INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb
Governor

Bruno Pigott
Commissioner

April 22, 2021

VIA ELECTRONIC MAIL

Mr. Brandon Miller, Environmental Control
United States Steel Corporation
One North Broadway
Gary, IN 46402

Dear Mr. Miller:

Re: NPDES Permit No. IN0000281
USS – Gary Works
Gary, IN – Lake County

Your application for a National Pollutant Discharge Elimination System (NPDES) permit for authorization to discharge into the waters of the State of Indiana has been processed in accordance with Section 402 and 405 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, et seq.), and IC 13-15, IDEM's permitting authority. All discharges from this facility shall be consistent with the terms and conditions of this permit.

One condition of your permit requires periodic reporting of several effluent parameters. You are required to submit both federal discharge monitoring reports (DMRs) and state Monthly Monitoring Reports (MMRs) on a routine basis. The MMR form can be found on IDEM's web site at http://www.in.gov/idem/cleanwater/2396.htm.

Once you are on this page, select the "IDEM Forms" page and locate the "Monthly Monitoring Report (MMR) for Industrial Discharge Permits-30530" under the Wastewater Facilities heading. We recommend selecting the "XLS" version because it will complete all of the calculations when you enter the data.

IDEM no longer accepts paper DMR or MMR. All NPDES permit holders are required to submit their monitoring data to IDEM using NetDMR. Please contact Rose McDaniel at (317) 233-2653 or Helen Demmings at (317) 232-8815 for more information on NetDMR. Information is also available on our website at http://IN.gov/idem/cleanwater/2422.htm.

Another condition, which needs to be clearly understood, concerns violation of the effluent limitations in the permit. Exceeding the limitations constitutes a violation of the permit and may subject the permittee to criminal or civil penalties. (See Part II A.2.) It is therefore urged that your office and treatment operator understand this part of the permit.

The draft NPDES permit for the facility was made available for public comment from January 29. 2021, through March 17, 2021, as part of Public Notice No. 20210129-IN0000281-RD on IDEM's website at https://www.in.gov/idem/6408.htm. A response to the comments received from the permittee, U.S.EPA, Tom Healy, Jennifer Dimitroff, the Izaak Walton League of America, the Alliance For The Great Lakes, the Environmental Law & Policy Center, Hoosier Environmental Council, National Parks Conservation Association, Save the Dunes, and the Sierra Club Hoosier Chapter pertaining to the draft NPDES permit is contained in the Post Public Notice Addendum. The Post Public Notice Addendum is located at the end of the Fact Sheet.

It should also be noted that any appeal must be filed under procedures outlined in IC 13-15-6, IC 4-21.5, and the enclosed Public Notice. The appeal must be initiated by filing a petition for administrative review with the Office of Environmental Adjudication (OEA) within fifteen (15) days of the emailing of an electronic copy of this letter or within eighteen (18) days of the mailing of this letter by filing at the following addresses:

Director
Office of Environmental Adjudication
Indiana Government Center North
Room N103
100 North Senate Avenue
Indianapolis, Indiana 46204

Commissioner
Indiana Department of Environmental Management
Indiana Government Center North
Room 1301
100 North Senate Avenue
Indianapolis, Indiana 46204

If you have any questions concerning the permit, please contact Richard Hamblin at 317/232-8696 or rhamblin@idem.in.gov. More information on the appeal review process is available at the website for the Office of Environmental Adjudication at http://www.in.gov/oea.

Sincerely,

Jerry Dittmer, Chief
Permits Branch
Office of Water Quality

Enclosures

cc: Chief, Permits Section, U.S. EPA, Region 5
Lake County Health Department
Eric Williams, USS
Nick Ream, IDEM Inspector
IDEM Northwest Regional Office
Joel Brammeier, Alliance for the Great Lakes
Jeffrey Hammons, Environmental Law & Policy Center
Indra Frank, Hoosier Environmental Council

Colin Deverell, National Parks Conservation Association
Natalie Johnson, Save the Dunes
Bowden Quinn, Sierra Club Hoosier Chapter
Jim Sweeney, Izaak Walton League of America
Gary Brown, Izaak Walton League of America
Jennifer Dimitroff, Citizen
Tom Healy, Citizen

STATE OF INDIANA

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq., the “Clean Water Act” or “CWA”), and IDEM’s authority under IC13-15,

UNITED STATES STEEL CORPORATION – GARY WORKS

is authorized to discharge from the integrated steel manufacturing facility that is located at One North Broadway, Gary, Indiana, to receiving waters identified as the Grand Calumet River and Lake Michigan in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III, IV, and V hereof. This permit may be revoked for the nonpayment of applicable fees in accordance with IC 13-18-20.

Effective Date: May 1, 2021

Expiration Date: April 30, 2026

In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit such information and forms as are required by the Indiana Department of Environmental Management no later than 180 days prior to the date of expiration.

Issued on _April 22, 2021_ for the Indiana Department of Environmental Management.

Jerry Dittmer, Chief
Permits Branch
Office of Water Quality

Table of Contents

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 501, located at Latitude 41˚ 36' 46.1", Longitude -87˚ 19' 19.8". The discharge is limited remediation groundwater, boiler feedwater pretreatment, freeze protection water, boiler blowdown and condensate, landfill leachate, truck wash water, miscellaneous clean up wastewaters, and storm water. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with other wastewaters. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [4][5]
Internal Outfall 501

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	Continuous
O+G	Report	Report	lbs/day	10.0	15.0	mg/l	2 X Weekly	3 Grabs/24 Hrs.[6]
TSS	Report	Report	lbs/day	30.0	60.0	mg/l	2 X Weekly	24 Hr. Comp.
Selenium[1]	Report	Report	lbs/day	Report	Report	ug/l	1 X Weekly	24 Hr. Comp.
Benzene	Report	Report	lbs/day	Report	Report	ug/l	3 X Monthly	3 Grabs/24 Hrs.[6]
Benzo-a-pyrene	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Phenols (4AAP)	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	3 Grabs/24 Hrs.[6]
Ammonia, as N	Report	Report	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
Free Cyanide[2]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	See Part I.N[6]
Lead[1]	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	24 Hr. Comp.
Zinc[1]	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	24 Hr. Comp.
$CBOD_5$	Report	Report	lbs/day	Report	Report	mg/l	1 X Weekly	24 Hr. Comp.

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	Report	Report	s.u.	1 X Weekly	Grab

[1] The permittee shall measure and report the identified metal as total recoverable metal.

[2] Free Cyanide shall be measured and reported as Available (Free) Cyanide. See Part I.N of this permit for additional requirements.

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] The permittee shall notify IDEM at least thirty (30) days prior to redirecting the wastewaters associated with Internal Outfall 607 to Internal Outfall 501.

[5] Organic solvents or non-biodegradable chemicals, soaps, and detergents as well as phosphates should only be managed in such a way that does not impact compliance with the final discharge limits.

[6] For the annotated parameters, a “3 Grabs/24 Hrs.” sample type means a minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

2. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 607, located at Latitude 41° 36’ 55.1”, Longitude -87° 19’ 0.1”. The discharge is limited to SWD-1 landfill leachate, and wastewater from the vacuum trucks and truck wash decant pad. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior comingling with other wastestreams. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [4][6]
Internal Outfall 607

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	24 Hour Total
O+G	Report	Report	lbs/day	10.0	15.0	mg/l	1 X Weekly	3 Grabs/24 Hrs.[7]
TSS	Report	Report	lbs/day	30.0	60.0	mg/l	1 X Weekly	24 Hr. Comp.
Benzo-a-pyrene	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[5]	24 Hr. Comp.
Phenols (4AAP)	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	3 Grabs/24 Hrs.[7]
Ammonia, as N	Report	Report	lbs/day	Report	Report	mg/l	1 X Weekly	24 Hr. Comp.
Free Cyanide[2]	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	See Part I.N[7]
Lead[1]	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	24 Hr. Comp.
Zinc[1]	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	24 Hr. Comp.
$CBOD_5$	Report	Report	lbs/day	Report	Report	mg/l	1 X Weekly	24 Hr. Comp.
Selenium[1]	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	24 Hr. Comp.

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	Report	Report	s.u.	1 X Weekly	Grab

[1] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[2] Cyanide shall be measured and reported as Available (Free) Cyanide. See Part I.N of this permit for additional requirements.

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] The permittee shall notify IDEM when the wastewaters associated with Internal Outfall 607 are directed to Internal Outfall 501.

[5] Samples shall be taken once at any time during each of the four annual quarters:

(A) January-February-March;
(B) April-May-June;
(C) July-August-September; and
(D) October-November-December.

For quarterly monitoring, in the first quarter for example, the permittee may conduct sampling within the month of January, February or March. The result from this reporting timeframe shall be reported on the March DMR, regardless of which of the months within the quarter the sample was taken.

[6] Organic solvents or non-biodegradable chemicals, soaps, and detergents as well as phosphates should only be managed in such a way that does not impact compliance with the final discharge limits.

[7] For the annotated parameters, a “3 Grabs/24 Hrs.” sample type means a minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

3. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 015, located at Latitude 41° 36’ 27.4”, Longitude -87° 19’ 19.6”. The discharge is limited to Sinter Plant non-contact cooling water, Pulverized Coal Injection (PCI) East non-contact cooling water, steam condensate, storm water runoff (drainage area #9), Internal Outfall 607 and Internal Outfall 501 treated wastewaters. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

<u>DISCHARGE LIMITATIONS</u> [1][2][18]

Outfall 015

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	24 Hour Total
O+G[4]	--------	---------	-------	Report	Report	mg/l	1 X Weekly	3 Grabs/24 Hrs.[19]
TSS	Report	Report	lbs/day	Report	Report	mg/l	1 X Weekly	24 Hr. Comp.
Benzo-a-pyrene	0.0017	0.0040	lbs/day	0.095	0.23	ug/l	2 X Weekly	24 Hr. Comp.
Phenols (4AAP)	Report	Report	lbs/day	Report	Report	ug/l	1 X Weekly	3 Grabs/24 Hrs.[19]
Ammonia, as N[13]								
Summer	21	40	lbs/day	1.2	2.5	mg/l	1 X Weekly	24 Hr. Comp.
Winter	23	44	lbs/day	1.3	2.5	mg/l	1 X Weekly	24 Hr. Comp.
Free Cyanide[5]								
Season 1[17]	0.15	0.32	lbs/day	8.8	18	ug/l	1 X Weekly	See Part I.N[19]
Season 2[17]	0.12	0.23	lbs/day	6.7	13	ug/l	1 X Weekly	See Part I.N[19]
Lead[6]	0.15	0.30	lbs/day	8.4	17	ug/l	1 X Weekly	24 Hr. Comp.
Zinc[6]	1.4	2.8	lbs/day	81	160	ug/l	1 X Weekly	24 Hr. Comp.
$CBOD_5$	Report	Report	lbs/day	Report	Report	mg/l	1 X Weekly	24 Hr. Comp.
Temperature[7]	---------	--------	---------	--------	Report	^{O}F	1 X Weekly	6 Grabs/24 Hrs.
TRC[12]	0.14	0.32[10]	lbs/day	8[8]	18[9]	ug/l	Daily[11]	Grab
Mercury[6][16]								
WQBELs	0.000023	0.000056	lbs/day	1.3	3.2	ng/l	Bi-Monthly[14]	Grab
Interim Discharge Limit		--------	--------	14[15]	Report	ng/l	Bi-Monthly[14]	Grab
Selenium[6]	0.072	0.14	lbs/day	4.1	8.2	ug/l	1 X Weekly	24 Hr. Comp.
Whole Effluent Toxicity		See Part I.I of this Permit						

Table 2

	Quality or Concentration			Monitoring Requirements	
Parameter	Daily Minimum	Daily Maximum	Units	Measurement Frequency	Sample Type
pH [3]	6.0	9.0	s.u.	1 X Weekly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] Cyanide shall be monitored and reported as Available (Free) Cyanide. See Part I.N for additional requirements.

[6] The permittee shall measure and report the identified metal as total recoverable metal.

[7] See Part III.A for additional temperature requirements. Temperature monitoring at the following individual outfalls [015, 018, 019, 020, 028, 030, and 034] shall be taken on the same day of the week. Where temperature is sampled at 6 grabs/day, the samples shall be equally spaced throughout the day. The highest temperature value measured shall be the value reported for that day.

[8] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[9] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[10] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 1.1 lbs/day.

[11] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[12] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[13] Summer limitations apply from July 1 through September 30. Winter limitations apply from October 1 through June 30.

[14] Effluent mercury monitoring shall be conducted 6 X annually, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

[15] See Part I.O and Part V for additional mercury requirements. The interim discharge limit is the annual average. Compliance with the interim discharge limit will be achieved when the annual average measured over the most recent (rolling) twelve-month period is less than the interim discharge limit.

Compliance with the interim discharge limit will demonstrate compliance with mercury discharge limitations of this permit for this outfall.

[16] The permittee applied for, and received, a variance from the water quality criterion used to establish the referenced mercury WQBEL under 327 IAC 5-3.5. For the term of this permit, the permittee is subject to the interim discharge limit developed in accordance with 327 IAC 5-3.5-8.

<u>The permittee shall report both a daily maximum concentration and an annual average concentration for total mercury.</u> The annual average value shall be calculated as the average of the measured effluent daily values from the most recent twelve-month period. Reporting of the annual average value for mercury is not required during the first year of the permit term.

Calculating and reporting of the annual average value for mercury is only required for the months when samples are taken for mercury.

[17] Season 1 (“salmonids absent”) limitations apply April 1 – September 30 of each year. Season 2 (“salmonids present”) limitations apply October 1 – March 31 of each year. These seasons are based on times when salmonids occur at the site.

[18] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[19] For the annotated parameters, a “3 Grabs/24 Hrs.” sample type means a minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

4. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 018, located at Latitude 41° 36’ 27.4”, Longitude -87° 19’ 42.2”. The discharge is limited PCI West non-contact cooling water, South End Blast Furnace non-contact cooling water, No. 4 Electric Power Station non-contact cooling water, Fab Shop steam condensates and air conditioner non-contact cooling water, storm water (drainage area #13), and if flow through Outfall 019 is restricted, Outfall 019 waters have the potential to discharge via Outfall 018. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][15]
Outfall 018

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	24 Hour Total
O+G[4]	--------	---------	-------	Report	Report	mg/l	1 X Weekly	Grab
TSS	Report	Report	lbs/day	Report	Report	mg/l	2 X Monthly	24 Hr. Comp.
Phenols (4AAP)	Report	Report	lbs/day	Report	Report	ug/l	2 X Monthly	3 Grabs/24 Hrs[16]
Ammonia, as N	Report	Report	lbs/day	Report	Report	mg/l	2 X Monthly	24 Hr. Comp.
Temperature[6]	---------	--------	-------	--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC[11]	4.1	9.1[9]	lbs/day	8[7]	18[8]	ug/l	Daily[10]	Grab
Mercury[5][14]								
WQBELs	0.00066	0.0016	lbs/day	1.3	3.2	ng/l	Bi-Monthly[12]	Grab
Interim Discharge Limit		--------	--------	2.8[13]	Report	ng/l	Bi-Monthly[12]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Weekly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[6] See Part III.A for additional temperature requirements. Temperature monitoring at the following individual outfalls [015, 018, 019, 020, 028, 030, and 034] shall be taken on the same day of the week. Where temperature is sampled at 6 grabs/day, the samples shall be equally spaced throughout the day. The highest temperature value measured shall be the value reported for that day.

[7] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[8] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[9] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 30.4 lbs/day.

[10] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[11] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[12] Effluent mercury monitoring shall be conducted 6 X annually, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

[13] See Part I.O and Part V for additional mercury requirements. The interim discharge limit is the annual average. Compliance with the interim discharge limit will be achieved when the annual average measured over the most recent (rolling) twelve-month period is less than the interim discharge limit.

Compliance with the interim discharge limit will demonstrate compliance with mercury discharge limitations of this permit for this outfall.

[14] The permittee applied for, and received, a variance from the water quality criterion used to establish the referenced mercury WQBEL under 327 IAC 5-3.5. For the term of this permit, the permittee is subject to the interim discharge limit developed in accordance with 327 IAC 5-3.5-8.

The permittee shall report both a daily maximum concentration and an annual average concentration for total mercury. The annual average value shall be calculated as the average of the measured effluent daily values from the most recent twelve-month period. Reporting of the annual average value for mercury is not required during the first year of the permit term.

Calculating and reporting of the annual average value for mercury is only required for the months when samples are taken for mercury.

[15] The storm water non-numeric limits, storm water pollution prevention plan , and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[16] A minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

5. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 019, located at Latitude 41° 36’ 27.7”, Longitude -87° 19’ 51.2”. The discharge is limited to Blast Furnace No. 14 non-contact cooling water, No. 2 QBOP miscellaneous non-contact cooling water, No. 1 Electric Power Station non-contact cooling water, No. 4 Boiler House car wash, Central Water Treatment Plant wastewaters (brine regenerant, ultrafiltration backwash, RO concentrate, softener backwash and regenerant), Turboblower Boiler House boiler blowdown and condensates, No. 4 Boiler House blowdown, No. 5 Electric Power Cooling Station condensates and non-contact cooling water, No. 4 Boiler House condensate, Turboblower Boiler House condensate and Turboblower Condenser non-contact cooling water, Iron Producing AST Tar Tank condensate, Blast Furnace No. 8 non-contact cooling water, and storm water (drainage area #14). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][14][15]
Outfall 019

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	24 Hour Total
O+G[4]	--------	---------	-------	Report	Report	mg/l	1 X Weekly	Grab
Phenols (4AAP)	Report	Report	lbs/day	Report	Report	ug/l	1 X Monthly	3 Grabs/24 Hrs[16]
Ammonia, as N	Report	Report	lbs/day	Report	Report	mg/l	2 X Monthly	24 Hr. Comp.
Temperature[5]	---------	--------		--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC[10]	4.9	11[8]	lbs/day	8[6]	18[7]	ug/l	Daily[9]	Grab
Mercury[17][13]								
WQBELs	0.00080	0.0020	lbs/day	1.3	3.2	ng/l	Bi-Monthly[11]	Grab
Interim Discharge Limit		--------	--------	2.3[12]	Report	ng/l	Bi-Monthly[11]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Weekly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] See Part III.A for additional temperature requirements. Temperature monitoring at the following individual outfalls [015, 018, 019, 020, 028, 030, and 034] shall be taken on the same day of the week. Where temperature is sampled at 6 grabs/day, the samples shall be equally spaced throughout the day. The highest temperature value measured shall be the value reported for that day.

[6] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[7] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[8] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 36.8 lbs/day.

[9] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[10] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[11] Effluent mercury monitoring shall be conducted 6 X annually, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

[12] See Part I.O and Part V for additional mercury requirements. The interim discharge limit is the annual average. Compliance with the interim discharge limit will be achieved when the annual average measured over the most recent (rolling) twelve-month period is less than the interim discharge limit.

Compliance with the interim discharge limit will demonstrate compliance with mercury discharge limitations of this permit for this outfall.

[13] The permittee applied for, and received, a variance from the water quality criterion used to establish the referenced mercury WQBEL under 327 IAC 5-3.5. For the term of this permit, the permittee is subject to the interim discharge limit developed in accordance with 327 IAC 5-3.5-8.

The permittee shall report both a daily maximum concentration and an annual average concentration for total mercury. The annual average value shall be calculated as the average of the measured effluent daily values from the most recent twelve-month period. Reporting of the annual average value for mercury is not required during the first year of the permit term.

Calculating and reporting of the annual average value for mercury is only required for the months when samples are taken for mercury.

[14] The storm water non-numeric limits, storm water pollution prevention plan , and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[15] Organic solvents or non-biodegradable chemicals, soaps, and detergents as well as phosphates should only be managed in such a way that does not impact compliance with the final discharge limits.

[16] A minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

[17] The permittee shall measure and report the identified metal as total recoverable metal.

6. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 020, located at Latitude 41° 36' 27.7", Longitude -87° 20' 0.2". The discharge is limited to No. 1 BOP Hood System non-contact cooling water, No. 1 BOP Continuous Caster non-contact cooling water, steam condensates (No. 1 BOP and No. 1 Continuous Caster), and storm water (drainage area #15). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][15][16]
Outfall 020

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	Continuous
O+G[4]	--------	---------	-------	Report	Report	mg/l	1 X Weekly	Grab
Temperature[6]	---------	--------		--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC[11]	3.2	7.1[9]	lbs/day	8[7]	18[8]	ug/l	Daily[10]	Grab
Mercury[5][14]								
WQBELs	0.00052	0.0013	lbs/day	1.3	3.2	ng/l	Bi-Monthly[12]	Grab
Interim Discharge Limit		--------	--------	2.2[13]	Report	ng/l	Bi-Monthly[12]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Weekly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[6] See Part III.A for additional temperature requirements. Temperature monitoring at the following individual outfalls [015, 018, 019, 020, 028, 030, and 034] shall be taken on the same day of the week. Where temperature is sampled at 6 grabs/day, the samples shall be equally spaced throughout the day. The highest temperature value measured shall be the value reported for that day.

[7] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[8] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[9] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 23.8 lbs/day.

[10] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[11] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[12] Effluent mercury monitoring shall be conducted 6 X annually, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

[13] See Part I.O and Part V for additional mercury requirements. The interim discharge limit is the annual average. Compliance with the interim discharge limit will be achieved when the annual average measured over the most recent (rolling) twelve-month period is less than the interim discharge limit.

Compliance with the interim discharge limit will demonstrate compliance with mercury discharge limitations of this permit for this outfall.

[14] The permittee applied for, and received, a variance from the water quality criterion used to establish the referenced mercury WQBEL under 327 IAC 5-3.5. For the term of this permit, the permittee is subject to the interim discharge limit developed in accordance with 327 IAC 5-3.5-8.

The permittee shall report both a daily maximum concentration and an annual average concentration for total mercury. The annual average value shall be calculated as the average of the measured effluent daily values from the most recent twelve-month period. Reporting of the annual average value for mercury is not required during the first year of the permit term.

Calculating and reporting of the annual average value for mercury is only required for the months when samples are taken for mercury.

[15] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[16] There shall be no discharge of any process wastewaters from Outfall 020.

7. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 021, located at Latitude 41˚ 36’ 28.1”, Longitude -87˚ 20’ 1.7”. The discharge is limited to No. 1 BOP Shop Cooling/Air Compressor non-contact cooling water, Steel Producing Area Air Conditioning condensates, Steel Producing Area steam condensates, and storm water (drainage area #16). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][10][11]
Outfall 021

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	1 X Monthly	Estimate
O+G[4]	---------	---------	------	Report	Report	mg/l	1 X Monthly	Grab
TRC[9]	0.040	0.090[7]	lbs/day	8[5]	18[6]	ug/l	Daily[8]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[6] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[7] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 0.3 lbs/day.

[8] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[9] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[10] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[11] There shall be no discharge of any process wastewaters from Outfall 021.

8. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 023, located at Latitude 41˚ 36’ 27.4”, Longitude -87˚ 20’ 7.1”. The discharge is limited to Hospital Building air conditioning non-contact cooling water, Hospital Building condensates, and storm water (drainage area #17). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][5][6][7]
Outfall 023 (Inactive)

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	-------	--------	------	1 X Monthly	Estimate
O+G[4]	---------	--------	------	-------	Report	mg/l	1 X Monthly	Grab
Ammonia, as N	Report	Report	lbs/day	Report	Report	mg/l	2 X Monthly	24 Hr. Comp.

Table 2

	Quality or Concentration			Monitoring Requirements	
Parameter	Daily Minimum	Daily Maximum	Units	Measurement Frequency	Sample Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[6] There shall be no discharge of any process wastewaters from Outfall 023.

[7] The permittee shall notify the Office of Water Quality at least 30 days prior to re-activation of this outfall, or as soon as possible after becoming aware of plans to re-activate this outfall.

9. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 026, located at Latitude 41° 36' 27.7", Longitude -87° 20' 15.7". The discharge is limited to Pass Control Area air conditioning non-contact cooling water, Pass Control Area steam condensates, and storm water (drainage area #18). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][5][6][7]
Outfall 026 (Inactive)

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	-------	--------	------	1 X Monthly	Estimate
O+G[4]	---------	--------	------	-------	Report	mg/l	1 X Monthly	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[6] There shall be no discharge of any process wastewaters from Outfall 026.

[7] The permittee shall notify the Office of Water Quality at least 30 days prior to re-activation of this outfall, or as soon as possible after becoming aware of plans to re-activate this outfall.

10. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 603, an administrative outfall, to Outfall 028/030. The discharge is limited to treated wastewater from the Slab Spray cooling, QBOP Vacuum Degasser overflow, #1 BOP, Vacuum Degasser, QBOP, #2 Continuous Caster A/B Line, C Line, #1 Continuous Caster Line, and stormwater. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with other wastewaters. Such discharge shall be limited and monitored by the permittee as specified below:

<u>DISCHARGE LIMITATIONS</u> [1]
Internal Outfall 603

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	---------	-----	Daily	Continuous
Lead[2]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly[3]	24 Hr. Comp.
Zinc[2]	9.81	29.4	lbs/day	Report	Report	ug/l	2 X Weekly[3]	24 Hr. Comp.

[1] Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to entry into Outfalls 028/030. Separate samples and flow measurements shall be taken at the discharge of the No. 1 Continuous Caster Scale Pit, the filtered blowdown from the No. 2 Continuous Caster, and the discharge from the No. 1 and No. 1A BOP Thickeners. The mass loadings from each monitoring point shall be calculated and added together to determine the daily and monthly average mass discharges.

[2] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[3] Sampling at Internal Outfall 603 for lead and zinc shall occur on the same day and at approximately at the same time as the sample taken at Outfalls 028 and 030.

11. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfalls 028/030 (Outfall 600), located at Latitude 41° 36’ 34.6”, Longitude -87° 20’ 26.9” and Latitude 41° 36’ 36”, Longitude -87° 20’ 46”, respectively. The discharge is limited to treated wastewater from #2 Continuous Caster non-contact cooling water, miscellaneous non-contact cooling water, #1 BOP/QBOP Cooling Tower blowdown, steam condensates, 160”/210” Plate Mill Scale Pit, Internal Outfall 603 wastewaters, and storm water from areas east of Buchanan Street. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][3][16][17]
Outfalls 028/030 (Outfall 600)

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	Continuous
TSS	1,667	4,825	lbs/day	Report	Report	mg/l	5 X Weekly	24 Hr. Comp.
O+G[5]	1,274	2,807	lbs/day	Report	Report	mg/l	5 X Weekly	3 Grabs/24 Hrs.
Lead[6]	4.5	10	lbs/day	19	43	ug/l	2 X Weekly	24 Hr. Comp.
Zinc[6]	38	75	lbs/day	160	320	ug/l	1 X Weekly	24 Hr. Comp.
Temperature[7]	---------	-------	-------	--------	Report	^{O}F	2 X Weekly	6 Grabs/24 Hrs.
TRC[12]	1.9	4.2[10]	lbs/day	8[8]	18[9]	ug/l	Daily[11]	Grab
Mercury[6][15]								
WQBELs	0.00031	0.00075	lbs/day	1.3	3.2	ng/l	Bi-Monthly[13]	Grab
Interim Discharge Limit		--------	--------	[14]	Report	ng/l	Bi-Monthly[13]	Grab
Whole Effluent Toxicity		See Part I.I of this Permit						

Table 2

	Quality or Concentration			Monitoring Requirements	
Parameter	Daily Minimum	Daily Maximum	Units	Measurement Frequency	Sample Type
pH [4]	6.0	9.0	s.u.	1 X Weekly	Grab

[1] The permittee shall measure for all parameters on the same day and at the same time for Outfalls 028 and 030 and report Outfalls 028 and 030 separately and also report the combined total (as Outfall 600). Sampling for lead and zinc shall occur on the same day and at approximately at the same time as the sample taken at Internal Outfall 603.

[2] See Part I.B. of the permit for the Minimum Narrative Limitations.

[3] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[4] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[5] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program.

[6] The permittee shall measure and report the identified metal as total recoverable metal.

[7] See Part III.A for additional temperature requirements. Temperature monitoring at the following individual outfalls [015, 018, 019, 020, 028, 030, and 034] shall be taken on the same day of the week. Where temperature is sampled at 6 grabs/day, the samples shall be equally spaced throughout the day. The highest temperature value measured shall be the value reported for that day.

[8] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[9] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[10] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 14.1 lbs/day.

[11] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[12] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[13] Effluent mercury monitoring shall be conducted 6 X annually, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

[14] See Part I.O and Part V for additional mercury requirements. The interim discharge limit is the annual average. Compliance with the interim discharge limit will be achieved when the annual average measured over the most recent (rolling) twelve-month period is less than the interim discharge limit.

Compliance with the interim discharge limit will demonstrate compliance with mercury discharge limitations of this permit for this outfall.

Outfall 028: The interim discharge limit is the Annual Average as 3.2 ng/l
Outfall 030: The interim discharge limit is the Annual Average as 3.0 ng/l

[15] The permittee applied for, and received, a variance from the water quality criterion used to establish the referenced mercury WQBEL under 327 IAC 5-3.5. For the term of this permit, the permittee is subject to the interim discharge limit developed in accordance with 327 IAC 5-3.5-8.

<u>The permittee shall report both a daily maximum concentration and an annual average concentration for total mercury.</u> The annual average value shall be calculated as the average of the measured effluent daily values from the most recent twelve-month period. Reporting of the annual average value for mercury is not required during the first year of the permit term.

Calculating and reporting of the annual average value for mercury is only required for the months when samples are taken for mercury.

[16] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[17] GW 10, a lift station associated with the Outfall 028/030 sewer system, is equipped with an emergency bypass. Discharge from the emergency bypass is not authorized by this permit. Should discharge from the GW10 bypass point occur, the permittee shall:

a. report the occurrence as a bypass, adhering to the reporting requirements and timeframes contained in Part II.B of this permit;
b. sample the discharge for all parameters listed in the discharge limitations table for Outfall 028/030 (600), using approved analytical methods ; and

12. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 032, located at Latitude 41° 36' 34.6", Longitude -87° 20' 51.4", into the Grand Calumet River. The discharge is limited to QA Lab Coolers non-contact cooling water, non-contact cooling waters from the Steel Producing Storage Building and Brandenburg Complex, steam condensate, storm water (drainage area #20), and freeze protection water. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with the Corrective Action Management Unit (CAMU) Wastewater Treatment Plant wastewaters. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][10]
Outfall 032

Table 1

Parameter	Quantity or Loading Monthly Average	Quantity or Loading Daily Maximum	Units	Quality or Concentration Monthly Average	Quality or Concentration Daily Maximum	Units	Monitoring Requirements Measurement Frequency	Monitoring Requirements Sample Type
Flow	Report	Report	MGD	---------	----------	-------	1 X Monthly	Estimate
O+G[4]	---------	---------	------	--------	Report	mg/l	1 X Monthly	Grab
TRC[9]	0.020	0.045[7]	lbs/day	8[5]	18[6]	ug/l	Daily[8]	Grab

Table 2

Parameter	Quality or Concentration Daily Minimum	Quality or Concentration Daily Maximum	Units	Monitoring Requirements Measurement Frequency	Monitoring Requirements Sample Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[6] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[7] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 0.15 lbs/day.

[8] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[9] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[10] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

13. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 033, located at Latitude 41˚ 36' 26", Longitude -87˚ 21' 11". The discharge is limited to Sheet and Tin Mill non-contact cooling waters, Atmospheric Gas Plant non-contact cooling water, steam condensates, and storm water (drainage area #21). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][10][11]
Outfall 033

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-------	1 X Monthly	Estimate
O+G[4]	---------	---------	------	--------	Report	mg/l	1 X Monthly	Grab
TRC[9]	0.013	0.030[7]	lbs/day	8[5]	18[6]	ug/l	Daily[8]	Grab
Phenols(4AAP)	---------	Report	lbs/day	---------	Report	ug/l	1 X Monthly	3 Grabs/24 Hrs.[12]

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[6] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[7] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 0.1 lbs/day.

[8] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[9] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[10] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[11] There shall be no discharge of process wastewaters through Outfall 033.

[12] A minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

14. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 604, located at Latitude 41° 34.7' 35", Longitude -87° 22' 23.5", to Outfall 034. The discharge is limited to treated process wastewater from the 84" Hot Strip Mill, 84" and 80" Pickle Lines, North and South Sheet Mills and Tin Mills, Demineralization Plant filter backwash and regenerant, EGL and 84" Hot Strip Mill basement water, 84" Hot Strip Mill boiler feed water softener blowdown, and storm water from areas west of Buchanan Street. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with other wastewaters before discharging via Outfall 034. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2]
Internal Outfall 604

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	--------	-----------	------	Daily	Continuous
TSS	Report	Report	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
O+G	Report	Report	lbs/day	Report	Report	mg/l	5 X Weekly	3 Grabs/24 Hrs.
Total Recoverable Chromium[4]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Zinc[4]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Lead[4]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Total Cyanide[3]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[7]	See Part I.N
Cadmium[4]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[7]	24 Hr. Comp.
Hexavalent Chromium[6]	Report[8]	Report	lbs/day	Report	Report	ug/l	[9]	Grab
Copper[4]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Nickel[4]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[7]	24 Hr. Comp.
Silver[4]	Report	Report	lbs/day	Report	Report	ug/l	2 X Monthly	24 Hr. Comp.
Iron[4]	Report	Report	lbs/day	Report	Report	ug/l	1 X Weekly[10]	24 Hr. Comp.
TTO[5]	---------	Report	lbs/day	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.
Naphthalene	---------	Report	lbs/day	---------	Report	ug/l	2 X Weekly	24 Hr. Comp.
Tetrachloro-ethylene	----------	Report	lbs/day	---------	Report	ug/l	2 X Weekly	2 Grabs/24 Hr.

[1] Bypasses of process wastewaters from the above sources around the Terminal Treatment Plant are permitted only in accordance with Part II.B.2 of this permit. The permittee shall not use cyanide plating solutions in any metal finishing operations, unless expressly authorized by a modification of this permit.

[2] Samples taken in accordance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to commingling with any other wastewaters. The permittee shall monitor Outfalls 034, 604, 605, 606, and 608 on the same days.

[3] Cyanide shall be measured and reported as Total Cyanide. See Part I.N for additional requirements.

[4] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[5] The limitation for TTO (Total Toxic Organics) applies to the summation of all quantifiable values greater than 0.01 mg/l for all toxic organics listed under 40 CFR 433.11(e) which are reasonably expected to be present. This is a federal effluent guideline based limitation and is not an authorization to discharge toxic organic compounds at levels which cause or may cause water quality violations. The discharge of organic compounds at levels which cause or may cause water quality violations is prohibited. The intent of this limitation is to assure that any solvent or other products in use at the plant, which contain any of the listed toxic organic compounds, are disposed of properly, and not dumped, spilled, discharged or leaked.

<u>Certification Statement</u>
In lieu of monthly monitoring for TTO, the party responsible for signing the monthly discharge monitoring report (DMR) forms may make the following statement, as part of the DMR: "Based on my inquiry of the persons directly responsible for managing compliance with the permit limitations for TTO, I certify that, to the best of my knowledge and belief, no disposal of concentrated toxic organics into the wastewaters has occurred since filing of the last discharge monitoring report. I further certify that this facility is implementing the Toxic Organic Pollutant Management Plan submitted to the Compliance Data Section of the Office of Water Quality, as required by this permit." The Certification Statement <u>may not</u> be used until completion of the Toxic Organic Pollutant Management Plan required by Part I.J of this permit.

If the above mentioned responsible party is unable to make the above Certification Statement because of discharge or spills of any TTO compounds, the Permittee is required to notify IDEM in accordance with Part II.C.3 of this permit.

[6] Hexavalent chromium shall be measured and reported as dissolved metal. The hexavalent chromium sample type shall be by grab method. The maximum holding time for a hexavalent chromium sample is 28 days under 40 CFR 136.3(e), Table II. However, as noted in footnote 20 of Table II, to achieve the 28-day holding time, the ammonium sulfate buffer solution specified in EPA Method 218.6 must be used. This holding time allowance of 28-days supersedes the preservation and holding time requirements in the approved hexavalent chromium methods, unless this supersession would compromise the measurement, in which case the preservation and holding time requirements [the sample must be analyzed within 24 hours of collection] in the method must be followed.

[7] Samples shall be taken once at any time during each of the four annual quarters:

(A) January-February-March;
(B) April-May-June;
(C) July-August-September; and
(D) October-November-December.

For quarterly monitoring, in the first quarter for example, the permittee may conduct sampling within the month of January, February or March. The result from this reporting timeframe shall be reported on the March DMR, regardless of which of the months within the quarter the sample was taken.

[8] For purposes of calculating the monthly average mass loading reported on the DMR forms, concentration values below the limit of quantitation (LOQ) of 0.94 ug/l may be assigned a value of zero (0) for purposes of calculating the monthly average mass value.

[9] Monitoring requirements are temporarily suspended for as long as both the No. 6 and No. 8 Galvanizing Lines and their associated Fume Scrubbers are idled. In the event that one or both are brought back online, the monitoring will resume at a minimum frequency of 1 X Weekly. The permittee shall give IDEM a minimum of thirty (30) days notice prior to bringing either line back into operation.

[10] Sampling only required during periods of dewatering the EGL building.

15. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 605, located at Latitude 41° 37’ 40.1”, Longitude -87° 22’ 10.6”, to Outfall 034. The discharge is limited to treated 84” Hot Strip Mill process wastewater, boiler blowdown, filter backwash, and condensates. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with other wastewaters. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2]
Internal Outfall 605

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	---------	-----------	------	Daily	24 Hour Total
TSS	725	2,175	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
O+G	Report	1,450	lbs/day	Report	Report	mg/l	5 X Weekly	3 Grabs/24 Hrs.

[1] The permittee may discharge process wastewater from the 84” Hot Strip Mill only through Internal Outfall 605, and basement sump waters through Internal Outfall 604 (Terminal Treatment Plant). Non-contact cooling water from the 84” Hot Strip Mill shall only be discharged through Outfall 039.

[2] The permittee shall monitor Outfalls 034, 604, 605, 606, and 608 on the same days.

16. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 606, located at Latitude 41° 37' 29.3", Longitude -87° 22' 9.5", to Outfall 034. The discharge is limited to Sheet and Tin Mill non-contact cooling waters and steam condensate, Temper Mill non-contact cooling water, 5-Stand Cold Reduction Mill non-contact cooling water, Annealing non-contact cooling water, No. 6 Galvanizing Line non-contact cooling water, Waste Acid Recycling Facility non-contact cooling water, Old S and T Pump Stations and 48" Lift Station non-contact cooling waters, Internal Outfall 608 treated wastewaters, and storm water from a portion of Drainage Area #22. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with other wastewaters. Such discharge shall be limited and monitored by the permittee as specified below:

<u>DISCHARGE LIMITATIONS</u> [1][2][3]
Internal Outfall 606

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	------	Daily	24 Hour Total
O+G	---------	---------	-------	---------	Report	mg/l	1 X Weekly	Grab
Total Recoverable Chromium	----------	---------	-------	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.
Zinc[4]	--------	---------	-------	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.
Lead[4]	--------	---------	-------	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.
Phenols(4AAP)	--------	---------	-------	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.

[1] The permittee may discharge non-process wastewaters associated with steel finishing operations via the 84" X 91" sewer to the final oil skimming basin at Outfall 034 for treatment prior to discharge through Outfall 034.

[2] The permittee shall monitor Outfalls 034, 604, 605, 606, and 608 on the same days.

[3] Corrective action will be initiated after an investigation of any reported discharges of process wastewaters discharging from Outfall 606.

[4] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

17. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 608, located at Latitude 41° 37' 17.9", Longitude -87° 22' 1.99", through Internal Outfall 606 to Outfall 034. The discharge is limited to treated process wastewater from the Chrome Wastewater Treatment Plant. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to comingling with any other wastewaters. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2]
Internal Outfall 608

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	--------	-----------	------	Daily	Continuous
TSS	Report	Report	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
O+G	Report	Report	lbs/day	Report	Report	mg/l	5 X Weekly	3 Grabs/24 Hrs.
Total Recoverable Chromium[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Zinc[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Lead[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Total Cyanide[2]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[6]	See Part I.N
Cadmium[3]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[6]	24 Hr. Comp.
Hexavalent Chromium[5]	Report[7]	Report	lbs/day	Report	Report	ug/l	[8]	Grab
Copper[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Nickel[3]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[6]	24 Hr. Comp.
Silver[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Monthly	24 Hr. Comp.
TTO[4]	---------	Report	lbs/day	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.
Naphthalene	---------	Report	lbs/day	---------	Report	ug/l	2 X Weekly	24 Hr. Comp.
Tetrachloro-ethylene	---------	Report	lbs/day	---------	Report	ug/l	2 X Weekly	2 Grabs/24 Hr.

[1] Samples taken in accordance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to entry into Outfall 034. The permittee shall monitor Outfalls 034, 604, 605, 606, and 608 on the same days.

[2] Cyanide shall be measured and reported as Total Cyanide. See Part I.N for additional requirements.

[3] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[4] The limitation for TTO (Total Toxic Organics) applies to the summation of all quantifiable values greater than 0.01 mg/l for all toxic organics listed under 40 CFR 433.11(e) which are reasonably expected to be present. This is a federal effluent guideline based limitation and is not an authorization to discharge toxic organic compounds at levels which cause or may cause water quality violations. The discharge of organic compounds at levels which cause or may cause water quality violations is prohibited. The intent of this limitation is to assure that any solvent or other products in use at the plant, which contain any of the listed toxic organic compounds, are disposed of properly, and not dumped, spilled, discharged or leaked.

Certification Statement

In lieu of monthly monitoring for TTO, the party responsible for signing the monthly discharge monitoring report (DMR) forms may make the following statement, as part of the DMR: "Based on my inquiry of the persons directly responsible for managing compliance with the permit limitations for TTO, I certify that, to the best of my knowledge and belief, no disposal of concentrated toxic organics into the wastewaters has occurred since filing of the last discharge monitoring report. I further certify that this facility is implementing the Toxic Organic Pollutant Management Plan submitted to the Compliance Data Section of the Office of Water Quality, as required by this permit." The Certification Statement may not be used until completion of the Toxic Organic Pollutant Management Plan required by Part I.J of this permit.

If the above mentioned responsible party is unable to make the above Certification Statement because of discharge or spills of any TTO compounds, the Permittee is required to notify IDEM in accordance with Part II.C.3 of this permit.

[5] Hexavalent chromium shall be measured and reported as dissolved metal. The hexavalent chromium sample type shall be by grab method. The maximum holding time for a hexavalent chromium sample is 28 days under 40 CFR 136.3(e), Table II. However, as noted in footnote 20 of Table II, to achieve the 28-day holding time, the ammonium sulfate buffer solution specified in EPA Method 218.6 must be used. This holding time allowance of 28-days supersedes the preservation and holding time requirements in the approved hexavalent chromium methods, unless this supersession would compromise the measurement, in which case the preservation and holding time requirements [the sample must be analyzed within 24 hours of collection] in the method must be followed.

[6] Samples shall be taken once at any time during each of the four annual quarters:

(A) January-February-March;
(B) April-May-June;
(C) July-August-September; and
(D) October-November-December.

For quarterly monitoring, in the first quarter for example, the permittee may conduct sampling within the month of January, February or March. The result from this reporting timeframe shall be reported on the March DMR, regardless of which of the months within the quarter the sample was taken.

[7] For purposes of calculating the monthly average mass loading reported on the DMR forms, concentration values below the limit of quantitation (LOQ) of 0.94 ug/l may be assigned a value of zero (0) for purposes of calculating the monthly average mass value.

[8] Monitoring requirements are temporarily suspended for as long as both the No. 6 and No. 8 Galvanizing Lines and their associated Fume Scrubbers are idled. In the event that one or both are brought back online, the monitoring will resume at a minimum frequency of 1 X Weekly. The permittee shall give IDEM a minimum of thirty (30) days notice prior to bringing either line back into operation.

18. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Internal Outfall 609 to Outfall 034. The discharge is limited to the treated wastewaters from Internal Outfall 604 and 608. Samples taken in compliance with the monitoring requirements below shall be taken at Internal Outfalls 604 and 608 with the combined total limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1]

Internal Outfall 609

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	--------	-----------	------	Daily	Continuous
TSS	1,685	3,745	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
O+G	Report	Report	lbs/day	Report	Report	mg/l	5 X Weekly	3 Grabs/24 Hrs.
Total Recoverable								
Chromium[3]	22.5	36.5	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Zinc[3]	24.8	49.7	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Lead[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Total Cyanide[2]	8.5	15.8	lbs/day	Report	Report	ug/l	1 X Quarterly[6]	See Part I.N
Cadmium[3]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[6]	24 Hr. Comp.
Hexavalent								
Chromium[5]	0.15[7]	0.45	lbs/day	Report	Report	ug/l	[8]	Grab
Copper[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Nickel[3]	31.4	52.3	lbs/day	Report	Report	ug/l	1 X Quarterly[6]	24 Hr. Comp.
Silver[3]	Report	Report	lbs/day	Report	Report	ug/l	2 X Monthly	24 Hr. Comp.
TTO[4]	--------	28.0	lbs/day	---------	Report	ug/l	1 X Monthly	24 Hr. Comp.
Naphthalene	--------	0.789	lbs/day	---------	Report	ug/l	2 X Weekly	24 Hr. Comp.
Tetrachloro-								
ethylene	--------	1.18	lbs/day	---------	Report	ug/l	2 X Weekly	2 Grabs/24 Hrs.

[1] The permittee shall monitor Outfalls 034, 604, 605, 606, and 608 on the same days.

[2] Cyanide shall be measured and reported as Total Cyanide. See Part I.N for additional requirements.

[3] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[4] The limitation for TTO (Total Toxic Organics) applies to the summation of all quantifiable values greater than 0.01 mg/l for all toxic organics listed under 40 CFR 433.11(e) which are reasonably expected to be present. This is a federal effluent guideline based limitation and is not an authorization to discharge toxic organic compounds at levels which cause or may cause water quality violations. The discharge of organic compounds at levels which cause or may cause water quality violations is prohibited. The intent of this limitation is to assure that any solvent or other products in use at the plant, which contain any of the listed toxic organic compounds, are disposed of properly, and not dumped, spilled, discharged or leaked.

Certification Statement
In lieu of monthly monitoring for TTO, the party responsible for signing the monthly discharge monitoring report (DMR) forms may make the following statement, as part of the DMR: "Based on my inquiry of the persons directly responsible for managing compliance with the permit limitations for TTO, I certify that, to the best of my knowledge and belief, no disposal of concentrated toxic organics into the wastewaters has occurred since filing of the last discharge monitoring report. I further certify that this facility is implementing the Toxic Organic Pollutant Management Plan submitted to the Compliance Data Section of the Office of Water Quality, as required by this permit." The Certification Statement may not be used until completion of the Toxic Organic Pollutant Management Plan required by Part I.J of this permit.

If the above mentioned responsible party is unable to make the above Certification Statement because of discharge or spills of any TTO compounds, the Permittee is required to notify IDEM in accordance with Part II.C.3 of this permit.

[5] Hexavalent chromium shall be measured and reported as dissolved metal. The hexavalent chromium sample type shall be by grab method. The maximum holding time for a hexavalent chromium sample is 28 days under 40 CFR 136.3(e), Table II. However, as noted in footnote 20 of Table II, to achieve the 28-day holding time, the ammonium sulfate buffer solution specified in EPA Method 218.6 must be used. This holding time allowance of 28-days supersedes the preservation and holding time requirements in the approved hexavalent chromium methods, unless this supersession would compromise the measurement, in which case the preservation and holding time requirements [the sample must be analyzed within 24 hours of collection] in the method must be followed.

[6] Samples shall be taken once at any time during each of the four annual quarters:

(A) January-February-March;
(B) April-May-June;
(C) July-August-September; and
(D) October-November-December.

For quarterly monitoring, in the first quarter for example, the permittee may conduct sampling within the month of January, February or March. The result from this reporting timeframe shall be reported on the March DMR, regardless of which of the months within the quarter the sample was taken.

[7] For purposes of calculating the monthly average mass loading reported on the DMR forms, concentration values below the limit of quantitation (LOQ) of 0.94 ug/l may be assigned a value of zero (0) for purposes of calculating the monthly average mass value.

[8] Monitoring requirements are temporarily suspended for as long as both the No. 6 and No. 8 Galvanizing Lines and their associated Fume Scrubbers are idled. In the event that one or both are brought back online, the monitoring will resume at a minimum frequency of 1 X Weekly. The permittee shall give IDEM a minimum of thirty (30) days notice prior to bringing either line back into operation

19. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 034, located at Latitude 41° 36' 23", Longitude -87° 23' 03". The discharge is limited to treated wastewaters from Internal Outfalls 604, 605, 606, and 608. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the Grand Calumet River. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][3][4][18][19]
Outfall 034

Table 1

Parameter	Quantity or Loading Monthly Average	Daily Maximum	Units	Quality or Concentration Monthly Average	Daily Maximum	Units	Monitoring Requirements Measurement Frequency	Sample Type
Flow	Report	Report	MGD	--------	-----------	------	Daily	Continuous
TSS	Report	Report	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
O+G[6]	1,430	3,660	lbs/day	Report	Report	mg/l	5 X Weekly	3 Grabs/24 Hrs.[22]
$CBOD_5$								
Summer[7]	1,334	2,669	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
Winter[7]	4,537	9,074	lbs/day	Report	Report	mg/l	2 X Weekly	24 Hr. Comp.
Total Recoverable								
Chromium[8]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Zinc[8]	Report	Report	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Lead[8]	2.52	5.85	lbs/day	Report	Report	ug/l	2 X Weekly	24 Hr. Comp.
Cadmium[8]	2.0	3.0	lbs/day	9.3	14	ug/l	1 X Monthly	24 Hr. Comp.
Copper[8]	3.6	7.8	lbs/day	17	37	ug/l	2 X Weekly	24 Hr. Comp.
Nickel[8]	Report	Report	lbs/day	Report	Report	ug/l	1 X Quarterly[10]	24 Hr. Comp.
Silver[8]	0.036	0.064	lbs/day	0.17	0.30	ug/l	2 X Monthly	24 Hr. Comp.
Phenols(4AAP)	26.00	39.00	lbs/day	Report	Report	ug/l	1 X Weekly	3 Grabs/24 Hrs.[20]
Temperature[9]	---------	--------	--------	--------	Report	^{O}F	2 X Weekly	6 Grabs/24 Hrs.
TRC[16]	1.7	3.8[13]	lbs/day	8[11]	18[12]	ug/l	Daily[14]	Grab
Mercury[8]	0.00028	0.00068	lbs/day	1.3	3.2	ng/l	Bi-Monthly[15]	Grab
Whole Effluent Toxicity			See Part I.I of this Permit					

Table 2

Parameter	Quality or Concentration Daily Minimum	Daily Maximum	Units	Monitoring Requirements Measurement Frequency	Sample Type
pH [5]	6.0	9.0	s.u.	1 X Daily	Grab
Dissolved Oxygen[17]	5.0	------	mg/l	1 X Weekly	2 Grabs/24 Hrs.

[1] The permittee shall discharge the effluents from Internal Outfalls 604, 605, 606, and 608 through Outfall 034.

[2] The permittee shall monitor Outfalls 034, 604, 605, 606, and 608 on the same days.

[3] See Part I.B. of the permit for the Minimum Narrative Limitations.

[4] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[5] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[6] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program.

[7] Summer limitations apply from July 1 through September 30. Winter limitations apply from October 1 through June 30.

[8] The permittee shall measure and report the identified metal as <u>total recoverable metal.</u>

[9] See Part III.A for additional temperature requirements. Temperature monitoring at the following individual outfalls [015, 018, 019, 020, 028, 030, and 034] shall be taken on the same day of the week. Where temperature is sampled at 6 grabs/day, the samples shall be equally spaced throughout the day. The highest temperature value measured shall be the value reported for that day.

[10] Samples shall be taken once at any time during each of the four annual quarters:

(A) January-February-March;
(B) April-May-June;
(C) July-August-September; and
(D) October-November-December.

For quarterly monitoring, in the first quarter for example, the permittee may conduct sampling within the month of January, February <u>or</u> March. The result from this reporting timeframe shall be reported on the March DMR, regardless of which of the months within the quarter the sample was taken.

[11] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the respective limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[12] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[13] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 12.7 lbs/day.

[14] Continuous chlorination at the above outfall is permitted on a year-round basis. The wastewater shall be de-chlorinated prior to discharge from Outfall 034. Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and 2 X Weekly during continuous chlorination treatment when the intake is not being treated for zebra mussels. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[15] Effluent mercury monitoring shall be conducted 6 X annually, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

[16] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[17] The daily average concentration of dissolved oxygen in the effluent shall be reported as the arithmetic mean determined by summation of the two (2) daily grab sample results divided by the number of daily grab samples. These samples are to be collected over equal time intervals.

[18] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[19] The following wastewater treatment systems may be added to reduce the $CBOD_5$ on a continuous year-round basis:

(i) Internal Outfall 604 – Chlorination (sodium hypochlorite) treatment
(ii) Internal Outfall 605 – Chlorination (sodium hypochlorite) treatment
(iii) Outfall 034 – De-chlorination (sodium bisulfite) treatment

[20] A minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

20. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 035, located at Latitude 41˚ 37' 29.3", Longitude -87˚ 19' 35.8". The discharge is limited to No. 14 Blast Furnace non-contact cooling water, Steam Turbine Gen (Co-Gen Turbo Gen) non-contact cooling water, No. 5 Power Station non-contact cooling water, steam condensates (No. 5 Power Station, No. 14 Blast Furnace, Turbo Gen), and storm water (drainage area #24). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][5][8]
Outfall 035

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	Continuous
O+G[4]	---------	---------	-------	---------	Report	mg/l	1 X Weekly	Grab
Temperature								
Discharge	---------	---------	-------	---------	Report	^{O}F	1 X Hour	Continuous
Intake[6]	---------	---------	-------	---------	Report	^{O}F	1 X Hour	Continuous
Thermal Discharge[7]	--	1.211	GBTU/Hr	--------	--------	----	Daily	Continuous
TRC[13]	10	24[11]	lbs/day	8[9]	18[10]	ug/l	Daily[12]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[6] The permittee shall continuously monitor intake temperature at the No. 2 Pump Station.

[7] The effluent limitation is 1.211 billion BTU/Hr (1.211 GBTU/Hr) as a maximum daily average. Monitoring shall include flow and intake and outlet temperatures as measured across the condensers on a continuous basis. The daily average BTU/Hr shall be calculated as follows: The BTU/Hr shall be determined once each hour and those values shall be averaged over a 24 hour period for each day. See Part III.A.2 for additional temperature requirements.

[8] There shall be no discharge of blast furnace or sinter plant process wastewater or any other process wastewater residuals through Outfall 035.

[9] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[10] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[11] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 78.5 lbs/day.

[12] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[13] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

21. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 037, located at Latitude 41° 37' 39", Longitude -87° 21' 25". The discharge is limited to Box Anneal North Mill Furnaces non-contact cooling water, North Sheet Mill No. 10 Air Compressor non-contact cooling water, 80" Temper Mill non-contact cooling water, North Sheet Mill steam condensates, non-contact cooling waters from the 5-Stand Cold Reduction Mill, and No. 6 and 8 Galvanized Lines, and storm water (drainage area #26). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][5]
Outfall 037

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow[6]	Report	Report	MGD	---------	----------	-----	1 X Weekly	Estimate
O+G[4]	---------	---------	-------	---------	Report	mg/l	1 X Weekly	Grab
Temperature								
Discharge[6]	---------	---------	-------	---------	Report	°F	1 X Hour	Continuous
Intake[7]	---------	---------	-------	---------	Report	°F	1 X Hour	Continuous
Thermal Discharge[8]	--	Report	GBTU/Hr	---------	--------	-----	Daily	Continuous
TRC[13]	0.20	0.45[11]	lbs/day	8[9]	18[10]	ug/l	Daily[12]	Grab
Phenols(4AAP)	---------	Report	lbs/day	---------	Report	ug/l	1 X Monthly	3 Grabs/24 Hrs.[14]

Table 2

	Quality or Concentration			Monitoring Requirements	
Parameter	Daily Minimum	Daily Maximum	Units	Measurement Frequency	Sample Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] Additional monitoring and reporting requirements are contained in Part I.L Visible Oil Corrective Action Monitoring Program. If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[6] The permittee may utilize a conservative flow estimate in lieu of continuous monitoring at Outfall 037. Continuous temperature monitoring will be maintained at an upstream location where flow measurement is impractical due to turbulence.

[7] The permittee shall continuously monitor intake temperature at the Lakeside Pump Station.

[8] The thermal discharge in billion BTU/Hr (GBTU/Hr) shall be reported as a maximum daily average. Monitoring shall include flow and intake and outlet temperatures on a continuous basis. The daily average BTU/Hr shall be calculated as follows: The BTU/Hr shall be determined once each hour and those values shall be averaged over a 24 hour period for each day. See Part III.A.2. for additional temperature requirements.

[9] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[10] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[11] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 1.5 lbs/day.

[12] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[13] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[14] A minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing.

22. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfall 039, located at Latitude 41° 37' 45.8", Longitude -87° 21' 59.8". The discharge is limited to 84" Hot Strip Mill (HSM) non-contact cooling water (Reheat Furnace and Fire Water Distribution), 84" HSM steam condensates, 84" Roughing and Finishing Mills Oil Tanks and Filters, 84" Roughing Mill emergency overflow, and storm water (drainage area #27). Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][5][13]
Outfall 039

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily		Monthly	Daily		Measurement	Sample
Parameter	Average	Maximum	Units	Average	Maximum	Units	Frequency	Type
Flow	Report	Report	MGD	---------	----------	-----	Daily	Continuous
O+G[4]	---------	---------	-------	---------	Report	mg/l	1 X Weekly	Grab
Temperature								
Discharge	---------	---------	-------	---------	Report	°F	1 X Hour	Continuous
Intake[6]	---------	---------	-------	---------	Report	°F	1 X Hour	Continuous
Thermal Discharge[7]	---	Report	GBTU/Hr	---------	--------	-----	Daily	Continuous
TRC[12]	3.7	8.3[10]	lbs/day	8[8]	18[9]	ug/l	Daily[11]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH [3]	6.0	9.0	s.u.	1 X Monthly	Grab

[1] See Part I.B. of the permit for the Minimum Narrative Limitations.

[2] In the event that a new water treatment additive is to be used that will contribute to this Outfall, or changes are to be made in the use of water treatment additives, including dosage, the permittee must apply for and receive approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) currently available at: http://www.in.gov/idem/5157.htm

[3] If the permittee collects more than one grab sample on a given day for pH, the values shall not be averaged for reporting daily maximums or daily minimums. The permittee must report the individual minimum and the individual maximum pH value of any sample during the month on the monitoring report forms.

[4] If oil and grease is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated. The facility is required to investigate and eliminate any significant or measured concentration of oil and grease (quantities in excess of 5 mg/l). The intent of this requirement is to assure that oil and grease is not added to once-through cooling water in measurable quantities (5 mg/l).

[5] The storm water non-numeric limits, storm water pollution prevention plan, and storm water sampling requirements can be found in Parts I.D, E, and F of this permit.

[6] The permittee shall continuously monitor intake temperature at the Lakeside Pump Station.

[7] The thermal discharge in billion BTU/Hr (GBTU/Hr) shall be reported as a maximum daily average. Monitoring shall include flow and intake and outlet temperatures on a continuous basis. The daily average BTU/Hr shall be calculated as follows: The BTU/Hr shall be determined once each hour and those values shall be averaged over a 24 hour period for each day. See Part III.A.2. for additional temperature requirements.

[8] The monthly average water quality based effluent limit (WQBEL) for TRC is less than the limit of quantitation (LOQ) as specified in Part I.C.4 of this permit. Compliance with the calculated monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. When calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

[9] The daily maximum WQBEL for TRC is less than the LOD as specified in Part I.C.4 of this permit. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

[10] Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 27.5 lbs/day.

[11] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and continue for three additional days after zebra or quagga mussel treatment has been completed. See Part I.M for Zebra and Quagga Mussel Control and Chlorination for additional requirements.

[12] The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ as specified in Part I.C.4 of this permit. See Part I.G of the permit for the Pollutant Minimization Program (PMP) requirements.

[13] There shall be no discharge of process wastewater through Outfall 039, except as provided for by Part II.B.1, 2, and 3.

23. The permittee is authorized to discharge from the outfall listed below in accordance with the terms and conditions of this permit. The permittee is authorized to discharge from Outfalls BW-1, BW-2, BW-3, BW-4, and BW-5. The discharge is limited to water intake screen backwash. Samples taken in compliance with the monitoring requirements below shall be taken at a point representative of the discharge but prior to entry into the boat slip at Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][2][4]

Table 1

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	-------	---------	-----	1 X Quarterly[3]	Estimate
Intake Flow[8]								
PS No. 1	Report	Report	MGD	-------	-------	------	Daily	Measured or Calculated
PS No. 2	Report	Report	MGD	-------	-------	------	Daily	Measured or Calculated
Lakeside Intake	Report	Report	MGD	-------	-------	------	Daily	Measured or Calculated
Intake Velocity- Lakeside Intake [5][6]								
Interim [7]				-------	-------	------	Daily	Measured or Calculated
Final [7]	------	0.5	fps	-------	-------	------	Daily	Measured or Calculated

[1] Discharge of water intake screen backwash is authorized from the following Lake Michigan water intakes:

BW-1 – No. 1 service water pumping station (PS No.1)
BW-2 – No. 2 service water pumping station (PS No.2)
BW-3 – No. 3 service water pumping station (PS No.3)
BW-4 – No. 4 service water pumping station (PS No.4)
BW-5 – Lakeside service water pumping station (LS PS)

[2] There shall be no discharge of process wastewaters from Outfalls BW-1, BW-2, BW-3, BW-4, and BW-5.

[3] Samples shall be taken once at any time during each of the four annual quarters:

(A) January-February-March;
(B) April-May-June;
(C) July-August-September; and
(D) October-November-December.

For quarterly monitoring, in the first quarter for example, the permittee may conduct sampling within the month of January, February or March. The result from this reporting timeframe shall be reported on the March DMR, regardless of which of the months within the quarter the sample was taken.

[4] See Part I.B. of the permit for the Minimum Narrative Limitations.

[5] The permittee must monitor the velocity at the screen at a minimum frequency of daily. Through screen velocity monitoring shall be conducted at a point at the screen face where intake velocities are the greatest. In lieu of velocity monitoring at the screen face, the permittee may calculate the through-screen velocity using water flow, water depth, and the screen open areas. The location and method used to determine the maximum velocity shall be included in the annual report required to be submitted under Part IV.B.8. If the permittee uses the calculation method to determine the through screen velocity, the input values and calculation for each day shall be included in the annual report.

[6] Intake velocity monitoring and reporting is only required if the permittee selects The impingement mortality option specified under Part I.P.2.(a)(i) of the permit (maximum actual through screen velocity of 0.5 feet per second).

[7] A schedule of compliance, providing the permittee up to thirty-six (36) months to comply with the through screen velocity limitation (if the permittee has selected the impingement mortality option specified under Part I.P.2.(a)(i) of the permit) is provided in Part I.P.2. of the permit. If the permittee has selected the impingement mortality option specified under Part I.P.2.(a)(i), the interim monitoring requirements for through screen velocity are applicable until the final effluent limitations for through screen velocity are in effect.

[8] The permittee must measure or calculate the intake flow at a minimum frequency of daily. The data and methods used to determine the intake flow shall be included in the annual report required to be submitted under Part IV.B.12. If the permittee uses the calculation method to determine the intake flow, the input values and calculation for each day shall be included in the annual report.

B. MINIMUM NARRATIVE LIMITATIONS

At all times the discharge from any and all point sources specified within this permit shall not cause receiving waters:

1. including waters within the mixing zone, to contain substances, materials, floating debris, oil, scum attributable to municipal, industrial, agricultural, and other land use practices, or other discharges that do any of the following:

   a. will settle to form putrescent or otherwise objectionable deposits;

   b. are in amounts sufficient to be unsightly or deleterious;

   c. produce color, visible oil sheen, odor, or other conditions in such degree as to create a nuisance;

   d. are in amounts sufficient to be acutely toxic to, or to otherwise severely injure or kill aquatic life, other animals, plants, or humans;

   e. are in concentrations or combinations that will cause or contribute to the growth of aquatic plants or algae to such a degree as to create a nuisance, be unsightly, or otherwise impair the designated uses.

2. outside the mixing zone, to contain substances in concentrations that on the basis of available scientific data are believed to be sufficient to injure, be chronically toxic to, or be carcinogenic, mutagenic, or teratogenic to humans, animals, aquatic life, or plants.

C. MONITORING AND REPORTING

1. Representative Sampling

   Samples and measurements taken as required herein shall be representative of the volume and nature of the discharge flow and shall be taken at times which reflect the full range and concentration of effluent parameters normally expected to be present. Samples shall not be taken at times to avoid showing elevated levels of any parameters..

2. Monthly Reporting

   The permittee shall submit federal and state discharge monitoring reports to the Indiana Department of Environmental Management (IDEM) containing results obtained during the previous month and shall be submitted no later than the 28th day of the month following each completed monitoring period. The first report shall be submitted by the 28th day of the month following the month in which the permit becomes effective.

These reports shall include, but not necessarily be limited to, the Discharge Monitoring Report (DMR) and the Monthly Monitoring Report (MMR). All reports shall be submitted electronically by using the NetDMR application, upon registration, receipt of the NetDMR Subscriber Agreement, and IDEM approval of the proposed NetDMR Signatory. Access the NetDMR website (for initial registration and DMR/MMR submittal) via CDX at: https://cdx.epa.gov/. The Regional Administrator may request the permittee to submit monitoring reports to the Environmental Protection Agency if it is deemed necessary to assure compliance with the permit. See Part II.C.10 of this permit for Future Electronic Reporting Requirements.

a. For parameters with monthly average water quality based effluent limitations (WQBELs) below the LOQ, daily effluent values that are less than the limit of quantitation (LOQ) may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

b. For all other parameters for which the monthly average WQBEL is equal to or greater than the LOQ, calculations that require averaging of measurements of daily values (both concentration and mass) shall use an arithmetic mean, except the monthly average for *E. coli* shall be calculated as a geometric mean. Daily effluent values that are less than the LOQ, that are used to determine the monthly average effluent level shall be accommodated in calculation of the average using statistical methods that have been approved by the Commissioner.

c. Effluent concentrations less than the LOD shall be reported on the Discharge Monitoring Report (DMR) forms as < (less than) the value of the LOD. For example, if a substance is not detected at a concentration of 0.1 µg/l, report the value as <0.1 µg/l.

d. Effluent concentrations greater than or equal to the LOD and less than the LOQ that are reported on a DMR shall be reported as the actual value and annotated on the DMR to indicate that the value is not quantifiable.

e. Mass discharge values which are calculated from concentrations reported as less than the value of the limit of detection shall be reported as less than the corresponding mass discharge value.

f. Mass discharge values that are calculated from effluent concentrations greater than the limit of detection shall be reported as the calculated value.

g. See Part III.E of the permit for additional reporting requirements for values below the limit of quantitation (LOQ).

3. Definitions

a. "Monthly Average" means the total mass or flow-weighted concentration of all daily discharges during a calendar month on which daily discharges are sampled or measured, divided by the number of daily discharges sampled and/or measured during such calendar month.

The monthly average discharge limitation is the highest allowable average monthly discharge for any calendar month.

b. "Daily Discharge" means the total mass of a pollutant discharged during the calendar day or, in the case of a pollutant limited in terms other than mass pursuant to 327 IAC 5-2-11(e), the average concentration or other measurement of the pollutant specified over the calendar day or any twenty-four hour period that reasonably represents the calendar day for the purposes of sampling.

c. "Daily Maximum" means the maximum allowable daily discharge for any calendar day.

d. A "24-hour composite sample" means a sample consisting of at least 3 individual flow-proportioned samples of wastewater, taken by the grab sample method or by an automatic sampler, which are taken at approximately equally spaced time intervals for the duration of the discharge within a 24-hour period and which are combined prior to analysis. A flow-proportioned composite sample may be obtained by:

(1) recording the discharge flow rate at the time each individual sample is taken,

(2) adding together the discharge flow rates recorded from each individuals sampling time to formulate the "total flow" value,

(3) the discharge flow rate of each individual sampling time is divided by the total flow value to determine its percentage of the total flow value,

(4) then multiply the volume of the total composite sample by each individual sample's percentage to determine the volume of that individual sample which will be included in the total composite sample.

e. “Concentration” means the weight of any given material present in a unit volume of liquid. Unless otherwise indicated in this permit, concentration values shall be expressed in milligrams per liter (mg/l).

f. The “Regional Administrator” is defined as the Region 5 Administrator, U.S. EPA, located at 77 West Jackson Boulevard, Chicago, Illinois 60604.

g. The “Commissioner” is defined as the Commissioner of the Indiana Department of Environmental Management, which is located at the following address: 100 North Senate Avenue, Indianapolis, Indiana 46204.

h. “Limit of Detection” or “LOD” means the minimum concentration of a substance that can be measured and reported with ninety-nine percent (99%) confidence that the analyte concentration is greater than zero (0) for a particular analytical method and sample matrix.

i. “Limit of Quantitation” or “LOQ” means a measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calibrated at a specified concentration above the method detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant. This term is also sometimes called limit quantification or quantification level.

j. “Method Detection Level” or “MDL” means the minimum concentration of an analyte (substance) that can be measured and reported with a ninety-nine percent (99%) confidence that the analyte concentration is greater than zero (0) as determined by procedure set forth in 40 CFR 136, Appendix B. The method detection level or MDL is equivalent to the LOD.

k. “Grab Sample” means a sample which is taken from a wastestream on a one-time basis without consideration of the flow rate of the wastestream and without considerations of time.

4. <u>Test Procedures</u>

The analytical and sampling methods used shall conform to the version of 40 CFR 136 incorporated by reference in 327 IAC 5. Different but equivalent methods are allowable if they receive the prior written approval of the Commissioner and the U.S. Environmental Protection Agency.

When more than one test procedure is approved for the purposes of the NPDES program under 40 CFR 136 for the analysis of a pollutant or pollutant parameter, the test procedure must be sufficiently sensitive as defined at 40 CFR 122.21(e)(3) and 122.44(i)(1)(iv). The following analytical methods and limits of detection and limits of quantitation shall be used:

Parameter[6]	Method[1]	Concentration (ug/l)	
		LOD	LOQ or ML
Ammonia	4500-NH3-G, 350.1 (undistilled)	10	32
	4500-NH3-G (w/prep SM 4500-NH3-B) (distilled)	50	160
Benzene	624	0.5	1.6
Benzo(a)Pyrene	625 with SIM	0.031	0.1
	610 HPLC [4]	0.023	0.073
	610-GC/MS [4]	2.0 [5]	5.7
Cadmium	200.8 Rev. 5.4 (1994)	0.5	1.6
CBOD5	5210B	-----	2000
Chloride	4500 Cl E (Colorimetric Automated)	400	1300
	300.0 Rev. 2.1 (1993) (Anions by IC)	200	640
Copper	200.8, Rev. 5.4 (1994)	0.31	1.0
Cyanide, Total	335.4, Rev. 1.0 (1993) or SM 4500-CN-E [2] (Colorimetric)	5.0	16
	Kelada-01	0.5	1.6
Cyanide, Free	4500-CN-I [2]	2.5	5.0
	OIA-1677-09	0.5	1.6
	Kelada-01	0.5	1.6
Fluoride	4500-F-C (Ion Selective Mode)	31	100
	300.0	100	320
Hex. Chrome	218.6	0.3	0.94
Lead	200.8	0.31	1.0
Mercury [3]	1631	0.0002	0.0005
Naphthalene	610 (HPLC)	0.2	0.64
	610 MS, EPA625	2.0	6.4
Nickel	3113B	1	3.2
	200.8	0.5	1.6
Oil & Grease	1664	2000	5000
Phenols	420.4	0.63	2
Selenium	200.8	1	3.2
	200.9, Rev. 2.2 (1994)	0.6	1.9
Silver	200.8 Rev. 5.4 (1994) Selection Ion Monitoring	0.005	0.016
Sulfate	300.0	200	640
Tetrachloroethylene	624	0.4	1.3
Total Residual Chlorine	4500-CL-D,E	20	60
	4500-CL-G	20	60
Total Suspended	2540 D	640	2000

Solids			
Zinc	3120B	3.3	10
	200.8	3.1	8.1
Chromium, Total	200.8 (Scanning Mode)	0.9	2.9
	200.8 (Ion Monitoring Mode)	0.11	1.5

[1] The methods listed are the EPA Methods referenced in 40 CFR 136 or approved Standard Methods (SM).
[2] American Public Health Association. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. Public Health Assoc., 1015 15th Street NW, Washington DC 20005.
[3] Revision E, or the most currently approved revision.
[4] Method 610-GC/MS shall be used at Outfall 501.
[5] MDL and resulting LOQ apply to Outfall 501.
[6] Mass for each corresponding LOD and LOQ shall be determined using the corresponding concentration provided in the above table multiplied by 8.345 multiplied by the corresponding outfall flow in MGD. For each outfall, use the following in Million Gallons per Day (MGD)

Outfall 015 = 2.1
Outfall 018 = 60.7
Outfall 019 = 73.4
Outfall 020 = 47.5
Outfall 021 = 0.6
Outfall 023 = inactive
Outfall 026 = inactive
Outfall 028/030 = 28.2
Outfall 032 = 0.3
Outfall 033 = 0.2
Outfall 034 = 25.4
Outfall 035 = 156.8
Outfall 037 = 3
Outfall 039 = 55

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall maintain records of all monitoring information and monitoring activities, including:

a. The date, exact place and time of sampling or measurement;

b. The person(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The person(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such measurements and analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of this monitoring shall be included in the calculation and reporting of the values required in the monthly Discharge Monitoring Report (DMR) and Monthly Monitoring Report (MMR). Such increased frequency shall also be indicated. Other monitoring data not specifically required in this permit (such as internal process or internal waste stream data) which is collected by or for the permittee need not be submitted unless requested by the Commissioner.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation and recording from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years. In cases where the original records are kept at another location, a copy of all such records shall be kept at the permitted facility. The three years shall be extended:

a. automatically during the course of any unresolved litigation regarding the discharge of pollutants by the permittee or regarding promulgated effluent guidelines applicable to the permittee; or

b. as requested by the Regional Administrator or the Indiana Department of Environmental Management.

D. STORM WATER MONITORING AND NON-NUMERIC EFFLUENT LIMITS

Within twelve (12) months of the effective date of this permit, the permittee shall implement the non-numeric permit conditions in this Section of the permit for the entire site as it relates to storm water associated with industrial activity regardless which outfall the storm water is discharged from.

1. Control Measures and Effluent Limits

In the technology-based limits included in Part D.2-4., the term “minimize” means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practice.

2. Control Measures

Select, design, install, and implement control measures (including best management practices) to address the selection and design considerations in Part D.3 to meet the non-numeric effluent limits in Part D.4. The selection, design, installation, and implementation of these control measures must be in accordance with good engineering practices and manufacturer’s specifications. Any deviation from the manufacturer’s specifications shall be documented. If the control measures are not achieving their intended effect in minimizing pollutant discharges, the control measures must be modified as expeditiously as practicable. Regulated storm water discharges from the facility include storm water run-on that commingles with storm water discharges associated with industrial activity at the facility.

3. Control Measure Selection and Design Considerations

When selecting and designing control measures consider the following:

a. preventing storm water from coming into contact with polluting materials is generally more effective, and cost-effective, than trying to remove pollutants from storm water;

b. use of control measures in combination is more effective than use of control measures in isolation for minimizing pollutants in storm water discharge;

c. assessing the type and quantity of pollutants, including their potential to impact receiving water quality, is critical to designing effective control measures that will achieve the limits in this permit;

d. minimizing impervious areas at your facility and infiltrating runoff onsite (including bioretention cells, green roofs, and pervious pavement, among other approaches), can reduce runoff and improve groundwater recharge and stream base flows in local streams, although care must be taken to avoid ground water contamination;

e. flow can be attenuated by use of open vegetated swales and natural depressions;

f. conservation and/or restoration of riparian buffers will help protect streams from storm water runoff and improve water quality; and

g. use of treatment interceptors (e.g. swirl separators and sand filters) may be appropriate in some instances to minimize the discharge of pollutants.

4. Technology-Based Effluent Limits (BPT/BAT/BCT)

Non-Numeric Effluent Limits:

a. Minimize Exposure

Minimize the exposure of raw, final, or waste materials to rain, snow, snowmelt, and runoff. To the extent technologically available and economically practicable and achievable, either locate industrial materials and activities inside or protect them with storm resistant coverings in order to minimize exposure to rain, snow, snowmelt, and runoff (although significant enlargement of impervious surface area is not recommended). In minimizing exposure, pay particular attention to the following areas:

Loading and unloading areas: locate in roofed or covered areas where feasible; use grading, berming, or curbing around the loading area to divert run-on; locate the loading and unloading equipment and vehicles so that leaks are contained in existing containment and flow diversion systems.

Material storage areas: locate indoors, or in roofed or covered areas where feasible; install berms/dikes around these areas; use dry cleanup methods.

Note: Industrial materials do not need to be enclosed or covered if storm water runoff from affected areas will not be discharged to receiving waters.

b. Good Housekeeping

Keep clean all exposed areas that are potential sources of pollutants, using such measures as sweeping at regular intervals, keeping materials orderly and labeled, and stowing materials in appropriate containers.

As part of the developed good housekeeping program, include a cleaning and maintenance program for all impervious areas of the facility where particulate matter, dust, or debris may accumulate, especially areas where material loading and unloading, storage, handling, and processing occur; and where practicable, the paving of areas where vehicle traffic or material storage occur but where vegetative or other stabilization methods are not practicable (institute a sweeping program in these areas too). For unstabilized areas where sweeping is not practicable, consider using storm water management devices such as sediment traps, vegetative buffer strips, filter fabric fence, sediment filtering boom, gravel outlet protection, or other equivalent measures that effectively trap or remove sediment.

c. Maintenance

Maintain all control measures which are used to achieve the effluent limits required by this permit in effective operating condition. Nonstructural control measures must also be diligently maintained (e.g., spill response supplies available, personnel appropriately trained). If control measures need to be replaced or repaired, make the necessary repairs or modifications as expeditiously as practicable.

d. Spill Prevention and Response Procedures

You must minimize the potential for leaks, spills and other releases that may be exposed to storm water and develop plans for effective response to such spills if or when they occur. At a minimum, you must implement:

(1) Procedures for plainly labeling containers (e.g., "Used Oil", "Spent Solvents", "Fertilizers and Pesticides", etc.) that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;

(2) Preventive measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling;

(3) Procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. Employees who may cause, detect or respond to a spill or leak must be trained in these procedures and have necessary spill response equipment available. If possible, one of these individuals should be a member of your storm water pollution prevention team;

(4) Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies. State or local requirements may necessitate reporting spills or discharges to local emergency response, public health, or drinking water supply agencies. Contact information must be in locations that are readily accessible and available;

(5) Procedures for documenting where potential spills and leaks could occur that could contribute pollutants to storm water discharges, and the corresponding outfalls that would be affected by such spills and leaks; and

(6) A procedure for documenting all significant spills and leaks of oil or toxic or hazardous pollutants that actually occurred at exposed areas, or that drained to a storm water conveyance.

e. Erosion and Sediment Controls

Through the use of structural and/or non-structural control measures stabilize, and contain runoff from, exposed areas to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants. Among other actions to meet this limit, place flow velocity dissipation devices at discharge locations and within outfall channels where necessary to reduce erosion and/or settle out pollutants. In selecting, designing, installing, and implementing appropriate control measures, you are encouraged to check out information from both the State and EPA websites. The following two websites are given as information sources:

http://www.in.gov/idem/stormwater/2363.htm
and
https://www.epa.gov/npdes/stormwater-discharges-industrial-activities

f. Management of Runoff

Divert, infiltrate, reuse, contain or otherwise reduce storm water runoff, to minimize pollutants in the discharge.

g. Salt Storage Piles or Piles Containing Salt

Enclose or cover storage piles of salt, or piles containing salt, used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces. You must implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. Piles do not need to be enclosed or covered if storm water runoff from the piles is not discharged.

h. Waste, Garbage, and Floatable Debris

Ensure that waste, garbage, and floatable debris are not discharged to receiving waters by keeping exposed areas free of such materials or by intercepting them before they are discharged.

i. Employee Training

Train all employees who work in areas where industrial material or activities are exposed to storm water, or who are responsible for implementing activities necessary to meet the conditions of this permit (e.g., inspectors, maintenance personnel), including all members of your Pollution Prevention Team. Training must cover the specific control measures used to achieve the effluent limits in this part, and monitoring, inspection, planning, reporting, and documentation requirements in other parts of this permit.

j. Non-Storm water Discharges

You must determine if any non-storm water discharges not authorized by an NPDES permit exist. Any non-storm water discharges discovered must either be eliminated or modified into this permit. The following non-storm water discharges are authorized and must be documented in the Storm Water Pollution Prevention Plan:

Discharges from fire-fighting activities;
Fire Hydrant flushings;
Potable water, including water line flushings;
Uncontaminated condensate from air conditioners, coolers, and other compressors and from the outside storage of refrigerated gases or liquids;
Irrigation drainage;
Landscape watering provided all pesticides, herbicides, and fertilizer have been applied in accordance with the approved labeling;

Pavement wash water where no detergents are used and no spills or leaks of toxic or hazardous material have occurred (unless all spilled material has been removed);
Routine external building washdown that does not use detergents;
Uncontaminated ground water or spring water;
Foundation or footing drains where flows are not contaminated with process materials;
Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but not intentional discharges from cooling towers (e.g., “piped cooling tower blowdown or drains);
Vehicle wash- waters where uncontaminated water without detergents or solvents is utilized; and
Runoff from the use of dust suppressants approved for use by IDEM.

k. Dust Generation and Vehicle Tracking of Industrial Materials

You must minimize generation of dust and off-site tracking of raw, final, or waste materials.

l. Fugitive Dust Emission.

Minimize fugitive dust emissions from coal handling areas. To minimize the tracking of coal dust offsite, consider procedures such as installing specially designed tires or washing vehicles in a designated area before they leave the site and controlling the wash water.

m. Delivery Vehicles

Minimize contamination of storm water runoff from delivery vehicles arriving at the plant site. Consider procedures to inspect delivery vehicles arriving at the plant site and ensure overall integrity of the body or container and procedures to deal with leakage or spillage from vehicles or containers.

n. Fuel Oil Unloading Areas

Minimize contamination of precipitation or surface runoff from fuel oil unloading areas. Consider using containment curbs in unloading areas, having personnel familiar with spill prevention and response procedures present during deliveries to ensure that any leaks or spills are immediately contained and cleaned up, and using spill and overflow protection devices (e.g., drip pans, drip diapers, or other containment devices placed beneath fuel oil connectors to contain potential spillage during deliveries or from leaks at the connectors).

o. Chemical Loading and Unloading

Minimize contamination of precipitation or surface runoff from chemical loading and unloading areas. Consider using containment curbs at chemical loading and unloading areas to contain spills, having personnel familiar with spill prevention and response procedures present during deliveries to ensure that any leaks or spills are immediately contained and cleaned up, and loading and unloading in covered areas and storing chemicals indoors.

p. Miscellaneous Loading and Unloading Areas

Minimize contamination of precipitation or surface runoff from loading and unloading areas. Consider covering the loading area; grading, berming, or curbing around the loading area to divert run-on; locating the loading and unloading equipment and vehicles so that leaks are contained in existing containment and flow diversion systems; or equivalent procedures.

q. Liquid Storage Tanks

Minimize contamination of surface runoff from above-ground liquid storage tanks. Consider protective guards around tanks, containment curbs, spill and overflow protection, dry cleanup methods, or equivalent measures.

r. Large Bulk Fuel Storage Tanks

Minimize contamination of surface runoff from large bulk fuel storage tanks. Consider containment berms (or their equivalent). You must also comply with applicable State and Federal laws, including Spill Prevention, Control and Countermeasure (SPCC) Plan requirements.

s. Spill Reduction Measures

Minimize the potential for an oil or chemical spill, or reference the appropriate part of your SPCC plan. Visually inspect as part of your routine facility inspection the structural integrity of all above-ground tanks, pipelines, pumps, and related equipment that may be exposed to storm water, and make any necessary repairs immediately.

t. Oil-Bearing Equipment in Switchyards

Minimize contamination of surface runoff from oil-bearing equipment in switchyard areas. Consider using level grades and gravel surfaces to retard flows and limit the spread of spills, or collecting runoff in perimeter ditches.

u. Residue-Hauling Vehicles

Inspect all residue-hauling vehicles for proper covering over the load, adequate gate sealing, and overall integrity of the container body. Repair vehicles without load covering or adequate gate sealing, or with leaking containers or beds.

v. Ash Loading Areas

Reduce or control the tracking of ash and residue from ash loading areas. Clear the ash building floor and immediately adjacent roadways of spillage, debris, and excess water before departure of each loaded vehicle.

w. Areas Adjacent to Disposal Ponds or Landfills

Minimize contamination of surface runoff from areas adjacent to disposal ponds or landfills. Reduce ash residue that may be tracked on to access roads traveled by residue handling vehicles, and reduce ash residue on exit roads leading into and out of residue handling areas.

x. Landfills, Scrap yards, Surface Impoundments, Open Dumps, General Refuse Sites

Minimize the potential for contamination of runoff from these areas.

5. Annual Review

At least once every twelve (12) months, you must review the selection, design, installation, and implementation of your control measures to determine if modifications are necessary to meet the effluent limitations in this permit. You must document the results of your review in a report that shall be retained within the SWPPP. You must also submit the report to the Industrial NPDES Permit Section, as well as the Compliance Branch, on an annual basis. The report may be submitted by email to the Industrial NPDES Permit Section at OWQWWPER@idem.in.gov and to the Compliance Branch at wwReports@idem.in.gov. The email subject line should include the NPDES Permit # and the type of report being submitted (Annual Storm Water Report). The permittee's first annual review report will be due twelve (12) months from the effective date of the permit.

6. Corrective Actions – Conditions Requiring Review

a. If any of the following conditions occur, you must review and revise the selection, design, installation, and implementation of your control measures to ensure that the condition is eliminated and will not be repeated:

(1) an unauthorized release or discharge (e.g., spill, leak, or discharge of non-storm water not authorized by this NPDES permit) occurs at this facility;

(2) it is determined that your control measures are not stringent enough for the discharge to meet applicable water quality standards;

(3) it is determined in your routine facility inspection, an inspection by EPA or IDEM, comprehensive site evaluation, or the Annual Review required in Part D.5 that modifications to the control measures are necessary to meet the effluent limits in this permit or that your control measures are not being properly operated and maintained; or

(4) Upon written notice by the Commissioner that the control measures prove to be ineffective in controlling pollutants in storm water discharges exposed to industrial activity.

b. If construction or a change in design, operation, or maintenance at your facility significantly changes the nature of pollutants discharged in storm water from your facility, or significantly increases the quantity of pollutants discharged, you must review and revise the selection, design, installation, and implementation of your control measures to determine if modifications are necessary to meet the effluent limits in this permit:

7. Corrective Action Deadlines

You must document your discovery of any of the conditions listed in Part I.D.6 within forty-five (45) days of making such discovery. Subsequently, within one-hundred and twenty (120) days of such discovery, you must document any corrective action(s) to be taken to eliminate or further investigate the deficiency or if no corrective action is needed, the basis for that determination. Specific documentation required within 45 and 120 days is detailed below. If you determine that changes to your control measures are necessary following your review, any modifications to your control measures must be made before the next storm event if possible, or as soon as practicable following that storm event. These time intervals are not grace periods, but schedules considered reasonable for the documenting of your findings and for making repairs and improvements. They are included in this permit to ensure that the conditions prompting the need for these repairs and improvements are not allowed to persist indefinitely.

8. Corrective Action Report

a. Within 45 days of a discovery of any condition listed in Part I.D.6, you must document the following information:

(1) Brief description of the condition triggering corrective action;

(2) Date condition identified; and

(3) How deficiency identified.

b. Within 120 days of discovery of any condition listed in Part I.D.6, you must document the following information:

(1) Summary of corrective action taken or to be taken (or, for triggering events identified in Part I.D.6.b.(1), where you determine that corrective action is not necessary, the basis for this determination)

(2) Notice of whether SWPPP modifications are required as a result of this discovery or corrective action;

(3) Date corrective action initiated; and

(4) Date corrective action completed or expected to be completed.

9. Inspections

The inspections in this part must be conducted at this facility when the facility is operating. Any corrective action required as a result of an inspection or evaluation conducted under Part I.D.9. must be performed consistent with Part I.D.6 of this permit.

a. Quarterly Inspections

At a minimum, quarterly inspections of the storm water management measures and storm water run-off conveyances. The routine inspections must be performed by qualified personnel with at least one member of your storm water pollution prevention team. Inspections must be documented and either contained in, or have the on-site record keeping location referenced in, the SWPPP.

As part of the routine inspections, address all potential sources of pollutants, including (if applicable) air pollution control equipment (e.g., baghouses, electrostatic precipitator, scrubbers, and cyclones), for any signs of degradation (e.g., leaks, corrosion, or improper operation) that could limit their efficiency and lead to excessive emissions.

As part of your inspection, inspect the following areas monthly: coal handling areas, loading or unloading areas, switchyards, fueling areas, bulk storage areas, ash handling areas, areas adjacent to disposal ponds and landfills, maintenance areas, liquid storage tanks, and long term and short term material storage areas.

Considering monitoring air flow at inlets and outlets (or use equivalent measures) to check for leaks (e.g., particulate deposition) or blockage in ducts. Also inspect all process and material handling equipment (e.g., conveyors, cranes, and vehicles) for leaks, drips, or the potential loss of material; and material storage areas (e.g., piles, bins, or hoppers for storing coke, coal, scrap, or slag, as well as chemicals stored in tanks and drums) for signs of material loss due to wind or storm water runoff.

Based on the results of the evaluation, the description of potential pollutant sources identified in the plan in accordance with Part I.E.2.b of this permit and pollution prevention measures and controls identified in the plan in accordance with Part I.D.4. of this permit shall be revised as appropriate within the timeframes contained in Part I.D.7 of this permit.

b. Annual Routine Facility Inspection

At least once during the calendar year, a routine facility inspection must be conducted while a discharge is occurring. You must document the findings of each routine facility inspection performed and maintain this documentation with your SWPPP or have the on-site record keeping location referenced in the SWPPP. At a minimum, your documentation must include:

(1) The inspection date and time;

(2) The name(s) and signature(s) of the inspectors;

(3) Weather information and a description of any discharges occurring at the time of the inspection;

(4) Any previously unidentified discharges of pollutants from the site;

(5) Any control measures needing maintenance or repairs;

(6) Any failed control measures that need replacement;

(7) Any incidents of noncompliance observed; and

(8) Any additional control measures needed to comply with the permit requirements.

c. Annual Comprehensive Site Compliance Evaluation

Qualified personnel and at least one member of your Pollution Prevention Team shall conduct a comprehensive site compliance evaluation, at least once per year, to confirm the accuracy of the description of potential pollution sources contained in the plan, determine the effectiveness of the plan, and assess compliance with the permit. Such evaluations shall provide:

(1) Areas contributing to a storm water discharge associated with industrial activity shall be visually inspected for evidence of, or the potential for, pollutants entering the drainage system. Measures to reduce pollutant loadings shall be evaluated to determine whether they are adequate and properly implemented in accordance with the terms of the permit or whether additional control measures are needed. Structural storm water management measures, sediment and erosion control measures, and other structural pollution prevention measures identified in the plan shall be observed to ensure that they are operating correctly. A visual inspection of equipment needed to implement the plan, such as spill response equipment, shall be made.

(2) A report summarizing the scope of the evaluation, personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the storm water pollution prevention plan, and actions taken in accordance with the above paragraph must be documented and either contained in, or have on-site record keeping location referenced in, the SWPPP at least 3 years after the date of the evaluation. The report shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the storm water pollution prevention plan and this permit. The report shall be signed in accordance with the signatory requirements of Part II.C.6 of this permit.

(3) Where compliance evaluation schedules overlap the inspections required under this part, the compliance evaluation may be conducted in place of one such inspection.

E. STORM WATER POLLUTION PREVENTION PLAN

1. Development of Plan

Within 12 months from the effective date of this permit, the permittee is required to revise and update the current Storm Water Pollution Prevention Plan (SWPPP) for the permitted facility. The plan shall at a minimum include the following:

a. Identify potential sources of pollution, which may reasonably be expected to affect the quality of storm water discharges associated with industrial activity from the facility. Storm water associated with industrial activity (defined in 40 CFR 122.26(b)(14)) includes, but is not limited to, the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or materials storage areas at an industrial plant;

b. Describe practices and measure to be used in reducing the potential for pollutants to be exposed to storm water; and

c. Assure compliance with the terms and conditions of this permit.

2. <u>Contents</u>

The plan shall include, at a minimum, the following items:

a. <u>Pollution Prevention Team</u> -The plan shall list, by position title, the member or members of the facility organization as members of a Storm Water Pollution Prevention Team who are responsible for developing the storm water pollution prevention plan (SWPPP) and assisting the facility or plant manager in its implementation, maintenance, and revision. The plan shall clearly identify the responsibilities of each storm water pollution prevention team member. Each member of the storm water pollution prevention team must have ready access to either an electronic or paper copy of applicable portions of this permit and your SWPPP.

b. <u>Description of Potential Pollutant Sources</u> – The plan shall provide a description of areas at the site exposed to industrial activity and have a reasonable potential for storm water to be exposed to pollutants. The plan shall identify all activities and significant materials (defined in 40 CFR 122.26(b)), which may potentially be significant pollutant sources. As a minimum, the plan shall contain the following:

(1) A soils map indicating the types of soils found on the facility property and showing the boundaries of the facility property.

(2) A graphical representation, such as an aerial photograph or site layout maps, drawn to an appropriate scale, which contains a legend and compass coordinates, indicating, at a minimum, the following:

(A) All on-site storm water drainage and discharge conveyances, which may include pipes, ditches, swales, and erosion channels, related to a storm water discharge.

(B) Known adjacent property drainage and discharge conveyances, if directly associated with run-off from the facility.

(C) All on-site and known adjacent property water bodies, including wetlands and springs.

(D) An outline of the drainage area for each outfall.

(E) An outline of the facility property, indicating directional flows, via arrows, of surface drainage patterns.

(F) An outline of impervious surfaces, which includes pavement and buildings, and an estimate of the impervious and pervious surface square footage for each drainage area placed in a map legend.

(G) On-site injection wells, as applicable.

(H) On-site wells used as potable water sources, as applicable.

(I) All existing major structural control measures to reduce pollutants in storm water run-off.

(J) All existing and historical underground or aboveground storage tank locations, as applicable.

(K) All permanently designated plowed or dumped snow storage locations.

(L) All loading and unloading areas for solid and liquid bulk materials.

(M) All existing and historical outdoor storage areas for raw materials, intermediary products, final products, and waste materials. Include materials handled at the site that potentially may be exposed to precipitation or runoff, areas where deposition of particulate matter from process air emissions or losses during material-handling activities.

(N) All existing or historical outdoor storage areas for fuels, processing equipment, and other containerized materials, for example, in drums and totes.

(O) Outdoor processing areas.

(P) Dust or particulate generating process areas.

(Q) Outdoor assigned waste storage or disposal areas.

(R) Pesticide or herbicide application areas.

(S) Vehicular access roads.

(T) Identify any storage or disposal of wastes such as spent solvents and baths, sand, slag and dross; liquid storage tanks and drums; processing areas including pollution control equipment (e.g., baghouses); and storage areas of raw material such as coal, coke, scrap, sand, fluxes, refractories, or metal in any form. In addition, indicate where an accumulation of significant amounts of particulate matter could occur from such sources as furnace or oven emissions, losses from coal and coke handling operation, etc., and could result in a discharge of pollutants.

(U) The mapping of historical locations is only required if the historical locations have a reasonable potential for storm water exposure to historical pollutants.

(3) An area site map that indicates:

(A) The topographic relief or similar elevations to determine surface drainage patterns;

(B) The facility boundaries;

(C) All receiving waters;

(D) All known drinking water wells; and

Includes at a minimum, the features in clauses (A), (C), and (D) within a one-fourth (1/4) mile radius beyond the property boundaries of the facility. This map must be to scale and include a legend and compass coordinates.

(4) A narrative description of areas that generate storm water discharges exposed to industrial activity including descriptions for any existing or historical areas listed in subdivision 2.b.(2)(J) through (T) of this Part, and any other areas thought to generate storm water discharges exposed to industrial activity. The narrative descriptions for each identified area must include the following:

(A) Type and typical quantity of materials present in the area.

(B) Methods of storage, including presence of any secondary containment measures.

(C) Any remedial actions undertaken in the area to eliminate pollutant sources or exposure of storm water to those sources. If a corrective action plan was developed, the type of remedial action and plan date shall be referenced.

(D) Any significant release or spill history dating back a period of three (3) years from the effective date of this permit, in the identified area, for materials spilled outside of secondary containment structures and impervious surfaces in excess of their reportable quantity, including the following:

i. The date and type of material released or spilled.

ii. The estimated volume released or spilled.

iii. A description of the remedial actions undertaken, including disposal or treatment.

Depending on the adequacy or completeness of the remedial actions, the spill history shall be used to determine additional pollutant sources that may be exposed to storm water. In subsequent permit terms, the history shall date back for a period of five (5) years from the date of the permit renewal application.

(E) Where the chemicals or materials have the potential to be exposed to storm water discharges, the descriptions for each identified area must include a risk identification analysis of chemicals or materials stored or used within the area. The analysis must include the following:

i. Toxicity data of chemicals or materials used within the area, referencing appropriate material safety data sheet information locations.

ii. The frequency and typical quantity of listed chemicals or materials to be stored within the area.

iii. Potential ways in which storm water discharges may be exposed to listed chemicals and materials.

iv. The likelihood of the listed chemicals and materials to come into contact with water.

(5) A narrative description of existing and planned management practices and measures to improve the quality of storm water run-off entering a water of the state. Descriptions must be created for existing or historical areas listed in subdivision 2.b.(2)(J) through (T) and any other areas thought to generate storm water discharges exposed to industrial activity. The description must include the following:

(A) Any existing or planned structural and nonstructural control practices and measures.

(B) Any treatment the storm water receives prior to leaving the facility property or entering a water of the state.

(C) The ultimate disposal of any solid or fluid wastes collected in structural control measures other than by discharge.

(D) Describe areas that due to topography, activities, or other factors have a high potential for significant soil erosion.

(E) Document the location of any storage piles containing salt used for deicing.

(F) Information or other documentation required under Part I.E.2(d) of this permit.

(6) The results of storm water monitoring. The monitoring data must include completed field data sheets, chain-of-custody forms, and laboratory results. If the monitoring data are not placed into the facility's SWPPP, the on-site location for storage of the information must be reference in the SWPPP.

(7) Drainage Area Site Map. Document in your SWPPP the locations of any of the following activities or sources that may be exposed to precipitation or surface runoff: storage tanks, scrap yards, and general refuse areas; short- and long-term storage of general materials (including but not limited to supplies, construction materials, paint equipment, oils, fuels, used and unused solvents, cleaning materials, paint, water treatment chemicals, fertilizer, and pesticides); landfills and construction sites; and stock pile areas (e.g., coal or limestone piles).

(8) Documentation of Good Housekeeping Measures. You must document in your SWPPP the good housekeeping measures implemented to meet the effluent limits in Part I.D.4 of this NPDES permit.

c. Non-Storm water Discharges – You must document that you have evaluated for the presence of non-storm water discharges not authorized by an NPDES permit. Any non-storm water discharges have either been eliminated or incorporated into this permit. Documentation of non-storm water discharges shall include:

(1) A written non-storm water assessment, including the following:

(A) A certification letter stating that storm water discharges entering a water of the state have been evaluated for the presence of illicit discharges and non-storm water contributions.

(B) Detergent or solvent-based washing of equipment or vehicles that would allow washwater additives to enter any storm water only drainage system shall not be allowed at this facility unless appropriately permitted under this NPDES permit.

(C) All interior maintenance area floor drains with the potential for maintenance fluids or other materials to enter storm water only storm sewers must be either sealed, connected to a sanitary sewer with prior authorization, or appropriately permitted under this NPDES permit. The sealing, sanitary sewer connecting, or permitting of drains under this item must be documented in the written non-storm water assessment program.

(D) The certification shall include a description of the method used, the date of any testing, and the on-site drainage points that were directly observed during the test.

d. General Requirements – The SWPPP must meet the following general requirements:

(1) The plan shall be certified by a qualified professional. The term qualified professional means an individual who is trained and experienced in water treatment techniques and related fields as may be demonstrated by state registration, professional certification, or completion of course work that enable the individual to make sound, professional judgments regarding storm water control/treatment and monitoring, pollutant fate and transport, and drainage planning.

(2) The plan shall be retained at the facility and be available for review by a representative of the Commissioner upon request. IDEM may provide access to portions of your SWPPP to the public.

(3) The plan must be revised and updated as required. Revised and updated versions of the plan must be implemented on or before three hundred sixty-five (365) days from the effective date of this permit. The Commissioner may grant an extension of this time frame based on a request by the person showing reasonable cause.

(4) If the permittee has other written plans, required under applicable federal or state law, such as operation and maintenance, spill prevention control and countermeasures (SPCC), or risk contingency plans, which fulfill certain requirements of an SWPPP, these plans may be referenced, at the permittee's discretion, in the appropriate sections of the SWPPP to meet those section requirements.

(5) The permittee may combine the requirements of the SWPPP with another written plan if:

(A) The plan is retained at the facility and available for review;

(B) All the requirements of the SWPPP are contained within the plan; and

(C) A separate, labeled section is utilized in the plan for the SWPPP requirements.

F. STORM WATER SAMPLING

1. Beginning on the effective date, the permittee shall continue the current schedule of conducting storm water monitoring for the storm water discharge points set out in Paragraph 2 of this section on a semi-annual basis with the exception of lead, which will be sampled quarterly.

2. Storm Water Monitoring:

a. Storm Water Monitoring Points:

SW-01	DA #11	East Side of Slip (LM)
SW-08	DA #32	Virginia Tunnel Drain (GCR)
SW-11		Broadway Tunnel Drain (GCR)
Outfall 032	DA #20	Bar Mill and Billet Storage Areas (GCR)
Outfall 033	DA #21	Tin Plate Areas, Atmospheric Gas Plant, Sheet Mill (GCR)

DA – Drainage Area
GCR – Grand Calumet River
LM – Lake Michigan

b. Monitoring requirements applicable to all points listed above:

Oil & Grease,
Carbonaceous Biochemical Oxygen Demand (CBOD5),
Chemical Oxygen Demand (COD),
Total Suspended Solids (TSS),
Total Kjeldahl Nitrogen (TKN),
Nitrite Plus Nitrate Nitrogen,
Total Phosphorus,
Zinc, and
pH

c. Additional monitoring requirements for specific outfalls are:

(i) Monitoring Points SW-01, 08, and 11:
Ammonia (as N),
Lead, and
Copper.

d. For all point source discharges of storm water, see Part I.B of the permit for the Minimum Narrative Limitations

e. In the event storm water runoff is not discharged from the same locations monitored for in the storm water application (2F) dated May 1, 2020, the permittee shall monitor storm water runoff from a point or points representative of the discrete storm water drainage areas illustrated in the application.

f. Monitoring Pollutant Reduction Measures:

This permit stipulates a pollutant baseline concentration that shall be used as a means for comparison of future discharge concentrations. Baseline monitoring will be on a semi-annual basis, except for lead which will be on a quarterly basis, and will provide a basis for the facility to know when additional corrective measures are necessary.

U.S. Steel will use the previous five (5) years of storm water data from the effective date of the permit to statistically determine the initial baseline concentration for total recoverable zinc, total suspended solids, total recoverable lead, and chemical oxygen demand. New baseline concentrations shall be statistically re-calculated using a five (5) year rolling dataset whenever the semi-annual or quarterly concentration(s) is less than the existing baseline concentration(s). A new baseline exceeding an existing baseline will default to the existing baseline until the next recalculation. A sample result exceeding an existing baseline at the time of comparison shall never be included in a baseline recalculation.

Storm water monitoring data collected during the permit term shall be compared to the base line concentrations to determine if the control measures being implemented at the site result in an improvement from the baseline established by the permittee. If a sample result exceeds the baseline concentration, the permittee must take corrective actions in Part I.D. of the permit. Follow-up sampling should occur as soon as possible after implementation of corrective actions.

An exceedance of a baseline concentration is not a permit violation. However, failing to take the corrective actions in Part I.D. as a result of a baseline concentration exceedance is a violation of the permit. The permittee shall strive for continuous improvement from the baseline until it has been demonstrated that the permittee has implemented the best management practice to meet the provisions in Part I.D.4 of this permit. This permit also requires an annual review of the selection, design, installation, and implementation of your control measures.

The permittee shall retain any and all records related to this documentation within the SWPPP. In addition, this same information must also be submitted to the Industrial NPDES Permit Section on an annual basis.

g. Parameters for determining baseline concentrations:

Monitoring Parameters		
Parameter	Outfalls	Monitoring Concentration
Total Recoverable Zinc	All Storm Water Locations in Part I.F.2	Report mg/l
Total Suspended Solids	All Storm Water Locations in Part I.F.2	Report mg/l
COD	All Storm Water Locations in Part I.F.2	Report mg/l
Total Recoverable Lead	SW-01, SW-08, SW-11	Report mg/l

G. POLLUTION MINIMIZATION PROGRAM

The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ unless the permittee provides information in accordance with Part I.G.b that demonstrates the discharges will be in compliance with the WQBEL at the point of discharge. This permit contains a WQBEL below the LOQ for TRC at Outfalls 015, 018, 019, 020, 021, 028, 030, 032, 033, 034, 035, 037, and 039. The permittee has previously submitted information in accordance with Part I.G.b. for Total Residual Chlorine, therefore a PMP will not be required for Total Residual Chlorine.

a. The goal of the pollutant minimization program shall be to maintain the effluent at or below the WQBEL. The pollutant minimization program shall include, but is not limited to, the following:

(1) Submit a control strategy designed to proceed toward the goal within one hundred eighty (180) days of the effective date of this permit.

(2) Implementation of appropriate cost-effective control measures, consistent with the control strategy within three hundred and sixty-five (365) days of the effective date of this permit.

(3) Monitor as necessary to record the progress toward the goal. Potential sources of the pollutant shall be monitored on a semi-annual basis. Quarterly monitoring of the influent of the wastewater treatment system is also required. The permittee may request a reduction in this monitoring requirement after four quarters of monitoring data.

(4) Submit an annual status to the Commissioner at the address listed in Part I.C.3.g. to the attention of the Office of Water Quality, Compliance Data Section, by January 31 of each year that includes the following information:

(i) All minimization program monitoring results for the previous year.

(ii) A list of potential sources of the pollutant.

(iii) A summary of all actions taken to reduce or eliminate the identified sources of the pollutant.

(5) A pollution minimization program may include the submittal of pollution prevention strategies that use changes in production process technology, materials, processes, operations, or procedures to reduce or eliminate the source of the pollutant.

b. No pollution minimization program is required if the permittee demonstrates that the discharge of a pollutant with a WQBEL below the LOQ is reasonably expected to be in compliance with the WQBEL at the point of discharge into the receiving water. This demonstration may include, but is not limited to, the following:

(1) Treatment information, including information derived from modeling the destruction of removal of the pollutant in the treatment process.

(2) Mass balance information.

(3) Fish tissue studies or other biological studies.

c. In determining appropriate cost-effective control measures to be implemented in a pollution minimization program, the following factors may be considered:

(1) Significance of sources.

(2) Economic and technical feasibility.

(3) Treatability.

H. SANITARY LIFT STATION EMERGENCY OVERFLOWS

Discharges from sanitary sewer system lift stations, or any other portion of the sanitary sewer system, are expressly prohibited. Should any discharge occur, the permittee shall notify the Compliance Evaluation Section within the Office of Water Quality within 24 hours and in writing within five (5) days of the event in accordance with Part II.C.4. The correspondence shall include a description of the duration and cause of the discharge as well as the remedial action taken to eliminate it. The duration and estimated volume of the discharge shall also be reported on the Discharge Monitoring Report. The permittee shall comply with any other relevant provision of its permit in the event of a discharge, including 327 IAC 5-2-8(3).

I. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

To adequately assess the effects of the effluent on aquatic life, the permittee is required by this section of the permit to conduct chronic whole effluent toxicity (WET) testing. Part I.I.1. of this permit describes the testing procedures and Part I.I.2. describes the toxicity reduction evaluation (TRE) which is only required if the effluent demonstrates toxicity in two (2) consecutive toxicity tests as described in Part I.I.1.f.

1. <u>Whole Effluent Toxicity (WET) Tests</u>

The permittee must conduct the series of aquatic toxicity tests specified in Part I.I.1.d. to monitor the acute and chronic toxicity of the effluent discharged from Outfalls 015, 028/030 (600), and 034.

If toxicity is demonstrated in two (2) consecutive toxicity tests, as described in Part I.I.1.f., with any test species during the term of the permit, the permittee is required to conduct a TRE under Part I.I.2.

a. Toxicity Test Procedures and Data Analysis

(1) All test organisms, test procedures and quality assurance criteria used must be in accordance with the Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition, Section 11, Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test Method 1000.0, and Section 13, Daphnid (*Ceriodaphnia dubia*) Survival and Reproduction Test Method 1002.0, EPA 821-R-02-013, October 2002 (hereinafter "Chronic Toxicity Test Method"), or most recent update that conforms to the version of 40 CFR 136 incorporated by reference in 327 IAC 5. [References to specific portions of the Chronic Toxicity Test Method contained in this Part I.I are provided for informational purposes. If the Chronic Toxicity Test Method is updated, the corresponding provisions of that updated method would be applicable.]

(2) Any circumstances not covered by the above methods, or that require deviation from the specified methods must first be approved by the IDEM Permits Branch.

(3) The determination of acute and chronic endpoints of toxicity (LC_{50}, NOEC and IC_{25} values) must be made in accordance with the procedures in Section 9, "Chronic Toxicity Test Endpoints and Data Analysis" and the Data Analysis procedures as outlined in Section 11 for fathead minnow (Test Method 1000.0; see flowcharts in Figures 5, 6 and 9) and Section 13 for *Ceriodaphnia dubia* (Test Method 1002.0; see flowcharts in Figures 4 and 6) of the Chronic Toxicity Test Method. The IC_{25} value together with 95% confidence intervals calculated by the Linear Interpolation and Bootstrap Methods in Appendix M of the Chronic Toxicity Test Method must be determined in addition to the NOEC value.

b. Types of Whole Effluent Toxicity Tests

(1) Tests may include a 3-brood (7-day) definitive static-renewal daphnid (*Ceriodaphnia dubia*) survival and reproduction toxicity test and a 7-day definitive static-renewal fathead minnow (*Pimephales promelas*) larval survival and growth toxicity test.

(2) All tests must be conducted using 24-hour composite samples of final effluent. Three effluent samples are to be collected on alternate days (e.g., collected on days one, three and five). The first effluent sample will be used for test initiation and for test solution renewal on day 2. The second effluent sample will be used for test solution renewal on days 3 and 4. The third effluent sample will be used for test solution renewal on days 5, 6 and 7. If shipping problems are encountered with renewal samples after a test has been initiated, the most recently used sample may continue to be used for test renewal, if first approved by the IDEM Permits Branch, but for no longer than 72 hours after first use.

(3) The whole effluent dilution series for the definitive test must include a control and at least five effluent concentrations with a minimum dilution factor of 0.5. The effluent concentrations selected must include and, if practicable, bracket the effluent concentrations associated with the determinations of acute and chronic toxicity provided in Part I.I.1.f. Guidance on selecting effluent test concentrations is included in Section 8.10 of the Chronic Toxicity Test Method. The use of an alternate procedure for selecting test concentrations must first be approved by the IDEM Permits Branch.

(4) If, in any control, more than 10% of the test organisms die in the first 48 hours with a daphnid species or the first 96 hours with fathead minnow, or more than 20% of the test organisms die in 7 days, that test is considered invalid and the toxicity test must be repeated. In addition, if in the *Ceriodaphnia dubia* survival and reproduction test, the average number of young produced per surviving female in the control group is less than 15, or if 60% of surviving control females have less than three broods; and in the fathead minnow (*Pimephales promelas*) survival and growth test, if the mean dry weight of surviving fish in the control group is less than 0.25 mg, that test is considered invalid and must also be repeated. All other test conditions and test acceptability criteria for the fathead minnow (*Pimephales promelas*) and *Ceriodaphnia dubia* chronic toxicity tests must be in accordance with the test requirements in Section 11 (Test Method 1000.0), Table 1 and Section 13 (Test Method 1002.0), Table 3, respectively, of the Chronic Toxicity Test Method.

c. Effluent Sample Collection and Chemical Analysis

(1) Whole effluent samples taken for the purposes of toxicity testing must be 24-hour composite samples collected at a point that is representative of the final effluent, but prior to discharge. Effluent sampling for the toxicity testing may be coordinated with other permit sampling requirements as appropriate to avoid duplication. First use of the whole effluent toxicity testing samples must not exceed 36 hours after termination of the 24-hour composite sample collection and must not be used for longer than 72 hours after first use. For discharges of less than 24 hours in duration, composite samples must be collected for the duration of the discharge within a 24-hour period (see "24-hour composite sample" definition in Part I.C.3. of this permit).

(2) Chemical analysis must accompany each effluent sample taken for toxicity testing, including each sample taken for the repeat testing as outlined in Part I.I.1.f.(3). The chemical analysis detailed in Parts I.A.3, 12, and 20 must be conducted for the effluent sample in accordance with Part I.C.4. of this permit.

d. Toxicity Testing Species, Frequency and Duration

For Outfalls 015 and 034, chronic toxicity testing for *Ceriodaphnia dubia* must be conducted once annually, as calculated from the effective date of the permit, for the duration of the permit. For Outfall 028/030 (600), chronic toxicity testing for *Ceriodaphnia dubia* must be conducted twice annually, for the duration of the permit. Chronic toxicity testing for Outfall 600 shall alternate between Outfalls 028 and 030 every six (6) months, as calculated from the effective date of the permit. Under the previous permit, this facility conducted whole effluent toxicity testing using the most sensitive species. Based on the permittee's record of compliance with whole effluent toxicity testing, the number of species tested may continue to include only the one most sensitive to the toxicity in the effluent.

If a TRE is initiated during the term of the permit, after receiving notification under Part I.I.1.e, the Compliance Data Section will suspend the toxicity testing requirements above for the term of the TRE compliance schedule described in Part I.I.2. After successful completion of the TRE, the toxicity tests established under Part I.I.2.c.(4) must be conducted once every six (6) months, as calculated from the first day of the first month following successful completion of the post-TRE toxicity tests (see Part I.I.2.c.(4)), for the remainder of the permit term.

e. Reporting

(1) Notifications of the failure of two (2) consecutive toxicity tests and the intent to begin the implementation of a toxicity reduction evaluation (TRE) under Part I.I.1.f.(4) must be submitted in writing to the Compliance Data Section of IDEM's Office of Water Quality.

(2) Results of all toxicity tests, including invalid tests, must be reported to IDEM according to the general format and content recommended in the Chronic Toxicity Test Method, Section 10, "Report Preparation and Test Review". However, only the results of valid toxicity tests are to be reported on the discharge monitoring report (DMR). The results of the toxicity tests and laboratory report are due by the earlier of 60 days after completion of the test or the 28th day of the month following the end of the period established in Part I.I.1.d.

(3) The full whole effluent toxicity (WET) test laboratory report must be submitted to IDEM electronically as an attachment to an e-mail to the Compliance Data Section at wwreports@idem.IN.gov. The results must also be submitted via NetDMR.

(4) For quality control and ongoing laboratory performance, the laboratory report must include results from appropriate standard reference toxicant tests. This will consist of acute (LC_{50} values), if available, and chronic (NOEC, LOEC and IC_{25} values) endpoints of toxicity obtained from reference toxicant tests conducted within 30 days of the most current effluent toxicity tests and from similarly obtained historical reference toxicant data with mean values and appropriate ranges for each species tested for at least three months to one year. Toxicity test laboratory reports must also include copies of chain-of-custody records and laboratory raw data sheets.

(5) Statistical procedures used to analyze and interpret toxicity data (e.g., Fisher's Exact Test and Steel's Many-one Rank Test for 7-day survival of test organisms; tests of normality (e.g., Shapiro-Wilk's Test) and homogeneity of variance (e.g., Bartlett's Test); appropriate parametric (e.g., Dunnett's Test) and non-parametric (e.g., Steel's Many-one Rank Test) significance tests and point estimates (IC_{25}) of effluent toxicity, etc.; together with graphical presentation of survival, growth and reproduction of test organisms), including critical values, levels of significance and 95% confidence intervals, must be described and included as part of the toxicity test laboratory report.

(6) For valid toxicity tests, the whole effluent toxicity (WET) test laboratory report must include a summary table of the results for each species tested as shown in the table presented below. This table will provide toxicity test results, reported in acute toxic units (TU_a) and chronic toxic units (TU_c), for evaluation under Part I.I.1.f. and reporting on the discharge monitoring report (DMR).

Test Organism [1]	Test Type	Endpoint [2]	Units	Result	Compliance Limit [6]	Pass/ Fail [7]	Reporting
Ceriodaphnia dubia	3-brood (7-day) Definitive Static-Renewal Survival and Reproduction	48-hr. LC_{50}	%	Report			Laboratory Report
			TU_a	Report			
		NOEC Survival	%	Report			
			TU_c	Report			
		NOEC Reproduction	%	Report			
			TU_c	Report			
		IC_{25} Reproduction	%	Report			
			TU_c	Report			
		Toxicity (acute) [3]	TU_a	Report [5]	1.0	Report	Laboratory Report **and NetDMR** (Parameter Code 61425)
		Toxicity (chronic) [4]	TU_c	Report [5]	Outfall 015: 1.0 Outfall 600: 2.6 Outfall 034: 3.1	Report	Laboratory Report **and NetDMR** (Parameter Code 61426)
Pimephales promelas	7-day Definitive Static-Renewal Larval Survival and Growth	96-hr. LC_{50}	%	Report			Laboratory Report
			TU_a	Report			
		NOEC Survival	%	Report			
			TU_c	Report			
		NOEC Growth	%	Report			
			TU_c	Report			
		IC_{25} Growth	%	Report			
			TU_c	Report			
		Toxicity (acute) [3]	TU_a	Report [5]	1.0	Report	Laboratory Report **and NetDMR** (Parameter Code 61427)
		Toxicity (chronic) [4]	TU_c	Report [5]	Outfall 015: 1.0 Outfall600: 2.6 Outfall 034: 3.1	Report	Laboratory Report **and NetDMR** (Parameter Code 61428)

[1] For the whole effluent toxicity (WET) test laboratory report, eliminate from the table any species that was not tested.
[2] A separate acute test is not required. The endpoint of acute toxicity must be extrapolated from the chronic toxicity test.
[3] The toxicity (acute) endpoint for *Ceriodaphnia dubia* is the 48-hr. LC_{50} result reported in acute toxic units (TU_a). The toxicity (acute) endpoint for *Pimephales promelas* is the 96-hr. LC_{50} result reported in acute toxic units (TU_a).
[4] The toxicity (chronic) endpoint for *Ceriodaphnia dubia* is the higher of the NOEC Survival, NOEC Reproduction and IC_{25} Reproduction values reported in chronic toxic units (TU_c). The

toxicity (chronic) endpoint for *Pimephales promelas* is the higher of the NOEC Survival, NOEC Growth and IC_{25} Growth values reported in chronic toxic units (TU_c).
[5] Report the values for acute and chronic endpoints of toxicity determined in [3] and [4] for the corresponding species. These values are the ones that need to be reported on the discharge monitoring report (DMR).
[6] These values do not represent effluent limitations, but rather exceedance of these values results in a demonstration of toxicity that triggers additional action and reporting by the permittee.
[7] If the toxicity result (in TUs) is less than or equal to the compliance limit, report "Pass". If the toxicity result (in TUs) exceeds the compliance limit, report "Fail".

f. Demonstration of Toxicity

(1) Toxicity (acute) will be demonstrated if the effluent is observed to have exceeded 1.0 TU_a (acute toxic units) for *Ceriodaphnia dubia* in 48 hours or in 96 hours for *Pimephales promelas*. For this purpose, a separate acute toxicity test is not required. The results for the acute toxicity demonstration must be extrapolated from the chronic toxicity test. For the purpose of selecting test concentrations under Part I.I.1.b.(3), the effluent concentration associated with acute toxicity is 100%.

(2) Toxicity (chronic) will be demonstrated if the effluent is observed to have exceeded TU_c (chronic toxic units) for *Ceriodaphnia dubia* or *Pimephales promelas* from the chronic toxicity test for the outfalls below:

Outfall	Chronic Toxicity Level	Units
015	1.0	TU_c
600	2.6	TU_c
034	3.1	TU_c

For the purpose of selecting test concentrations under Part I.I.1.b.(3), the effluent concentration associated with chronic toxicity is:

Outfall	Effluent Concentration
015	100%
600	38.5%
034	32.3%

(3) If toxicity (acute) or toxicity (chronic) is demonstrated in any of the chronic toxicity tests specified above, a repeat chronic toxicity test using the procedures in Part I.I.1. of this permit and the same test species must be initiated within two (2) weeks of test failure.

During the sampling for any repeat tests, the permittee must also collect and preserve sufficient effluent samples for use in any toxicity identification evaluation (TIE) and/or toxicity reduction evaluation (TRE), if necessary.

(4) If any two (2) consecutive chronic toxicity tests, including any and all repeat tests, demonstrate acute or chronic toxicity, the permittee must notify the Compliance Data Section under Part I.I.1.e. within 30 days of the date of termination of the second test, and begin the implementation of a toxicity reduction evaluation (TRE) as described in Part I.I.2. After receiving notification from the permittee, the Compliance Data Section will suspend the whole effluent toxicity testing requirements in Part I.I.1. for the term of the TRE compliance schedule.

g. Definitions

(1) "Acute toxic unit" or "TU_a" is defined as $100/LC_{50}$ where the LC_{50} is expressed as a percent effluent in the test medium of an acute whole effluent toxicity (WET) test that is statistically or graphically estimated to be lethal to fifty percent (50%) of the test organisms.

(2) "Chronic toxic unit" or "TU_c" is defined as 100/NOEC or $100/IC_{25}$, where the NOEC or IC_{25} are expressed as a percent effluent in the test medium.

(3) "Inhibition concentration 25" or "IC_{25}" means the toxicant (effluent) concentration that would cause a twenty-five percent (25%) reduction in a nonquantal biological measurement for the test population. For example, the IC_{25} is the concentration of toxicant (effluent) that would cause a twenty-five percent (25%) reduction in mean young per female or in growth for the test population.

(4) "No observed effect concentration" or "NOEC" is the highest concentration of toxicant (effluent) to which organisms are exposed in a full life cycle or partial life cycle (short term) test, that causes no observable adverse effects on the test organisms, that is, the highest concentration of toxicant (effluent) in which the values for the observed responses are not statistically significantly different from the controls.

2. Toxicity Reduction Evaluation (TRE) Schedule of Compliance

The development and implementation of a TRE is only required if toxicity is demonstrated in two (2) consecutive tests as described in Part I.I.1.f.(4). The post-TRE toxicity testing requirements in Part I.I.2.c. must also be completed as part of the TRE compliance schedule.

Milestone Dates: See a. through e. below for more detail on the TRE milestone dates.

Requirement	**Deadline**
Development and Submittal of a TRE Plan	Within 90 days of the date of two (2) consecutive failed toxicity tests.
Initiate a TRE Study	Within 30 days of TRE Plan submittal.
Submit TRE Progress Reports	Every 90 days beginning six (6) months from the date of two (2) consecutive failed toxicity tests.
Post-TRE Toxicity Testing Requirements	Immediately upon completion of the TRE, conduct three (3) consecutive months of toxicity tests with both test species; if no acute or chronic toxicity is shown with any test species, reduce toxicity tests to once every six (6) months for the remainder of the permit term. If post-TRE toxicity testing demonstrates toxicity, continue the TRE study.
Submit Final TRE Report	Within 90 days of successfully completing the TRE (including the post-TRE toxicity testing requirements), not to exceed three (3) years from the date that toxicity is initially demonstrated in two (2) consecutive toxicity tests.

a. Development of TRE Plan

Within 90 days of the date of two (2) consecutive failed toxicity tests (i.e. the date of termination of the second test), the permittee must submit plans for an effluent TRE to the Compliance Data Section. The TRE plan must include appropriate measures to characterize the causative toxicants and reduce toxicity in the effluent discharge to levels that demonstrate no toxicity with any test species as described in Part I.I.1.f. Guidance on conducting effluent toxicity reduction evaluations is available from EPA and from the EPA publications listed below:

(1) Methods for Aquatic Toxicity Identification Evaluations:

Phase I Toxicity Characterization Procedures, Second Edition (EPA/600/6-91/003), February 1991.

Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity (EPA/600/R-92/080), September 1993.

Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity (EPA/600/R-92/081), September 1993.

(2) Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I (EPA/600/6-91/005F), May 1992.

(3) Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs) (EPA/600/2-88/070), April 1989.

(4) Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program, U.S. EPA, March 27, 2001.

b. Conduct the TRE

Within 30 days after submittal of the TRE plan to the Compliance Data Section, the permittee must initiate the TRE consistent with the TRE plan.

c. Post-TRE Toxicity Testing Requirements

(1) After completing the TRE, the permittee must conduct monthly post-TRE toxicity tests with the two (2) test species *Ceriodaphnia dubia* and fathead minnow (*Pimephales promelas*) for a period of three (3) consecutive months.

(2) If the three (3) monthly tests demonstrate no toxicity with any test species as described in Part I.I.1.f., the TRE will be considered successful. Otherwise, the TRE study must be continued.

(3) The post-TRE toxicity tests must be conducted in accordance with the procedures in Part I.I.1. The results of these tests must be submitted as part of the final TRE Report required under Part I.I.2.d.

(4) After successful completion of the TRE, the permittee must resume the chronic toxicity tests required in Part I.I.1. The permittee may reduce the number of species tested to only include the species demonstrated to be most sensitive to the toxicity in the effluent. The established starting date for the frequency in Part I.I.1.d. is the first day of the first month following successful completion of the post-TRE toxicity tests.

d. Reporting

(1) Progress reports must be submitted every 90 days to the Compliance Data Section beginning six (6) months from the date of two (2) consecutive failed toxicity tests. Each TRE progress report must include a listing of proposed activities for the next quarter and a schedule to reduce toxicity in the effluent discharge to acceptable levels through control of the toxicant source or treatment of whole effluent.

(2) Within 90 days of successfully completing the TRE, including the three (3) consecutive monthly tests required as part of the post-TRE toxicity testing requirements in Part I.I.2.c., the permittee must submit to the Compliance Data Section a final TRE Report that includes the following:

(A) A discussion of the TRE results;

(B) The starting date established under Part I.I.2.c.(4) for the continuation of the toxicity testing required in Part I.I.1.; and

(C) If applicable, the intent to reduce the number of species tested to the one most sensitive to the toxicity in the effluent under Part I.I.2.c.(4).

e. Compliance Date

The permittee must complete items a., b., c. and d. from Part I.I.2. and reduce toxicity in the effluent discharge to acceptable levels as soon as possible, but no later than three (3) years from the date that toxicity is initially demonstrated in two (2) consecutive toxicity tests (i.e. the date of termination of the second test) as described in Part I.I.1.f.(4).

J. TOXIC ORGANIC POLLUTANT MANAGEMENT PLAN

In order to use the Certification Statement for Total Toxic Organics on Pages 38, 44, and 47 of this permit, the Permittee is required to submit a management plan for toxic organic pollutants. The Toxic Organic Pollutant Management Plan is to be submitted to the Compliance Data Section of the Office of Water Quality within ninety (90) days of the effective date of this permit, and is to include a listing of toxic organic compounds used, the method of disposal, and procedure for ensuring that these compounds do not routinely spill or leak into the process wastewater, noncontact cooling water, groundwater, stormwater, or other surface waters.

K. REPORTING REQUIREMENTS FOR SOLVENTS, DEGREASING AGENTS, ROLLING OILS, WATER TREATMENT CHEMICALS AND BIOCIDES

Annually, US Steel will report as part of the fourth monthly Discharge Monitoring Report of the following year, the total quantity (lbs/yr) of each solvent, degreasing agent, water treatment chemical, rolling oil and biocide that was purchased for that year and which can be present in any outfall regulated by this permit. This reporting requirement includes all surfactants, anionic, cationic and non-ionic, which may be used in part or wholly as a constituent in these compounds.

The permittee may submit the annual SARA 312 chemical inventory report, in lieu of a separate chemical report, by the end of the first quarter of each calendar year.

US Steel will maintain these files for a period of ten years. Files will include the Material Safety Data Sheet, FIFRA Label for each biocide, chemical name and CAS Number for each compound used. If these compounds contain proprietary material, US Steel may maintain this information in a separate file that can be accessed by U.S. EPA or IDEM personnel with appropriate authority.

L. VISIBLE OIL CORRECTIVE ACTION MONITORING PROGRAM

The permittee shall monitor the Grand Calumet River and Lake Michigan, in the vicinity of Outfalls 015, 018, 019, 020, 030, 033, 034, 035, and 037 in the manner and following the procedures and protocols established between United States Steel and US EPA. Frequency shall be at a rate of 5 X Weekly. All records for this program shall be maintained at the facility for inspection and review by IDEM.

M. ZEBRA AND QUAGGA MUSSEL CONTROL AND CHLORINATION

As a means of controlling both the Zebra and Quagga Mussel colonization at the US Steel Gary Works Facility, the permittee can chlorinate the intake water on a continuous basis year round. Wastewater will be de-chlorinated prior to discharge from an external Outfall. Currently, the affected outfalls are the following: 015, 018, 019, 020, 021, 028, 030, 032, 033, 034, 035, 037, AND 039.

In addition to the numeric effluent limitations specified at each individual outfall the following requirements shall apply:

The monthly average water quality based effluent limit (WQBEL) for Total Residual Chlorine is less than the limit of quantitation (LOQ) as defined below. Compliance with the monthly average limit will be demonstrated if the monthly average effluent level is less than or equal to the monthly average WQBEL. Daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for Total Residual Chlorine is less than the LOD as specified below. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

For calculating the monthly average values, See Part III.E. of this permit.

At present, two methods are considered to be acceptable to IDEM, amperometric and DPD colorimetric methods, for chlorine concentrations at the level of 0.06 mg/l.

Parameter	Test Method	LOD	LOQ
Chlorine	4500-Cl-D,E	0.02 mg/l	0.06 mg/l
Chlorine	4500-Cl-G	0.02 mg/l	0.06 mg/l

<u>Case-Specific LOD/LOQ</u>
The permittee may determine a case-specific LOD or LOQ using the analytical method specified above, or any other test method which is approved by the Commissioner prior to use. The LOD shall be derived by the procedure specified for method detection limits contained in 40 CFR Part 136, Appendix B, and the LOQ shall be set equal to 3.18 times the LOD. Other methods may be used if first approved by the Commissioner.

N. CYANIDE REQUIREMENTS

Sample preservation procedures and maximum allowable holding times for total cyanide, or available (free) are prescribed in Table II of 40 CFR Part 136. Note the footnotes specific to cyanide. Preservation and holding time information in Table II takes precedence over information in specific methods or elsewhere. Therefore, cyanide is to be monitored by collecting a representative grab sample and analyzing it within 24 hours. "Representative Grab Sample" is defined as a sample type of three grab samples within 24 hours.

O. MERCURY MONITORING REQUIREMENTS

1. Effluent mercury monitoring shall be conducted bi-monthly, monitoring in the months of February, April, June, August, October and December of each year for the term of the permit.

   The following EPA test method and/or Standard Method and associated LOD and LOQ is to be used in the analysis of the effluent samples (alternative methods may be used if first approved by IDEM):

Parameter	EPA Method	LOD	LOQ
Total Mercury	1631, Revision E	0.2 ng/l	0.5 ng/l

2. The interim discharge limit is the Annual Average. Compliance with the interim discharge limit will be achieved when the annual average measured over the most recent (rolling) twelve-month period is less than the interim discharge limit.

   Compliance with the interim discharge limit will demonstrate compliance with mercury discharge limitations of this permit for this outfall.

3. The permittee applied for, and received, a variance from the water quality criterion used to establish the referenced mercury WQBEL under 327 IAC 5-3.5. For the term of this permit, the permittee is subject to the interim discharge limit developed in accordance with 327 IAC 5-3.5-8.

   The permittee shall report both a daily maximum concentration and an annual average concentration for total mercury. The annual average value shall be calculated as the average of the measured effluent daily values from the most recent twelve-month period. Calculating and reporting of the annual average value for mercury is only required for the months when samples are taken for mercury.

   Reporting of the annual average value for mercury is not required during the first year of the permit term for Outfall 015, as that SMV has not yet been in place for a year.

4. The permittee shall at all times continue to operate and maintain the wastewater treatment system(s) in good working condition to minimize the discharge of Mercury.

5. See Part V of the permit for the Pollutant Minimization Program Plan (PMPP) requirements.

P. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the 316(b) impingement mortality BTA requirements established in Part III.A. of this permit for Pump Station No.1, Pump Station No.2, and the Lakeside Pump Station in accordance with the following schedules:

1. The below schedule of compliance is for installation of the selected BTA for impingement at Pump Station No. 1 and No. 2 Intakes. The permittee shall install new modified traveling screens with fish friendly return and that meet the definition of the rule 125.92(s) at these intakes no later than thirty-six (36) months after the effective date of this permit in accordance with the following schedule.

   a. As soon as practicable but no later than twelve (12) months after the effective date of the permit submit to the Industrial NPDES Permits Section of Office of Water Quality (OWQ) for review a conceptual design and plan for the modified traveling screens including fish return.

   b. As soon as practicable, but no later than eighteen (18) months after the effective date of the permit, complete detailed design of the modified traveling screens, including the fish return systems.

   c. As soon as practicable but no later than twenty-four (24) months after the effective date of the permit, initiate construction of the modified traveling screens and fish return systems.

   d. As soon as practicable, but no later than thirty-six (36) months after the effective date of the permit, complete construction of the modified traveling screen and fish return systems.

   e. Within thirty (30) days of completion of construction, the permittee shall file with the Industrial NPDES Permits Section of Office of Water Quality (OWQ) a notice of installation for the modified traveling screen and a design summary of any modifications.

   f. The permittee shall submit a written progress report to the Compliance Data Section of the OWQ three (3) months from the effective date of this permit and every six (6) months thereafter until the requirements in the compliance schedule outlined above have been achieved. The progress reports shall include relevant information related to steps the permittee has taken to meet the requirements in the compliance schedule and whether the permittee is meeting the dates in the compliance schedule.

2. The below schedule of compliance is for installation of the selected BTA for impingement at the Lakeside Pump Station. The permittee shall comply with the selected BTA for impingement in accordance with the following schedule.

a. As soon as practicable but no later than six (6) months after the effective date of this permit, the permittee must notify IDEM which of the following impingement mortality BTA options it has selected for this intake to comply with the cooling water intake structure requirements:

   i. The impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second].

   ii. The impingement mortality option under 40 CFR 125.94(c)(5) [modified traveling screens].

b. If the permittee has selected the impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second], the following compliance schedule is applicable.

   i. As soon as practicable but no later than six (6) months after the effective date of this permit submit to the Industrial NPDES Permits Section, Office of Water Quality (OWQ) for review and approval the information and operating protocol which supports compliance with maximum actual through screen velocity of 0.5 feet per second.

   ii. The permittee shall comply with this requirement as soon as practicable but no later than twelve (12) months after the effective date of the permit.

c. If the permittee has selected the impingement mortality option under 40 CFR 125.94(c)(5) [modified traveling screens], the following compliance schedule is applicable.

   i. As soon as practicable but no later than twelve (12) months after the effective date of the permit submit to the Industrial NPDES Permits Section of Office of Water Quality (OWQ) for review a conceptual design and plan for the modified traveling screens including fish return.

   ii. As soon as practicable, but no later than eighteen (18) months after the effective date of the permit, complete detailed design of the modified traveling screens, including the fish return systems.

   iii. As soon as practicable but no later than twenty-four (24) months after the effective date of the permit, initiate construction of the modified traveling screens and fish return systems.

   iv. As soon as practicable, but no later than thirty-six (36) months after the effective date of the permit, complete construction of the modified traveling screen and fish return systems.

v. Within thirty (30) days of completion of construction, the permittee shall file with the Industrial NPDES Permits Section of Office of Water Quality (OWQ) a notice of installation for the modified traveling screen and a design summary of any modifications.

d. The permittee shall submit a written progress report to the Compliance Data Section of the OWQ six (6) months from the effective date of this permit and every six (6) months thereafter until the requirements in the compliance schedules outlined above have been achieved. The progress reports shall include relevant information related to steps the permittee has taken to meet the requirements in the compliance schedule and whether the permittee is meeting the dates in the compliance schedule.

3. If the permittee fails to comply with any deadline contained in either of the foregoing schedules, the permittee shall, within fourteen (14) days following the missed deadline, submit a written notice of noncompliance to the Compliance Data Section of the OWQ stating the cause of noncompliance, any remedial action taken or planned, and the probability of meeting the date fixed for compliance.

Q. REOPENING CLAUSES

This permit may be modified, or alternately, revoked and reissued, after public notice and opportunity for hearing:

1. to comply with any applicable effluent limitation or standard issued or approved under 301(b)(2)(C),(D) and (E), 304 (b)(2), and 307(a)(2) of the Clean Water Act, if the effluent limitation or standard so issued or approved:

    a. contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

    b. controls any pollutant not limited in the permit.

2. to incorporate any of the reopening clause provisions cited at 327 IAC 5-2-16.

3. to include Whole Effluent Toxicity (WET) limitations or to include limitations for specific toxicants if the results of the WET testing and/or the Toxicity Reduction Evaluation (TRE) study indicate that such limitations are necessary.

4. to include a case-specific Limit of Detection (LOD) and/or Limit of Quantitation (LOQ). The permittee must demonstrate that such action is warranted in accordance with the procedures specified under Appendix B, 40 CFR Part 136, using the most sensitive analytical methods approved by EPA under 40 CFR Part 136, or approved by the Commissioner.

5. to specify the use of a different analytical method if a more sensitive analytical method has been specified in or approved under 40 CFR 136 or approved by the Commissioner to monitor for the presence and amount in the effluent of the pollutant for which the WQBEL is established. The permit shall specify, in accordance with 327 IAC 5-2-11.6(h)(2)(B), the LOD and LOQ that can be achieved by use of the specified analytical method.

6. this permit may be modified or revoked and reissued after public notice and opportunity for hearing to revise or remove the requirements of the pollutant minimization program, if supported by information generated as a result of the program.

7. to include revised Streamlined Mercury Variance (SMV) and/or Pollutant Minimization Program Plan (PMPP) requirements.

8. to comply with any applicable standards, regulations and requirements issued or approved under section 316(b) of the Clean Water Act. This includes, is but not limited to, modification to include verifiable and enforceable permit conditions that ensure the BTA technology installed at Pump Station No. 1, Pump Station No. 2, or the Lakeside Pump Station will perform as demonstrated.

9. to incorporate IDEM approved Alternative Thermal Effluent Limitations (ATELs) supported by a review of the available data.

10. to incorporate effluent limitations reflecting the results of a TMDL or a revised wasteload allocation if the IDEM determines that such effluent limitations are needed to assure that State Water Quality Standards are met in the receiving stream.

11. to include revisions based upon site specific studies. The permittee shall submit work plans to conduct such site-specific studies before initiation of the study. Work plans must be approved by IDEM and the results of all such studies must be approved by IDEM and possibly EPA. Any necessary rulemaking must be completed before the permit may be modified to reflect the results of the studies.

12. If IDEM determines that a treatment technology for the removal of mercury from wastewater may be technologically and economically viable, then the permittee must investigate and trial the technology as soon as possible. The permittee must develop a work plan, subject to IDEM approval, to investigate and trial the proposed technologies within 90 days after IDEM's determination. If the studies and trials show that the technology is capable and economically viable, the permittee will submit a schedule for full scale installation and treatment, subject to IDEM approval, within 6 months of the permittee's determination studies and trials show that the technology is capable and economically viable.

PART II

STANDARD CONDITIONS FOR NPDES PERMITS

A. GENERAL CONDITIONS

1. Duty to Comply

The permittee shall comply with all terms and conditions of this permit in accordance with 327 IAC 5-2-8(1) and all other requirements of 327 IAC 5-2-8. Any permit noncompliance constitutes a violation of the Clean Water Act and IC 13 and is grounds for enforcement action or permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

2. Duty to Mitigate

In accordance with 327 IAC 5-2-8(3), the permittee shall take all reasonable steps to minimize or correct any adverse impact to the environment resulting from noncompliance with this permit. During periods of noncompliance, the permittee shall conduct such accelerated or additional monitoring for the affected parameters, as appropriate or as requested by IDEM, to determine the nature and impact of the noncompliance.

3. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must obtain and submit an application for renewal of this permit in accordance with 327 IAC 5-2-8(2). It is the permittee's responsibility to obtain and submit the application. In accordance with 327 IAC 5-2-3(c), the owner of the facility or operation from which a discharge of pollutants occurs is responsible for applying for and obtaining the NPDES permit, except where the facility or operation is operated by a person other than an employee of the owner in which case it is the operator's responsibility to apply for and obtain the permit. Pursuant to 327 IAC 5-3-2(a)(2), the application must be submitted at least 180 days before the expiration date of this permit. This deadline may be extended if all of the following occur:

a. permission is requested in writing before such deadline;

b. IDEM grants permission to submit the application after the deadline; and

c. the application is received no later than the permit expiration date.

4. Permit Transfers

In accordance with 327 IAC 5-2-8(4)(D), this permit is nontransferable to any person except in accordance with 327 IAC 5-2-6(c). This permit may be transferred to another person by the permittee, without modification or revocation and reissuance being required under 327 IAC 5-2-16(c)(1) or 16(e)(4), if the following occurs:

a. the current permittee notified the Commissioner at least thirty (30) days in advance of the proposed transfer date;

b. a written agreement containing a specific date of transfer of permit responsibility and coverage between the current permittee and the transferee (including acknowledgment that the existing permittee is liable for violations up to that date, and the transferee is liable for violations from that date on) is submitted to the Commissioner;

c. the transferee certifies in writing to the Commissioner their intent to operate the facility without making such material and substantial alterations or additions to the facility as would significantly change the nature or quantities of pollutants discharged and thus constitute cause for permit modification under 327 IAC 5-2-16(d). However, the Commissioner may allow a temporary transfer of the permit without permit modification for good cause, e.g., to enable the transferee to purge and empty the facility's treatment system prior to making alterations, despite the transferee's intent to make such material and substantial alterations or additions to the facility; and

d. the Commissioner, within thirty (30) days, does not notify the current permittee and the transferee of the intent to modify, revoke and reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

The Commissioner may require modification or revocation and reissuance of the permit to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act or state law.

5. Permit Actions

a. In accordance with 327 IAC 5-2-16(b) and 327 IAC 5-2-8(4), this permit may be modified, revoked and reissued, or terminated for cause, including, but not limited to, the following:

   1. Violation of any terms or conditions of this permit;

   2. Failure of the permittee to disclose fully all relevant facts or misrepresentation of any relevant facts in the application, or during the permit issuance process; or

3. A change in any condition that requires either a temporary or a permanent reduction or elimination of any discharge controlled by the permit, e.g., plant closure, termination of discharge by connection to a POTW, a change in state law that requires the reduction or elimination of the discharge, or information indicating that the permitted discharge poses a substantial threat to human health or welfare.

b. Filing of either of the following items does not stay or suspend any permit condition: (1) a request by the permittee for a permit modification, revocation and reissuance, or termination, or (2) submittal of information specified in Part II.A.3 of the permit including planned changes or anticipated noncompliance.

The permittee shall submit any information that the permittee knows or has reason to believe would constitute cause for modification or revocation and reissuance of the permit at the earliest time such information becomes available, such as plans for physical alterations or additions to the permitted facility that:

1. could significantly change the nature of, or increase the quantity of pollutants discharged; or

2. the commissioner may request to evaluate whether such cause exists.

c. In accordance with 327 IAC 5-1-3(a)(5), the permittee must also provide any information reasonably requested by the Commissioner.

6. Property Rights

Pursuant to 327 IAC 5-2-8(6) and 327 IAC 5-2-5(b), the issuance of this permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to persons or private property or invasion of other private rights, any infringement of federal, state, or local laws or regulations. The issuance of the permit also does not preempt any duty to obtain any other state, or local assent required by law for the discharge or for the construction or operation of the facility from which a discharge is made.

7. Severability

In accordance with 327 IAC 1-1-3, the provisions of this permit are severable and, if any provision of this permit or the application of any provision of this permit to any person or circumstance is held invalid, the invalidity shall not affect any other provisions or applications of the permit which can be given effect without the invalid provision or application.

8. Oil and Hazardous Substance Liability

   Nothing in this permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under Section 311 of the Clean Water Act.

9. State Laws

   Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Clean Water Act or state law.

10. Penalties for Violation of Permit Conditions

    Pursuant to IC 13-30-4, a person who violates any provision of this permit, the water pollution control laws; environmental management laws; or a rule or standard adopted by the Environmental Rules Board is liable for a civil penalty not to exceed twenty-five thousand dollars ($25,000) per day of any violation.

    Pursuant to IC 13-30-5, a person who obstructs, delays, resists, prevents, or interferes with (1) the department; or (2) the department's personnel or designated agent in the performance of an inspection or investigation performed under IC 13-14-2-2 commits a class C infraction.

    Pursuant to IC 13-30-10-1.5(e), a person who willfully or negligently violates any NPDES permit condition or filing requirement, or any applicable standards or limitations of IC 13-18-3-2.4, IC 13-18-4-5, IC 13-18-12, IC 13-18-14, IC 13-18-15, or IC 13-18-16, commits a Class A misdemeanor.

    Pursuant to IC 13-30-10-1.5(i), an offense under IC 13-30-10-1.5(e) is a Level 4 felony if the person knowingly commits the offense and knows that the commission of the offense places another person in imminent danger of death or serious bodily injury. The offense becomes a Level 3 felony if it results in serious bodily injury to any person, and a Level 2 felony if it results in death to any person.

    Pursuant to IC 13-30-10-1.5(g), a person who willfully or recklessly violates any applicable standards or limitations of IC 13-18-8 commits a Class B misdemeanor.

    Pursuant to IC 13-30-10-1.5(h), a person who willfully or recklessly violates any applicable standards or limitations of IC 13-18-9, IC 13-18-10, or IC 13-18-10.5 commits a Class C misdemeanor.

    Pursuant to IC 13-30-10-1, a person who knowingly or intentionally makes any false material statement, representation, or certification in any NPDES form, notice, or report commits a Class B misdemeanor.

11. Penalties for Tampering or Falsification

In accordance with 327 IAC 5-2-8(10), the permittee shall comply with monitoring, recording, and reporting requirements of this permit. The Clean Water Act, as well as IC 13-30-10-1, provides that any person who knowingly or intentionally (a) destroys, alters, conceals, or falsely certifies a record, (b) tampers with, falsifies, or renders inaccurate or inoperative a recording or monitoring device or method, including the data gathered from the device or method, or (c) makes a false material statement or representation in any label, manifest, record, report, or other document; all required to be maintained under the terms of a permit issued by the department commits a Class B misdemeanor.

12. Toxic Pollutants

If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act for a toxic pollutant injurious to human health, and that standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition in accordance with 327 IAC 5-2-8(5). Effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants injurious to human health are effective and must be complied with, if applicable to the permittee, within the time provided in the implementing regulations, even absent permit modification.

13. Wastewater treatment plant and certified operators

The permittee shall have the wastewater treatment facilities under the responsible charge of an operator certified by the Commissioner in a classification corresponding to the classification of the wastewater treatment plant as required by IC 13-18-11-11 and 327 IAC 5-22. In order to operate a wastewater treatment plant the operator shall have qualifications as established in 327 IAC 5-22-7.

327 IAC 5-22-10.5(a) provides that a certified operator may be designated as being in responsible charge of more than one (1) wastewater treatment plant, if it can be shown that he will give adequate supervision to all units involved. Adequate supervision means that sufficient time is spent at the plant on a regular basis to assure that the certified operator is knowledgeable of the actual operations and that test reports and results are representative of the actual operations conditions. In accordance with 327 IAC 5-22-3(11), “responsible charge operator” means the person responsible for the overall daily operation, supervision, or management of a wastewater facility.

Pursuant to 327 IAC 5-22-10(4), the permittee shall notify IDEM when there is a change of the person serving as the certified operator in responsible charge of the wastewater treatment facility. The notification shall be made no later than thirty (30) days after a change in the operator.

14. Construction Permit

In accordance with IC 13-14-8-11.6, a discharger is not required to obtain a state permit for the modification or construction of a water pollution treatment or control facility if the discharger has an effective NPDES permit.

If the discharger modifies their existing water pollution treatment or control facility or constructs a new water pollution treatment or control facility for the treatment or control of any new influent pollutant or increased levels of any existing pollutant, then, within thirty (30) days after commencement of operation, the discharger shall file with the Department of Environment Management a notice of installation for the additional pollutant control equipment and a design summary of any modifications.

The notice and design summary shall be sent to the Office of Water Quality, Industrial NPDES Permits Section, 100 North Senate Avenue, Indianapolis, IN 46204-2251.

15. Inspection and Entry

In accordance with 327 IAC 5-2-8(8), the permittee shall allow the Commissioner, or an authorized representative, (including an authorized contractor acting as a representative of the Commissioner) upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee’s premises where a regulated facility or activity is located or conducted, or where records must be kept pursuant to the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the terms and conditions of this permit;

c. Inspect at reasonable times any facilities, equipment or methods (including monitoring and control equipment), practices, or operations regulated or required pursuant to this permit; and

d. Sample or monitor at reasonable times, any discharge of pollutants or internal wastestreams for the purposes of evaluating compliance with the permit or as otherwise authorized.

16. New or Increased Discharge of Pollutants

This permit prohibits the permittee from undertaking any action that would result in a new or increased discharge of a bioaccumulative chemical of concern (BCC) or a new or increased permit limit for a regulated pollutant that is not a BCC unless one of the following is completed prior to the commencement of the action:

a. Information is submitted to the Commissioner demonstrating that the proposed new or increased discharges will not cause a significant lowering of water quality as defined under 327 IAC 2-1.3-2(50). Upon review of this information, the Commissioner may request additional information or may determine that the proposed increase is a significant lowering of water quality and require the submittal of an antidegradation demonstration.

b. An antidegradation demonstration is submitted to and approved by the Commissioner in accordance with 327 IAC 2-1.3-5 and 327 IAC 2-1.3-6.

17. New or Increased Discharge of Pollutants into an OSRW

This permit prohibits the permittee from undertaking any action that would result in the following:

a. A new or increased discharge of a bioaccumulative chemical of concern (BCC), other than mercury.

b. A new or increased discharge of mercury or a new or increased permit limit for a regulated pollutant that is not a BCC unless one of the following is completed prior to the commencement of the action:

(1) Information is submitted to the Commissioner demonstrating that the proposed new or increased discharges will not cause a significant lowering of water quality as defined under 327 IAC 2-1.3-2(50). Upon review of this information, the Commissioner may request additional information or may determine that the proposed increase is a significant lowering of water quality and require the permittee to do the following:

(i) Submit an antidegradation demonstration in accordance with 327 IAC 2-1.3-5; and
(ii) Implement or fund a water quality improvement project in the watershed of the OSRW that results in an overall improvement in water quality in the OSRW in accordance with 327 IAC 2-1.3-7.

(2) An antidegradation demonstration is submitted to and approved by the Commissioner in accordance with 327 IAC 2-1.3-5 and 327 IAC 2-1.3-6 and the permittee implements or funds a water quality improvement project in the watershed of the OSRW that results in an overall improvement in water quality in the OSRW in accordance with 327 IAC 2-1.3-7.

B. MANAGEMENT REQUIREMENTS

1. Proper Operation and Maintenance

The permittee shall at all times maintain in good working order and efficiently operate all facilities and systems (and related appurtenances) for the collection and treatment which are installed or used by the permittee and which are necessary for achieving compliance with the terms and conditions of this permit in accordance with 327 IAC 5-2-8(9).

Neither 327 IAC 5-2-8(9), nor this provision, shall be construed to require the operation of installed treatment facilities that are unnecessary for achieving compliance with the terms and conditions of the permit.

2. Bypass of Treatment Facilities

Pursuant to 327 IAC 5-2-8(12), the following are requirements for bypass:

a. The following definitions:

(1) “Bypass” means the intentional diversion of a waste stream from any portion of a treatment facility.

(2) “Severe property damage” means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. The permittee may allow a bypass to occur that does not cause a violation of the effluent limitations contained in this permit, but only if it is also for essential maintenance to assure efficient operation. These bypasses are not subject to Part II.B.2.c. and d.

c. The permittee must provide the Commissioner with the following notice:

(1) If the permittee knows or should have known in advance of the need for a bypass (anticipated bypass), it shall submit prior written notice. If possible, such notice shall be provided at least ten (10) days before the date of the bypass for approval by the Commissioner.

(2) As required by 327 IAC 5-2-8(11)(C), the permittee shall orally report an unanticipated bypass that exceeds any effluent limitations in the permit within twenty-four (24) hours from the time the permittee becomes aware of such noncompliance. A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; and if the cause of noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance. If a complete report is submitted by e-mail within 24 hours of the noncompliance, then that e-mail report will satisfy both the oral and written reporting requirement. E-mails should be sent to wwreports@idem.in.gov.

d. The following provisions are applicable to bypasses:

(1) Except as provided by Part II.B.2.b., bypass is prohibited, and the Commissioner may take enforcement action against a permittee for bypass, unless the following occur:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage.

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance.

(C) The permittee submitted notices as required under Part II.B.2.c.

(2) The Commissioner may approve an anticipated bypass, after considering its adverse effects, if the Commissioner determines that it will meet the conditions listed above in Part II.B.2.d.(1). The Commissioner may impose any conditions determined to be necessary to minimize any adverse effects.

e. Bypasses that result in death or acute injury or illness to animals or humans must be reported in accordance with the "Spill Response and Reporting Requirements" in 327 IAC 2-6.1, including calling 888/233-7745 as soon as possible, but within two (2) hours of discovery. However, under 327 IAC 2-6.1-3(1), when the constituents of the bypass are regulated by this permit, and death or acute injury or illness to animals or humans does not occur, the reporting requirements of 327 IAC 2-6.1 do not apply.

3. Upset Conditions

Pursuant to 327 IAC 5-2-8(13):

a. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Paragraph c of this section, are met.

c. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence, that:

(1) An upset occurred and the permittee has identified the specific cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee complied with any remedial measures required under Part II.A.2; and

(4) The permittee submitted notice of the upset as required in the "Twenty-Four Hour Reporting Requirements," Part II.C.3, or 327 IAC 2-6.1, whichever is applicable. However, under 327 IAC 2-6.1-3(1), when the constituents of the discharge are regulated by this permit, and death or acute injury or illness to animals or humans does not occur, the reporting requirements of 327 IAC 2-6.1 do not apply.

d. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof pursuant to 40 CFR 122.41(n)(4).

4. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed from or resulting from treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State and to be in compliance with all Indiana statutes and regulations relative to liquid and/or solid waste disposal. The discharge of pollutants in treated wastewater is allowed in compliance with the applicable effluent limitations in Part I. of this permit.

C. REPORTING REQUIREMENTS

1. Planned Changes in Facility or Discharge

Pursuant to 327 IAC 5-2-8(11)(F), the permittee shall give notice to the Commissioner as soon as possible of any planned physical alterations or additions to the permitted facility. In this context, permitted facility refers to a point source discharge, not a wastewater treatment facility. Notice is required only when either of the following applies:

a. The alteration or addition may meet one of the criteria for determining whether the facility is a new source as defined in 327 IAC 5-1.5.

b. The alteration or addition could significantly change the nature of, or increase the quantity of, pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in Part I.A. nor to notification requirements in Part II.C.9. of this permit.

Following such notice, the permit may be modified to revise existing pollutant limitations and/or to specify and limit any pollutants not previously limited.

2. Monitoring Reports

Pursuant to 327 IAC 5-2-8(10) and 327 IAC 5-2-13 through 15, monitoring results shall be reported at the intervals and in the form specified in "Discharge Monitoring Reports", Part I.C.2.

3. Twenty-Four Hour Reporting Requirements

Pursuant to 327 IAC 5-2-8(11)(C), the permittee shall orally report to the Commissioner information on the following types of noncompliance within 24 hours from the time permittee becomes aware of such noncompliance. If the noncompliance meets the requirements of item b (Part II.C.3.b) or 327 IAC 2-6.1, then the report shall be made within those prescribed time frames. However, under 327 IAC 2-6.1-3(1), when the constituents of the discharge that is in noncompliance are regulated by this permit, and death or acute injury or illness to animals or humans does not occur, the reporting requirements of 327 IAC 2-6.1 do not apply.

a. Any unanticipated bypass which exceeds any effluent limitation in the permit;

b. Any noncompliance which may pose a significant danger to human health or the environment. Reports under this item shall be made as soon as the permittee becomes aware of the noncomplying circumstances; or

c. Any upset (as defined in Part II.B.3 above) that causes an exceedance of any effluent limitation in the permit; or

d. Violation of a maximum daily discharge limitation for any of the following toxic pollutants: Benzene, Total or Free Cyanide, Lead, Copper, Nickel, Zinc, Selenium, Chromium, Cadmium, Silver, Phenols, Mercury, TTO, Naphthalene, Tetrachloroethylene.

The permittee can make the oral reports by calling (317)232-8670 during regular business hours and asking for the Compliance Data Section or by calling (317) 233-7745 ((888)233-7745 toll free in Indiana) during non-business hours. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce and eliminate the noncompliance and prevent its recurrence. The Commissioner may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

Alternatively, the permittee may submit a “Bypass/Overflow Report” (State Form 48373) or a “Noncompliance 24-Hour Notification Report” (State Form 52415), whichever is appropriate, to IDEM at (317) 232-8637 or wwreports@idem.in.gov. If a complete e-mail submittal is sent within 24 hours of the time that the permittee became aware of the occurrence, then the email report will satisfy both the oral and written reporting requirements.

4. Other Compliance/Noncompliance Reporting

Pursuant to 327 IAC 5-2-8(11)(D), the permittee shall report any instance of noncompliance not reported under the “Twenty-Four Hour Reporting Requirements” in Part II.C.3, or any compliance schedules at the time the pertinent Discharge Monitoring Report is submitted. The report shall contain the information specified in Part II.C.3;

The permittee shall also give advance notice to the Commissioner of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements; and

All reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

5. Other Information

Pursuant to 327 IAC 5-2-8(11)(E), where the permittee becomes aware of a failure to submit any relevant facts or submitted incorrect information in a permit application or in any report, the permittee shall promptly submit such facts or corrected information to the Commissioner.

6. Signatory Requirements

Pursuant to 327 IAC 5-2-22 and 327 IAC 5-2-8(15):

a. All reports required by the permit and other information requested by the Commissioner shall be signed and certified by a person described below or by a duly authorized representative of that person:

(1) For a corporation: by a responsible corporate officer. A “responsible corporate officer” means either of the following:

a. A president, secretary, treasurer, any vice president of the corporation in charge of a principal business function, or any other person who performs similar policymaking or decision making functions for the corporation; or

b. The manager of one (1) or more manufacturing, production, or operating facilities provided the manager is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty to make major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a Federal, State, or local governmental body or any agency or political subdivision thereof: by either a principal executive officer or ranking elected official.

(4) Under the proposed Federal E-Reporting Rule, a method will be developed for submittal of all affected reports and documents using electronic signatures that is compliant with the Cross-Media Electronic Reporting Regulation (CROMERR). Enrollment and use of NetDMR currently provides for CROMERR-compliant report submittal.

b. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above.

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or a position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

(3) The authorization is submitted to the Commissioner.

c. Electronic Signatures. If documents described in this section are submitted electronically by or on behalf of the NPDES-regulated facility, any person providing the electronic signature for such documents shall meet all relevant requirements of this section, and shall ensure that all of the relevant requirements of 40 CFR part 3 (including, in all cases, subpart D to part 3) (Cross-Media Electronic Reporting) and 40 CFR part 127 (NPDES Electronic Reporting Requirements) are met for that submission.

d. Certification. Any person signing a document identified under Part II.C.6. shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

7. Availability of Reports

Except for data determined to be confidential under 327 IAC 12.1, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Indiana Department of Environmental Management and the Regional Administrator. As required by the Clean Water Act, permit applications, permits, and effluent data shall not be considered confidential.

8. Penalties for Falsification of Reports

IC 13-30 and 327 IAC 5-2-8(15) provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance, shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 180 days per violation, or by both.

9. Changes in Discharge of Toxic Substances

Pursuant to 327 IAC 5-2-9, the permittee shall notify the Commissioner as soon as it knows or has reason to know:

a. That any activity has occurred or will occur which would result in the discharge of any toxic pollutant that is not limited in the permit if that discharge will exceed the highest of the following notification levels.

(1) One hundred micrograms per liter (100 µg/l);

(2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) A notification level established by the Commissioner on a case-by-case basis, either at the Commissioner's own initiative or upon a petition by the permittee. This notification level may exceed the level specified in subdivisions (1), (2), or (3) but may not exceed the level which can be achieved by the technology-based treatment requirements applicable to the permittee under the CWA (see 327 IAC 5-5-2).

b. That it has begun or expects to begin to use or manufacture, as an intermediate or final product or byproduct, any toxic pollutant that was not reported in the permit application under 40 CFR 122.21(g)(9). However, this subsection b. does not apply to the permittee's use or manufacture of a toxic pollutant solely under research or laboratory conditions.

10. Future Electronic Reporting Requirements

IDEM is currently developing the technology and infrastructure necessary to allow compliance with the EPA Phase 2 e-reporting requirements per 40 CFR 127.16 and to allow electronic reporting of applications, notices, plans, reports, and other information not covered by the federal e-reporting regulations.

IDEM will notify the permittee when IDEM's e-reporting system is ready for use for one or more applications, notices, plans, reports, or other information. This IDEM notice will identify the specific applications, notices, plans, reports, or other information that are to be submitted electronically and the permittee will be required to use the IDEM electronic reporting system to submit the identified application(s), notice(s), plan(s), report(s), or other information. See Part I.C.2. of this permit for the current electronic reporting requirements for the submittal of monthly monitoring reports such as the Discharge Monitoring Report (DMR) and the Monthly Monitoring Report (MMR).

PART III
Other Requirements

A. Thermal Effluent Requirements

1. The following temperature effluent limitations and requirements shall apply to discharges from Outfalls 015, 018, 019, 020, 028, 030, and 034 to the Grand Calumet River:

a. The monitoring of the Temperature is to occur on a continuous basis at the following locations in the Grand Calumet River:

Approximately 100 feet downstream of the US Steel Outfall 020, which shall be designated as monitoring point 220; and

Approximately 100 feet downstream of the US Steel Outfall 030, which shall be designated as monitoring point 230.

Temperature measurements taken in the Grand Calumet River at the above locations shall be taken at mid-stream and at a depth of approximately one meter below the water's surface.

b. Temperature measurements at the above stated locations shall be recorded in one hour intervals. The highest single recorded measurement for each day shall be reported on the state monthly monitoring report for each day. The highest single recorded daily measurement shall be reported on the federal discharge monitoring report as the maximum daily temperature of that month.

The permittee shall submit an annual summary of the individual data points for the instream temperature at the measuring points for Outfall 220 and 230. The annual summary shall be sent no later than January 31st of the succeeding year to the Industrial NPDES Permits Section of the Office of Water Quality, MC 65-42, 100 North Senate Avenue, Indianapolis, Indiana 46204-2251. The annual summary shall be in a database using Microsoft Excel software copied to a compact disk.

c. The temperature measured at monitoring points 220 and 230 shall not exceed the maximum limits in Temperature Table 1 below.

Temperature Table 1

Month	Monthly Average	Daily Maximum
January	--------	59
February	--------	58
March	---------	69
April	---------	73
May	---------	83
June	90	93
July	90	93
August	90	93
September	90	93
October	----------	83
November	----------	75
December	----------	63

d. The number of days where the measured temperature exceeds the limits in Table 1 above shall be reported on the state monthly monitoring report and the federal discharge monitoring report.

e. There shall be no abnormal temperature changes that may adversely affect aquatic life unless caused by natural conditions.

f. The normal daily and seasonal temperature fluctuations that existed before the addition of heat due to other natural causes shall be maintained.

2. The following temperature effluent limitations and requirements shall apply to discharges from Outfalls 035, 037, and 039 to Lake Michigan.

a. There shall be no abnormal temperature changes so as to be injurious to fish, wildlife, or other aquatic life, or the growth or propagation thereof. In addition, plume interaction with the bottom shall be minimized and shall not injuriously affect fish, shellfish, and wildlife spawning or nursery areas.

b. The normal daily and seasonal temperature fluctuations that existed before the addition of heat shall be maintained.

c. Intake temperature shall be continuously monitored at intake structures No. 1, No. 2, and the Lakeside Pump Stations. Discharge flow and discharge temperature shall be continuously monitored at Outfalls 035 and 039. Temperature shall be continuously monitored at an upstream location that is representative of Outfall 037 discharge. Outfall 037 flow will be estimated.

d. The facilities described as follows that discharge into the open waters of Lake Michigan shall be limited to the amount essential for blowdown in the operation of a closed cycle cooling facility:

(i) All facilities that have new waste heat discharges exceeding a daily average of five-tenths (0.5) billion British thermal units per hour. As used in this item, "new waste heat discharge" means a discharge that had not begun operations as of February 11, 1972.
(ii) All facilities with existing waste heat discharges that increase the quantity of waste heat discharged by more than a daily average of five-tenths (0.5) billion British thermal units per hour.

e. Thermal plumes shall not overlap or intersect except for discharges in existence as of the date that 327 IAC 2-1.5-8(c)(4)(D)(vii) became effective.

f. Facilities discharging more than a daily average of five-tenths (0.5) billion British thermal units of waste heat shall continuously record intake and discharge temperature and discharge flow and make those records available to the public or regulatory agencies upon request.

g. The thermal discharges from Outfalls 035, 037 and 039 shall be computed and reported as maximum daily averages for each separate outfall. The daily average BTU/Hr for each outfall shall be calculated as follows: the BTU/Hr shall be determined once each hour, as shown below, and those values shall be averaged over a 24 hour period for each day.

Hourly Thermal Discharge (E*6 BTU/Hr) = $Q \times (T_o - T_i) \times 0.3477$
where,

E*6, converts to million BTU/Hr.
Q = Hourly discharge flow, MGD.
T_o = Hourly effluent temperature, $^\circ$F
T_i = Hourly intake temperature, $^\circ$F
0.3477, conversion factor

h. The permittee shall submit an annual summary of the individual data points for the effluent temperature at Outfalls 035, 037, and 039 discharges. The annual summary shall be sent no later than January 31st of the succeeding year to the Industrial NPDES Permits Section of the Office of Water Quality, MC 65-42, 100 North Senate Avenue, Indianapolis, Indiana 46204-2251. The annual summary shall be in a database using Microsoft Excel software copied to a compact disk.

B. Future Thermal Demonstration Requirements

A new CWA section 316(a) demonstration in accordance with 327 IAC 5-7 and Subpart H of 40 CFR 125 shall be submitted to IDEM no later than one year prior to the expiration date of this permit. The new 316(a) demonstration is necessary to support alternate thermal effluent limitations that might be requested as part of the next permit renewal.

1. Within 180 days of the effective date of this permit, the permittee applying for ATEL must submit a proposed 316(a) Type I, II, or III demonstration study plan to IDEM for review. The demonstration study plan must include a list of the proposed representative important species (RIS).

2. This proposed 316(a) demonstration study plan (and the completed demonstration) must conform to 327 IAC 5-7 and Subpart H of 40 CFR 125 and to the IDEM draft Guidance for Conducting a Demonstration as a Requirement of a 316(a) Alternative Thermal Effluent Limitation Request, March 2015. In addition, EPA has issued a draft CWA 316(a) guidance entitled "Interagency 316(a) Technical Guidance Manual And Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements," 1977. Both of these guidance documents provide valuable information on conducting 316(a) demonstrations.

3. IDEM will review the proposed study plan, and may, based on its review, request additional information from the discharger to make the demonstration study plan complete. IDEM will also provide the discharger with the accepted RIS. When the study plan is complete and satisfies the requirements of the regulations and guidance, IDEM will inform the discharger in writing that the demonstration study plan is complete so that the discharger may begin the study.

4. The discharger must initiate the demonstration study within two (2) years of receiving notification from IDEM that the demonstration study plan is complete.

5. The discharger must submit the completed Type I, II, or III demonstration and application for alternate thermal effluent limits (ATEL) to IDEM for review at least one year prior to the expiration date of this permit. The application must be signed and certified by a responsible official in compliance with 327 IAC 5-2-22(a) and (d). The demonstration and application for ATEL will be reviewed by IDEM for completeness. A complete demonstration must include the following:

    a. A quantitative description and rationale for the proposed ATEL.

    b. The absence of prior appreciable harm assessment and RIS assessment supporting the proposed ATEL.

    c. All of the thermal and biological data collected during the demonstration and/or used to support the demonstration, provided in a format amenable for electronic data interfacing into the Office of Water Quality's External Data Framework of the Assessment Information Management System (AIMS). Summarized data and data compilations alone will NOT be accepted.

d. Executive summary of study findings.

e. Request for Thermal Mixing Zone. The thermal mixing zone request must specify the temperatures within and at the edge of the mixing zone and the proposed sizes of the mixing zones as applicable.

f. Any other information deemed necessary and developed by the discharger for the demonstration.

g. A delineation/model of the thermal plume under representative flow conditions based on in-lake temperature monitoring data, and with the proposed point of compliance for the proposed thermal limits.

h. Any additional studies conducted since the last demonstration was completed and an analysis of any changes from the previous assessments and conclusions.

6. Once a technical, regulatory and completeness review has been completed, IDEM will make a tentative decision to approve the ATEL, deny the ATEL, or approve a modified ATEL. The tentative decision will be included in a draft NPDES permit that is placed on public notice for a 30-day public comment period. The public notice will provide the proposed ATEL and the limitations that would have been required otherwise. A public hearing may be requested during the 30 day comment period.

7. IDEM will respond to all comments received during the 30 day comment period and from a public hearing, if applicable, and make a final decision regarding the ATEL. The final decision regarding the ATEL will be included in the final NPDES permit with the opportunity to appeal the final decision during the 18 day appeal period after the final permit is issued.

C. <u>Polychlorinated Biphenyl</u>

There shall be no discharge of polychlorinated biphenyl (PCBs) compounds such as those commonly used for transformer fluid. Many electrical transformers manufactured prior to 1978 contained PCBs. Therefore, in order to determine compliance with the PCB prohibition, the permittee shall provide the following PCB* data with the next renewal application for at least one sample taken from each final outfall. The corresponding facility water intakes shall be monitored at the same time as the final outfalls.

Parameter	Test Method	LOD	LOQ
Total PCBs*	608	0.1 ug/l	0.3 ug/l

*Total PCBs is the sum of the following aroclors: PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, and PCB-1260

D. INTAKE SCREEN WASH

The discharge of Intake Screen Backwash shall meet the Minimum Narrative Limitations contained in Part I.B. of the permit.

E. SPECIAL REPORTING REQUIREMENTS

1. NPDES effluent data are to be reported on the monthly DMRs as follows:

a. Daily Values

(i) Effluent concentrations less than the limit of detection (LOD) shall be reported as less than the value of the LOD. For example, if a substance is not detected at a concentration of one (1.0) milligram per liter, the value shall be reported as <1.0 mg/l.

(ii) Effluent concentrations greater than or equal to the LOD shall be reported at the measured result. Effluent concentrations greater than or equal to the LOD and less than the limit of quantification (LOQ) that are reported on a DMR shall be annotated on the DMR to indicate that the result is not quantifiable.

(iii) Mass discharge results which are calculated from concentrations reported as less than the value of the limit of detection shall be reported as less than the corresponding mass discharge result.

(iv) Mass discharge values that are calculated from effluent concentrations greater than the limit of detection but less than the limit of quantitation shall be reported as the calculated value. These values shall be annotated on the DMR to indicate that the value is not quantifiable.

Mass discharge values that are calculated from effluent concentrations equal to and greater than the limit of quantitation shall be reported on the DMR as the calculated value.

b. Monthly Average of Daily Values

(i) For all parameters for which there is a monthly average, calculations that require averaging of measurements of daily results (both concentration and mass) shall use an arithmetic mean. When a daily discharge result is less than the LOQ, the equation in Part III.E.2., below shall be used to calculate a daily discharge value that shall be used in the calculation of the monthly average in place of the actual daily discharge result.

(ii) For all parameters for which the monthly average is less than the LOQ, daily effluent results, used in the determination of a monthly average effluent level, that are less than the LOQ, may be assigned a value of zero (0), unless, after considering the number of monitoring results that are greater than the LOD, and appropriate statistical techniques, a value other than zero (0) is warranted.

2. Averaging Analytical Values When One or More Values are Less than the LOQ.

Where the permittee samples more than once per month and obtains an analytical data base that contains concentration results below the LOQ, the permittee shall utilize the following protocol that sets a value to be used for analytical results below the LOQ according to their frequency of occurrence. These values can then be used to calculate the average value for DMR reporting.

a. For results that are less than the LOD:

V_{LOD} (or values) = (LOD) *(F_{LOD}) Eqn. 1

Where:

$$F_{LOD} = 1 - \frac{\text{Number of Results Less Than the LOD}}{\text{Total Number of Results}} \quad \text{Eqn.2}$$

b. For results that are less than the LOQ (including results that are less than or equal to the LOD):

V_{LOQ} (or values) = (LOQ) *(F_{LOQ}) Eqn.3

Where:

$$F_{LOQ} = 1 - \frac{\text{Number of Results Less Than the LOQ}}{\text{Total Number of Results}} \quad \text{Eqn.4}$$

c. Process of generating database to be used to calculate monthly averages:

(1) For concentration values:

(a) LOD = The concentration-based LOD obtained from the table of analytical methods and detection and quantitation levels in Part I.C.4.d. of this permit.

(b) LOQ = The concentration-based LOQ obtained from the table of analytical methods and detection and quantitation levels in Part I.C.4.d. of this permit.

(c) All individual concentration results below the concentration-based LOD are assigned the value of V_{LOD}. This "V" is referred to as the "V_{LOD} – conc.".

(d) All individual concentration results below the concentration-based LOQ, but greater than or equal to the LOD are assigned the value of V_{LOQ}. This "V" is referred to as the "V_{LOQ} – conc.".

(2) For mass values:

Generate a mass result from the corresponding concentration result and flow, converted to mass. This result is presented on the DMR.

The "Number of Results Less than LOD", as used in Equation 2, is the number of concentration results below the concentration-based LOD.

Part IV
Cooling Water Intake Structures

A. Best Technology Available (BTA) Determination

In accordance with 40 CFR 401.14, the location, design, construction and capacity of cooling water intake structures of any point source for which a standard is established pursuant to section 301 or 306 of the Clean Water Act (CWA) shall reflect the best technology available for minimizing adverse environmental impact.

The EPA promulgated a CWA section 316(b) regulation on August 15, 2014, which became effective on October 14, 2014. 79 Fed. Reg. 48300-439 (August 15, 2014). This regulation established application requirements and standards for cooling water intake structures. The regulation is applicable to point sources with a cumulative design intake flow (DIF) greater than 2 MGD where 25% or more of the water withdrawn (using the actual intake flow (AIF)) is used exclusively for cooling purposes. The regulation establishes best technology available (BTA) standards to reduce impingement and entrainment of aquatic organisms at existing power generation and manufacturing facilities.

Impingement is the process by which fish and other aquatic organisms are trapped and often killed or injured when they are pulled against the cooling water intake structures (CWIS's) outer structure or screens as water is withdrawn from a water body. Entrainment is the process by which fish larvae and eggs and other aquatic organisms in the intake flow enter and pass through a CWIS and into a cooling water system, including the condenser or heat exchanger, which often results in the injury or the death of the organisms (see definitions at 40 CFR § 125.92(h) and (n)).

The permittee has five intakes, and the design and actual intake flow of each of these intakes is as follows:

USS Gary Works – Design Intake Flow (MGD) and Actual Intake Flow (MGD)

Intake Name	Intake Description	Design Intake Flow (MGD)	Actual Intake Flow (MGD)
Pump Station No.1	Iron/Steel Making	424	188
Pump Station No. 2	Iron/Steel Making	372	214
Pump Station No. 3	Emergency Backup for Pump Station No. 4	60	0
Pump Station No.4	Sinter Operation	5	11
Lakeside Pump Station	Hot Roll/Finishing	266	55
	Totals:	**1128**	**468**

- AIF based on flows from calendar years 2015 through 2019
- DIF based on pump capacity
- The No. 4 Pump Station design intake flow or DIF is currently 5 MGD. The replacement of pumps to reduce the capacity at this intake occurred in June 2017. The AIF is defined as the "average volume of water withdrawn on an annual basis

by the cooling water intake structures over the past five years." As such the No. 4 Pump Station AIF exceeds the current DIF.

The permittee has a design intake flow (DIF) of 1,128 MGD and approximately 86% (east side plant operations) and 65% (west side plant operations) of the intake water is used for cooling purposes. Therefore, since the facility has a DIF greater than 2 MGD, and because the percentage of flow used at the facility exclusively for cooling is greater than 25%, the facility is required to meet the BTA standards for impingement mortality and entrainment, including any measures to protect Federally-listed threatened and endangered species and designated critical habitat established under 40 CFR 125.94(g).

Based on the information available to IDEM, IDEM has determined that the following are the impingement mortality BTA for each of these intakes.

Impingement Best Technology Available (BTA) Compliance Technology		
Intake	**Impingement BTA Compliance Technology**	**Federal Rule Citation**
Pump Station No 1	Modified Traveling Screens	40 CFR 125.94(c)(5)
Pump Station No 2	Modified Traveling Screens	40 CFR 125.94(c)(5)
Pump Station No 3	Emergency Backup – BTA Not Applicable	40 CFR 125.94(e)(3)(iv)
Pump Station No 4	Operate at Maximum Actual Through Screen Intake Velocity of 0.5 feet per second	40 CFR 125.94(c)(3)
Lakeside Pump Station	Either a) Operate at a Maximum Intake Velocity of 0.5 feet per second or b) Install Modified Traveling Screens	Either: a. 40 CFR 125.94(c)(3) or b. 40 CFR 125.94(c)(5)

After considering all the factors that must and may be considered by the federal rules, IDEM has determined that the existing facility (after installation of the above impingement BTA) meets the best technology available (BTA) for entrainment mortality both for the entire facility and each intake. This is primarily based on the following factors:

1. The number and species of organisms projected to be entrained by the facility and limited impact to the ecosystem;
2. The costs and technical difficulties installing a combined cycle recycle system or fine mesh screens;
3. The flow reduction/water reuse optimization efforts already implemented at the facility; and
3. The off-shore location of the Lakeside Pump Station intake.

Compliance schedules have been included in Part I.P. of the permit, establishing the interim conditions and deadlines for the permittee to achieve compliance with these new permit BTA requirements as allowed under 40 CFR § 125.98(c).

B. Permit Requirements

The permittee shall comply with the following cooling water intake structure permit requirements:

1. In accordance with 40 CFR 125.98(b)(1), nothing in this permit authorizes take for the purposes of a facility's compliance with the Endangered Species Act.

2. The permittee must at all times properly operate and maintain the cooling water intake structures and associated intake equipment.

3. The permittee must inform IDEM of any proposed changes to the CWIS or proposed changes to operations at the facility that affect the information taken into account in the current BTA evaluation.

4. Any discharge of intake screen backwash must meet the Minimum Narrative Limitations contained in Part I.B of the permit. There must be no discharge of debris from intake screen washing which will settle to form objectionable deposits which are in amounts sufficient to be unsightly or deleterious, or which will produce colors or odors constituting a nuisance.

5. Pump Station No. 1. As soon as practicable but no later than twenty-four months after the effective date of the permit the permittee must submit to IDEM for review and approval a study plan including schedule for obtaining information required by the impingement technology optimization study required by 40 CFR 125.94(c)(5) and 40 CFR 122.21(r)(6)(i). After installation of the modified traveling screen at this intake has been completed, the permittee must conduct approved the impingement technology optimization study at this intake. The study plan must be able to demonstrate that the technology is or will be optimized to minimize impingement mortality of all non-fragile species. The permittee must submit the preliminary results of the first year of their optimization study with 60 days of completion of the first year of sampling. The permittee must submit the final technology optimization study report, covering both year 1 and year 2 of sampling within 90 days of completing the second year of sampling. The permit may be modified to include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

6. Pump Station No. 2. As soon as practicable but no later than twenty-four months after the effective date of the permit the permittee must submit to IDEM for review and approval a study plan including schedule for obtaining information required by the impingement technology optimization study required by 40 CFR 125.94(c)(5) and 40 CFR 122.21(r)(6)(i). After installation of the modified traveling screen at this intake has been completed, the permittee must conduct approved the impingement technology optimization study at this intake. The study plan must be able to demonstrate that the technology is or will be optimized to minimize impingement mortality of all non-fragile species.

The permittee must submit the preliminary results of the first year of their optimization study with 60 days of completion of the first year of sampling. The permittee must submit the final technology optimization study report, covering both year 1 and year 2 of sampling within 90 days of completing the second year of sampling. The permit may be modified to include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

7. Lakeside Intake. If the permittee selects the impingement mortality option under 40 CFR 125.94(c)(5) [modified traveling screens] for this intake, then as soon as practicable but no later than twenty-four months after the effective date of the permit the permittee must submit to IDEM for review and approval a study plan including schedule for obtaining information required by the impingement technology optimization study required by 40 CFR 125.94(c)(5) and 40 CFR 122.21(r)(6)(i). After installation of the modified traveling screen at this intake has been completed, the permittee must conduct approved the impingement technology optimization study at this intake. The study plan must be able to demonstrate that the technology is or will be optimized to minimize impingement mortality of all non-fragile species. The permittee must submit the preliminary results of the first year of their optimization study with 60 days of completion of the first year of sampling. The permittee must submit the final technology optimization study report, covering both year 1 and year 2 of sampling within 90 days of completing the second year of sampling. The permit may be modified to include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

8. Lakeside Intake. If the permittee selects the impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second] for this intake, then the permittee must monitor the velocity at the screen at a minimum frequency of daily. In lieu of velocity monitoring at the screen face, the permittee may calculate the through-screen velocity using water flow, water depth, and the screen open areas. These daily measurements must be reported on the MMR with the monthly results summarized on the DMRs that are submitted every month.

9. In accordance with 40 CFR 125.97(c), by January 31 of each year, the permittee must submit to the Industrial NPDES Permit Section IDEM-OWQ an annual certification statement for the preceding calendar year signed by the responsible corporate officer as defined in 40 CFR 122.22 (see 327 IAC 5-2-22) subject to the following:

    a. If the information contained in the previous year's annual certification is still pertinent, you may simply state as such in a letter to IDEM and the letter, along with any applicable data submission requirements specified in this section shall constitute the annual certification.

b. If you have substantially modified operation of any unit at your facility that impacts cooling water withdrawals or operation of your cooling water intake structures, you must provide a summary of those changes in the report. In addition, you must submit revisions to the information required at 40 CFR 122.21(r) in your next permit application.

10. Best technology available (BTA) determinations for entrainment mortality and impingement mortality at cooling water intake structures will be made in each permit reissuance, in accordance with 40 CFR 125.90-98. The permittee must submit all the information required by the applicable provisions of 40 CFR 122.21(r)(2) through (r)(13) with the next renewal application. Since the permittee has submitted the studies required by 40 CFR 122.21(r), the permittee may, in subsequent renewal applications pursuant to 40 CFR 125.95(c), request to reduce the information required if conditions at the facility and in the waterbody remain substantially unchanged since the previous application so long as the relevant previously submitted information remains representative of the current source water, intake structure, cooling water system, and operating conditions. Any habitat designated as critical or species listed as threatened or endangered after issuance of the current permit whose range of habitat or designated critical habitat includes waters where a facility intake is located constitutes potential for a substantial change that must be addressed by the owner/operator in subsequent permit applications, unless the facility received an exemption pursuant to 16 U.S.C. 1536(o) or a permit pursuant to 16 U.S.C. 1539(a) or there is no reasonable expectation of take. The permittee must submit a request for reduced cooling water intake structure and waterbody application information at least **two years and six months** prior to the expiration of its NPDES permit. The request must identify each element in in 40 CFR 122.21(r) that it determines has not substantially changed since the previous permit application and the basis for the determination. IDEM has the discretion to accept or reject any part of the request.

11. The permittee must only operate Intake Pump Station No. 3 as an emergency backup. The permittee must immediately notify IDEM, Office of Water Quality, NPDES Permits Branch if Pump Station No. 3 is or will be used for any other purpose. Operating information including dates of operation, hours of operation and reason for use of Pump Station No. 3 must be included in the annual report required in Item 12, below.

12. The permittee must submit an annual summary of the actual intake flows measured or calculated at a minimum frequency of daily. For all calculated intake flows, the permittee must provide the data and calculations used to calculate each calculated intake flow in this annual report.

13. The permittee must either conduct visual inspections or employ remote monitoring devices during the period the cooling water intake structure is in operation as required by 40 CFR 125.96(e). The permittee must conduct such inspections at least weekly to ensure that any technologies operated to comply with § 125.94 are maintained and operated to function as designed including those installed to protect Federally-listed threatened or endangered species or designated critical habitat. Alternative procedures can be approved if this requirement is not feasible (e.g., an offshore intake, velocity cap, or during periods of inclement weather).

14. The permittee must submit and maintain all the information required by the applicable provisions of 40 CFR 125.97.

15. All required reports must be submitted to the IDEM, Office of Water Quality, NPDES Permits Branch, Industrial NPDES Permit Section at OWQWWPER@idem.in.gov and the Compliance Branch at wwReports@idem.in.gov

16. The permittee shall construct fish handling and return systems (FHRS) at No. 1 Pump Station and No. 2 Pump Station.

Part V
Streamlined Mercury Variance (SMV)

Introduction

The permittee submitted an application for a streamlined mercury variance (SMV) on May 1, 2020, in accordance with the provisions of 327 IAC 5-3.5. The SMV establishes a streamlined process for obtaining a variance from a water quality criterion used to establish a WQBEL for mercury in an NPDES permit. Based on a review of the SMV application, IDEM has determined the application to be complete as outlined in 327 IAC 5-3.5-4(e). Therefore, the SMV is being incorporated into the NPDES permit in accordance with 327 IAC 5-3.5-6.

Term of SMV

The SMV and the interim discharge limits included in Parts I.A.3, 4, 6, 7, and 11 Discharge limitations Table, will remain in effect until the NPDES permit expires under IC 13-14-8-9 (amended under SEA 620, May 2005). Pursuant to IC 13-14-8-9(d), when the NPDES permit is extended under IC 13-15-3-6 (administratively extended), the SMV will remain in effect as long as the NPDES permit requirements affected by the SMV are in effect.

Annual Reports

The annual report is a condition of the Pollutant Minimization Program Plan (PMPP) requirements of 327 IAC 5-3.5-9(a)(8). The annual report must describe the permittee's progress toward fulfilling each PMPP requirement, the results of all mercury monitoring within the previous year, and the steps taken to implement the planned activities outlined under the PMPP. The annual report may also include documentation of chemical and equipment replacements, staff education programs, and other initiatives regarding mercury awareness or reductions. The complete inventory and complete evaluation required by the PMPP may be submitted as part of the annual report.

The permittee will submit the annual reports to IDEM on the anniversary of the effective date of this NPDES permit renewal, as indicated on Page 1 of this permit. Annual Reports should be submitted to the Office of Water Quality, Industrial NPDES Permit Section at OWQWWPER@idem.in.gov and the Compliance Branch at wwReports@idem.in.gov.

SMV Renewal

As authorized under 327 IAC 5-3.5-7(a)(1), the permittee may apply for the renewal of an SMV at any time within 180 days prior to the expiration of the NPDES permit. In accordance with 327 IAC 5-3.5-7(c), an application for renewal of the SMV must contain the following:

- All information required for an initial SMV application under 327 IAC 5-3.5-4, including revisions to the PMPP, if applicable.
- A report on implementation of each provision of the PMPP.
- An analysis of the mercury concentrations determined through sampling at the facility's locations that have mercury monitoring requirements in the NPDES permit for the two (2) year period prior to the SMV renewal application.
- A proposed alternative mercury discharge limit, if appropriate, to be evaluated by the department according to 327 IAC 5-3.5-8(b) based on the most recent two (2) years of representative sampling information from the facility.

Renewal of the SMV is subject to a demonstration showing that PMPP implementation has achieved progress toward the goal of reducing mercury from the discharge.

Pollutant Minimization Program Plan (PMPP)

The PMPP is a requirement of the SMV application and is defined in 327 IAC 5-3.5-3(4) as the plan for development and implementation of Pollutant Minimization Program (PMP). The PMPP is defined in 327 IAC 5-3.5-3(3) as the program developed by an SMV applicant to identify and minimize the discharge of mercury into the environment. PMPP requirements (including the enforceable parts of the PMPP) are outlined in 327 IAC 5-3.5-9. In accordance with 327 IAC 5-3.5-6, the permittee's PMPP is hereby incorporated within this permit below:

Outfalls 018, 019, and 020

Planned Activity	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
Complete Inventory		Finalize the inventory.	Submittal of completed inventory to IDEM.	Within 6 months of SMV approval.	Complete (see Section 3.1)
Outfalls 018, 019, and 020 Source Characterization: Mussel and Biofouling Control Chemicals	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Already implemented.	Complete (see Section 3.2)
Boiler Water Treatment Chemicals(A) Characterization	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 6 months of SMV approval.	Complete (see Section 3.2)
Stored Chemicals and Materials (B) Characterization	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 6 months of SMV approval.	Complete (see Section 3.2)
Condensate Characterization (C)	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete (see Section 3.3)
Alternatives for Reduction Evaluation: Mercury-Containing Chemicals and Materials	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.4)
Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Collect mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Adoption/Implementation of Policies and Procedures that address the mercury content of materials.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.5)
Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.6)
Good Housekeeping Practices: Mercury Containing Chemicals and Materials	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Already implemented.	Implemented/Ongoing (see Section 3.7)
Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.8)
Standard Operating Practices: Spill Response: Chemicals and Materials	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills.	Training of employees on proper and safe spill response for dealing with chemical spills.	Already implemented.	Implemented/Ongoing (see Section 3.9)
Standard Operating Practices: Spill Prevention: Stored Chemicals and Materials	Type 3: Awareness and Containment Control	Evaluation of above-ground storage tanks for proper secondary containment that eliminates possibility of chemical release.	Tracking/documentation of inspections and preventive measures implemented, if appropriate.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.9)
Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Already implemented. Updates will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.10)
Disposal Practices of Mercury-Containing Items: Bulbs/Lamps	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Already implemented. Updates will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.10)
Disposal Practices of Mercury-Containing Items: Batteries	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Within 3 months of SMV approval.	Implemented/Ongoing (see Section 3.10)
Outfalls 018, 019, and 020 Heat Exchanger Evaluation	Type 3: Awareness and Containment Control	Evaluate pressure differentials to assure that any leaks, if occurring, would not result in additional process wastewaters from potentially reaching outfalls.	Documentation of evaluation.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.11)
Gary Rail Oil Water Separator Waters and Stormwater Evaluation	Type 3: Awareness and Containment Control	Evaluate operation of Gary Rail OWS to assure adequate capacity of the system during storm events.	Documentation of evaluation.	Within 9 months of SMV approval.	Complete (see Section 3.12)
Characterization of FO-120, Salt, and Lime	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	By submission of the Annual Progress Report that is due 04/01/2014	Complete (see Section 3.2)
Characterization of FO-180	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	By submission of the Annual Progress Report that is due 04/01/2016	Complete (see Section 3.2)
Source Characterization: New Water Treatment Additives and Boiler Treatment Chemicals	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	For new water treatment additives and boiler treatment chemicals, w/in1 year of beginning use.	Ongoing as needed (see Section 3.2)
Source Characterization: CL1355	Type 1: Source Characterization	Perform additional mercury characterization of CL1355 in order to better assess the magnitude of the potential mercury contribution.	Documentation of evaluation.	By the due date of the 2017 progress report.	Complete (see Section 3.2)
Alternatives for Reduction Evaluation: FO180	Type 2: Alternatives for Reduction Evaluation	Investigate the current usage practices of FO180 in order to better assess the potential for impacts to the 018/019/020 discharge.	Documentation of evaluation.	By the due date of the 2018 progress report.	Complete (see Section 3.4.2)
Source Characterization: RL9007	Type 1: Source Characterization	Perform additional mercury characterization of RL9007 in order to better assess the magnitude of the potential mercury contribution.	Documentation of evaluation.	By the due date of the 2021 progress report.	In Progress (see Section 3.2)

Outfall 028/030

Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action	Current Status
Complete Inventory	Type 1: Source Characterization	Finalize the inventory of listed equipment/materials, and usage rates.	Submittal of completed inventory to IDEM.	Within 9 months of SMV approval. Updated inventory will be provided as part of the Annual Progress Report.	Complete (see Section 3.1)
Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Review mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Implementation of Policies and Procedures that address the mercury content of materials.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.2)
Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.3)
Good Housekeeping Practices: Mercury Containing Chemicals and Materials	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.4)
Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.5)
Standard Operating Practices: Spill Prevention and Response: Chemicals and Materials	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills. Reduce possibility of accidental spills and releases.	Training of employees on proper and safe spill prevention and response for dealing with chemical spills.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.6)
Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.7)
Disposal Practices of Mercury-Containing Items: Bulbs/Lamps	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.7)
Disposal Practices of Mercury-Containing Items: Batteries	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.7)

Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action	Current Status
Outfall 028/030 Source Characterization: Water Treatment Chemicals - High Potential	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	ORIGINAL: Within 9 months of SMV approval. REVISED: For new water treatment additives, w/in 1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
Outfall 028/030 Source Characterization: Water Treatment Chemicals - Low Potential	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	ORIGINAL: Within 12 months of SMV approval. REVISED: For new water treatment additives, w/in 1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
Outfall 028/030 Source Characterization: Sodium Hypochlorite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium hypochlorite used for mussel control at the intake.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete (see Section 3.8)
Outfall 028/030 Source Characterization: Sodium Bisulfite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium bisulfite used for dechlorination of the final Outfall 028/030 discharge.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete (see Section 3.8)
Outfall 028/030 Source Characterization: Process Chemicals - Low Potential	Type 1: Source Characterization	ORIGINAL ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information. REVISED ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information for the low potential process chemicals that meet the usage threshold criteria (A).	Documentation that mercury has been quantified.	ORIGINAL: Within 9 months of SMV approval. REVISED: For new process chemicals, w/in1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
Outfalls 028/030 Source Characterization: Process Chemicals - Very Low Potential	Type 1: Source Characterization	ORIGINAL ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information. REVISED ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information for the very low potential process chemicals that meet the usage threshold criteria (A).	Documentation that mercury has been quantified.	ORIGINAL: Within 12 months of SMV approval. REVISED: For process chemicals, w/in 1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
Condensate Characterization (B)	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Already implemented.	Complete (see Section 3.9)
Outfall 603 Source Characterization	Type 1: Source Characterization	Perform additional mercury monitoring of internal Outfall 603 sources for comparison to previously collected mercury data for these locations.	Documentation of evaluation.	ORIGINAL: Within 12 months of SMV approval. REVISED: Repeat in 2017.	Complete (see Section 3.10)
GW-10 Source Characterization	Type 1: Source Characterization	Perform additional source survey sampling for GW-10 and the select areas identified by the 2012 source survey program.	Documentation of evaluation.	ORIGINAL: Within 12 months of SMV approval. REVISED: Repeat in 2017.	Complete (see Section 3.11)

Planned Activity	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
ArcelorMittal Plate Mill Source Characterization	Type 1: Source Characterization	Mercury characterization of associated water treatment and/or process chemicals.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined if process wastewater producing operations are resumed.	On hold (see Section 3.12
Alternatives for Reduction Evaluation: Mercury-Containing Chemicals and Materials	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined based on the outcome of the various source characterization activities.	Ongoing as needed (see Section 3.13)
Source Characterization: Sodium Hydroxide	Type 1: Source Characterization	Perform additional mercury characterization of Sodium Hydroxide in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2017 progress report.	Complete (see Section 3.8.)
Source Characterization: CL2840	Type 1: Source Characterization	Perform additional mercury characterization of CL2840 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	ORIGINAL: By the due date of the 2017 progress report. REVISED: Repeat again by the due date of the 2018 progress report.	Original Complete; Revised Complete (see Section 3.8)
Alternatives for Reduction Evaluation: Caster Mold Fluxes	Type 2: Alternatives for Reduction Evaluation	Investigate the current usage (including BMPs) practices of Caster Mold Fluxes in order to better assess the potential for impacts to the 028/030 discharge.	Documentation of evaluation.	By the due date of the 2017 progress report.	Complete (see Section 3.13)
GW-10 Source Characterization	Type 1: Source Characterization	Revisit (in order to confirm/revise) the approach and assumption used in evaluation of the GW-10 Source Characterization sampling data (Row ID 18).	Documentation of evaluation.	By the due date of the 2018 progress report.	Complete (see Section 3.11)
GW-11 Characterization	Type 1: Source Characterization	Perform mercury characterization of GW-11.	Documentation of evaluation.	By the due date of the 2019 progress report.	Complete (see Section 3.11)
Source Characterization: CL1370	Type 1: Source Characterization	Perform additional mercury characterization of CL1370 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2020 progress report.	Complete (see Section 3.8)
Source Characterization: CL4800	Type 1: Source Characterization	Perform additional mercury characterization of CL4800 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2021 progress report.	In Progress (see Section 3.8)

Outfall 015

Row ID	**Planned Activity**	***Activity Type***	***Goal***	***Measure of Performance***	***Schedule of Action***
1	Complete Inventory	Type 1: Source Characterization	Finalize the inventory of listed equipment/materials, and usage rates.	Submittal of completed inventory to IDEM.	In progress. Submit an updated inventory as part of the first Annual Progress Report following SMV approval and incorporation into the Permit.
2	Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Review mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Implementation of Policies and Procedures that address the mercury content of materials.	Implemented/Ongoing.
3	Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Implemented/Ongoing.
4	Good Housekeeping Practices: *Mercury Containing Chemicals and Materials*	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Implemented/Ongoing.
5	Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Implemented/Ongoing.
6	Standard Operating Practices: Spill Prevention and Response: *Chemicals and Materials*	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills. Reduce possibility of accidental spills and releases.	Training of employees on proper and safe spill response for dealing with chemical spills.	Implemented/Ongoing.
7	Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.
8	Disposal Practices of Mercury-Containing Items: *Bulbs/Lamps*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.
9	Disposal Practices of Mercury-Containing Items: *Batteries*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.
10	*Outfall 015* Source Characterization: Water Treatment Additives [(A)]	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	For currently used materials, within 9 months of SMV approval and permit incorporation. For new water treatment additives, w/in 1 year of beginning use.

Row ID	Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action
11	*Outfall 015* Source Characterization and : Sodium Hypochlorite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium hypochlorite used for mussel control at the intake.	Documentation that mercury has been quantified.	Complete
12	*Outfall 015* Source Characterization: Sodium Bisulfite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium bisulfite used for dechlorination of the final Outfall 015 discharge.	Documentation that mercury has been quantified.	Complete
13	*Outfall 015* Source Characterization and : Sulfuric Acid	Type 1: Source Characterization	Perform additional mercury characterization of sulfuric acid used at the LTP in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	Complete
14	Alternatives for Reduction Evaluation: *Mussel Control Chemicals*	Type 1: Source Characterization	Investigate the current usage practices of the Sodium Hypochlrorite used at the intakes for mussel control and Sodium Bisulfite used at Outfall 015 for dechlorination.	Documentation of evaluation.	Complete
15	*Outfall 015* Source Characterization: Condensate	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Complete
16	*Outfall 607* Source Characterization: *Landfill sludges*	Type 1: Source Characterization	Evaluation of sludge inputs to landfill will be reviewed annually to confirm no significant changes in volume or sources. If a significant change occurs in current individual sludge disposal quantities or a new sludge accounting for more than 2% of total monthly mass disposed is added, it will be subjected to mercury characterization.	Documentation of evaluation.	Implemented/Ongoing as needed.
17	*Outfall 501* Source Characterization: *Landfill leachate*	Type 1: Source Characterization	Continued periodic mercury monitoring of the landfill leachate treated at the LTP for comparison to historical data.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).
18	*Outfall 501* Source Characterization: *Groundwater and misc. wastewaters*	Type 1: Source Characterization	Continued periodic mercury monitoring of the various influent streams (e.g. groundwater, misc. wastewaters) to the ETF for comparison to historical data.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).
19	*Outfall 501 & 607* Source Characterization: *Monitoring*	Type 1: Source Characterization	Continued periodic monitoring of Outfall 501 for mercury for comparison to historical data.	Documentation of evaluation.	Implemented/Ongoing.
20	*Outfall 501 & 607* Source Characterization: *Type of Mercury*	Type 1: Source Characterization	Continued periodic characterization of the types (filterable or dissolved) present in the Outfall 501 and Outfall 607 wastewaters.	Documentation of characterization.	Periodic evaluations (e.g., every other year).
21	*Outfall 501* Alternatives for Reduction Evaluation: *Current ETF Treatment System*	Type 2: Alternatives for Reduction Evaluation	Continued periodic evaluations of the current ETF sand filters with respect to mercury removal.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).

Row ID	Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action
22	*Outfall 607* Alternatives for Reduction Evaluation: *Current LTP Treatment System*	Type 2: Alternatives for Reduction Evaluation	Continued periodic evaluations of the current LTP treatment system with respect to mercury removal.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).
23	*Source Characterization:* CL1370	Type 1: Source Characterization	Perform additional mercury characterization of CL1370 in order to better assess the magnitude of the potential mercury contribution.	Documentation of evaluation.	In progress. Complete within 1 year of approval and incorporation of the SMV into the Permit.
24	Alternatives for Reduction Evaluation: *Mercury-Containing Chemicals and Materials*	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined based on the outcome of the various source characterization activities.
25	*Proposed Future Outfall 501* Alternatives for Reduction Evaluation: *ETF Treatment System w/proposed future wastewaters*	Type 2: Alternatives for Reduction Evaluation	Evaluate of the ETF system for mercury removal follo This may include periodic mercury monitoring at various locations in the ETF system (e.g., influents or combined influent to the system, just prior to and after the sand filters).	Documentation of evaluation.	If applicable, complete within 1 year of re-reouting the wastewaters currently treated by the LTP to the ETF for treatment.
26	*Proposed Future Outfall 501* Source Characterization: *Type of Mercury*	Type 2: Alternatives for Reduction Evaluation	Determine the predominate form of mercury present (e.g., filterable/particulate based or dissolved) for the new combined wastewaters treated by the ETF.	Documentation of evaluation.	If applicable, complete within 1 year of re-reouting the wastewaters currently treated by the LTP to the ETF for treatment.
27	*Future proposed Outfall 015* Source Characterization	Type 2: Alternatives for Reduction Evaluation	Evaluate the estimated mercury contribution of the proposed future Outfall 501 to Outfall 015 following the rerouting of all Outfall 607 wastewaters to the ETF for treatment.	Documentation of evaluation.	If applicable, complete within 1 year of re-reouting the wastewaters currently treated by the LTP to the ETF for treatment.

National Pollutant Discharge Elimination System
Fact Sheet for
United States Steel Corp.
Draft: February 2021
Final: April 2021

Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
Toll Free (800) 451-6027
www.idem.IN.gov

Permittee:	United States Steel Corporation – Gary Works One North Broadway Gary, IN 46402
Existing Permit Information:	Permit Number: IN0000281 Expiration Date: 10/31/20
Facility Contact:	Brandon Miller, Environmental Control (219)888-3360 or bsmiller@uss.com
Facility Location:	One North Broadway Gary, IN 46402 Lake County
Receiving Stream(s):	Grand Calumet River Lake Michigan
GLI/Non-GLI:	GLI
Proposed Permit Action:	Renew
Date Application Received:	5/1/2020
Source Category	NPDES Major – Industrial
Permit Writer:	Richard Hamblin (317)232-8696 or rhamblin@idem.in.gov

Table of Contents

1.0 INTRODUCTION

The Indiana Department of Environmental Management (IDEM) received a National Pollutant Discharge Elimination System (NPDES) Permit application from the permittee on May 1, 2020.

In accordance with 327 IAC 5-2-6(a), the current five year permit was issued with an effective date of November 1, 2015. The permit was subsequently modified five (5) times during the previous permit cycle. Modified permits were issued on January 13, 2017, March 23, 2018, August 16, 2018, June 20, 2019, and April 16, 2020. A five year permit is proposed in accordance with 327 IAC 5-2-6(a).

The Federal Water Pollution Control Act (more commonly known as the Clean Water Act), as amended, (Title 33 of the United States Code (U.S.C.) Section 1251 *et seq.*), requires an NPDES permit for the discharge of pollutants into surface waters. Furthermore, Indiana law requires a permit to control or limit the discharge of any contaminants into state waters or into a publicly owned treatment works. This proposed permit action by IDEM complies with and implements these federal and state requirements.

In accordance with Title 40 of the Code of Federal Regulations (CFR) Sections 124.8 and 124.56, as well as Title 327 of the Indiana Administrative Code (IAC) Article 5-3-8, a Fact Sheet is required for certain NPDES permits. This document fulfills the requirements established in these regulations. This Fact Sheet was prepared in order to document the factors considered in the development of NPDES Permit effluent limitations. The technical basis for the Fact Sheet may consist of evaluations of promulgated effluent guidelines, existing effluent quality, receiving water conditions, Indiana water quality standards-based wasteload allocations, and other information available to IDEM. Decisions to award variances to Water Quality Standards or promulgated effluent guidelines are justified in the Fact Sheet where necessary.

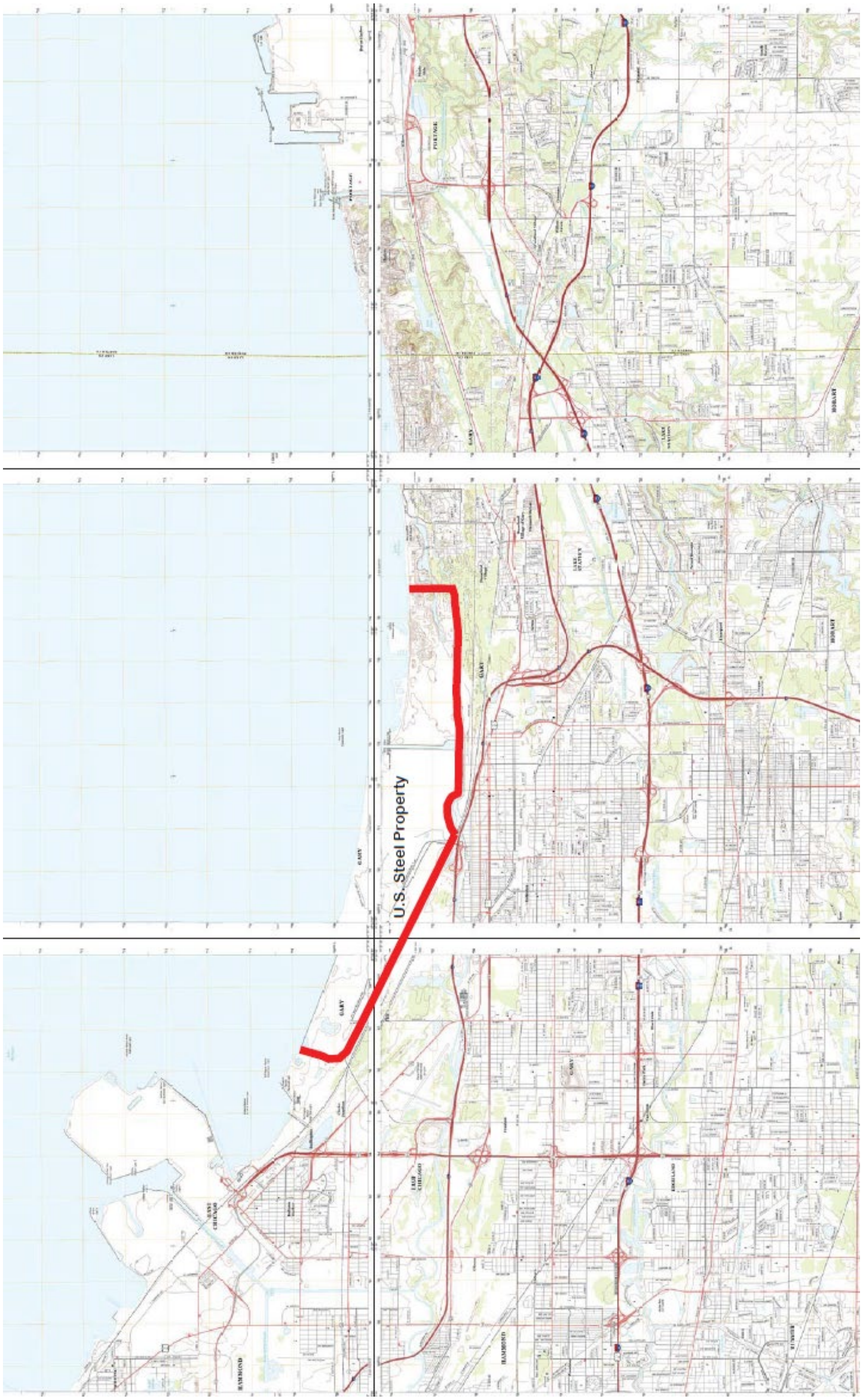
2.0 FACILITY DESCRIPTION

2.1 General

U.S. Steel – Gary Works is classified under Standard Industrial Classification (SIC) Code 3312 – Steel Works, Blast Furnaces, and Rolling Mills. The facility is an integrated steel mill. Intermediate and final products include sinter, iron, raw steel, cast steel, plate, hot strip, cold rolled strip, and coated steels.

A map showing the location of the facility has been included as Figure 1. Detailed maps identifying the outfall locations are included as Figures 2 and 3.

Figure 1: Facility Location



One North Broadway
Gary, IN – Lake County

Figure 2: Facility Outfall Map – West Side

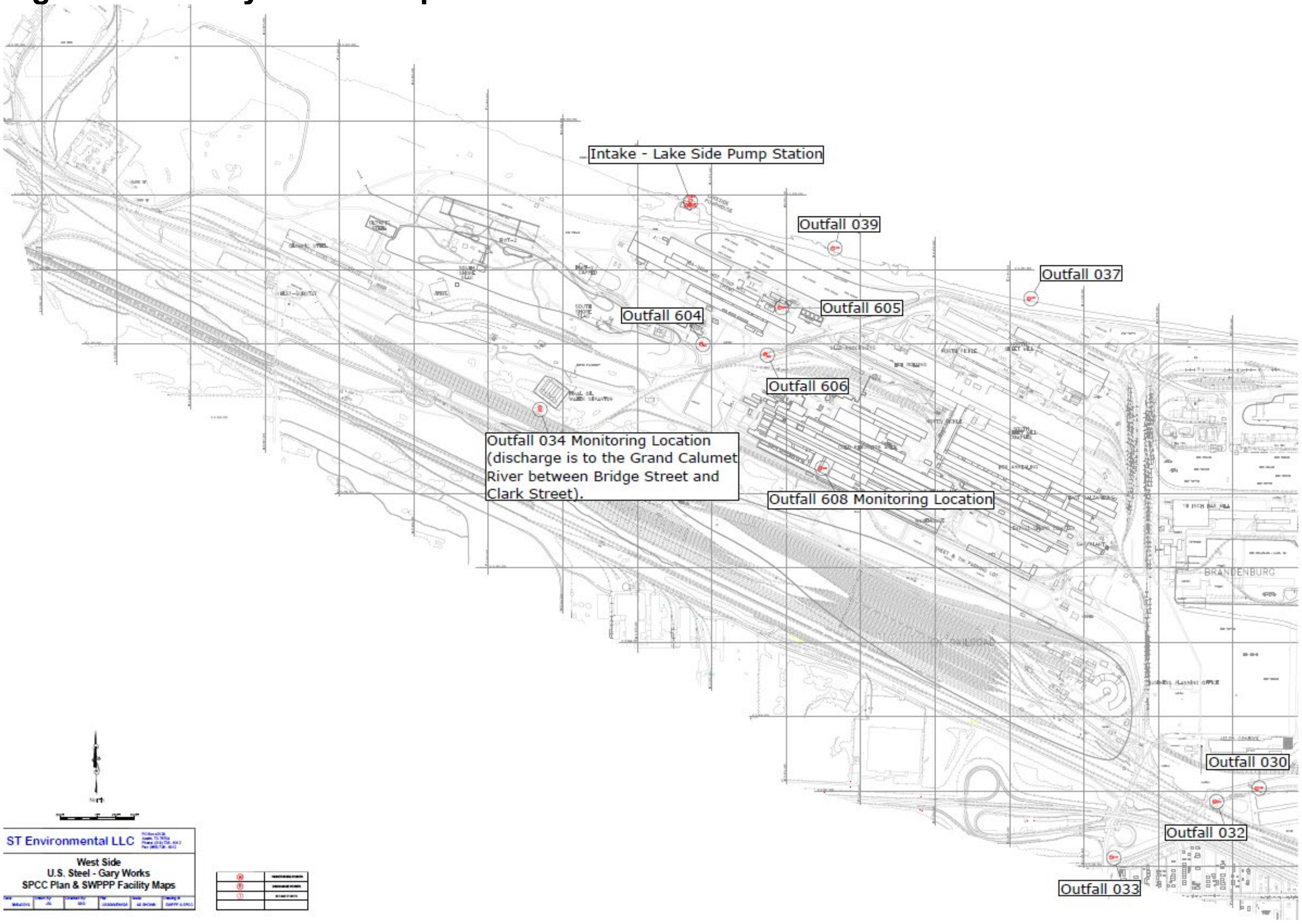
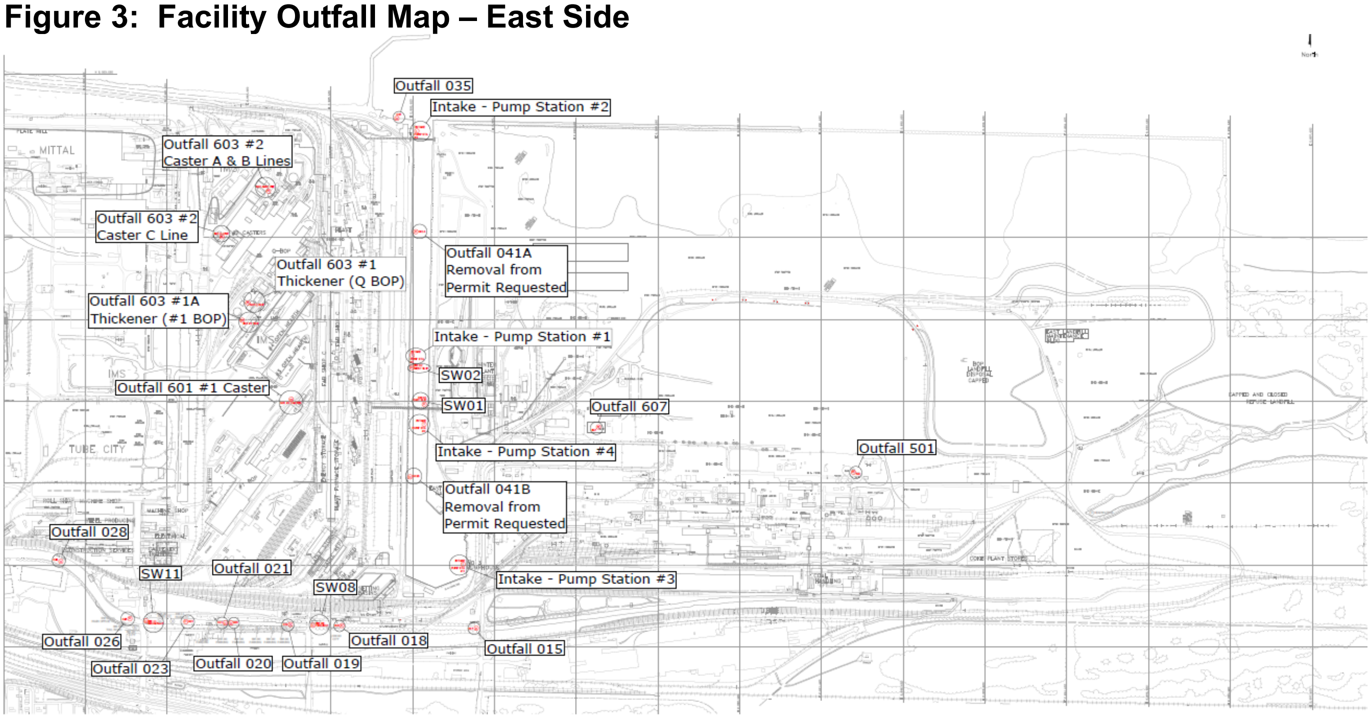


Figure 3: Facility Outfall Map – East Side



2.2 Outfall Locations

Outfall #	Location	Receiving Stream or Final Outfall
Outfall 015	Latitude: 41º 36’ 27.4” Longitude: -87º 19’ 19.6”	Grand Calumet River
Internal Outfall 607	Latitude: 41º 36’ 55.1” Longitude: -87º 19’ 0.1”	Outfall 015
Internal Outfall 501	Latitude: 41º 36’ 46.1” Longitude: -87º 19’ 19.8”	Outfall 015
Outfall 018	Latitude: 41º 36’ 27.4” Longitude: -87º 19’ 42.2”	Grand Calumet River
Outfall 019	Latitude: 41º 36’ 27.7” Longitude: -87º 19’ 51.2”	Grand Calumet River
Outfall 020	Latitude: 41º 36’ 27.7” Longitude: -87º 20’ 0.2”	Grand Calumet River
Outfall 021	Latitude: 41º 36’ 28.1” Longitude: -87º 20’ 1.7”	Grand Calumet River
Outfall 023 (Inactive)	Latitude: 41º 36’ 27.4” Longitude: -87º 20’ 7.1”	Grand Calumet River
Outfall 026 (Inactive)	Latitude: 41º 36’ 27.7” Longitude: -87º 20’ 15.7”	Grand Calumet River
Outfall 028	Latitude: 41º 36’ 34.6” Longitude: -87º 20’ 26.9”	Grand Calumet River
Outfall 030	Latitude: 41º 36’ 36” Longitude: -87º 20’ 46”	Grand Calumet River
Internal Outfall 603	Administrative Outfall	Outfalls 028/030
Outfall 032	Latitude: 41º 36’ 34.6” Longitude: -87º 20’ 51.4”	Grand Calumet River
Outfall 033	Latitude: 41º 36’ 26” Longitude: -87º 21’ 11”	Grand Calumet River
Outfall 034	Latitude: 41º 36’ 23” Longitude: -87º 23’ 03”	Grand Calumet River
Internal Outfall 604	Latitude: 41º 34.7’ 35” Longitude: -87º 22’ 23.5”	Outfall 034
Internal Outfall 605	Latitude: 41º 37’ 40.1” Longitude: -87º 22’ 10.6”	Outfall 034
Internal Outfall 606	Latitude: 41º 37’ 29.3” Longitude: -87º 22’ 9.5”	Outfall 034
Internal Outfall 608	Latitude: 41º 37’ 17.9” Longitude: -87º 22’ 1.99”	Outfall 034
Internal Outfall 609	Administrative Outfall	Outfall 034
Outfall 035	Latitude: 41º 37’ 29.3” Longitude: -87º 19’ 35.8”	Lake Michigan
Outfall 037	Latitude: 41º 37’ 39” Longitude: -87º 21’ 25”	Lake Michigan
Outfall 039	Latitude: 41º 37’ 45.8” Longitude: -87º 21’ 59.8”	Lake Michigan

SW-01	Latitude: 41º 37' 2.6" Longitude: -87º 19' 27.8"	Lake Michigan
SW-08	Latitude: 41º 36' 27.4" Longitude: -87º 19' 47.6"	Grand Calumet River
SW-11	Latitude: 41º 36' 28.1" Longitude: -87º 20' 13.6"	Grand Calumet River
SW-32	Latitude: 41º 36' 34.6" Longitude: -87º 20' 51.4"	Grand Calumet River
SW-33	Latitude: 41º 36' 26.0" Longitude: -87º 21' 11.0"	Grand Calumet River

2.3 Wastewater Treatment

The facility has numerous outfalls and associated treatment facilities. The following is a description of each permitted outfall's wastewater sources and treatments:

Outfall 015
2.1 MGD
The discharge from Outfall 015 is composed of Sinter Plant non-contact cooling waters and steam condensate, PCI East non-contact cooling water, stormwater runoff, and Internal Outfalls 607 and Internal Outfall 501. The final treatment consists of dechlorination. A flow diagram for Outfall 015 is provided as Figure 4.

Internal Outfall 501
0.26-0.35 MGD
The discharge from Outfall 501 is composed of treated remediation groundwater, boiler blowdown and condensates, boiler feedwater pretreatment, freeze protection water, and stormwater. Treatment is performed at the Environmental Treatment Facility Integral Activated Sludge System (ETF facility) and consists of oil and tar separation, biological equalization, activated sludge, clarification, and final sand filtration.

The facility may re-route the wastestreams associated with Internal Outfall 607 (as described below) to Internal Outfall 501. If that is completed, the ETF facility would then treat the SWD-1 landfill leachate and truck wash water. The average daily discharge of Internal Outfall 501 is estimated to increase from 0.26 MGD to 0.35 MGD. The Leachate Treatment System and discharge from Internal Outfall 607 would cease at that time. There would be no overall change in discharge volume at Outfall 015. A flow diagram for Internal Outfall 501 is included as Figure 5.

Internal Outfall 607
0.09 MGD
The discharge from Outfall 607 is composed of treated SWD-1 landfill leachate and treated washwater from the vacuum trucks and truck wash decant pad. Treatment consists of equalization, neutralization, chemical precipitation, sludge dewatering filter press, activated carbon, clarification, and sand filtration at the Leachate Treatment Plant. This treatment system is batch operated and treated when needed.

As mentioned above, the facility may re-route the wastestreams associated with Internal Outfall 607 to the ETF facility associated with Internal Outfall 501 at a future date. This was permitted in the April 2020 modified permit. If the facility proceeds to redirect the landfill leachate and truck wash water, the wastestreams would no longer be treated with the Leachate Treatment Plant associated in Internal Outfall 607. Rather, it would be treated by the ETF facility associated with Internal Outfall 501. The Leachate Treatment Plant and discharge from Internal Outfall 607 would cease at that time. The facility will notify IDEM thirty (30) days prior to redirections of these wastestreams. A Flow diagram for Internal Outfall 607 is provided as Figure 6.

<u>Outfall 018</u>
60.7 MGD
The discharge from Outfall 018 is composed of Pulverized Coal Injection (PCI) West non-contact cooling water, South End Blast Furnace non-contact cooling water, Fab Shop Air Conditioner non-contact cooling water, No. 4 Electric Power Station noncontact cooling water, Fab Shop steam condensates, and storm water (drainage area #13). In addition, if flow through Outfall 019 is restricted, Outfall 019 waters have the potential to discharge via Outfall 018. The Outfall 018 and 019 sewer systems have cross connections at various points that can be controlled (open or blocked off) via steel plates. The purpose of this is that if one system becomes hydraulically overloaded due to some obstruction or flow restriction, the water will overflow into the other parallel sewer system, preventing flooding in operational areas. Under normal operation the sewers do not overflow into each other. Final treatment consists of dechlorination.

A flow diagram for Outfall 018 has been provided as Figure 4.

The facility requested the authorization to discharge treated Blast Furnace Recycle System Blowdown for emergency situations, to Outfall 018 as part of this renewal. The facility plans to install a treatment system to treat and discharge emergency blowdown from the Blast Furnace Recycle System. Details of the treatment system and exact location are still being determined and may change prior to construction. Therefore, this discharge has not been authorized in this renewal permit. Once the facility has finalized details of the treatment plant, they may request a modification of the permit.

Figure 4: Outfalls 015, 018, and 019 Flow Diagram

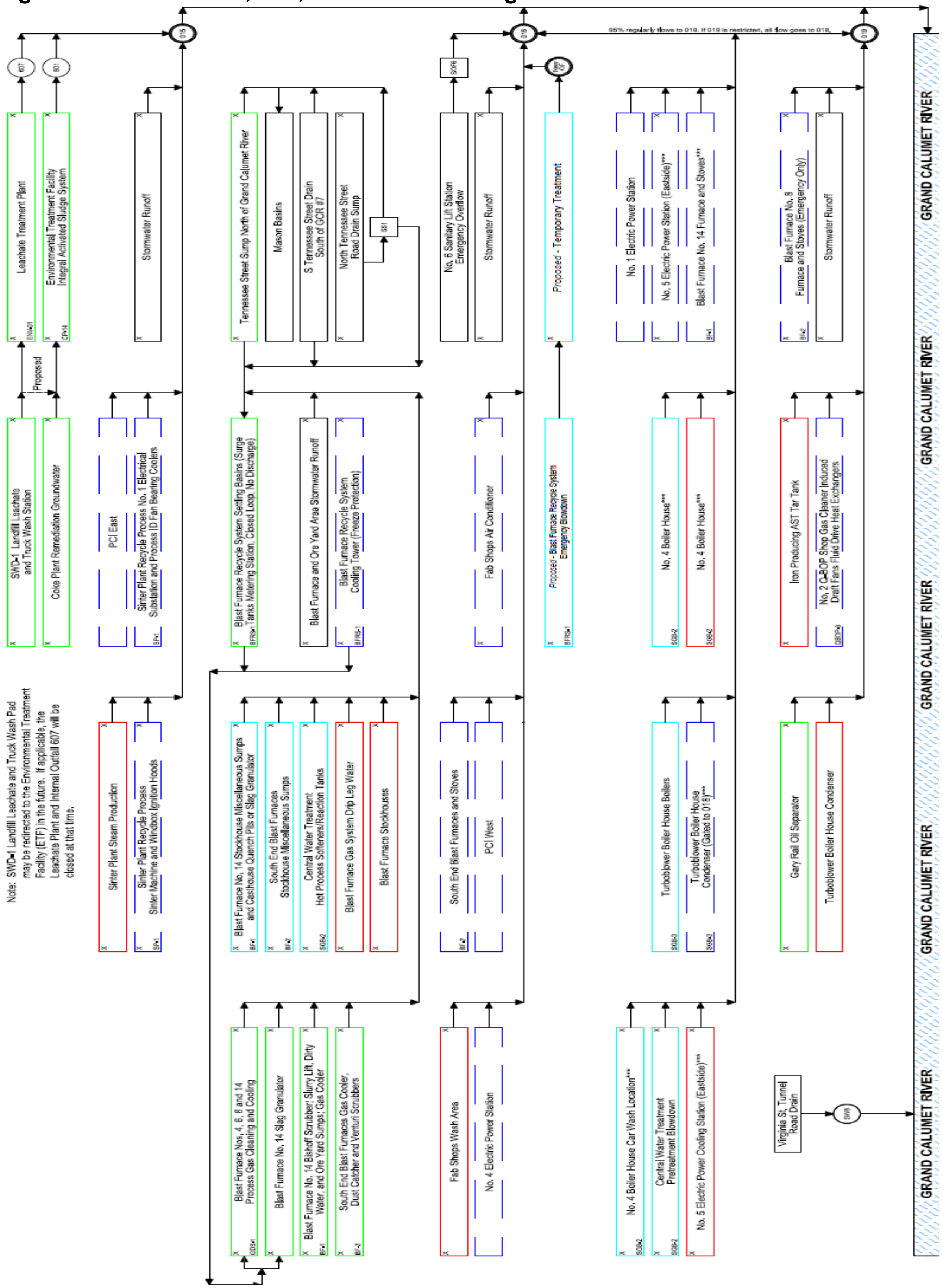
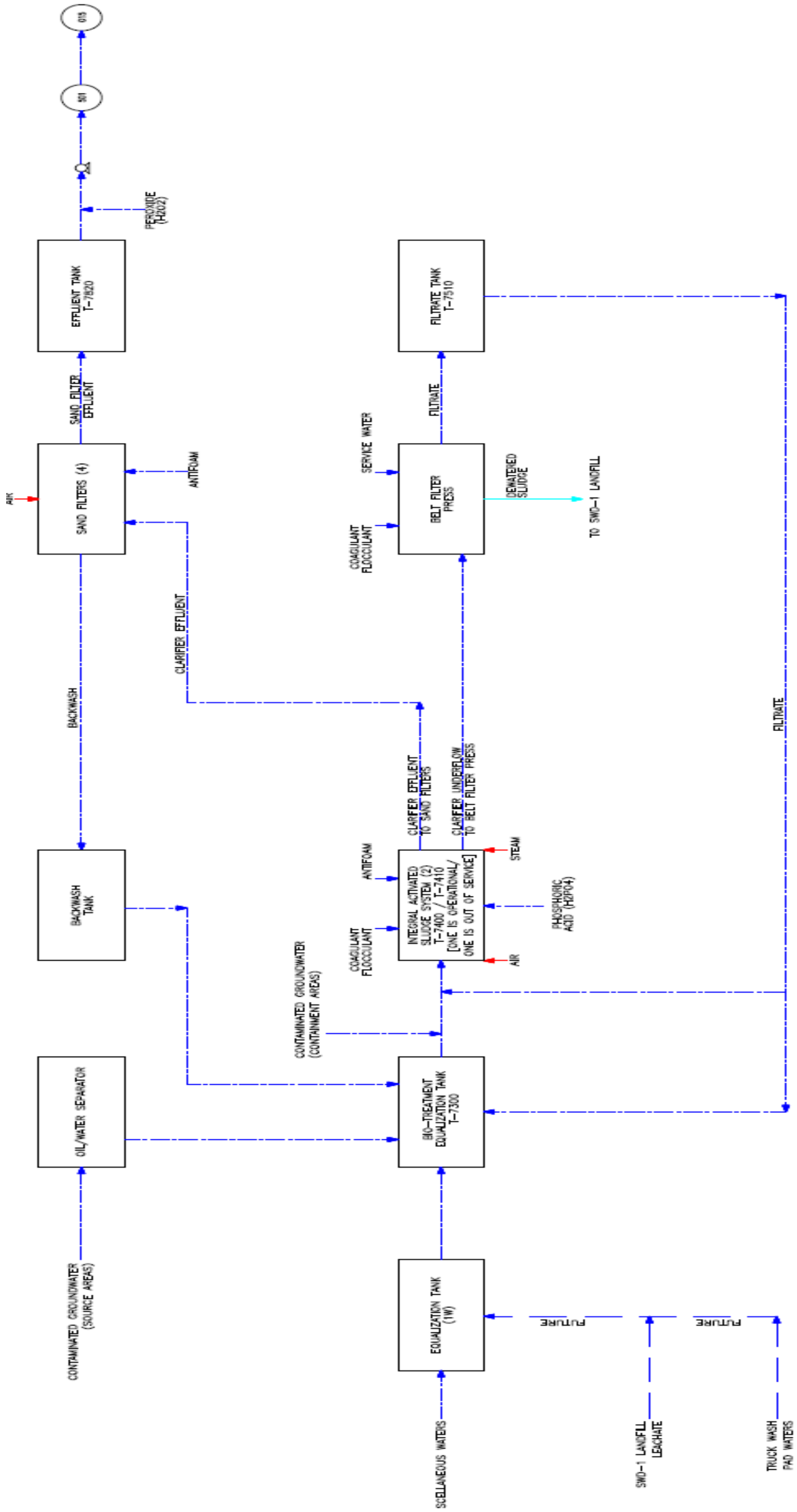
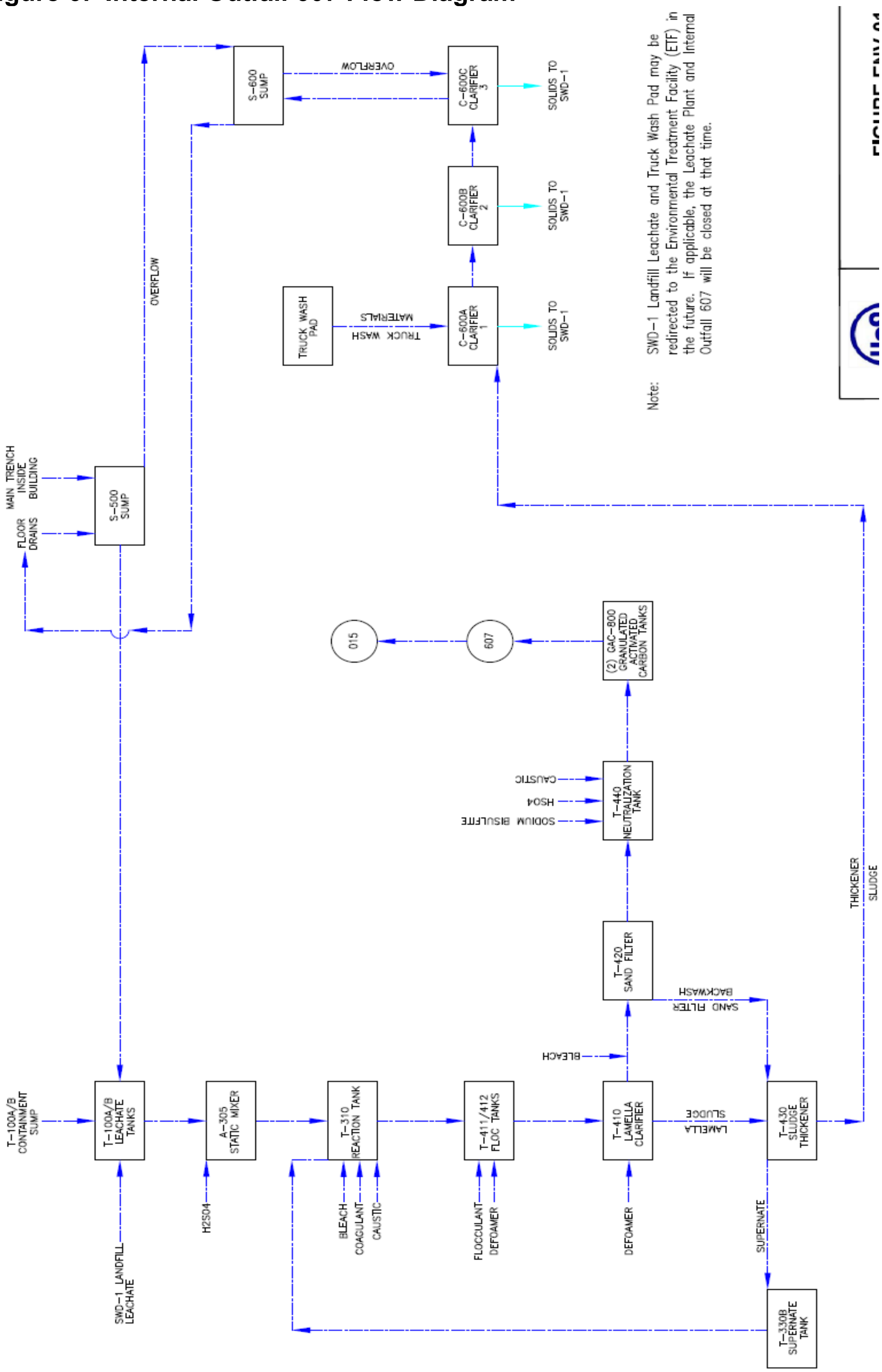


Figure 5: Internal Outfall 501 Flow Diagram



Note: SWD-1 Landfill Leachate and Truck Wash Pad may be redirected to the Environmental Treatment Facility (ETF) in the future. If applicable, the Leachate Plant and Internal Outfall 607 will be closed at that time.

Figure 6: Internal Outfall 607 Flow Diagram



Outfall 019
73.4 MGD
The discharge from Outfall 019 is composed of Blast Furnace No. 14 noncontact cooling water, No. 2 Q-BOP miscellaneous non-contact cooling water, Turboblower Boiler House Condenser non-contact cooling water, No. 1 Electric Power Station non-contact cooling water, No. 5 Electric Power Station non-contact cooling water, No. 4 Boiler House car wash, Central Water Treatment Pretreatment Plant wastewaters (brine regenerant, ultrafiltration backwash, RO concentrate, softener backwash and regenerant), Turboblower Boiler House boiler blowdown, No. 4 Boiler House blowdown, No. 5 Electric Power Cooling Station condensate, No. 4 Boiler House condensate, Turboblower Boiler House condensate, Iron Producing AST Tar Tank condensate, Blast Furnace No. 8 non-contact cooling water, and storm water (drainage area #14).

The use of organic solvents or non-biodegradable chemicals, soaps, and detergents is prohibited. All chemicals, soaps, and detergents shall be phosphate-free.

The Central Water Treatment Pretreatment plant utilizes ultrafiltration (UF) and reverse osmosis (RO). The UF membranes will receive pressurized service water from the intake pump house to remove suspended solids and many organic impurities will be captured. Water from the UFs will be pumped to the RO system prior to the softeners. The UF membranes will be cleaned via backwash, maintenance wash, and a clean-in-place routine. The backwash is expected to occur every thirty minutes, the maintenance wash is expected to occur once a day, and the clean-in-place routine is expected to occur once a month. Both the maintenance wash and clean-in-place action will be directed to the Blast Furnace Recycle system and not discharged to the receiving stream, except during emergency situations and monitored at Internal Outfall 610.

The RO units will be cleaned once a quarter. This water will also be directed to the Blast Furnace Recycle system and not discharged except during emergency situations and monitored at Internal Outfall 610. The daily regenerant will be sent to Outfall 019.

A flow diagram for Outfall 019 has been provided as Figure 4 above.

Outfall 020
47.5 MGD
The discharge from Outfall 020 is composed of No. 1 BOP Hood System non-contact cooling water, No. 1 BOP Continuous Caster non-contact cooling water, steam condensate from the No. 1 BOP and No. 1 Continuous Caster, and storm water (drainage area #15). Treatment consists of dechlorination.

A flow diagram for Outfall 020 has been provided as Figure 7.

Outfall 021
0.6 MGD
The discharge from Outfall 021 is composed of No. 1 BOP Shop cooling/air compressor non-contact cooling water, steel producing area air conditioner and steam condensates, and storm water (drainage area #16). Treatment consists of dechlorination.

A flow diagram for Outfall 021 has been provided as Figure 7.

Outfall 023

Inactive

When discharging, Outfall 023 effluent is composed of Hospital Building air conditioning non-contact cooling water, Hospital Building condensates, and storm water (drainage area #17). No treatment is provided.

A flow diagram for Outfall 023 has been provided as Figure 7.

Outfall 026

Inactive

When discharging, Outfall 026 effluent is composed of Pass Control Area air conditioning non-contact cooling water, Pass Control Area steam condensates, and storm water (drainage area #18). No treatment is provided.

A flow diagram for Outfall 026 has been provided as Figure 7.

Outfalls 028/030 (Outfall 600)

8.2 MGD/20.0 MGD

The discharge from Outfalls 028 and 030 are from the Terminal Lagoons. The Terminal Lagoons accept noncontact cooling waters from the #2 Continuous Caster, miscellaneous non-contact cooling waters, #1 BOP/QBOP Cooling Tower blowdown, storm water (drainage area #19), steam condensate, 160”/210” Plate Mill Scale Pit (currently inactive), main garage and locomotive services pressure washing/steam cleaning areas, and treated wastewater from Internal Outfall 603. These wastewaters are first collected in a distribution chamber located in between the lagoons. The distribution chamber has an opening on the west side and the east side. Water leaving the distribution chamber flows through both openings to the lagoons. The east opening leads to a single lagoon, associated with Outfall 028. The west opening leads to 2 lagoons that are adjacent to each other, associated with Outfall 030. Because there are 2 lagoons on the west side (Outfall 030) and 1 lagoon on the east side (Outfall 028), Outfall 030 receives roughly 2/3rds of the flow and Outfall 028 roughly 1/3 of all the flow coming into the distribution chamber.

The Terminal Lagoons provide additional treatment via sedimentation and dechlorination.

The permittee is authorized to discharge from Outfalls 028 & 030 and report a combined total as Outfall 600. A flow diagram for Outfalls 028/030 has been provided as Figure 7.

Internal Outfall 603

8.6 MGD

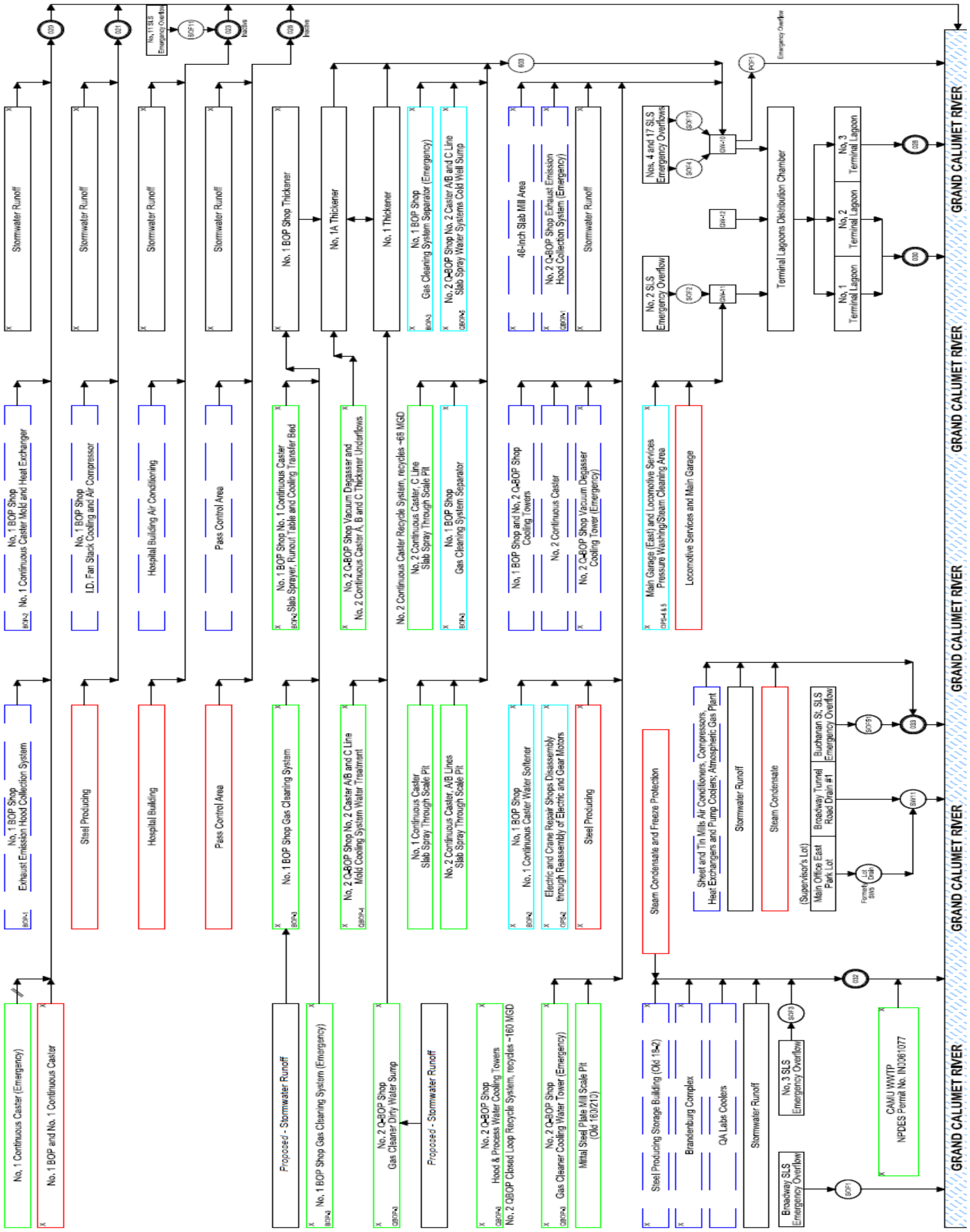
Internal Outfall 603 discharges to the Terminal Lagoons. The discharge from Internal Outfall 603 is comprised of Slab Spray cooling, QBOP Vacuum Degasser overflow, #1 BOP, Vacuum Degasser, QBOP, #2 Continuous Caster A/B Line and C Line, and #1 Continuous Caster Line and stormwater.

Internal Outfall 603 is comprised of 5 separate monitoring points. These monitoring points are as follows:

1. #1 Thickener – this thickener receives and treats water blown down from the QBOP Gas Cleaning system. It also receives backwash from the #2 Caster A/B and #2 Caster C line multimedia filters.
2. #1A Thickener – this thickener receives and treats water blown down from the #1BOP Gas Cleaning system.
    a. The sources to each thickener can be sent to either thickener if needed
3. #2 Caster A/B Line process water system blowdown
4. #2 Caster C Line process water system blowdown
5. #1 Caster process water system blowdown

Each of these points are monitored separately after being treated at each respective location. The QBOP gas cleaning system blowdown is treated normally in #1 Thickener, the BOP gas cleaning system is treated normally in #1A thickener, #2 Caster A/B Line and #2 Caster C Line process water is treated via a scale pit and multimedia filters before being blowdown and sampled, and #1 Caster water is treated via a scale pit before being blown down and sampled. All of these different sources comingle in the sewer system along with other non-contact cooling water sources (the NCCW sources make up >60% of the total flow), all of which then flows to GW-10 lift station. From there all the water is pumped to the C-lot lagoons (terminal lagoons) and is discharged through outfalls 028 and 030 (600). The facility has indicated that stormwater from areas east of Buchanan Street may be sent to the #1 or #1A Thickener treatment systems to prevent and/or mitigate flooding.

Figure 7: Outfalls 020, 021, 023, 026, 028, 030, 032, and 033 Flow Diagram



Outfall 032

0.3 MGD

The discharge from Outfall 032 is composed of QA Lab Coolers non-contact cooling water, miscellaneous non-contact cooling water (Steel Producing Storage Building and Brandenburg Complex), storm water (drainage area #20), steam condensate, and freeze protection water. Treatment consists of dechlorination.

Discharge from U.S. Steel's Grand Calumet River Sediment Remediation Project is covered under a separate NPDES Permit (IN0061077) but is conveyed to the Grand Calumet River via the Outfall 032 discharge structure associated with this permit. The discharge from the Corrective Action Management Unit (CAMU) Treatment Plant consists of leachate from sediments dredged from the Grand Calumet River and remediation wastes from Gary Works. However, sampling for Outfall 032 and the CAMU occurs prior to commingling of the respective wastewaters.

A flow diagram for Outfall 032 has been provided as Figure 7 above.

<u>Outfall 033</u>
0.2 MGD
The discharge from Outfall 033 is composed of miscellaneous Sheet and Tin Mill non-contact cooling water, Atmospheric Gas Plant non-contact cooling water, storm water (drainage area #21), and steam condensates. Treatment consists of dechlorination.

A flow diagram for Outfall 033 has been provided as Figure 7 above.

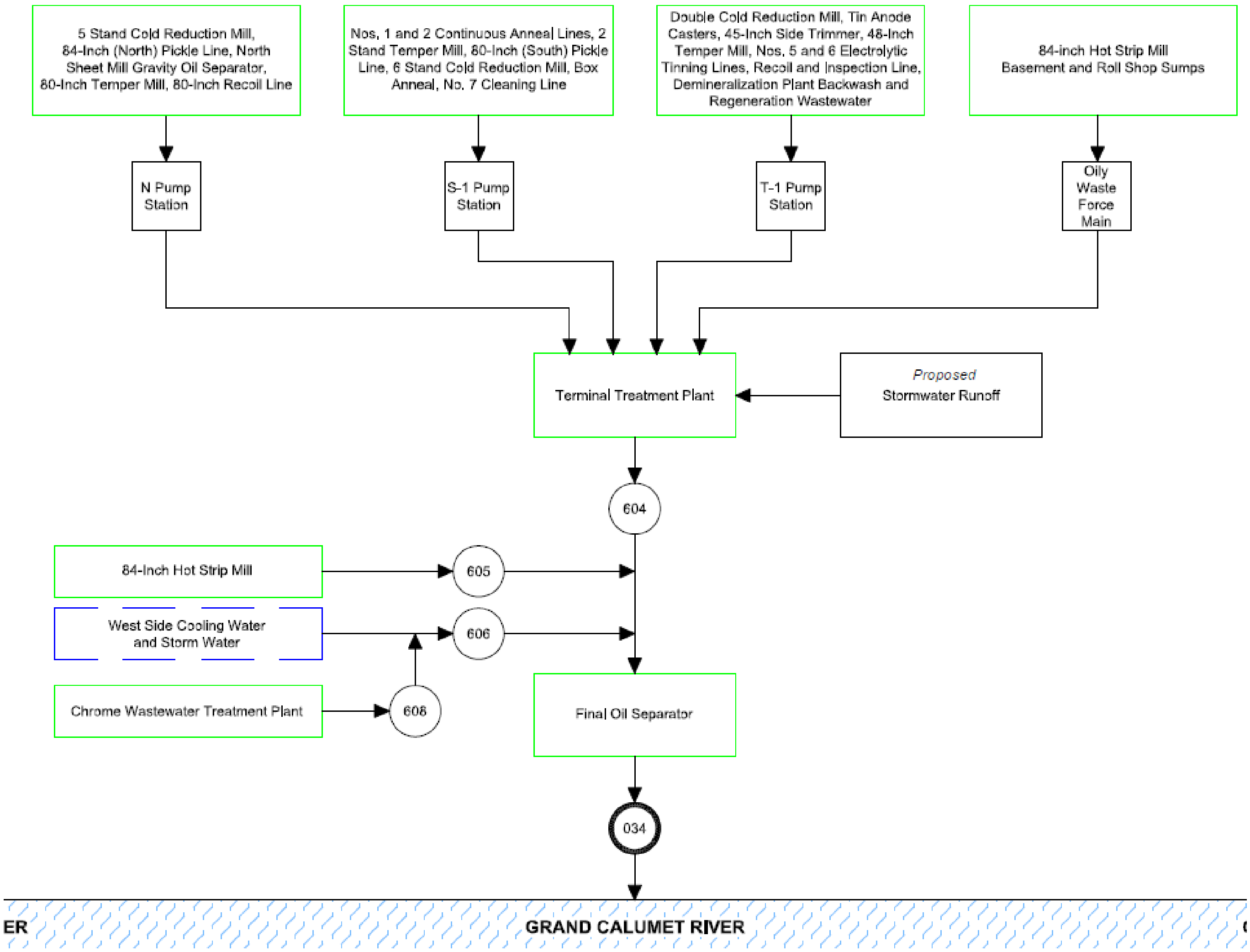
<u>Outfall 034</u>
25.4 MGD
The discharge from Outfall 034 is composed of treated process and nonprocess wastewaters from Internal Outfall 604, Internal Outfall 605, Internal Outfall 606, and Internal Outfall 608. These treated wastewaters are further treated with a final oil/water separator and dechlorination prior to discharging via Outfall 034.

A flow diagram for Outfall 034 has been provided as Figure 8.

<u>Internal Outfall 604</u>
14.8 MGD
The discharge from Internal Outfall 604 is composed of treated process water from the 84" Hot Strip Mill, 84" and 80" Pickle Lines, North and South Sheet Mills and Tin Mills, Demineralizer Plant filter backwash and regenerant, EGL and 84" Hot Strip Mill basement water, boiler feedwater softener blowdown (backwash and regenerant), and stormwater from areas west of Buchanan Street as needed to prevent and/or mitigate flooding. Treatment consists of flash mixing, reduction tanks, pH adjustment, flocculation, clarification, sludge denitrification, mixing, and API separation.

<u>Internal Outfall 605</u>
5.6 MGD
The discharge from Internal Outfall 605 is composed of treated 84" Hot Strip Mill Process Wastewater, boiler blowdown, filter backwash, and condensates. Treatment consists of scale pits for sedimentation and oil removal.

Figure 8: Outfall 034 and Internal Outfalls 604, 605, 606, and 608 Flow Diagram



<u>Internal Outfall 606</u>
4.1 MGD
The discharge from Internal Outfall 606 is composed of miscellaneous Sheet and Tin Mill non-contact cooling waters and condensates, various Temper Mill non-contact cooling waters, 5 Stand Cold Reduction Mill non-contact cooling water, various Annealing non-contact cooling waters, No. 6 Galvanizing Line non-contact cooling water, Waste Acid Recycling Facility non-contact cooling water, Old S and T pump stations and 48” lift station non-contact cooling water, Internal Outfall 608 wastewaters, storm water from a portion of drainage area #22. Treatment consists of a final oil separator. The No. 6 Galvanizing Line non-contact cooling waters are treated via gravity filters prior to the final oil separator.

<u>Internal Outfall 608</u>
0.6 MGD
The discharge from Internal Outfall 608 is from the Chrome Wastewater Treatment Plant and consists of Tin Free Steel line and No 4 basement sumps, and process wastewater

from No. 5 and No. 6 Electrolytic Tinning Lines. Treatment consists of equalization, reduction tanks, pH adjustment, flocculation, and clarification.

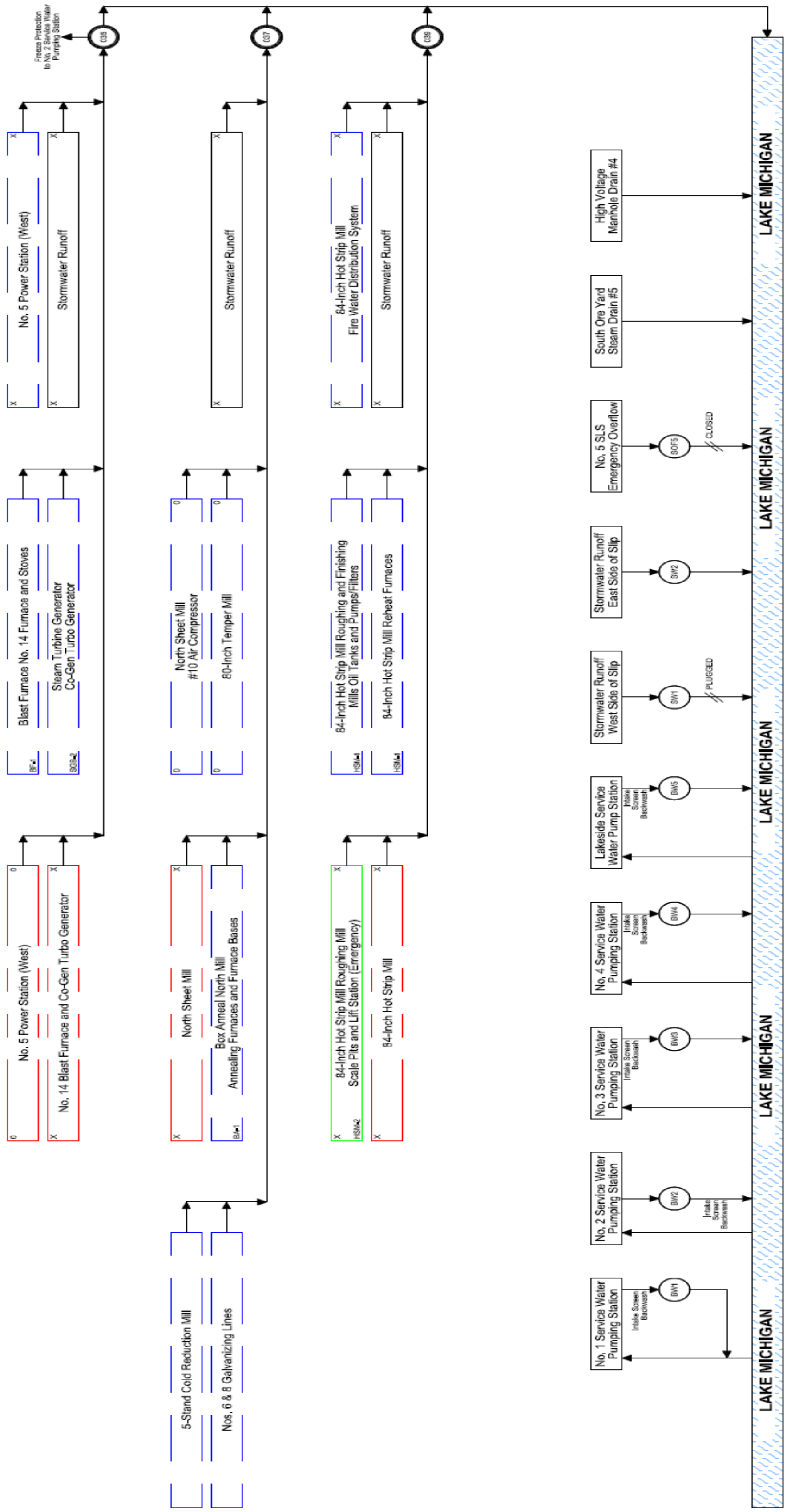
Outfall 035
156.8 MGD
The discharge from Outfall 035 is composed of No. 14 Blast Furnace non-contact cooling water and condensates, Steam Turbine (Co-Gen Turbo Gen) non-contact cooling water and condensates, No. 5 Power Station non-contact cooling water and condensates, and storm water (Drainage Area #24). Treatment consists of dechlorination. A flow diagram for Outfall 035 has been provided as Figure 9.

Outfall 037
3.0 MGD
The discharge from Outfall 037 is composed of Box Anneal North Mill Furnaces non-contact cooling water, North Sheet Mill No. 10 air compressor non-contact cooling water, 80” Temper Mill non-contact cooling water, North Sheet Mill steam condensates, 5-Stand Cold Reduction and No. 6 and No. 8 Galvanized Lines non-contact cooling water, and stormwater (Drainage Area #26). Treatment consists of dechlorination. A flow diagram for Outfall 037 has been provided as Figure 9.

Outfall 039
55.0 MGD
The discharge from Outfall 039 is composed of 84” Hot Strip Mill (HSM) non-contact cooling waters (Reheat Furnace non-contact cooling water, Fire Water Distribution water, 84” HSM Roughing and Finishing Mills Oil Tanks and Filters and non-contact cooling water, and 84” HSM steam condensates), 84” HSM Roughing Mill emergency overflow, and storm water (drainage area #27). Treatment consists of dechlorination. A flow diagram for Outfall 039 has been provided as Figure 9.

Sanitary Lift Station Overflows
The facility has requested that several sanitary lift station overflow points be identified in the authorized discharge at various outfalls. The facility has no recorded overflows. However, should an overflow occur, it has the potential to discharge via an NPDES outfall. Part I.I. of the permit, as issued on October 2, 2015, identified these overflow points and expressly prohibited the discharge from the lift stations or any other portion of the sanitary sewer system. The permit also stated that, “Should any discharge occur, the permittee shall notify the Compliance Evaluation Section within…24 hours and in writing within five days of the event in accordance with Part II.C.4 of the permit.” That portion of the permit will be retained in this permit, and the identified sanitary lift station overflows will not be added to the authorized discharge description.

Figure 9: Outfalls 035, 037, and 039 Flow Diagram



Wastewater Treatment Plant Classification

The permittee shall have all the wastewater treatment facilities under the responsible charge of an operator certified by the Commissioner in a classification corresponding to the classification of the wastewater treatment plant as required by IC 13-18-11-11 and 327 IAC 5-22-5. In order to operate a wastewater treatment plant, the operator shall have qualifications as established in 327 IAC 5-22-7.

IDEM has given the permittee a Class D industrial wastewater treatment plant classification.

2.4 Changes in Operation

On March 30, 2015, U.S. Steel – Gary Works ceased coke production. As a result, Outfall 005 was removed and Internal Outfall 501 was redirected to Outfall 015. This was incorporated into a January 13, 2017, permit modification. In addition, Canadian National (CN) eliminated the discharge of nonprocess wastewater and oil/water separator water from Outfall 033, and storm water via SW-12 to Outfall 034. SW-06 was also eliminated in that permit modification.

In a March 23, 2018, modified permit, the facility installed a water demineralization (demin) pre-treatment plant to provide demineralized water to the #5 and #6 Electrolytic Tinning Lines (ETL). The discharge from the demin plant is through Internal Outfall 604 and ultimately through Outfall 034 to the Grand Calumet River.

An August 16, 2018, modified permit acknowledged the upgrade of the Central Wastewater Treatment Plant (CWTP) that discharges to Outfalls 019 and 018. Historically, the CWTP system consisted of two reaction tanks with lime addition, thirteen anthracite filters, eight zeolite filters, and two deaerators. The anthracite and softener backwash water was recycled to the closed-loop Blast Furnace Recycle System. The softener regenerant is discharged to Outfall 019 with excess to Outfall 018. The upgrade reduced the loading on the softeners and improved the quality of feed water to the Turboblower and No. 4 Boiler House. The new system utilizes ultrafiltration (UF) and reverse osmosis (RO).

A June 20, 2019, permit modification incorporated a new Internal Outfall 608 and administrative Internal Outfall 609. This was a result of installing a new Chromium Wastewater Treatment Plant and decommissioning the existing one. The new plant is located closer to operations and discharges through Internal Outfall 608. Internal Outfall 608 then combines with other wastewater discharges conveyed to internal Outfall 606. Internal Outfalls 604, 605, 606 and 608 continue to discharge through Outfall 034 to the Grand Calumet River.

An April 16, 2020, modified permit authorized the discharge of water softener regenerant from the 84” Hot Strip Mill water softener system to Internal Outfall 604 and the redirection of Landfill Leachate Treatment Plant (Internal Outfall 607) to the Environmental Treatment Facility (Internal Outfall 501).

As part of this renewal application, the facility has requested the removal of Outfalls 041A/041B and SW-02 from the Permit. Operational changes have eliminated these discharges and no future need is anticipated. Therefore, these outfalls have been removed in this renewal permit.

2.5 Facility Storm Water

Some facility storm water is discharged via the outfalls identified in Section 2.3 above. However, the facility also has five (5) dedicated storm water outfalls. These Outfalls are SW-01, SW-08, SW-11, 032, and 033. Outfall SW-01 discharges to Lake Michigan. The other outfalls discharge to the Grand Calumet River. Please refer to Section 5.7 of this Fact Sheet for information regarding Storm Water Pollution Prevention Plan (SWPPP) requirements applicable to these, and all storm water bearing outfalls.

3.0 PERMIT HISTORY

3.1 Compliance History

The purpose of this section is to summarize any violations associated with the permit. A review of this facility's discharge monitoring data was conducted for compliance verification. This review indicates the following permit limitation violations between June 2017 thru June 2020:

Outfall 015
Selenium [11/18]

Internal Outfall 607
Oil and Grease [1/20; 2/20; 5/20]

Outfall 018
Mercury [12/19; 2/20; 4/20; 6/20]

Outfall 019
Mercury [12/19; 2/20; 4/20; 6/20]

Outfalls 028/030 (Outfall 600)
Total Suspended Solids [2/18]

Outfall 035
Thermal Discharge [11/19]

4.0 LOCATION OF DISCHARGE/RECEIVING WATER USE DESIGNATION

The receiving stream for Outfalls 015, 018, 019, 020, 021, 023, 026, 028, 030, 032, 033, and 034 is the Grand Calumet River. The receiving stream for Outfalls 035, 037, and 039 is Lake Michigan.

The Grand Calumet River is designated for full-body contact recreation; shall be capable of supporting a well-balanced, warm water aquatic community; and, is designated as an industrial water supply. The Indiana portion of the open waters of Lake Michigan is designated for full-body contact recreation; shall be capable of supporting a well-balanced warm water aquatic community; is designated as salmonid waters and shall be capable of supporting a salmonid fishery; is designated as a public water supply; and is designated as an industrial water supply.

The Indiana portion of the open waters of Lake Michigan is also classified as an outstanding state resource water.

These waterbodies are identified as waters of the state within the Great Lakes system. Therefore it is subject to NPDES requirements specific to Great Lakes system dischargers under 327 IAC 2-1.5 and 327 IAC 5-2-11.4 through 11.6. These rules contain water quality standards applicable to dischargers within the Great Lakes system and the procedures to calculate and incorporate water quality-based effluent limitations.

4.1 Total Maximum Daily Loads (TMDLs)

Section 303(d) of the Clean Water Act requires states to identify waters, through their Section 305(b) water quality assessments, that do not or are not expected to meet applicable water quality standards with federal technology based standards alone. States are also required to develop a priority ranking for these waters taking into account the severity of the pollution and the designated uses of the waters. Once this listing and ranking of impaired waters is completed, the states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards. Indiana's 2020 303(d) List of Impaired Waters was developed in accordance with Indiana's Water Quality Assessment and 303(d) Listing Methodology for Waterbody Impairments and Total Maximum Daily Load Development for the 2020 Cycle.

The facility discharges along a five mile stretch of the Grand Calumet River and to the open waters of Lake Michigan. As of the 2020 303(d) List of Impaired Waters, the following impairments were listed for waters to which U.S. Steel discharges:

Assessment Unit INC0163_G1074 (Lake Michigan Shoreline) is listed for Mercury and PCBs in Fish Tissue. The U.S. Steel outfalls that discharge to this assessment unit are 035, 037 and 039.

Assessment Unit INM00G1000_00 (Lake Michigan) is listed for Mercury and PCBs in Fish Tissue.

A TMDL for *E. coli* for the Lake Michigan Shoreline (including Assessment Unit INC0163_G1074) was approved by U.S. EPA September 1, 2004 and is included in the Lake Michigan Shoreline TMDL. This TMDL does not place limits for *E. coli* on any of the U.S. Steel outfalls to Lake Michigan.

Assessment Unit INK0346_01 (Grand Calumet River) is impaired for Ammonia, Free Cyanide, Biological Integrity, Oil and Grease, and PCBs in Fish Tissue. This assessment unit begins at the outlet of the culvert about 1,900 feet upstream of former Outfall 005 and extends to former Outfall 005. No U.S. Steel outfalls discharge to this assessment unit.

Assessment Unit INK0346_02 (Grand Calumet River) is impaired for Ammonia, Biological Integrity, Oil and Grease, and PCBs in Fish Tissue. This assessment unit begins at former Outfall 005 and extends to a point one mile downstream. U.S. Steel Outfall 015 discharges to this assessment unit.

Assessment Unit INK0346_03 (Grand Calumet River) is impaired for Ammonia, Biological Integrity, Oil and Grease, and PCBs in Fish Tissue. This assessment unit begins one mile downstream of former Outfall 005 and extends to a point about 0.5 miles upstream of Bridge Street. The U.S. Steel Outfalls that discharge to this assessment unit are 018, 019, 020, 021, 023, 026, 028/030, 032 and 033.

Assessment Unit INK0346_04 (Grand Calumet River) is impaired for *E. coli*, Biological Integrity, Oil and Grease, and PCBs in Fish Tissue. This assessment unit begins at a point about 0.5 miles upstream of Bridge Street and extends down to the Indiana Harbor Canal. U.S. Steel Outfall 034 discharges to this assessment unit.

5.0 PERMIT LIMITATIONS

Under 327 IAC 5-2-10 (see also 40 CFR 122.44), NPDES permit limits are based on either TBELs (including TBELs developed on a case-by-case basis using BPJ, where applicable) or WQBELs, whichever is most stringent. The decision to limit or monitor the parameters contained in this permit is based on information contained in the permittee's NPDES application, and other available information relating to the facility and the receiving waterbody. In addition, when renewing a permit, the existing permit limits and the antibacksliding requirements under 327 IAC 5-2-10(a)(11) must be considered.

5.1 Technology-Based Effluent Limits (TBEL)

TBELs require every individual member of a discharge class or category to operate their water pollution control technologies according to industry-wide standards and accepted engineering practices. TBELs are developed by applying the National Effluent Limitation Guidelines (ELGs) established by EPA for specific industrial categories. Technology-based treatment requirements established pursuant to sections 301(b) and 306 of the CWA represent the minimum level of control that must be imposed in an NPDES permit (327 IAC 5-5-2(a)).

The applicable technology-based standards for the facility are contained in 40 CFR 420 – Iron and Steel Manufacturing Point Source Category as well as 40 CFR 433 – Metal Finishing Point Source Category. Table 1 below provides a description of applicable subpart(s), process(es), and average daily production as included in the permit application.

Table 1: Applicable ELG Subparts and Production Levels

Applicable ELG Subparts

Subpart	Description
40 CFR 420.30 Subpart C – Ironmaking Subcategory	Discharges from operations in which iron ore is reduced to molten iron in a blast furnace.
40 CFR 420.40 Subpart C – Steelmaking Subcategory	Discharges from steelmaking operations in which steelmaking operations are performed in basic oxygen or electric arc furnaces.
40 CFR 420.50 Subpart E – Vacuum Degassing Subcategory	Discharges from vacuum degassing operations conducted by applying a vacuum to molten steel.

40 CFR 420.60 Subpart F – Continuous Casting Subcategory	Discharges from the continuous casting of molten steel into intermediate or semi-finished steel products through water cooled molds.
40 CFR 420.70 Subpart G – Hot Forming Subcategory	Discharges from hot forming operations conducted in primary, section, flat, and pipe and tube mills.
40 CFR 420.90 Subpart I – Acid Pickling Subcategory	discharges from sulfuric acid, hydrochloric acid, or combination acid pickling operations.
40 CFR 420.100 Subpart J – Cold Forming Subcategory	discharges from cold rolling and cold working pipe and tube operations in which unheated steel is passed through rolls or otherwise processed to reduce its thickness, to produce a smooth surface, or to develop controlled mechanical properties in the steel.
40 CFR 420.110 Subpart K – Alkaline Cleaning Subcategory	discharges from operations in which steel and steel products are immersed in alkaline cleaning baths to remove mineral and animal fats or oils from the steel, and those rinsing operations which follow such immersion.
40 CFR 420.120 Subpart L – Hot Coating Subcategory	discharges from the operations in which steel is coated with zinc, terne metal, or other metals by the hot dip process, and those rinsing operations associated with that process.
40 CFR 433 Metal Finishing Point Source Category	Discharges from plants which perform any of the following six metal finishing operations on any basis material: Electroplating, Electroless Plating, Anodizing, Coating (chromating, phosphating, and coloring), Chemical Etching and Milling, and Printed Circuit Board Manufacture.

Internal outfalls, collecting various wastestreams at the facility, provide treatment and monitoring locations where TBELs can be established. TBELs are applicable to Internal Outfalls 501, 607, 603, 604, 605, 608, 609, and final Outfalls 028/030. **Appendix A** of this Fact Sheet identifies the applicable TBELs and how they were calculated. Section 5.3 of this Fact Sheet identifies how the TBELs are applied to the respective outfalls.

5.2 Water Quality-Based Effluent Limits

WQBELs are designed to be protective of the beneficial uses of the receiving water and are independent of the available treatment technology. The WQBELs for this facility are based on water quality criteria in 327 IAC 2-1.5-8 or developed under the procedures described in 327 IAC 2-1.5-11 through 16 and implementation procedures in 327 IAC 5. Limitations are required for any parameter which has the reasonable potential to exceed a water quality criterion as determined using the procedures under 327 IAC 5-2-11.5. As part of this renewal, a Waste Load Allocation (WLA) report was completed and is included as **Appendix B** of this Fact Sheet.

5.3 Effluent Limitations and Monitoring Requirements by Outfall

Under 327 IAC 5-2-10(a) (see also 40 CFR 122.44), NPDES permit requirements are technology-based effluent limitations and standards (including technology-based effluent limitations (TBELs) based on federal effluent limitations guidelines or developed on a case-by-case basis using best professional judgment (BPJ), where applicable), water quality standards-based, or based on other more stringent requirements. The decision to limit or monitor the parameters contained in this permit is based on information contained in the permittee's NPDES application and other available information relating to the facility and the receiving waterbody as well as the applicable federal effluent limitations guidelines. In addition, when renewing a permit, the existing permit limits, the antibacksliding requirements under 327 IAC 5-2-10(a)(11), and the antidegradation requirements under 327 IAC 2-1.3 must be considered.

5.3.1 All External Outfalls

Narrative Water Quality Based Limits
The narrative water quality criteria contained under 327 IAC 2-1.5-8(b)(1) and (2) have been included in this permit to ensure that these minimum water quality conditions are met.

Flow
The permittee's flow is to be monitored in accordance with 327 IAC 5-2-13(a)(2).

pH
Limitations for pH in the proposed permit are based on the criteria established in 327 IAC 2-1.5-8(c)(2). No pH values below six (6.0) or above nine (9.0), except daily fluctuations that exceed pH nine (9.0) and are correlated with photosynthetic activity.

5.3.2 Internal Outfall 501

Oil and Grease (O & G)
O & G limitations are 15.0 mg/l Daily Maximum and 10.0 mg/l Monthly Average. These limits are considered sufficient to ensure compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree to create a nuisance.

Total Suspended Solids (TSS)
TSS is a regulated conventional pollutant and is limited in the NPDES permit to ensure adequate wastewater treatment is provided and the narrative water quality criteria will be protected. TSS is a parameter used to protect the existing and designated uses by preventing the discharge from having putrescent, or otherwise objectionable deposits, unsightly or deleterious deposits, color or other conditions in such a degree as to create a nuisance. TSS technology-based effluent limits are always designed to protect and maintain the existing uses. The proposed monitoring requirements and effluent limitations are based upon best professional judgment (BPJ) of the technology and corresponding effluent limitations equivalent to the Best Conventional Pollutant Control

Technology (BCT), and were developed in accordance with the technology-based treatment standards requirements of 327 IAC 5-5-2(b). The limitations are 60.0 mg/l daily maximum and 30.0 mg/l monthly average.

Benzene
TBELs for benzene are established on BPJ in accordance with 327 IAC 5-2-10 and 327 IAC 5-5 (which implement 40 CFR 122.44, 125.3, and Section 402(a)(1) of the Clean Water Act (CWA)). Due to the treatment of groundwater remediation wastewater, the daily maximum limitation of 5 ug/l for benzene is retained at Internal Outfall 501.

Phenols (4AAP), Ammonia as N, $CBOD_5$, Benzo-a-pyrene, Free Cyanide, Selenium, Lead, and Zinc
Reporting requirements for the above parameters are included in this permit. These parameters are pollutants identified with historical coke making operations, the groundwater remediation activities, and the landfill leachate.

The facility had requested and was granted in the April 2020 modified permit the authorization to discharge the wastestreams associated with Internal Outfall 607 to Internal Outfall 501, eliminating the need for Internal Outfall 607. The parameters monitored and/or limited at Internal Outfall 607 are already monitored and/or limited at Internal Outfall 501. Therefore, no additional pollutants or limitations are needed at Internal Outfall 501 once the redirection is completed. Please refer to Section 5.3.3 of this Fact Sheet for additional information.

5.3.3 Internal Outfall 607

Oil and Grease (O & G)
O & G limitations are 15.0 mg/l Daily Maximum and 10.0 mg/l Monthly Average. These limits are considered sufficient to ensure compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree to create a nuisance.

Total Suspended Solids (TSS)
TSS is a regulated conventional pollutant and is limited in the NPDES permit to ensure adequate wastewater treatment is provided and the narrative water quality criteria will be protected. TSS is a parameter used to protect the existing and designated uses by preventing the discharge from having putrescent, or otherwise objectionable deposits, unsightly or deleterious deposits, color or other conditions in such a degree as to create a nuisance. TSS technology-based effluent limits are always designed to protect and maintain the existing uses. The proposed monitoring requirements and effluent limitations are based upon best professional judgment (BPJ) of the technology and corresponding effluent limitations equivalent to the Best Conventional Pollutant Control Technology (BCT), and were developed in accordance with the technology-based treatment standards requirements of 327 IAC 5-5-2(b). The limitations are 60.0 mg/l daily maximum and 30.0 mg/l monthly average.

Benzo-a-pyrene, Phenols (4AAP), Ammonia as N, $CBOD_5$, Free Cyanide, Selenium, Zinc and Lead
The above parameters are expected to be present in the solid waste from the landfill. Therefore, may be present in the landfill leachate. Reporting requirements for these parameters are included in this permit.

As identified in Section 5.3.2 above, if the discharge from Internal Outfall 607 is directed to Internal Outfall 501, these parameters and limitations will be monitored at Internal Outfall 501.

5.3.4 Outfall 015

TSS and O & G
Reporting requirements for TSS and O & G are required at Outfall 015. Limitations for these parameters are included at the internal outfall(s). The majority of wastestreams that are discharged via Outfall 015 consist of non-contact cooling waters, steam condensates, and storm water and are not expected to contribute significant amounts of TSS and O & G. Therefore, reporting requirements are included to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or from having putrescent, or otherwise objectionable deposits, unsightly or deleterious deposits, color or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

Ammonia, as N
As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and ammonia was evaluated for reasonable potential to exceed (RPE) a water quality criterion. The results of the RPE analysis show that ammonia has reasonable potential to exceed a water quality criterion, therefore, water quality-based effluent limitations are required and have been included in the permit. The previous daily maximums for summer and winter limitations were 40 and 44 lbs/day, respectively. The calculated WQBELs from the WLA report included as **Appendix B** of this Fact Sheet, are 44 lbs/day daily maximum in both summer and winter seasons. However, the previous permit limitations are retained in accordance with antibacksliding provisions found in 327 IAC 5-2-10(a)(11). Please refer to Section 5.5 of this Fact Sheet for the antibacksliding provisions.

CBOD5 and Phenols (4AAP)
Reporting requirements for the above parameters are carried over from the previous permit. These parameters are pollutants identified with historical coke making operations, the groundwater remediation activities, and the landfill leachate.

Free Cyanide
The WQBELs for free cyanide are carried over from the previous permit. Free cyanide was included in the 2010 renewal for monitoring. In the 2015 renewal, it was determined that the discharge from Outfall 015 exhibited a RPE for free cyanide. A WLA report dated May 1, 2015, established WQBELs based on two (2) seasons. The WQBELs for Season 1, from April 1 to September 30, are 0.32 lbs/day and 18 ug/l daily maximum and 0.15

lbs/day and 8.8 ug/l monthly average. The WQBELs for Season 2, October 1 to May 30, are 0.23 lbs/day and 13 ug/l daily maximum and 0.12 lbs/day and 6.7 ug/l monthly average.

Lead and Zinc
As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and lead and zinc were evaluated for RPE. The results of the RPE analysis show that lead and zinc have a reasonable potential to exceed a water quality criterion. Therefore, WQBELs are required and have been included in the permit. The WLA report has been included as **Appendix B** of this Fact Sheet. The WQBELs at Outfall 015 are 0.30 lbs/day and 17 ug/l daily maximum and 0.15 lbs/day and 8.4 ug/l monthly average for lead. The WQBELs at Outfall 015 are 2.8 lbs/day and 160 ug/l daily maximum and 1.4 lbs/day and 81 ug/l monthly average for zinc.

Temperature
The facility has been granted a Clean Water Act (CWA) Section 316(a) Thermal Variance. Please refer to Section 6.3 of this Fact Sheet for more information.

Total Residual Chlorine (TRC)
Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B** of this Fact Sheet.

In accordance with 327 IAC 5-2-11.6(g)(1), mass limits for TRC are included in the permit, based on a flow volume of 2.1 MGD. This volume represents the highest reported monthly average from the previous two year period and is used in accordance with 327 IAC 5-2-11.4(9)(B), as required by 327 IAC 5-2-11.6(g)(2).

The effluent limitations for TRC at Outfall 015 are 0.32 lbs/day and 18 ug/l daily maximum and 0.14 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 1.1 lbs/day. This value was determined by multiplying the LOQ

(0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (2.1 MGD).

Selenium
The WQBELs for selenium are carried over from the previous permit. Selenium limits are included for the wastestreams associated with Internal Outfall 501 and Internal Outfall 607. In the January 13, 2017, modified permit, it was determined that the discharge from Outfall 015 exhibited a RPE for selenium. An updated WLA report dated July 8, 2016, established WQBELs of 0.14 lbs/day and 8.2 ug/l as a daily maximum and 0.072 lbs/day and 4.1 ug/l as a monthly average.

Benzo-a-pyrene
The WQBELs for benzo-a-pyrene are carried over from the previous permit. Benzo-a-pyrene limits are included for the wastestreams associated with Internal Outfall 501 and Internal Outfall 607. In the January 13, 2017, modified permit, it was determined that the discharge from Outfall 015 exhibited a RPE for benzo-a-pyrene. An updated WLA report dated July 8, 2016, determined that the discharge from Outfall 015 exhibited a RPE for benzo-a-pyrene and established WQBELs of 0.0040 lbs/day and 0.23 ug/l as a daily maximum and 0.0017 lbs/day and 0.095 ug/l as a monthly average.

Mercury
The facility has requested a new Streamlined Mercury Variance (SMV) for this outfall. Please refer to Section 6.5 of this Fact Sheet for additional information.

Whole Effluent Toxicity (WET) Testing
WET monitoring for Outfall 015 was included in the 2017 permit modification. Based on a review of WET data, there is no RPE for WET at Outfall 015 to exceed the numeric interpretation of the narrative criterion for acute or chronic toxicity. However, reporting requirements and Toxicity Reduction Evaluation (TRE) trigger values are included in this renewal permit. Please refer to Section 5.4 of this Fact Sheet for additional information.

5.3.5 Outfalls 018 and 019

O & G
Reporting requirements for O & G are required at Outfalls 018 and 019 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

TSS
Reporting requirements for TSS are included at Outfall 018 only. TSS is limited by ELG at Internal Outfall 610, which discharges to Outfall 018. Representative sampling shall occur at times to capture the discharge from Internal Outfall 610 when possible. Minimum monitoring frequencies shall be maintained otherwise.

Free Cyanide
As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and free cyanide was evaluated for reasonable potential to exceed (RPE) a water quality criterion at Outfalls 018 and 019. The results of the RPE analysis show that free cyanide does not have the reasonable potential to exceed Indiana's water quality criterion. Therefore, reporting requirements for free cyanide have been removed from these outfalls.

Ammonia, as N, and Phenols (4AAP)
Reporting requirements are included and carried over from the previous permit for Outfall 018. The facility intends to install a treatment system for the Blast Furnace Recycle System and discharge via Outfall 018 in a modified permit at a later date. That wastestream will be subject to technology-based standards contained in 40 CFR 420.30 - Subpart C, Ironmaking Category. The above parameters are included in those standards. Therefore, reporting requirements are included for these parameters at Outfall 018 to evaluate RPE and compare to applicable ELGs in the anticipated modification.

Temperature
The facility has been granted a Clean Water Act (CWA) Section 316(a) Thermal Variance. Please refer to Section 6.3 of this Fact Sheet for more information.

Mercury
The facility has requested a continuance of the mercury variance for these outfalls. Please refer to Section 6.5 of this Fact Sheet for additional information.

TRC
Due to the use of chlorine in wastewaters associated with this outfall and applicable TBELs at Internal Outfall 610, effluent limitations for TRC are applicable. As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and has been included as **Appendix B**. The WQBELs for chlorine are 9.1 lbs/day and 18 ug/l daily maximum and 4.1 lbs/day and 8 ug/l monthly average at Outfall 018. The WQBELs for chlorine at Outfall 019 are 11 lbs/day and 18 ug/l daily maximum and 4.9 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 30.4 lbs/day for Outfall 018 and less than 36.8 lbs/day for Outfall 019. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (60.7 MGD for Outfall 018 and 73.4 MGD for Outfall 019).

5.3.6 Outfall 020

O & G

Reporting requirements for O & G are required at Outfall 020 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

Lead and Zinc

As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and lead and zinc were evaluated for reasonable potential to exceed (RPE) the water quality criterion. The results of the RPE analysis show that lead and zinc do not have RPE. Therefore, reporting requirements for lead and zinc have been removed from this outfall.

Temperature

The facility has been granted a Clean Water Act (CWA) Section 316(a) Thermal Variance. Please refer to Section 6.3 of this Fact Sheet for more information.

Mercury

The facility has requested a continuance of the mercury variance for this outfall. Please refer to Section 6.5 of this Fact Sheet for additional information.

TRC

Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B.**

The effluent limitations for TRC at Outfall 020 are 7.1 lbs/day and 18 ug/l daily maximum and 3.2 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 23.8 lbs/day. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (47.5 MGD).

5.3.7 Outfalls 021 and 032

O & G

Reporting requirements for O & G are required at Outfalls 021 and 032 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

TRC

Due to the use of chlorine in wastewaters associated with these outfalls, effluent limitations for TRC are applicable. As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and has been included as **Appendix B**. The WQBELs for chlorine are 0.090 lbs/day and 18 ug/l daily maximum and 0.040 lbs/day and 8 ug/l monthly average at Outfall 021. The WQBELs for chlorine are 0.045 lbs/day and 18 ug/l daily maximum and 0.020 lbs/day and 8 ug/l monthly average at Outfall 032.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 0.3 lbs/day for Outfall 021 and less than 0.15 lbs/day for Outfall 032. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (0.6 MGD for Outfall 021 and 0.3 MGD for Outfall 032).

5.3.8 Outfall 023 (Inactive)

O & G
Reporting requirements for O & G are required at Outfall 023 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

Ammonia, as N
Reporting requirements are carried over from the previous permit. This outfall is currently inactive and has not generated any recent data to evaluate for a reasonable potential to exceed Indiana's water quality criteria.

5.3.9 Outfall 026 (Inactive)

O & G
Reporting requirements for O & G are required at Outfall 026 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

5.3.10 Internal Outfall 603

O & G
The discharge from Internal Outfall 603 contains regulated wastestreams with O & G TBELs from 40 CFR 420 – Subparts D, E, F, and G [**Appendix A** of this Fact Sheet]. Currently, reporting requirements are included for O & G at Internal Outfall 603 and TBELs are applied at Outfalls 028/030(Outfall 600). Those limitations were based on an Oil and Grease Bubble, which allowed a portion the TBELs for O & G applicable to Outfall 034 to be applied to Outfalls 028/030 (Outfall 600). US Steel has requested to retain the O & G limitations at Outfalls 028/030 (Outfall 600) and 034. Therefore, reporting requirements for O & G are included at Internal Outfall 603 while the applicable TBEL for O & G will apply at Outfall 600. See Sections 5.3.11 and 18 of this Fact Sheet for more information regarding the O & G limitations at Outfalls 600 and 034.

TSS
While the treatment associated with Internal Outfall 603 contains various stages of sedimentation, thickener-flocculation, scale pit (sedimentation/oil removal), and multimedia filters, the Terminal Lagoon system allows for additional TSS removal. Therefore, the applicable TBELs calculated from the ELGs for TSS are applied to Outfalls 028/030 (Outfall 600). The calculated limitations for TSS are 4,825 lbs/day daily

maximum and 1,667 lbs/day monthly average. Please refer to Section 5.3.12 of this Fact Sheet for the TBEL calculations.

Zinc
Steelmaking, vacuum degassing, continuous casting, and hot forming subparts from 40 CFR 420 apply to the wastestreams collected and treated at Internal Outfall 603. ELGs for zinc are applied at Internal Outfall 603. The calculated TBELs for zinc are 29.4 lbs/day daily maximum and 9.81 lbs/day monthly average. **Appendix A** of this Fact Sheet identifies how the applicable TBELs were calculated.

Lead
Lead is also subject to the technology-based standards contained in 40 CFR 420. The calculated TBELs in the previous permit were less stringent than the applicable WQBELs. Therefore, reporting requirements were included at Internal Outfall 603 and the more stringent WQBELs were applied at Outfall 028/030 (Outfall 600). As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and lead was evaluated. Based on a recalculation of the technology-based effluent limitations using current production rates, the TBELs are still less stringent than the water quality-based effluent limitations. Therefore, reporting requirements for lead are included at Internal Outfall 603.

5.3.11 Outfalls 028/030 (Outfall 600)

TSS
TSS is subject to the technology-based standards contained in 40 CFR 420, subparts for steelmaking, vacuum degassing, continuous casting, and hot forming. While the treatment associated with Internal Outfall 603 contains various stages of sedimentation, thickener-flocculation, scale pit (sedimentation/oil removal), and multimedia filters, the Terminal Lagoon system allows for additional TSS removal. There are no numeric water quality standards for TSS. Therefore, the applicable TBELs calculated from the ELGs for TSS are applied to Outfalls 028/030 (Outfall 600).

The calculated TBELs for TSS for this renewal, based on current production rates, are 4,825 lbs/day daily maximum and 1,667 lbs/day monthly average.

As part of this renewal application, the facility has requested to retain the current TSS limitations, with an additional allowance for TSS from cooling water intakes. 40 CFR 122.45(g) does allow that TBELs may be adjusted to reflect credit for pollutants in the discharger's intake water. However, 40 CFR 122.45(g) also states that, “credit for generic pollutants such as biochemical oxygen demand (BOD) or total suspended solids (TSS) should not be granted unless the permittee demonstrates that the constituents…in the effluent are substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere… Credit shall be granted only to the extent necessary to meet the applicable limitation or standard, up to a maximum value equal to the influent value…

The portion of the Grand Calumet River for this discharge location, Assessment Unit INK0346_03 is impaired for Ammonia, Biological Integrity, Oil and Grease, and PCBs in Fish Tissue (Please refer to Section 4.1 of this Fact Sheet for more information). Therefore, IDEM does not agree that a credit and net limitations for TSS are warranted at this time and based on the available information for these outfalls.

In addition, IDEM is allowing the use of production values from 160"/210" Plate Mill owned and operated by ArcelorMittal as part of the current TBEL calculation. The 160"/210" Plate Mill is currently not in operation. However, US Steel Gary Works receives this wastewater and has no control on startup of this system. IDEM feels this allowance is appropriate to adequately limit the discharge under normal operating conditions from this outfall. Currently, the inclusion of the calculated TBELs associated with the 160"/210" Plate Mill allow an additional 1,270 lbs/day daily maximum and 476 lbs/day monthly average.

Lead
In the previous permit, the calculated WQBELs for lead were more stringent than the TBELs and were applicable to Outfalls 028/030 (Outfall 600). As part of this renewal application, a Wasteload Allocation (WLA) report was completed and lead was evaluated for reasonable potential to exceed (RPE) a water quality criterion. The results of the RPE analysis show that lead has reasonable potential to exceed a water quality criterion. In addition, the TBELs were recalculated based on current production rates. The water quality-based effluent limitations continue to be more stringent than the technology based effluent limitations. Therefore, the water quality-based effluent limitations are required and have been included in the permit. The WQBELs for lead are 10 lbs/day and 43 ug/l daily maximum and 4.5 lbs/day and 19 ug/l monthly average. The WLA report has been included as **Appendix B**.

O & G
US Steel has requested to retain the O & G limitations for Outfalls 028/030 (Outfall 600). The sum of O & G calculated TBELs applicable to Outfall 600 for this renewal are 4,825 lbs/day daily maximum and 1,667 lbs/day monthly average. [**Appendix A** of this Fact Sheet]. The current limitation for O & G at Outfall 600 is 2,807 lbs/day daily maximum and 1,274 lbs/day monthly average. Since the current O & G limitations are more stringent than the applicable calculated TBELs for this renewal, the previous limitations are retained in accordance with antibacksliding provisions found in 327 IAC 5-2-10(a)(11). Please refer to Section 5.5 of this Fact Sheet for additional information.

It should be noted, however, that the current limitations were based on an Oil & Grease Bubble, determined using BPJ, between Outfalls 028/030 (Outfall 600) and Outfall 034, with allowance from a portion of the TBEL applicable to Outfall 034 applied at Outfalls 028/030 (Outfall 600). This concept allowed for intra-plant transfers of mass pollutant discharges from outfalls where performance is better than required by ELGs, on a pollutant by pollutant basis, to outfalls where additional treatment would otherwise be required to comply with the calculated ELG limitations.

The Oil and Grease bubble was last modified in US Steel's 2010 permit. The 2015 permit retained the modified Oil and Grease bubble using BPJ. US Steel has requested to retain the Oil & Grease Bubble at Outfalls 028/030 (Outfall 600) and 034 for this renewal. As mentioned above, the existing limitations for O & G are retained in accordance with antibacksliding provisions in 327 IAC 5-2-10(a)(11).

Zinc

As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and zinc was evaluated for reasonable potential to exceed (RPE) a water quality criterion at Outfalls 028/030 (Outfall 600). The results of the RPE analysis show that zinc has reasonable potential to exceed Indiana's water quality criterion. A review of effluent data for zinc at Outfall 028/030 and internal Outfall 603, where TBELs for zinc apply, show a significant additional source of zinc to the final outfall. Therefore, the WQBELs are required and have been included. The WLA report has been included as **Appendix B** of this Fact Sheet. The WQBELs at Outfalls 028/030 (Outfall 600) are 75 lbs/day and 320 ug/l daily maximum and 38 lbs/day and 160 ug/l monthly average.

Mercury

The facility has requested a continuance of the mercury variance for this outfall. Please refer to Section 6.5 of this Fact Sheet for additional information.

Fluoride

As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and fluoride was evaluated for reasonable potential to exceed (RPE) a water quality criterion at Outfalls 028/030 (Outfall 600). The results of the RPE analysis show that fluoride does not have the reasonable potential to exceed Indiana's water quality criterion. Therefore, reporting requirements for fluoride have been removed from this outfall.

TRC

Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B**.

The effluent limitations for TRC at Outfalls 028/030 (Outfall 600) are 4.2 lbs/day and 18 ug/l daily maximum and 1.9 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 14.1 lbs/day. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (28.2 MGD).

Temperature
The facility has been granted a Clean Water Act (CWA) Section 316(a) Thermal Variance. Please refer to Section 6.3 of this Fact Sheet for more information.

Whole Effluent Toxicity (WET) Testing
WET monitoring for Outfall 030 was included in the 2015 permit renewal. Based on a review of WET data, there is no RPE for WET at Outfall 030 to exceed the numeric interpretation of the narrative criterion for acute or chronic toxicity. However, reporting requirements and Toxicity Reduction Evaluation (TRE) trigger values are retained in this renewal permit. Please refer to Section 5.4 of this Fact Sheet for additional information.

5.3.12 Outfall 033

O & G
Reporting requirements for O & G are required at Outfall 033 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

TRC
Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B**.

In accordance with 327 IAC 5-2-11.6(g)(1), mass limits for TRC are included in the permit, based on a flow volume of 0.2 MGD.

The effluent limitations for TRC at Outfall 032 are 0.030 lbs/day and 18 ug/l daily maximum and 0.013 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 0.1 lbs/day. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (0.2 MGD).

Phenols (4AAP)
Reporting requirements for phenols are carried over from the previous permit. Reporting requirements were included in the 2010 permit to ensure that possible leaks of process waters from the tin lines are detected.

5.3.13 Internal Outfall 604

TSS, O & G, Total Chromium, Zinc, Lead, Total Cyanide, Cadmium, Copper, Nickel Silver, Total Toxic Organics (TTO), Naphthalene, Tetrachloroethylene
The above parameters are subject to the technology-based standards contained in 40 CFR 420, subparts for acid pickling, cold forming, and alkaline cleaning, as well as 40 CFR 433 for metal finishing operations. In addition, a BPJ allowance for TSS has been continued for the 84" Hot Strip Mill basement sump waters. The TBELs contained in 40 CFR 420 are production based limitations expressed in lbs/day limitations. The TBELs contained in 40 CFR 433 and the BPJ limits for TSS from the 84" Hot Strip Mill are concentration based. Due to the comingling of these regulated wastestreams for treatment, only reporting requirements are included at this location. In addition, a portion of the wastestreams from the No. 5 and 6 Electrolytic Tinning Lines and the No. 1 Tin Free Line are directed to Chrome Wastewater Treatment Plant associated with Internal Outfall 608. Therefore, the summation of TBELs from 604 and 608 for the above parameters are applied at an administrative outfall, Internal Outfall 609.

Hexavalent Chromium
Internal Outfall 604 previously contained effluent limitations for hexavalent chromium. In the 2015 permit renewal, however, the effluent limitations were removed due to the idling of the No. 6 and No. 8 Galvanizing Lines and associated fume scrubbers. Since the No. 6 and No. 8 Galvanizing Lines are still idled, reporting requirements are carried over from the previous permit.

5.3.14 Internal Outfall 605

TSS and O & G
TSS and O & G are subject to the technology-based standards contained in 40 CFR 420.70, Subpart G for Hot Forming. **Appendix A** of this Fact Sheet identifies how the applicable TBELs were calculated. The calculated limitations, based on current production rates, is 13,950 lbs/day daily maximum and 5,227 lbs/day monthly average for TSS and 3,496 lbs/day daily maximum for O & G. These limits are less stringent than the current limitations. Therefore, pursuant to the antibacksliding provisions in 327 IAC 5-2-

10(a)(11), the previous limitations of 2,175 lbs/day daily maximum and 725 lbs/day monthly average for TSS and 1,450 lbs/day daily maximum for O & G, will remain in this permit. Please refer to Section 5.5 of this Fact Sheet for antibacksliding information.

5.3.15 Internal Outfall 606

O & G, Total Chromium, Zinc, Lead, Phenols (4AAP)
Reporting requirements for the above parameters are carried over from the previous permit. There are no applicable ELGs for wastestreams from this outfall (except Internal Outfall 608 described in Section 5.3.17 below). Therefore, reporting requirements for the above parameters are included in this permit.

5.3.16 Internal Outfall 608

TSS, O & G, Total Chromium, Zinc, Lead, Total Cyanide, Cadmium, Copper, Nickel Silver, and Total Toxic Organics (TTO)
The above parameters are subject to the technology-based standards contained in 40 CFR 433 for metal finishing operations. The Chrome Treatment Plant also treats wastewater associated with 40 CFR 420 steel producing. The TBELs contained in 40 CFR 420 are production based limitations expressed in lbs/day limitations. The TBELs contained in 40 CFR 433 are concentration based. Due to the comingling of these regulated wastestreams for treatment, only reporting requirements are included at this location. The summation of TBELs from 604 and 608 for the above parameters are applied at an administrative outfall, Internal Outfall 609.

Naphthalene, Tetrachloroethylene
The Chrome Treatment Plant also treats wastewater associated with 40 CFR 420 steel producing. However, these pollutants are not included in the 40 CFR 433 metal finishing operations ELGs. Therefore, reporting requirements for the above pollutants are carried over from the previous permit.

Hexavalent Chromium
As a portion of the previous Internal Outfall 604 contributions is now being treated separately at the new chrome treatment plant, Internal Outfall 608, reporting requirements for hexavalent chromium are carried over from the previous permit.

5.3.17 Internal Outfall 609 (Administrative Outfall)
Internal Outfall 609 contains applicable TBELs associated with Internal Outfalls 604 and 608, from both 40 CFR 420 steel producing and 40 CFR 433 metal finishing operations. This administrative outfall applies the applicable TBELs as the summation, calculated by the respective ELGs, for Internal Outfalls 604 and 608. **Appendix A** of this Fact Sheet identifies how the applicable TBELs were calculated.

TSS, Zinc, Naphthalene, and Tetrachloroethylene
The above parameters are subject to applicable TBELs associated with Internal Outfalls 604 and 608. The applicable TBELs, based on current production rates, are more stringent than the water quality-based effluent limitations. Therefore, the calculated TBELs for the above parameters are included at Internal Outfall 609. The calculated

TBELs for this renewal are at least as stringent or more stringent than the applicable TBELs in the current permit. **Appendix A** of this Fact Sheet identifies how the applicable TBELs were calculated.

Lead, Cadmium, Copper, and Silver
The above parameters are subject to applicable TBELs associated with Internal Outfalls 604 and 608. The calculated TBELs in the previous permit were less stringent than the applicable WQBELs. Therefore, reporting requirements were included at Internal Outfall 609. As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and the above parameters were evaluated. Based on the calculation of the technology-based effluent limitations based on current production rates, the TBELs are still less stringent than the water quality-based effluent limitations. Therefore, the reporting requirements at Internal Outfall 609 are carried over, and the more stringent WQBELs are applied at Outfall 034 for the above parameters. **Appendix A** of this Fact Sheet identifies how the applicable TBELs were calculated and the WLA report has been included as **Appendix B**.

Nickel, Total Chromium, Total Cyanide, and Total Toxic Organics (TTO)
The above parameters contain applicable TBELs associated with Internal Outfalls 604 and 608. However, the calculated TBELs based on current production levels are less stringent than the currently applicable limitations at Internal Outfall 609. Therefore, pursuant to the antibacksliding provisions in 327 IAC 5-2-10(a)(11), the previous limitations for the above pollutants will remain in this permit. Please refer to Section 5.5 of this Fact Sheet for antibacksliding information.

Hexavalent Chromium
As Internal Outfall 609 is the summation of Internal Outfall 604 and Internal Outfall 608, reporting requirements for hexavalent chromium are carried over from the previous permit.

O & G
The discharge from Internal Outfalls 604 and 608 contains regulated wastestreams with O & G TBELs from 40 CFR 420 – Subparts I, J, K, and L and 40 CFR 433 [**Appendix A** of this Fact Sheet]. Currently, reporting requirements are included for O & G at Internal Outfall 609 and TBELs are applied at Outfall 034. Those TBELs were based on an Oil and Grease Bubble, which allowed a portion the TBELs for O & G applicable to Outfall 034 to be applied to Outfalls 028/030 (Outfall 600). US Steel has requested to retain the O & G limitations at Outfalls 028/030 (Outfall 600) and 034. Therefore, reporting requirements for O & G are included at Internal Outfall 609 while the applicable TBELs for O & G will apply at Outfall 034. See Sections 5.3.11 and 18 of this Fact Sheet for more information regarding the O & G limitations at Outfalls 600 and 034.

5.3.18 Outfall 034

O & G
The sum of Oil and Grease calculated TBELs for the discharges associated with Outfall 034 is 17,228 lbs/day Daily Maximum and 6,737 lbs/day Monthly Average [**Appendix A**

of this Fact Sheet]. The current limitations for O & G at Outfall 034 is 3,660 lbs/day daily maximum and 1,430 lbs/day monthly average. Since the previous limitations are more stringent than the calculated TBELs, the previous limitations are retained in accordance with antibacksliding provisions found in 327 IAC 5-2-10(a)(11). Please refer to Section 5.5 of this Fact Sheet for additional information.

It should be noted, however, that these limitations were based on an Oil & Grease Bubble between Outfalls 028/030 (Outfall 600) and Outfall 034, with allowance from a portion of the TBEL applicable to Outfall 034 applied at Outfalls 028/030 (Outfall 600). This concept allowed for intra-plant transfers of mass pollutant discharges, on a pollutant by pollutant basis, from outfalls where performance is better than required by ELGs to outfalls where additional treatment would otherwise be required to comply with the calculated ELG limitations.

The Oil and Grease bubble was last modified in US Steel's 2010 permit. The 2015 permit retained the modified Oil and Grease bubble using BPJ. US Steel has requested to retain the Oil & Grease Bubble at Outfalls 028/030 (Outfall 600) and 034 for this renewal. As mentioned above, the existing limitations for O & G are retained in accordance with antibacksliding provisions in 327 IAC 5-2-10(a)(11).

TSS, Zinc, Nickel, and Total Chromium

The above parameters are subject to the technology-based standards contained in 40 CFR 420, subparts for acid pickling, cold forming, and alkaline cleaning, as well as 40 CFR 433 for metal finishing operations. TBELs apply at internal monitoring locations Internal Outfalls 604 and 608, as the summation at Internal Outfall 609, and are more stringent than the applicable WQBELs. The projected effluent quality for the above parameters do not exhibit a Reasonable Potential to Exceed (RPE) Indiana's Water Quality Standards. However, reporting requirements are included for these parameters.

Lead, Cadmium, Copper, and Silver

The above parameters are subject to the technology-based standards contained in 40 CFR 433 for metal finishing operations. TBELs are applicable at internal monitoring locations Internal Outfalls 604 and 608, and are applied as the summation at Internal Outfall 609. The mass-based WQBELs at the final outfall were compared to the mass-based TBELs at the Internal Outfall 609. Since the facility is authorized to discharge up to the mass-based TBELs, if the mass-based TBELs at the internal outfall exceed the mass-based WQBELs at the final outfall, the pollutant may be discharged at a level that will cause an excursion above a numeric water quality criterion or value under 2-1.5. Therefore, WQBELs are required for the pollutants at the final outfall. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B**.

Phenols (4AAP)

Reporting requirements for phenols are carried over from the previous permit. This pollutant is a parameter of concern associated with the Iron and Steel Category.

$CBOD_5$

The effluent limitations for $CBOD_5$ are carried over from the previous permit. The effluent limitations are based on a 1992 WLA report.

TRC
Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B**.

The effluent limitations for TRC at Outfall 034 are 3.8 lbs/day and 18 ug/l daily maximum and 1.7 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 12.7 lbs/day. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the effluent flow used to determine the mass-based WQBEL (25.4 MGD).

Temperature
The facility has been granted a Clean Water Act (CWA) Section 316(a) Thermal Variance. Please refer to Section 6.3 of this Fact Sheet for more information.

Mercury
The facility has previously had an SMV for this outfall. However, in this renewal application, the facility has requested that the SMV be removed at Outfall 034. Therefore, WQBELs for mercury have been included in this permit. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B**. The WQBELs for mercury are 0.00068 lbs/day and 3.2 ng/l daily maximum and 0.00028 lbs/day and 1.3 ng/l monthly average.

Dissolved Oxygen
The effluent limitations for dissolved oxygen are carried over from the previous permit. The effluent limitations are based on a 1992 WLA report.

Ammonia, as N
As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and ammonia was evaluated for reasonable potential to exceed (RPE) the water quality

criterion. The results of the RPE analysis show that ammonia does not have the reasonable potential to exceed Indiana's water quality criterion. Therefore, reporting requirements for ammonia have been removed from this outfall.

Whole Effluent Toxicity (WET) Testing
WET monitoring for Outfall 034 was included in the 2015 permit renewal. Based on a review of WET data, there is no RPE for WET at Outfall 034 to exceed the numeric interpretation of the narrative criterion for acute or chronic toxicity. However, reporting requirements and Toxicity Reduction Evaluation (TRE) trigger values are included in this renewal permit. Please refer to Section 5.4 of this Fact Sheet for additional information.

5.3.19 Outfalls 035 and 039

O & G
Reporting requirements for O & G are required at Outfalls 035 and 039 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

Temperature
Temperature limitations apply to Outfall 035. However, reporting requirements for temperature are retained for Outfall 039. As part of the 1997 permit modification for the No. 5 Power Generating Station, and again as part of the 2010 permit renewal, a BTU limit of 1.211 billion BTU per hour as a maximum daily average was applied at Outfall 035. This limit was determined to be appropriate based upon the documentation submitted by US Steel and reviewed by IDEM and EPA as the daily average hourly BTU heat rejection rate across the condensers. In accordance with the thermal requirements in 327 IAC 2-1.5-8(c)(4)(D)(v), all facilities with existing waste heat discharges to Lake Michigan who increase the quantity of waste heat by more than a daily average of five-tenths (0.5) billion British thermal units (BTU) per hour shall be limited to the amount essential for blowdown in the operation of a closed cycle cooling facility. Therefore, the Outfall 035 temperature effluent limitation was based on the amount of heat that can be discharged without the need to install a closed cycle cooling facility.

As part of the 1997 permit modification, a study was required to determine compliance with the temperature limits at the 1000' arc. In November 1997, US Steel submitted the thermal study as required. The study supported US Steel's position that the temperature requirements at the 1,000'arc were being met at the thermal levels discharged through Outfall 035.

The Outfall 035 effluent limitation remains at 1.211 billion BTU/hour as a maximum daily average. Monitoring shall include flow and intake and outlet temperatures as measured across the condensers on the continuous basis. The daily average BTU's/hour shall be calculate as follows: the BTU's/hour shall be determined once each hour, as shown below, and those volumes shall be averaged over a 24 hour period for each day.

Compliance with the BTU/hour limitations results in compliance with the 1,000 foot arc requirements set forth in 327 IAC 2-1.5-8.

Hourly Thermal Discharge (E*6 BTU/hr)=Q x (To-Ti) x 0.3477
Where,

E*6, converts to million BTU/hr
Q=Hourly discharge flow, MGD
To=Hourly effluent temperature, F
Ti=Hourly intake temperature, F
0.3477, conversion factor

Based upon the information provided in the study referenced above, and because Outfall 035 has the most significant heat impact to Lake Michigan, IDEM determined that the temperature requirements are met at the 1,000 foot arc by the remaining Lake Michigan Outfalls. Therefore, monitoring only is required at Outfall 037 and 039. For these Outfalls temperature is to be monitored at the Intake and Outfall locations.

TRC
Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and has been included as **Appendix B**.

In accordance with 327 IAC 5-2-11.6(g)(1), mass limits for TRC are included in the permit, based on a flow volume of 156.8 MGD for Outfall 035 and 55 MGD for Outfall 039. This volume represents the highest reported monthly average from the previous two year period and is used in accordance with 327 IAC 5-2-11.4(9)(B), as required by 327 IAC 5-2-11.6(g)(2).

The effluent limitations for TRC at Outfall 035 are 24 lbs/day and 18 ug/l daily maximum and 10 lbs/day and 8 ug/l monthly average. The effluent limitations for TRC at Outfall 039 are 8.3 lbs/day and 18 ug/l daily maximum and 3.7 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 78.5 lbs/day at Outfall 035 and 27.5 lbs/day at Outfall 039. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the highest reported monthly average from the previous two year period (156.8 MGD and 55 MGD, respectively).

5.3.20 Outfall 037

O & G
Reporting requirements for O & G are required at Outfall 037 to monitor compliance with narrative water quality criteria in 327 IAC 2-1.5-8(b)(1)(C) which prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree as to create a nuisance. If O & G is measured in the effluent in significant quantities, the source of such discharge is to be investigated and eliminated (quantities in excess of 5 mg/l).

Temperature
Temperature monitoring requirements are carried over from the previous permit. Based upon the information provided in the study referenced for temperature in Section 5.3.20 above, IDEM determined that temperature monitoring only is required at Outfall 037.

TRC
Due to the use of chlorine in wastewaters associated with this outfall, effluent limitations for TRC are applicable. As part of this permit renewal, a WLA report was completed and has been included as **Appendix B**.

In accordance with 327 IAC 5-2-11.6(g)(1), mass limits for TRC are included in the permit, based on a flow volume of 3 MGD. This volume represents the highest reported monthly average from the previous two year period and is used in accordance with 327 IAC 5-2-11.4(9)(B), as required by 327 IAC 5-2-11.6(g)(2).

The effluent limitations for TRC at Outfall 037 are 0.45 lbs/day and 18 ug/l daily maximum and 0.20 lbs/day and 8 ug/l monthly average.

The monthly average WQBEL for TRC (8 ug/l) is less than the limit of quantitation (LOQ) for TRC test methods 4500-Cl-D-2000,E-2000 or 4500-Cl-G-2000. The LOQ is 60 ug/l. Therefore, when calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0) unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.

The daily maximum WQBEL for TRC is less than the Limit of Detection (LOD) for the approved methods identified above. The LOD is 20 ug/l. Compliance with the daily maximum limit will be demonstrated if the observed effluent concentrations are less than the LOD. Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

Compliance with the daily maximum mass value will be demonstrated if the calculated mass value is less than 1.5 lbs/day. This value was determined by multiplying the LOQ (0.06 mg/l) by a conversion factor of 8.345 and the highest reported monthly average from the previous two year period (3 MGD).

Zinc
As part of this permit renewal, a Wasteload Allocation (WLA) report was completed and zinc was evaluated for reasonable potential to exceed (RPE) a water quality criterion. The results of the RPE analysis show that zinc does not have an RPE at this outfall. Therefore, reporting requirements for zinc have been removed from this outfall.

Phenols (4AAP)
Reporting requirements for phenols are carried over from the previous permit. Monitoring was previously established using BPJ to ensure that possible leaks of process material or discharges of process wastewaters are detected and corrected.

5.4 Whole Effluent Toxicity (WET) TESTING

Under 327 IAC 2-1.5-8(b)(1)(E)(ii), a discharge shall not cause acute toxicity, as measured by whole effluent toxicity (WET) tests, at any point in the waterbody. Under 327 IAC 2-1.5-8(b)(2)(A)(iv) a discharge shall not cause chronic toxicity to aquatic life, outside of the applicable mixing zone, as measured by WET tests. Under 327 IAC 5-2-11.5(c)(2), IDEM may include WET test requirements in an NPDES Permit, or if determined to be necessary, WET limits based on a reasonable potential to exceed water quality standards.

WET monitoring was included for Outfall 030 and Outfall 034 in the 2015 permit renewal. In the 2017 permit modification, WET monitoring was included at Outfall 015. As part of this permit renewal, an RPE analysis for WET was performed for these outfalls. The results show that the discharges from Outfalls 015, 028/030 and 034 do not have a reasonable potential to exceed the numeric interpretation of the narrative criterion for acute or chronic WET. The TRE triggers for the permit renewal for Outfalls 015, 030 and 034 are included in **Appendix B** of this Fact Sheet. This does not negate the requirement to submit a water treatment additive (WTA) application and/or worksheet for replacement or new additives/chemicals proposed for use at the site.

5.5 Antibacksliding

Pursuant to 327 IAC 5-2-10(a)(11), unless an exception applies, a permit may not be renewed, reissued or modified to contain effluent limitations that are less stringent than the comparable effluent limitations in the previous permit. None of the limits included in this permit conflict with antibacksliding regulations found in 327 IAC 5-2-10(a)(11).

Indiana's prohibitions on backsliding are only applicable to BPJ case-by-case technology-based limits and limits developed/based on water quality standards; therefore, the BPJ/TBEL limits for Oil and Grease at Outfalls 028/030 (Outfall 600) and 034, as well as the summer daily maximum WQBEL for ammonia at Outfall 015, are retained from the previous permit.

Antibacksliding provisions under 327 IAC 5-2-10(a)(11) are not applicable when limits based on EPA effluent limitations guidelines are increased. Under 40 CFR 122.44(l)(1), less stringent effluent limitations are not prohibited when the permit is renewed or reissued if "[t]he circumstances on which the previous permit was based has materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under 40 CFR 122.62." Furthermore, under 40 CFR 122.62(a)(1), a cause for modification exists when "[t]here are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit."

Per 327 IAC 5-2-16(d)(1), production changes would constitute as "[m]aterial and substantial alterations or additions to the discharger's operation which were not covered by the effective permit." The federal ELGs for 40 CFR 420 and 40 CFR 433 have not changed since the previous permit. The increased effluent limitations for Zinc at Internal Outfall 603 are due to an increase in production. Therefore, an increase in the TBELs is not prohibited by either Indiana's or EPA's antibacksliding rules.

If the permittee is able to consistently maintain compliance with the TBELs in the previous permit there is not cause for modification as described in 327 IAC 5-2-16. Furthermore, if there is no cause for modification per 327 IAC 5-2-16 then less stringent effluent limitations are prohibited under 40 CFR 122.44(l)(1). The permittee has consistently meet the TBELs for TSS and Oil and Grease at Internal Outfall 605 and the nickel, chromium, and total cyanide TBELs at Internal Outfall 609. Therefore, those TBELs have been retained from the previous permit.

5.6 Antidegradation

Indiana's Antidegradation Standards and Implementation procedures are outlined in 327 IAC 2-1.3. The antidegradation standards established by 327 IAC 2-1.3-3 apply to all surface waters of the state. The permittee is prohibited from undertaking any deliberate activity that would result in a new or increased discharge of a bioaccumulative chemical of concern (BCC) or a new or increased permit limit for a regulated pollutant that is not a BCC unless information is submitted to the commissioner demonstrating that the proposed new or increased discharge will not cause a significant lowering of water quality, or an antidegradation demonstration submitted and approved in accordance 327 IAC 2-1.3-5 and 2-1.3-6.

The permit includes new permit limitations at Outfall 015 for lead and zinc, and at Outfalls 028/030 for zinc. In accordance with 327 IAC 2-1.3-1(b), the new permit limitations are not subject to the Antidegradation Implementation Procedures in 327 IAC 2-1.3-5 and 2-1.3-6 as the new permit limitations are not the result of a deliberate activity taken by the permittee. The permit limitations are a result of a Reasonable Potential to Exceed (RPE) analysis based on the current dataset. The results of the RPE analysis included in the WLA report as **Appendix B** of this Fact Sheet.

5.7 Storm Water

Under 327 IAC 5-4-6(d), if an individual permit is required under 327 IAC 5-4-6(a) for discharges consisting entirely of storm water, or if an individual permit is required under 327 IAC 5-2-2 that includes discharge of commingled storm water associated with industrial activity, IDEM may consider the following in determining the requirements to be contained in the permit:

(1) The provisions in the following: (A) 327 IAC 15-5, 327 IAC 15-6, and 327 IAC 15-13, as appropriate to the type of storm water discharge, (B) NPDES Pesticide General Permit for Point Source Discharges to Waters of the State from the Application of Pesticides, Permit Number ING870000, effective October 31, 2011, available at: http://www.in.gov/idem/cleanwater/2480.htm#pesticide or from the IDEM Office of Water Quality, Permits Branch, 100 North Senate Avenue, Indianapolis, IN 46204-2251, and (C) 327 IAC 5-2 [Basic NPDES Requirements], 327 IAC 5-5 [NPDES Criteria and Standards for Technology-based Treatment Requirements], and 327 IAC 5-9 [Best Management Practices; Establishment].
(2) "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits", EPA 833-D-96-001, September 1, 1996, available from U.S. EPA, National Service Center for Environmental Publications at https://www.epa.gov/nscep or from IDEM.
(3) The nature of the discharges and activities occurring at the site or facility.
(4) Other information relevant to the potential impact on water quality.

In accordance with 327 IAC 15-2-2(a), the commissioner may regulate storm water discharges associated with industrial activity, as defined in 40 CFR 122.26(b)(14), consistent with the EPA 2008 NPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, as modified, effective May 27, 2009, under an NPDES general permit. Therefore, using Best Professional Judgment to develop case-by-case technology-based limits as authorized by 327 IAC 5-2-10, 327 IAC 5-5, and 327 IAC 5-9 (see also 40 CFR 122.44, 125.3, and Section 402(a)(1) of the Clean Water Act (CWA)), IDEM has developed storm water requirements for individual permits that are consistent with the EPA 2008 NPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity. The 2008 Multi-Sector General Permit and Fact Sheet is available from: https://www.epa.gov/npdes/previous-versions-epas-msgp-documents.

According to 40 CFR 122.26(b)(14) and 327 IAC 15-6-2 facilities classified under Standard Industrial Classification (SIC) Code 3312 – Blast Furnaces, Steel Works, and Rolling Mills, are considered to be engaging in “industrial activity” for purposes of 40 CFR 122.26(b). Therefore, the permittee is required to have all storm water discharges associated with industrial activity permitted. Treatment for storm water discharges associated with industrial activities is required to meet, at a minimum, best available technology economically achievable/best conventional pollutant control technology (BAT/BCT) requirements. EPA has determined that non-numeric technology-based effluent limits have been determined to be equal to the best practicable technology (BPT) or BAT/BCT for storm water associated with industrial activity.

Storm water associated with industrial activity must also be assessed to ensure compliance with all water quality standards. Effective implementation of the non-numeric technology-based requirements should, in most cases, control discharges as necessary to meet applicable water quality standards. Violation of any of these effluent limitations constitutes a violation of the permit.

Additionally, IDEM has determined that with the appropriate implementation of the required control measures and Best Management Practices (BMPs) found in Part I.D. of the permit, the discharge of storm water associated with industrial activity from this facility will meet applicable water quality standards and will not cause a significant lowering of water quality. Therefore, the storm water discharge is in compliance with the antidegradation standards found in 327 IAC 2-1.3-3, and pursuant to 327 IAC 2-1.3-4(a)(5), an antidegradation demonstration is not required.

The technology-based effluent limits (TBELs) require the permittee to minimize exposure of raw, final, or waste materials to rain, snow, snowmelt, and runoff. In doing so, the permittee is required, to the extent technologically available and economically achievable, to either locate industrial materials and activities inside or to protect them with storm resistant coverings. In addition, the permittee is required to: (1) use good housekeeping practices to keep exposed areas clean, (2) regularly inspect, test, maintain and repair all industrial equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in storm water discharges, (3) minimize the potential for leaks, spills and other releases that may be exposed to storm water and develop plans for effective response to such spills if or when they occur, (4) stabilize exposed area and contain runoff using structural and/or non-structural control measures to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants, (5) divert, infiltrate, reuse, contain or otherwise reduce storm water runoff, to minimize pollutants in the permitted facility discharges, (6) enclose or cover storage piles of salt or piles containing salt used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces, (7) train all employees who work in areas where industrial materials or activities are exposed to storm water, or who are responsible for implementing activities necessary to meet the conditions of this permit (e.g., inspectors, maintenance personnel), including all members of your Pollution Prevention Team, (8) ensure that waste, garbage and floatable debris are not discharged to receiving waters by keeping exposed areas free of such materials or by intercepting them before they are discharged, and (9) minimize generation of dust and off-site tracking of raw, final or waste materials.

To meet the non-numeric effluent limitations in Part I.D.4, the permit requires the facility to select control measures (including BMPs) to address the selection and design considerations in Part I.D.3.

The permittee must control its discharge as necessary to meet applicable water quality standards. It is expected that compliance with the non-numeric technology-based requirements should ensure compliance with applicable water quality standards. However, if at any time the permittee, or IDEM, determines that the discharge causes or contributes to an exceedance of applicable water quality standards, the permittee must take corrective actions, and conduct follow-up monitoring and IDEM may impose additional water quality-based limitations.

“Terms and Conditions” to Provide Information in a Storm Water Pollution Prevention Plan (SWPPP)

Distinct from the effluent limitation provisions in the permit, the permit requires the discharger to prepare a SWPPP for the permitted facility. The SWPPP is intended to document the selection, design, installation, and implementation (including inspection, maintenance, monitoring, and corrective action) of control measures being used to comply with the effluent limits set forth in Part I.D. of the permit. In general, the SWPPP must be kept up-to-date, and modified when necessary, to reflect any changes in control measures that were found to be necessary to meet the effluent limitations in the permit.

The requirement to prepare a SWPPP is not an effluent limitation. Rather, it documents what practices the discharger is implementing to meet the effluent limitations in Part I.D. of the permit. The SWPPP is not an effluent limitation because it does not restrict quantities, rates, and concentrations of constituents which are discharged. Instead, the requirement to develop a SWPPP is a permit “term or condition” authorized under sections 402(a)(2) and 308 of the Act. Section 402(a)(2) states, “[t]he Administrator shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.” The SWPPP requirements set forth in this permit are terms or conditions under the CWA because the discharger is documenting information on how it intends to comply with the effluent limitations (and inspection and evaluation requirements) contained elsewhere in the permit. Thus, the requirement to develop a SWPPP and keep it up-to-date is no different than other information collection conditions, as authorized by 327 IAC 5-1-3 (see also CWA section 402(a)(2)).

It should be noted that EPA has developed a guidance document, “Developing your Storm Water Pollution Prevention Plan – A guide for Industrial Operators (EPA 833-B09-002), February 2009, to assist facilities in developing a SWPPP. The guidance contains worksheets, checklists, and model forms that should assist a facility in developing a SWPPP.

Public availability of documents

Part I.E.2.d(2) of the permit requires that the permittee retain a copy of the current SWPPP at the facility and make it immediately available, at the time of an onsite inspection or upon request, to IDEM. When submitting the SWPPP to IDEM, if any information in the SWPPP is considered to be confidential, that information shall be submitted in accordance with 327 IAC 12.1. Interested persons can request a copy of the SWPPP through IDEM. Any information that is confidential pursuant to Indiana law will not be released to the public.

5.8 Water Treatment Additives

In the event that changes are to be made in the use of water treatment additives that could significantly change the nature of, or increase the discharge concentration of any of the additives contributing to an outfall governed under the permit, the permittee must apply for and obtain approval from IDEM prior to such discharge. Discharges of any such additives must meet Indiana water quality standards. The permittee must apply for permission to use water treatment additives by completing and submitting State Form 50000 (Application for Approval to Use Water Treatment Additives) available at: http://www.in.gov/idem/5157.htm and submitting any needed supplemental information. In the review and approval process, IDEM determines, based on the information submitted with the application, whether the use of any new or changed water treatment additives/chemicals or dosage rates could potentially cause the discharge from any permitted outfall to cause chronic or acute toxicity in the receiving water.

The authority for this requirement can be found under one or more of the following: 327 IAC 5-2-8(11)(B), which generally requires advance notice of any planned changes in the permitted facility, any activity, or other circumstances that the permittee has reason to believe may result in noncompliance with permit requirements; 327 IAC 5-2-8(11)(F)(ii), which generally requires notice as soon as possible of any planned physical alterations or additions to the permitted facility if the alteration or addition could significantly change the nature of, or increase the quantity of, pollutants discharged; and 327 IAC 5-2-9(2) which generally requires notice as soon as the discharger knows or has reason to know that the discharger has begun or expects to begin to use or manufacture, as an intermediate or final product or byproduct, any toxic pollutant that was not reported in the permit application.

A list of water treatment additives currently approved for use at the facility is provided as **Appendix C**.

6.0 PERMIT DRAFT DISCUSSION

6.1 Discharge Limitations, Monitoring Conditions and Rationale

The proposed final effluent limitations are based on the more stringent of the Indiana water quality-based effluent limitations (WQBELs), technology-based effluent limitations (TBELs), or approved total maximum daily loads (TMDLs) and NPDES regulations as appropriate for each regulated outfall. Section 5.3 of this document explains the rationale for the effluent limitations at each Outfall.

Analytical and sampling methods used shall conform to the version of 40 CFR 136 as referenced in 327 IAC 5-2-13(d)(1) and 327 IAC 5-2-1.5. The approved analytical and sampling methods are found in Part I.C.4 of the Permit.

Internal Outfall 501 to 015:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
Oil and Grease	Report 10	Report 15	lbs/day mg/l	2 X Weekly	3 Grabs/24 Hrs.
TSS	Report 30	Report 60	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Selenium	Report Report	Report Report	lbs/day ug/l	1 X Weekly	24 Hr. Comp.
Benzene	Report Report	Report Report	lbs/day ug/l	3 X Monthly	3 Grabs/24 Hrs.
Benzo-a-pyrene	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Phenols (4AAP)	Report Report	Report Report	lbs/day ug/l	2 X Weekly	3 Grabs/24 Hrs.
Ammonia, as N	Report Report	Report Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.

Free Cyanide	Report Report	Report Report	lbs/day ug/l	2 X Weekly	3 Grabs/24 Hrs.
Lead	Report Report	Report Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
Zinc	Report Report	Report Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
CBOD5	Report Report	Report Report	lbs/day mg/l	1 X Weekly	24 Hr. Comp.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	Report	Report	Std Units	1 X Weekly	Grab

Internal Outfall 607 to 015:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	24 Hr. Total
Oil and Grease	Report 10	Report 15	lbs/day mg/l	1 X Weekly	3 Grabs/24 Hrs.
TSS	Report 30	Report 60	lbs/day mg/l	1 X Weekly	24 Hr. Comp.
Ammonia, as N	Report Report	Report Report	lbs/day mg/l	1 X Weekly	24 Hr. Comp.
CBOD5	Report Report	Report Report	lbs/day mg/l	1 X Weekly	24 Hr. Comp.
Free Cyanide	Report Report	Report Report	lbs/day ug/l	1 X Monthly	3 Grabs/24 Hrs.
Phenols (4AAP)	Report Report	Report Report	lbs/day ug/l	1 X Monthly	3 Grabs/24 Hrs.
Lead	Report Report	Report Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
Zinc	Report Report	Report Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
Benzo-a-pyrene	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	Report	Report	Std Units	1 X Weekly	Grab

Outfall 015:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type

Flow	Report	Report	MGD	Daily	24 Hr. Total
Oil and Grease	Report	Report	mg/l	1 X Weekly	3 Grabs/24 Hrs.
TSS	Report Report	Report Report	lbs/day mg/l	1 X Weekly	24 Hr. Comp.
Ammonia, as N Summer Winter	 21 1.2 23 1.3	 40 2.5 44 2.5	 lbs/day mg/l lbs/day mg/l	1 X Weekly	24 Hr. Comp.
CBOD5	Report Report	Report Report	lbs/day mg/l	1 X Weekly	24 Hr. Comp.
Free Cyanide Season 1 Season 2	 0.15 8.8 0.12 6.7	 0.32 18 0.23 13	 lbs/day ug/l lbs/day ug/l	1 X Weekly	3 Grabs/24 Hrs.
Phenols (4AAP)	Report Report	Report Report	lbs/day ug/l	1 X Weekly	3 Grabs/24 Hrs.
Lead	0.15 8.4	0.30 17	lbs/day ug/l	1 X Weekly	24 Hr. Comp.
Zinc	1.4 81	2.8 160	lbs/day ug/l	1 X Weekly	24 Hr. Comp.
Temperature	--------	Report	°F	1 X Weekly	6 Grabs/24 Hrs.
TRC	0.14 8	0.32 18	lbs/day ug/l	Daily	Grab
Mercury WQBELs Interim Limit	 0.000023 1.3 14	 0.000056 3.2 Report	 lbs/day ng/l ng/l	Bi-Monthly	Grab
Selenium	0.072 4.1	0.14 8.2	lbs/day ug/l	1 X Weekly	24 Hr. Comp.
Benzo-a-pyrene	0.0017 0.095	0.0040 0.23	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
WETT	See Part I.I of the Permit				

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Weekly	Grab

Outfall 018:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type

Flow	Report	Report	MGD	Daily	24 Hr. Total
TSS	Report Report	Report Report	lbs/day mg/l	2 X Monthly	24 Hr. Comp.
Oil and Grease	Report	Report	mg/l	1 X Weekly	Grab
Ammonia, as N	Report Report	Report Report	lbs/day mg/l	2 X Monthly	24 Hr. Comp.
Phenols (4AAP)	Report Report	Report Report	lbs/day ug/l	2 X Monthly	3 Grabs/24 Hrs.
Mercury WQBELs Interim Limit	 0.00066 1.3 2.8	 0.0016 3.2 Report	 lbs/day ng/l ng/l	Bi-Monthly	Grab
Temperature	--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC	4.1 8	9.1 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Weekly	Grab

Outfall 019:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	24 Hr. Total
Oil and Grease	Report	Report	mg/l	1 X Weekly	Grab
Phenols (4AAP)	Report Report	Report Report	lbs/day ug/l	1 X Monthly	3 Grabs/24 Hrs.
Mercury WQBELs Interim Limit	 0.00080 1.3 2.3	 0.0020 3.2 Report	 lbs/day ng/l ng/l	Bi-Monthly	Grab
Temperature	--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC	4.9 8	11 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Weekly	Grab

Outfall 020:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
Oil and Grease	Report	Report	mg/l	1 X Weekly	Grab
Mercury WQBELs Interim Limit	 0.00052 1.3 2.2	 0.0013 3.2 Report	 lbs/day ng/l ng/l	Bi-Monthly	Grab
Temperature	--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC	3.2 8	7.1 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Weekly	Grab

Outfall 021:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Monthly	Estimate
Oil and Grease	Report	Report	mg/l	1 X Monthly	Grab
TRC	0.040 8	0.090 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

Outfall 023: (Inactive)

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Monthly	Estimate
Oil and Grease	--------	Report	mg/l	1 X Monthly	Grab
Ammonia, as N	Report Report	Report Report	lbs/day mg/l	2 X Monthly	24 Hr. Comp.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

Outfall 026: (Inactive)

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Monthly	Estimate
Oil and Grease	--------	Report	mg/l	1 X Monthly	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

Internal Outfall 603 to Outfall 028/030:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Monthly	Estimate
Lead	Report Report	Report Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Zinc	9.81 Report	29.4 Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.

Outfall 028/030: (Administrative Outfall 600)

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
Oil and Grease	1274 Report	2807 Report	lbs/day mg/l	5 X Weekly	3 Grabs/24 Hrs.
TSS	1667 Report	4825 Report	lbs/day mg/l	5 X Weekly	24 Hr. Comp.
Lead	4.5 19	10 43	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Zinc	38 160	75 320	lbs/day ug/l	1 X Weekly	24 Hr. Comp.
Temperature	--------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
TRC	1.9 8	4.2 18	lbs/day ug/l	Daily	Grab
Mercury WQBELs Interim Limit	 0.00031 1.3 [1]	 0.00075 3.2 Report	 lbs/day ng/l ng/l	Bi-Monthly	Grab
WETT	See Part I.I of the Permit				

[1] The Annual Average interim discharge limit for Outfall 028 is 3.2 ng/l. The Annual Average interim discharge limit for Outfall 030 is 3.0 ng/l.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Weekly	Grab

Outfall 032:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Monthly	Estimate
Oil and Grease	--------	Report	mg/l	1 X Monthly	Grab
TRC	0.020 8	0.045 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

Outfall 033:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Monthly	Estimate
Oil and Grease	--------	Report	mg/l	1 X Monthly	Grab
TRC	0.013 8	0.030 18	lbs/day ug/l	Daily	Grab
Phenols(4AAP)	------- -------	Report Report	lbs/day ug/l	1 X Monthly	3 Grabs/24 Hrs.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

Internal Outfall 604 to Outfall 034:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
TSS	Report Report	Report Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Oil and Grease	Report Report	Report Report	lbs/day mg/l	5 X Weekly	3 Grabs/24 Hrs.
Total Chromium	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Zinc	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Lead	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.

Total Cyanide	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	See Permit Part I.N.
Cadmium	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Hexavalent Chromium	Report Report	Report Report	lbs/day ug/l	[1]	Grab
Copper	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Nickel	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Silver	Report Report	Report Report	lbs/day ug/l	2 X Monthly	24 Hr. Comp.
TTO	-------- --------	Report -------	lbs/day --------	1 X Monthly	24 Hr. Comp.
Naphthalene	-------- --------	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Tetrachloroethylene	-------- --------	Report Report	lbs/day ug/l	2 X Weekly	2 Grabs/24 Hrs.

[1] Monitoring requirements are temporarily suspended for as long as both the No. 6 and No. 8 Galvanizing Lines and their associated Fume Scrubbers are idled. In the event that one or both are brought back online, the monitoring will resume at a minimum frequency of 1 X Weekly. The permittee shall give IDEM a minimum of thirty (30) days notice prior to bringing either line back into operation.

Internal Outfall 605 to Outfall 034:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
Oil and Grease	Report Report	1450 Report	lbs/day mg/l	5 X Weekly	3 Grabs/24 Hrs.
TSS	725 Report	2175 Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.

Internal Outfall 606 to Outfall 034:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	24 Hr. Total
Oil and Grease	-------- --------	--------- Report	lbs/day mg/l	1 X Weekly	Grab
Total Recoverable Chromium	-------- --------	--------- Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
Zinc	-------- --------	--------- Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.

Lead	-------- --------	--------- Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
Phenols (4AAP)	-------- --------	--------- Report	lbs/day ug/l	1 X Monthly	24 Hr. Comp.

Internal Outfall 608 to Internal Outfall 606 to Outfall 034:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
TSS	Report Report	Report Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Oil and Grease	Report Report	Report Report	lbs/day mg/l	5 X Weekly	3 Grabs/24 Hrs.
Total Chromium	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Zinc	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Lead	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Total Cyanide	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	See Permit Part I.N.
Cadmium	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Hexavalent Chromium	Report Report	Report Report	lbs/day ug/l	[1]	Grab
Copper	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Nickel	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Silver	Report Report	Report Report	lbs/day ug/l	2 X Monthly	24 Hr. Comp.
TTO	-------- --------	Report --------	lbs/day --------	1 X Monthly	24 Hr. Comp.
Naphthalene	-------- --------	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Tetrachloroethylene	-------- --------	Report Report	lbs/day ug/l	2 X Weekly	2 Grabs/24 Hr.

[1] Monitoring requirements are temporarily suspended for as long as both the No. 6 and No. 8 Galvanizing Lines and their associated Fume Scrubbers are idled. In the event that one or both are brought back online, the monitoring will resume at a minimum frequency of 1 X Weekly. The permittee shall give IDEM a minimum of thirty (30) days notice prior to bringing either line back into operation.

Internal Outfall 609 to Outfall 034: (Summation of 606 and 608)

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
TSS	1685 Report	3745 Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Oil and Grease	Report Report	Report Report	lbs/day mg/l	5 X Weekly	3 Grabs/24 Hrs.
Total Chromium	22.5 Report	36.5 Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Zinc	24.8 Report	49.7 Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Lead	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Total Cyanide	8.5 Report	15.8 Report	lbs/day ug/l	1 X Quarterly	See Permit Part I.N.
Cadmium	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Hexavalent Chromium	0.15 Report	0.45 Report	lbs/day ug/l	[1]	Grab
Copper	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Nickel	31.4 Report	52.3 Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Silver	Report Report	Report Report	lbs/day ug/l	2 X Monthly	24 Hr. Comp.
TTO	-------- --------	28.0 --------	lbs/day --------	1 X Monthly	24 Hr. Comp.
Naphthalene	-------- --------	0.789 Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Tetrachloroethylene	-------- --------	1.18 Report	lbs/day ug/l	2 X Weekly	2 Grabs/24 Hrs.

[1] Monitoring requirements are temporarily suspended for as long as both the No. 6 and No. 8 Galvanizing Lines and their associated Fume Scrubbers are idled. In the event that one or both are brought back online, the monitoring will resume at a minimum frequency of 1 X Weekly. The permittee shall give IDEM a minimum of thirty (30) days notice prior to bringing either line back into operation.

Outfall 034:

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
TSS	Report Report	Report Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Oil and Grease	1430 Report	3660 Report	lbs/day mg/l	5 X Weekly	3 Grabs/24 Hrs.
CBOD5 Summer Winter	 1334 Report 4537 Report	 2669 Report 9074 Report	 lbs/day mg/l lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Zinc	Report Report	Report Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Lead	2.52 Report	5.85 Report	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Cadmium	2.0 9.3	3.0 14	lbs/day ug/l	1 X Monthly	24 Hr. Comp.
Total Chromium	Report Report	Report Report	lbs/day mg/l	2 X Weekly	24 Hr. Comp.
Copper	3.6 17	7.8 37	lbs/day ug/l	2 X Weekly	24 Hr. Comp.
Nickel	Report Report	Report Report	lbs/day ug/l	1 X Quarterly	24 Hr. Comp.
Silver	0.036 0.17	0.064 0.30	lbs/day ug/l	2 X Monthly	24 Hr. Comp.
Mercury	0.00028 1.3	0.00068 3.2	lbs/day ng/l	Bi-Monthly	Grab
Phenols (4AAP)	26.00 Report	39.00 Report	lbs/day ug/l	1 X Weekly	3 Grabs/24 Hrs.
TRC	1.7 8	3.8 18	lbs/day ug/l	[1]	Grab
Temperature	---------	Report	°F	2 X Weekly	6 Grabs/24 Hrs.
WETT	See Part I.I of the Permit				

[1] Monitoring for TRC shall be 1 X Daily during zebra or quagga mussel intake chlorination, and 2 X Weekly during continuous chlorination treatment when the intake is not being treated for zebra mussels.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Daily	Grab
Dissolved Oxygen	5.0	------	mg/l	1 X Weekly	2 Grabs/ 24 Hrs.

Outfall 035

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	Daily	Continuous
Oil and Grease	-------	Report	mg/l	1 X Weekly	Grab
Temperature Discharge Intake	 -------- --------	 Report Report	°F	 1 X Hourly 1 X Hourly	 Continuous Continuous
Thermal Discharge	--------	1.211[1]	GBTU/Hr	Daily	Continuous
TRC	10 8	24 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

[1] The effluent limitation is 1.211 billion BTU/Hr (1.211 GBTU/Hr) as a maximum daily average. Monitoring shall include flow and intake and outlet temperatures as measured across the condensers on a continuous basis. The daily average BTU/Hr shall be calculated as follows: The BTU/Hr shall be determined once each hour and those values shall be averaged over a 24 hour period for each day.

Outfall 037

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Weekly	Estimate
Oil and Grease	-------	Report	mg/l	1 X Weekly	Grab
Temperature Discharge Intake	 -------- --------	 Report Report	°F	 1 X Hourly 1 X Hourly	 Continuous Continuous
Thermal Discharge	---------	Report[1]	BTU/Hr	Daily	Continuous
TRC	0.20 8	0.45 18	lbs/day ug/l	Daily	Grab
Phenols (4AAP)	-------- --------	Report Report	lbs/day ug/l	1 X Monthly	3 Grabs/24 Hrs.

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

[1] The thermal discharge in billion BTU/Hr (GBTU/Hr) shall be reported as a maximum daily average. Monitoring shall include flow and intake and outlet temperatures on a continuous basis. The daily average BTU/Hr shall be calculated as follows: The BTU/Hr shall be determined once each hour and those values shall be averaged over a 24 hour period for each day.

Outfall 039

Parameter	Monthly Average	Daily Maximum	Units	Minimum Frequency	Sample Type
Flow	Report	Report	MGD	1 X Weekly	Estimate
Oil and Grease	-------	Report	mg/l	1 X Weekly	Grab
Temperature			°F		
Discharge	--------	Report		1 X Hourly	Continuous
Intake	--------	Report		1 X Hourly	Continuous
Thermal Discharge	--------	Report	BTU/Hr	Daily	Continuous
TRC	3.7 8	8.3 18	lbs/day ug/l	Daily	Grab

Parameter	Daily Minimum	Daily Maximum	Units	Minimum Frequency	Sample Type
pH	6.0	9.0	Std Units	1 X Monthly	Grab

6.2 Schedule of Compliance

The draft permit contains new effluent limits for zinc at Outfalls 028/030 (Outfall 600). In accordance with 327 IAC 5-2-12.1 (see also 40 CFR 122.47(a)), a schedule of compliance is allowed in an NPDES permit when requested and justified by the permittee, but only when appropriate and when the schedule of compliance requires achievement of compliance “as soon as possible” and meets other specified conditions. Before a schedule of compliance can be included in a permit, the permittee must submit a request for the schedule to IDEM and demonstrate that they meet the requirements for such a schedule pursuant to 327 IAC 5-2-12.1. The facility submitted a request for a schedule of compliance for the new zinc limitation at Outfalls 028/03 (Outfall 600) on January 14, 2021. However, after a review of the previous three (3) years data for zinc at this outfall, IDEM has determined that the facility is able to demonstrate compliance with the new limitations at this time. Therefore, a schedule of compliance for this parameter, at Outfalls 028/030 (Outfall 600), has not been granted at this time.

Schedules of compliance have been incorporated for BTA regarding 316(b) Cooling Water Intake Structures. Please refer to Section 6.3.2.H of this Fact Sheet for more information.

6.3 Special Conditions and Other Permit Requirements

6.3.1 Clean Water Act (CWA) Section 316(a) Alternative Thermal Effluent Limitations

A. <u>Applicability, Purpose and Scope</u>

The information in this section is taken in large part from an October 28, 2008 memorandum from James A. Hanlon to Region 1-10 Water Division Directors regarding the implementation of Clean Water Act (CWA) Section 316(a) Thermal Variances in NPDES Permits. Section 316(a) of the CWA is applicable to point sources with thermal discharges. It authorizes the NPDES permitting authority to impose alternate effluent limitations for the control of the thermal component of a discharge in lieu of the effluent limitations that would otherwise be required.

Federal regulations implementing section 316(a) are codified at 40 CFR Part 125, subpart H; while Indiana has established rules implementing section 316(a) of the CWA at 327 IAC 5-7. These rules and regulations identify the criteria and processes for determining whether an alternate effluent limitation (i.e. a thermal variance from the otherwise applicable limits) may be included in a permit, and, if so, what that limit should be. This means that before a thermal variance can be granted, 327 IAC 5-7-3 and 4 (see also 40 CFR 125.72 and 125.73) require the permittee to demonstrate that the otherwise applicable thermal discharge effluent limit is more stringent than necessary to assure the protection and propagation of the waterbody's balanced indigenous community of shellfish, fish and wildlife.

The burden of proof is on the permittee to demonstrate that it is eligible to receive an alternative effluent limit under 316(a). In support of any proposed alternative thermal limit, the discharger must demonstrate that the alternative limit will assure protection of the waterbody's balanced indigenous population, considering the impacts of its thermal discharge together with all other significant impacts on the species affected. (see 327 IAC 5-7-4(a) and 40 CFR 125.73(a)) When applying for an alternative thermal limit, an applicant must submit the supporting information and demonstrations identified and described in 327 IAC 5-7-3 and 4 (see also 40 CFR 125.72 and 73). Among other things, the applicant must identify and describe (1) the requested alternative effluent limitation, (2) methodology used to support the limitation, (3) the organisms comprising the balanced indigenous community along with supporting data and information, and (4) the types of data, studies, experiments and other information the applicant intends to use to demonstrate that the alternative thermal limit assures the protection and propagation of the balanced indigenous community. 327 IAC 5-7-3(a) and (b) (see also 40 CFR 125.72(a) and (b)).

IDEM has developed a draft 316(a) guidance document, Guidance for Conducting a Demonstration as a Requirement of a 316(a) Alternative Thermal Effluent Limitation Request, March 2015; available at: https://www.in.gov/idem/cleanwater/2365.htm. For demonstrations conducted after the date of this guidance, dischargers shall take this guidance into consideration when preparing 316(a) study plans and conducting 316(a) demonstrations.

B. Criteria and standards for the determination of ATELs

Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the IDEM that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will ensure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.

Existing dischargers may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies in accordance with 327 IAC 5-7-5(c)(1). Any such demonstrations shall show: (i) That no appreciable harm has resulted from the normal component of the discharge (taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge has been made; or (ii) That despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless ensure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. In determining whether or not prior appreciable harm has occurred, the IDEM shall consider the length of time in which the applicant has been discharging and the nature of the discharge.

C. The 316(a) Alternate Thermal Effluent Limitations Renewal Process

A 316(a) variance is a permit condition. It expires along with the permit. A permittee may request renewal of its 316(a) variance prior to the expiration of the permit. Therefore, when the permittee submits its next NPDES permit renewal application, if the permittee still wants the 316(a) variance, it must also request renewal of its 316(a) variance. In accordance with the IDEM draft 316(a) guidance document, Guidance for Conducting a Demonstration as a Requirement of a 316(a) Alternative Thermal Effluent Limitation Request, March 2015; existing dischargers are required to conduct a new Type I Demonstration if they have not completed a Type I Demonstration within the past 10 years. At the time this permit is due for renewal, 10 years will have passed since the previous demonstration was completed. Therefore, IDEM will require a new demonstration to be completed and submitted prior to the next permit renewal.

D. Historical summary of Alternative Thermal Effluent Limitations for the facility

Alternate Thermal Effluent Limits (ATELs) have been previously approved for thermal discharges to the Grand Calumet River. The GCR limitations are applied at in-stream GCR monitoring points 220 (100 feet downstream of Outfall 020) and 230 (100 feet downstream of Outfall 030). The temperatures measured at monitoring points 220 and 230 shall not exceed the maximum limits below:

Month	Monthly Average	Daily Maximum
January	--------	59
February	--------	58
March	---------	69
April	---------	73
May	---------	83
June	90	93
July	90	93
August	90	93
September	90	93
October	----------	83
November	----------	75
December	----------	63

Temperature measurements taken in the Grand Calumet River are taken mid-stream, at a depth of approximately one (1) meter, and collected in one (1) hour intervals. The highest single recorded measurement is reported on the State's MMR for each day, and the highest recorded measurement is reported on the Federal DMR as the maximum daily temperature for that month.

These were first incorporated into a modified Permit (effective January 1, 2013) and continued in the November 1, 2015 renewed Permit. Pursuant to Part III.A.g. of the current permit, U. S. Steel has re-evaluated the need for ATELs since elimination of the Outfall 005 thermal discharge associated with coke production.

E. <u>Summary and Evaluation of 2020 316(a) Demonstration</u>

U. S. Steel requests continued authorization of the existing ATELs for these locations. Even with the cessation of coke production and the removal of Outfall 005, U. S. Steel demonstrates that the need for the 316(a) ATELs are necessary and believe they are keeping with long-standing historical conditions that support existing communities in the Grand Calumet River.

The tables below provide a comparison of the measured daily maximums to the currently approved ATELs and the thermal limitations which would be applicable in the absence of the 316(a) variance.

Table 1: Monitoring Location 220

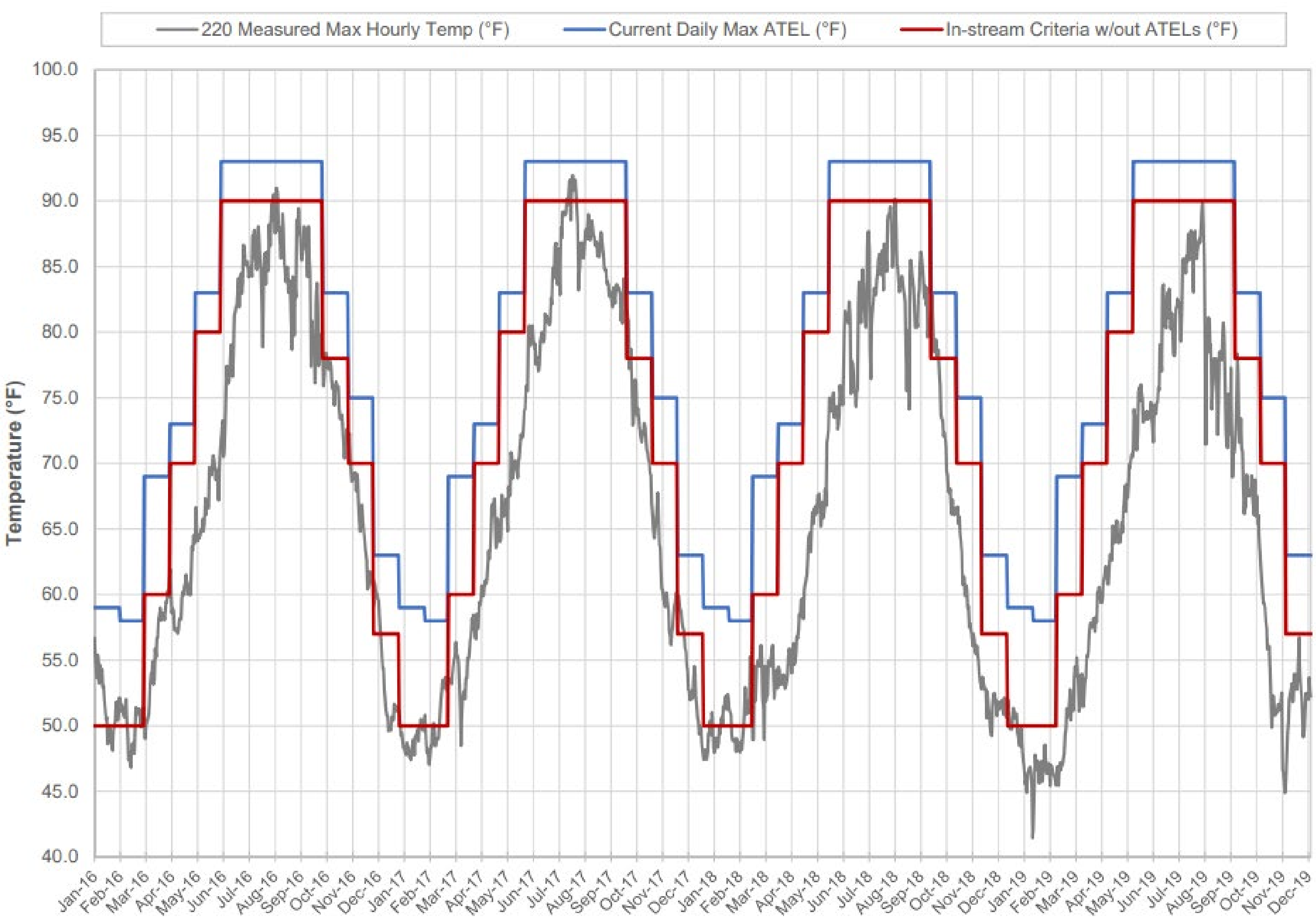
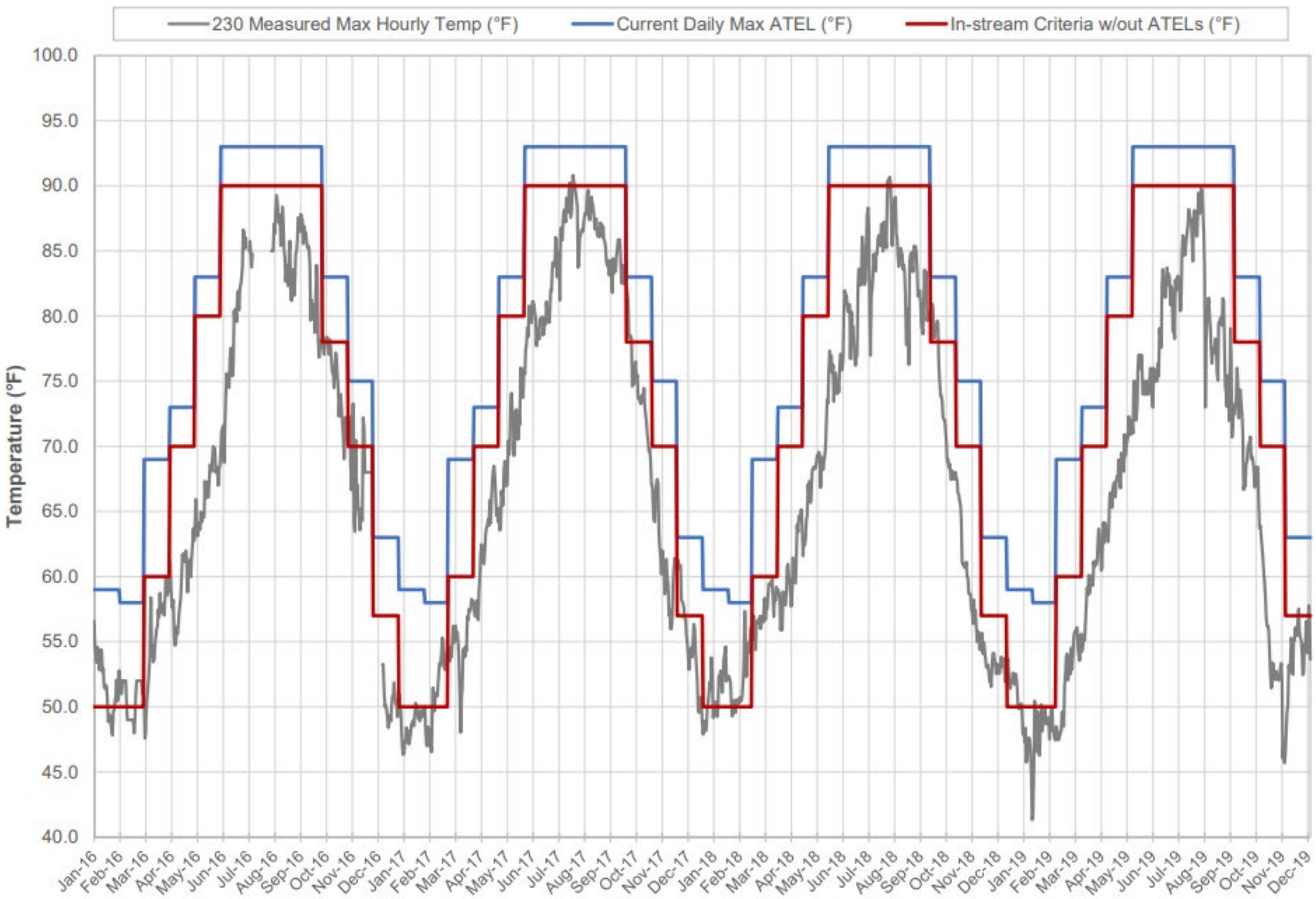


Table 2: Monitoring Location 230



F. <u>Thermal Limitations which would be Applicable in the Absence of a 316(a) Variance</u>

In absence of a 316(a) thermal variance, the following temperature limitations apply for direct discharge from Outfalls 020 and 030 to the GCR based on 327 IAC 2-1.5-8:

Water Quality Based Effluent Limitations Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ºF	50	50	60	70	80	90	90	90	90	78	70	57
ºC	10	10	15.6	21.1	26.7	32.2	32.2	32.2	32.2	25.5	21.1	14

G. <u>Proposed Thermal Limitations</u>

IDEM agrees to continue the currently approved ATELs. IDEM shared a copy of the 316(a) portion of the renewal application with the U.S. Department of Fish and Wildlife Services on June 11, 2020. The U.S. Department of Fish and Wildlife Services had no comments.

H. <u>Future Demonstration Requirements</u>

A new CWA section 316(a) demonstration in accordance with 327 IAC 5-7 and Subpart H of 40 CFR 125 shall be submitted to IDEM no later than one year prior to the expiration date of this permit. The new 316(a) demonstration is necessary to support alternate thermal effluent limitations that might be requested as part of the next permit renewal.

1. Within 180 days of the effective date of this permit, the permittee applying for ATEL must submit a proposed 316(a) Type I, II, or III demonstration study plan to IDEM for review. The demonstration study plan must include a list of the proposed representative important species (RIS).

2. This proposed 316(a) demonstration study plan (and the completed demonstration) must conform to 327 IAC 5-7 and Subpart H of 40 CFR 125 and to the IDEM draft *Guidance for Conducting a Demonstration as a Requirement of a 316(a) Alternative Thermal Effluent Limitation Request*, March 2015. In addition, EPA has issued a draft CWA 316(a) guidance entitled "*Interagency 316(a) Technical Guidance Manual And Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements*," 1977. Both of these guidance documents provide valuable information on conducting 316(a) demonstrations.

3. IDEM will review the proposed study plan, and may, based on its review, request additional information from the discharger to make the demonstration study plan complete. IDEM will also provide the discharger with the accepted RIS. When the study plan is complete and satisfies the requirements of the regulations and guidance, IDEM will inform the discharger in writing that the demonstration study plan is complete so that the discharger may begin the study.

4. The discharger must initiate the demonstration study within two (2) years of receiving notification from IDEM that the demonstration study plan is complete.

5. The discharger must submit the completed Type I, II, or III demonstration and application for alternate thermal effluent limits (ATEL) to IDEM for review at least one year prior to the expiration date of this permit. The application must be signed and certified by a responsible official in compliance with 327 IAC 5-2-22(a) and (d). The demonstration and application for ATEL will be reviewed by IDEM for completeness. A complete demonstration must include the following:

    a. A quantitative description and rationale for the proposed ATEL.

    b. The absence of prior appreciable harm assessment and RIS assessment supporting the proposed ATEL.

    c. All of the thermal and biological data collected during the demonstration and/or used to support the demonstration, provided in a format amenable for electronic data interfacing into the Office of Water Quality's External Data Framework of the Assessment Information Management System (AIMS). Summarized data and data compilations alone will NOT be accepted.

d. Executive summary of study findings.

e. Request for Thermal Mixing Zone. The thermal mixing zone request must specify the temperatures within and at the edge of the mixing zone and the proposed sizes of the mixing zones as applicable.

f. Any other information deemed necessary and developed by the discharger for the demonstration.

g. A delineation/model of the thermal plume under representative flow conditions based on in-lake temperature monitoring data, and with the proposed point of compliance for the proposed thermal limits.

h. Any additional studies conducted since the last demonstration was completed and an analysis of any changes from the previous assessments and conclusions.

6. Once a technical, regulatory and completeness review has been completed, IDEM will make a tentative decision to approve the ATEL, deny the ATEL, or approve a modified ATEL. The tentative decision will be included in a draft NPDES permit that is placed on public notice for a 30-day public comment period. The public notice will provide the proposed ATEL and the limitations that would have been required otherwise. A public hearing may be requested during the 30 day comment period.

7. IDEM will respond to all comments received during the 30 day comment period and from a public hearing, if applicable, and make a final decision regarding the ATEL. The final decision regarding the ATEL will be included in the final NPDES permit with the opportunity to appeal the final decision during the 18 day appeal period after the final permit is issued.

6.3.2 Clean Water Act Section 316(b) Cooling Water Intake Structure(s) (CWIS)

A. <u>Introduction</u>

In accordance with 40 CFR 401.14, the location, design, construction and capacity of cooling water intake structures of any point source for which a standard is established pursuant to section 301 or 306 of the Act shall reflect the best technology available for minimizing adverse environmental impact.

The EPA promulgated a CWA section 316(b) regulation on August 15, 2014, which became effective on October 14, 2014. 79 Fed. Reg. 48300-439 (August 15, 2014). This regulation established application requirements and standards for cooling water intake structures. The regulation is applicable to point sources with a cumulative design intake flow (DIF) greater than 2 MGD where 25% or more of the water withdrawn (using the actual intake flow (AIF)) is used exclusively for cooling purposes. The regulation establishes best technology available standards to reduce impingement and entrainment of aquatic organisms at existing power generation and manufacturing facilities.

Impingement is the process by which fish and other aquatic organisms are trapped and often killed or injured when they are pulled against the cooling water intake structures (CWIS's) outer structure or screens as water is withdrawn from a waterbody. Entrainment is the process by which fish larvae and eggs and other aquatic organisms in the intake flow enter and pass through a CWIS and into a cooling water system, including a condenser or heat exchanger, which often results in the injury or the death of the organisms (see definitions at 40 CFR § 125.92(h) and (n)).

The USS Gary facility withdraws water for their process and cooling water needs through five separate intakes. Three of the intakes are located in the ore loading slip area (Pump Station No. 1, Pump Station No. 3 and Pump Station No. 4), one intake is located at the mouth of the ore loading slip in Gary Harbor (Pump Station No 2) and one intake is located approximately 3000 feet offshore in Lake Michigan (Lakeside Intake). See Appendix D – Figures 1, 2 and 3 for site location maps.

The design intake flow (DIF) for the entire USS Gary facility is 1128 MGD. Approximately 86% (east side plant operations) and 65% (west side plant operations) of the intake water is used for cooling purposes. Therefore, since the facility has a DIF greater than 2 MGD, and because the percentage of flow used at the facility exclusively for cooling is greater than 25%, the facility is required to meet the BTA standards for impingement and entrainment mortality, including any measures to protect Federally-listed threatened and endangered species and designated critical habitat established under 40 CFR 125.94(g).

The actual intake flow (AIF), as defined under 40 CFR 125.92(a), is the average volume of water withdrawn on an annual basis by the cooling water intake structures over the past five years. The DIF and AIF for each intake are shown in the Table below. The average actual intake flow for the entire facility over this period is 468 MGD.

USS Gary Works – Design Intake Flow (MGD) and Actual Intake Flow (MGD)

Intake Name	Intake Description	Design Intake Flow (MGD)	Actual Intake Flow (MGD)
Pump Station No.1	Iron/Steel Making	424	188
Pump Station No. 2	Iron/Steel Making	372	214
Pump Station No. 3	Emergency Backup for Pump Station No. 4	60	0
Pump Station No.4	Sinter Operation	5	11
Lakeside	Hot Roll/Finishing	266	55
	Totals:	**1128**	**468**

- AIF based on flows from calendar years 2015 through 2019
- DIF based on pump capacity
- The No. 4 Pump Station design intake flow or DIF is currently 5 MGD. The replacement of pumps to reduce the capacity at this intake occurred in June 2017. The AIF is defined as the "average volume of water withdrawn on an annual basis by the cooling water intake structures over the past five years." As such the No. 4 Pump Station AIF exceeds the current DIF.

As an existing facility with a DIF greater than 2 MGD and because the AIF is greater than 125 MGD, the permittee was required to submit the application information required by 40 CFR § 122.21(r)(2) through (r)(13). The permittee submitted a complete 316(b) application with its May

2020 NPDES renewal application (U.S. Steel. 2020. Application for Renewal of NPDES Permit No. IN0000281. Prepared by Ramboll.) The permittee's 316(b) application was presented in three parts, 40 CFR § 122.21(r)(2) through (r)(8), 40 CFR § 122.21(r)(9) through (r)(12), and 40 CFR § 122.21(r)(13).

The regulation also established requirements that build on existing CWA requirements to coordinate with the U.S. Fish and Wildlife Service prior to issuing NPDES permits. Pursuant to 40 CFR 125.98(h), upon receipt of an NPDES permit 316(b) application for an existing facility subject to the rule, the Director (IDEM) must forward a copy of the 316(b) application to the appropriate Field Office of the U.S. Fish and Wildlife Service for a 60-day review. A copy of this application was sent to the Bloomington Field Office of the U.S. Fish and Wildlife Service on June 11, 2020. A response was received from Mr. Daniel W. Sparks of the U.S. Fish and Wildlife Service on September 21, 2020 which is discussed in the sections below.

Much of the factual and narrative information presented below was taken, sometimes directly, from the permittee's 2020 Clean Water Act 316(b) application submitted with the 2020 NPDES renewal application.

This application is available from IDEM. After the permit is issued, the 2020 renewal application, including the 2020 316(b) application will be included in IDEM's virtual filing cabinet with the issued permit.

B. <u>Facility and Cooling Water Intake Structure (CWIS) Description</u>

As discussed in the Introduction section above, the USS Gary facility withdraws water for their process and cooling water needs through five separate intakes. Three of the intakes are located in the ore loading slip area (Pump Station No. 1, Pump Station No. 3 and Pump Station No. 4), one intake is located at the mouth of the ore loading slip in Gary Harbor (Pump Station No 2) and one intake is located approximately 3000 feet offshore in Lake Michigan (Lakeside) Intake). See Appendix D – Figures 1, 2 and 3 for site location maps.

<u>Cooling Water Intake Structure Descriptions</u>

A narrative description of each intake is provided below. Engineering drawings of each intake are provided in the 316b application materials.

1. The No. 1 Pump Station (No. 1 PS) intake is located on the west side of the vessel slip about 2,500 feet south from the slip mouth supplying water to the iron and steel making operations. Water is withdrawn through an intake consisting of two openings of approximately 10 feet (ft) in diameter. Each intake opening is capped with trash bars that are spaced approximately 6 inches apart. No. 1 PS is located approximately 600 feet directly west of the vessel slip bank with the intake channel piping running under the ore yard and blast furnace operation areas. The pump station pumps are protected from debris by a series of fifteen vertical traveling screens, twelve of which are currently in operation. The traveling screens have debris trays that are vertically spaced approximately every 2 ft., span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. Eleven of the operating traveling screens and one of the out-of-operation screens are of 0.250-inch mesh and one remaining operating screen and two stand-by screens have 0.125-inch mesh. The debris trays for each screen are emptied into a common trough, which is located near the top of the

screen, during the screen wash operating cycle. The appropriate distance from the screen bottom up to the water surface is 12.5 ft. The approximate distance from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough is about 15 ft. The trough gradually slopes to a discharge pipe, where it further slopes to two retaining baskets roughly 6 ft high by 5.5 ft wide by 3 ft deep. The remaining water from the No. 1 Pump Station trough is discharged back to the intake bays in front of the traveling screens. The existing infrastructure does not currently support discharge of return water back to the Gary Harbor Slip.

2. The No. 2 Pump Station (No. 2 PS) intake is located on the west side of the vessel slip mouth of Gary Harbor also supplying water to iron and steel making operations. Water is withdrawn through an intake consisting of two 10 ft. by 20 ft. openings. Each of the intake openings are capped with trash bars that are spaced approximately 6 inches apart. No. 2 PS is located approximately 60 feet from the pump station intake. The pump station has a total of seven traveling screen bays, six of which have vertical traveling screens installed. Four vertical traveling screens are currently in operation. The traveling screens have debris trays that are vertically spaced approximately every 2 ft., span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. Three of the 4 operating traveling screens and one of the out-of-operation screens are constructed of 0.250-inch mesh. The remaining operating screen and one out-of-operation screen are constructed of 0.152-inch mesh. The debris trays for each screen are emptied into a common return trough, which his located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 10 ft, and about 18 ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, where it further slopes back to the Gary Harbor Slip.

3. The No. 3 Pump Station (No. 3 PS) intake is located on the southeastern corner of the ore yard loading slip and is currently not in operation. No. 3 PS previously supplied water to coke making operations which were decommissioned on March 30, 2015. This pump station now serves as an emergency spare to support No. 4 PS if issues occur and has not operated since September 2014. Water is withdrawn through a concrete intake conduit via three 10 ft diameter intake openings. Each of the intake openings are capped with bars that are spaced approximately six inches apart. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through the traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility uses No. 3 Pump Station is located immediately adjacent to the intake. The pump station has a total of three traveling screens, all of which are currently not in operation. Similar to the No. 1 and No. 2 Pump Stations screens, the traveling screens have debris trays that are vertically spaced approximately every 2 ft, span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. The three traveling screens are constructed of 0.138-inch mesh. The debris trays for each screen are emptied into a common return trough, which is located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 11 ft, and about 12 ft from the water surface to the top of the traveling screens

just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, where it further slopes back to the Gary Harbor Slip.

4. The No. 4 Pump Station (No. 4 PS) intake is located on the eastern side of the ore yard loading slip and currently supplies water to sintering operations. No. 4 Pump Station previously supported coke making operations, and similar to No. 3 Pump Station, once coke making operations were decommissioned in March 2015 the water demand for this intake decreased. Water is withdrawn through a concrete intake conduit via two intake openings of approximately 10 feet in diameter. Each of the intake openings is capped with bars that are spaced approximately six inches apart. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through the traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility uses. No. 4 Pump Station is located about 165 ft from the ore yard slip bank. The pump station has a total of five traveling screen bays, four of which have traveling screens installed. Of the four traveling screens, three are currently in operation. The debris trays for each screen are emptied into a common return trough, which is located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 10.5 ft, and about 25 ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, which drops about 5 ft, to another pipe, where it further slopes back to the Gary Harbor Slip.

5. The Lakeside Pump Station (LS PS) intake is located approximately 3,000 ft. off-shore at a depth of approximately 28 ft. Water is withdrawn through an intake crib and conduit located about 6 feet above the lake bed. The Lakeside pump station is located along the shore of Lake Michigan on the northwest side of the Plant. The LS PS pumps are protected from debris by four vertical traveling screens, all of which are currently in operation. The traveling screens have debris trays that are vertically spaced approximately every 2 ft., span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. Two of the 4 traveling screens are constructed of 0.4-inch mesh with the other 2 constructed of 0.188-inch mesh. The debris trays for each screen are emptied into a common return trough, which is located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 12 ft, and about 20 ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, where it further slopes back to Lake Michigan in the vicinity of the pump station intake bay.

Facility Operation and Water Reuse/Reduction

Operations at the facility are continuous with intakes operated 24 hours per day, 7 days per week with the exception of Pump Station No. 3. Pump Station No. 3 is used as a backup for Pump Station No 4 and has not operated since September 2014.

Gary Works typically operates at roughly 50% of the DIF. In addition, a trend of relatively consistent water withdrawal since 2016 has been observed with minimal seasonal fluctuations.

The most notable change in intake flows is observed at No. 4 Pump Station. In August 2014, use of No. 4 Pump Station decreased following the decommissioning of the coke batteries in March 2015 and subsequent shutdown of cooling water to the Coke and Chemicals By-Product operations in August 2015. To accommodate these changes, lower capacity pumps were installed at No. 4 Pump Station in summer of 2017.

The USS Gary facility has also completed water reduction/reuse/optimization efforts throughout the facility both in primary operations (East Side) and finishing operations (West Side). This is reflected in the AIF compared to DIF.

The East Side operates various cooling water systems for water recirculation/reuse at the facility. Both process wastewater and cooling water are treated for reuse on the East Side. The main process wastewater treatment and reuse systems include the Blast Furnace Gas Cleaning System, No. 1 BOP Gas Cleaning System, and No. 2 QBOP Gas Cleaning System. These systems treat process wastewater for solids removal prior to cycling through a cooling tower for reuse within the process. The cooling water reuse systems include the No. 2 QBOP Hood Cooling Water System (closed recirculation design equal to 40,000 gpm = 57.6 MGD), No. 2 Caster Mold Water Cooling Water System (closed recirculation design equal to 5,730 gpm = 8.3 MGD), and No. 2 Caster Internal Machine Cooling Water System (two cell cooling tower designed for 7,842 gpm per cell equal to a total of 22.6 MGD). The recirculation systems for cooling water reuse total approximately 88.5 MGD.

The West Side operates various cooling water systems for water recirculation/reuse at the facility. The most prominent water recycle facility on the West Side is the 84” Hot Strip Mill Recycle System. This system treats process wastewater for oil, grease, and solids removal prior to cycling through a cooling tower for reuse within the process. The cooling tower contains five cells (200A/B/C/D/E) each sized for 26,000 gpm, totaling a recirculation capacity of 187 MGD.

Operation of the above water reuse and optimization systems reduce the number of organisms impinged and entrained by reducing intake volumes. Additionally, the Lakeside Pump Station intake is submerged and located off-shore away from spawning areas which will also reduce the level of impingement and entrainment.

<u>Intake Flows, Velocity of Intake Flows Through Submerged Intake Openings, Velocity of Intake Flows Through Traveling Screens and Area of Influence</u>

The Area of Influence (AOI) is that portion of water subject to the forces of the intake structure such that a particle within the area is likely to be pulled into the intake structure. The extent of the AOI is generally interpreted as an area delineated by the 0.5 fps velocity contour extending out from the CWIS. Impingement studies have shown that organisms can usually swim away from intake screens at velocities less than 0.5 fps. While low intake velocities will reduce levels of impingement, they do not generally affect entrainment rates of smaller non-motile organisms such as eggs and larvae.

Under the regulations, there are two velocities that are used in the BTA standards for impingement mortality. The through-screen design intake velocity and the through-screen actual intake velocity.

The through-screen design intake velocity is the maximum design intake velocity as water passes through the structural components of a screen measured perpendicular to the screen mesh. The maximum velocity must be achieved under all conditions, including during minimum ambient source water surface elevations (based on Best Professional Judgement (BPJ) using hydrological data) and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure.

The through screen actual intake velocity is the maximum through-screen intake velocity as water passes through the structural components of a screen measured perpendicular to the screen mesh. The maximum velocity must be achieved under all conditions, including during minimum ambient source water surface elevations (based on best professional judgment using hydrological data) and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure. The Director may authorize the owner or operator of the facility to exceed the maximum velocity at an intake for brief periods for the purpose of maintaining the cooling water intake system, such as backwashing the screen face.

A summary description of each intake including intake flows, velocity through the submerged intake openings and also through the traveling screens at each intake are summarized in the Table below. USS did not evaluate how far from each intake structure or traveling screen the 0.5 fps velocity contour extends. The design intake velocities in the below table are the through-screen design intake velocities as described under the regulations. However, the velocities provided at the monthly average intake flow are for reference and not the through-screen actual intake velocities that are described in the regulations.

USS Gary Intake Description, DIF, AIF and Velocity Through Submerged Intake Openings and Traveling Screens						
Intake	**Intake Water Primary Use**	**Description of Submerged Intake Opening**	**DIF (MGD)**	**AIF (MGD)**	**Velocity Through Submerged Intake Openings at DIF and 2019 Monthly Average Intake Flows (MAIF) (fps)**	**Velocity Through Traveling Screens at DIF and 2019 Monthly Average Intake Flows (MAIF)(fps)**
PS No. 1	Iron/Steel Making	Two Openings – Each 10 ft Diameter	424	188	DIF – 4.9 MAIF – 1.9 to 2.2	DIF – 1.44 to 1.71 MAIF – 0.56 to 0.77
PS NO 2	Iron/Steel Making	Two Openings – Each 10 ft by 20 ft	372	214	DIF –1.7 MAIF – 0.95 to 0.98	DIF – 2.41 to 2.97 MAIF – 1.40 to 1.71
PS No 3	Emergency Backup PS No 4	Three Openings – Each 10 ft Diameter	60	0	DIF – 0.47	DIF – 0.47 to 0.54
PS No 4	Sinter Operations	Two Openings – Each 10 ft Diameter	5	11	DIF – 0.06 MAIF – 0.04	DIF – 0.09 to 0.11 MAIF – 0.07 -0.08
Lakeside	Hot Roll/Finishing	Fourteen Openings Each 14.3 ft Diameter	266	55	DIF 0 0.21 MAIF – 0.04 to 0.05	DIF – 1.39 to 1.65 MAIF – 0.26 to 0.31
		Totals:	1127	468		

- AIF – Actual Intake Flow Based on flows from 2015-2019.
- DIF – Design Intake Flow based on pump capacity
- MAIF – Monthly Average Intake Flows for 2019
- Submerged Intake and Traveling Screen Velocity are Variable Due to Fluctuations in Lake Michigan Water Levels and Variability in Monthly Average 2019 Intake Flows
- The No. 4 Pump Station design intake flow or DIF is currently 5 MGD. The replacement of pumps to reduce the capacity at this intake occurred in June 2017. The AIF is defined as the "average volume of water withdrawn on an annual basis by the cooling water intake structures over the past five years." As such the No. 4 Pump Station AIF exceeds the current DIF.
- MGD – million gallons per day
- fps – feet per second
- The velocity through traveling screens at the DIF was calculated using 2019 lake levels.

Based on the Table above, intake velocities are greater than 0.5 fps through both the submerged intakes and traveling screens at PS No 1 and PS No 2 for both DIF and the 2019 Monthly Average Intake Flows. Consistent with these higher intake velocities, impingement studies (see details below) observed significant numbers of fish impinged at PS No 1 and PS No 2.

At PS No 3, which is used only for emergency backup and which has not been used since 2014, velocity through both the submerged intake and traveling screens is 0.54 fps at the DIF.

Intake velocities at both the submerged intake openings and traveling screens are well below 0.5 fps at PS No 4 for the DIF.

The intake velocity at the submerged intake in Lake Michigan for the Lakeside PS indicates velocities significantly under 0.5 fps (0.21 fps) even at the DIF. Intake velocities through the Lakeside Traveling Screens were also calculated to be below 0.5 fps based on the 2019 monthly average intake flows and water elevation of Lake Michigan. It should be noted, however, that through-screen velocities at the Lakeside PS would be above 0.5 fps at intake flows observed in earlier years. Also, as explained above, monthly average flows would not be used to determine the through screen actual intake velocity.

USS is further investigating whether operations would allow USS to permanently maintain an intake flow and through screen actual intake velocity under 0.5 fps at the Lakeside Intake.

Impingement studies at the Lakeside Intake (see below) showed significant numbers of yellow perch impinged at the Lakeside PS traveling screens. This indicates fish may be drawn into the current offshore intake despite the low velocity at the submerged intake openings and subsequently become entrapped at the onshore traveling screens. Debris and fish washed off the traveling screens are returned to Lake Michigan. Data on percent mortality of impinged fish was collected for the Lakeside Intake and are presented in the 316b application. Survival rates of impinged fish ranged from approximately 10% survival to 70% survival. The traveling screens at the Lakeside Intake, as currently designed, do not meet the requirements of a fish friendly return system described in the federal rules as a compliance option for impingement.

C. <u>Source Water Biological Characterization</u>

<u>Lake Michigan and Lakeside Intake:</u> The Lakeside Pump Station is situated along the southern shore of Lake Michigan on U. S. Steel property with an intake structure positioned offshore a distance of 3,000 feet and at a lake depth of 28 feet. This area receives minimal commercial boat or ship traffic and is subject to occasional recreational boat activity. Bottom substrates for this portion of the southern shoreline of Lake Michigan consist of sand, the surface of which is unconsolidated and is constantly disrupted by surface wave energy. No critical or significant habitats have been identified in the area of the intake structure.

<u>Gary Harbor and Ore Loading Slip Intakes:</u> Pump Station No. 2 is located at the mouth of the ore loading slip in Gary Harbor. No. 1 Pump Station, No. 3 Pump Station and No. 4 Pump Station are located along the ore loading slip of Gary Harbor extending inland from the shore of Lake Michigan/Gary Harbor onto U. S. Steel property. The ore loading slip is approximately 5,800 feet long and ranges in depth from less than 25 feet near the walls to over 31 feet below low water datum1 in the middle of the channel. Ship activity in the ore loading slip averages one to two ships at a time and an average in-port dock time of 10 hours. Dredging activity for navigational purposes occurs within the slip on an intermittent basis as needed. Therefore, the physical habitat of Gary Harbor, the ore loading slip, and the turning basin is maintained for navigational purposes and is not considered a critical/significant habitat for reproduction or growth of resident species present in the Southern Basin of Lake Michigan.

Species Abundance and Susceptibility to Impingement and Entrainment

Numerous studies (cited in Section D, below) have been performed to characterize fish assemblages in the nearshore area of southern Lake Michigan both by the USS Gary facility and other nearby industrial facilities with cooling water intakes on the southern shore of Lake Michigan.

Overall conclusions from the above referenced studies suggest Yellow Perch, Round Goby, Alewife, Gizzard Shad and Spottail Shiner are the most prevalent species in the vicinity of the intake structures.

A study conducted by Ball State University that focused on yellow perch in the Indiana waters of Lake Michigan also provides some information on the near-shore fish community (Lauer and Doll. 2007. Final Project Report: Dynamics and Models of the Yellow Perch in Indiana Waters of Lake Michigan and Near-Shore Fish Community Characteristics. Final Report for 2000-2006. Submitted to Indiana DNR.). In this study, 19 non-salmonine fish species were collected by trawling at three locations in near-shore waters. Overall, Spottail Shiners was the most abundant species and contributed to 45 percent of the total catch, followed by Yellow Perch (24%), Alewife (19%), and Round Goby (11%). Gill netting collected 12 non-salmonine species with Yellow Perch dominating (83%-95%) of the catches from 2000-2006; other species each accounted for less than 1% of the total.

In the final rule, EPA adopted the term "fragile species" which were designated as those species of fish and shellfish that are least likely to survive any form of impingement with an impingement survival rate of less than 30 percent. This approach was used to ensure that biological data would reflect only the effects of a facility's improvements to the CWIS technology, and not be confounded by effects of data collection (i.e. fish handling) that are not caused by impingement. Based on the listing of known fragile species provided in §125.92(m), three fragile species were encountered at each of the pump stations: alewife, gizzard shad, and rainbow smelt. These fragile species account for 62%, 50% and 6% of the total fish impinged at No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station respectively.

U. S. Steel also encountered one prevalent nuisance species (round goby) during biological monitoring which accounted for 2%, 3% and 40% of the total fish impinged at No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station respectively. IDNR considers round goby a nuisance species. U.S. Steel is requesting, and IDEM concurs, that round goby be defined as nuisance species for U.S. Steel presentation of impingement and entrainment performance of their intakes.

Impacts from cooling water intakes are more likely to affect pelagic species or life stages of aquatic organisms. These typically are eggs, larvae and juveniles of various species and typically include fragile species.

Based on the species encountered during the environmental field studies discussed previously and presented in more detail below, the species most likely to be impacted by impingement and entrainment at USS Gary include Alewife, Spottail Shiner, Round Goby, Gizzard Shad, and Yellow Perch.

D. Impingement and Entrainment – Aquatic Life Studies

Impingement:
Studies to characterize numbers and species of organisms impinged have been conducted at the U.S. Steel Gary Works and ArcelorMittal Indiana Harbor facilities. The ArcelorMittal facilities withdraw water from the same general area in Lake Michigan as USS Gary Works.

Results of the impingement studies at the USS Gary Works facility indicate significant numbers of fish impinged – most importantly the sport fish yellow perch. Yellow perch were impinged primarily at the Pump Station No. 1 Intake located on the ore loading slip but also at the Lakeside intake which pulls water from an offshore intake crib. The numbers of impinged fish varied significantly by season and year sampled.

Results of the USS Gary Works and ArcelorMittal impingement studies are summarized in more detail below.

ArcelorMittal Indiana Harbor 316(b) Species and Relative Abundance Data
Impingement studies were conducted at the ArcelorMittal Indiana Harbor East (IHE) and West (IHW) facilities from June 2013 through May 2015. For the IHW intakes, withdrawal is via several pump houses located near-shore. For the IHE facility, withdrawal is either via the No. 2E Pumphouse that withdraws water from the Main Intake via a subterranean tunnel located approximately 1,280 feet off-shore, or via No. 7E Pumphouse from near-shore intake bays. The IHE No. 2E Pumphouse is most similar to the Whiting Refinery intakes based on the offshore location.

During the sampling period at the IHE facility, there were 9 different species impinged (Yellow Perch, Gizzard Shad, Round Goby, Spottail Shiner, Salmonidae, Shiner, Walleye, Green Sunfish, Bullhead Minnow, unidentifiable, mussels).

No species of special concern were impinged at IHE; however, there were several species of sport fish impinged, including Yellow Perch and Walleye. Yellow Perch, Gizzard Shad, and Salmonidae were the most frequently impinged fish species at IHE, accounting for 64.1%, 4.8%, and 4.5% of the total impinged fish sample respectively (ArcelorMittal USA. 2016. ArcelorMittal Indiana Harbor East Entrainment and Impingement Study. Summary Report. Prepared by Tetra Tech).

ArcelorMittal Burns Harbor 316(b) Species and Relative Abundance Data
Impingement studies were conducted at the ArcelorMittal Burns Harbor facility (BH) from June 2012 through May 2014. For BH, withdrawal is via two pump stations that withdraw water from Lake Michigan via two intake cribs located approximately 3,600 feet off-shore in about 40 feet of water. The DIF for both pump stations is 748.8 MGD.

During the sampling period at the BH pump stations, there were 11 different species impinged (alewife, round goby, yellow perch, smallmouth bass, bluegill, emerald shiner, spottail shiner, gizzard shad, rainbow smelt, burbot, unidentifiable). No species of special concern were impinged at the BH pump stations; however, there was one sport fish species impinged (yellow perch). Yellow perch, round goby, alewife, and spottail shiner were the most frequently impinged fish species at the BH pump stations, accounting for 39.8%, 31.3%, 18.9%, and 6.7% of the total impinged fish sample respectively (ArcelorMittal USA. 2015. 316(b) Cooling Water Intake Structures 2012-2014 Impingement and Entrainment Study Results NPDES Permit IN0000175. Prepared by ENVIRON International Corporation).

USS Gary Impingement Studies
Pursuant to the previous NPDES Permit No. IN0000281 (effective March 1, 2010), U. S. Steel was required to conduct scientifically valid monitoring studies to further characterize the nature and extent of the environmental impacts from the cooling water intake structures.

The studies included monitoring for both impingement and entrainment for the years 2011 through 2015.

Impingement monitoring was required at No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station, while entrainment monitoring was only required at No. 1 Pump Station and Lakeside Pump Station (see entrainment section below).

Initial sampling periods were scheduled every other week during the peak spawning months of March through May and October through November, and once a month during June through September, and December. Studies were abbreviated in 2015 with the agreement of IDEM due to the promulgation of the final federal 316(b) rule which eliminated the need for the final year of monitoring.

At No. 1 Pump Station the three most abundant species encountered were gizzard shad, yellow perch, and alewife respectively accounting for a combined 92.1% of the total abundance. Total richness observed at No. 1 Pump Station from 2011 through 2015 was 41 species with the peak spawning periods resulting in the greatest abundance in April and November. More detail available in Table 7 of the 40 CFR 122.21(r)(2) – (r)(8) report submitted with the NPDES application.

Likewise, observations at No. 2 Pump Station found the same three species to be the most abundant, but in a modified order: yellow perch, alewife, and gizzard shad respectively, making up a combined 89.1% of the total abundance. Total richness observed at No. 2 Pump Station over the four-year monitoring period was 26 species with peak spawning periods resulting in the greatest abundance in May/June and October/November. More detail is available in Table 8 of the 316(b) 40 CFR 122.21(r)(2) – (r)(8) report submitted with the NPDES application.

At Lakeside Pump Station, the three most abundant species encountered were yellow perch, round goby, and alewife respectively. These three species accounted for 95.7% of the total abundance. Total richness observed at Lakeside Pump Station over the four-year monitoring period was 20 species with peak spawning periods resulting in the greatest abundance in April, June, and November. More detail available in Table 9 of the 40 CFR 122.21 (r)(2) – (r)(8) report submitted with the NPDES application.

Charts 6, 7 and 8 from the 40 CFR 122.21(r)(2) – (r)(8) report submitted with the NPDES application provide estimated annual impingement totals by year and species for PS No 1, PS No 2 and Lakeside Intakes based on the sampling conducted. These charts are attached as Appendix B for reference.

Entrainment:

Entrainment studies have been conducted at USS Gary as well as several other nearby facilities. The results of those studies indicate that for the volume of water used by these facilities, there were relatively small numbers of organisms entrained by their offshore intakes. Distance of intakes from shore of some intakes and lack of habitat likely contributed to the smaller number of organisms entrained.

Studies at USS Gary showed that entrainment of fish larvae and eggs was sporadic and relatively rare at Gary Works during the permit required monitoring beginning in mid-2011 through 2014.

- No. 1 Pump Station documented no entrainment in 85% of sample events (66 events total)
- Lakeside Pump Station documented no entrainment in 82% of sample events (66 events total). Additionally, when ichthyoplankton were present taxonomic classification indicated *Neogobius melanostomus* (Round Goby), a common invasive nuisance species present in Lake Michigan.

Based on the entrainment sampling done at the USS Gary facility, entrainment at Lakeside Pump Station was measurably lower than No. 1 Pump Station. This is likely due to the configuration of the submerged, offshore intake crib at Lakeside Pump Station versus the shoreline withdrawal at No. 1 Pump Station. The round goby accounted for a large portion of the species fraction at Lakeside Pump Station versus the other shoreline intake. The round goby is a benthic foraging and spawning species, and is likely colonizing the offshore crib at the Lakeside intake.

Based on the studies from the USS Gary study as well as other nearby Lake Michigan facility studies, it appears that entrainment impacts from operation of the USS Gary facility are not significant in terms of numbers or species entrained as well as impacts on the nearby ecosystem.

Results of the USS Gary and Arcelor Mittal entrainment studies are summarized in more detail below.

ArcelorMittal Burns Harbor

Concurrently with impingement studies, entrainment characterization studies were performed over a two-year period from 2012 to 2014. The BH pump stations withdraw water from Lake Michigan via two intake cribs located approximately 3,600 feet off-shore in about 40 feet of water, with a total DIF of 748.8 MGD.

Entrainment samples were collected during 32 sample events over a 24-month period from June 2012 to May 2014. Samples were collected more frequently during peak spawning months (February – May and October – November).

The results of the 32 entrainment sampling events found no fish larvae and/or eggs in over 80 percent of all sampling events at both pump stations. Subsequently, the total daily entrainment estimates of ichthyoplankton varied radically from 0 to 132,000 larvae and/or eggs per day.

Round goby larvae accounted for the majority of fish larvae entrained. The only other identified larvae were alewife from two sampling events at one of the pump stations. Fish eggs accounted for roughly two thirds of all ichthyoplankton entrained, but because they were only identified to the class or family level, no further assessment was possible. However, given the significant numbers of alewife found in the impingement data, it is assumed that the majority of the eggs are associated with alewife (ArcelorMittal 2015).

Given the high percentage of samples with no entrained ichthyoplankton, and with most of the positive samples being dominated by round goby larvae, the impact due to entrainment is considered negligible for AMBH.

ArcelorMittal Indiana Harbor

The IHE has one off-shore intake that withdraws water from Lake Michigan via the Main Intake and Pumphouse 2E. The total DIF for the Main Intake is 1152 MGD. During the IHE 2E Pumphouse sampling, entrainment samples were collected monthly or twice monthly over the two-year period per the sampling plan at the 7E and 2E intakes. Sample events spanned periods both with and without chlorination for mussel control. Water volume of entrained samples averaged 122 cubic meters. The results of 32 events found no fish/larvae or eggs in the majority of sampling events. Only one fish, all of the same species, (slimy sculpin) was entrained during the sampling period (ArcelorMittal 2016).

U.S. Steel Midwest

The USS Midwest Plant operates a cooling water intake structure (CWIS) at the Portage facility which is located approximately 2,800 feet offshore at a depth of roughly 30 feet (U.S. Steel. 2015b. United States Steel Corporation Impingement and Entrainment Study. Prepared by Ramboll Environ). No screens are present at the Midwest CWIS. Intake flows for this pump station average approximately 50 MGD. Entrainment samples were collected during 32 sample events over a 24-month period from June 2012 to May 2014. Samples were collected every other week during peak spawning months (March – May and October – November) and once a month during February, June – September.

Of the 32 sample events, 28 did not indicate the presence of any ichthyoplankton. Projections of ichthyoplankton per 24-hours ranged from 58 to 1,121. For Sample Events #1 - #16, the annual projection of ichthyoplankton entrained was 15,667, and for Sample Events #17- #32 the projection was 26,900. These projections are a combination of fish eggs and larvae collected, which includes Actinopterygii (ray-finned fishes Class), Gobidae juveniles, and Round Goby adults). Zooplankton (not identified to species) were present during all but one sample event, while the appearance of mussel veligers was more inconsistent. No threatened or endangered species were encountered; nor were there any species on the Indiana Department of Natural Resources list of species of concern collected during sampling.

The results of entrainment sampling and the subsequent data evaluation demonstrate that entrainment of critical fish eggs, larvae, and other valued ichthyoplankton by the Midwest Plant CWIS and equipment is likely negligible. This is likely due to a variety of factors, including the fact that coastal shoreline fish assemblages in the vicinity of the Midwest Plant and the available habitat in the vicinity of the Midwest CWIS intake crib is limited. Moreover, the distance of the intake crib from the shore likely reduces this area of the lake to planktivorous fish. Consequently, the high number of samples with no entrained ichthyoplankton, and the few positive samples dominated by round goby larvae indicate that the impact due to entrainment would be considered negligible (United States Steel Corporation Midwest, 2015).

U. S. Steel Gary Works

Pursuant to the NPDES Permit No. IN0000281 (effective March 1, 2010) Part III.C.2(a), U. S. Steel was required to conduct scientifically valid entrainment studies at the Lakeside and #2 Pump Stations in two-year periods following Year 1 of the Permit. Due to logistical constraints, entrainment sampling was conducted at No. 1 Pump Station, rather than No. 2 Pump Station. This change in sampling location was reflected in the study plan submitted to IDEM.

Entrainment characterization studies were conducted in the second half of 2011, 2012, 2013, and 2014 at the U. S. Steel Gary Works site, but were suspended in 2015 following a March 24, 2015 email from the Indiana Department of Environmental Management, stating that sampling could be stopped.

Under the federal regulations, an existing facility that withdraws greater than 125 MGD Actual Intake Flow (AIF), as does USS Gary, must develop for submission to the Director an *Entrainment Characterization Study* that includes a minimum of two years of entrainment data collection. The Entrainment Characterization Study conducted pursuant to the 2010 NPDES permit, is accepted by IDEM as meeting the requirements of the rule.

Entrainment sample analysis focused on identification to the lowest practical taxonomic classification and enumeration of fish larvae/juveniles, fish eggs, mussel veligers, and immature mussels. Invertebrate forms of plankton that were noted included bivalve veligers and copepods as either present or absent.

Ichthyoplankton were fairly rare (although invertebrate forms were observed in most samples). A certain degree of seasonality was observed during entrainment sampling. Ichthyoplankton, when encountered, were typically identified as present during the spring and summer months. Entrainment typically occurred in June, July, and August at both No. 1 Pump Station and Lakeside Pump Station.

Raw data, daily entrainment estimates, and annualized totals are shown for each pump station in Tables 2 through 10 in the NPDES Permit Application 40 CFR 122.21(r)(9) – (r)(12) report. The annualized entrainment estimate for the facility by species and life stage with (Table 11) and without Round Goby (Table 12) is also provided in the NPDES Permit Application 40 CFR 122.21(r)(9) – (r)(12) report. Table 10 from the same report provides annualized entrainment data but only for the Lakeside Intake.

Tables 10. 11 and 12 are also attached as Appendix D.

E. Protected Species Susceptible to Impingement and Entrainment

The Final Rule requires that facilities identify all federally listed threatened and endangered species and designated critical habitat that are present in the "action area." The "action area," as defined by the U.S. Fish and Wildlife Service (USFWS) under Section 7, includes all areas that may be directly or indirectly affected by the operation of a facility's CWIS and not merely the immediate area involved in the action; this is because the USFWS consider that the effects of CWIS can extend well beyond the footprint of the CWIS.

There are no known federally listed threatened or endangered (T&E) aquatic species in the vicinity of the intakes that may be susceptible to impingement and entrainment.

However, Lake Sturgeon (*Acipenser fulvescens*) is listed as a state Endangered Species and is identified on IDNR's Wildlife Action Plan. One tagged adult Lake Sturgeon was found during the 2011 316(a) Demonstration conducted by the BP Whiting refinery, at a location east of the Whiting Refinery Intakes (EA Engineering, Science and Technology. 2012. Final 316(a) Demonstration for the BP Whiting Refinery). IDNR also reports catches of Lake Sturgeon at several locations in southern Lake Michigan. It is possible, based on the reported catches and habitat preferences of Lake Sturgeon that they could be found near the USS CWIS Intakes.

In addition, Trout-perch (*Percopsis omiscomaycus*) and Slimy Sculpin (*Cottus cognatus*), both being State Species of Concern, have been identified in 316(b) impingement studies in the area.

IDEM received the following comment on the permittee's 316(b) application from the U.S. Fish and Wildlife Service, Bloomington Field Office on June 11, 2020:

> *"We have no ESA concerns with regard to US Steel's CWIS."*

F. Best Technology Available (BTA) Determinations

Impingement BTA:

Under 40 CFR 125.94(c) existing facilities subject to the rule must comply with one of the following seven BTA Standards for Impingement Mortality:

1. Operate a closed-cycle recirculating system as defined at 40 CFR §125.92;
2. Operate a CWIS that has a maximum design through-screen design intake velocity of 0.5 fps;
3. Operate a CWIS that has a maximum actual through-screen intake velocity of 0.5 fps;
4. Operate an offshore velocity cap that is a minimum of 800 feet offshore;
5. Operate a modified traveling screen that the Director (IDEM) determines meets the definition of the rule (at §125.92(s)) and that the Director (IDEM) determines is BTA for impingement reduction;
6. Operate any other combination of technologies, management practices, and operational measures that the Director (IDEM) determines is BTA for impingement reduction; or
7. Achieve the specified impingement mortality performance standard of less than 24 percent.

Pump Station No. 1 and Pump Station No. 2 Intakes
For Pump Station No 1 and Pump Station No. 2 Intakes, the permittee has proposed to comply with alternative 5, above. Under this alternative, a facility must operate a modified traveling screen that IDEM determines meets the definition at 40 CFR §125.92(s) and that, after review of the information required in the impingement technology performance optimization study at 40 CFR 122.21(r)(6)(i), IDEM determines is the best technology available for impingement reduction at the site. As the basis for IDEM's determination, the permittee must demonstrate the technology is or will be optimized to minimize impingement mortality of all non-fragile species. IDEM must include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

As authorized by 327 IAC 5-2-12, a three-year schedule of compliance has been included in the NPDES permit to allow the permittee time to comply with this requirement to install the modified traveling screens. The permit will also require the permittee to conduct an impingement technology performance optimization study after the modified traveling screens have been installed as required by 40 CFR 125.94(c)(5) in accordance with the specific requirements for such a study detailed under 40 CFR 122.21(r)(6)(i).

Pump Station No. 3 Intake
Pump Station No 3 Intake operates as an emergency backup to the Pump Station No 4 Intake and has not operated since September 2014. Pursuant to 40 CFR 125.94(e)(3)(iv), the federal cooling water intake requirements are not applicable to emergency back-up water flows. Therefore, as long as the use of this intake is limited to emergency backup, the federal regulatory requirements are not applicable to this intake. The permit will include a condition limiting its use to that of an emergency backup for the Pump Station #4 Intake and will require the permittee to notify IDEM whenever this Intake is used.

Pump Station No. 4 Intake
For the Pump Station No. 4 Intake, the permittee has chosen to comply with alternative 2, above. Under this alternative, a facility must operate a cooling water intake structure that has a maximum design through-screen intake velocity of 0.5 feet per second. The permittee must submit information to IDEM that demonstrates that the maximum design intake velocity as water passes through the structural components of a screen measured perpendicular to the screen mesh does not exceed 0.5 feet per second. The maximum velocity must be achieved under all conditions, including during minimum ambient source water surface elevations (based on BPJ using hydrological data) and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure.

Based on the information provided by the permittee, the maximum design intake through-screen intake velocity of this intake is 0.11 feet per second; therefore, IDEM has determined that the permittee does comply with this alternative.

Lakeside Intake
For the Lakeside Intake, the permittee is evaluating the actual intake flows and whether the facility can operate at an intake flow that will result in a maximum actual through-screen intake velocity of 0.5 fps. If so, the permittee proposes to comply with alternative 3, above. Under this alternative, a facility must operate a cooling water intake structure that has a

maximum through-screen intake velocity of 0.5 feet per second. Further, the permittee must submit information to IDEM that demonstrates that the maximum intake velocity as water passes through the structural components of a screen measured perpendicular to the screen mesh does not exceed 0.5 feet per second. The maximum velocity must be achieved under all conditions, including during minimum ambient source water surface elevations (based on best professional judgment using hydrological data) and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure. IDEM may authorize the owner or operator of the facility to exceed the 0.5 fps velocity at an intake for brief periods for the purpose of maintaining the cooling water intake system, such as backwashing the screen face. In addition, the permittee must monitor the velocity at the screen at a minimum frequency of daily. In lieu of velocity monitoring at the screen face, the permittee may calculate the through-screen velocity using water flow, water depth, and the screen open areas.

If the permittee determines that compliance with alternative 3 is not viable, the permittee proposes to comply with alternative 5, above. Under this alternative, a facility must operate a modified traveling screen that IDEM determines meets the definition at 40 CFR §125.92(s) and that, after review of the information required in the impingement technology performance optimization study at 40 CFR 122.21(r)(6)(i), IDEM determines is the best technology available for impingement reduction at the site. As the basis for IDEM's determination, the permittee must demonstrate the technology is or will be optimized to minimize impingement mortality of all non-fragile species. IDEM must include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

As authorized by 327 IAC 5-2-12, a three-year schedule of compliance has been included in the NPDES permit to allow the permittee time to comply with one of these alternatives. Further, within six months of the permit effective date the permittee must submit a plan to IDEM for approval that identifies the chosen method of compliance at this intake, either alternative 3 or 5 above, with all supporting information.

If the permittee choses alternative 3, above, the permit will include an intake velocity limit of 0.5 fps that will be applicable 18 months from the effective date of the permit.

If the permittee choses alternative 5, above, the permit will require the permittee to conduct an impingement technology performance optimization study after the modified traveling screens have been installed as required by 40 CFR 125.94(c)(5) in accordance with the specific requirements for such a study detailed under 40 CFR 122.21(r)(6)(i).

IDEM concurs with the permittee that the alternatives proposed for compliance with the BTA standards for impingement mortality at the Lakeside Intake meet best technology available(BTA).

<u>Entrainment BTA</u>:
For existing facilities, EPA did not identify any single technology or group of technology controls as available and feasible for establishing national performance standards for entrainment. Instead, EPA's regulations require the permitting agency to make a site-specific determination of the best technology available standard for entrainment for each individual facility. *See* 40 CFR § 125.94(d).

EPA's regulations put in place a framework for establishing entrainment requirements on a site-specific basis, including the factors that must be considered in the determination of the appropriate entrainment controls. These factors include the number of organisms entrained, emissions changes, land availability, and remaining useful plant life as well as social benefits and costs of available technologies when such information is of sufficient rigor to make a decision. These required factors are listed under 40 CFR § 125.98(f)(2).

EPA's regulations also establish factors that may be considered when establishing site-specific entrainment BTA requirements, including: entrainment impacts on the waterbody, thermal discharge impacts, and credit for flow reductions associated with unit retirements, impacts on reliability of energy delivery, impacts on water consumption, and availability of alternative sources of water. (*Id*. § 125.98(f)(3))

As the owner/operator of an existing facility that withdraws greater than 125 MGD actual intake flow (AIF) of water for cooling purposes, for the entrainment BTA, the permittee is required to submit to IDEM for review the information required under paragraphs (r)(9), (10), (11), (12), and (13) of 40 CFR 122.21(r). This includes the following:

- Entrainment Characterization Study (§122.21(r)(9))
- Comprehensive Technical Feasibility and Cost Evaluation Study (§122.21(r)(10))
- Benefits Valuation Study (§122.21(r)(11))
- Non-water Quality Environmental and Other Impacts Study (§122.21(r)(12))
- Peer Review (§122.21(r)(13))

In accordance with these requirements, the permittee evaluated the technical feasibility and engineering costs for the implementation of ichthyoplankton entrainment reduction technologies, including conversion to a closed-cycle recirculation system and installation of fine mesh screens. The reuse of existing or nearby wastewater, grey water or municipal water or the use of alternative fresh water sources was determined to be infeasible given the temperature, quality, and flow rate requirements at Gary Works. Technical feasibility defined for the purposes of this evaluation is not a determination of practicality or effectiveness, but rather the ability to design, construct, and operate the technology.

The 40 CFR 122.21(r)(10) and (r)(12) reports quantified social benefits and costs based on a conceptual level design. The total social costs (which included compliance costs, government regulatory costs, power system costs, and applicable environmental externalities) based on present value ranged from $2.40M - $149.38M for closed-cycle recirculating cooling systems (CCRS) and from $0.41M to $22.44M for fine mesh screens (FMS). The associated total benefits based on present value ranged from $10 to $26,918 for CCRS and $0 to $30 for FMS.

As discussed previously, the permittee has also completed water reduction/reuse/optimization efforts throughout the facility both in primary operations (East Side) and finishing operations (West Side).

The East Side operates various cooling water systems for water recirculation/reuse at the facility. Both process wastewater and cooling water are treated for reuse on the East Side. The recirculation systems for cooling water reuse total approximately 88.5 MGD.

The West Side also operates various cooling water systems for water recirculation/reuse at the facility. The most prominent water recycle facility on the West Side is the 84" Hot Strip Mill Recycle System. This system treats process wastewater for oil, grease, and solids removal prior to cycling through a cooling tower for reuse within the process. The cooling tower contains five cells (200A/B/C/D/E) each sized for 26,000 gpm, totaling a recirculation capacity of 187 MGD.

Operation of the above water reuse and optimization systems coupled with closure of the coke batteries in 2015 reduce the number of organisms entrained by proportionally reducing intake volumes. Additionally, the Lakeside Pump Station intake is submerged and located off-shore, away from spawning areas which would also reduce the level of entrainment.

After considering all the factors that must and may be considered by the federal rules (see discussion below), IDEM finds that the existing facility for each intake and facility overall meets the best technology available (BTA) for entrainment mortality. This is primarily based on the following factors:

1. The number and species of organisms projected to be entrained by the facility and limited impact to the ecosystem;
2. The costs and technical difficulties installing CCRS or FMS;
3. The flow reduction/water reuse optimization efforts already implemented at the facility; and
4. The off-shore location of the Lakeside PS intake

Must and May Factor Discussion (40 CFR 125.98(f)(2) and (3))

MUST FACTORS (§ 125.98(f)(2))

i. *Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species, and designated critical habitat (e.g., prey base);*
As discussed previously, entrainment characterization studies from other nearby Lake Michigan facilities with large water intake volumes (i.e., ArcelorMittal Indiana Harbor East, ArcelorMittal Burns Harbor, U. S. Steel Midwest Plant) suggest that entrainment is sporadic and that relatively small numbers of organisms are entrained by facilities with intakes in the area of USS Gary.

The USS Gary entrainment studies also showed that entrainment of fish larvae and eggs was sporadic and relatively rare at Gary Works during the permit required monitoring beginning in mid-2011 through 2014.

- No. 1 Pump Station documented no entrainment in 85% of sample events (66 events total)
- Lakeside Pump Station documented no entrainment in 82% of sample events (66 events total). Additionally, when ichthyoplankton were present taxonomic classification

indicated *Neogobius melanostomus* (Round Goby), a common invasive nuisance species present in Lake Michigan.

Overall, entrainment at Lakeside Pump Station was measurably lower than No. 1 Pump Station. This is likely due to the configuration of the submerged, offshore intake crib at Lakeside Pump Station versus the shoreline withdrawal at No. 1 Pump Station. Round Goby accounted for a large portion of the species fraction at Lakeside Pump Station versus the other shoreline intake. The Round Goby is a benthic foraging and spawning species, and is likely colonizing the offshore crib at the Lakeside intake. USS has excluded Round Goby when quantifying social benefits of proposed entrainment reduction technologies due to it being considered a nuisance species. However, Round Goby have been included in the supporting tables for reference with the understanding they have be excluded for quantifying benefits in the Benefits Valuation Study required by the federal rules.

There are no known federally-listed threatened or endangered (T&E) aquatic species near the intakes that may be susceptible to impingement and entrainment. In addition, there is no federally-listed designated critical habitat in the vicinity of the intakes.

A state-listed endangered species, Lake Sturgeon (Acipenser fulvescens) is listed for Lake County, Indiana and is identified on IDNR's Wildlife Action Plan. One tagged adult Lake Sturgeon was found during the 2011 316(a) Demonstration conducted by the BP Whiting refinery, although it was not at a location in the vicinity of the Whiting Refinery Intakes. IDNR reports several catches of Lake Sturgeon in southern Lake Michigan and it is possible based on the noted catches and habitat preferences of Lake Sturgeon that they could be found near the USS CWIS Intakes.

Based on the above, the IDEM conclusion is that the numbers of organisms entrained by USS Gary is minimal and that impacts on aquatic ecology of the nearshore area are expected to be negligible.

While entrainment impacts are expected to be negligible, the USS impingement studies observed significantly large numbers of the sportfish yellow perch impinged at the Lakeside and ore slip intakes.

ii. Impact of changes in particulate emissions or other pollutants associated with entrainment technologies;

The installation of additional cooling towers would be expected to result in:

- Significant increases in particulate emissions (e.g., PM, PM-10, and PM-2.5) from the cooling towers drift;
- Significant increases in carbon dioxide (CO2) and other criteria air pollutants from the increase in energy required to operate the cooling towers;
- A potential increase of mists, fog, and icing from the cooling towers evaporation plumes impacting facility safety;
- Impacts to nearby vegetation/structures from drift corrosion; and
- An increase in the total dissolved solids (TDS) loading to Lake Michigan due to concentrating pollutants in cooling tower cycles and use of water treatment

additives to control corrosion.

iii. Land availability insofar as it relates to the feasibility of entrainment technology;
Area limitations on the Gary Works site include existing buildings, railroad equipment, access roads, slab storage, piles, and waterways. The continuous operation of the facility relies on optimal ground and marine transportation of raw and processed materials, personnel, and equipment throughout the site.

Selection of siting from unused areas for the proposed new cooling towers, particularly for the larger east cooling tower system, required consideration of the operations and management of the facility. Detailed design would need to be completed to confirm the proposed siting in the conceptual design.

Installation of fine mesh screens can be accomplished through a retrofit at the existing pump stations and does not expand the existing footprint. However, installation of a fish handling and return system at No. 1 and No. 2 Pump Station would impact land availability during excavation/construction by requiring road closures and rerouting.

iv. Remaining useful plant life; and,
USS Gary Works has operated at this location since the early 1900s and plans to continue operations for the foreseeable future.

v. Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.
As noted above, U. S. Steel evaluated the technical feasibility and engineering costs for the implementation of ichthyoplankton entrainment reduction technologies, including conversion to a closed-cycle recirculation system and installation of fine mesh screens.

Conversion to Closed Cycle Recirculation System (CCRS)
Conversion of U.S. Steel's Gary Works integrated steel mill facility to closed-cycle cooling with hybrid cooling capacity is technically feasible but would involve a significant construction project, would impact the operation of the facility, and introduce mechanical and thermal risks to critical infrastructure which is essential to the safety of U.S. Steel employees and the surrounding community. The conceptual design involves two predominantly independent cooling and process water systems (referred to herein as East and West) that would be cooled with the mechanical draft cooling tower systems. During particularly warm periods, each cooling tower system would return cooling and process water at temperatures higher than the historic intake temperature operability limit if operated in a closed-cycle mode. Therefore, a hybrid cooling capacity was integrated into the design, which would result in periods of operation as a partial and once-through cooling system.

Identified risks at this level of conceptual design include:

- A greater quantity of large diameter piping, new booster pumps or a greater quantity of cooling tower cells could be required if a detailed design were to determine that reliability of the facility would be insufficient under reasonable combinations of system requirements and environmental conditions. This would result in an increase in construction costs relative to those quantified during the conceptual design.

- Installation of long runs of buried, large diameter piping from the existing outfalls to the proposed cooling towers would require extensive excavation through areas of the facility which include complex buried utilities, relatively old underground infrastructure, and areas of legacy industrial operations. A detailed review of the piping route has not been completed and would be required.
- Tie-in of the proposed piping would require specialized planning, analysis and coordination to complete without requiring a major facility outage. Unplanned loss of cooling and process water discharge could result in significant risks to the safety of Gary Works personnel and the local community.
- Ground fogging at and nearby the Gary Works site would be compounded due to the evaporative plumes from the cooling tower stacks and traffic safety risks could be increased due to these effects.

The estimated construction cost for closed-cycle cooling is approximately $148,180,000, and the recommended engineering budget would be $29,640,000. Estimated permitting costs are $3,820,000. Closed-cycle cooling would require new and modified permits for the construction and final configuration. Additionally, closed-cycle cooling would create new particulate air emissions via cooling tower drift and would result in increased energy consumption. The total capital investment excluding operation and maintenance costs would be $181,640,000.

<u>Installation of Fine Mesh Screens (FMS)</u>
Retrofit of the traveling water screens (TWS) in operation at U.S. Steel's Gary Works integrated steel mill facility with fine mesh (2.0 mm) and modified fish protection systems is technically feasible but would involve a significant and technically challenging construction project in order to complete the fish handling and return system. Due to the higher intake velocity, construction of buried fish handling and return systems (FHRS) would be required at No. 1 Pump Station and No. 2 Pump Station.

Identified risks at this level of conceptual design include:

- In order to complete the retrofitting activities without causing a major facility outage, the TWS would be taken out of service one at a time while the facility cooling and process water withdrawal would continue at current rates. Debris loading of the existing TWS would be anticipated to increase during the retrofitting activities due to the redistribution of water withdrawal through a decreased quantity of TWS.
- Fine mesh TWS are at higher risk for increased debris loading, differential pressures in excess of operable limits and, in extreme cases, catastrophic failure. Due to the high heat load nature of the steelmaking process, resultant partial or total loss of cooling and process water could result in serious risk to the health and safety of Gary Works personnel and the local community.
- Due to the age of the facility and complex heavy manufacturing infrastructure in the path of the FHRS pipe, the installation would require extensive and potentially intrusive excavation through areas of the facility which include complex buried utilities, relatively old underground infrastructure, and areas of legacy industrial operations. A detailed review of the piping route has not been completed and

would be required.

- Chlorination agents would continue to be required for invasive mussel control at the fine mesh screens. Therefore, it is expected low levels of residual chlorine would contribute to chemical stresses and likely mortality of entrainable organisms excluded by the fine mesh screens. This chlorination for control of invasive mussels effectively negates any perceived benefits of the exclusion technology.
- Additionally, to maintain compliance with water quality based effluent limitations, screen backwash water must be dechlorinated prior to discharge. Due to the long, complex routing of the FHRS piping and dechlorination of the sluice water, the control of biogrowth or blockages in the FHRS pipe would likely be a significant challenge. Mechanical and hydrostatic cleaning may be required on a frequent basis in order to maintain an unobstructed path for the return of organisms to Lake Michigan. Excessive biogrowth or blockages would result in loss of operation of the FHRS.

The estimated construction cost for a retrofit of the existing TWS with fine mesh would be approximately $23,810,000, and the recommended engineering budget would be $4,760,000. Estimated permitting costs are $880,000. Fine mesh TWS would require new and modified permits for the construction and final configuration. The total capital investment excluding operation and maintenance expenses would be $29,450,000.

USS was also asked by IDEM to evaluate the incremental costs of installing fine mesh screens (FMS) vs. coarse mesh (CMS) traveling screens at PS #1 and #2 Intakes given that USS is proposing installation of modified traveling screens with fish friendly return for impingement BTA at those two intakes. These two intakes, along with the Lakeside Intake have large intake volumes and most potential to affect entrainment levels.

USS provided the requested information and also provided a high-level risk analysis of installing FMS.

In a follow-up submittal, USS also provided information on the expected reduction in entrainment and net social benefits of installing the FMS.

These supplemental submittals have been added to the 316b application materials for reference.

USS estimates an additional capital cost of approximately $500,000 per intake and an additional annual operation/maintenance cost of approximately $65,000 per year per intake to install the FMS vs CMS at Intake PS #1 and #2. If the Lakeside Intake moves forward with installing new modified traveling screens for impingement control, cost estimates would likely be similar to install the FMS vs CMS.

USS also identified an increased risk of failure due to potential for screen blockage from use of FMS from unexpected siltation/debris loads as well as unexpected loading from aquatic life and zebra mussels. Intakes PS #1 and #2 are particularly susceptible to siltation loads given location on the ore loading slip. While this increased likelihood of screen binding can be mitigated by increased cleaning and inspection, the increased risk remains. Loss of cooling water due to screen blockage could result in loss of production capability.

Installation of the FMS vs. CMS would reduce the numbers of organisms entrained. However, it would not result in significant social benefits due to the already low numbers of organisms entrained by the facility.

IDEM concurs with USS conclusion that installation of FMS are not warranted at Intakes where modified traveling screens with fish friendly return systems are proposed, currently PS #1 and #2 and possibly Lakeside PS. This is due to the increased risk of failure and minimal expected social benefits.

Cost Summary for CCRS and FMS

In addition to the capital investments (which are a portion of the compliance costs), social costs of installing entrainment reduction technologies were also developed and evaluated. Social costs represent "the total burden imposed on the economy; it is the sum of all opportunity costs incurred associated with taking actions. These opportunity costs consist of the value lost to society of all the goods and services that will not be produced and consumed as a facility complies with permit requirements, and society reallocates resources away from other production activities and towards minimizing adverse environmental impacts." (79 Fed. Reg. 158, 48432).

Social costs from entrainment reductions for this evaluation resulted from:

- Compliance costs defined as the owner's cost for purchasing, permitting, installing, operating, and maintaining entrainment reduction technologies;
- Government Regulatory Costs defined as permitting, monitoring, administering, and enforcing regulatory compliance;
- Power System Costs defined as increased fuel costs from running more expensive units when the facility is subject to outage, capacity reductions, or closure due to the implementation of entrainment reducing technologies; and
- Impacts to Safety as an environmental externality.

These costs are summarized in the Social Costs of Purchasing and Installing Entrainment Reduction Technologies report (Appendix 2) of the 40 CFR 122.21(r)(9)-(r)(12) report submitted with the NPDES application, and excerpted in the Table below.

Discount Rate	Technology Type	Compliance Costs [a] Total Design, Construction, and Installation Costs	Annual O&M Costs	Tower Fill Replacement [b]	Social Costs (Present Value) Compliance Costs	Power System Costs	Externality Costs [c]	Government Regulatory Costs	Total Social Costs	Annual Social Costs
3%	CCRS	$181.64M	$0.24M	$5.32M	$108.20M	$41.07M	$0.07M	$0.03M	$149.38M	$4.98M
	FMS	$29.45M	$0.20M	NA	$21.05M	$1.38M	NA	$0.01M	$22.44M	$0.75M
7%	CCRS	$181.64M	$0.24M	$5.32M	$52.19M	$19.83M	$0.04M	$0.02M	$72.08M	$2.40M
	FMS	$29.45M	$0.20M	NA	$11.44M	$0.74M	NA	$0.01M	$12.19M	$0.41M

[a] Compliance costs presented in Table 1 are undiscounted and in 2018 dollars. The social costs associated with each technology are in 2019 dollars and discounted at 3 and 7 percent using the specifications outlined in Table 2.

[b] Low fouling counterflow cooling tower fill replaced once every 10 years of operation beginning at start-up. This cost is incurred in 2037 and 2047.

[c] Externality costs include expenditures to maintain baseline safety conditions and avoid increased mortality and morbidity effects of potential accidents from cooling tower induced fogging and icing.

Benefits of Entrainment Reduction Technologies

Differences between With Entrainment (baseline) and Reduced-Entrainment conditions are used to quantify the benefits of entrainment reduction technologies by modeling fishery stocks. Facility entrainment data from the site-specific characterization studies in 2012 and 2013 were used for the with entrainment (baseline) scenario. These years represent the low and high end of the observed annual entrainment. Benefits evaluated include reactional, commercial, and nonuse benefits. For the purposes of this evaluation, only recreational and commercial benefits were quantified.

Reduced entrainment conditions were evaluated for both the conversion to closed cycle recirculating system (CCRS) and retrofit with 2.0 mm fine mesh screens (FMS). Additionally, the results are also depicted for the complete elimination of entrainment (100% reduction). This is done for reference purposes and for clarity in presenting the figures within the Benefits Valuation Study. This does not represent an attainable metric based on the technologies evaluated. These benefits are summarized in the Benefits Valuation Study (Appendix 3) of the 40 CFR 122.21(r)(9)-(r)(12) report submitted with the NPDES application, and excerpted in the Table below.

		2012 Entrainment Data						2013 Entrainment Data					
		Present Value			Annual Value			Present Value			Annual Value		
Discount Rate	Technology	Rec	Com	Total	Rec	Com	Total	Rec	Com	Total	Rec	Com	Total
3%	100%Reduction	$64	$0	$64	$2	$0	$2	$74,005	$22	$74,027	$2,467	$1	$2,468
	CCRS[a]	$50	$0	$50	$2	$0	$2	$57,954	$18	$57,972	$1,932	$1	$1,933
	FMS[b]	$64	$0	$64	$2	$0	$2	$0	$0	$0	$0	$0	$0
7%	100%Reduction	$30	$0	$30	$1	$0	$1	$36,677	$11	$36,688	$1,223	$1	$1,224
	CCRS[a]	$21	$0	$21	$1	$0	$1	$25,620	$8	$25,628	$854	$1	$855
	FMS[b]	$30	$0	$30	$1	$0	$1	$0	$0	$0	$0	$0	$0

Notes: Totals may not sum due to rounding

a The percent reduction for mechanical draft cooling towers is estimated using the cooling tower system average annual configuration frequency presented in the Comprehensive Technical Feasibility and Cost Evaluation Study (122.21(r)(10)). Baseline flow is calculated by multiplying the once through cooling flow rate by the total number of annual hours. The cooling tower flow is calculated by multiplying the flow rate by the number of annual hours under each cooling tower configuration and summing across configurations. The percent reduction is then estimated as the difference between Baseline and cooling tower flow.

b The percent reduction for 2.0mm fine mesh screens is based on Ramboll (2019). No eggs are excluded with 2.0mm fine mesh screens, and all larvae and juveniles are excluded with 2.0mm fine mesh screens (Ramboll 2019). The large difference in benefits across years and technologies results from differences in egg entrainment in 2012 and 2013 (0 in 2012 vs more than 16 million in 2013).

MAY FACTORS (§ 125.98(f)(3))

i. Entrainment impacts on the waterbody;

As discussed previously, the IDEM conclusion is that the numbers of organisms entrained by USS Gary has limited impacts on aquatic ecology of the nearshore area.

ii. Thermal discharge impacts;

Based on recent studies of aquatic life in the Grand Calumet River, the aquatic life community is recovering but still impacted from past pollution, sediment contamination and dredging activities.

Installation of cooling towers would significantly reduce the thermal load discharged by USS Gary to the Grand Calumet River and potentially eliminate the need for the existing 316(a) thermal variance. It would also significantly reduce the flow in the Grand Calumet River.

This NPDES permit requires USS to conduct a 316(a) study for thermal discharges from the facility to Grand Calumet River. This study will evaluate the impact on the aquatic community of the existing thermal load.

At this time, it is unclear what impact eliminating or reducing the thermal discharge would have on the aquatic community.

iii. *Credit for reductions in flow associated with the retirement of units occurring within the ten years preceding October 14, 2014;*
While the USS Gary facility has reduced the intake volumes of cooling water due to various water reuse projects and changes in production, IDEM did not consider reductions in flow associated with the retirement of units prior to October 14, 2014 in determining entrainment BTA.

iv. *Impacts on the reliability of energy delivery within the immediate area;*
Impacts on the reliability of energy delivery with the immediate area from installation of cooling towers is unknown.

v. *Impacts on water consumption; and,*
The installation of cooling towers would possibly result in an increase in net water consumption, due to the increase in consumptive use from cooling tower evaporation

vi. *Availability of process water, gray water, waste water, reclaimed water, or other waters of appropriate quantity; and, quality for reuse as cooling water*
The USS Gary facility has limited options for available process, gray, waste, or reclaimed water in appropriate quantity and/or appropriate quality that could be used for reuse of the total volume of cooling water.

G. BTA Summary – Impingement and Entrainment

Based on the information provided by the permittee IDEM concurs with the permittee that the alternatives described in the Table below and selected by the permittee are the best technology available (BTA) for impingement mortality at each of the intakes (Pump Station No. 1, Pump Station No. 2, Pump Station No. 4, and the Lakeside Intake).

Selected Impingement BTA Compliance Technology		
Intake	**Selected Impingement BTA Compliance Technology**	**Federal Rule Citation**
PS No 1	Modified Traveling Screens	40 CFR 125.94(c)(5)
PS No 2	Modified Traveling Screens	40 CFR 125.94(c)(5)
PS No 3	Emergency Backup – BTA Not Applicable	40 CFR 125.94(e)(3)(iv)
PS No 4	Operate at Maximum Actual Through Screen Intake Velocity of 0.5 feet per second	40 CFR 125.94(c)(3)
Lakeside PS	Either a) Operate at a Maximum Intake Velocity of 0.5 feet per second or b) Install Modified Traveling Screens	Either: a. 40 CFR 125.94(c)(3) or b. 40 CFR 125.94(c)(5)

After considering all the factors that must and may be considered by the federal rules (see discussion in Section F above), IDEM finds that the existing facility meets the best technology available (BTA) for entrainment mortality both for the entire facility and each intake. This is primarily based on the following factors:

1. The number and species of organisms projected to be entrained by the facility and limited impact to the ecosystem;
2. The costs and technical difficulties installing CCRS or FMS;
3. The flow reduction/water reuse optimization efforts already implemented at the facility; and
3. The off-shore location of the Lakeside Pump Station intake.

H. <u>Permit Conditions</u>

The permittee shall comply with requirements below:

1. Cooling Water Intake Structure Permit Requirements

   a. In accordance with 40 CFR 125.98(b)(1), nothing in this permit authorizes take for the purposes of a facility's compliance with the Endangered Species Act.

   b. The permittee must at all times properly operate and maintain the cooling water intake structure and associated intake equipment.

   c. The permittee must inform IDEM of any proposed changes to the CWIS or proposed changes to operations at the facility that affect the information taken into account in the current BTA evaluation.

   d. Any discharge of intake screen backwash must meet the Minimum Narrative Limitations contained in Part I.B of the permit. There must be no discharge of debris from intake screen washing which will settle to form objectionable deposits which are in amounts sufficient to be unsightly or deleterious, or which will produce colors or odors constituting a nuisance.

   e. Pump Station No. 1. As soon as practicable but no later than twenty-four months after the effective date of the permit the permittee shall submit to IDEM for review and approval a study plan including schedule for obtaining information required by the impingement technology optimization study required by 40 CFR 125.94(c)(5) and 40 CFR 122.21(r)(6)(i). After installation of the modified traveling screen at this intake has been completed, the permittee shall conduct approved the impingement technology optimization study at this intake. The study plan must be able to demonstrate that the technology is or will be optimized to minimize impingement mortality of all non-fragile species. The permittee shall submit the preliminary results of the first year of their optimization study with 60 days of completion of the first year of sampling. The permittee shall submit the final technology optimization study report, covering both year 1 and year 2 of sampling within 90 days of completing the second year of sampling. The permit may be modified to include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

   f. Pump Station No. 2. As soon as practicable but no later than twenty-four months after the effective date of the permit the permittee shall submit to IDEM for review and approval a study plan including schedule for obtaining information required by the impingement technology optimization study required by 40 CFR 125.94(c)(5) and 40 CFR 122.21(r)(6)(i). After installation of the modified traveling screen at this intake has been completed, the permittee shall conduct approved the impingement technology optimization study at this intake. The study plan must be able to demonstrate that the technology is or will be optimized to minimize impingement mortality of all non-fragile species. The permittee shall submit the preliminary results of the first year of their optimization study with 60 days of completion of the first year of sampling. The permittee shall submit the final technology optimization study report, covering both year 1 and year 2 of sampling within 90 days of completing the second year of sampling. The permit may be modified to include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

g. Lakeside Intake. If the permittee selects the impingement mortality option under 40 CFR 125.94(c)(5) [modified traveling screens] for this intake, then as soon as practicable but no later than twenty-four months after the effective date of the permit the permittee shall submit to IDEM for review and approval a study plan including schedule for obtaining information required by the impingement technology optimization study required by 40 CFR 125.94(c)(5) and 40 CFR 122.21(r)(6)(i). After installation of the modified traveling screen at this intake has been completed, the permittee shall conduct approved the impingement technology optimization study at this intake. The study plan must be able to demonstrate that the technology is or will be optimized to minimize impingement mortality of all non-fragile species. The permittee shall submit the preliminary results of the first year of their optimization study with 60 days of completion of the first year of sampling. The permittee shall submit the final technology optimization study report, covering both year 1 and year 2 of sampling within 90 days of completing the second year of sampling. The permit may be modified to include verifiable and enforceable permit conditions that ensure the technology will perform as demonstrated.

h. Lakeside Intake. If the permittee selects the impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second] for this intake, then the permittee must monitor the velocity at the screen at a minimum frequency of daily. In lieu of velocity monitoring at the screen face, the permittee may calculate the through-screen velocity using water flow, water depth, and the screen open areas. These daily measurements shall be reported on the MMR with the monthly results summarized on the DMRs that are submitted every month.

i. In accordance with 40 CFR 125.97(c), by January 31 of each year, the permittee must submit to the Industrial NPDES Permit Section IDEM-OWQ an annual certification statement for the preceding calendar year signed by the responsible corporate officer as defined in 40 CFR 122.22 (see 327 IAC 5-2-22) subject to the following:

    i. If the information contained in the previous year's annual certification is still pertinent, you may simply state as such in a letter to IDEM and the letter, along with any applicable data submission requirements specified in this section shall constitute the annual certification.

    ii. If you have substantially modified operation of any unit at your facility that impacts cooling water withdrawals or operation of your cooling water intake structures, you must provide a summary of those changes in the report. In addition, you must submit revisions to the information required at 40 CFR 122.21(r) in your next permit application.

j. Best technology available (BTA) determinations for entrainment mortality and impingement mortality at cooling water intake structures will be made in each permit reissuance, in accordance with 40 CFR 125.90-98. The permittee must submit all the information required by the applicable provisions of 40 CFR 122.21(r)(2) through (r)(13) with the next renewal application. Since the permittee has submitted the studies required by 40 CFR 122.21(r), the permittee may, in subsequent renewal applications pursuant to 40 CFR 125.95(c), request to reduce the information required if conditions at the facility and in the waterbody remain substantially unchanged since the previous application so long as the relevant previously submitted information remains representative of the current source water, intake structure, cooling water system, and operating conditions. Any habitat designated as critical or species listed as threatened or endangered after issuance of the current permit whose range of habitat or designated critical habitat includes waters where a facility intake is located constitutes potential for a substantial change that must be addressed by the owner/operator in subsequent permit applications, unless the facility received an exemption pursuant to 16 U.S.C. 1536(o) or a permit pursuant to 16 U.S.C. 1539(a) or there is no reasonable expectation of take. The permittee must submit a request for reduced cooling water intake structure and waterbody application information at least **two years and six months** prior to the expiration of its NPDES permit. The request must identify each element in in 40 CFR 122.21(r)that it determines has not substantially changed since the previous permit application and the basis for the determination. IDEM has the discretion to accept or reject any part of the request.

k. The permittee must only operate Intake Pump Station No. 3 as an emergency backup to Intake Pump Station No 4. The permittee shall immediately notify IDEM, Office of Water Quality, NPDES Permits Branch if Pump Station No. 3 is or will be used for any other purpose. Operating information including dates of operation, hours of operation and reason for use of Pump Station No. 3 shall be included in the annual report required in Item l below.

l. The permittee shall submit an annual summary of the actual intake flows at each intake and measured at a minimum frequency of daily.

m. The permittee must either conduct visual inspections or employ remote monitoring devices during the period the cooling water intake structure is in operation as required by 40 CFR 125.96(e). The permittee must conduct such inspections at least weekly to ensure that any technologies operated to comply with 40 CFR 125.94 are maintained and operated to function as designed including those installed to protect Federally-listed threatened or endangered species or designated critical habitat. Alternative procedures can be approved if this requirement is not feasible (e.g., an offshore intake, velocity cap, or during periods of inclement weather).

n. The permittee must submit and maintain all the information required by the applicable provisions of 40 CFR 125.97.

o. All required reports must be submitted to the IDEM, Office of Water Quality, NPDES Permits Branch, Industrial NPDES Permit Section at OWQWWPER@idem.in.gov and the Compliance Branch at wwReports@idem.in.gov.

2. Pump Stations No. 1 and No. 2-Compliance Schedule for Implementation of 316(b) Requirements

   a. Schedule of Compliance: The below schedule of compliance is for installation of the selected BTA for impingement at Pump Station No. 1 and No. 2 Intakes.
      The permittee shall install new modified traveling screens with fish friendly return and that meet the definition of the rule 125.92(s) at these intakes in accordance with the following schedule.
      i. As soon as practicable but no later than twelve (12) months after the effective date of the permit submit to the Industrial NPDES Permits Section of Office of Water Quality (OWQ) for review a conceptual design and plan for the modified traveling screens including fish return.
      ii. As soon as practicable, but no later than eighteen (18) months after the effective date of the permit, complete detailed design of the modified traveling screens, including the fish return systems.
      iii. As soon as practicable but no later than twenty-four (24) months after the effective date of the permit, initiate construction of the modified traveling screens and fish return systems.
      iv. As soon as practicable, but no later than thirty-six (36) months after the effective date of the permit, complete construction of the modified traveling screen and fish return systems.
      v. Within thirty (30) days of completion of construction, the permittee shall file with the Industrial NPDES Permits Section of Office of Water Quality (OWQ) a notice of installation for the modified traveling screen and a design summary of any modifications.
      vi. The permittee shall submit a written progress report to the Compliance Data Section of the OWQ three (3) months from the effective date of this permit and every six (6) months thereafter until the requirements in the compliance schedule outlined above have been achieved. The progress reports shall include relevant information related to steps the permittee has taken to meet the requirements in the compliance schedule and whether the permittee is meeting the dates in the compliance schedule.

   b. If the permittee fails to comply with any deadline contained in the foregoing schedules, the permittee shall, within fourteen (14) days following the missed deadline, submit a written notice of noncompliance to the Compliance Data Section of the OWQ stating the cause of noncompliance, any remedial action taken or planned, and the probability of meeting the date fixed for compliance

3. Lakeside Intake- Compliance Schedule for Implementation of 316(b) Requirements.

   a. As soon as practicable but no later than six (6) months after the effective date of this permit, the permittee must notify IDEM which of the following impingement mortality

BTA options it has selected for this intake to comply with the cooling water intake structure requirements:

i. The impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second].
ii. The impingement mortality option under 40 CFR 125.94(c)(5) [modified traveling screens].

b. If the permittee has selected the impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second], the following compliance schedule is applicable.

   i. As soon as practicable but no later than six (6) months after the effective date of this permit submit to the Industrial NPDES Permits Section, Office of Water Quality (OWQ) for review and approval the information and operating protocol which supports compliance with maximum actual through screen velocity of 0.5 feet per second.
   ii. The permittee shall comply with this requirement as soon as practicable but no later than twelve (12) months after the effective date of the permit.

c. If the permittee has selected the impingement mortality option under 40 CFR 125.94(c)(5) [modified traveling screens], the following compliance schedule is applicable.
   i. As soon as practicable but no later than twelve (12) months after the effective date of the permit submit to the Industrial NPDES Permits Section of Office of Water Quality (OWQ) for review a conceptual design and plan for the modified traveling screens including fish return.
   ii. As soon as practicable, but no later than eighteen (18) months after the effective date of the permit, complete detailed design of the modified traveling screens, including the fish return systems.
   iii. As soon as practicable but no later than twenty-four (24) months after the effective date of the permit, initiate construction of the modified traveling screens and fish return systems.
   iv. As soon as practicable, but no later than thirty-six (36) months after the effective date of the permit, complete construction of the modified traveling screen and fish return systems.
   v. Within thirty (30) days of completion of construction, the permittee shall file with the Industrial NPDES Permits Section of Office of Water Quality (OWQ) a notice of installation for the modified traveling screen and a design summary of any modifications.
   vi. The permittee shall submit a written progress report to the Compliance Data Section of the OWQ six (6) months from the effective date of this permit and every six (6) months thereafter until the requirements in the compliance schedule outlined above have been achieved. The progress reports shall include relevant information related to steps the permittee has taken to meet the requirements in the compliance schedule and whether the permittee is meeting the dates in the compliance schedule.

d. If the permittee fails to comply with any deadline contained in the foregoing schedules, the permittee shall, within fourteen (14) days following the missed deadline, submit a written notice of noncompliance to the Compliance Data Section of the OWQ stating the cause of noncompliance, any remedial action taken or planned, and the probability of meeting the date fixed for compliance

6.4 Streamlined Mercury Variance (SMV)

The previous permit contained SMV's for Outfalls 018, 019, 020, 028/030, and 034. The facility is requesting a new SMV for Outfall 015, renewal of the SMVs at Outfalls 018, 019, 020, and 028/030, and the discontinuance of the previously approved SMV for Outfall 034. The following SMV's approved in this permit are detailed below:

Outfall 015

The facility previously applied for an SMV on September 3, 2013, and was granted the SMV for Outfall 015 in a permit modification effective December 1, 2014. However, IDEM felt the SMV would no longer be applicable after redirection of Internal Outfall 501 wastewaters to Outfall 015 and was removed in the January 13, 2017, modified permit. Therefore, water quality based effluent limitations were required and included in the January 13, 2017, modified permit. A 60-month Schedule of Compliance (SC) was granted to the permittee, effective February 1, 2017. In anticipation of not being able to meet the final limitations for mercury, the permittee applied for a Streamlined Mercury Variance (SMV) with this permit renewal application on May 1, 2020. The SMV has been incorporated into this permit renewal.

The SMV establishes a streamlined process for obtaining a variance from a water quality criterion used to establish a WQBEL for mercury in an NPDES permit. The goal of the SMV is to reduce the effluent levels of mercury towards, and achieve as soon as practicable, compliance with the mercury WQBELs through implementation of a pollutant minimization program plan (PMPP). The SMV will remain in effect until the permit expires under IC 13-14-8-9. Pursuant to IC 13-14-8-9(e), when the SMV is incorporated into a permit extended under IC 13-15-3-6 (administratively extended), the renewal will remain in effect as long as the NPDES permit requirements affected by the SMV are in effect.

The interim discharge limits were developed in accordance with 327 IAC 5-3.5-7 and with 327 IAC 5-3.5-8. Specifically, the interim discharge limits shall be based upon available, valid, and representative data of the effluent mercury levels collected and analyzed over the most recent two (2) year period from the facility. The interim limit of 14.0 ng/L represents the highest daily value for mercury from the most recent two (2) years of the permittee's effluent data. This Office received a complete SMV application on May 1, 2020. Therefore, mercury data two (2) years prior to May 1, 2020, were utilized in determining the mercury interim discharge limit (see **Appendix E** of this fact sheet to view the permittee's SMV dataset).

After the first year of the permit term, the permittee will also report the annual average value for Outfall 015.

Outfalls 018, 019, 020, and 028/030

The permittee applied for a Streamlined Mercury Variance (SMV) for Outfalls 018, 019, and 020 on October 18, 2011. The SMV for Outfalls 018, 19, and 20 was initially incorporated into the NPDES Permit Modification that became effective on April 1, 2012. The permittee applied for a

SMV for Outfall 028/030 on September 3, 2013. The SMV for Outfalls 028/030 were incorporated in a permit modification effective December 1, 2014. The permittee submitted a SMV renewal application with the permit renewal application on May 1, 2020. The SMV renewal has been incorporated into this permit renewal and applies to the discharge from Outfalls 018, 019, 020, and 028/030.

The SMV establishes a streamlined process for obtaining a variance from a water quality criterion used to establish a WQBEL for mercury in an NPDES permit. The goal of the SMV is to reduce the effluent levels of mercury towards, and achieve as soon as practicable, compliance with the mercury WQBELs through implementation of a pollutant minimization program plan (PMPP). The SMV renewal will remain in effect until the permit expires under IC 13-14-8-9. Pursuant to IC 13-14-8-9(e), when the SMV renewal is incorporated into a permit extended under IC 13-15-3-6 (administratively extended), the renewal will remain in effect as long as the NPDES permit requirements affected by the SMV are in effect.

<u>Mercury Interim Discharge Limit</u>
The interim discharge limits were developed in accordance with 327 IAC 5-3.5-7 and with 327 IAC 5-3.5-8. Specifically, the interim discharge limits shall be based upon available, valid, and representative data of the effluent mercury levels collected and analyzed over the most recent two (2) year period from the facility.

Based on a review of the data, the existing interim limits for Outfalls 018, 019, 020, and 028/030 will continue to be effective in the renewal of the SMV. A review of the effluent data indicates that the existing interim limits should be maintained in the SMV renewal in accordance with the antibacksliding requirements of 327 IAC 5-2-10(a)(11).

Compliance with the interim discharge limit will be achieved when the average of the measured effluent daily values over the rolling twelve month period is less than the interim limit. Each reporting period, the permittee shall report both a daily maximum value and an annual average value for mercury.

<u>Pollutant Minimization Program Plan (PMPP)</u>
PMPP requirements are outlined in 327 IAC 5-3.5-9 and are included in Part V of the NPDES permit in accordance with 327 IAC 5-3.5-6. The PMPP focuses on pollution prevention and source control measures to achieve mercury reduction in the effluent. The PMPP was public noticed prior to submittal to IDEM in accordance with 327 IAC 5-3.5-9(c). No comments were received during the public notice period. The goal of the PMPP is to reduce the effluent levels of mercury towards, and achieve as soon as practicable, compliance with the mercury WQBELs established for the permitted facility.

<u>SMV Annual Reports</u>
The permittee is required to submit annual reports to IDEM by August 1 of each year in which the SMV is in effect. The annual report must describe the SMV applicant's progress toward fulfilling each PMPP requirement, the results of all mercury monitoring within the previous year, and the steps taken to implement the planned activities outlined under the PMPP.

6.6 Polychlorinated Biphenyl (PCB)

There shall be no discharge of polychlorinated biphenyl (PCB) compounds attributable to facility operations such as those historically used in transformer fluids. In order to determine compliance with the PCB discharge prohibition, the permittee shall provide the following PCB data with the next NPDES permit renewal application for at least one sample taken from each final outfall. The corresponding facility water intakes shall be monitored at the same time as the final outfalls.

Pollutant	Test Method	LOD	LOQ
PCBs*	EPA 608	0.1 ug/L	0.3 ug/L

*PCB 1242, 1254, 1221, 1232, 1248, 1260, 1016

6.7 Spill Response and Reporting Requirement

Reporting requirements associated with the Spill Reporting, Containment, and Response requirements of 327 IAC 2-6.1 are included in Part II.B.2.(d), Part II.B.3.(c), and Part II.C.3. of the NPDES permit. Spills from the permitted facility meeting the definition of a spill under 327 IAC 2-6.1-4(15), the applicability requirements of 327 IAC 2-6.1-1, and the Reportable Spills requirements of 327 IAC 2-6.1-5 (other than those meeting an exclusion under 327 IAC 2-6.1-3 or the criteria outlined below) are subject to the Reporting Responsibilities of 327 IAC 2-6.1-7.

It should be noted that the reporting requirements of 327 IAC 2-6.1 do not apply to those discharges or exceedances that are under the jurisdiction of an applicable permit when the substance in question is covered by the permit and death or acute injury or illness to animals or humans does not occur. In order for a discharge or exceedance to be under the jurisdiction of this NPDES permit, the substance in question (a) must have been discharged in the normal course of operation from an outfall listed in this permit, and (b) must have been discharged from an outfall for which the permittee has authorization to discharge that substance.

6.8 Permit Processing/Public Comment

Pursuant to 327 IAC 5-3-9 and 327 IAC 5-3-12, IDEM is required to public notice this draft permit. For this public notice, IDEM will publish a general notice online at https://www.in.gov/idem/5474.htm and in the newspaper with the largest general circulation within the county that this facility is located. A 30-day comment period is provided to solicit input from interested parties, including the general public. Comments concerning the draft permit should be submitted in accordance with the procedure outlined in the enclosed public notice form.

6.9 Post Public Notice Addendum

The draft NPDES permit for the facility was made available for public comment from January 29, 2021, through March 17, 2021, as part of Public Notice No. 20210129-IN0000281-PH/RD. During this comment period, a public hearing was held on March 3, 2021. At the public hearing, two (2) individuals provided oral comments. Also during the comment period, additional written comments were received. The comments submitted and this Office's corresponding responses are summarized below. Any changes to the permit and/or Fact Sheet are so noted below.

Public Hearing Comments by Alexis Piscitelli, U.S. Steel

Comment 1: I'm Alexis Piscitelli, Senior Environmental Director, Gary Works. First, I'd like to thank IDEM for significant efforts in renewing this permit in a timely manner, and allowing me to make a few comments today.

Gary has an excellent compliance history, well over 99.9 percent in the last decade. We continue to invest in the facility to make environmental improvements. In the last permit cycle, we have eliminated three outfalls, reducing discharges by almost 65 million gallons each day. We upgraded our water treatment plants. Most notably, we invested 12 million dollars in a new chrome waste water treatment plant, to treat waters going into finishing facilities. The new plant has substantial monitoring automation, it's more reliable, and we have eliminated miles of outgoing piping.

While the draft might not appear overly onerous, there are multiple items which significantly impact the business. As part of the permit, U.S. Steel has agreed to put traveling screens and a fish return at two of our water intakes, costing roughly 30 million dollars for what we believe would provide little to no environmental benefit.

IDEM has tightened multiple limits in the permit. Of most concern, the total suspended solids at Outfalls 28 and 30. Several weeks a year, unrelated to our operations, Lake Michigan has total suspend solids two to three points higher than the permitted discharge. We will be challenged to meet the limits during these periods. U.S. Steel requests IDEM consider granting an in-kind credit for the outfalls that have significant lowering of noncontact cooling water.

Again, I would like to thank IDEM for their efforts, and hearing my comments today.

Response 1: IDEM appreciates your participation in the Public Hearing. U.S. Steel's written comments, in regard to the statement above, are provided further below.

Public Hearing Comments by Tom Healy, Citizen

Comment 2: My name is Tom Healy. I'm a resident of Chicago. I'm appearing on my own behalf. I am not appearing in any representative capacity.

As the fact sheet -- well, first of all, let me also compliment the IDEM staff for having put on a very good and thorough presentation, particularly Mr. Hamblin. I truly do appreciate this, and the opportunity to speak this evening. As the fact sheet notes, and I quote, the goal of the SMV, the Streamlined Mercury Variance, is to reduce the effluent levels of mercury towards, and achieve as soon as practical, compliance with the WQBEL to implementation of PMVP.

So, my question --and I will follow this up in writing with Richard, as he suggested that I do. And so, the question that I have for IDEM is: What data has U.S. Steel presented in its permit renewal application that demonstrates that there has been in fact a reduction of mercury in the effluent of any of the outfalls which have been the subject of an SMV over the past several years?

So, that's question number one is: What data is IDEM relying upon? And question two is: Has IDEM made an express finding that during the most recent SMV period, particularly the last five-year period during which the SMV's have been in effect, has IDEM made an express finding that the concentrations of mercury have in fact been reduced? And if you have reached that conclusion, should that not appear in the fact sheet describing the justification for the SMV's?

Thank you.

Response 2: IDEM appreciates your participation in the Public Hearing. As part of IDEMs review of the SMV applications, IDEM has access to all the mercury data reported on the monthly Discharge Monitoring Reports (DMRs). However, pursuant to 327 IAC 5-3.5-8(b), “The interim discharge limit shall be….based upon available, valid, and representative data…collected and analyzed over the most recent two (2) year period…”. Therefore, the most recent two (2) years of data were analyzed for both the renewal SMVs and the new SMV at Outfall 015.

For Outfall 015, the SMV granted is a new SMV and not subject to the renewal SMV requirements in 327 IAC 5-3.5-7 and was calculated and based on different characteristics and circumstances than the SMV previously approved for Outfall 015. The facility requested in 2017 to redirect some wastestreams to Outfall 015, and eliminate another outfall (Outfall 005). IDEM did not allow the continuance of the SMV for Outfall 015 and the water quality-based limits (WQBELs) for mercury were included. However, information at the time indicated that the facility would not be immediately capable of meeting the WQBEL for mercury. Therefore, a schedule of compliance was granted. Based on information gathered as part of the schedule of compliance requirements and data generating since the redirection of those wastestreams, the primary source of mercury was identified as noncontact cooling water; Internal Outfalls 501 and 607 contribute approximately 20% of overall flow to Outfall 015. As part of the Pollutant Minimization Program Plan (PMPP), the permittee has been monitoring mercury and TSS concentrations in the intake water from Lake Michigan. While the intake concentrations for mercury are variable, the permittee discovered that this source has the potential to contribute almost half of the mercury to Outfall 015. Therefore, as part of this renewal, the facility requested a new SMV for Outfall 015.

For the SMVs at Outfalls 018, 019, 020, and 028/030, a review of the previous two (2) years data, as well as the PMPPs for each outfall was conducted. The review and renewal of these SMVs was done in accordance with 327 IAC 5-3.5-7. 327 IAC 5-3.5-7(b) states that, "The department may renew an initial SMV…if the applicant demonstrates that implementation of the PMPP has achieved progress toward the goal of reducing mercury from its discharge except as provided in subsection (d)." Subsection (d) states that, "…If the applicant can provide information, as part of a revision to a PMPP, that demonstrates there is no known reasonable additional action that will reduce mercury, the PMPP may remain as previously approved."

PMPPs for the outfalls subject to SMV requirements have been submitted on a annual basis by permittee. As part of those PMPPs, the facility investigated possible sources for mercury, analyzed chemicals used on-site, evaluated reduction alternatives, implemented purchasing policies on mercury containing products, employee awareness training, implemented cleaning and maintenance and good housekeeping practices, as well as other site-specific activities to reduce and/or prevent additional mercury loading.

Please refer to Responses 43 and 44 for additional information on the SMVs.

Comment Letter from US EPA

Comment 3: While the permit includes thermal limits (BTU/hr) for Outfalls 035, 037, and 039, the fact sheet does not include discussion regarding development of these limits other than a statement that the limits are derived from the results of a mixing zone study. This study demonstrates compliance with the thermal limits at a 1,000 foot arc in compliance with 327 IAC 2-1.5-8(c)(4)(D)(iv) but there is no documentation in the record that describes how the temperature differential evaluated in the study was translated into the BTU/hr limit for these outfalls. See 40 C.F.R. § 124.56. Please revise the fact sheet to show how the permit limits were derived.

Response 3: Section 5.3.19 of this Fact Sheet has been updated to incorporate the justification of the 1.211 GBTU/Hr limitation at Outfall 035.

Comment 4: The permit requires whole effluent toxicity (WET) testing be performed annually at outfall 600 which is an administrative outfall continued from previous permits and intended to represent the discharges from Outfalls 028 and 030. WET testing has historically been performed at outfall 030 with the assumption that a single test at this location accurately characterizes outfall 028. Outfalls 028 and 030 discharge from separate settling lagoons which receive influent from substantially similar sources though the flows discharge from separate and differently sized lagoons that have different retention times. Though these outfalls discharge to the same assessment unit of the receiving water, they are 0.3 miles apart. Based on our discussions, IDEM will revise the WET testing requirements to (1) occur twice annually and (2) alternate between 028 and 030. See 40 C.F.R. §§ 122.48(b) and 122.41(j)(1).

Response 4: IDEM has agreed to incorporate the above requested change. WET testing requirements for Outfall 030 have been modified to apply at Outfall 600 with sample collection alternating between Outfall 028 and 030 on a semi-annual basis.

Comment 5: Part I.I.1.f.(4) of the draft permit includes a trigger for a toxicity reduction evaluation (TRE) if toxicity is demonstrated in two consecutive tests. EPA recommends that IDEM amend this condition so that a TRE will be triggered if toxicity is demonstrated in any two consecutive chronic toxicity tests or toxicity is demonstrated in three or more non-consecutive tests.

Response 5: IDEM has not made the above recommended change. IDEM will evaluate this portion of the permit language for all its applicable industrial NPDES permits and consider such recommended language. However, such change would constitute a policy change and needs to be properly evaluated for all possible effects.

Comment 6: IDEM performed a reasonable potential analysis as part of the permit renewal that indicated a reasonable potential to exceed the chronic water quality criteria for zinc. The draft permit appropriately includes both daily maximum and monthly average effluent limitations that are 75 lb/day (320 mg/l) and 38 lb/day (160 mg/l), respectively, that are effective upon permit issuance (see 40 C.F.R. §§ 122.44(d)(1)(iii) and 122.45(d)(1)). Based on the November 2015 through December 2020 monitoring events, EPA supports IDEM's decision to not include a compliance schedule for zinc. Compliance schedules provide the time necessary to comply with permit conditions and as only one of the 62 zinc samples with a value of 77.1 lb/day in January of 2020 would have exceeded the daily maximum limit in the draft permit additional time to comply with the limit is not necessary.

Response 6: IDEM agrees and appreciates support in its decision to not grant a schedule of compliance on the above basis. No changes to the permit were made in response to this comment.

Email Comment by Jennifer Dimitroff, Citizen

Comment 7: IDEM must apply the most stringent limits for pollutants discharged by US Steel in to Lake Michigan and the Grand Calumet. NW Indiana's unique ecosystem is counting on your protection.

The draft npdes permit fails to put USS on the path to compliance and needs to do so. Also, transparency is needed to explain any discharge of pollutants over the limit.

Thank you for all you do to protect the waters and citizens of Indiana.

Response 7: IDEM agrees that Indiana's unique ecosystems deserve and require protection for all designated uses. This NPDES permit is designed to do that for our waters and is in accordance with the NPDES requirements of 327 IAC 5-2.

Effluent violations during the previous three (3) years are provided in Section 3.1 of this Fact Sheet. The violations listed for each outfall, by each pollutant, is derived from Discharge Monitoring Report (DMR) data submitted by the permittee on a monthly basis. The DMRs are subject to public availability and may be found on IDEMs Virtual File Cabinet at: https://www.in.gov/idem/legal/public-records/virtual-file-cabinet/

Comment Letter from The Izaak Walton League of America

Comment 8: At both the Gary and Portage plants, US Steel has shown itself to be an untrustworthy neighbor and needs to be regulated as such.

IDEM must apply the most stringent effluent limits for pollutants discharged by U.S. Steel's Gary Works (USS) facility into the Grand Calumet River and Lake Michigan to ensure compliance with Indiana's water quality standards.

With their track record, it would be completely unacceptable to renew any of the variances for mercury pollution at the Gary, Indiana facility, as IDEM proposed in its draft permit.

Any person or business that has shown that it cannot meet the standards of a regulation, do not merit a variance from the regulations. This is not complicated.

Every renewal the IDEM issues should be allowing LESS pollution from the facility. You should not be renewing variances for a plant that cannot meet the limits of the variance.

IDEM has been issuing variances which allow USS to discharge mercury at multiple outfalls at Gary Works. The mercury in these discharges continue to exceed the applicable water quality standards established by IDEM years ago. It is unacceptable to renew variances.

This draft permit does not require USS to comply with Indiana water quality standards. USS will never do it voluntarily.

Mercury is highly toxic and the adverse health impacts from ingestion of mercury are well-established. Mercury bioaccumulates in fish that are caught and consumed by people of this region.

Children born to mothers who have ingested even tiny amounts of mercury may exhibit motor difficulties, sensory problems or cognitive deficits.

Your charge as a state agency is to protect the public from the effects of pollution. It is not to allow factories to continue to pollute our air and water. It is worse yet to allow them to legally discharge more pollution on a renewed permit from the previous permit.

IDEM should be committed to reducing mercury exposure from all sources and should not continue to grant variances mercury for USS.

We request IDEM provide the public a report with an explanation for all permit exceedances from all of the Gary plant limits during the life of the current permit and what was done by IDEM to address the exceedances.

We ask that the draft be rewritten to tighten the permit limits so that a new permit results in less pollution to Lake Michigan, not more.

Response 8: No changes have been made in response to the above comment. IDEM believes that all the limitations included in the permit are consistent with State and Federal regulations. Please refer to Responses 43 and 44 for additional information on the SMVs.

Comment Letter from U.S. Steel

Comment 9: Issue: Internal Outfall 501 Miscellaneous Water
Reference: Draft NPDES Permit Part I.A.1. (Internal Outfall 501). Page 4 of 151

U. S. Steel Position:
Previous permit included authorization to discharge 'miscellaneous water' from Internal Outfall 501. Draft Permit specifies 'miscellaneous remediation wastewaters' is authorized to discharge from Internal Outfall 501.

Requested Change:
Revise to include 'miscellaneous clean up water' instead of 'miscellaneous remediation wastewaters'. Remediation wastewaters would refer to remediation waste being managed as part of a RCRA managed remediation project. This water would not fall under that definition. The miscellaneous waters previously authorized by the permit were intended to include miscellaneous cleanup waters, precipitation, containment water, basement sumps and groundwater that are being generated as part of the ongoing cleanup activities in the Coke Plant.

Response 9: The above requested changes have been made.

Comment 10: Issue: Benzo(a)Pyrene Numeric Effluent Limitation at Internal Outfall 501
Reference: Draft NPDES Permit Part I.A.1. (Internal Outfall 501). Page 4 of 151. Fact Sheet Pages 25-26 (Section 5.3.2).

U. S. Steel Position:
A numeric effluent limitation is included at Internal Outfall 501. This limit was included in the February 2017 Permit Modification as an interim limitation. From the associated January 2017 Fact Sheet: "Using Best Professional Judgment

(BPJ), IDEM has proposed an interim limitation of 1.0 ug/l monthly average for Benzo(a)pyrene at internal outfall 501 until the final limits for Benzo(a)pyrene become effective at Outfall 015." The final Outfall 015 Benzo(a)pyrene limit became effective on August 1, 2018 and the Outfall 501 Benzo(a)pyrene interim limit was removed and replaced with monitor and report requirements. The Fact Sheet for the draft Permit also indicates reporting (but no limit) requirements for Benzo(a)pyrene at Outfall 501.

In addition, as is detailed in a separate comment, no Reasonable Potential to Exceed the water quality based effluent limits for Benzo(a)pyrene exists for Outfall 015 (the external outfall to which Outfall 501 discharges). As such the monitoring of Outfall 501 is not necessary.

Requested Change:
Removal of the monitoring requirements and numeric effluent limit of 1.0 ug/l for Benzo(a)Pyrene at Outfall 501.

Response 10: The effluent limitation of 1.0 ug/l as a daily maximum has been changed to report. As identified in Section 5.3.2 of this Fact Sheet, the intent was to have reporting requirements at Internal Outfall 501. The inclusion of the old interim limit was in error.

Comment 11: Issue: Internal Outfall 501 Selenium Monitoring
Reference: Draft NPDES Permit Part I.A.1. (Outfall 501). Page 4 of 151

U. S. Steel Position:
The monitoring frequency for selenium at Outfall 501 should be consistent with the monitoring frequency at Outfall 015 where the numeric selenium limits are applied.

Requested Change:
Revision of the twice per week monitoring for selenium at Outfall 501 to once per week.

Response 11: IDEM agrees to make the above requested change.

Comment 12: Issue: Organic solvents or non-biodegradable chemicals, soaps, and detergents
References: Draft NPDES Permit Part I.A.1. (Internal Outfall 501) Footnote [5]. Page 5 of 151. Draft NPDES Permit Part I.A.2. (Internal Outfall 607) Footnote [6]. Page 7 of 151. Draft NPDES Permit Part I.A.5. (Outfall 019) Footnote [15]. Page 17 of 151.

U. S. Steel Position:
The prohibition against the use of organic solvents or non-biodegradable chemicals soaps and detergents should be removed. To the best of our knowledge, this prohibition is not imposed on any other NPDES discharge in the state and puts U. S. Steel at a competitive disadvantage. Furthermore, we do not

believe that this prohibition is required. The facility is already regulated against the discharge of Total Toxic Organics and must comply with a Toxic Organic Pollutant Management Plan. We believe that is sufficient to prevent the discharge of potentially hazardous materials. Many organic solvents and nonbiodegradable chemicals, soaps, and detergents are currently used at the facility, but are not used in sufficient quantity to adversely impact the final discharge.

Requested Change:
The following footnotes should be removed from the permit:

- Footnote [5], Page 5 of 151 (Outfall 501)
- Footnote [6], Page 7 of 151 (Outfall 607)
- Footnote [15], Page 17 of 151 (Outfall 019)

While U. S. Steel strongly believes removal of the footnotes is correct, if IDEM does not remove them, then U. S. Steel requests that the footnote language be changed as follows:

> *'Organic solvents or non-biodegradable chemicals, soaps, and detergents as well as phosphates should only be managed in such a way that does not impact compliance with the final discharge limits.'*

Lastly, U. S. Steel requests that the following footnotes are identical:

- Footnote [5], Page 5 of 151 (Outfall 501)
- Footnote [6], Page 7 of 151 (Outfall 607)
- Footnote [15], Page 17 of 151 (Outfall 019)

Response 12: IDEM agrees to change the above identified footnotes as suggested in the comment. The inclusion of the original footnote is included due to the washing operations associated with the above outfalls. However, given that there are several other wastewater sources, the original wording is not appropriate.

Comment 13: Issue: Internal Outfall 607 Selenium Monitoring
Reference: Draft NPDES Permit Part I.A.2. (Internal Outfall 607). Page 6 of 151. Fact Sheet Pages 26-27 (Section 5.3.3).

U. S. Steel Position:
Selenium monitoring of Outfall 607 is not required. The Fact Sheet does not include a selenium monitoring requirement for Outfall 607 nor provide a basis for monitoring.

Requested Change:
U. S. Steel requests removal of the selenium monitoring requirements for Outfall 607.

Response 13: The rational for selenium monitoring at Internal Outfall 607 was inadvertently omitted. Selenium monitoring at Internal Outfall 607 is continued to be included in the permit in order to correlate selenium concentrations and sources for Outfall

015, which has exhibited a Reasonable Potential to Exceed Indiana's Water Quality Standards for selenium. IDEM believes, at this time, that once monthly sample analysis at Internal Outfall 607 is sufficient for that purpose.

Comment 14: Issue: Internal Outfall 607 Benzo(a)Pyrene Monitoring
Reference: Draft NPDES Permit Part I.A.2. (Outfall 501). Page 6 of 151.

U. S. Steel Position:
As is detailed in a separate comment, no Reasonable Potential to Exceed the water quality based effluent limits for Benzo(a)pyrene exists for Outfall 015 (the external outfall to which Outfall 607 discharges). As such the monitoring of Outfall 607 is not necessary.

Requested Change:
Removal of the monitoring requirements for Benzo(a)Pyrene at Outfall 607.

Response 14: Monitoring requirements for Benzo(a)pyrene will remain in the permit. While Outfall 015 contains water quality-based effluent limitations for benzo(a)pyrene, the source of benzo(a)pyrene has been historically identified with wastestreams from Internal Outfall 607. In addition, the treatment system associated with Internal Outfall 607 should treat benzo(a)pyrene to non-detectable levels. Therefore, it would not be appropriate to remove pollutants that no longer exhibit an RPE due to treatment. It would be appropriate to continue to monitor or limit the pollutant to ensure the treatment system is operated in an efficient manner.

Comment 15: Issue: Outfall 015 Benzo(a)Pyrene Effluent Limitations and Monitoring
Reference: Draft NPDES Permit Part I.A.3. (Outfall 015). Page 8 of 151. Fact Sheet Page 28 (Section 5.3.4).

U. S. Steel Position:
Numeric effluent limitations are included at Outfall 015 based on a wasteload allocation and reasonable potential to exceed water quality criteria (RPE) evaluation performed in July 2016. Examination of the Outfall 015 discharge data from May 2017 (commencement of the current discharge composition) through January 2021 shows there is no RPE for Benzo(a)Pyrene at Outfall 015. An RPE summary and data to support this are included as Attachment A, Table 1A and Table 1B.

Requested Change:
Removal of the numeric effluent limits and monitoring requirements for Benzo(a)Pyrene at Outfall 015.

Response 15: IDEM will not remove the benzo(a)pyrene limitations at this time. Please refer to Response 14.

Comment 16: Issue: Outfall 015 Lead Effluent Limitations
Reference: Draft NPDES Permit Part I.A.3. (Outfall 015). Page 8 of 151.

U. S. Steel Position:
Evaluation of dissolved lead data for Outfall 015 shows there is no reasonable potential to exceed (RPE) water quality criteria for dissolved lead. Although the final discharge limits for lead are required to be expressed as total metals, the water quality criteria are for the dissolved form. The RPE analysis that serves as the basis of the proposed permit limits was carried out using total metal data and water quality criteria after conversion from a dissolved to total basis. However, if dissolved metals data is available, the RPE analysis can be carried out with both data and criteria in the dissolved form. When the RPE analysis is performed on a dissolved basis, there is no RPE for lead at Outfall 015. An RPE summary and data to support this are included as Attachment A, Table 2.

Requested Change:
Remove Outfall 015 lead limitations and monitoring requirements.

Absent removal of these limitations, U. S. Steel requests inclusion of a specific reopener addressing re-evaluation of the RPE using dissolved data and as appropriate subsequent removal of the limitations following collection of a total of six (6) months of dissolved data. Suggested language is below:

"This permit may be modified or, alternatively, revoked and reissued after public notice and opportunity for hearing to remove effluent limitations for dissolved metals if the permittee submits a minimum of six (6) months of effluent data which shows that the discharge does not have a reasonable potential to exceed applicable water quality criteria for dissolved metals. The six (6) months of dissolved effluent data do not have to be adjacent months."

Response 16: IDEM will not remove lead limitations at Outfall 015 at this time. The dissolved metal data submitted to date is insufficient to determine RPE. IDEM does agree to evaluate dissolved metal data, once enough data has been generated, and determine if an RPE for lead at Outfall 015 exists.

IDEM will not likely take action to reopen the permit for this change. Therefore, no reopener clause is needed. However, the facility may request a modification to the permit, at which time IDEM may modify the permit.

In order for IDEM to consider such a request, dissolved metal data must be collected minimally twice monthly, correlated to total metals sample data at Outfall 015, and for a twelve (12) month period.

Comment 17: Issue: Outfall 015 Zinc Effluent Limitations
Reference: Draft NPDES Permit Part I.A.3. (Outfall 015). Page 8 of 151.

U. S. Steel Position:
Evaluation of dissolved zinc data for Outfall 015 shows there is no reasonable potential to exceed (RPE) water quality criteria for dissolved zinc. Although the final discharge limits for zinc are required to be expressed as total metals, the water quality criteria are for the dissolved form. The RPE analysis that serves as the basis of the proposed permit limits was carried out using total metal data and water quality criteria after conversion from a dissolved to total basis. However, if dissolved metals data is available, the RPE analysis can be carried out with both data and criteria in the dissolved form. When the RPE analysis is performed on a dissolved basis, there is no RPE for zinc at Outfall 015. An RPE summary and data to support this are included as Attachment A, Table 3.

Requested Change:
Removal of Outfall 015 zinc limitations and monitoring requirements.

Absent removal of these limitations, U. S. Steel requests inclusion of a specific reopener addressing re-evaluation of the RPE using dissolved data and as appropriate subsequent removal of the limitations following collection of a total of six (6) months of dissolved data. Suggested language is below:

"This permit may be modified or, alternatively, revoked and reissued after public notice and opportunity for hearing to remove effluent limitations for dissolved metals if the permittee submits a minimum of six (6) months of effluent data which shows that the discharge does not have a reasonable potential to exceed applicable water quality criteria for dissolved metals. The six (6) months of dissolved effluent data do not have to be adjacent months."

Response 17: No changes to the permit were made in response to the above comment. Please refer to Response 16.

Comment 18: Issue: Appropriate statistical techniques for sample results less than the LOQ
Reference: Draft NPDES Permit Part I.A.3. (Outfall 015) Footnote [9]. Pages 9-10 of 151, Outfall (018) Footnote [7] & [8] page 13 of 151, Outfall 019 Footnote [6] & [7] page 16 of 151, Outfall 020 Footnote [7] & [8] page 20 of 151, Outfall 021 Footnote [5] & [6] Page 23 of 151, Outfall 028/030 Footnote [8] & [9] Page 30 of 151, Outfall 032 Footnote [5] & [6] Page 34 of 151, Outfall 033 Footnote [5] & [6] Page 36 of 151.

U. S. Steel Position:
Permit language is ambiguous and unclear when referencing 'appropriate statistical techniques.' By definition, data below an LOQ cannot be statistically confirmed or distinguished with precision or accuracy. Therefore, the exception cannot be implemented and must be removed.

Requested Change:
Footnotes should be restated as follows:

'….Effluent levels greater than or equal to the LOD but less than the LOQ are in compliance with the daily maximum WQBEL.~~, except when confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.~~'

'…When Calculating the monthly average effluent level, daily effluent values that are less than the LOQ, used to determine the monthly average effluent levels less than the LOQ, may be assigned a value of zero (0).~~, unless, after considering the number of monitoring results that are greater than the limit of detection (LOD), and applying appropriate statistical techniques, a value other than zero (0) is warranted.~~'

Response 18: No changes to the permit were made in response to the above comment. The strikethrough language above is language included 327 IAC 5-2-11.6(h)(3).

Comment 19: Issue: Internal Outfall 603 Zinc Limitations
Reference: Draft NPDES Permit Part I.A.10. (Internal Outfall 603). Page 28 of 151.

U. S. Steel Position:
The Technology Based Effluent Limitations (TBELs) which are based on the max monthly average production values for 2015-2019 are more stringent for zinc at Internal Outfall 603. These average production rates for this timeframe are unrealistically low due to a variety of economic and global conditions including low market demand and correspondingly low capacity utilization across the iron and steel industry. These average values are not representative of anticipated future production trends based on both increasing demand and reassignment of certain production quotas from other U. S. Steel locations to Gary Works. U. S. Steel is not requesting an increase in TBELs but retention of the current permit TBELs based on anticipated production rates that are likely to occur during this permit term. This approach has been utilized in other NPDES Permits within USEPA Region 5 (see recently renewed Permit IL0000329) and is in keeping with the guidance in the NPDES Permit Writers' Manual (PWM). When discussing appropriate production values for calculation of TBELs, Section 5.2.2 offers the following overall conclusion: "Whatever value is selected, the permit writer should ensure that the production rate used in deriving mass-based effluent limitations is representative of the actual production likely to prevail during the next term of the permit."

Requested Change:
U. S. Steel requests that the current permit limits for zinc at Outfall 603 continue to be applied in the renewed permit. The current permit limits are 34.5 lbs/day Daily Maximum and 11.5 lbs/day Monthly Average.

Response 19: The zinc limitations at Internal Outfall 603 remain unchanged. The previous zinc limitations were based on maximum monthly production from 2009 to 2013. The zinc limitations included in this permit were based on the maximum monthly production from 2015 to 2019. IDEM believes that limits based on the most recent period of five (5) years production is more appropriate than production rates from eight to twelve years ago. The facility may request a modification if a significant increase in production is expected and detailed information on such is available.

Comment 20: Issue: Outfalls 028/030 (Outfall 600) TSS Limitations
Reference: Draft NPDES Permit Part I.A.11. (Outfalls 028/030 (Outfall 600)). Page 29 of 151; Fact Sheet Pages 34-35.

U. S. Steel Position:
The Technology Based Effluent Limitations (TBELs) which are based on the max monthly average production values for 2015-2019 are more stringent for TSS at Outfall 028/030 (600). These average production rates for this timeframe are unrealistically low, due to a variety of economic and global conditions including low market demand and correspondingly low capacity utilization across the iron and steel industry. These average values are not representative of anticipated future production trends based on both increasing demand and reassignment of certain production quotas from other U. S. Steel locations to Gary Works. U. S. Steel is not requesting an increase in TBELs but retention of the current permit TBELs based on historical production. This approach has been utilized in other NPDES Permits withing USEPA Region 5 (see recently renewed Permit IL0000329) and is in keeping with the guidance in the NPDES Permit Writers' Manual (PWM). When discussing appropriate production values for calculation of TBELs, Section 5.2.2 offers the following overall conclusion: "Whatever value is selected, the permit writer should ensure that the production rate used in deriving mass-based effluent limitations is representative of the actual production likely to prevail during the next term of the permit."

Requested Change:
U. S. Steel requests that the current permit limits for TSS at Outfall 028/030 (600) continue to be applied in the renewed permit. The current permit limits are 5,933 lbs/day Daily Maximum and 2,038 lbs/day Monthly Average.

Response 20: The TSS limitations at Outfalls 028/030 remain unchanged. Please refer to Response 19 for further information.

Comment 21: Issue: Outfalls 028/030 (Outfall 600) Intake Credit for TSS
Reference: Draft NPDES Permit Part I.A.11. (Outfalls 028/030 (Outfall 600)). Page 29 of 151; Fact Sheet Pages 34-35.

U. S. Steel Position:
Intake credits are allowed per 40 CFR 122.45(g) as IDEM states on Page 34 of the fact sheet. U. S. Steel disagrees with IDEM's position that '…IDEM does not agree that a credit and net limitations for TSS are warranted at this time and based on available information.' IDEM seems to base their decision on the fact that the Grand Calumet River is impaired, however TSS is not one of the impairments. The intake allowance does not change the quantity of TSS currently being discharged, it only allows credit for TSS that is beyond U. S. Steel's control.

40 CFR 122.45(g) "Pollutants in intake water" states:

(1) Upon request of the discharger, technology-based effluent limitations or standards shall be adjusted to reflect credit for pollutants in the discharger's intake water if:

(i) The applicable effluent limitations and standards contained in 40 CFR subchapter N specifically provide that they shall be applied on a net basis; or
(ii) The discharger demonstrates that the control system it proposes or uses to meet applicable technology-based limitations and standards would, if properly installed and operated, meet the limitations and standards in the absence of pollutants in the intake waters.

(2) Credit for generic pollutants such as biochemical oxygen demand (BOD) or total suspended solids (TSS) should not be granted unless the permittee demonstrates that the constituents of the generic measure in the effluent are substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere.

(3) Credit shall be granted only to the extent necessary to meet the applicable limitation or standard, up to a maximum value equal to the influent value. Additional monitoring may be necessary to determine eligibility for credits and compliance with permit limits.

(4) Credit shall be granted only if the discharger demonstrates that the intake water is drawn from the same body of water into which the discharge is made. The Director may waive this requirement if he finds that no environmental degradation will result.

(5) This section does not apply to the discharge of raw water clarifier sludge generated from the treatment of intake water.

Attached is an excerpt from the 2017 ArcelorMittal Fact Sheet (NPDES IN0000205) in which it was concluded that the discharge in question to a tributary of Lake Michigan was considered to be discharged to the same body of water as the Lake Michigan intake. The section on Mercury cites 327 IAC 5-2-11.5(b)(4)(B)(iv), which states:

> *(iv) Notwithstanding any other provision in this clause, an intake pollutant shall be considered to be from the same body of water if the permittee's intake point is located on Lake Michigan and the outfall point is located on a tributary of Lake Michigan and the following conditions are met:*
>
> > *(AA) The representative background concentration of the pollutant in the receiving water, as determined under section 11.4(a)(8) of this rule (excluding any amount of the pollutant in the facility's discharge) is similar to or greater than that in the intake water.*
> > *(BB) Any difference in a water quality characteristic (such as temperature, pH, and hardness) between the intake and receiving waters does not result in an adverse impact on the receiving water."*

While 327 IAC 5-2-11.5 (Great Lakes system dischargers determination of reasonable potential to exceed water quality standards) is specific to WQS/RPE, not TBELs such as TSS at Outfall 600, this statement supports the "same body of water" provision that allows credit for intake waters.

U. S. Steel has provided the data that shows elevated TSS in the intake water as well as met the conditions under 40 CFR 122.45(g), therefore intake credits for TSS at Outfall 028/030 should be allowed.

Requested Change:
U. S. Steel requests an allowance for intake credits for TSS at Outfall 028/030 (600). U. S. Steel provided data in the application that demonstrates the significant TSS contribution from non-contact cooling water.

Add footnote [18] to show calculation:
[18] Due to the large quantity of non-contact cooling water discharged through Outfall 028/030 (600), compliance with the TSS limitation is determined by the following formula:
Outfall 600 TSS loading = (028/030 TSS loading) – (No. 2 PS Intake TSS loading),
Where No. 2 PS Intake TSS loading = 8.34*(No. 2 PS Intake TSS in mg/L)*(028 Flow + 030 Flow – 603 Flow)

In instances where the calculated Outfall 600 TSS loading is negative, a value of zero (0) shall be utilized for reporting and compliance purposes.

Response 21: No changes have been made in response to the above comment. Furthermore, the proposed footnote would not be the appropriate application of 40 CFR 122.45(g) as written nor has the permittee provided all the information necessary to evaluate the appropriateness of net credits.

40 CFR 122.45(g) applies to technology-based effluent limitations derived from the Effluent Limitations Guidelines (ELGs) and may allow an intake credit for a pollutant. However, the preamble language to 40 CFR 122.45(g), which begins at 49 FR 38025, makes it clear that a simple subtraction of intake pollutants often does not make sense and would result in relaxing control standards.

The ELGs that are associated with the TSS technology-based effluent limits are from 40 CFR 420, subparts for steelmaking, vacuum degassing, continuous casting, and hot forming. The TBELs from the vacuum degassing and continuous casting subcategory are based on New Source Performance Standards (NSPS), while the steelmaking and hot forming TBELs are based on Best Practicable Control Technology currently available (BPT) standards.

In accordance with 40 CFR 122.45(g)(1)(ii), the permittee would have to demonstrate that the control system it uses to meet applicable technology-based limitations and standards would, if properly installed and operated, meet the limitations and standards in the absence of pollutants in the intake waters. For example, the facility would have to demonstrate whether the NSPS contribution of TSS from the various wastestreams meet the floor requirements with the current technology installed. The Development Document for the Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category, Volume III, identifies the model treatment systems that the ELGs were based on.

For the continuous casting category, the development document (Section IX) identifies the BPT model treatment system as the system used to develop the original BPT limitations promulgated in June 1974. This system includes a primary scale pit equipped with a drag link conveyor and oil removal facilities, a flat bed filter, a cooling tower, and recycle. Suspended solids collected by the scale pit are disposed internally or landfilled. Accumulated oils are hauled away or incinerated. The overflow from the scale pit is pumped to a flat bed filter. The filter effluent is recycled through a cooling tower to the process, except for a small blowdown , which is discharged to a receiving stream. Make-up water is added to the recycle system to compensate for evaporative and blowdown losses.

The BAT model treatment system provided for three (3) alternatives (Section X). These alternatives were an “add-on” to the BPT model treatment system and include lime precipitation and sedimentation of the BPT treatment system blowdown to remove both particulate and dissolved toxic metals. The NSPS model treatment system includes the lime precipitation and sedimentation with the effluent passing through the full flow filter (Section XII).

The facility would have to demonstrate that the control systems it uses for each categorical wastestream are equivalent to, or more proficient for the removal of TSS, than the systems identified in the development document and that proper operation of such systems cannot meet the applicable technology-based limitations and standards due to the presence of TSS in the intake.

A simple subtraction of intake pollutants would not be adequate in demonstrating that because intake pollutants are unlikely to pass through a facility and all of its associated intake and/or effluent treatment without some removal and/or complicated exchange of pollutants. This is typically the case with generic pollutants like TSS.

For example, the development document, in regard to continuous casting (Section VI), states that:

> *The previously limited pollutants, suspended solids, oil and grease, and pH, were chosen based upon the nature of the raw materials and equipment used in the casting process. Suspended solids was chosen because a large quantity of scale is generated by the casting process and carried out by the spray cooling waters. When scale comes into contact with cooling water, the particulates are transferred to the wastewater. The suspended solids concentration indicates the degree to which the process wastewater has been contaminated. Toxic metals are often entrained with solids suspended in the wastewater. The removal of suspended solids often results in removal of toxic metals.*

In addition, ELGs are written and developed on a gross basis without any subtraction (e.g. intake credits) because, within a broad range of influent concentrations, treatment systems typically reduce pollutants to a certain level. The development document (Section VII), regarding the effect of make-up water quality on the control technologies, states that:

> "*Where the mass loading of a limited pollutant in the make-up water to a process is small in relation to the raw waste loading of that pollutant, the impact of make-up water quality on wastewater treatment system performance is not significant, and, in many cases, not measurable. In these instances, the agency has determined that the respective effluent limitations and standards should be developed and applied on a gross basis.*
>
> *As shown in Table VII-4, the effect of make-up water quality for continuous casting operations is not significant when compared to the raw waste loadings for the limited pollutants. The pollutants in the intake water supply do not exceed 5 percent of the pollutants in the raw wastewaters. Thus, the agency has determined the effluent limitations and standards should be applied on a gross basis, except to the extent allowed by 40 cfr 122.63(h)".* [NOTE 122.63(h) was the proposed version/numbering for what is now 122.45(g)]

Secondly, the permittee would have to demonstrate that the TSS contribution from the intake is substantially similar to the TSS of the effluent, as required by 40 CFR 122.45(g)(2). The permittee has provided intake values for TSS. However, as explained in the paragraphs above, it is unlikely that the TSS from the intake is passing through the facility and all the associated treatment systems to the final effluent. The final regulations do not contain details on determining what is considered substantially similar, but the preamble for the final rule (47 FR 38027) states that, "*The tests specified in the proposal may still be considered by permit writers. However, alternatives may be required where necessary for adequate protection*." 47 FR 52090 states that:

> *"The showing of substantial similarity required under 122.63(h)(3) may be made by showing similarity in the levels of priority toxic pollutants in the intake water and effluent, performing an aquatic toxicity test on the intake water and effluent, or in appropriate cases, by demonstrating that the nature of the facility, its processes, or other circumstances make clear that the intake water and effluent are similar."*

The permittee will need to submit a plan as part of a permit modification request detailing how the requirements of 40 CFR 122.45(g)(1) and (2) are met. Following everything above, if the permittee successfully demonstrates that net limits are appropriate, then credit shall be granted only to the extent necessary to meet the applicable limitation or standard up to a maximum value equal to the influent value in accordance with 40 CFR 122.45(g)(3).

Regarding the "*same body of water*" determination, the above comment is correct that 327 IAC 5-2-11.5(b)(4)(B)(iv) states that "*an intake pollutant shall be considered to be from the same body of water if the permittee's intake point is located on Lake Michigan and the outfall point is located on a tributary of Lake Michigan…"* While that rule applies to water-quality based limitations, IDEM may agree to waive the "*same body of water*" requirement of 40 CFR 122.45(g)(4). However, IDEM will review the impairments associated with the Grand Calumet River and possible impacts caused by TSS prior to making such determination. IDEM will notify the permittee if the requirements of 40 CFR 122.45(g)(4) can be waived in future discussions with the permittee. That decision and any modified limits would be incorporated into a modified permit, subject to public notice procedures.

Comment 22: Issue: Outfalls 028/030 (Outfall 600) Compliance Schedule for Zinc
Reference: Draft NPDES Permit Part I.A.11. (Outfalls 028/030 (Outfall 600). Page 29 of 151; Fact Sheet Section 6.2, Page 62

U. S. Steel Position:
Because a new numeric effluent limit for zinc is proposed at Outfalls 028/030 (600), U. S. Steel is eligible for a compliance schedule to meet the proposed effluent limit.

As IDEM points out on page 36 of the fact sheet, there is now a reasonable potential to exceed Indiana's water quality criterion for zinc and U. S. Steel is not currently able to consistently comply with the proposed limits. This was not the case in the current permit and U. S. Steel needs the time afforded by a compliance schedule to investigate and institute appropriate controls if needed.

The fact sheet also states that IDEM's review of the last three years of discharge data indicates that U. S. Steel is currently able to comply with the proposed limits. U. S. Steel disagrees with this statement. Review of the Outfall 600 data from the current permit cycle (November 2015 – January 2021) indicates several instances where the data is above the proposed limitations (for concentration limits - 3 daily maxes and 7 monthly averages; for mass 1 daily max and 5 monthly averages). These instances (many of which occurred in late 2020) indicate the facility is not currently able to comply with the proposed new limits and is eligible for a compliance schedule.

Requested Change:
U. S. Steel requests a 60-month Schedule of Compliance (SOC) to meet the new water quality based effluent limits for zinc at Outfall 028/030 (600).

SOC Action	Milestone
Develop Detailed Work Plan	3-months after Permit Effective Date (PED)
Complete investigation of sources of zinc in Outfall 028/030 (600) and refinement of WQBEL	15-months after PED
Complete alternatives evaluation for compliance with WQBEL	24-months after PED
Selection of specific control option(s) and detailed schedule for implementation	27-months after PED
Complete design of control option(s)	36-month after PED
Complete procurement	42-months after PED
Complete construction	54-months after PED
Complete start-up of control option(s)	60-months after PED

Response 22: No changes have been made to permit in response to the above comment. A review of the data for zinc at Outfall 600 since the beginning of drafting the renewal permit does indicate a sudden increase in zinc concentrations. While the recent data generated since public notice of the draft permit would indicate the facility cannot meet the new WQBEL for zinc, the facility has not been able to identify any explanation that would account for the recent increase zinc values at Outfall 028/020 (600). As noted in the comment above, from July 2017-January 2021 there would have been 3 daily maximum concentration limit exceedances and 1 daily maximum mass limit exceedances. However, most all the data points are consistently below the new WQBEL for zinc. Compliance schedules provide the time necessary to comply with permit conditions as soon as reasonably possible. Therefore, IDEM does not believe it has been properly demonstrated that the permittee would require a 60-month SOC to comply with the limitation.

Comment 23: Issue: Outfalls 028/030 (Outfall 600) Compliance Schedule for Lead
Reference: Draft NPDES Permit Part I.A.11. (Outfalls 028/030 (Outfall 600). Page 29 of 151; Fact Sheet Page 35

U. S. Steel Position:
Because more stringent numeric effluent limits for lead are proposed at Outfalls 028/030 (600), U. S. Steel is eligible for a compliance schedule to meet the proposed effluent limit. The more stringent WQBELs are based on an updated wasteload allocation (WLA) that utilizes different inputs than the WLA upon which current lead limits are based (i.e., reduced upstream flows and lower receiving water hardness).

Requested Change:
Include 60-month compliance schedule to meet new water quality based effluent limits for lead.

SOC Action	Milestone
Develop Detailed Work Plan	3-months after Permit Effective Date (PED)
Complete investigation of sources of Lead in Outfall 028/030 (600) and refinement of WQBEL	15-months after PED
Complete alternatives evaluation for compliance with WQBEL	24-months after PED
Selection of specific control option(s) and detailed schedule for implementation	27-months after PED
Complete design of control option(s)	36-month after PED
Complete procurement	42-months after PED
Complete construction	54-months after PED
Complete start-up of control option(s)	60-months after PED

Response 23: No changes have been made to permit in response to the above comment. 327 IAC 5-2-12.1 states that, “Any existing permit that is reissued or modified to contain a new or more restrictive WQBEL…may allow a reasonable period of time, up to five (5) years from the date of permit issuance or modification, for the permittee to comply with that limit…”. However, a review of the data submitted for lead at Outfall 600 indicates that no reported values from July 2017-January 2021 would have exceeded the new limit for lead at Outfall 600 and the most recent months data show that the new limitations can be met. Therefore, IDEM believes that the permittee can comply with the limitation at this time and a schedule of compliance would not be appropriate.

Comment 24: Issue: GW 10 Emergency Bypass
Reference: Draft NPDES Permit Part I.A.11. (Outfalls 028/030 (Outfall 600)) Footnote [17]. Page 31 of 151.

U. S. Steel Position:
GW-10 is a pump station that transfers non-contact cooling water (NCCW) and partially treated process water from steel producing and hot forming operations to the terminal lagoons for final ‘polishing’ treatment of solids and oil and grease (O&G) prior to discharge through Outfall 028/030 (600). The process flows into GW-10 have already been treated for metals, solids and O&G removal and are monitored via internal monitoring point 603. There is an emergency overflow at GW-10 in the event of pump failure or hydraulic overloading of the GW-10 lift station. This overflow serves to prevent situations in which the sewer leading up to GW-10 becomes fully surcharged causing water to back up into and restrict flow through infrastructure that operates at very high temperatures, and is necessary to prevent catastrophic equipment damage and mitigate high risk of severe injury to employees. The discharge of the overflow from GW-10 is directly to the Grand Calumet River upstream of Outfalls 028/030. Both EPA and IDEM have been aware of this bypass for many years, and procedures were put in place for monitoring and reporting discharges from this location. These procedures are incorporated into a July 1990 Consent Decree entered into by U. S. Steel and the EPA. As per the 1990 Consent Decree, U. S. Steel is required to monitor and sample overflows when they occur at GW-10 and report them in the NPDES DMR under Outfall 028/030. Following the 1990 Consent Decree, a flow monitor was installed to record the volume of water which overflows GW-10 during overflow events, however the data provided by the flow meter proved to be inaccurate and often resulted in false positive readings. This issue was discussed via communication between U. S. Steel and IDEM in a letter dated April 6, 1992. No permanent solution to the issues with obtaining accurate flow measurement of the overflow was found. The drives powering the GW-10 pumps were upgraded to variable frequency drives (VFD’s) in the early 2000’s, and at that time U. S. Steel believed it had addressed the issues which had caused historical overflow events prior to installation of the VFD’s. The flowmeter and automatic sampler, installed as required by the Consent Decree, are no longer present, As a result, U. S. Steel has used estimated flows based on available GW-10 level information and overflow duration information for all overflow events in the last 5 years. Sampling has been performed manually. There have been 2 events in the last 5 years, both of which were reported.

We have previously requested that this discharge be incorporated into our NPDES permit to clarify monitoring and reporting requirements in case of a future overflow event. We have repeated our request for the current renewal.

Requested Change:
The GW-10 emergency overflow should be included as a permitted discharge in our NPDES permit. Footnote [17] should read as follows: ‘In the event of an emergency overflow at GW-10, samples of the overflow must be analyzed for the parameters listed in the discharge limitation table for Outfall 028/030 (600). Results will be reported in the DMR & MMR with the Outfall 028/030 (600) data.’

Response 24: IDEM will remove the last line of Footnote [17], regarding submitting the results within 2 hours of receipt, in response to the above comment. IDEM understands the intent of comment. However, authorizing the discharge from GW-10 directly to the Grand Calumet River would be authorizing a bypass of treatment. IDEM believes that such instances should continue to be reported as emergency bypasses and subject to Part II.B.2 of the permit. Part II.B.2.c.(2) states that, "the permittee shall orally report an unanticipated bypass that exceeds any effluent limitations in the permit…". Therefore, it is expected that the permittee will collect samples for parameters associated with Outfall 028/030 (600) during such bypasses and provide oral notification (within 24-Hours) and written notification (within 5 days) of becoming aware of any sample results from the bypass that exceed the respective limitations for Outfall 028/030 (600).

After review of the previous notifications for bypasses at the GW-10 lift station, it appears that the permittee has taken sample results from previous bypasses and calculated what the discharge would be with the discharge of Outfall 028/030 (600). Only after that was completed would the permittee notify IDEM if that calculation exceeded the effluent limits for Outfall 028/030 (600). Such an approach in applying the notification requirements is incorrect. The facility should report any sample result from the bypass that exceeds the value of the limitation given for Outfall 028/030 (600). In the absence of an effluent violation, the information and data collected shall be submitted in the DMR and MMR with the Outfall 028/030 (600) data.

Comment 25: Issue: Outfall 604, 608, and 609 Total Toxic Organics Related Requirements
References: Draft NPDES Permit Part I.A.14. (Outfall 604) Footnote [5]. Page 39 of 151. Draft NPDES Permit Part I.A.17. (Outfall 608) Footnote [4]. Page 44-45 of 151. Draft NPDES Permit Part I.A.18. (Outfall 609) Footnote [4]. Page 47-48 of 151.

U. S. Steel Position:
The draft Permit footnotes for Total Toxic Organics (TTO) at Outfalls 604, 608, and 609 include the following language and requirements that were not included in previously permit footnotes for TTOs. The entire footnote is included below with the added language in red.

"The limitation for TTO (Total Toxic Organics) applies to the summation of all quantifiable values greater than 0.01 mg/l for all toxic organics listed under 40 CFR 433.11(e) which are reasonably expected to be present. This is a federal effluent guideline based limitation and is not an authorization to discharge toxic organic compounds at levels which cause or may cause water quality violations. The discharge of organic compounds at levels which cause or may cause water quality violations is prohibited. The intent of this limitation is to assure that any solvent or other products in use at the plant, which contain any of the listed toxic organic compounds, are disposed of properly, and not dumped, spilled, discharged or leaked.

Certification Statement
In lieu of monthly monitoring for TTO, the party responsible for signing the monthly discharge monitoring report (DMR) forms may make the following

statement, as part of the DMR: "Based on my inquiry of the persons directly responsible for managing compliance with the permit limitations for TTO, I certify that, to the best of my knowledge and belief, no disposal of concentrated toxic organics into the wastewaters has occurred since filing of the last discharge monitoring report. I further certify that this facility is implementing the Toxic Organic Pollutant Management Plan submitted to the Compliance Data Section of the Office of Water Quality, as required by this permit." The Certification Statement may not be used until completion of the Toxic Organic Pollutant Management Plan required by Part I.J of this permit.

If the above mentioned responsible party is unable to make the above Certification Statement because of discharge or spills of any TTO compounds, the Permittee is required to notify IDEM in accordance with Part II.C.3 of this permit.

Initial GC-MS Scan for TTO's
The Certification Statement does not eliminate the requirement for a complete initial GC/MS (Gas Chromatograph/Mass Spectrophotometer) scan as part of the permit application or Toxic Organic Pollutant Management Plan. Because the results of a GC/MS scan were not included with the permit application, the Permittee must perform at least one scan to characterize its pollutants and wastewaters according to the description below.

At least two (2) grab samples for volatile pollutants and either an eight (8) hour or twenty-four (24) hour composite sample for acid and base/neutral pollutants shall be obtained. Wastewater samples shall be prepared and analyzed by GC/MS in accordance with U.S. EPA Analytical Methods 624 and 625 (40 CFR 136), or subsequently approved methods.

In addition to the quantitative analysis for the priority pollutants, a diligent attempt shall be made to identify and quantify any additional substances indicated to be present in the extracts by peaks on the reconstructed gas chromatographs (total ion plots) more than 10 times higher than the peak-to-peak background noise. Identification shall be by reference to the EPA/NIH computerized library of mass spectra, with visual confirmation by an experienced analyst. Quantification may be an order of magnitude estimate based upon comparison with an internal standard."

The basis of the new language and requirements is unknown; these changes are not addressed in the Fact Sheet. While Part I.J. (Toxic Organic Pollutant Management Plan) does require development and submission of a plan prior to use of the certification statement for TTOs, it does not include or specify analytical monitoring requirements. These requirements also do not appear in the metal finishing effluent limit guidelines (40 CFR 433) which form the basis of the TTO limitations. The original footnote language provided clarity on the TTO limitation and use of the certification statement for the specific defined list of compounds. In particular, the expanded language of the requirement to perform attempted identification of non TTO compounds expands the scope beyond the applicable TTO regulation.

Requested Change:
Removal of the new (above in red) language from the TTO footnotes for Outfall 604, 608, and 609.

Response 25: IDEM agrees to remove the identified above language from the TTO footnotes.

Comment 26: Issue: Internal Outfall 609 TSS, Zinc, Naphthalene and Tetrachloroethylene Limitations
Reference: Draft NPDES Permit Part I.A.18. (Internal Outfall 609). Page 47 of 151.

U. S. Steel Position:
The Technology Based Effluent Limitations (TBELs) which are based on the max monthly average production values for 2015-2019 are more stringent for TSS, zinc, naphthalene, and tetrachloroethylene at Internal Outfall 609. These average production rates for this timeframe are unrealistically low due to a variety of economic and global conditions including low market demand and correspondingly low capacity utilization across the iron and steel industry. These average values are not representative of anticipated future production trends based on both increasing demand and reassignment of certain production quotas from other U. S. Steel locations to Gary Works. U. S. Steel is not requesting an increase in TBELs but retention of the current permit TBELs based on historical production. This approach has been utilized in other NPDES Permits withing USEPA Region 5 (see recently renewed Permit IL0000329) and is in keeping with the guidance in the NPDES Permit Writers' Manual (PWM). When discussing appropriate production values for calculation of TBELs, Section 5.2.2 offers the following overall conclusion: "Whatever value is selected, the permit writer should ensure that the production rate used in deriving mass-based effluent limitations is representative of the actual production likely to prevail during the next term of the permit."

Requested Change:
Retain the existing TSS (4,368 lbs/day Daily Maximum and 1,968 lbs/day Monthly Average), zinc (52.1 lbs/day Daily Maximum and 25.4 lbs/day Monthly Average), naphthalene (1.14 lbs/day Daily Maximum), and tetrachloroethylene (1.71 lbs/day Daily Maximum) TBELs from the current Permit for application at Outfall 609.

Response 26: No changes have been made to the permit in response to the above comments. Please refer to Response 19 for further information.

Comment 27: Issue: Intake Flow Reporting
Reference: Draft NPDES Permit Part I.A.23. Page 63 of 151.

U. S. Steel Position:
In order to meet the 316(b) requirements for impingement, #1 and #2 Pump Station have chosen modified traveling screens with a fish return system as the method of compliance. There is no reason to require daily flow monitoring at #1 and #2 pump stations.

Requested Change:
Remove intake flow reporting requirements under Part I.A.23 for #1 and #2 Pump Stations in favor of 316(b) requirements included in Part IV.B.12 page 143 of 151 of the permit.

Response 27: No changes to the permit have been made in response to the above comment. IDEM does not consider this requirement overburdensome and this data will be used to determine the Actual Intake Flow (AIF) velocity for the next renewal.

Comment 28: Issue: Lakeside Pump Station Impingement BTA Option
Reference: Part I.P.2, Page 110 - 111 of 151

U. S. Steel Position:
The feasibility determination and engineering to determine the BTA for impingement will require more than six (6) months.

Requested Change:
U. S. Steel requests twelve (12) months after the effective date of this permit to choose an impingement mortality BTA.

Response 28: No changes have been made in response to the above comment. Please refer to Response 29 below for additional information.

Comment 29: Issue: Lakeside Pump Station Through Screen Velocity Limitation Schedule of Compliance
Reference: Draft NPDES Permit Part I.A.23. Footnote [7]. Page 63 of 151. Part I.P.2.b, Page 111 of 151

U. S. Steel Position:
The feasibility determination, engineering and installation of reliable equipment for flow measurements need to assess compliance with the through screen velocity limitation will take significant time and may require outages associated with the operations. For these reasons, a schedule of compliance of forty-eight (48) months should be allowed.

Requested Change:
U. S. Steel requests a schedule of compliance of up to forty-eight (48) months to comply with the through screen velocity limitation at the Lakeside Pump Station. The feasibility determination, engineering and installation will take significant time

and may require outages associated with the operations. For these reasons, the schedule of compliance under Part I.P.2.b page 111 of 151 should read as follows:

b. If the permittee has selected the impingement mortality option under 40 CFR 125.94(c)(3) [maximum actual through screen velocity of 0.5 feet per second], the following compliance schedule is applicable.

i. As soon as practicable but no later than twelve (12) months after the effective date of this permit submit to the Industrial NPDES Permits Section, Office of Water Quality (OWQ) for review and approval the available monitoring information, required equipment, and operating protocol which supports the compliance demonstration with maximum actual through screen velocity of 0.5 feet per second.

ii. The permittee shall comply with this requirement as soon as practicable but no later than thirty-six (36) months after notifying IDEM of the chosen impingement mortality option.

Response 29: No changes have been made in response to the comment above. Under 327 IAC 5-2-12(a), "[a] schedule of compliance shall require compliance as soon as reasonably possible, but not later than … three (3) years from the date … requirements are incorporated into the permit." The one year that the permittee has requested to choose the method of compliance with the BTA requirements for this intake are included within this 36-month period. Therefore, the permittee must comply with the BTA requirements for this intake no later than 36 months from the effective date of the permit.

Comment 30: Issue: Pollutant Minimization Program
Reference: Draft NPDES Permit Part I.G. Pollution Minimization Program requirements for silver and total residual chlorine. Page 94 of 151.

U. S. Steel Position:
U. S. Steel already has a Pollution Minimization Program for Gary Works.

This section requires U. S. Steel to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ, and notes specifically that this permit contains WQBELs below the LOQ for Total Residual Chlorine (TRC) and silver. U. S. Steel requests that IDEM revise Part I.G. of the draft permit to clarify that PMPs are not required due to previous submission of control strategies that satisfy the requirements of Part I.G.b.

Proposed revised language for the first paragraph of Part I.G. is listed below with changes in *red italics*.

Requested Change:
"The permittee is required to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the LOQ *unless the*

permittee provides information in accordance with Part I.G.b that demonstrates the discharges will be in compliance with the WQBEL at the point of discharge. This permit contains a WQBEL below the LOQ for Silver at Outfall 034 and TRC at Outfalls 015, 018, 019, 020, 021, 028, 030, 032, 033, 034, 035, 037, and 039. *The permittee has previously submitted information in accordance with Part I.G.b. for Total Residual Chlorine and silver, therefore PMPs will not be required for Total Residual Chlorine.*"

Response 30: IDEM agrees to make the above requested changes. This is consistent with the language in the current permit. In addition, the method LOD and LOQ for silver has been updated in this permit with current LOD/LOQ values. The WQBEL for silver is no longer less than the LOQ. Therefore, the PMP footnotes for silver have been removed from the permit.

Comment 31: Issue: General Whole Effluent Toxicity Testing Requirements
Reference: Draft NPDES Permit Part I.I. Whole Effluent Toxicity Testing Requirements. Page 102 of 151.

U. S. Steel Position:
The timing requirements in the Demonstration of Toxicity (specifically the first sentence of Part I.I.f.(3); page 102 of 151) need to be clarified to indicate the repeat chronic testing must be initiated within 2 weeks of the completion of the initial test failure. The requested clarification is consistent with current Permit requirements.

Proposed revised language is listed below in *red italics.*

Requested Change:
"(3) If toxicity (acute) or toxicity (chronic) is demonstrated in any of the chronic toxicity tests specified above, a repeat chronic toxicity test using the procedures in Part I.I.1. of this permit and the same test species must be initiated within two (2) weeks *of the time the permittee becomes aware of a* test failure."

Response 31: No changes have been made in response to the above comment. This language is in all similarly issued NPDES permits by IDEM.

Comment 32: Issue: Outfall 030 Whole Effluent Toxicity Testing Requirements
Reference: Draft NPDES Permit Part I.I. Whole Effluent Toxicity Testing Requirements. Pages 96 and 101-102 of 151. Fact Sheet Pages 13 and 37.

U. S. Steel Position:
The current Permit and draft Permit both require annual Whole Effluent Toxicity (WET) Testing for Outfall 030. As noted in the Fact Sheet (p.13) the wastewaters discharged by Outfall 028 and Outfall 030 come from three lagoons that receive the same wastewater from the distribution chamber. Between the distribution chamber and final discharge, the wastewaters receive the same treatment

(sedimentation and dechlorination). Virtual Outfall 600 is the mathematical combination of Outfall 028 and Outfall 030. Due to the physical configuration of the lagoon system, two of the lagoons discharge via Outfall 030 and one lagoon discharges via Outfall 028. As such, Outfall 030 is the major flow component (~ 2/3) of Outfall 600 flow. Recognition of Outfall 030 as the major component and the equivalent treatment received by Outfall 028 and Outfall 030 wastewaters is observed with the historical and current Permit requirement for WET testing to be performed with Outfall 030 effluent. U. S. Steel request continuation of this approach for WET testing. In addition the frequency of once per year should also be continued; all historical Outfall 030 WET testing result have been passing, therefore there is no reason for additional WET testing.

Attachment A, Table 4 provides a summary of WET data for Outfall 030 from the current permit cycle.

Requested Change:
U. S. Steel requests no change to frequency of WET testing and that the historical rational for WET testing of Outfall 030 (instead of both Outfall 028 and 030) be documented in the fact sheet.

Response 32: In response to Comment 4, IDEM has changed the annual WET testing at Outfall 030 to twice annually WET testing for Outfall 600. Please refer to Response 4 for additional information.

Comment 33: Issue: Cyanide Requirements
References:
Draft NPDES Permit Part I.N. Cyanide Requirements. Page 108 of 151. Draft NPDES Permit Part I.A.1. (Outfall 501) Footnote [6]. Page 5 of 151. Draft NPDES Permit Part I.A.2. (Outfall 607) Footnote [7]. Page 7 of 151. Draft NPDES Permit Part I.A.3. (Outfall 015) Footnote [19]. Page 11 of 151.

U. S. Steel Position:
U. S. Steel requests continued inclusion of language for this section that allows for use of a 24-hr composite sample type for Total Cyanide and Free Cyanide monitoring. Historically composite sampling for cyanide has been allowed if a discharger can demonstrate that sulfide is not present. The current Permit requirements for cyanide include the following language. In the Draft Permit, the last paragraph (red text) has been removed.

> *"Sample preservation procedures and maximum allowable holding times for total cyanide, or available (free) are prescribed in Table II of 40 CFR Part 136. Note the footnotes specific to cyanide. Preservation and holding time information in Table II takes precedence over information in specific methods or elsewhere. Therefore, cyanide is to be monitored by collecting a representative grab sample and analyzing it within 24 hours. "Representative Grab Sample" is defined as a sample type of three grab samples within 24 hours.*

Upon demonstration to IDEM that "no Sulfides" are present at the effected internal and/or final outfalls and IDEM has reviewed and approved the demonstration, the permittee may collect samples by 24-Hr. Composite."

The Outfall 501, 607, and 015 tables also include apply the following footnote for free cyanide. Outfall 604, 608, and 609 tables (which include total cyanide monitoring) do not include this note.

> *" For the annotated parameters, a "3 Grabs/24 Hrs." sample type means a minimum of three (3) grab samples must be collected at equally spaced time intervals for the duration of the discharge within a twenty-four (24) hour period. The grab samples may be analyzed individually and the arithmetic mean of the concentrations reported as the value for the twenty-four (24) hour period. Alternatively, for grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3(e)) the grab samples may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3(e)) and sample integrity is not compromised by compositing."*

The current version of 40 CFR 136.3, Table II prescribes sample preservation and hold times (listed as 14 days) but does not address sample type requirements cyanide nor concerns about sulfide in the table itself or associated footnotes. When addressing possible interference mitigation techniques, the 40 CFR Table II footnotes do reference ASTM D7365-09a ("Standard Practice for Sampling, Preservation and Mitigating Interferences in Water Samples for Analysis of Cyanide").

The following are relevant footnotes or parts of footnotes from 40 CFR 136 Table II:

- Note 5 (specific to cyanide): "ASTM D7365-09a specifies treatment options for samples containing oxidants (e.g., chlorine) for cyanide analyses. Also, Section 9060A of Standard Methods for the Examination of Water and Wastewater (20th and 21st editions) addresses dechlorination procedures for microbiological analyses."
- Note 6 (specific to cyanide): "Sampling, preservation and mitigating interferences in water samples for analysis of cyanide are described in ASTM D7365-09a. There may be interferences that are not mitigated by the analytical test methods or D7365-09a. Any technique for removal or suppression of interference may be employed, provided the laboratory demonstrates that it more accurately measures cyanide through quality control measures described in the analytical test method. Any removal or suppression technique not described in D7365-09a or the analytical test method must be documented along with supporting data."

ASTM D7365-09a also does not directly address sample type requirements, however, it includes the following relevant statement regarding sulfide.

"Sulfide—During sample collection, test for the presence of sulfide by placing a drop of sample on a lead acetate test strip that has been previously moistened with acetate buffer. If the test strip turns black, sulfide is present (above approximately 50 mg/L S2-) and treatment is necessary as described below."

To summarize, 40 CFR 136.3 does not provide sample type requirements or recommendations for cyanide sample but does indicate a 14 day hold time for cyanide samples. As indicated by the full footnote language in the current permit, historically the concern related to composite samples for cyanide was related to the presence of sulfide. The ASTM method referenced by 40 CFR 136.3 does address sulfide and in doing so provides a recommended technique and estimated concentration level at which sulfide is likely to be concern. With this information, it is reasonable to allow flexibility in cyanide sample type upon demonstration that sulfides are not present at or above the level noted in the cited ASTM method.

Requested Change:
U. S. Steel requests revision of Part I.N as follows (changes in red text).

"Sample preservation procedures and maximum allowable holding times for total cyanide, or available (free) are prescribed in Table II of 40 CFR Part 136. Note the footnotes specific to cyanide. Preservation and holding time information in Table II takes precedence over information in specific methods or elsewhere. Therefore, cyanide is to be monitored by collecting a representative grab sample ~~and analyzing it within 24 hours~~. "Representative Grab Sample" is defined as a sample type of three grab samples within 24 hours.

Upon demonstration to IDEM that "no Sulfides" are present at the effected internal and/or final outfalls and IDEM has reviewed and approved the demonstration, the permittee may collect samples by 24-Hr. Composite."

Response 33: No changes have been made in response to the above comment. As part of a compliance action involving ArcelorMittal Burns Harbor (IN0000175); IDEM, in consultation with EPA, evaluated the appropriate sampling requirements for cyanide. In this evaluation, IDEM and EPA determined that an automatic sampler should not be used for cyanide samples (the absence of sulfide is not a factor in this determination) and if a permit did require a 24-hour composite sample for cyanide, the permittee was required to collect individual grab samples that were each preserved within 15 minutes of collection and these individual grab samples collected during a 24-hour period were to be composited on a flow-proportioned basis to obtain the required 24-hour composite sample. IDEM is in the process of incorporating these changes into NPDES permits as it renews permits. For reference, please see the following ArcelorMittal Burns Harbor Inspection Reports: IDEM Inspection Report for dated March 12, 2020 for a February 5, 2020 inspection (copy available in IDEM VFC); EPA Inspection Report dated February 27, 2020 for a February 5, 2020 inspection (Copy available from IDEM);

IDEM Inspection Report dated August 12, 2020 for a June 22 and July 15, 2020 inspection (copy available in IDEM VFC); and EPA Inspection Report signed September 30, 2020 for an August 12, 2020 inspection (Copy available from IDEM).

Comment 34: Issue: 316(b) Impingement Mortality BTA Schedule of Compliance for # 1 PS
Reference: Draft NPDES Permit Part I.P. Schedule of Compliance. Page 110 of 151; Fact Sheet pages 84-85.

U. S. Steel Position:
The draft permit provides a 36-month compliance schedule for both #1 and #2 pump stations to meet BTA for impingement. This timeframe is based on 327 IAC 5-2-12(a) which includes the following:

> "A schedule of compliance shall require compliance as soon as reasonably possible, but not later than the earlier of the following:
> (1) An applicable statutory deadline.
> (2) A deadline specified in a rule establishing applicable limitations, standards, or other requirements.
> (3) If no statutory or regulatory deadline is expressly applicable, three (3) years from the date applicable standards, limitations, or other requirements are incorporated into the permit.

It is U. S. Steel's understanding that since the federal 316(b) rule does not explicitly include a deadline or timeframe (40 CFR 125.94 (b) indicates applicable facilities must "…comply with the impingement mortality standard in §125.94(c) as soon as practicable. The Director may establish interim compliance milestones in the permit."), IDEM has interpreted the above such that 316(b) Impingement Mortality BTA related compliance schedules are limited to a maximum of 3 years or 36-months. This timeframe is unrealistic for both #1 PS and # 2 PS but in particular #1 PS. The #1 PS will require significantly more time for engineering and construction than that of #2 PS.

The fish friendly return system at #1 Pump Station will require additional time to engineer and construct, due to its location and significant distance from Lake Michigan. Due to the significant underground construction and legacy issues associated with an industrial site, extensive site work / evaluation will be needed to engineer and design a solution as well as additional time needed in construction (and obtaining necessary permits for such). As a result, additional time is needed to complete requirements associated with the schedule of compliance for #1 pump station.

U. S. Steel requests a variance from 327 IAC 5-2-12(a)(3) in keeping with Indiana Code 13-14-8-8:

> "(a) Except as provided in section 9 of this chapter, if a person who is affected by a rule adopted by a board believes that the imposition of the

rule would impose an undue hardship or burden upon the person, the person may apply to the commissioner for a variance from the rule.
(b) If the variance for which a person applies under subsection (a) would be in effect for more than one (1) year, the person's application must include a demonstration of how the person would come into compliance with the rule within the period for which the variance would be in effect.
(c) The commissioner may hold a public hearing on an application submitted under subsection (a).
(d) If the commissioner determines that immediate compliance with the rule would impose an undue hardship or burden upon the applicant, the commissioner may grant a variance from the rule, except as provided in section 9 of this chapter. A variance from a rule may be granted for a period of not more than five (5) years.
(e) If a variance from a rule granted to a person under this section will be in effect for more than one (1) year, the variance must include a schedule requiring the person to come into compliance with the rule within the period for which the variance will be in effect.
(f) The commissioner may revoke a variance granted to a person under this section if the person:

(1) fails to meet the requirements of the compliance schedule set forth in the variance;
(2) receives a notice of noncompliance from the commissioner; and
(3) after receiving the notice of noncompliance, fails to take corrective action in order to comply with the compliance schedule.

If a variance is revoked under this subsection, the person granted the variance shall comply with the rule for which the variance was granted."

Given the concerns for # 1 PS, imposition of a 36-month compliance schedule constitutes an undue hardship or burden especially when examined in the context of the federal language to comply "as soon as practicable".

Requested Change:
U. S. Steel requests a 60-month alternate schedule to complete activities associated with the schedule of compliance for #1 PS impingement BTA as follows:

The below schedule of compliance is for installation of the selected BTA for impingement at Pump Station No. 1 Intakes. The permittee shall install new modified traveling screens with fish friendly return and that meet the definition of the rule 125.92(s) at these intakes no later than sixty (60) months after the effective date of this permit in accordance with the following schedule.

a. As soon as practicable but no later than twelve (12) months after the effective date of the permit submit to the Industrial NPDES Permits Section of Office of Water Quality (OWQ) for review a conceptual design and plan for the modified traveling screens including fish return.

b. As soon as practicable, but no later than twenty-four (24) months after the effective date of the permit, complete detailed design of the modified traveling screens, including the fish return systems.

c. As soon as practicable but no later than thirty-six (36) months after the effective date of the permit, initiate construction of the modified traveling screens and fish return systems.

d. As soon as practicable, but no later than sixty (60) months after the effective date of the permit, complete construction of the modified traveling screen and fish return systems.

Response 34: No changes have been made in response to the above comment. IDEM has consistently interpreted 327 IAC 5-2-12 to require compliance within a maximum of three (3) years. Additionally, the permittee submitted insufficient information for IDEM to consider or grant a variance under IC 13-14-8-8 from the compliance schedule requirements established under 327 IAC 5-2-12. Therefore, as required by 327 IAC 5-2-12, the permit requires compliance with the BTA requirements for these two intakes by no later than three years after the effective date of the permit.

Comment 35: Issue: 316(b) Impingement Mortality BTA Modified Traveling Screen Optimization study
Reference: Draft NPDES Permit Part IV.B.5, 6 & 7 Page 141 - 142 of 151.

U. S. Steel Position:
The proposed 24-month timeline to submit the study plan for the modified traveling screen optimization study is unreasonable due to the fact that the traveling screen modification will not be fully engineered by that time. Detailed design needs to be completed and approved prior to developing the optimization plan.

Requested Change:
U. S. Steel requests that the language in Part IV.B.5, 6 & 7 be changed to allow 36 months from the effective date of the permit to submit the study plan for the traveling screen optimization study to IDEM.

Response 35: No changes to the permit have been made in response to the comment above. IDEM believes that the 24 months provided is sufficient for the permittee to develop the study plan for this optimization study. In addition, as noted in the Response 29, IDEM is not changing the length of the compliance schedule provided in the permit for compliance with these BTA requirements for these two intakes. As such, the permit still requires the submittal of complete detailed design and plan for the modified traveling screens and fish return must be submitted no later than 18 months after the effective date of the permit.

Comment 36: Issue: Alternative Thermal Effluent Limits (ATELs)
Reference: Draft NPDES Permit Part III.A.1. and Part III.B. Pages 131-135 of 151.

U. S. Steel Position:
Compliance for the existing ATELs for discharges to the Grand Calumet River are currently applied instream at monitoring points 220 and 230 (Part III.A.1). In the submissions required by Part III.B. Future Thermal Demonstration, U. S. Steel intends to continue this approach of instream monitoring and compliance for approved ATELs.

Requested Change:
U. S. Steel requests the addition of clarifying language to Part III.B to clearly indicate the requirements relate the existing instream ATELs.

Response 36: No changes to the permit have been made in response to the above comment. The facility may intend to currently apply ATELs at monitoring points 220 and 230. However, IDEM is requiring the facility to submit an updated 316(a) demonstration study to determine the appropriateness of the ATELs and/or monitoring locations. Section 6.3.1.H of this Fact Sheet provides additional information on this requirement.

Comment 37: Issue: Actual Intake Flows Annual Summary
Reference: Draft NPDES Permit Part I.A.23, Page 63 of 151.

U. S. Steel Position:
Actual intake flows are calculated in some instances.

Requested Change:
U. S. Steel requests permit conditions of sample type in Table 1 page 63 to specify 'Measured or Calculated' for all intake flows.

Response 37: IDEM will incorporate 'Measured or Calculated' for all intake flows in Table 1 of Part I.A.23. However, the permittee must provide the data and calculations used to calculate the flows with their annual report submitted under Part IV.B.12 of the Permit. Part IV.B.12 of the Permit has been changed to read: *[added language]*

12. The permittee must submit an annual summary of the actual intake flows measured *or calculated* at a minimum frequency of daily. *For all calculated intake flows, the permittee must provide the data and calculations used to calculate each calculated intake flow in this annual report.*

In addition, Footnote [8] has been added to Part I.A.23 that states:

[8] The permittee must measure or calculate the intake flow at a minimum frequency of daily. The data and methods used to determine the

intake flow shall be included in the annual report required to be submitted under Part IV.B.12. If the permittee uses the calculation method to determine the intake flow, the input values and calculation for each day shall be included in the annual report.

Comment 38: Issue: Fish Handling and Return Systems
Reference: Draft NPDES Permit Part IV.B.16. Page 144 of 151.

U. S. Steel Position:
Fish handling and return systems are not required to be buried. While the submitted 316(b) documents frame the fish handling and return systems as buried, this was done in the context of presenting costs and benefits with various compliance options and not in support of final design. Final design will include fish handling and return systems that meet the intended purpose but the requirement for buried returns is premature.

Requested Change:
U. S. Steel requests permit language to be revised as follows:

"16. The permittee shall construct ~~buried~~ fish handling and return systems (FHRS) at No. 1 Pump Station and No. 2 Pump Station.

Response 38: IDEM has made the above requested change.

Comment 39: Issue: Outfall 015 Pollutant Minimization Program Plan (PMPP) Table
Reference: Draft NPDES Permit Part V. Pages 150-151 of 151.

U. S. Steel Position:
A condition of the approved SMVs is develop and implementation of a PMPP. For each of the approved SMVs, IDEM has incorporated the PMPP table of activities into the draft Permit. The table of activities shown for Outfall 015 on pages 150-151 of the draft Permit is incorrect. The activities listed are not from the Outfall 015 PMPP but from the Outfall 034 PMPP. Renewal of the SMV for Outfall 034 was not requested.

Requested Change:
U. S. Steel requests replacement of the Outfall 034 activities table with the Outfall 015 activities table.

Response 39: IDEM has made the above requested change.

Comment 40: Issue: Visible Oil Corrective Action Monitoring Program (VOCAMP)
Reference: Draft NPDES Permit Part I.L Page 107 of 151

U. S. Steel Position:
Requirements associated with the VOCAMP were established in a Consent Decree between U. S. Steel and the EPA.

Requested Change:
U. S. Steel requests that Outfall 028 be removed from Part I.L to match the requirements in the Consent Decree.

Response 40: IDEM has made the above requested change.

Comment 41: Issue: Anti-backsliding and Technology Based Effluent Limits
Reference: Fact Sheet Page 46.

U. S. Steel Position:
The numeric Technology Based Effluent Limits (TBELs) values from the current Permit are retained for several parameters even though calculated TBELs based on recent production data are higher. Compliance with the anti-backsliding provisions of 327 IAC 5-2-10(a)(11) is cited as the rationale for this.

However, the restriction on backsliding in Indiana and parallel language in the Clean Water Act (CWA 402(o)(1)) apply only to limits properly based on best professional judgement (when there is subsequent promulgation of federal effluent limit guidelines or ELGs) or water quality based effluent limitations.

> From 327 IAC 5-2-10(a)(11)(A): "In the case of effluent limitations established on the basis of Section 402(a)(1)(B)* of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under Section 304(b)* of the CWA subsequent to the original issuance of the permit to contain effluent limitations that are less stringent than the comparable effluent limitations in the previous permit. ..."

With the exception of the Oil & Grease TBELs (Oil & Grease Bubble) for Outfalls 028/030 (600) and Outfall 034, none of the TBELs for which anti-backsliding is cited (Outfall 605 TSS and Oil & Grease, Outfall 609 Nickel, Chromium, Total Cyanide, and TTO) are BPJ TBELs.

Even if the backsliding prohibition were applicable to this situation, exceptions to that prohibition would justify revision of the current limits.

> From 327 IAC 5-2-10(a)(11)(B): "A permit, in which clause (A) applies, may be renewed, reissued, or modified to contain less stringent effluent limitations applicable to a pollutant if:

(i) material and substantial alterations or additions to the permitted facility occurred after permit issuance that justify the application of a less stringent effluent limitation;
(ii) …..”

Similar language is found in 40 CFR 122.44(l):

“Reissued permits. (1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under §122.62.)

(2) In the case of effluent limitations established on the basis of Section 402(a)(1)(B) of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 304(b) subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit.

(i) Exceptions—A permit with respect to which paragraph (l)(2) of this section applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant, if—

(A) Material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;
(B) …”

As part of the permit writing process production based non-BPJ TBELs are based on anticipated production rates for the next permit term. Often this relies on recent production data or projections. These values can fluctuate from term to term and changes in production qualify for the above cited exception to backsliding.

The below cited language from the Fact Sheet for NPDES Permit AS0000019 (February 2020, as Revised February 2021), issued by the U.S. EPA[1] demonstrates that changes in production levels constitute an exception from backsliding prohibitions.

“Compliance with Federal Anti-Backsliding Regulations and American Samoa Antidegradation Policy for Proposed Technology-based Effluent Limitations. ELGs provide the basis for technology-based effluent limits in the permit. Section 402(o) of the CWA prohibits the renewal or reissuance of an existing NPDES permit that contains technology-based effluent limits that are less stringent than those established in the previous permit, except as provided in 40 CFR 122.44(l). This is referred to as "antibacksliding." The permit establishes less stringent mass-based technology-based effluent limitations for total suspended solids and oil and grease based on an estimated increase in the daily production level over the term of the permit (ELGs for seafood processors are production based). 40 CFR 122.44(l)(1) allows for backsliding to technology-based effluent limitations in the permit since circumstances on which the previous permit were based, i.e., a lower production of processed tuna than projected in the permit term, have materially and substantially changed since the time the previous permit was issued and would have constituted cause for a permit modification under 40 CFR 122.62(a)."

Requested Change:
U. S. Steel is not requesting increased TBELs over those in the current Permit but requests recognition in the Fact Sheet that anti-backsliding does not prohibit increased for the above described situation: non-BPJ TBELs calculated in accordance with previously enacted ELGs.

Response 41: The antibacksliding rationale in Section 5.5 of this Fact Sheet has been updated to clearly explain the retention of certain TBELs in this renewal.

Comment 42: Issue: Typographic Errors
Reference: Draft NPDES Permit Part I.A.16. (Internal Outfall 606) Footnote [1]. Page 43 of 151.

U. S. Steel Position:
Typographic errors

Requested Change:
[1] The permittee may discharge non-process wastewaters associated with steel finishing operations via the 84" X 91" sewer to the final oil skimming basin at Outfall 034 for treatment prior to discharge ~~to discharge~~ through Outfall 034.

Response 42: IDEM has made the above requested change.

Comment Letter from Alliance For The Great Lakes; Environmental Law &Policy Center; Hoosier Environmental Council; National Parks Conservation Association; Save the Dunes; Sierra Club Hoosier Chapter

Comment 43: IDEM Should Require Renewed Investigation of Mercury Control Technologies

USS filed its last engineering review report assessing mercury control technologies on February 28, 2013. Following submission of that report, IDEM granted Streamlined Mercury Variances (SMV) for all mercury discharges at the facility. Since that time, IDEM has not required USS to resume any investigation of mercury control technologies that could potentially remove mercury from effluent and achieve Water Quality-Based Effluent Limitations (WQBEL) for mercury (i.e., 1.3 ng/l monthly average and 3.2 ng/l daily maximum) that IDEM has identified for the facility. Instead, the Draft Permit renews the existing SMVs for outfalls 018, 019, 020 and 028/030 for yet another five-year term with interim discharge limits that exceed the WQBEL, without imposing any obligation on USS to investigate, pilot test and/or select an effective mercury control technology to achieve compliance.

For the reasons set forth in Comments 2 and 3 (44 and 45 below), IDEM should not renew the SMVs. Rather, IDEM should issue a Schedule of Compliance for each of the outfalls that includes technology forcing requirements that will require USS to complete its investigation, pilot testing and technology selection and then install mercury control technology that will bring USS into compliance. If, however, IDEM elects to continue the SMVs, the mercury Pollution Minimization Program Plan (PMPP) for each outfall should be modified to incorporate these technology-forcing requirements to achieve compliance with WQBELs as soon as practicable but within the term of the SMV.

Response 43: No changes have been made in response to the above comment. 327 IAC 5-3.5-7(b) states:

> The department may renew an initial SMV in accordance with IC 13-14-8-9 if the applicant demonstrates that implementation of the PMPP has achieved progress toward the goal of reducing mercury from its discharge except as provided in subsection (d).

327 IAC 5-3.5-7(d) states that:

> A PMPP must be revised if implementation of the original PMPP does not lead to demonstrable progress in minimizing the discharge of mercury. If the applicant can provide information, as part of a revision to a PMPP, that demonstrates there is no known reasonable additional action that will reduce mercury, the PMPP may remain as previously approved.

IDEM has reviewed the PMPPs for each outfall and finds the PMPPs for each outfall to be consistent with the requirements of 327 IAC 5-3.5-7. It should be noted that as part of the Schedule of Compliance requirements for Outfall 015 during the previous permit cycle, the facility indicated in their Schedule of Compliance Progress Report that treatment technologies were evaluated and concluded that, “at this time no known treatment technology is available to consistently meet the 1.3 ng/l monthly average limit at full-scale.” There are no requirements in 327 IAC 5-3.5-7 specifically requiring evaluations of control technologies.

Comment 44: Renewal of SMVs is not Warranted

The SMVs granted to USS over the years have not achieved an important pollution control goal and should not be renewed. In the Draft Permit Fact Sheet, IDEM acknowledges that the SMV is an interim measure, and is intended to help the permittee to achieve compliance with applicable water quality standards: "The goal of the SMV is to reduce the effluent levels of mercury, and achieve as soon as practicable, compliance with the WQBELs through implementation of a Pollution Minimization Program Plan (PMPP)." Draft Permit Fact Sheet, p. 101 (emphasis added). IDEM may renew an SMV "if the applicant demonstrates that the implementation of the PMPP has achieved progress toward the goal of reducing mercury from its discharge except as provided in subsection (d)," (327 IAC 5-3.5-7(d)). Since the SMVs are not moving USS meaningfully toward compliance through demonstrated reductions of mercury in effluent continued renewal of the SMVs is not warranted and not supported by Indiana's pollution control regulations.

Neither the Draft Permit Fact Sheet nor the Draft Permit contain findings to sustain IDEM's continued renewals of the SMVs. If IDEM has concluded that USS has presented in its permit renewal application data sufficient to demonstrate actual, long-term reduction of mercury in the effluent at any of the outfalls for which an SMV has been granted, then IDEM should state that conclusion affirmatively and present the specific data or references upon which it relies.

If IDEM has not made, or cannot make, an express finding that USS has achieved meaningful mercury reductions during the preceding term of SMVs for each outfall, then the pollutant reduction goal of the SMV has not been satisfied--and either the request for renewal of the SMV must be denied, or the PMPP associated with that SMV must substantially revised to put the permittee on a path towards compliance (See 327 IAC 5-3.5-7(d)). Since the regulatory conditions for SMV renewal have not been met for this permit renewal, IDEMs renewals for Outfalls 018, 019, 020 and 028/030 are not warranted and may violate the SMV regulations. Indiana's SMV program is not intended to create a scheme of perpetually renewed SMVs that push compliance into an indefinite future (See IAC and IC regulations referenced in Draft Permit Fact Sheet, p 100-102).

Response 44: No changes have been made in response to the comment above. Please refer to Response 43 for additional information. In accordance with 327 IAC 5-3.5-7(d), "If the applicant can provide information, as part of a revision to a PMPP, that demonstrates there is no known reasonable additional action that will reduce mercury, the PMPP may remain as previously approved." The facility submits annual SMV progress reports that detail the progress and implementation of PMPP activities required by 327 IAC 5-3.5-9 for each outfall containing a SMV. These progress reports provide details of activities taken to date, as well as any planned activities, for each outfall. IDEM reviews these progress reports and determines if additional activities are warranted. At this time, IDEM cannot identify any additional activity that would likely result in further lowering of mercury discharges.

Comment 45: New SMV for Outfall 015 is not Warranted

In the 2015 Final Permit, IDEM established an SMV for Outfall 015 and assigned an Interim Discharge Limit (IDL) of 3.7 ng/L monthly average, which is well-above the applicable WQBELs (i.e., 1.3 ng/l monthly average and 3.2 ng/l daily maximum). The IDL for Outfall 015 was in effect until IDEM removed the SMV in the January 13, 2017, modified permit. That modified permit reverted the effluent limitation back to the WQBEL and established a 60-month Schedule of Compliance, at the end of which USS would have been required to achieve compliance with the WQBELs.

The SMV for Outfall 015 in the Draft Permit is moving in the wrong direction. The Draft Permit contains a new SMV for Outfall 015 and sets a new IDL of 14 ng/L monthly average, more than three times the IDL established in the 2015 permit for this outfall. Neither the Draft Permit nor the Fact Sheet explain the basis for this backsliding other than indicating that this was the highest daily value for mercury from the previous two years. Since an SMV, if properly granted, is intended to reduce rather than increase mercury levels in effluent, IDEM should clearly state the justification for granting a new SMV for Outfall 015 (Draft Permit Fact Sheet p. 100-102). The SMV regulations cannot be applied in such a way as to allow a permittee to increase mercury in its effluent. IDEM should consider removing the SMV for Outfall 015 and instituting a compliance schedule that will bring the mercury effluent at this outfall into compliance with the WQBELs as soon as practicable.

Response 45: No changes to the permit have been made in response to the above comment. Please refer to Response 2 for further information.

Comment 46: SMV/PMPPs are not Stringent enough

A mercury PMPP incorporated into an SMV is intended to achieve actual reductions of mercury in effluent during the term of the PMPP and achieve, as soon as practicable and no later than the end of the SMV term, compliance with the applicable WQBELs (E.g. Draft Permit Fact Sheet, p. 101; Draft Permit, p. 146). Data included in USS's Renewal Application do not demonstrate that actual reductions have been achieved, despite PMPPs in effect for over ten years for this facility.

Merely renewing the SMVs with PMPPs that have not led to sustained, demonstrable reductions of mercury in effluent does not satisfy regulatory requirements (See IAC and IC regulations referenced in Draft Permit Fact Sheet, p 100-102). IDEM should reconsider the PMPPs associated with each outfall and strengthen the requirements, such that it is reasonable to expect that compliance with water quality standards will be achieved by the end of the SMV term.

If IDEM does not believe compliance via performance of the PPMPs will likely be achieved, then renewing the SMVs is not warranted and does not meet regulatory requirements for granting an SMV (See IAC and IC regulations referenced in Draft Permit Fact Sheet, p 100-102). IDEM should remove the SMVs and establish a Schedule of Compliance that will force USS to implement mercury control technologies that will achieve compliance. Similarly, since the PMPP incorporated into the new SMV for Outfall 015 (see Draft Permit, p. 146) is nearly identical to the existing PMPPs at other outfalls which have not achieved compliance, this comment applies equally to Outfall 015.

Response 46: No changes to the permit have been made in response to the above comment. Please refer to Responses 43 and 44 for additional information. IDEM believes the requirements of 327 IAC 5-3.5-7 have been met.

Comment 47: Possible Violation of Antibacksliding and Antidegradation Requirements

In Section 5.5 of the Draft Permit Fact Sheet, IDEM notes that effluent limitations for conventional, toxic and non-conventional pollutants at Outfalls 028/030 (Outfall 600), 034, 015 and Internal Outfall 609 have been revised and are now less stringent than the corresponding limitations contained in the previous permit. IDEM correctly notes that the anti-backsliding regulations do not allow loosening of effluent limitations unless one of the stated exceptions applies (See 327 IAC 5-2-10(a)(11)).

IDEM offers no explanation for the exception to 327 IAC 5-2-10(a)(11) in either the Draft Permit or the Fact Sheet that justifies the loosening of pre-existing limitations. IDEM does note in Section 5.5 that USS "…has consistently met the TBELs identified above. Therefore, those TBELs shall be retained from the previous permit." If this is offered as a rationale for less stringent effluent limitations, it is invalid; Indiana regulations do not recognize this as a valid basis for violating the anti-backsliding policy. In its presentation slide deck, IDEM states that none of the regulatory exceptions to the anti-backsliding rule applies. Thus, the less stringent effluent limitations at those outfalls appear to violate 327 IAC 5-2-10(a)(11).

In Section 5.6 of the Fact Sheet, IDEM offers an explanation for compliance with the state's antidegradation policy, i.e. the new permit limitations are not the result of deliberate activity taken by the permittee. However, since IDEM admits that higher mass limitations have been set due to increased flow, it is important to know whether the increased flow is the result of deliberate USS activity. If so, it is possible the antidegradation regulation will be violated. We ask that IDEM explain how it has complied with the antidegradation regulation, 327 IAC 2-1.3.

Response 47: Section 5.5 of the Fact Sheet has been updated to more clearly explain that the previous permit limitations have been retained instead of including the less stringent limitations calculated as part of this permit renewal process.

Appendix A
Technology-Based Effluent Limitation Calculations

Internal Outfall 603 to Outfalls 028/030

			Parameter															
			TSS				O+G				Lead				Zinc			
40 CFR	**Production Unit/Area**	**Production Value (Ton/day)**	ELG Coefficient		Calculated TBEL (lbs/day)		Coefficient		Calculated TBEL (lbs/day)		Coefficient		Calculated TBEL (lbs/day)		Coefficient		Calculated TBEL (lbs/day)	
			DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA
420.42(c)	#1 BOP & #2 BOP	18807	0.0687	0.0229	2584	861.4												
420.43(c)											0.000413	0.000138	15.5	5.19	0.000620	0.000207	23.3	7.79
420.54	Vacuum Degassing	3625	0.00730	0.00261	52.9	18.9					0.0000939	0.0000313	0.68	0.227	0.000141	0.0000469	1.02	0.340
420.62	No. 1 Continuous Casting	4637	0.0780	0.0260	723	241	0.0234	0.00780	217	72.3								
420.63											0.0000939	0.0000313	0.871	0.290	0.000141	0.0000469	1.31	0.435
420.64	No. 2 Continuous Casting	13329	0.00730	0.00261	195	69.6	0.00313	0.00104	83.4	27.7	0.0000939	0.0000313	2.503	0.834	0.000141	0.0000469	3.76	1.250
420.72(c)(2)	160"/210" Plate Mill	2797	0.227	0.0851	1270	476	0.0568		318									
	Total Calculated Limitation (lbs/day)				4825	1667			618	100			19.59	6.54			29.41	9.81

Internal Outfall 605 to Outfall 034

			Parameter							
			TSS				O+G			
40 CFR	**Production Unit/Area**	**Production Value (Ton/day)**	ELG Coefficient		Calculated TBEL (lbs/day)		Coefficient		Calculated TBEL (lbs/day)	
			DM	MA	DM	MA	DM	MA	DM	MA
420.72(C)(1)	84" Hot Strip Mill	16335	0.427	0.160	13950	5227	0.107		3496	
	Total Calculated Limitation (lbs/day)				13950	5227			3496	Report

Internal Outfall 604 to Outfall 034

Parameter

40 CFR	Production Unit/Area	Production Value (Ton/day)	TSS ELG Coefficient DM	TSS ELG Coefficient MA	TSS Calculated TBEL (lbs/day) DM	TSS Calculated TBEL (lbs/day) MA	O+G Coefficient DM	O+G Coefficient MA	O+G Calculated TBEL (lbs/day) DM	O+G Calculated TBEL (lbs/day) MA	Lead Coefficient DM	Lead Coefficient MA	Lead Calculated TBEL (lbs/day) DM	Lead Calculated TBEL (lbs/day) MA	Zinc Coefficient DM	Zinc Coefficient MA	Zinc Calculated TBEL (lbs/day) DM	Zinc Calculated TBEL (lbs/day) MA
420.92(b)(2)	80" South Pickle Line	2005	0.0818	0.0350	328	140	0.0350	0.0117	140	46.9	0.000526	0.000175	2.11	0.702	0.000701	0.000234	2.81	0.938
420.93(b)(2)											0.000526	0.000175	2.11	0.702	0.000701	0.000234	2.81	0.938
420.92(b)(4)	80" South Pickle Line Scrubber	1 Scrubber	5.72	2.45	12.60	5.40	2.45	0.819	5.40	1.80	0.0368	0.0123	0.0811	0.0271	0.0491	0.0164	0.108	0.0361
420.93(b)(4)											0.0368	0.0123	0.0811	0.0271	0.0491	0.0164	0.108	0.0361
420.92(b)(2)	84" North Pickle Line	5774	0.0818	0.0350	945	404	0.0350	0.0117	404	135	0.000526	0.000175	6.07	2.02	0.000701	0.000234	8.10	2.70
420.93(b)(2)											0.000526	0.000175	6.07	2.02	0.000701	0.000234	8.10	2.70
420.92(b)(4)	84" North Pickle Line Scrubber	1 Scrubber	5.72	2.45	12.60	5.40	2.45	0.819	5.40	1.80	0.0368	0.0123	0.0811	0.0271	0.0491	0.0164	0.108	0.0361
420.93(b)(4)											0.0368	0.0123	0.0811	0.0271	0.0491	0.0164	0.108	0.0361
420.92/93(a)(3)	No. 1 Tin Free Steel Line	Inactive																
420.92/93(b)(2)	No. 1 Electrogalvanizing	Inactive																
420.92(a)(3)	No. 5 Electrolytic Tinning Line	458	0.0526	0.0225	48.2	20.6	0.0225	0.0075	20.6	6.88	0.000338	0.000113	0.310	0.104	0.000451	0.000150	0.413	0.137
420.93(a)(3)											0.000338	0.000113	0.310	0.104	0.000451	0.000150	0.413	0.137
420.92(a)(3)	No. 6 Electrolytic Tinning Line	836	0.0526	0.0225	87.9	37.6	0.0225	0.0075	37.6	12.56	0.000338	0.000113	0.565	0.189	0.000451	0.000150	0.754	0.251
420.93(a)(3)											0.000338	0.000113	0.565	0.189	0.000451	0.000150	0.754	0.251
420.102(a)(2)	No. 5 Stand Cold Reduction Mill	5584	0.0063	0.0031	69.9	35.0	0.0026	0.001	29.1	11.6	0.0000469	0.0000156	0.524	0.174	0.0000313	0.0000104	0.350	0.116
420.103(a)(2)											0.0000469	0.0000156	0.524	0.174	0.0000313	0.0000104	0.350	0.116
420.102(a)(2)	No. 6 Stand Cold Reduction Mill	1511	0.0063	0.0031	18.9	9.46	0.0026	0.001	7.89	3.14	0.0000469	0.0000156	0.142	0.047	0.0000313	0.0000104	0.095	0.031
420.103(a)(2)											0.0000469	0.0000156	0.142	0.047	0.0000313	0.0000104	0.095	0.031
420.102(a)(2)	48" Temper Mill	849	0.0063	0.0031	10.6	5.31	0.0026	0.001	4.43	1.77	0.0000469	0.0000156	0.080	0.026	0.0000313	0.0000104	0.053	0.018
420.103(a)(2)											0.0000469	0.0000156	0.080	0.026	0.0000313	0.0000104	0.053	0.018
420.102(a)(2)	84" Temper Mill	345	0.0063	0.0031	4.32	2.16	0.0026	0.001	1.80	0.72	0.0000469	0.0000156	0.032	0.011	0.0000313	0.0000104	0.022	0.007
420.103(a)(2)											0.0000469	0.0000156	0.032	0.011	0.0000313	0.0000104	0.022	0.007
420.102(a)(2)	Hot Coil Prep Line	Inactive																
420.103(a)(2)																		
420.102(a)(4)	North Sheet Temper Mills: 80" Temper	2152	0.0225	0.0113	96.8	48.6	0.0094	0.0038	40.4	16.2	0.000169	0.0000563	0.727	0.242	0.000113	0.0000376	0.486	0.162
420.103(a)(4)											0.000169	0.0000563	0.727	0.242	0.000113	0.0000376	0.486	0.162
420.102(a)(4)	North Sheet Temper Mills: 80" Recoil	321	0.0225	0.0113	14.4	7.25	0.0094	0.0038	6.03	2.41	0.000169	0.0000563	0.108	0.036	0.000113	0.0000376	0.073	0.024
420.103(a)(4)											0.000169	0.0000563	0.108	0.036	0.000113	0.0000376	0.073	0.024
420.102(a)(5)	No. 2 Stand Temper Mill	490	0.100	0.0501	98.0	49.1	0.0417	0.0167	40.9	16.4	0.000751	0.000250	0.736	0.245	0.000501	0.000167	0.491	0.164
420.103(a)(5)											0.000751	0.000250	0.736	0.245	0.000501	0.000167	0.491	0.164
420.102(a)(5)	Tin Double Cold Reduction Mill	800	0.100	0.0501	160	80.2	0.0417	0.0167	66.7	26.7	0.000751	0.000250	1.20	0.400	0.000501	0.000167	0.802	0.267
420.103(a)(5)											0.000751	0.000250	1.20	0.400	0.000501	0.000167	0.802	0.267
420.112(b)	No. 1 Electrogalvanizing	Inactive																
420.112(b)	No. 1 Tin Free Steel Line	Inactive																
420.112(b)	No. 2 Continuous Anneal Line	867	0.102	0.0438	177	75.9	0.0438	0.0146	75.9	25.3								
420.112(b)	No. 5 Electrolytic Tinning Line	458	0.102	0.0438	93.4	40.1	0.0438	0.0146	40.1	13.4								
420.112(b)	No. 6 Electrolytic Tinning Line	836	0.102	0.0438	171	73.2	0.0438	0.0146	73.2	24.4								
420.112(b)	No. 6 Galvanizing	Inactive																
420.112(b)	No. 7 Cleaning Line	607	0.102	0.0438	124	53.2	0.0438	0.0146	53.2	17.7								
420.112(b)	No. 8 Galvanizing	Inactive																
420.122(a)(1)	No. 6 Galvanizing Line	Inactive																
420.123(a)(1)																		
420.122(c)	No. 6 Galvanizing Line Fume Scrubber	Inactive																
420.123(c)																		
420.122(a)(1)	No. 8 Galvanizing Line	Inactive																
420.123(a)(1)																		
420.122(c)	No. 8 Galvanizing Line Fume Scrubber	Inactive																
420.123(c)																		
433.13(a)	No. 1 Electrogalvanizing Line; No. 1 Tin Free Steel Line; No. 5 Electrolytic Tinning Line; No. 6	1.31	60	31	656	339	52	26	569	284	0.69	0.43	7.55	4.70	2.61	1.48	28.5	16.2
433.14(a)											0.69	0.43	7.55	4.70	2.61	1.48	28.5	16.2
BPJ	84" HSM Basement Sump Water	1.4	40	15	467	175												
	Total Calculated Limitation (lbs/day)				3595	1607			1622	649			20.3	8.95			43.2	21.1

40 CFR	Production Unit/Area	Total Chromium Coefficient DM	Total Chromium Coefficient MA	Total Chromium Calculated TBEL (lbs/day) DM	Total Chromium Calculated TBEL (lbs/day) MA	Nickle Coefficient DM	Nickle Coefficient MA	Nickle Calculated TBEL (lbs/day) DM	Nickle Calculated TBEL (lbs/day) MA	Naphthalene Coefficient DM	Naphthalene Coefficient MA	Naphthalene Calculated TBEL (lbs/day) DM	Naphthalene Calculated TBEL (lbs/day) MA	Tetrachloroethylene Coefficient DM	Tetrachloroethylene Coefficient MA	Tetrachloroethylene Calculated TBEL (lbs/day) DM	Tetrachloroethylene Calculated TBEL (lbs/day) MA
420.102(a)(2)	No. 5 Stand Cold Reduction Mill	0.0001	0.0000418	1.16	0.467	0.0000939	0.0000313	1.05	0.350	0.0000104		0.116		0.0000156		0.174	
420.103(a)(2)		0.0001	0.0000418	1.16	0.467	0.0000939	0.0000313	1.05	0.350	0.0000104		0.116		0.0000156		0.174	
420.102(a)(2)	No. 6 Stand Cold Reduction Mill	0.0001	0.0000418	0.31	0.126	0.0000939	0.0000313	0.28	0.095	0.0000104		0.031		0.0000156		0.047	
420.103(a)(2)		0.0001	0.0000418	0.31	0.126	0.0000939	0.0000313	0.28	0.095	0.0000104		0.031		0.0000156		0.047	
420.102(a)(2)	48" Temper Mill	0.0001	0.0000418	0.18	0.071	0.0000939	0.0000313	0.16	0.053	0.0000104		0.018		0.0000156		0.026	
420.103(a)(2)		0.0001	0.0000418	0.18	0.071	0.0000939	0.0000313	0.16	0.053	0.0000104		0.018		0.0000156		0.026	
420.102(a)(2)	84" Temper Mill	0.0001	0.0000418	0.07	0.029	0.0000939	0.0000313	0.06	0.022	0.0000104		0.007		0.0000156		0.011	
420.103(a)(2)		0.0001	0.0000418	0.07	0.029	0.0000939	0.0000313	0.06	0.022	0.0000104		0.007		0.0000156		0.011	
420.102(a)(4)	North Sheet Temper Mills: 80" Temper	0.0004	0.000150	1.618	0.646	0.000338	0.000113	1.45	0.486	0.0000376		0.162		0.0000563		0.242	
420.103(a)(4)		0.0004	0.000150	1.618	0.646	0.000338	0.000113	1.45	0.486	0.0000376		0.162		0.0000563		0.242	
420.102(a)(4)	North Sheet Temper Mills: 80" Recoil	0.0004	0.000150	0.241	0.096	0.000338	0.000113	0.22	0.073	0.0000376		0.024		0.0000563		0.036	
420.103(a)(4)		0.0004	0.000150	0.241	0.096	0.000338	0.000113	0.22	0.073	0.0000376		0.024		0.0000563		0.036	
420.102(a)(5)	No. 2 Stand Temper Mill	0.0017	0.000668	1.64	0.655	0.00150	0.000501	1.47	0.491	0.000167		0.164		0.000250		0.245	
420.103(a)(5)		0.0017	0.000668	1.64	0.655	0.00150	0.000501	1.47	0.491	0.000167		0.164		0.000250		0.245	
420.102(a)(5)	Tin Double Cold Reduction Mill	0.0017	0.000668	2.67	1.069	0.00150	0.000501	2.4	0.802	0.000167		0.267		0.000250		0.400	
420.103(a)(5)		0.0017	0.000668	2.67	1.069	0.00150	0.000501	2.4	0.802	0.000167		0.267		0.000250		0.400	
433.13(a)	No. 1 Electrogalvanizing Line; No. 1 Tin Free Steel Line; No. 5 Electrolytic Tinning Line; No. 6	2.77	1.71	30	19	3.98	2.38	43.5	26.0								
433.14(a)		2.77	1.71	30	19	3.98	2.38	43.5	26.0								
	Total Calculated Limitation (lbs/day)			38.2	21.9			50.6	28.4			0.789	Report			1.18	Report

40 CFR	Production Unit/Area	Cadmium ELG Concentration DM	Cadmium ELG Concentration MA	Cadmium Calculated TBEL (lbs/day) DM	Cadmium Calculated TBEL (lbs/day) MA	Copper ELG Concentration DM	Copper ELG Concentration MA	Copper Calculated TBEL (lbs/day) DM	Copper Calculated TBEL (lbs/day) MA	Silver ELG Concentration DM	Silver ELG Concentration MA	Silver Calculated TBEL (lbs/day) DM	Silver Calculated TBEL (lbs/day) MA	Total Cyanide ELG Concentration DM	Total Cyanide ELG Concentration MA	Total Cyanide Calculated TBEL (lbs/day) DM	Total Cyanide Calculated TBEL (lbs/day) MA	TTO ELG Concentration DM	TTO ELG Concentration MA	TTO Calculated TBEL (lbs/day) DM	TTO Calculated TBEL (lbs/day) MA
433.13(a)	No. 1 Electrogalvanizing Line; No. 1 Tin Free Steel Line; No. 5 Electrolytic Tinning Line; No. 6	0.69	0.26	7.55	2.84	3.38	2.07	37.0	22.6	0.43	0.24	4.70	2.62	1.2	0.65	13.1	7.11	2.13		23.3	
433.14(a)		0.69	0.26	7.55	2.84	3.38	2.07	37.0	22.6	0.43	0.24	4.70	2.62	1.2	0.65	13.1	7.11	2.13		23.3	
	Total Calculated Limitation (lbs/day)			7.55	2.84			37.0	22.6			4.70	2.62			13.1	7.11			23.3	

Example Calculation: 40 CFR 420.92/93(b)(4) ELG coefficients are kg/day converted to lbs/day

TSS – Daily Maximum Limit = $5.72 \frac{kg}{day} x \ \frac{1\ lb}{0.454\ kg} = 12.6 \frac{lb}{day}$

Internal Outfall 608

40 CFR	Production Unit/Area	Discharge Flow (MGD)	TSS ELG Concentration DM	TSS ELG Concentration MA	TSS Calculated TBEL (lbs/day) DM	TSS Calculated TBEL (lbs/day) MA	O+G ELG Concentration DM	O+G ELG Concentration MA	O+G Calculated TBEL (lbs/day) DM	O+G Calculated TBEL (lbs/day) MA	Cadmium ELG Concentration DM	Cadmium ELG Concentration MA	Cadmium Calculated TBEL (lbs/day) DM	Cadmium Calculated TBEL (lbs/day) MA	Total Chromium ELG Concentration DM	Total Chromium ELG Concentration MA	Total Chromium Calculated TBEL (lbs/day) DM	Total Chromium Calculated TBEL (lbs/day) MA
433.13(a)	No. 1 Electrogalvanizing Line; No. 1 Tin Free Steel Line; No. 5 Electrolytic Tinning Line; No. 6 Electrolytic Tinning Line	0.3	60	31	150	78	52	26	130	65	0.69	0.26	1.73	0.65	2.77	1.71	6.9	4.3
433.14(a)											0.69	0.26	1.73	0.65	2.77	1.71	6.9	4.3
	Total Calculated Limitation (lbs/day)				150	78			130	65			1.73	0.65			6.9	4.3

40 CFR	Copper ELG Concentration DM	Copper ELG Concentration MA	Copper Calculated TBEL (lbs/day) DM	Copper Calculated TBEL (lbs/day) MA	Lead ELG Concentration DM	Lead ELG Concentration MA	Lead Calculated TBEL (lbs/day) DM	Lead Calculated TBEL (lbs/day) MA	Nickel ELG Concentration DM	Nickel ELG Concentration MA	Nickel Calculated TBEL (lbs/day) DM	Nickel Calculated TBEL (lbs/day) MA	Silver ELG Concentration DM	Silver ELG Concentration MA	Silver Calculated TBEL (lbs/day) DM	Silver Calculated TBEL (lbs/day) MA
433.13(a)	3.38	2.07	8.5	5.2	0.69	0.43	1.73	1.08	3.98	2.38	10.0	6.0	0.43	0.24	1.08	0.60
433.14(a)	3.38	2.07	8.5	5.2	0.69	0.43	1.73	1.08	3.98	2.38	10.0	6.0	0.43	0.24	1.08	0.60
Total Calculated Limitation (lbs/day)			8.5	5.2			1.73	1.08			10.0	6.0			1.08	0.60

40 CFR	Zinc ELG Concentration DM	Zinc ELG Concentration MA	Zinc Calculated TBEL (lbs/day) DM	Zinc Calculated TBEL (lbs/day) MA	Total Cyanide ELG Concentration DM	Total Cyanide ELG Concentration MA	Total Cyanide Calculated TBEL (lbs/day) DM	Total Cyanide Calculated TBEL (lbs/day) MA	TTO ELG Concentration DM	TTO ELG Concentration MA	TTO Calculated TBEL (lbs/day) DM	TTO Calculated TBEL (lbs/day) MA
433.13(a)	2.61	1.48	6.5	3.7	1.2	0.65	3.0	1.63	2.13		5.3	
433.14(a)	2.61	1.48	6.5	3.7	1.2	0.65	3.0	1.63	2.13		5.3	
Total Calculated Limitation (lbs/day)			6.5	3.7			3.0	1.63			5.3	

Internal Outfall 609 (Administrative Outfall as the sum of Internal Outfalls 604 and 608)

Parameter	TSS		O+G		Cadmium		Total Chromium		Copper		Lead		Nickel		Silver		Zinc		Total Cyanide		TTO		Naphthalene		Tetrachloroethylen	
	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA	DM	MA
lbs/day	3745	1685	1752	714	9.27	3.49	45.1	26.1	45.4	27.8	22.0	10.0	60.6	34.4	5.78	3.23	49.7	24.8	16.1	8.7	28.6		0.789		1.18	

Appendix B
Waste Load Allocation

Appendix C

Approved Water Treatment Additives

Outfall	Water Treatment Additive / Trade Name	Purpose / Use
015	ChemTreat BL-126	Dechlorination
015*	ChemTreat CL-1370	Scale Inhibitor
015*	ChemTreat CL-4074	Scale Inhibitor
015*	ChemTreat CL-5002	Tracer Dye for Test Purposes
015*	ChemTreat CT-775	WWTP - Biological Nutrient
015*	ChemTreat CT-930	WWTP - Dewatering Aid
015*	ChemTreat CT-936	Surfactant
015*	ChemTreat FO-120	Antifoam
015	ChemTreat FO-180	Antifoam
015*	ChemTreat P-817E	WWTP - Flocculant
015*	ChemTreat P-823L	WWTP - Coagulant
015*	ChemTreat P-825L	WWTP - Coagulant
015*	ChemTreat P-835E	WWTP - Flocculant
015	ChemTreat P-8905L	WWTP - Coagulant
015	ChemTreat P-891L	WWTP - Coagulant
015*	Hydrochloric (Muriatic) Acid	WWTP - pH Control
015	Perlite / Sil-Kleer	WWTP - Dewatering Aid
015*	Magnesium Hydroxide	WWTP - pH / Alkalinity Control
015	Sodium Bisulfite & Sodium Metabisulfite	Dechlorination prior to discharge
015	Sodium Hydroxide	WWTP - pH Adjustment / Alkalinity Control
015	Sodium Hypochlorite	Biocide for Zebra Mussel Control & Microbial Control
015	Sulfuric Acid	WWTP - pH Adjustment / Ammonia Absorbing Aid
018/019	ChemTreat BL-122	Dechlorination
018/019	ChemTreat BL-126	Dechlorination
018/019	ChemTreat BL-1253	Dechlorination
018/019	ChemTreat BL-1302	Dechlorination
018/019	ChemTreat BL-1350	Boiler Water Dispersant
018/019	ChemTreat BL-1513	Amine for Corrosion Control
018/019	ChemTreat BL-197	Defoamer
018/019	ChemTreat CL-1355	Service Water Deposit Control
018/019	ChemTreat CL-1376	Scale Inhibitor
018/019	ChemTreat CT-709	Corrosion Inhibitor
018/019	ChemTreat FO-180	Antifoam
018/019	ChemTreat CL-5002	Tracer Dye for Test Purposes
018/019	ChemTreat RL-9007	Antiscalent (RO system)
018/019	Lime	pH / Alkalinity Control
018/019	Sodium Bisulfite	Dechlorination prior to discharge and for the CWTP system
018/019	Sodium Chloride (Salt)	Boiler Feed Water Treatment / Softener Regeneration
018/019	Sodium Hydroxide	pH Control (UF & RO System)
018/019	Sodium Hypochlorite	Biocide for Zebra Mussel Control and Microbiological Control
020	ChemTreat CL-1355	Service Water Deposit Control
020	ChemTreat FO-180	Antifoam
020	Sodium Bisulfite or ChemTreat BL-122	Dechlorination prior to discharge
020	Sodium Hypochlorite	Biocide for Zebra Mussel Control
021	Sodium Bisulfite	Dechlorination prior to discharge
021	Sodium Hypochlorite	Biocide for Zebra Mussel Control
023	Sodium Bisulfite	Dechlorination prior to discharge
023	Sodium Hypochlorite	Biocide for Zebra Mussel Control
026	Sodium Bisulfite	Dechlorination prior to discharge
026	Sodium Hypochlorite	Biocide for Zebra Mussel Control
028/030	ChemTreat CL-1355	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-1370	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-1375	Dispersant / Scale inhibitor
028/030	ChemTreat BL-1377	Corrosion Inhibitor

Outfall	Water Treatment Additive / Trade Name	Purpose / Use
028/030	ChemTreat CL-1427	Dispersant / Scale inhibitor
028/030	ChemTreat CL-2005	Dispersant / Scale inhibitor
028/030	ChemTreat CL-206	Biocide
028/030	ChemTreat CL-2840	Dispersant / Scale inhibitor
028/030	ChemTreat CL-2900	Dispersant / Scale inhibitor
028/030	ChemTreat CL-3857	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-4074	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-4075	Dispersant / Scale inhibitor
028/030	ChemTreat CL-4125	Dispersant / Scale inhibitor
028/030	Chemtreat CL-41	Microbiological Control
028/030	ChemTreat CL-4437	Service Water Deposit Control
028/030	ChemTreat CL-4442	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-4800	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-49	Dispersant / Scale inhibitor
028/030	ChemTreat CL-5695	Dispersant / Scale inhibitor
028/030	ChemTreat FO-120	Antifoam
028/030	Chemtreat CL-5691	Scale / Corrosion Inhibitor
028/030	ChemTreat FO-180	Antifoam
028/030	ChemTreat P-813E	WWTP - Flocculant
028/030	ChemTreat P-817E	WWTP - Flocculant
028/030	ChemTreat P-841L	WWTP - Coagulant
028/030	ChemTreat P-873L	WWTP - Coagulant
028/030	ChemTreat P-891L	WWTP - Coagulant
028/030	ChemTreat P-894L	WWTP - Coagulant
028/030	ChemTreat P-895L	WWTP - Coagulant
028/030	ChemTreat S-101	WWTP - Polymer
028/030	Hydrochloric (Muriatic) Acid	WWTP - pH Control
028/030	ChemTreat P-8905L	WWTP - Coagulant
028/030	Potassium Hydroxide	pH / Alkalinity Control
028/030	Sodium Bisulfite	Dechlorination prior to discharge
028/030	Sodium Hydroxide	pH / Alkalinity Control
028/030	Sodium Hypochlorite	Biocide for Zebra Mussel Control & Microfouling Control in Caster Systems
028/030	Sulfuric Acid	pH Control
028/030	ChemTreat CT708	Antiscalent at QBOP Hood Cooling water system
028/030	ChemTreat CL5690	Antiscalent at QBOP Hood Cooling water system
032	Sodium Bisulfite	Dechlorination prior to discharge
032	Sodium Hypochlorite	Biocide for Zebra Mussel Control
033	Sodium Bisulfite	Dechlorination prior to discharge
033	Sodium Hypochlorite	Biocide for Zebra Mussel Control
034	ChemTreat BL-124	Corrosion Inhibitor
034	ChemTreat BL-1301	Dispersant
034	ChemTreat BL-1304	Boiler Water Treatment
034	ChemTreat BL-1349	Corrosion Inhibitor
034	ChemTreat CL-1355	Dispersant / Scale Inhibitor
034	ChemTreat BL-1513	Corrosion Inhibitor
034	ChemTreat BL-1547	Corrosion Inhibitor
034	ChemTreat CL-1439	Dispersant / Scale inhibitor
034	ChemTreat CL-454	Catalyst used with oxidizer
034	ChemTreat CL-49	Dispersant / Scale inhibitor
034	ChemTreat CT-709	Corrosion Inhibitor
034	ChemTreat CT-804	Bacteria Supplement
034	ChemTreat CT-907	Surfactant
034	ChemTreat CT-930	Demulsifier
034	ChemTreat FO-180	Antifoam

Outfall	Water Treatment Additive / Trade Name	Purpose / Use
034	ChemTreat P-802E	WWTP - Flocculant
034	ChemTreat P-813E	WWTP - Flocculant
034	ChemTreat P-817E	WWTP - Flocculant
034	ChemTreat P-819L	WWTP - Coagulant
034	ChemTreat P-835E	WWTP - Flocculant
034	ChemTreat P-841L	WWTP - Coagulant
034	ChemTreat P-846E	WWTP - Flocculant
034	ChemTreat P-873L	WWTP - Coagulant
034	ChemTreat P-8005L	Chromium Reduction
034	ChemTreat P-8905L	WWTP - Coagulant
034	ChemTreat P-891L	WWTP - Coagulant
034	ChemTreat P-895L	WWTP - Coagulant
034	Chlorine Dioxide	Oxidizer
034	Copper Sulfate	Biocide
034	Hydrochloric (Muriatic) Acid	WWTP - pH Control
034	Ferric Chloride	Demineralization System
034	Hydrogen Peroxide	Oxidizer / Odor Control
034	Lime	pH / Alkalinity Control
034	Purate	Chlorine Dioxide Generation
034	Sodium Bisulfite	Dechlorination prior to discharge and for the Demin System
034	Sodium Hydroxide	pH / Alkalinity Control / Demin Regeneration
034	Sodium Hypochlorite	Biocide for Zebra Mussel Control & Microfouling Control in Hot Strip Mill Recycle System
034	Sulfuric Acid	pH control / Demin Regeneration / Chlorine Dioxide Generation
035	ChemTreat CL-1355	Dispersant / Scale Inhibitor
035	ChemTreat CT-709	Corrosion Inhibitor
035	Sodium Bisulfite	Dechlorination prior to discharge
035	Sodium Hypochlorite	Biocide for Zebra Mussel Control
037	ChemTreat CL-4358	Dispersant / Scale Inhibitor
037	ChemTreat CT-709	Corrosion Inhibitor
037	Sodium Bisulfite	Dechlorination prior to discharge
037	Sodium Hypochlorite	Biocide for Zebra Mussel Control
039	Sodium Bisulfite	Dechlorination prior to discharge
039	Sodium Hypochlorite	Biocide for Zebra Mussel Control

Appendix D

316(b) Cooling Water Intake Structures Location Maps

Please note that the Location Maps can be found in IDEM's Virtual File Cabinet online. See document number 83099518

CHART 6. NO 1 PUMP STATION ANNUAL IMPINGEMENT

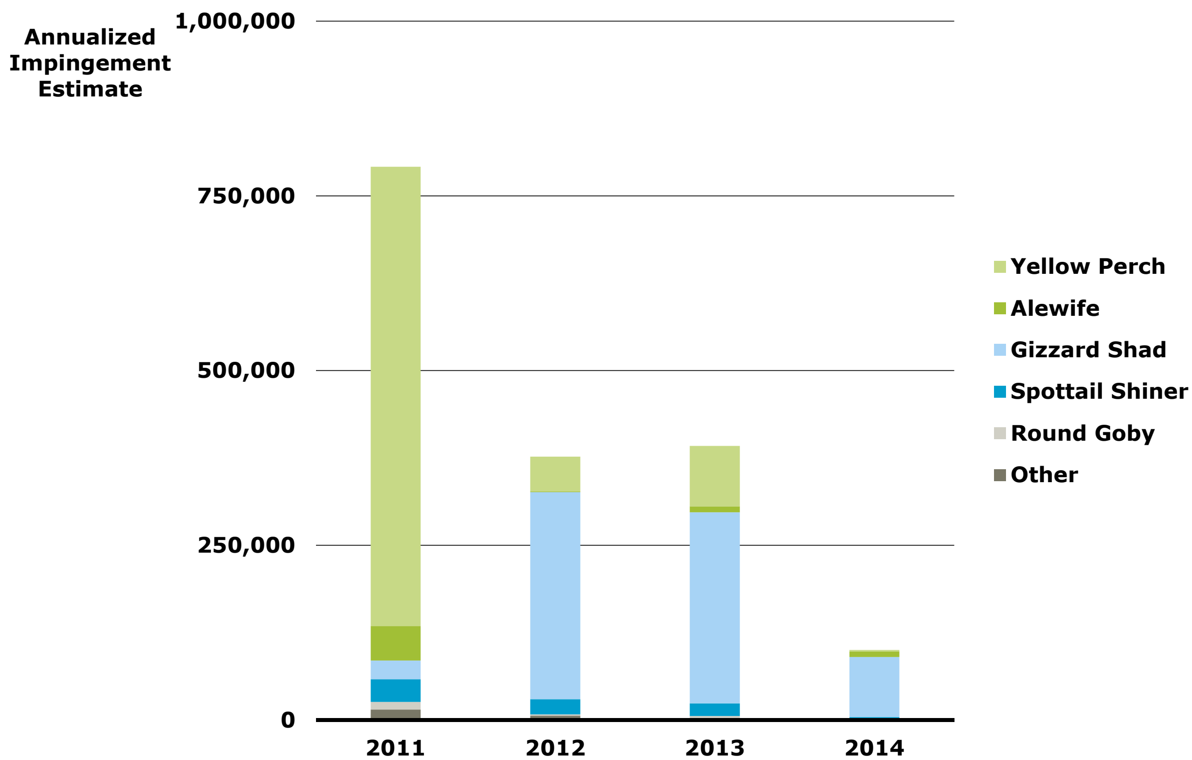


CHART 7. NO 2 PUMP STATION ANNUAL IMPINGEMENT

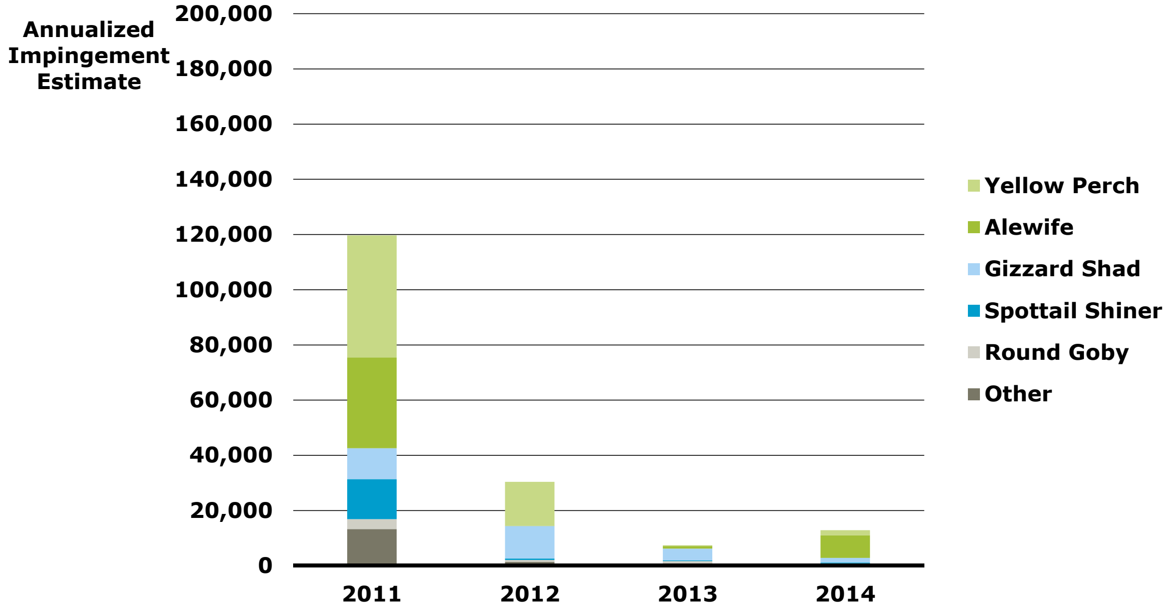


CHART 8. LAKESIDE PUMP STATION ANNUAL IMPINGEMENT

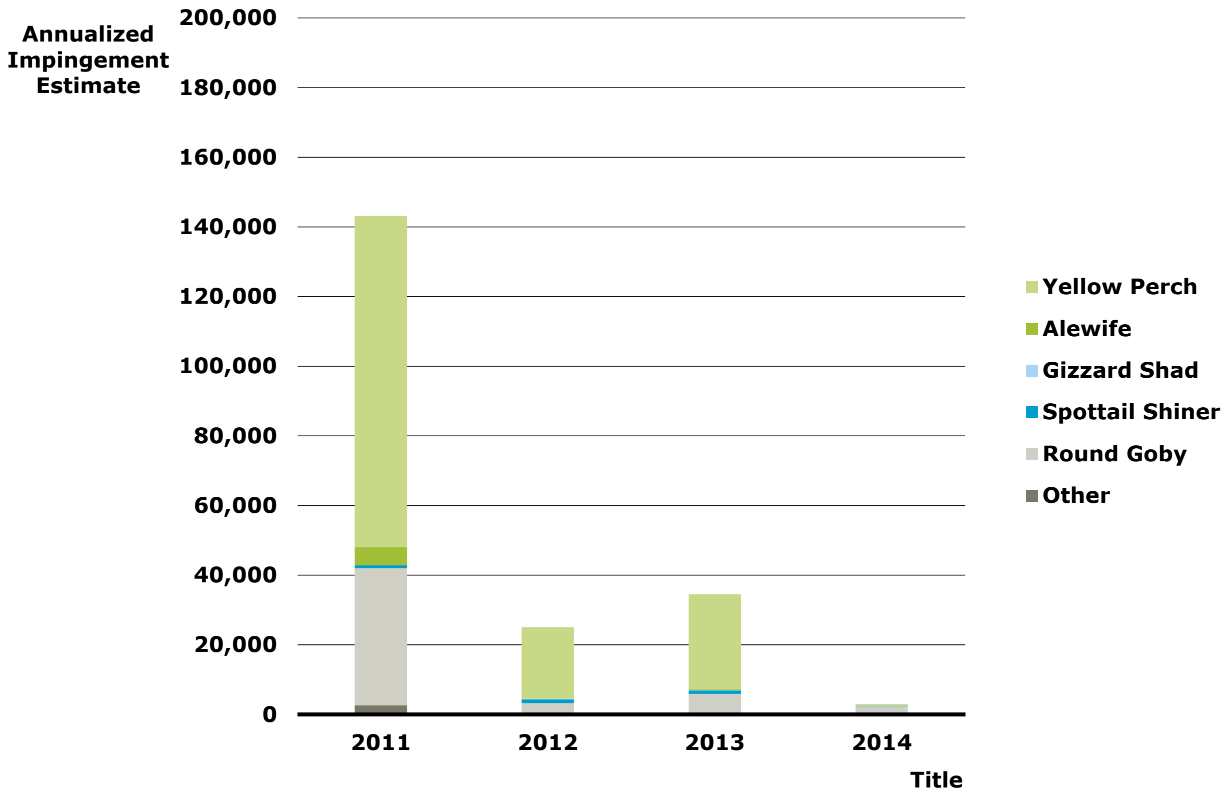


TABLE 10. LAKESIDE PUMP STATION ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE

Year	Identification	Common Name	Species Fraction	Eggs	Larvae	Juvenile	Total Ichthyoplankton
2012	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**403,068**	**337,850**	**740,918**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	100%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	5%	0	0	0	0
	Perca flavescens	Yellow Perch	51%	0	0	0	0
	Notropis hudsonius	Spottail Shiner	2%	0	0	0	0
	Osmerus mordax	Rainbow Smelt	1%	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	41%	0	0	0	0
2013	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**132,332**	**0**	**132,332**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	100%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**101,980**	**0**	**0**	**101,980**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	5%	4,812	0	0	4,812
	Perca flavescens	Yellow Perch	51%	52,405	0	0	52,405
	Notropis hudsonius	Spottail Shiner	2%	2,381	0	0	2,381
	Osmerus mordax	Rainbow Smelt	1%	960	0	0	960
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	41%	41,423	0	0	41,423
2014	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**104,951**	**0**	**104,951**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	100%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	5%	0	0	0	0
	Perca flavescens	Yellow Perch	51%	0	0	0	0
	Notropis hudsonius	Spottail Shiner	2%	0	0	0	0
	Osmerus mordax	Rainbow Smelt	1%	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	41%	0	0	0	0

TABLE 11. FACILITY ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE

Year	Identification	Common Name	Eggs	Larvae	Juvenile	Total Ichthyoplankton
2012	**Neogobius melanostomus**	**Round Goby**	**0**	**403,068**	**337,850**	**740,918**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**190,176**	**0**	**190,176**
	Dorosoma cepedianum	Gizzard Shad	0	134,992	0	134,992
	Alosa pseudoharengus	Alewife	0	55,184	0	55,184
	Actinopterygii	**Unidentified**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0
	Alosa pseudoharengus	Alewife	0	0	0	0
	Perca flavescens	Yellow Perch	0	0	0	0
	Notropis hudsonius	Spottail Shiner	0	0	0	0
	Osmerus mordax	Rainbow Smelt	0	0	0	0
	Notropis atherinoides	Emerald Shiner	0	0	0	0
	Neogobius melanostomus	Round Goby	0	0	0	0
				Annualized Entrainment Estimate	**=**	**931,094**
2013	**Neogobius melanostomus**	**Round Goby**	**0**	**279,859**	**48,904**	**328,764**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0
	Alosa pseudoharengus	Alewife	0	0	0	0
	Actinopterygii	**Unidentified**	**16,040,239**	**0**	**0**	**16,040,239**
	Dorosoma cepedianum	Gizzard Shad	6,181,137	0	0	6,181,137
	Alosa pseudoharengus	Alewife	2,633,568	0	0	2,633,568
	Perca flavescens	Yellow Perch	5,866,645	0	0	5,866,645
	Notropis hudsonius	Spottail Shiner	641,687	0	0	641,687
	Osmerus mordax	Rainbow Smelt	211,219	0	0	211,219
	Notropis atherinoides	Emerald Shiner	49,947	0	0	49,947
	Neogobius melanostomus	Round Goby	456,037	0	0	456,037
				Annualized Entrainment Estimate	**=**	**16,369,002**
2014	**Neogobius melanostomus**	**Round Goby**	**0**	**820,867**	**0**	**820,867**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**254,881**	**0**	**254,881**
	Dorosoma cepedianum	Gizzard Shad	0	163,796	0	163,796
	Alosa pseudoharengus	Alewife	0	91,085	0	91,085
	Actinopterygii	**Unidentified**	**1,081,119**	**0**	**0**	**1,081,119**
	Dorosoma cepedianum	Gizzard Shad	395,049	0	0	395,049
	Alosa pseudoharengus	Alewife	192,486	0	0	192,486
	Perca flavescens	Yellow Perch	401,965	0	0	401,965
	Notropis hudsonius	Spottail Shiner	42,196	0	0	42,196
	Osmerus mordax	Rainbow Smelt	16,235	0	0	16,235
	Notropis atherinoides	Emerald Shiner	3,857	0	0	3,857
	Neogobius melanostomus	Round Goby	29,332	0	0	29,332
				Annualized Entrainment Estimate	**=**	**2,156,868**

TABLE 12. FACILITY ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE ADJUSTED FOR REMOVAL OF EXOTIC/NUISANCE SPECIES

Year	Identification	Common Name	Eggs	Larvae	Juvenile	Total Ichthyoplankton	Organism Removal with Fine Mesh (2 mm) Screens (A)
2012	**Neogobius melanostomus**	**Round Goby**					
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**190,176**	**0**	**190,176**	100%
	Dorosoma cepedianum	Gizzard Shad	0	134,992	0	134,992	100%
	Alosa pseudoharengus	Alewife	0	55,184	0	55,184	100%
	Actinopterygii	**Unidentified**	**0**	**0**	**0**	**0**	N/A
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0	N/A
	Alosa pseudoharengus	Alewife	0	0	0	0	N/A
	Perca flavescens	Yellow Perch	0	0	0	0	N/A
	Notropis hudsonius	Spottail Shiner	0	0	0	0	N/A
	Osmerus mordax	Rainbow Smelt	0	0	0	0	N/A
	Notropis atherinoides	Emerald Shiner	0	0	0	0	N/A
	Neogobius melanostomus	Round Goby					
				Annualized Entrainment Estimate =		**190,176**	100%
2013	**Neogobius melanostomus**	**Round Goby**					
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**0**	**0**	**0**	N/A
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0	N/A
	Alosa pseudoharengus	Alewife	0	0	0	0	N/A
	Actinopterygii	**Unidentified**	**16,040,239**	**0**	**0**	**16,040,239**	0%
	Dorosoma cepedianum	Gizzard Shad	6,181,137	0	0	6,181,137	0%
	Alosa pseudoharengus	Alewife	2,633,568	0	0	2,633,568	0%
	Perca flavescens	Yellow Perch	5,866,645	0	0	5,866,645	0%
	Notropis hudsonius	Spottail Shiner	641,687	0	0	641,687	0%
	Osmerus mordax	Rainbow Smelt	211,219	0	0	211,219	0%
	Notropis atherinoides	Emerald Shiner	49,947	0	0	49,947	0%
	Neogobius melanostomus	Round Goby					
				Annualized Entrainment Estimate =		**15,584,202**	0%
2014	**Neogobius melanostomus**	**Round Goby**					
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**254,881**	**0**	**254,881**	100%
	Dorosoma cepedianum	Gizzard Shad	0	163,796	0	163,796	100%
	Alosa pseudoharengus	Alewife	0	91,085	0	91,085	100%
	Actinopterygii	**Unidentified**	**1,081,119**	**0**	**0**	**1,081,119**	0%
	Dorosoma cepedianum	Gizzard Shad	395,049	0	0	395,049	0%
	Alosa pseudoharengus	Alewife	192,486	0	0	192,486	0%
	Perca flavescens	Yellow Perch	401,965	0	0	401,965	0%
	Notropis hudsonius	Spottail Shiner	42,196	0	0	42,196	0%
	Osmerus mordax	Rainbow Smelt	16,235	0	0	16,235	0%
	Notropis atherinoides	Emerald Shiner	3,857	0	0	3,857	0%
	Neogobius melanostomus	Round Goby					
				Annualized Entrainment Estimate =		**1,306,668**	20%

(A) Assumes eggs to be removed by 0.5 mm mesh; juveniles and larvae to be removed by 2 mm mesh

Appendix E
SMV Data

Effluent Data Collected by USS - Gary Works for the Two (2) Year Period Prior to SMV Renewal Application being considered complete Outfall 0015 (IN0000281)			
Date SMV Application Deemed Complete: 5/1/20			
Sample Date	Total Mercury Normal Sample (ng/L)	Total Mercury Duplicate Sample (ng/L)	Total Mercury Daily Average (ng/L)
05/07/18	3.6		3.6
06/20/18	2.9	3.0	2.95
07/16/18	2.7		2.7
821/18	2.5		2.5
09/17/20	2.1		2.1
10/10/18	2.1		2.1
11/12/18	2.3		2.3
12/11/18	1.8	2.0	1.9
02/11/19	2.2		2.2
04/16/19	2.1	2.6	2.35
06/17/19	5.5		5.5
08/19/19	1.5		1.5
10/14/19	1.3		1.3
12/16/19	2.2	1.6	1.9
12/22/19	0.46		0.46
12/23/19	1.5		1.5
12/24/19	1.5		1.5
12/25/19	1.1		1.1
12/26/19	2.1		2.1
12/27/19	1.2		1.2
12/28/19	0.66		0.66
12/29/19	1.1		1.1
12/30/19	1.7		1.7
12/31/19	14		14
01/01/20	2.2		2.2
01/02/20	1.6		1.6
01/03/20	2.1		2.1
01/04/20	1.9		1.9
01/05/20	1.9		1.9
01/06/20	2.4		2.4
01/07/20	1.8		1.8
01/08/20	7.1		7.1
01/09/20	1.8		1.8
01/10/20	1.2		1.2
01/11/20	11		11
01/12/20	4.8		4.8
01/13/20	2.4		2.4
01/14/20	2.2		2.2
01/15/20	1.6		1.6
01/16/20	1.3		1.3
01/17/20	1.5		1.5
01/18/20	1.3		1.3
01/19/20	1.3		1.3
01/20/20	1.6		1.6
01/21/20	1.5		1.5
01/22/20	1.0		1
01/23/20	0.94		0.94
01/24/20	1.1		1.1
01/25/20	3.4		3.4
01/26/20	1.5		1.5
01/27/20	1.7		1.7
01/28/20	0.80		0.8
01/29/20	2.2		2.2
01/30/20	1.4		1.4
01/31/20	1.2		1.2
02/01/20	1		1
02/02/20	1.1		1.1
02/03/20	1.8		1.8
02/04/20	1.4		1.4
02/05/20	1.3		1.3
02/06/20	4.4		4.4
02/07/20	2.2		2.2
02/08/20	0.86		0.86
02/09/20	0.52		0.52
02/10/20	2.6		2.6
02/11/20	1.2		1.2
02/12/20	0.93		0.93
02/13/20	2.0		2
02/14/20	1.5		1.5
02/15/20	1.2		1.2
02/16/20	1.8		1.8
02/17/20	1.2		1.2
02/18/20	1.6		1.6
02/19/20	0.58		0.58
04/16/20	1.1		1.1
Number			**75**
Max			**14**
SMV Limit			**14.0**

STATE OF INDIANA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
PUBLIC NOTICE NO. 20210422 – IN0000281 – F
DATE OF NOTICE: APRIL 22, 2021

The Office of Water Quality issues the following NPDES FINAL PERMIT.

MAJOR – RENEWAL

UNITED STATES STEEL CORPORATION – GARY WORKS, Permit No. IN0000281, LAKE COUNTY, One North Broadway, Gary, IN. This industrial facility is an integrated steel mill that discharges to the Grand Calumet River and Lake Michigan via existing permitted outfalls. The discharges consist of non-contact cooling water, treated process wastewaters, and storm water. The facility withdraws its water from Lake Michigan. Permit Manager: Richard Hamblin, 317/232-8696, rhamblin@idem.in.gov.

Notice of Right to Administrative Review [Permits]

If you wish to challenge this Permit, you must file a Petition for Administrative Review with the Office of Environmental Adjudication (OEA), and serve a copy of the Petition upon IDEM. The requirements for filing a Petition for Administrative Review are found in IC 4-21.5-3-7, IC 13-15-6-1 and 315 IAC 1-3-2. A summary of the requirements of these laws is provided below.

A Petition for Administrative Review must be filed with the Office of Environmental Adjudication (OEA) within fifteen (15) days of the issuance of this notice (eighteen (18) days if you received this notice by U.S. Mail), and a copy must be served upon IDEM. Addresses are:

Director
Office of Environmental Adjudication
Indiana Government Center North
100 North Senate Avenue - Room N103
Indianapolis, Indiana 46204

Commissioner
Indiana Department of Environmental Management
Indiana Government Center North
100 North Senate Avenue - Room 1301
Indianapolis, Indiana 46204

The Petition must contain the following information:

1. The name, address and telephone number of each petitioner.
2. A description of each petitioner's interest in the Permit.
3. A statement of facts demonstrating that each petitioner is:
    a. a person to whom the order is directed;
    b. aggrieved or adversely affected by the Permit;
    c. entitled to administrative review under any law.
4. The reasons for the request for administrative review.
5. The particular legal issues proposed for review.
6. The alleged environmental concerns or technical deficiencies of the Permit.
7. The Permit terms and conditions that the petitioner believes would be appropriate and would comply with the law.
8. The identity of any persons represented by the petitioner.
9. The identity of the person against whom administrative review is sought.
10. A copy of the Permit that is the basis of the petition.
11. A statement identifying petitioner's attorney or other representative, if any.

Failure to meet the requirements of the law with respect to a Petition for Administrative Review may result in a waiver of your right to seek administrative review of the Permit. Examples are:

1. Failure to file a Petition by the applicable deadline;
2. Failure to serve a copy of the Petition upon IDEM when it is filed; or
3. Failure to include the information required by law.

If you seek to have a Permit stayed during the Administrative Review, you may need to file a Petition for a Stay of Effectiveness. The specific requirements for such a Petition can be found in 315 IAC 1-3-2 and 315 IAC 1-3-2.1. Pursuant to IC 4-21.5-3-17, OEA will provide all parties with Notice of any pre-hearing conferences, preliminary hearings, hearings, stays, or orders disposing of the review of this action. If you are entitled to Notice under IC 4-21.5-3-5(b) and would like to obtain notices of any pre-hearing conferences, preliminary hearings, hearings, stays, or orders disposing of the review of this action without intervening in the proceeding you must submit a written request to OEA at the address above. More information on the appeal review process is available on the website for the Office of Environmental Adjudication at http://www.in.gov/oea.

United States Steel Corporation – Gary Works
One North Broadway, MS 70-A
Gary, IN 46402

May 1, 2020

Indiana Department of Environmental Management
Office of Water Quality
Industrial NPDES Permits Section
100 North Senate Avenue MC 65-42
Indianapolis, IN 46204-2251
Electronically: OWQ@idem.in.gov

Subject: **United States Steel Corporation (U. S. Steel) Gary Works, Lake County, IN Application for Renewal of NPDES Permit No. IN0000281**

Enclosed is the United States Steel Corporation Gary Works ("U. S. Steel") Application to renew existing NPDES Permit No. IN0000281 ("Renewal Application"). Pursuant to 327 IAC 5-3-2, USS is filing for reissuance at least 180 days prior to the expiration date of the current NPDES Permit, October 31, 2020.

As indicated in IDEM's "Written Correspondence and Electronic Signature Guidance" document (last updated April 21, 2020) and due to file size constraints, U. S. Steel is submitting this Renewal Application electronically via the cloud-based file sharing site OneDrive. The Renewal Application is being provided in two (2) PDF files. Part 1 includes all Renewal Application items except for required Cooling Water Intake Structure 316(b) materials, which comprise the entirety of Part 2 of the Renewal Application.

In accordance with IC 13-18-20-12, an application fee of $50 is being provided under separate cover (along with a hardcopy of the application) to address the permit renewal application fee. If you have any questions regarding this application or any of the materials contained within, please contact me at 219.888.3369 or bsmiller@uss.com.

Sincerely,

Brandon Miller
Environmental Engineer
U. S. Steel Gary Works

Enclosures:
- Application for Renewal of NPDES IN0000281, Part 1 of 2
- Application for Renewal of NPDES IN0000281, Part 2 of 2

cc: Nicole Gardner; Industrial NPDES Permits Section Chief (ngardner@idem.in.gov)
Richard Hamblin; Industrial NPDES Permit Manager (rhamblin@idem.in.gov)

Application for Renewal of NPDES Permit No. IN0000281

Part 1 of 2

Prepared for:

U. S. Steel Gary Works

Submitted to:
Industrial Permits Section
Office of Water Management
Indiana Department of Environmental Management

Prepared by:
Ramboll
Arlington, Virginia

Submission Date:
May 1, 2020

Executive Summary

EXECUTIVE SUMMARY

This Executive Summary and subsequent attachments constitute the application by U. S. Steel Corporation – Gary Works (U. S. Steel) for renewal of its existing National Pollutant Discharge Elimination System (NPDES) Permit No. IN0000281. This summary contains a brief description of the source of materials contained in this application and a general overview of the renewal request. The NPDES permit application consists of the following required forms:

- IDEM General Information Form
- IDEM Owner-Operator Affidavit Form
- IDEM Request for Information Form
- Identification of Potentially Affected Persons
- Form 2C - applies to all existing industrial facilities with process wastewater
- Form 2F – applicable for stormwater discharges associated with industrial activity
- Listing of Water Treatment Additives
- Application fee

The application also contains information on various other requests:

- Removal of Outfalls 041A/041B from the Permit. Operational changes have eliminated these discharges and no future need is anticipated.
- Authorization to discharge treated stormwater through Outfall 603 and Outfall 604 on an as needed basis.
- Authorization to discharge treated Blast Furnace Recycle System blowdown through Outfall 018 on an emergency only basis.
- Continued use of production data from the current permit for determination of Effluent Limit Guideline (ELGs) Technology Based Effluent Limits (TBELs).
- An intake allowance or intake credits for TSS is requested in association with the current TBEL based TSS limitations applied at Outfalls 028/030.
- Continued authorization for previously approved water treatment additives.
- Continued authorization for year-round chlorination of intake waters.
- Continued use of the water bubble for oil and grease at Outfalls 028/030 and 034. U. S. Steel is requesting the same methodology for allocation of oil and grease limits for Outfall 028/030 as used for the current permit.
- Continued approval of the 316(a) Alternate Temperature Effluent Limits (ATELs) for Grand Calumet River monitoring points 220 and 230 (which are 100 feet downstream of Outfalls 020 and 030 respectively).
- Stream-lined Mercury Variance (SMV) requests:
  - Renewal: Outfalls 018, 019, 020, and 028/030.
  - New SMV: Outfall 015
  - Removal of SMV: Outfall 034
- 316(b) Cooling Water Intake Structure (CWIS) Determinations. Attachment IV includes the documentation required by Section 316(b) of the federal Clean Water Act needed to make a Best Technology Available (BTA) determination related to CWIS adverse environmental impacts. U. S. Steel requests the BTA determination be made as follows and a 7-year compliance schedule be granted for those items/locations that are not currently meeting BTA.
  - U. S. Steel asserts the location, design, construction, and capacity of the cooling water intake structures reflect the best technology available for minimizing adverse environmental impact for entrainment and no additional engineered or operational changes are required.

- U. S. Steel asserts the existing cooling water intake structures associated with No. 3, No. 4, and Lakeside Pump Station represent Best Technology Available (BTA) to minimize adverse environmental impact related to impingement in accordance with Section 316(b) of the federal Clean Water Act.
- No. 1 and 2 Pump Station do not currently comply with one of the identified BTA alternatives detailed in 40 CFR 125.94(c). After entrainment requirements have been established, U. S. Steel will select and comply with the most feasible and effective impingement mortality standard in 125.94(c) as soon as practicable. With the information known so far, it appears that the most viable option is modified traveling screens with a fish return system. The feasibility of this option will be determined once IDEM issues a final BTA determination for entrainment and detailed engineering design is completed for impingement.

- Removal of the following monitoring requirements and permit limits on the basis that there is no reasonable potential to exceed the applicable water quality criteria. Additional information on this request is provided as part of Attachment 2C-A.
  - Outfall 018: Free Cyanide and Ammonia monitoring requirements
  - Outfall 019: Free Cyanide limits & monitoring requirements; Ammonia monitoring requirements
  - Outfall 020: Lead and Zinc monitoring requirements
  - Outfall 034: Ammonia monitoring requirements
  - Outfall 037: Zinc monitoring requirements

For convenience, and directly following this summary, there is a listing of documents that provides the general order of the application materials.

OUTFALL INVENTORY

The existing NPDES Permit, which was effective November 1, 2015 and most recently modified with effective date of May 1, 2020, authorizes U. S. Steel to discharge treated wastewaters, cooling waters and stormwater via internal and final outfalls to the Grand Calumet River and Lake Michigan. An outfall inventory that includes the type of wastewater discharged and corresponding receiving water is provided in Table ES-1. The table includes summary discharge descriptions and indicates where sources listed in the current Permit descriptions can be removed. Renewal is requested for the continued discharge of these waters with the exception of Outfalls 041A/041B. Operational changes have occurred that eliminated the discharge associated with these locations and no future need to discharge is anticipated. As such, renewed authorization for Outfalls 041A/041B is not requested. Table ES-1 also shows authorized future changes as well as the requested changes described below.

DISCHARGE OF TREATED STORMWATER VIA OUTFALLS 603 AND 604

U. S. Steel is requesting the option to treat and discharge stormwater through these outfalls on an as needed basis to prevent and/or mitigate flooding concerns. As needed, stormwater from areas of the facility west of Buchanan Street could be sent to the terminal treatment plant prior to discharge via Outfall 604. Also as needed, stormwater from areas of the facility east of Buchanan Street could be sent to the #1 or #1A Thickener treatment systems prior to discharge via Outfall 603.

DISCHARGE OF BLAST FURNACE RECYCLE TREATED WASTEWATER

U. S. Steel is requesting the option to discharge treated wastewater from the blast furnace recycle system on emergency only basis. It is anticipated that exemption in 327 IAC 2-1.3-4 for anti-degradation demonstration requirements would be applicable as the discharge would be temporary. Before discharge would commence, U. S. Steel will provide IDEM with notification 48 hours in advance. A temporary treatment system will be brought in that would meet or exceed applicable TBELs associated with the blast furnace production. It is estimated that the discharge flow would be 200 gpm or less. The compliance point (a new internal outfall) would be at the discharge of the treatment system prior to comingling with other waters with ultimate discharge would be via Outfall 018. Analytical data representative of the BFRS wastewater prior to treatment has previously been submitted to IDEM. Details of the temporary treatment system are still being determined, but one treatment train being considered includes the following main steps:

- Ammonia Treatment by Breakpoint Chlorination
    - Chlorination Tank for ORP controlled addition of sodium hypochlorite
    - Dechlorination Tank for ORP controlled removal of residual chlorine using sodium bisulfite
- Cyanide Treatment by Precipitation
    - Reaction Tank 1 for addition of ferrous sulfate and hydrochloric acid
    - Reaction Tank 2 for addition of air and sodium hydroxide
    - Dissolved Air Floatation Tank for cyanide solids removal; anionic polymer addition to aid in removal is expected.
- Neutralization
    - Reaction Tank 3 for further addition of sodium hydroxide to bring the wastewater to a pH with the range of 6.0 – 9.0 standard units
- Final filtration
    - A bag filtration system would provide additional solids removal prior to discharge

EFFLUENT LIMIT GUIDELINES

U. S. Steel owns and operates the largest integrated steel mill in North America, with capacity to produce over eight million tons of raw steel per year. Intermediate and final products include sinter, iron, raw steel, cast steel, plate, hot strip, cold rolled strip and coated steels. The production units/areas where wastewaters are subject to USEPA ELGs for the Iron and Steel Manufacturing Point Source Category (40 CFR 420) are provided in Table ES-2. U. S. Steel requests continued use of the production values used to establish the current permit limits instead of the most recent five year period (2015-2019) for use in calculating discharge limits. Due to recent market fluctuations, production mix for the most recent 5-years is not representative of future anticipated production trends. Use of the values used for the current limits is considered more appropriate representative of potential future trends. Production data is presented in Table ES-2. The table shows the production values used in the current permit and production values for 2015-2019. For the 2015-2019 period two values are presented: actual daily maximums and daily maximums estimated from maximum monthly production (monthly production divided by the number of days in the month). Note that in almost all cases, the actual daily maximum values exceed the production values used in the calculation of current permit limits. This further supports continued use of the values used for development of the current permit limits.

The Plate Mill located at U. S. Steel Gary Works discharges to the C-Lot Lagoons associated with Outfalls 028/030 when in operation. The Plate Mill has not operated during the required five year look back period. However, the Plate Mill is owned and operated by a third party, and as such, it may operate should business conditions allow. That said, U. S. Steel is reporting the production numbers that were used historically for permit limit calculations and requests continued use of these values.

U. S. Steel also requests an intake allowance or intake credits for TSS in association with the TBEL based TSS limitations applied at Outfalls 028/030. The mass limits are TBELs based on the processes and operations associated with Outfall 603 and the idled 160”/210” Plate Mill. However, significant volumes of non-contact cooling water (i.e., Lake Michigan intake waters) with appreciable amounts of TSS are also discharged through Outfalls 028/030. U. S. Steel requests continuation of the current Outfall 028/030 mass limits with an added allowance for non-contact cooling water TSS. For example, the current mass limits would be effective, but compliance would be assessed based on the measured Outfall 028/030 mass minus the TSS allowance. The TSS allowance would be based on historical intake TSS concentrations and estimated non-contact cooling water discharged through Outfall 028/030. Intake TSS data to support this request is presented in Table 2C-D.

OTHER PERMIT RENEWAL ITEMS

Water Treatment Additives

Attachment I – Table A contains the list of all approved water treatment additives for use at U. S. Steel. Approval materials (i.e., MSDSs, form 2Es with dosage information) for the already approved water treatment additives listed in Attachment I – Table A have been submitted to IDEM previously and are on file with the agency. Approvals for use of new chemicals are not requested at this time. U. S. Steel requests continued approval for the use of the water treatment additives listed in Attachment I – Table A.

Year-Round Chlorination

U. S. Steel requests the continued allowance for year-round chlorination of intake waters. U. S. Steel currently chlorinates intake water to treat for zebra mussels and quagga mussels approximately May through October. Although treatment for zebra mussels is only needed during warmer lake conditions due to temperature tolerances, quagga mussels tolerate a wider range of temperatures and therefore can cause issues within the facility piping systems year-round. Lake Michigan temperatures between December and March have not drastically changed in the last five years such that temperatures would not be conducive to colonization. Therefore, U. S. Steel requests continued approval for year-round chlorination of intake waters. All discharges containing non-contact cooling water are dechlorinated before discharge to their respective receiving water.

Water bubble

U. S. Steel is requesting IDEM continue to utilize the water bubble approach for oil and grease (O&G) at Outfalls 603, 028/030 and 605, 609 (combined 604 and 608), and 034. U. S. Steel requests that the method for the allocation of O&G limits be applied in a similar manner as was done previously in the 2010 and 2015 NPDES permits and the 2019 permit modification to incorporate Outfalls 608 and 609.

316(a) Alternate Thermal Limits

U. S. Steel requests continued recognition of the Clean Water Act 316(a) (thermal demonstration) alternate thermal effluent limits applied at Grand Calumet River monitoring points 220 and 230 approved by IDEM. These were first incorporated into a modified Permit (effective January 1, 2013) and continued in the November 1, 2015 renewed Permit. Pursuant to the Part III.A.g. of the current Permit, U. S. Steel has re-evaluated the need for ATELs and requests continued authorization ATELs for these locations. Attachment II presents the results of the evaluation which employed the same methodology used to determine the existing numeric ATELs.

Mercury Variances

U. S. Steel requests renewal of the mercury variances granted for Outfalls 018, 019, 020, and 028/030. Attachment III includes the variance renewal application and relevant materials for Outfalls 018, 019, 020 and 028/030. These items include a narrative statement (with the requested SMV numerical limit), SMV application form, the current Pollutant Minimization Program Plan (PMPP) which contains the last 2 years of mercury monitoring data, and the most recent Annual Progress Report. The PMPPs for each of these were re-public noticed (for a 30-day period) in March 2020. Supporting documentation for this is included as part of the PMPPs. No comments or requests for the PMPPs were received during the public notice period.

U. S. Steel requests approval of an SMV for Outfall 015. Outfall 015 mercury limits are subject to a 60-month compliance schedule which began on February 1, 2017 and ends on January 31, 2022. Attachment III includes the Outfall 015 SMV application. The application includes include a narrative statement (with the requested SMV numerical limit), SMV application form, and a Pollutant Minimization Program Plan (PMPP) which contains the last 2 years of mercury monitoring data. The PMPP for Outfall 015 was public noticed (for a 30-day period) in March 2020. Supporting documentation for this is included as part of the PMPPs. No comments or requests for the PMPP were received during the public notice period.

U. S. Steel is not requesting renewal of the current mercury variance for Outfall 034. U. S. Steel anticipates that the final water quality-based effluent limits (1.3 ng/L as a monthly average and 3.2 ng/L as a daily maximum) in the current permit will be retained in the renewed permit and effective as the same date of the renewed permit.

316(b) Requirements

As an existing facility with surface water intakes withdrawing greater than two million gallons per day (based on cumulative design intake flow) and more than 25% of the actual intake flow used exclusively for cooling purposes, the U. S. Steel cooling water intake structures are subject to the requirements published in 40 CFR Part 122.21(r)(2) through (r)(8). Corresponding federal regulation citations include:

- Physical Information for Source Water (§122.21(r)(2))
- Physical description of CWIS (§122.21(r)(3))
- Biological Information for Source Water (§122.21(r)(4))
- Cooling Water System Data (§122.21(r)(5))
- Impingement Mortality BTA Demonstration (§122.21(r)(6))
- Entrainment Performance Studies (§122.21(r)(7))
- Operational Status (§122.21(r)(8))

In addition, the owner or operator of an existing facility that withdraws greater than 125 MGD actual intake flow (AIF) of water for cooling purposes must also submit to the Director for review the information required under paragraphs (r)(9), (10), (11), (12), and (13) of this section.

- Entrainment Characterization Study (§122.21(r)(9))
- Comprehensive Technical Feasibility and Cost Evaluation Study (§122.21(r)(10))
- Benefits Valuation Study (§122.21(r)(11))
- Non-water Quality Environmental and Other Impacts Study (§122.21(r)(12))
- Peer Review (§122.21(r)(13))

Pursuant to Part IV.B.1. of the current permit, U. S. is submitting the application information required by 40 CFR 122.21(r)(2–13). These materials are included as Attachment IV.

Characterization Information

Attachment 2C-A describes the datasets and data handling practices used for preparation of these application materials, and presents in Table 2C-A a listing the analytical methods and associated detection limits required by Form 2C Section V.

Dissolved metals data for select parameters and locations is also presented in Table 2C-B of this attachment. U. S. Steel requests that these dissolved metal data be utilized in IDEM's Reasonable Potential to Exceed (RPE) analysis (i.e., dissolved Projected Effluent Quality be generated for comparison to dissolved Preliminary Effluent Limits).

Attachment 2C-A also includes data to support the following previously mentioned requests:

- On the basis of no RPE, removal of various permit limits and monitoring requirements is requested. Statistical data summaries for these parameters are provided in Table 2C-C.
- An intake allowance or credit for TSS is requested in association with the current TBEL based TSS limitations applied at Outfalls 028/030. Intake TSS data for No. 2 Pump Station is presented in Table 2C-D.

Order of Materials

ORDER OF MATERIALS

Attachment 2C-A: Characterization Information

- Approach and Database Summary
- Table 2C-A. Analytical Methods and Detection Limits
- Table 2C-B. Dissolved Metals Data
- Table 2C-C. Data Summaries for no RPE Requests
- Table 2C-D. Lake Michigan Intake (No. 2 Pump Station) TSS Data

Attachment 2C-B: Water Balance / Flow Diagrams

LDD-2:	Outfalls 015, 607, 501, 018, and 019 Emergency SOF6 Stormwater Outfall SW08
LDD-03 Detail:	Outfalls 020, 021, 023, 026, 028, 030, 603, 032, and 033 Emergency SOFs 1, 2, 3, 4, 11, and 51 Emergency POF1 Stormwater Outfall SW11
LDD4 Detail:	Outfalls 034, 604, 605, 606, and 608
LDD4 Overview:	Outfalls 034, 604, 605, 606, and 608
LDD5:	Outfalls 035, 037, and 039 Emergency SOF5 Stormwater Outfalls SW01 and SW02 BWs 1, 2, 3, 4, and 5

Attachment 2C-C: Treatment Schematics*

**Note that these are intended to provide an overview of normal treatment operations only and may not list all flows to the associated final outfall. Those are included in the LDD Figures.*

CP-14:	Environmental Treatment Facility; Outfall 501
ENV-01:	Leachate Treatment Plant; Outfall 607
Outfalls 603, 028 & 030:	Steel Shop Wastewater Treatment Overview; Outfall 603
TTP-1:	Terminal Treatment Plant; Outfall 604
HSM-2:	84" Hot Strip Mill Wastewater Treatment; Outfall 605
CTP-1:	Chrome Treatment Plant; Outfall 608

Form 2F Materials

- Form 2F Pages 1-3 for SW01, SW02, SW06, SW08, SW11, SW12, & Outfalls 032 and 033
- SW01: Form 2F Pages VII-1 and VII-2
- SW02: Form 2F Pages VII-1 and VII-2
- SW06: Form 2F Pages VII-1 and VII-2
- SW08: Form 2F Pages VII-1 and VII-2
- SW11: Form 2F Pages VII-1 and VII-2
- Outfall 032: Form 2F Pages VII-1 and VII-2
- Outfall 033: Form 2F Pages VII-1 and VII-2
- Attachment 2F-III:
  - West Side Site Drainage Overview Map
  - East Side Site Drainage Overview Map
  - West Side SPCC/SWPPP Map
  - East Side SPCC/SWPPP Map

General Information Form

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

GENERAL INFORMATION FORM

(TO BE SUBMITTED WITH FORMS 2C, 2D AND 2E)

(Replaces EPA General Form 1)

Revised 4/12/12

1. Name of Facility: U. S. Steel Corporation Gary Works

2. Facility Contact

Name: Brandon Miller

Address: One North Broadway Mail Station 70

City or Town: Gary State: IN Zip Code: 46402

County: Lake

Telephone: Work: 219-888-3369 Email: bsmiller@uss.com

3. Certified Operator

Name: Brandon Miller

Certification #: WW020987 Classification: D

Address: One North Broadway Mail Station 70

City or Town: Gary State: IN Zip Code: 46402

Telephone: Work: 219-888-3369 Email: bsmiller@uss.com

4. Facility Mailing Address

Street or P.O. Box: One North Broadway

City or Town: Gary State: IN Zip Code: 46402

5. Facility Location

Street, Route No.,County,Other Specific Identifier: One North Broadway Gary, IN 46402

6. Type of Permit Action:

New ___ Renewal _X_ Modification ___

7. EPA I.D. Number: IND005444062

8. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the state? (Form 2B)

Yes ___ No _X_ Form Attached ___

9. Is this a facility which currently results in discharges to waters of the state other than described in 8? (Form 2C-Process Wastewater or Form 2E-Nonprocess Wastewater)

Yes _X_ No ___ Form Attached X

10. Is this a proposed facility (other than described in 8) which will result in a discharge to waters of the state? (Form 2D)

Yes ___ No_X_Form Attached ___

11. SIC Codes (4-digit, in order of priority)

First:	3312	Specify: Blast Furnaces, Steel Works, and Rolling Mills
Second:	__	Specify: ____________________
Third:	__	Specify: ____________________
Fourth:	__	Specify: ____________________

12. Existing Environmental Permits (Identification #)

NPDES (Discharges to Surface Waters): IN0000281; IN0061077

UIC (Underground Injection of Fluids): NA

RCRA (Hazardous Wastes): IND005444062: IND985097716

PSD (Air Emissions from Proposed Sources): NA

Other: 1808900121 Specify: Air (Title V)

Other: US1012 Specify: Gary Sanitary District Industrial WW Pretreatment

Other: FP 45-29 Specify: Facility Solids Waste Permit

Other: _________ Specify: _______________

13. Nature of Business (Provide a Brief Description)

Integrated Sheet Steel Manufacturing Facility

14. Map

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluid underground. Include all springs, rivers and other surface water bodies in the map area.

SEE FIGURE 1

15. Signature Block:

This application must be signed by a person in responsible charge to be valid. This signature attests to the following:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations".

Daniel Kileen (Printed Name)	Vice President – Gary Works (Title)
Daniel M Kileen (Signature)	4-30-20 (Date Signed)

Return Completed Application, Fee and Associated Materials to:
Indiana Department of Environmental Management
Cashiers Office – Mail Code 50-10C
100 North Senate Avenue
Indianapolis, Indiana 46204-2251

General Form Figures

Figure 1. Topographic Site Map
Figure 2. West Side Outfall Location Map
Figure 3. East Side Outfall Location Map

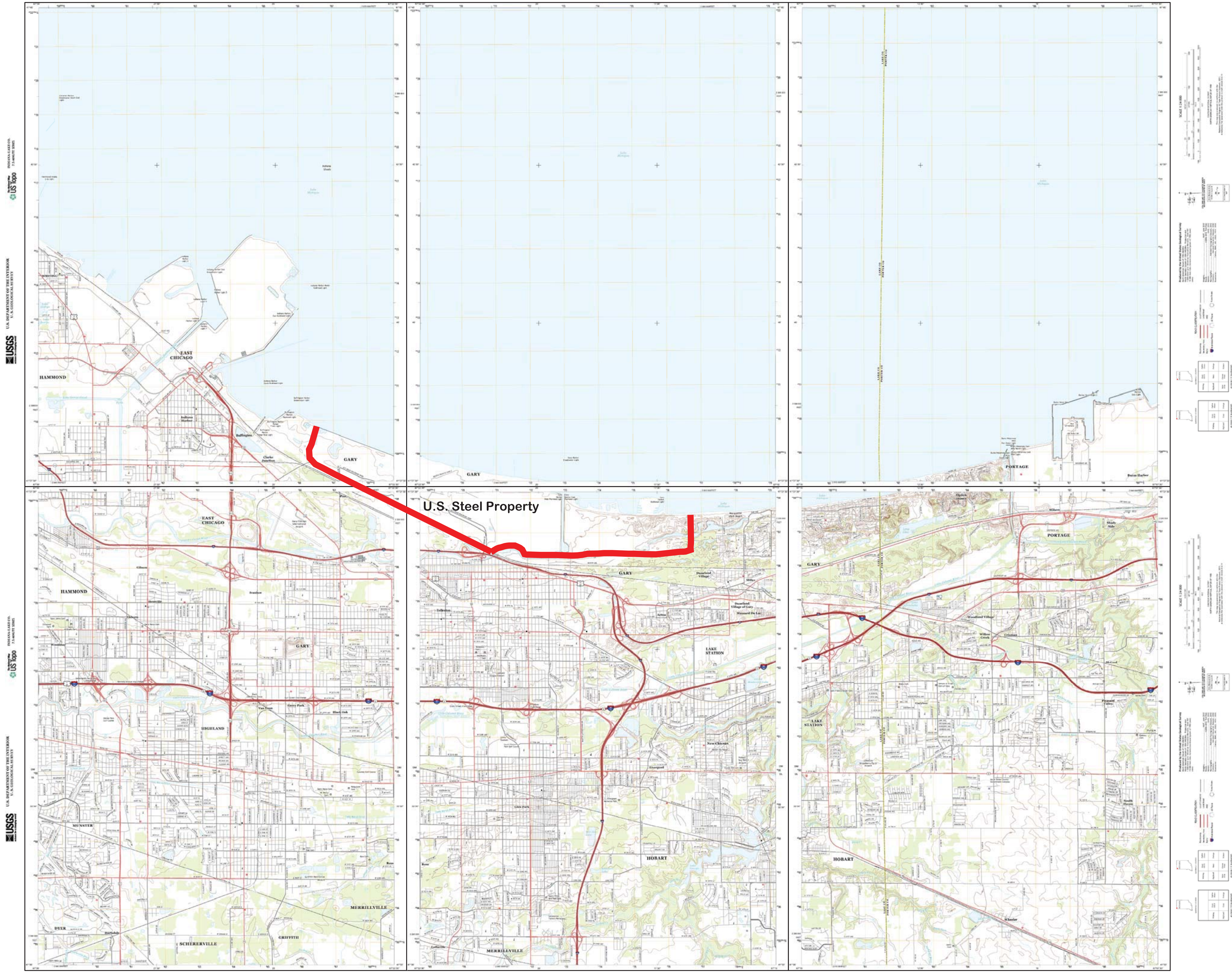


Figure 1.
Topographic
Site Map

Figure 2. West Side Intake and Outfall Location Map

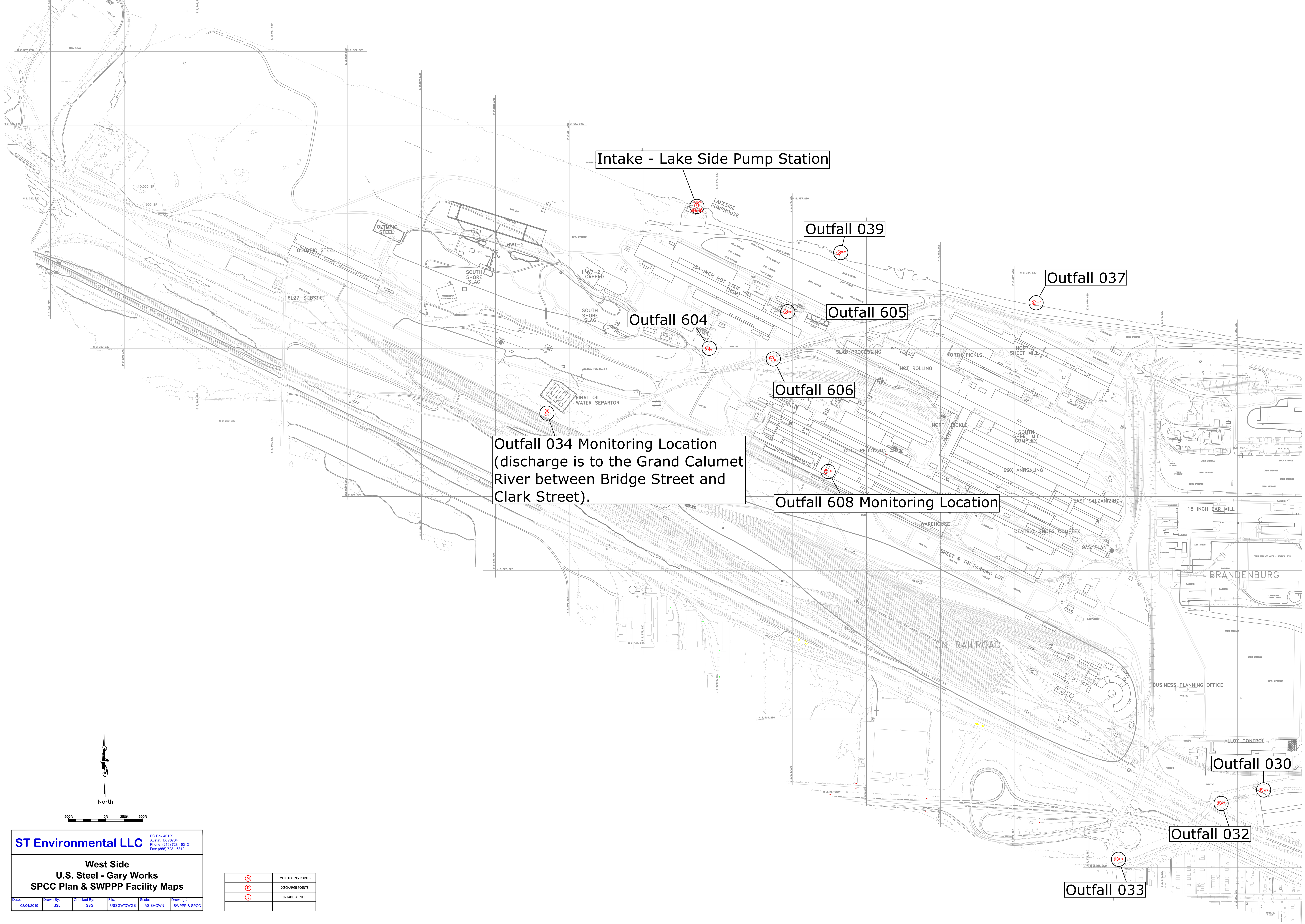


Figure 3. East Side Intake and Outfall Location Map

ST Environmental LLC
PO Box 40129
Austin, TX 78704
Phone: (219) 728 - 6312
Fax: (855) 728 - 6312

East Side
U.S. Steel - Gary Works
SPCC Plan & SWPPP Facility Maps

Date:	Drawn By:	Checked By:	File:	Scale:	Drawing #:
08/04/2019	JSL	SSG	USSGW/DWGS	AS SHOWN	SWPPP & SPCC

M	MONITORING POINTS
D	DISCHARGE POINTS
I	INTAKE POINTS

IDEM Owner-Operator Affidavit Form

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OWNER/OPERATOR AFFIDAVIT TO DETERMINE THE APPROPRIATE NPDES PERMITTEE(S)

327 IAC 5-2-3(c) requires the operator to apply for and obtain the NPDES permit for the NPDES discharge, unless the operator is an employee of the owner of the facility (in which case it is the owner's responsibility to apply for and obtain the NPDES permit). This is consistent with the federal regulations at 40 CFR 122.21(b). Additionally, pursuant to 327 IAC 5-2-6(c), the permittee is required to notifiy the IDEM if there is a change in either the ownership or the operation of the wastewater treatment plant.

When an NPDES permittee contracts with a private firm to operate its wastewater treatment plant, and the contractual agreement is one in which the private entity is not an employee of the owner, the permit should be issued to the private firm. Some contractual arrangements may have been made without the knowledge of this rule requirement, and the contract may not have been adequately set up to reflect this private firm as the sole permittee. Or the private contractor may not want to be the sole permittee. Therefore, in such instances EPA has suggested that the permit be issued to both the owner and to the private contractor, as co-permittees.

In order to help us determine who should be listed on the NPDES permit as the permittee(s), please complete the following information:

1. Name of Facility: U. S. Steel Corporation – Gary Works
2. NPDES Permit Number: IN0000281
3. Name of Owner: United States Steel Corporation
(individual or legal business name)

   Mailing Address of Owner: One North Broadway Mail Station 70, Gary, IN 46402
4. Name of Operator: United States Steel Corporation
(individual or legal business name)

   Mailing Address of Owner: One North Broadway Mail Station 70, Gary, IN 46402
5. Is the operator an employee of the owner: ☒ YES ☐ NO
6. If the answer to #5 is "No", is the operator willing to be the sole permittee?

   ☐ YES ☐ NO ☒ N/A
7. If the answer to #6 is "No", the NPDES permit will be issued to both the owner and the operator as co-permittees.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

(Signature of Owner)

(Signature of Operator)

Please complete this form and return it to the IDEM, Office of Water Quality, Municipal NPDES Permits Section 100 North Senate Ave.
Indianapolis, IN 46204

IDEM Request for Information Form

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

REQUEST FOR INFORMATION

We request that you fill in the blanks on this form and return it along with your NPDES PERMIT application. The information provided will be helpful in our personal contact with officials of your municipality, industry, or other facility in assuring prompt delivery of correspondence, etc. Thank you for your cooperation.

I. Current NPDES Permit Number IN0000281
(New applicants will be assigned a number later)

II. WASTEWATER TREATMENT FACILITY LOCATION ADDRESS

Name of Facility: U. S. Steel Corporation – Gary Works
Address: One North Broadway, Mail Station 70
City: Gary State: IN Zip code: 46402
Telephone: 219-888-4500 Email: apiscitelli@uss.com

III. DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS (ADDRESS WHERE IDEM IS TO SEND PRE-PRINTED DMRS)

Name: Brandon Miller Title: Water Compliance Manager
Address: One North Broadway, Mail Station 70
City: Gary State: IN Zip code: 46402
Telephone: 219-888-3369 Email: bsmiller@uss.com
Cognizant Official (Representative responsible for completing DMR):
Name: Alexis Piscitelli Title: Environmental Director

IV. OWNER ADDRESS

Name of Owner: United States Steel Corporation Title: Corporation
Address: One North Broadway, Mail Station 70
City: Gary State: IN Zip code: 46402
Telephone: 219-888-4500 Email: apiscitelli@uss.com

V. WASTEWATER TREATMENT PLANT OPERATOR/SUPERINTENDENT ADDRESS

Name of Operator: Brandon Miller Certificate Number: WW020987
Address: One North Broadway, Mail Station 70
City: Gary State: IN Zip code: 46402
Telephone: Work: 219-888-3369 Email: bsmiller@uss.com

Identification of Potentially Affected Persons Form

I. Identification of Potentially Affected Persons

Please list here any and all persons whom you have reason to believe have a substantial or proprietary interest in this matter, or could otherwise be considered to be potentially affected under the law. Failure to notify any person who is later determined to be potentially affected could result in voiding our decision on procedural grounds. To ensure conformance with AOPA and to avoid reversal of a decision, please list all such parties. The letter attached to this form will further explain the requirements under the AOPA. Attach additional names and addresses on a separate sheet of paper, as needed. Please indicate below the type of action you are requesting.

Name: Kyle Allen Sr., 1st District Commissioner, Lake County	Name: Jerome Prince, Mayor
Street address: Building A, 3rd Floor, 2293 N. Main Street	Street address: 401 Broadway, Mayor's Office
City/State/ZIP code: Crown Point, IN 46037	City/State/ZIP code: Gary, IN 46402
Name: Brenda Scott-Henry, Dept. of Env. Affairs, City of Gary	Name: Gary Sanitary District
Street address: 839 Broadway, Suite N206	Street address: 3600 West 3rd Avenue
City/State/ZIP code: Gary, IN 46402	City/State/ZIP code: Gary, IN 46406
Name: Devin Sprinkle, Canadian National Environmental	Name: John Battisti, Plate Operations, ArcelorMittal Burns Harbor
Street address: 1 North Buchanan Street, KY-152	Street address: 250 West Highway 12
City/State/ZIP code: Gary, IN 46402	City/State/ZIP code: Burns Harbor, IN 46304
Name: Robert Maciel, Environmental Department	Name:
Street address: 250 West Highway 12	Street address:
City/State/ZIP code: Burns Harbor, IN 46304	City/State/ZIP code:
Name:	Name:
Street address:	Street address:
City/State/ZIP code:	City/State/ZIP code:
Name:	Name:
Street address:	Street address:
City/State/ZIP code:	City/State/ZIP code:
Name:	Name:
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Street address:	Street address:
City/State/ZIP code:	City/State/ZIP code:
Name:	Name:
Street address:	Street address:
City/State/ZIP code:	City/State/ZIP code:
Name:	Name:
Street address:	Street address:
City/State/ZIP code:	City/State/ZIP code:

II. Please complete this form by signing the following statement.

I certify to the best of my knowledge I have listed all potentially affected parties, as defined by IC 4-21.5.		
Signature: [signature]		4-30-20
Printed name: Daneil Killeen		Date:
Facility name: United States Steel Corporation - Gary Works		
Facility address: One North Broadway		
Facility city: Gary	Facility state: Indiana	ZIP code: 46402

III. Type of Action (check one)

- [x] NPDES Permit-327 IAC 5
- [ ] Pretreatment Permit -327 IAC 5
- [ ] Construction Permit-327 IAC 3

A $50.00 fee is required for a New permit, a Renewal or a Modification; if this is a renewal or modification request, include NPDES permit No. on check and return to:
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Cashiers Office – Mail Code 50-10C
100 North Senate Avenue
Indianapolis, IN 46204-2251

If No Fee Is Required (Fee has previously been paid), Return To:
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Office of Water Quality – Mail Code 65-42
Room N1255
Permits Branch
100 North Senate Avenue
Indianapolis, Indiana 46204-2251

Table ES-1.
U. S. Steel Gary Works Outfall Inventory

Table ES-1. U. S. Steel Gary Works Outfall Inventory

Outfall	North Latitude	West Longitude	Receiving Water	Status	Discharge Type	Permit App Form	General Discharge Flows Summary
015	41-36-27.4	87-19-19.6	GCR	Active	NCCW, NP, P, SW	2C	sinter plant, PCI East - NCCW; condensates; stormwater; internal 607 - treated P; internal 501 - NP, NCCW
501 (current)	41-36-46.1	87-18-19.8	015	Active	INTERNAL	2C	treated remediation groundwater, boiler blowdown and condensates, freeze protection water; boiler feedwater pretreatment; stormwater - NP; NCCW; SW
501 (authorized - optional future)	41-36-46.1	87-18-19.8	015	*Authorized - Future*	INTERNAL	2C w/o data	treated remediation groundwater, boiler blowdown and condensates, freeze protection water; boiler feedwater pretreatment; stormwater; ***SWD-1 landfill leachate and truck wash decant waters*** - NP; NCCW; SW
607 (current)	41-36-55.1	87-19-0.1	015	Active	INTERNAL	2C	treated SWD-1 landfill leachate and vacuum trucks & truck wash decant waters
607 (optional future)	*Internal Outfall 607 would be eliminated.*						
018 (current)	41-36-27.4	87-19-42.2	GCR	Active	NCCW, SW, NP	2C	blast furnace, Fab AC, PCI West, power station - NCCW; stormwater; condensates; if Outfall 019 flow restricted, then Outfall 019 discharges; SOF06 (emergency only)
018 (proposed - future)	41-36-27.4	87-19-42.2	GCR	*Proposed - Future*	NCCW, SW, NP, **P**	2C	blast furnace, Fab AC, PCI West, power station - NCCW; stormwater; condensates; if Outfall 019 flow restricted, then Outfall 019 discharges; SOF06 (emergency only); ***Discharge of treated Blast Furnace Recycle System Blowdown (emergency only)***
019	41-36-27.7	87-19-51.2	GCR	Active	NCCW, SW, NP	2C	blast furnace, power station and No. 2 Q-BOP - NCCW; stormwater; Turboboiler and boiler house - blowdown; condensates; boiler house car wash; CWT regenerant, backwashes and concentrates (UF/RO/softener systems)
020	41-36-27.7	87-20-0.2	GCR	Active	NCCW, SW	2C	No. 1 BOP shop, No. 1 Caster - NCCW; condensates; stormwater
021	41-36-28.1	87-20-1.7	GCR	Active	NP, SW	2C	No. 1 BOP Shop compressor cooling water; steel producing area AC condensates and steam condensates; stormwater
023	41-36-27.4	87-20-7.1	GCR	Inactive	NP, SW	2C w/o data	hospital building AC NCCW; hospital building condensates; stormwater; SOF11 (emergency only)
026	41-36-27.7	87-20-15.7	GCR	Inactive	NP, SW	2C w/o data	pass control AC NCCW and steam condensates; stormwater
028 & 030 (current)	028: 41-36-34.6 030: 41-36-36	028: 87-20-26.9 030: 87-20-46	GCR	Active	NCCW, P, SW	2C	internal 603 (steelmaking, vacuum degassing, continuous casting and hot forming process) - treated P; stormwater; continuous caster and slab cooling water - NCCW and direct contact cooling water; caster and misc. - NCCW; No. 1 BOP cooling tower blowdown; 160"/210" Plate Mill Scale Pit (currently inactive) - P; SOFs #2, 4, & 17 (emergency only)

Table ES-1. U. S. Steel Gary Works Outfall Inventory

<table>
<tr><th>Outfall</th><th>North Latitude</th><th>West Longitude</th><th>Receiving Water</th><th>Status</th><th>Discharge Type</th><th>Permit App Form</th><th>General Discharge Flows Summary</th></tr>
<tr><td>028 & 030
(proposed - future)</td><td>028:
41-36-34.6
030:
41-36-36</td><td>028:
87-20-26.9
030:
87-20-46</td><td>GCR</td><td>Proposed - Future</td><td>NCCW, P, SW</td><td>2C</td><td>internal 603 (steelmaking, vacuum degassing, continuous casting, hot forming process; stormwater) - treated P & SW; stormwater; continuous caster and slab cooling water - NCCW and direct contact cooling water; caster and misc. - NCCW; No. 1 BOP cooling tower blowdown; 160"/210" Plate Mill Scale Pit (currently inactive) - P; SOFs #2, 4, & 17 (emergency only)</td></tr>
<tr><td>200</td><td>Virtual outfall</td><td>Virtual outfall</td><td>028/030</td><td>Active</td><td>Virtual</td><td>N/A</td><td>Combined mathematical sum of external outfalls 028 and 030</td></tr>
<tr><td>603 (current)</td><td colspan="2">5 locations below</td><td rowspan="6">028/030</td><td rowspan="6">Active</td><td rowspan="6">INTERNAL
(Outfall 603)</td><td rowspan="6">2C</td><td rowspan="6">steelmaking, vacuum degassing, continuous casting and hot forming process treated wastewaters: BOP (1-BOP and Q-BOP); vacuum degasser and vacuum degasser overflow, and continuous casting (No.1-Caster, No.2-Caster A/B line, No.2-Caster C line), and slab spray cooling water - treated P</td></tr>
<tr><td>603 - #1 Caster</td><td>41-36-54.4</td><td>87-19-49.8</td></tr>
<tr><td>603 - #2 Caster A/B</td><td>41-37-19.6</td><td>87-19-54.8</td></tr>
<tr><td>603 - #2 Caster C Line</td><td>41-37-14.5</td><td>87-20-1.7</td></tr>
<tr><td>603 - #1 Thickner</td><td>41-37-8.4</td><td>87-19-56.3</td></tr>
<tr><td>603 - #1A Thickner</td><td>41-37-7.7</td><td>87-19-56.6</td></tr>
<tr><td>603 (proposed - future)</td><td colspan="2">5 locations below</td><td rowspan="6">028/030</td><td rowspan="6">Proposed - Future</td><td rowspan="6">INTERNAL
(Outfall 603)</td><td rowspan="6">2C</td><td rowspan="6">steelmaking, vacuum degassing, continuous casting and hot forming process treated wastewaters: BOP (1-BOP and Q-BOP); vacuum degasser and vacuum degasser overflow, and continuous casting (No.1-Caster, No.2-Caster A/B line, No.2-Caster C line), and slab spray cooling water; stormwater - treated P and SW</td></tr>
<tr><td>603 - #1 Caster</td><td>41-36-54.4</td><td>87-19-49.8</td></tr>
<tr><td>603 - #2 Caster A/B</td><td>41-37-19.6</td><td>87-19-54.8</td></tr>
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<tr><td>603 - #1 Thickner</td><td>41-37-8.4</td><td>87-19-56.3</td></tr>
<tr><td>603 - #1A Thickner</td><td>41-37-7.7</td><td>87-19-56.6</td></tr>
<tr><td>032</td><td>41-36-34.6</td><td>87-20-51.4</td><td>GCR</td><td>Active</td><td>NP, SW</td><td>2C, 2F</td><td>QA lab coolers and misc. NCCW (steel producing storage bldg and brandenburg complex); condensate; freeze protection water; stormwater; SOF3 (emergency only)</td></tr>
<tr><td>033</td><td>41-36-26</td><td>87-21-11</td><td>GCR</td><td>Active</td><td>NCCW, SW</td><td>2C, 2F</td><td>sheet and tin mills, atmospheric gas plant - NCCW; condensate; stormwater; SOF51 (emergency only)</td></tr>
<tr><td>034</td><td>41-36-23</td><td>87-23-03</td><td>GCR</td><td>Active</td><td>NCCW, P, SW</td><td>2C</td><td>604, 605, 606, and 608 - treated P, NCCW, condensates and stormwater</td></tr>
<tr><td>604
(current)</td><td>41-37-34.7</td><td>87-22-23.5</td><td>034</td><td>Active</td><td>INTERNAL</td><td>2C</td><td>84" hot strip mill, 84" and 80" pickle lines, north and south sheet mill, and tin mill processes (e.g. rolling, acid pickling, alkaline cleaning, coating, electroplating, tempering, galvanizing, OWS, grinding, trimming, quenching, etc.), demin plant backwash and regenerant, boiler feedwater softener blowdown (backwash and regenerant), and EGL basement water - treated P</td></tr>
</table>

Table ES-1. U. S. Steel Gary Works Outfall Inventory

Outfall	North Latitude	West Longitude	Receiving Water	Status	Discharge Type	Permit App Form	General Discharge Flows Summary
604 (proposed - future)	41-37-34.7	87-22-23.5	034	*Proposed - Future*	INTERNAL	2C	84" hot strip mill, 84" and 80" pickle lines, north and south sheet mill, and tin mill processes (e.g. rolling, acid pickling, alkaline cleaning, coating, electroplating, tempering, galvanizing, OWS, grinding, trimming, quenching, etc.), demin plant backwash and regenerant, boiler feedwater softener blowdown (backwash and regenerant), EGL basement water; ***stormwater*** - treated P and ***SW***
605	41-37-40.1	87-22-10.6	034	Active	INTERNAL	2C	84" hot strip mill - P; 84" hot strip mill boiler blowdown, filter backwash and softener regenerate, and condensates
606	41-37-29.3	87-22-9.5	034	Active	INTERNAL	2C	steel finishing operation - NCCW; Misc NP; condensates; internal 608 - treated P; stormwater
608	41-37-17.90	87-22-1.99	034	Active	INTERNAL	2C w/o data	treated process water from the new Chrome Wastewater Treatment Plant (Tin Free Steel line and No. 4 basement sumps; process water from No. 5 and No. 6 Electrolytic Tinning lines) - treated P
609	Virtual outfall	Virtual outfall	034	Active	Virtual	N/A	Combined mathematical sum of internal outfalls 604 and 608
035	41-37-29.3	87-19-35.8	LM	Active	NCCW, SW	2C	No. 14 blast furnace, No. 5 electric power station, steam turbine gen (co-gen plant) - NCCW; steam condensates; stormwater
037	41-37-39	87-21-25	LM	Active	NCCW, SW	2C	5-stand cold reduction mill, north sheet mill annealing and air compressor, 80" temper mill, No 6 & 8 galvanized lines - NCCW; condensate; stormwater
039	41-37-45.8	87-21-59.8	LM	Active	NCCW, SW	2C	84" hot strip mill, reheat furnace, fire water distribution, roughing & finishing mill oil tanks & filters - NCCW; 84" hot strip mill roughing mill scale pit emergency overflow; condensates; stormwater
041A and 041B (current)	41-37-12.4	87-19-32.2	LM	Inactive	NCCW, SW	No Forms	Ore Yard N. & S. Rectifier NCCW; Ore Yard N. & S. Rectifier stormwater
041A and 041B (future)	*Remove Outfalls 41A and 041B.*						
BW1	41-36-58.7	87-19-41.2	LM	Active	No. 1 PS BW	2C w/data tables for Intake	intake screen backwash
BW2	41-37-27.1	87-19-31.4	LM	Active	No. 2 PS BW		intake screen backwash
BW3	41-36-36	87-19-21.7	LM	Active	No. 3 PS BW		intake screen backwash
BW4	41-36-55.4	87-19-13.8	LM	Active	No. 4 PS BW		intake screen backwash
BW5	41-37-52	87-22-26.8	LM	Active	Lakeside PS BW		intake screen backwash
SW01	41-37-2.6	87-19-27.8	LM	Active	SW	2F	stormwater
SW02	41-36-52.6	87-19-31.4	LM	Active	SW	2F	stormwater

Table ES-1. U. S. Steel Gary Works Outfall Inventory

Outfall	North Latitude	West Longitude	Receiving Water	Status	Discharge Type	Permit App Form	General Discharge Flows Summary
SW08	41-36-27.4	87-19-47.6	GCR	Active	SW	2F	stormwater
SW11	41-36-28.1	87-20-13.6	GCR	Active	SW	2F	stormwater
SOF1	41-36-28.4	87-20-12.8	GCR	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF2	41-36-43.2	87-20-14.3	028/030 via GW11	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF3	41-36-49	87-20-58.2	032	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF4	41-36-55.8	87-20-4.9	028/030 via GW10	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF5	41-36-36.7	87-19-33.6	LM	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF6	41-36-49.7	87-19-42.2	018	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF11	41-36-25.9	87-20-6.4	023	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF17	41-37-12.7	87-20-10	028/030 via GW10	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
SOF51	41-37-1.9	87-21-20.5	033	Active	Emer San Over	2C w/o data	emergency only sanitary lift station overflow
POF1	41-36-28.1	87-20-2.4	GCR	Active	GW-10 Overflow	2C w/o data	emergency only process overflow

Notes:
Receiving waters - GCR = Grand Calumet River, LM = Lake Michigan
Discharge types - P = process, NP = non-process, NCCW = non-contact cooling water, SW = stormwater, BW = backwash, Emer San Over = emergency only sanitary overflow

Table ES-2.
Effluent Limitation Guidelines Production Values

Tables ES-2. Effluent Limitation Guidelines Production Values

ELG Outfall	Max Production Values used in Development of Current Permit TBELs[1] (Ton/day)	Max Production based on Highest Monthly Production Values[2] 2015 to 2019 (Ton/day)	Max Production based on Highest Daily Production Values[3] 2015 to 2019 (Ton/day)	Production Unit/Area	40 CFR
603 (note a)	9,583	8,642	9,718	No. 1 Basic Oxygen Plant (#1 BOP)	420.42/43
	12,197	10,165	11,210	Q-BOP = #2 Q-BOP	420.42/43
	4,292	3,625	5,321	Vacuum Degassing	420.54
	5,075	4,637	5,304	No. 1 Continuous Casting	420.62/63
	17,071	13,329	32,177	No. 2 Continuous Casting	420.64
	2,797 (note b)	2,797 (note b)	2,797 (note b)	160"/210" Plate Mill **	420.72(c)(2)
605	18,208	16,335	21,951	84" Hot Strip Mill	420.72(c)(1)
609* (Acid Pickling)	2,112	2,005	2,828	80" South Pickle Line	420.92/93(b)(2)+(b)(4)
	1 unit	1 unit	1 unit	Fume Scrubber (associated with 80" South Pickle Line)	420.92/93(b)(2)+(b)(4)
	7,190	5,774	9,027	84" North Pickle Line	420.92/93(b)(2)+(b)(4)
	1 unit	1 unit	1 unit	Fume Scrubber (associated with 84" North Pickle Line)	420.92/93(b)(2)+(b)(4)
	inactive	inactive	inactive	No. 1 Electrogalvanizing Line	420.92/93(b)(2)
	inactive	inactive	inactive	No. 1 Tin Free Steel Line	420.92/93(a)(3)
	604	458	665	No. 5 Electrolytic Tinning Line	420.92/93(a)(3)
	953	836	1,580	No. 6 Electrolytic Tinning Line	420.92/93(a)(3)
609* (Cold Rolling)	1,176	490	1,010	No. 2 Stand Temper Mill	420.102/103(a)(5)
	2,798	2,152	4,279	North Sheet Temper Mills: 80" Temper Mill	420.102/103(a)(4)
	586	321	787	North Sheet Temper Mills: 80" Recoil Line	420.102/103(a)(4)
	7,135	5,584	8,736	No. 5 Stand Cold Reduction Mill	420.102/103(a)(2)
	1,899	1,511	3,008	No. 6 Stand Cold Reduction Mill	420.102/103(a)(2)
	947	849	1,840	48" Temper Mill	420.102/103(a)(2)
	877	800	1,434	Tin Double Cold Reduction Mill	420.102/103(a)(5)
	688	345	1,147	84" Temper	420.102/103(a)(2)
	inactive	inactive	inactive	Hot Coil Prep Line	420.102/103(a)(2)
609* (Alkaline Cleaning)	inactive	inactive	inactive	No. 1 Electrogalvanizing Line	420.112(b)
	inactive	inactive	inactive	No. 1 Tin Free Steel Line	420.112(b)
	1,002	867	1,023	No. 2 Continuous Anneal Line	420.112(b)
	604	458	665	No. 5 Electrolytic Tinning Line	420.112(b)
	953	836	1,580	No. 6 Electrolytic Tinning Line	420.112(b)
	inactive	inactive	inactive	No. 6 Galvanizing Line	420.112(b)
	816	607	1,282	No. 7 Cleaning Line	420.112(b)
	inactive	inactive	inactive	No. 8 Galvanizing Line	420.112(b)

Tables ES-2. Effluent Limitation Guidelines Production Values

ELG Outfall	Max Production Values used in Development of Current Permit TBELs(1) (Ton/day)	Max Production based on Highest Monthly Production Values(2) 2015 to 2019 (Ton/day)	Max Production based on Highest Daily Production Values(3) 2015 to 2019 (Ton/day)	Production Unit/Area	40 CFR
609* (Hot Coating)	inactive	inactive	inactive	No. 6 Galvanizing Line	420.122/123(a)(1)+(c)
	inactive	inactive	inactive	Fume Scrubber (associated with No. 6 Galvanizing Line)	420.122/123(a)(1)+(c)
	inactive	inactive	inactive	No. 8 Galvanizing Line	420.122/123(a)(1)+(c)
	inactive	inactive	inactive	Fume Scrubber (associated with No. 8 Galvanizing Line)	420.122/123(a)(1)+(c)
609* (Metal Finishing)	1.61 mgd	1.61 mgd		Electroplating	433.13/14(a)
				No. 1 Electrogalvanizing Line (inactive)	
				No. 1 Tin Free Steel Line (inactive)	
				No. 5 Electrolytic Tinning Line	
				No. 6 Electrolytic Tinning Line	
				Chromating	433.13/14(a)
				No. 1 Tin Free Line (inactive)	
				No. 5 Electrolytic Tinning Line	
				No. 6 Electrolytic Tinning Line	
609* (BPJ)	1.4 mgd	1.4 mgd		84" HSM Basement	BPJ
New Internal Outfall**	na	17,403	20,599	No. 4, No. 6, No. 8, and No. 14 Blast Furnaces	420.32/33

Notes:
(1) Unless noted, values are based on the highest monthly production total divided by the number of days in the month from the 2009 - 2013 timeframe.
(2) Values based on the highest monthly production total divided by the number of days in the month.
(3) Values are the actual highest daily production for the listed timeframe.
(a) For TSS TBELs for Outfall 603 ELGs (applied at Outfall 028/030), the current permit limits were carried over from the 2010 Permit utilizing different production values.
(b) Plate Mill belongs to ArcelorMittal (no USS control over startup): has not been in operation, no plans to restart have been communicated to USS. Use of previous production value (1993-1997) requested.
* 609 is the combined discharge of Outfalls 604 and 608.
** As indicated in the Executive Summary, authorization to discharge treated Blast Furnace Recycle System (BFRS) Blowdown on an emergency only basis is requested. The proposed discharge would be subject to the Ironmaking Subcategory ELGs.

Form 2Cs

Outfalls 015, 501 and 607:

Form 2C Pages 1-4
Form 2C Part V for Outfall 015
Form 2C Part V for Outfall 501
Form 2C Part V for Outfall 607

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
015	41	36	27.4	87	19	19.6	Grand Calumet River
607	41	36	55.1	87	19	0.1	Outfall 015 to Grand Calumet River
501	41	36	46.1	87	19	19.8	Outfall 015 to Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachments 2C-B and 2C-C)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
015		2.1 MGD Long Term Ave	Dechlorination	4A	2E
	Sinter Plant and PCI East NCCW	Continuous			
	Steam Condensate & Stormwater	Intermittent			
	Current: Internal Outfalls 501 and 607	See below	See below		
	Proposed/Future: Internal Outfall 501	*See below*	*See below*		
607 (current)		0.09 MGD Long Term Ave	Equalization (2) & Neutralization (2)	1U	2K
	Solid Waste Landfill Leachate (SWD-1)	Intermittent	Chemical Precipitation	2C	
	Vacuum trucks & truck wash decant pad	Intermittent	Sludge Dewatering Filter Press	5C	
			Activated Carbon	2A	
			Lamella Clarification w/ Mix Tanks	1U	1O
			Sand Filtration	1R	
501 (current)		0.26 MGD Long Term Ave			
	Boiler Blowdown and Condensate	Intermittent	Oil & Tar Removal	1G	1U
	Non-Contact Cooling Water	Continuous	Equalization & Integral Clarifier	1O	3A
	Freeze protection water	Intermittent	Activated Sludge System	3A	
	Remediation Groundwater	Continuous (0.2 MGD est.)	*Nitrification-Denitrification (optional)*	*3D*	
	Boiler feedwater pretreatment		Final Sand Filtration	1R	
	Stormwater				
501 (authorized - future)	Same as current 501 but also including:	0.35 MGD Estimated	Same as current 501		
	Solid Waste Landfill Leachate (SWD-1)				
	Vacuum trucks & truck wash decant pad				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
015 (current)	Steam condensate	As needed	As needed					
607 (current)	Landfill leachate, vacuum trucks & truck wash decant pad	WWTP is batch operated, wastewater treated as needed		0.09 MGD	0.15 MGD			
501 (current)	Boiler blowdown & condensates, freeze protection water	As needed	As needed					
501 (authorized future)	Boiler blowdown & condensates, freeze protection water	As needed	As needed					
	Landfill leachate, vacuum trucks & truck wash decant pad	As needed	As needed					

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* X NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
Outfall 607 Vanadium	Facility non-hazardous waste		
Outfall 501 (current) Naphthenic acid	Breakdown product of activated sludge		
Outfall 501 (proposed/future) – assuming inclusion of current Leachate Treatment Plant influent wastewaters) *Vanadium* *Naphthenic acid*	*Facility non-hazardous waste* *Breakdown product of activated sludge*		

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

X YES *(list all such pollutants below)* ☐ NO *(go to Item VI-B)*

Outfall 607 (current)

The following constituents are potentially present in 607 effluent because they are a substance or component of a substance made by U. S. Steel, and hence could be present in the solid waste:

Benzene	Ethylbenzene	Toluene	Benzo(a)pyrene	Naphthalene	Phenanthrene	Phenol (single cmpd)
Arsenic	Copper	Lead	Selenium	Cyanide (total)	Phenols (total)	

Outfall 501 (current)

The following could potentially be present because they could be in remediation groundwater. The WWTP is designed to effectively treat biodegradable compounds.

Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead
Selenium	Silver	Thallium	Zinc	Cyanide (total)	Phenols (total)	Benzene
Ethylbenzene	Toluene	Phenol (single cmpd)	Acenaphthene	Acenaphthylene	Anthracene	
Benzo(a)Anthracene	Benzo(a)Pyrene	3,4-Benzofluoranthene	Benzo(ghi)Perylene	Benzo(k)Fluoranthene	Chrysene	
Fluoranthene	Fluorene	Indeno(1,2,3-cd)Pyrene	Naphthalene	Phenanthrene	Pyrene	

Outfall 501 (proposed/future)

The following could potentially be present because they could be in remediation groundwater or landfill leachate (possibly present in the soild waste since they are a substance or component of a substance made by U. S. Steel). The WWTP is designed to effectively treat biodegradable compounds.

Antimony	*Arsenic*	*Beryllium*	*Cadmium*	*Chromium*	*Copper*	*Lead*
Selenium	*Silver*	*Thallium*	*Zinc*	*Cyanide (total)*	*Phenols (total)*	*Benzene*
Ethylbenzene	*Toluene*	*Phenol (single cmpd)*	*Acenaphthene*	*Acenaphthylene*	*Anthracene*	
Benzo(a)Anthracene	*Benzo(a)Pyrene*	*3,4-Benzofluoranthene*	*Benzo(ghi)Perylene*	*Benzo(k)Fluoranthene*	*Chrysene*	
Fluoranthene	*Fluorene*	*Indeno(1,2,3-cd)Pyrene*	*Naphthalene*	*Phenanthrene*	*Pyrene*	

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

X YES *(identify the test(s) and describe their purpose below)* ☐ NO *(go to Section VIII)*

Outfall 015

Date	Species	Acute Toxicity LC$_{50}$	Acute Toxicity TUa (100/LC50)	Acute Toxicity Compliance Point Pass/Fail	Chronic Toxicity IC25	Chronic Toxicity NOEC	Chronic Toxicity TUc (100/NOEC)	Chronic Toxicity TUc (100/IC25)	Chronic Toxicity Compliance Point Pass/Fail
July-18	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS
June-19	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	1.0	PASS

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, MI 49424	(616) 399-6070	All except WET
Battelle	1529 West Sequim Bay Road Sequim, Washington 98382	(360) 681-3650	Mercury Split Samples
Ramboll	201 Summit View Drive Suite 300 Brentwood, TN 37027	(615) 277-7570	Whole Effluent Toxicity (WET) Testing

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen, General Manager – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) OUTFALL NO. 015

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	38.0	698	17.4	319	7.9	143	150/32	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	22	404					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	6.4	117					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	420	7,706					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	11	202					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	7740	142,099	1550	28,460	63.7	1,159	150/32	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	1.7	29.0	1.19	20.8	0.54	9.7	150/32	mg/L	lb/day					
Flow	VALUE 3.1		VALUE 2.4		VALUE 2.1		962/32	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 72		VALUE 75		VALUE 60		689/23	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 86		VALUE 83		VALUE 70		272/9	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	150	2,752						mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.4	MAXIMUM 8.1	MINIMUM 6.7	MAXIMUM 7.9			136/32	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	015

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		0.20	3.7					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		55	1,009			50	805	2	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	<0.02		<0.02		<0.02		753/26	mg/L						
Color (C.U.) Cas No. E-11712	X		< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.24	4.4					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.33	6.1					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		5.2	95.5	2.6	47.7	1.5	27.3	151/32	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.256	4.7					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		110	2,018			94	1,530	2	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4	X		< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.102	1.9					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0355	0.65					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0617	1.1					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4	X		< 0.000300						1	mg/L						
Iron Cas No. 7439-89-6	X		0.423	7.8					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		13.1	240					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.0241	0.44					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*			IND005444062							Outfall Number		015				
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.0473	0.87					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.00040						1	mg/L						
Titanium Cas No. 7440-32-6	X		0.0045	0.082					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		1.1	20					1	mg/L	lb/day					
Nitrate Cas No. 14797-55-8	X		0.27	5.0					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0	X		< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	015

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis daily / monthly average	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X	X		< 0.000400						1	mg/L						
Arsenic Cas No. 7440-38-2	X	X		0.00465	0.085					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.000440						1	mg/L						
Cadmium Cas No. 7440-43-9	X		X	< 0.000200						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		< 0.0022						1	mg/L						
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.000226	0.0041	Result is a J flagged value between the method detection limit and reporting limit.				1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.011	0.15			0.0059	0.088	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.15	2.8	0.04	0.74	0.0043	0.08	150/32	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		14	0.00026	6.4	0.00013	2.2	0.000033	103/45	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.014	0.25			0.010	0.17	2	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X	X		0.017	0.31	0.0031	0.06	0.0016	0.03	151/31	mg/L	lb/day					
Silver Cas No. 7440-22-4	X		X	< 0.000500						1	mg/L						
Thallium Cas No. 7440-28-0	X		X	< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		< 0.0031						1	mg/L						
Zinc Cas No. 7440-66-6	X	X		0.61	11.2	0.15	2.8	0.023	0.41	150/32	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.012	0.18	0.0065	0.13	0.0031	0.06	150/32	mg/L	lb/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.032	0.59	0.024	0.36	0.0088	0.16	150/32	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.079	1.45	0.02	0.36	0.0077	0.14	150/32	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	015						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT						3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)		
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	b. (2) Mass	c. Long Term Average (*if available*) (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (*if available*) (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21						1	ug/L						
Acetaldehyde Cas No. 75-07-0	X	X		< 38						1	ug/L						
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X	X		< 43						1	ug/L						
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46						1	ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40						1	ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X	X		0.75	0.014	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	ug/L						
Acetone Cas No. 67-64-1	X	X		15.3	0.28					1	ug/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	ug/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	ug/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 015

1. POLLUTANT	2. MARK (X) a. Testing Required	2. MARK (X) b. Believed Present	2. MARK (X) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0	X	X		< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		< 0.40						1	ug/L						
Chloroethane Cas No. 75-00-3	X	X		< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		< 0.49						1	ug/L						
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X	X		< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X	X		< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X	X		< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 015						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X	X		< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X	X		< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X	X		< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X	X		< 0.051						1	ug/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X	X		0.19	0.0035					1	ug/L	lb/day					
Anthracene Cas No. 120-12-7	X	X	X	< 0.028						1	ug/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X	X		< 0.099						1	ug/L						
Benzo(a)pyrene Cas No. 50-32-8	X	X		<0.04		<0.04		<0.03		273/31	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	015

1. POLLUTANT	2. MARK (X) a. Testing Required	2. MARK (X) b. Believed Present	2. MARK (X) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X	X		< 0.030						1	ug/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X	X		< 0.048						1	ug/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	36*	0.66*			14*	0.23*	4	ug/L	lb/day					
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X	X		< 0.048						1	ug/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X	X		< 0.073						1	ug/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X	X		< 0.038						1	ug/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X	X		< 0.067						1	ug/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X	X		< 0.067						1	ug/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X	X		< 0.036						1	ug/L						

* Detection believed due to contamination from sample tubing. Initial result was a detection but no equipment blank was available for comparison. The first resampling event included collection of an equipment blank and yielded similar detections for both the sample (18 ug/L) and the equipment blank (22 ug/L). For a second resampling event the same process was used but with additional rinsing of the sample tubing prior to collection of the equipment blank. The sample result was non-detect at the reporting limit (a J flagged detection of 1.7 ug/L) and the equipment blank result non-detect at the MDL (< 0.40 ug/L). For the third resampling event a 24-hr composite was collected in two ways: one with an autosampler and tubing and the other consisted of 3 manual grabs (over 24 hrs) without use of any tubing. An equipment blank from the pre-rinsed tubing was also collected. All results for this event were non-detect (< 0.40 ug/L) at the MDL.

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 015						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5	X	X		< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	015					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046		< 0.046		< 0.046		1	ug/L	lb/day					
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028		< 0.028		< 0.028		1	ug/L	lb/day					
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046		< 0.046		< 0.046		1	ug/L	lb/day					
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046		< 0.046		< 0.046		1	ug/L	lb/day					
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046		< 0.046		< 0.046		1	ug/L	lb/day					
PCB-1260 Cas No. 11096-82-5	X		X	< 0.046		< 0.046		< 0.046		1	ug/L	lb/day					
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046		< 0.046		< 0.046		1	ug/L	lb/day					
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X	See Outfall 015 Form 2C page 4 (Section VII) for available WET data.													
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Copper, Dissolved		X		0.0113	0.018	All results are J flagged values between the method detection limit & reporting limit.		0.0059	0.015	3	mg/L	lb/day					
Chloroform	X	X		2.8	0.051					1	ug/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) — OUTFALL NO. 501

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2.a. (2) Mass	2.b. Maximum 30 Day Values *(if available)* (1) Concentration	2.b. (2) Mass	2.c. Long Term Average *(if available)* (1) Concentration	2.c. (2) Mass	2.d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3.b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4.a. (2) Mass	4.b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5.b. **Reporting** Limit
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.0						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	2.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	40	88.6					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	7.2	15.9					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	750	1,661					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	19	42.1					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	40.0	90.6	17.25	30.3	5.88	10.9	254/29	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	1100	2.5	379	0.70	191	0.41	439/50	mg/L	lb/day					
Flow	VALUE 0.43		VALUE 0.31		VALUE 0.26		1519/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 76		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	420	930					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 7.0	MAXIMUM 8.2	MINIMUM 7.1	MAXIMUM 7.6			218/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	501

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X)		2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. Maximum 30 Day Values (if available) (2) Mass	c. Long Term Average (if available) (1) Concentration	c. Long Term Average (if available) (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available) (1) Concentration	a. Long Term Average Value (if available) (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		0.90	2.0					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		120	266					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02						1	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	CPU						
Fluoride Cas No. 16984-48-8	X		0.70	1.6					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.26	0.58					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		3.60	8.07	1.91	4.44	1.47	3.18	440/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		1.74	3.9					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		210	465					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4	X		0.30	0.66					1	mg/L	lb/day					
Aluminum Cas No. 7429-90-5	X		0.17	0.37					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.107	0.24					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.224	0.50					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.000300						1	mg/L						
Iron Cas No. 7439-89-6	X		0.647	1.4					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		21.1	46.7					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.0208	0.046					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	501					
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.146	0.32					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.00040						1	mg/L						
Titanium Cas No. 7440-32-6	X		0.00452	0.010					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.21	0.47					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	501

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis daily / monthly average	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X		X	< 0.000400						1	mg/L						
Arsenic Cas No. 7440-38-2	X	X		0.0221	0.049					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.000400						1	mg/L						
Cadmium Cas No. 7440-43-9	X		X	< 0.000400						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.00255	0.0056					1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X		X	< 0.0000260						1	mg/L						
Copper Cas No. 7440-50-8	X	X		0.00657	0.015					1	mg/L	lb/day					
Lead Cas No. 7439-92-1	X		X	< 0.000400						1	mg/L						
Mercury Cas No. 7439-97-6	X	X		179	0.00035	179	0.00035	28	0.000055	48/45	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.00139	0.0031					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X	X		0.14	0.35	0.04	0.09	0.0064	0.01	446/50	mg/L	lb/day					
Silver Cas No. 7440-22-4	X		X	< 0.000500						1	mg/L						
Thallium Cas No. 7440-28-0	X		X	< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		0.00277	0.0061					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.00583	0.013					1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.076	0.17	0.018	0.04	0.0048	0.01	442/50	mg/L	lb/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.69	1.35	0.42	0.79	0.18	0.33	135/16	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.028	0.069	0.0084	0.021	0.0047	0.01	442/50	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	501					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21						1	ug/L						
Acetaldehyde Cas No. 75-07-0	X		X	< 38						1	ug/L						
Bis(chloromethyl)ether Cas No. 542-88-1	X		X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2	X		X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6	X		X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X		X	< 43						1	ug/L						
Tributyl tin oxide * Cas No. 56-35-9	X		X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46						1	ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40						1	ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X		X	< 0.52						1	ug/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	ug/L						
Acetone Cas No. 67-64-1	X		X	< 1.1						1	ug/L						
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	ug/L						
Benzene Cas No. 71-43-2	X		X	< 6.83		< 2.44		< 0.42		160/50	ug/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	501					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X		X	< 0.40						1	ug/L						
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X		X	< 0.49						1	ug/L						
Dichlorodifluoromethane Cas No. 75-71-8	X		X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X		X	< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5	X		X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4	X		X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	501					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X	X		0.42	0.00093					1	ug/L	lb/day					
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X	X		1.6	0.0035					1	ug/L	lb/day					
Anthracene Cas No. 120-12-7	X	X		0.15	0.00033					1	ug/L	lb/day					
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X	X		0.22	0.00049					1	ug/L	lb/day					
Benzo(a)pyrene Cas No. 50-32-8	X	X		4.0	0.009	1.86	0.004	0.36	0.001	440/50	ug/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 501						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X	X		0.69	0.0015					1	ug/L	lb/day					
Benzo(k)fluoranthene Cas No. 207-06-9	X	X		0.13	0.00029					1	ug/L	lb/day					
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	< 0.40						1	ug/L						
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X	X		0.16	0.00035					1	ug/L	lb/day					
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X	X		0.13	0.00029					1	ug/L	lb/day					
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X	X		0.29	0.00064					1	ug/L	lb/day					
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X	X		0.56	0.0012					1	ug/L	lb/day					
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X	X		5.30	< 0.009	0.64	0.001	0.12	0.0002	135/16	ug/L	lb/day					
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X	X		0.34	0.00075					1	ug/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 501						
1. POLLUTANT	2. MARK *(X)* a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5	X		X	< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062	Outfall Number 501

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9			X														
PCB-1254 Cas No. 11097-69-1			X														
PCB-1221 Cas No. 11104-28-2			X														
PCB-1232 Cas No. 11141-16-5			X														
PCB-1248 Cas No. 12672-29-6			X														
PCB-1260 Cas No. 11096-82-5			X														
PCB-1016 Cas No. 12674-11-2			X														
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X		X	< 0.460						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 607

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE a. (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. b. **Reporting** Limit
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	376	354	273	240	170	147	156/36	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	250	240					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	6.2	6.0					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	2600	2,496					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	85	81.6					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	18.0	16.4	12.1	11.7	5.5	4.6	158/36	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	50.0	43.2	30.8	27.8	14.9	12.8	153/36	mg	lb/day					
Flow	VALUE 0.15		VALUE 0.13		VALUE 0.088		874/36	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 76.0		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	90	86.4					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.2	MAXIMUM 8.4	MINIMUM 6.4	MAXIMUM 7.8			874/36	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	607

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X)		2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. (2) Mass	c. Long Term Average (if available) (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available) (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		1.2	1.2					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		360	346					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5	X		> 8.8	8.4					1	mg/L	lb/day					
Color (C.U.) Cas No. E-11712	X		10						1	PCU						
Fluoride Cas No. 16984-48-8		X	< 0.34						1	mg/L						
Nitrate/Nitrite (as N) Cas No. E-10128	X		1.20	1.2					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		8.60	8.3					1	mg/L	lb/day					
Oil & Grease Cas No. E-10140	X		8.7	7.9	4.2	3.7	2.4	2.1	156/36	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.115	0.11					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		960	922					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.108	0.10					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0196	0.019					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.073	0.070					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4	X		0.000709	0.00068					1	mg/L	lb/day					
Iron Cas No. 7439-89-6	X		0.0453	0.043					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		1.07	1.0					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.307	0.29					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 607

1. POLLUTANT	2. MARK (*X*) a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0016	0.0015					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.00040						1	mg/L						
Titanium Cas No. 7440-32-6	X		0.0077	0.0074					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		24	23.0					1	mg/L	lb/day					
Nitrate Cas No. 14797-55-8	X		0.48	0.46					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0	X		0.31	0.30					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	607

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0	X	X		0.00112	0.0011					1	mg/L	lb/day					
Arsenic Cas No. 7440-38-2	X	X		0.00829	0.0080					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.0004						1	mg/L						
Cadmium Cas No. 7440-43-9	X		X	< 0.0002						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.00306	0.0029					1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.00198	0.0019					1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.188	0.18					1	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0039	0.00436	0.0007	0.00071	0.0009	0.00080	39/1	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		168.5	0.00014	168.5	0.00014	26.5	0.000022	35/32	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.203	0.19					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X	X		0.0154	0.015					1	mg/L	lb/day					
Silver Cas No. 7440-22-4	X		X	< 0.0005						1	mg/L						
Thallium Cas No. 7440-28-0	X		X	< 0.0003						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		0.00859	0.0082					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.61	0.48	0.16	0.15	0.16	0.11	39/1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.83	0.83			0.15	0.14	36	mg/L	lb/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.288	0.28					1	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		1.90	1.64	0.16	0.03	0.29	0.23	37/1	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 607

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21						1	µg/L						
Acetaldehyde Cas No. 75-07-0	X	X		133	0.075					1	µg/L	lb/day					
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X	X		218	0.122					1	µg/L	lb/day					
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	µg/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	< 0.46						1	µg/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	µg/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	µg/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	< 0.40						1	µg/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	µg/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	µg/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	µg/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	µg/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	µg/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	µg/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	µg/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	µg/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	µg/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X	X		22	0.021					1	µg/L	lb/day					
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	µg/L						
Acetone Cas No. 67-64-1	X	X		460	0.44					1	µg/L	lb/day					
Acrolein Cas No. 1070-20-8	X	X		53	0.051					1	µg/L	lb/day					
Acrylonitrile Cas No. 107-13-1	X	X		0.63	0.00060	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					
Benzene Cas No. 71-43-2	X		X	< 0.46						1	µg/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	607					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0	X	X		0.66	0.00063	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.4						1	µg/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.4						1	µg/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		1.10	0.0011					1	µg/L	lb/day					
Chloroethane Cas No. 75-00-3	X	X		1.50	0.0014					1	µg/L	lb/day					
Dichlorobromomethane Cas No. 75-27-4	X	X		3.30	0.0032					1	µg/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	µg/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	µg/L						
Methanol Cas No. 67-56-1	X	X		2.13	0.0012	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.9						1	µg/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X	X		3.70	0.0036					1	µg/L	lb/day					
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	µg/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X	X		3.70	0.0036					1	µg/L	lb/day					
Propylene glycol Cas No. 57-55-6			X	< 0.55						1	µg/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	µg/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	µg/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	µg/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	µg/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	µg/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	µg/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	µg/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	µg/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.25						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 607						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	µg/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	µg/L						
4-Nitrophenol Cas No. 100-02-7	X	X		21	0.020					1	µg/L	lb/day					
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	µg/L						
Benzoic acid Cas No. 65-85-0	X	X		110	0.11					1	µg/L	lb/day					
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	µg/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	µg/L						
Phenol Cas No. 108-95-2	X	X		2.1	0.0020					1	µg/L	lb/day					
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41							µg/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39							µg/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14							µg/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65							µg/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32							µg/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075							µg/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065							µg/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.42							µg/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11							µg/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46							µg/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051							µg/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33							µg/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31							µg/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081							µg/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075							µg/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028							µg/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0							µg/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099							µg/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.036		< 0.036		< 0.034		14/1	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 607						
1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	µg/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	µg/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	µg/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	µg/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	µg/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	35*	0.034*			17.7*	0.017*	2	µg/L	lb/day					
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	µg/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	µg/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	µg/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	µg/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	µg/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	µg/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	µg/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	µg/L						
Fluoranthene Cas No. 206-44-0	X		X	< 0.038						1	µg/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	µg/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	µg/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	µg/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.10						1	µg/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	µg/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	µg/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	µg/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	µg/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	µg/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	µg/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	µg/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	µg/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	µg/L						
Pyrene Cas No. 129-00-0	X		X	< 0.036						1	µg/L						

* Detection believed due to contamination from sample tubing. Initial result was a detection but no equipment blank was available for comparison. Resampling w/collection of an equipment blank yielded a non-detect (< 0.40 ug/L) for the sample and a detection (22 ug/L) for the equipment blank.

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 607						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5	X	X		0.92	0.00088					1	µg/L	lb/day					
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 607

1. POLLUTANT	2. MARK (X) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9			X														
PCB-1254 Cas No. 11097-69-1			X														
PCB-1221 Cas No. 11104-28-2			X														
PCB-1232 Cas No. 11141-16-5			X														
PCB-1248 Cas No. 12672-29-6			X														
PCB-1260 Cas No. 11096-82-5			X														
PCB-1016 Cas No. 12674-11-2			X														
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		110	0.106					1	µg/L	lb/day					

Outfalls 018:

Form 2C Pages 1-4
Form 2C Part V for Outfall 018

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE 1. DEG.	2. MIN.	3. SEC.	C. LONGITUDE 1. DEG.	2. MIN.	3. SEC.	D. RECEIVING WATER *(name)*
018	41	36	27.4	87	19	42.2	Grand Calumet River
SOF6	41	36	49.7	87	19	42.2	Outfall 018 to Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW a. OPERATION	b. AVERAGE FLOW *(Include units)*	3. TREATMENT a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
018		59.9 MGD Long Term Average	Dechlorination	2E	4A
	PCI West NCCW	Continuous			
	South End Blast Furnace NCCW	Continuous			
	Fab Shop Air Conditioner NCCW	Continuous			
	No. 4 Electric Power Station NCCW	Continuous			
	Fab Shop steam condensates	Intermittent			
	Stormwater (Drainage Area #13)	Intermittent			
	SOF6 No. 6 Sanitary Lift Station Emergency Overflow	Emergency Only			
	If flow through Outfall 019 is restricted, Outfall 019 waters have the potential to discharge via Outfall 018. See Outfall 019 Form 2C for a description of these waters.				
	Proposed: Discharge of treated Blast Furnace Recycle System Blowdown (emergency only)				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
018	Steam condensates	As Needed						
018	No. 6 Sanitary Lift Station Emergency Overflow	Emergency only						
018	Outfall 019 discharges	Potential if Outfall 019 flow is restricted						
018	Treated Blast Furnace Recycle System Blowdown	Infrequent Temporary Basis						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)* X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	D. DATE SIGNED
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3)

OUTFALL NO. 018

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	2.57	1,301					1	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	< 6.1						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	6.8	3,443					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	180	91,138					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	2.5	1,266					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	1.02	516					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.250	132	0.11	70.3	0.068	33.9	117/50	mg/L	lb/day					
Flow	VALUE 86.6		VALUE 81.2		VALUE 59.9		1518/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 81.5		VALUE 74.8		VALUE 56.1		1150/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 88.1		VALUE 81.9		VALUE 78.3		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	140	70,885					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.7	MAXIMUM 8.5	MINIMUM 7.0	MAXIMUM 8.4			234/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	018

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032	16.2					1	mg/L						
Chloride Cas No. 1688-70-6	X		19	9,620					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/24	mg/L	lb/day					
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8		X	< 0.110	55.7					1	mg/L						
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.28	142					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0	506					1	mg/L						
Oil & Grease Cas No. E-10140	X		4.1	2,320	1.95	1229	1.45	733	236/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.28	142					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		25	12,658					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		34	17,215					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.04	19.0					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0209	10.6					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0236	11.9					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.77	410	0.21	113	0.201	107	15/2	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		12.1	6,126					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00148	0.75					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	018					
1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.00739	3.7					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.0004						1	mg/L						
Titanium Cas No. 7440-32-6	X		0.00273	1.4					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.24	122					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	018

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK b. Believed Present	2. MARK c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis daily / monthly average	3. UNITS *(specify if blank)* a. Concentration	3. b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. a. (2) Mass	4. b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9	X		X	< 0.0002		< 0.0002		< 0.0002		14/1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.0055	2.9	0.0012	0.6	0.0012	0.6	14/1	mg/L	lbs/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.0202	9.8	0.0202	9.8	0.007	3.8	18/5	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0011	0.6	0.00084	0.4	0.0005	0.3	15/2	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		8.1	0.00402	1.5	0.00078	1.0	0.00052	122/45	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.00052	0.3	0.0005	0.3	0.0005	0.3	14/1	mg/L	lb/day					
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4	X		X	< 0.0005		< 0.0005		< 0.0005		14/1	mg/L						
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.0081	4.3	0.0041	2.2	0.004	2.2	15/2	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.0018	1.04	0.0015	0.84	0.0014	0.70	68/2	mg/L	lbs/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5		X															
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.0150	10.05	0.0038	1.98	0.0045	2.37	67/1	mg/L	lbs/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 018						
1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	018					
1. POLLUTANT	2. MARK *(X)* a. Testing Required	2. MARK b. Believed Present	2. MARK c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4.6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	018					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 018

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 018

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	(2) Mass	c. Long Term Average (*if available*) (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS (*specify if blank*) a. Concentration	b. Mass	4. INTAKE (*optional*) a. Long Term Average Value (*if available*) (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*) a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	018					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Iron, Dissolved			X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.00211	1.097	All results are J flagged values between the method detection limit & reporting limit.		0.00121	0.613	3	mg/L	lb/day					

Outfalls 019:

Form 2C Pages 1-4
Form 2C Part V for Outfall 019

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE 1. DEG.	2. MIN.	3. SEC.	C. LONGITUDE 1. DEG.	2. MIN.	3. SEC.	D. RECEIVING WATER *(name)*
019	41	36	27.7	87	19	51.2	Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW a. OPERATION	b. AVERAGE FLOW *(Include units)*	3. TREATMENT a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
019		73.9 MGD Long Term Average	Dechlorination	2E	4A
	Blast Furnace No. 14 NCCW	Continuous			
	No. 2 Q-BOP Misc NCCW	Continuous			
	Turboblower Boiler House Condenser NCCW	Continuous			
	No. 1 Electric Power Station NCCW	Continuous			
	No. 5 Electric Power Station NCCW	Continuous			
	No. 4 Boiler House Car Wash	Intermittent			
	Central Water Treatment Plant Brine Regenerant	Intermittent			
	Central Water Treatment Plant Ultrafiltration backwash, Reverse Osmosis concentrate, and softener backwash & regeneration waters	Intermittent			
	Turboblower Boiler House Boiler Blowdown	Intermittent			
	No. 4 Boiler House Blowdown	Intermittent			
	No. 5 Electric Power Cooling Station Condensate	Intermittent			
	No. 4 Boiler House Condensate	Intermittent			
	Turboblower Boiler House condensate	Intermittent			
	Iron Producing AST Tar Tank condensate	Intermittent			
	Blast Furnace No. 8 NCCW	Emergency only			
	Stormwater (Drainage Area #14)	Intermittent			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
019	Central Water Treatment Plant backwash, concentrate, & regeneration waters	As needed						
019	Steam Condensates	As needed						
019	Blowdowns	As needed						
019	No. 4 Boiler House Car Wash	As needed						
019	Blast Furnace No. 8 NCCW	Emergency Only						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE .See the General Information Form for the certification signature	D. DATE SIGNED

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 019

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.0						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	10						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	6.9	2,610					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	170	64,303					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	2.6	983					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	3.0	1,135					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.14	95.6	0.10	71.1	0.053	31.3	117/50	mg/L	lb/day					
Flow	VALUE 87.6		VALUE 86.2		VALUE 73.9		1518/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 82.4		VALUE 73.5		VALUE 56.0		1150/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 87.8		VALUE 83.1		VALUE 78.9		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	140	52,956					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.3	MAXIMUM 8.5	MINIMUM 7.0	MAXIMUM 8.3			234/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	019

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X) a. Be-lieved Pre-sent	2. MARK (X) b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		18	6,809					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.020		< 0.020		< 0.020		623/24	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.10	37.8					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.27	102					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		7.4	4403	2.63	1754	1.49	887	235/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.014	5.3					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		23	8,700					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		38	14,374					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.03	9.8					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0202	7.6					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0219	8.3					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.41	137	0.16	54	0.15	51	15/2	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		12.1	4,577					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00137	0.52					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 019						
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.00333	1.3					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.00184	0.70					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.0014	0.53					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.25	94.5					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	019

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	(2) Mass	c. Long Term Average (*if available*) (1) Concentration	(2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value (*if available*) (1) Concentration	(2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9	X		X	< 0.0002		< 0.0002		< 0.0002		14/1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.0012	0.4	0.00073	0.2	0.0007	0.2	14/1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.0185	6.6	0.0092	3.5	0.0060	2.1	18/4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.00084	0.30	0.00084	0.3	0.0005	0.2	15/2	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		2.6	0.00090	1.3	0.00082	0.64	0.00028	123/44	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X		X	< 0.0005		< 0.0005		< 0.0005		14/1	mg/L						
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4	X		X	< 0.0005		< 0.0005		< 0.0005		14/1	mg/L						
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.019	6.9	0.0088	3.3	0.0056	1.9	15/2	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.0024	1.53	0.00185	1.19	0.00134	0.76	117/50	mg/L	lbs/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5		X															
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.0082	5.44	0.0028	0.97	0.0030	1.67	67/2	mg/L	lbs/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 019						
1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 019						
1. POLLUTANT	2. MARK *(X)* a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4,6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 019						
1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 019						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 019						
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	019					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Iron, Dissolved			X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.00121	0.446	All results are J flagged values between the method detection limit & reporting limit.		0.00086	0.335	3	mg/L	lb/day					

Outfalls 020:

Form 2C Pages 1-4
Form 2C Part V for Outfall 020

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
020	41	36	27.7	87	20	0.2	Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
020		47.6 MGD Long Term Average	Dechlorination	2E	4A
	No. 1 BOP Hood System NCCW	Continuous			
	No. 1 BOP; Continuous Caster NCCW	Continuous			
	Steam Condensate (No. 1 BOP & No. 1 Continuous Caster) Intermittent	Intermittent			
	Stormwater (Drainage Area #15)	Intermittent			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
020	Steam Condensate	As Needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)* X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE See the General Information Form for the certification signature	D. DATE SIGNED

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3)

OUTFALL NO. 020

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	12.1						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	2						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	6.2						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	6.9	2875					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	180	75004					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	2.3	958					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	1.33	554					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.1	29.5					1	mg/L	lb/day					
Flow	VALUE 68.4		VALUE 65		VALUE 47.6		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 84		VALUE 77		VALUE 58		1154/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 93		VALUE 88		VALUE 81		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	140	58337					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.6	MAXIMUM 8.4	MINIMUM 7.0	MAXIMUM 8.2			218/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	020

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		20	8334					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		1235/42	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.1	41.7					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.24	100					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		3.0	1480	1.95	949	1.42	563	218/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0151	6.3					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		25	10,417					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0551	23.0					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0217	9.0					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0286	11.9					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.139	57.9					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		12.5	5209					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00173	0.72					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 020

1. POLLUTANT	2. MARK *(X)* a. Believed Present	2. MARK *(X)* b. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE a. Long Term Average Value (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0126	5.3					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.000579	0.24					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.00239	1.0					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.24	100					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	020

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.0053	2.2			0.0032	1.13	3	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.00160	0.490	0.00117	0.36	0.00037	0.14	100/50	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		8.9	0.00232	1.3	0.00060	0.7	0.00024	105/43	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.035	14.82	0.024	11.29	0.0093	4.0	100/50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5			X														
Cyanide, Total Cas No. 57-12-5			X														
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253			X														
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 020

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values (*if available*)		c. Long Term Average (*if available*)		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (*if available*)		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	020

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4,6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 020						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 020						
1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 020						
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	020

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	0.16*	0.067*					1	µg/L	lb/day					
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														
ADDITIONAL ANALYSES																	
Iron, Dissolved	X		X	< 0.041						1	mg/L						

* Believed not present. The result is a J flagged value between the method detection limit and reporting limit. Analysis performed using Method 608 which is prone to positive interferences. 2014 monitoring was non-detect at the method detection limit (<0.099 ug/L).

Outfalls 021:

Form 2C Pages 1-4
Form 2C Part V for Outfall 021

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE 1. DEG.	2. MIN.	3. SEC.	C. LONGITUDE 1. DEG.	2. MIN.	3. SEC.	D. RECEIVING WATER *(name)*
021	41	36	28.1	87	20	1.7	Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW a. OPERATION	b. AVERAGE FLOW *(Include units)*	3. TREATMENT a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
021		0.6 MGD Long Term Average	Dechlorination	2E	4A
	No. 1 BOP Shop Cooling/Air Compressor NCCW	Continuous			
	Steel Producing Area Air Conditioning Condensates	Intermittent			
	Steel Producing Area Steam Condensates	Intermittent			
	Stormwater (Drainage Area # 16)	Intermittent			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
021	Steel Producing Area Air Conditioning Condensates	As Needed						
021	Steel Producing Area Steam Condensates	As Needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen, General Manager – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 021

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.0						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	11.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	6.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	10						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	7.10	35.5					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	240	1201					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	2.5	12.5					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	2.9	14.3					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.179	0.90					1	mg/L	lb/day					
Flow	VALUE 0.6		VALUE 0.6		VALUE 0.6		671/24	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 80.0		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	300	1501					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.7	MAXIMUM 8.9	MINIMUM	MAXIMUM			50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	021

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X)		2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. (2) Mass	c. Long Term Average (if available) (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available) (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		0.11	0.55					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		38	190					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/24	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.3	1.5					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.27	1.4					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		2.0	10.0			1.35	6.8	50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.176	0.88					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		46	230					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.80	4.0					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0303	0.15					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0303	0.15					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4	X		0.000554	0.0028					1	mg/L	lb/day					
Iron Cas No. 7439-89-6	X		3.60	18.0					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		16.7	83.6					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00342	0.017					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 021						
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.383	1.918			0.328	1.642	2	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.0105	0.053					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.0453	0.23					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.32	1.6					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	021

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.026	0.13			0.0093	0.047	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0087	0.044					1	mg/L	lb/day					
Mercury Cas No. 7439-97-6		X															
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6		X		0.058	0.29			0.038	0.19	4	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5			X														
Cyanide, Total Cas No. 57-12-5			X														
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253			X														
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 021						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 021

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	(2) Mass	c. Long Term Average (*if available*) (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS (*specify if blank*) a. Concentration	b. Mass	4. INTAKE (*optional*) a. Long Term Average Value (*if available*) (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*) a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4,6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	021					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 021

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	021

1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	021

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														
ADDITIONAL ANALYSES																	
Iron, Dissolved			X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.000817	0.0041	All results are J flagged values between the method detection limit & reporting limit.		0.00069	0.0035	3	mg/L	lb/day					

Outfalls 023:

Form 2C Pages 1-4
****No Form 2C Part V – Inactive Outfall***

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
023	41	36	27.4	87	20	7.1	Grand Calumet River
SOF11	41	36	25.9	87	20	6.4	Outfall 023 to Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. (See Attachment 2C-B)

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
023		INACTIVE	NONE	4A	
	Hospital Building Air Conditioning NCCW				
	Hospital Building Condensates				
	Stormwater (Drainage Area #17)				
	Sanitary Lift Station Emergency Overflow SOF11				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY a. DAYS PER WEEK *(specify average)*	3. FREQUENCY b. MONTHS PER YEAR *(specify average)*	4. FLOW a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	4. FLOW a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	4. FLOW b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	4. FLOW b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	4. FLOW c. DURATION *(in days)*
023	Air conditioning NCCW	As needed						
023	Steam condensates	As needed						
023	Sanitary Lift Station Emergency Overflow SOF11	Emergency only						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION a. QUANTITY PER DAY	1. AVERAGE DAILY PRODUCTION b. UNITS OF MEASURE	1. AVERAGE DAILY PRODUCTION c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	2. AFFECTED OUTFALLS *(list outfall numbers)*

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS a. NO.	2. AFFECTED OUTFALLS b. SOURCE OF DISCHARGE	3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE a. REQUIRED	4. FINAL COMPLIANCE DATE b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*　　X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

☐ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*　　X NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
Inactive, no flow, no analysis			

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen, Vice-President – Gary Works	
C. SIGNATURE	D. DATE SIGNED
See the General Information Form for the certification signature	

Outfalls 026:

Form 2C Pages 1-4

No Form 2C Part V – Inactive Outfall

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
026	41	36	27.7	87	20	15.7	Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. (See Attachment 2C-B)

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
026		INACTIVE	NONE	4A	
	Pass Control Area Air Conditioning NCCW				
	Pass Control Area Steam Condensates				
	Stormwater (Drainage Area #18)				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
026	Air conditioning condensates							
026	Steam condensates							

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

☐ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   X NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
Inactive, no flow, no analysis			

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen, Vice-President – Gary Works	
C. SIGNATURE	D. DATE SIGNED
See the General Information Form for the certification signature	

Outfalls 028, 030, and 603:

Form 2C Pages 1-4
Form 2C Part V for Outfall 028
Form 2C Part V for Outfall 030
Form 2C Part V for Outfall 603

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
028	41	36	34.6	87	20	26.9	Grand Calumet River
030	41	36	36	87	20	46	Grand Calumet River
603	Five Locations – See Table ES-1						Grand Calumet River via Outfalls 028/030
SOFs #2, 4, & 17	Three Locations – See Table ES-1						Grand Calumet River via Outfalls 028/030

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. (See Attachments 2C-B and 2C-C)

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
028 030	Long Term Average Flows: 028 =7.29 MGD; 030=17.23 MGD		Terminal Lagoons - Sedimentation, & Dechlorination	1U	4A, 2E
	#2 Continuous Caster NCCW	Continuous			
	Misc. NCCW	Continuous			
	#1 BOP/QBOP Cooling Tower Blowdown	Continuous			
	Stormwater (drainage area #19)	Intermittent			
	Steam Condensates	Intermittent			
	160"/210" Plate Mill Scale Pit	Currently Inactive			
	Main Garage & Locomotive Services Pressure Washing/Steam Cleaning Areas	Intermittent			
	Internal Outfall 603	See Below	See Below		
	Sanitary Lift Station Overflows (SOF2, SOF4, SOF17)	Emergency Only			
603	Long Term Average Flow: 8.6 MGD				
	Slab Spray Cooling	Intermittent			
	QBOP Vacuum Degasser Overflow	Intermittent			
	#1 BOP	Continuous	Sedimentation (Settling), Thickener - Flocculation/Sedimentation	1U	1U, 1G
	Vacuum Degasser	Intermittent	Thickener - Flocculation/Sedimentation	1U	1G
	QBOP	Continuous	Sedimentation (Settling), Thickener - Flocculation/Sedimentation	1U	1U, 1G
	#2 Continuous Caster A/B Line, C Line	Continuous	Scale Pit - Sedimentation/Oil Removal	1U	1G
			Multimedia Filters	1Q	
	#1 Continuous Caster Line	Continuous	Scale Pit - Sedimentation/Oil Removal	1U	1G
	Proposed: As needed to prevent and/or mitigate flooding, stormwater from areas of the facility east of Buchanan Street may be sent to the #1 or #1A Thickener treatment systems prior to discharge via Outfall 603.				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
028/030	Steam Condensate	As needed						
028/030	Sanitary Lift Station overflows	Emergency only						
603	Slab Spray Cooling	As needed						
603	QBOP Vacuum Degasser	As needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

X YES *(complete Item III-B)* ☐ NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

X YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	
See Table ES-2: #1BOP, QBOP, Vacuum Degassing, Continuous Casters, and Plate Mill			

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS a. NO.	2. AFFECTED OUTFALLS b. SOURCE OF DISCHARGE	3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE a. REQUIRED	4. FINAL COMPLIANCE DATE b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

X YES *(identify the test(s) and describe their purpose below)*   ☐ NO *(go to Section VIII)*

Outfall 030

Date	Species	Acute Toxicity LC$_{50}$	Acute Toxicity TUa (100/LC50)	Acute Toxicity Compliance Point Pass/Fail	Chronic Toxicity IC25	Chronic Toxicity NOEC	Chronic Toxicity TUc (100/NOEC)	Chronic Toxicity TUc (100/IC25)	Chronic Toxicity Compliance Point Pass/Fail
Mar-16	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS
Mar-17	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS
June-18	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS
June-19	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All except WET Testing
Ramboll	201 Summit View Drive Suite 300 Brentwood, TN 37027	(615) 277-7570	Whole Effluent Toxicity (WET) Testing

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3)	OUTFALL NO. 028

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	5.71	452					1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	7.4	586					1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	8	634					1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	14	1,109					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	6.20	491					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	220	17,431					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	8.6	681					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	31	1,966	9.19	581	5.65	340	1087/50	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.0644	5.1					1	mg/L	lb/day					
Flow	VALUE 11.15		VALUE 10		VALUE 7.29		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 92		VALUE 86		VALUE 69		1154/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 95		VALUE 91		VALUE 88		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	140	11,092					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 7.2	MAXIMUM 8.6	MINIMUM 7.5	MAXIMUM 8.5			221/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	028

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*) a. Be-lieved Pre-sent	2. MARK (*X*) b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. a. (2) Mass	4. b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		0.16	12.7					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		28	2,218					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		1309/44	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	mg/L						
Fluoride Cas No. 16984-48-8	X		7.40	569	5.60	447	3.36	204	102/50	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.46	36.4					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		5.53	379	2.41	140	1.74	105	1087/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0441	3.5					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		43	3,407					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4	X		< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.21	16.4					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0199	1.6					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		< 0.045						1	mg/L						
Cobalt Cas No. 7440-48-4		X	< 0.000300						1	mg/L						
Iron Cas No. 7439-89-6	X		0.187	14.8					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		14.0	1,109					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.129	10.2					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 028						
1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.0159	1.3					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.000821	0.065					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.00146	0.12					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.39	30.9					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0	X		< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	028

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Testing Required	b. Believed Present	c. Believed Absent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X	X		0.0123	0.97					1	mg/L	lb/day					
Arsenic Cas No. 7440-38-2	X	X		0.00150	0.12					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.000440						1	mg/L						
Cadmium Cas No. 7440-43-9	X	X		< 0.000200						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.00126	0.10					1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.00076	0.060					1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.010	0.81			0.0073	0.54	3	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0080	0.44	0.0032	0.17	0.0019	0.11	437/50	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		6.0	0.00232	4.7	0.00027	1.1	0.00008	106/43	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.000623	0.049					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X	X		< 0.00100						1	mg/L						
Silver Cas No. 7440-22-4	X		X	< 0.000500						1	mg/L						
Thallium Cas No. 7440-28-0	X	X		< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		0.00512	0.41					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.19	13.5	0.15	8.63	0.07	4.12	221/50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		< 0.0015						1	mg/L	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.					
Cyanide, Total Cas No. 57-12-5	X	X		< 0.002000						1	mg/L						
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		< 0.0025						1	mg/L						
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number (*copy from Item 1 of Form 1*)	IND005444062										Outfall Number	028					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values (*if available*)		c. Long Term Average (*if available*)		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (*if available*)		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21						1	ug/L						
Acetaldehyde Cas No. 75-07-0	X		X	< 38						1	ug/L						
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X		X	< 43						1	ug/L						
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46						1	ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40						1	ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X		X	< 0.52						1	ug/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	ug/L						
Acetone Cas No. 67-64-1	X	X		3.9	0.31	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	ug/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	ug/L						
Bromoform Cas No. 75-25-2	X	X		< 0.56						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	028

1. POLLUTANT	2. MARK (X) a. Testing Required	2. MARK (X) b. Believed Present	2. MARK (X) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		0.88	0.070	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		1.1	0.087					1	ug/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8	X		X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X	X		< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55							ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X	X		< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X	X		< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 028						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	ug/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075						1	ug/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	ug/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	ug/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	028					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	ug/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	ug/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	28*	2.2*			11*	0.85*	4	ug/L	lb/day					
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	ug/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	ug/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X	X		< 0.038						1	ug/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	ug/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	ug/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X	X		< 0.036						1	ug/L						

* Detection believed due to contamination from sample tubing. Initial result was a detections but no equipment blank was available for comparison. The first resampling event included collection of an equipment blank and yielded a detections for both the sample (15 ug/L) and a higher detection (260 ug/L) for the equipment blank. For a second resampling event the same process was used but with additional rinsing of the sample tubing prior to collection of the equipment blank. Results for both the sample and equipment blank were non-detect (< 0.40 ug/L) at the MDL. For the third resampling event a 24-hr composite was collected in two ways: one with an autosampler and tubing and the other consisted of 3 manual grabs (over 24 hrs) without use of any tubing. An equipment blank from the pre-rinsed tubing was also collected. All results for this event were non-detect (< 0.40 ug/L) at the MDL.

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 028						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5	X		X	< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	028

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	ug/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	ug/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	ug/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	ug/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	ug/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	ug/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	ug/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		1.6	0.13					1	µg/L	lb/day					
Copper, Dissolved		X		1.72	0.129	All results are J flagged values between the method detection limit & reporting limit.		1.69	0.121	3	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3)

OUTFALL NO. 030

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	8.62	1,201					1	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	7.4						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	12						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	18	2,507					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	6.30	877					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	230	32,034					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	9.3	1,295					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	26.00	4535	9.59	1501	5.90	850	1087/50	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.0533	7.4					1	mg/L	lb/day					
Flow	VALUE 25.24		VALUE 20.97		VALUE 17.23		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 90		VALUE 86		VALUE 69		1154/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 94		VALUE 91		VALUE 88		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	110	15,321					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 7.2	MAXIMUM 8.6	MINIMUM 7.7	MAXIMUM 8.5			221/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	030

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		0.15	20.9					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		29	4,039					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		1309/44	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		7.60	633	5.60	623	3.39	473	108/50	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		1.90	265					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		5.43	817	2.29	311	1.75	251	1087/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0592	8.2					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		54	7,521					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4	X		< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.21	29.7					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0203	2.8					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0432	6.0					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.000300						1	mg/L						
Iron Cas No. 7439-89-6	X		0.211	29.4					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		13.9	1,936					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.141	19.6					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	030					
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.0219	3.1						mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.000970	0.14						mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.00152	0.21						mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		< 1.0							mg/L						
Nitrate Cas No. 14797-55-8	X		0.85	118						mg/L	lb/day					
Nitrite Cas No. 14797-65-0	X		< 0.016							mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	030

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark “X” in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark “X” in column 2-b for each pollutant you know or have reason to believe is present. Mark “X” in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis daily / monthly average	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X	X		< 0.0128						1	mg/L						
Arsenic Cas No. 7440-38-2	X	X		0.00163	0.23					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.000440						1	mg/L						
Cadmium Cas No. 7440-43-9	X	X		< 0.000200						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.00132	0.18					1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.00073	0.10					1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.015	2.0			0.0082	1.2	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.014	2.12	0.0048	0.71	0.0022	0.31	440/50	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		6.8	0.00095	3.7	0.00052	1.2	0.00017	105/43	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.000667	0.093					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X	X		< 0.00100						1	mg/L						
Silver Cas No. 7440-22-4	X		X	< 0.000500						1	mg/L						
Thallium Cas No. 7440-28-0	X	X		< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		0.00517	0.72					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.36	54.3	0.17	24.6	0.079	11.5	227/50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		< 0.0015						1	mg/L		Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.00202	0.28					1	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		< 0.0025						1	mg/L						
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number (copy from Item 1 of Form 1)	IND005444062										Outfall Number	030						
1. POLLUTANT	2. MARK (X)			2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values (if available)		c. Long Term Average (if available)		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available)		b. No. of Analysis	a. Method	b. Reporting Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21							ug/L						
Acetaldehyde Cas No. 75-07-0	X		X	< 38							ug/L						
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X		X	< 43							ug/L						
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38							ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46							ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46							ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44							ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40							ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45							ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44							ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48							ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48							ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65							ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40							ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57							ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38							ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57							ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X		X	< 0.52							ug/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82							ug/L						
Acetone Cas No. 67-64-1	X	X		5.9	0.82	Result is a J flagged value between the method detection limit and reporting limit.					ug/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.3							ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50							ug/L						
Benzene Cas No. 71-43-2	X		X	< 0.46							ug/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56							ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 030

1. POLLUTANT	2. MARK (X) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. (2) Mass	c. Long Term Average (if available) (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS (specify if blank) a. Concentration	b. Mass	4. INTAKE (optional) a. Long Term Average Value (if available) (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.) a. Method	b. Reporting Limit
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		0.93	0.13					1	ug/L	lb/day					
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		1.3	0.18					1	ug/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X	X		< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X	X		< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X	X		< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 030						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	ug/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075						1	ug/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	ug/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	ug/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	030

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	2. MARK (*X*) b. Be-lieved Pre-sent	2. MARK (*X*) c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	ug/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	ug/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	79*	11.5*			26.3*	3.8*	4	ug/L	lb/day					
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	ug/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	ug/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X		X	< 0.038						1	ug/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	ug/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	ug/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X	X		< 0.036						1	ug/L						

* Detection believed due to contamination from sample tubing. Initial result was a detection but no equipment blank was available for comparison. The first resampling event included collection of an equipment blank and yielded similar detections for both the sample (79 ug/L) and the equipment blank (89 ug/L). For a second resampling event the same process was used but with additional rinsing of the sample tubing prior to collection of the equipment blank. The sample result was non-detect at the reporting limit (a J flagged detection of 0.71 ug/L) and the equipment blank result non-detect at the MDL (< 0.40 ug/L). For the third resampling event a 24-hr composite was collected in two ways: one with an autosampler and tubing and the other consisted of 3 manual grabs (over 24 hrs) without use of any tubing. An equipment blank from the pre-rinsed tubing was also collected. All results for this event were non-detect (< 0.40 ug/L) at the MDL.

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 030

1. POLLUTANT	2. MARK *(X)* a. Testing Required	2. MARK b. Believed Present	2. MARK c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Styrene Cas No. 100-42-5	X		X	< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 — Outfall Number 030

1. POLLUTANT	2. MARK (X) a. Testing Required	2. MARK (X) b. Believed Present	2. MARK (X) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE a. Long Term Average Value (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	ug/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	ug/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	ug/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	ug/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	ug/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	ug/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	ug/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X	See Outfall 028/030 Form 2C page 4 (Section VII) for available WET data.													
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		1.6	0.22					1	µg/L	lb/day					
Copper, Dissolved		X		1.79	0.26	All results are J flagged values between the method detection limit & reporting limit.		1.70	0.24	3	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) (Continued from page 3)

OUTFALL NO. 603

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	4.3	308					1	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	8.9						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	49						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	52	3,714					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	5.3	382					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	264	18,909					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	17	1235					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	68.2	6,993	25.9	2,623	11.0	802	559/50	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.057	4.0					1	mg/L	lb/day					
Flow	VALUE 21.87		VALUE 12.93		VALUE 8.6		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 100		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	165	11,861					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 8.2	MAXIMUM 8.2	MINIMUM	MAXIMUM			1	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	603

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X)		2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. (2) Mass	c. Long Term Average (if available) (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available) (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6	X		0.34	24.0					1	mg/L	lb/day					
Chloride Cas No. 1688-70-6	X		42	3,039					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02						1	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		5.1	366					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.62	44					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		1.06	76.0					1	mg/L	lb/day					
Oil & Grease Cas No. E-10140	X		2.8	198					1	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.12	8.0					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		34	2,404					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		0.83	60					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4	X		0.27	20					1	mg/L	lb/day					
Aluminum Cas No. 7429-90-5	X		0.27	19					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.02	1					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.08	6					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.00030						1	mg/L						
Iron Cas No. 7439-89-6	X		1.11	80					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		17	1,206					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.29	21					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 603						
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.0695	5.0					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.0009	0.068					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.0043	0.31					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		0.94	68					1	mg/L	lb/day					
Nitrate Cas No. 14797-55-8	X		0.42	30					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0	X		0.15	11					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	603

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X	X		0.028	1974					1	mg/L	lb/day					
Arsenic Cas No. 7440-38-2	X	X		0.002	0.169					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.00044						1	mg/L						
Cadmium Cas No. 7440-43-9	X	X		0.0003	0.025					1	mg/L	lb/day					
Chromium Cas No. 7440-47-3	X	X		0.0039	0.28					1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.00216	0.16					1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.015	1.08					1	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.015	0.99	0.007	0.4	0.003	0.22	435/50	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		0.92	0.000058	0.92	0.000058	0.72	0.000046	4/3	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.0012	0.087					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X	X		0.0015	0.11					1	mg/L	lb/day					
Silver Cas No. 7440-22-4	X		X	< 0.0005						1	mg/L						
Thallium Cas No. 7440-28-0	X	X		0.0003	0.024					1	mg/L	lb/day					
Vanadium Cas No. 7440-62-2	X	X		0.013	0.96					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.89	19	0.23	9.5	0.081	5.5	435/50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.0028	0.20					1	mg/L	lb/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.0029	0.209					1	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.0027	0.19					1	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 603								
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21						1	µg/L						
Acetaldehyde Cas No. 75-07-0	X		X	< 38						1	µg/L						
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X		X	< 43						1	µg/L						
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	µg/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	< 0.46						1	µg/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	µg/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	µg/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	< 0.40						1	µg/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	µg/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	µg/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	µg/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	µg/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	µg/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	µg/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	µg/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	µg/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	µg/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X		X	< 0.52						1	µg/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	µg/L						
Acetone Cas No. 67-64-1	X	X		14.3	1.03					1	µg/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	µg/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	µg/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	µg/L						
Bromoform Cas No. 75-25-2	X	X		0.57	0.041	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	603						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Testing Required	b. Believed Present	c. Believed Absent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	µg/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	µg/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	µg/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		0.61	0.043					1	µg/L	lb/day					
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	µg/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		0.69	0.049					1	µg/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	µg/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	µg/L						
Methanol Cas No. 67-56-1	X	X		0.62	0.058					1	µg/L	lb/day					
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	µg/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	µg/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	µg/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	µg/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	µg/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	µg/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	µg/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	µg/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	µg/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	µg/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	µg/L						
2,4-Dimethylphenol Cas No. 105-67-9	X	X		0.49	0.035	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	µg/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X	X		0.27	0.02	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	603					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	µg/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	µg/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	µg/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	µg/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	µg/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	µg/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	µg/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	µg/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	µg/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	µg/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	µg/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	µg/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	µg/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	µg/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	µg/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.42						1	µg/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	µg/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	µg/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	µg/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	µg/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	µg/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	µg/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075						1	µg/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	µg/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	µg/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	µg/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	603					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	µg/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	µg/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	µg/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	µg/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	µg/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	32*	2.3*					1	µg/L	lb/day					
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	µg/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	µg/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	µg/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	µg/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	µg/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	µg/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	µg/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	µg/L						
Fluoranthene Cas No. 206-44-0	X	X		0.045	0.003					1	µg/L	lb/day					
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	µg/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	µg/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	µg/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	µg/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	µg/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	µg/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	µg/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	µg/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	µg/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	µg/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	µg/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	µg/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	µg/L						
Pyrene Cas No. 129-00-0	X	X		0.046	0.003					1	µg/L	lb/day					

* Detection believed due to contamination from sample tubing. Initial results for the five 603 inputs included some detections but no equipment blank was available for comparison. Resampling of the two locations with initial detections above the reporting limit along w/collection of equipment blanks yielded a detections (17 ug/L and 3.2 ug/L) for the samples but also similar or higher equipment blank detections (13 ug/L and 21 ug/L respectively).

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 603						
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5	X		X	< 0.33						1	µg/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	603

1. POLLUTANT	2. MARK *(X)* a. Test-ing Re-quired	2. MARK b. Be-lieved Pre-sent	2. MARK c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE a. Long Term Average Value (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9			X														
PCB-1254 Cas No. 11097-69-1			X														
PCB-1221 Cas No. 11104-28-2			X														
PCB-1232 Cas No. 11141-16-5			X														
PCB-1248 Cas No. 12672-29-6			X														
PCB-1260 Cas No. 11096-82-5			X														
PCB-1016 Cas No. 12674-11-2			X														
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		1.53	0.11					1	µg/L	lb/day					

Outfalls 032:

Form 2C Pages 1-4
Form 2C Part V for Outfall 032

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
032	41	36	34.6	87	20	51.4	Grand Calumet River
SOF3	41	36	49	87	20	58.2	Outfall 018 to Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
032		0.3 MGD Long Term Average	Dechlorination	2E	4A
	QA Labs Coolers NCCW	Continuous			
	Misc NCCW (Steel Producing Storage Bldg and Brandenburg Complex)	Continuous			
	Stormwater Runoff (Drainage Area #20)	Intermittent			
	No. 3 Sanitary Lift Station Emergency Overflow (SOF3)	Emergency only			
	Steam condensate	Intermittent			
	Freeze protection water	Intermittent			
	Note: Discharge from the CAMU Wastewater Treatment Plant (covered under separate NPDES Permit IN0061077) is conveyed to the Grand Calumet River via the Outfall 032 discharge structure. However, sampling for Outfall 032 and the CAMU are prior to commingling of the wastewaters.				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
032	SOF3 Emergency Overflow	Emergency only						
032	Steam Condensate	As needed						
032	Freeze Protection Water	As needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 032

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	2.46	6.2					1	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	27.8						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	38						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	8.2						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	7.60	19.0					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	210	525					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	3	7.5					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	2.29	5.7					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.121	0.30					1	mg/L	lb/day					
Flow	VALUE 0.3		VALUE 0.3		VALUE 0.3		671/24	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 78.0		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	130	325					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 7.1	MAXIMUM 8.6	MINIMUM	MAXIMUM			50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	032

PART B - Mark “X” in column 2-a for each pollutant you know or have reason to believe is present. Mark “X” in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X)		2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values (if available)		c. Long Term Average (if available)		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available)		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		23	57.5					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/24	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.81	2.0					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.84	2.1					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		2.90	7.26			1.49	3.74	50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0358	0.0896					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		39	97.6					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		0.72	1.8					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.067	0.17					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0203	0.051					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0294	0.074					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.0749	0.19					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		12.3	30.8					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.0382	0.096					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 032						
1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0168	0.042					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.000956	0.0024					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6		X	< 0.0014						1	mg/L						
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.45	1.1					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	032

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.012	0.029			0.007	0.018	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.00112	0.0028					1	mg/L	lb/day					
Mercury Cas No. 7439-97-6		X															
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.0109	0.0273					1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5			X														
Cyanide, Total Cas No. 57-12-5			X														
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253			X														
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 032						
1. POLLUTANT	2. MARK *(X)* a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 032						
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4,6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 032						
1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 032						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062	Outfall Number 032

1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 032

1. POLLUTANT	2. MARK (X) a. Testing Required	2. MARK (X) b. Believed Present	2. MARK (X) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE a. Long Term Average Value (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														
ADDITIONAL ANALYSES																	
Iron, Dissolved			X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.0019	0.0048	All results are J flagged values between the method detection limit & reporting limit.		0.0018	0.0045	3	mg/L	lb/day					

Outfalls 033:

Form 2C Pages 1-4
Form 2C Part V for Outfall 033

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION							
For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.							
A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
033	41	36	26	87	21	11	Grand Calumet River
SOF51	41	37	1.9	87	21	20.5	Outfall 033 to Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
033		0.2 MGD Long Term Average	Dechlorination	2E	4A
	Misc. Sheet and Tin Mill NCCW, Atmospheric gas plant NCCW	Continuous			
	Stormwater Runoff (Drainage Area #21)	Intermittent			
	Steam Condensates	Intermittent			
	SOF51 (Buchanan St Sanitary Lift Station Overflow)	Emergency only			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
033	Steam Condensates	As needed						
033	SOF51 Buchanan St Sanitary Lift Station	Emergency only						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)* X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) — OUTFALL NO. 033

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT: a. Maximum Daily Values (1) Concentration	2.a. (2) Mass	2. b. Maximum 30 Day Values *(if available)* (1) Concentration	2.b. (2) Mass	2. c. Long Term Average *(if available)* (1) Concentration	2.c. (2) Mass	2. d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4.a. (2) Mass	4. b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. b. **Reporting** Limit
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.0						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	21.3						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	14						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	10						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	7.00	11.7					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	330	550					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	5.2	8.7					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	2.11	3.5					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.18	0.30					1	mg/L	lb/day					
Flow	VALUE 0.2		VALUE 0.2		VALUE 0.2		671/24	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 74.0		VALUE		VALUE			°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	180	300					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 7.1	MAXIMUM 8.3	MINIMUM	MAXIMUM			50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	033

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)* a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		65	108					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/24	mg/L						
Color (C.U.) Cas No. E-11712	X		10						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.54	0.90					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.44	0.73					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		3.40	5.67			1.44	2.40	50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0209	0.035					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		61	102					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0553	0.092					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0298	0.050					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0581	0.097					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.345	0.58					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		15.7	26.2					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.0132	0.022					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 033						
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0346	0.058					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.00053	0.00088					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.0022	0.0037					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.39	0.65					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	033

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.0072	0.012			0.0047	0.0079	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.000786	0.0013					1	mg/L	lb/day					
Mercury Cas No. 7439-97-6		X															
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.00764	0.013					1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5			X														
Cyanide, Total Cas No. 57-12-5			X														
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.0120	0.0200			0.0033	0.0057	49	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 033						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 033						
1. POLLUTANT	2. MARK *(X)* a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4.6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 033

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 033						
1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 033

1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 033

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Iron, Dissolved			X	< 0.0412						1	mg/L						

Outfalls 034, 604, 605, 606, and 608:

Form 2C Pages 1-4
Form 2C Part V for Outfall 034
Form 2C Part V for Outfall 604
Form 2C Part V for Outfall 605
Form 2C Part V for Outfall 606
**** No Form 2C Part V for Outfall 608***

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
034	41	36	23	87	23	03	Grand Calumet River
604	41	34.7	35	87	22	23.5	Grand Calumet River via Outfall 034
605	41	37	40.1	87	22	10.6	Grand Calumet River via Outfall 034
606	41	37	29.3	87	22	9.5	Grand Calumet River via Outfall 034
608	41	37	17.9	87	22	1.99	Grand Calumet River via Outfall 034 via Outfall 606

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. (See Attachments 2C-B and 2C-C)

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
034	Outfalls 604, 605, 606, and 608	19.3 MGD Long Term Average	Final Oil Separator, dechlorination	1U, 1G	2E, 4A
604	Treated Wastewater From:	14.8 MGD Long Term Average	Flash Mix Tank, Sump	1O	1U
	84" Hot Strip Mill (HSM), 84" & 80" Pickle Lines	Continuous	Equalization Tank, Reduction Tanks,	1U	2L
	North and South Sheet Mills, Tin Mills	Continuous	pH Adjustment, Flocculation, Clarifier	2K	1G, 1U
	Demin. Plant filter backwash & regenerant	Intermittent	Sludge Denitrification Unit	3D	
	EGL basement water	Intermittent	Mix Tank, API Separator	1O	1U, 1G
	Boiler Feedwater Softener Blowdown (backwash and regenerant)	Intermittent	Mix Tank, Flocculators/Clarifiers	1O	1G
	Proposed: As needed to prevent and/or mitigate flooding, stormwater from areas of the facility west of Buchanan Street may be sent to the terminal treatment plant prior to discharge via Outfall 604.				
605	84" HSM Process Wastewater, boiler blowdown, filter backwash and softener regenerant, & condensates	5.6 MGD Long Term Average	Scale Pit - Sedimentation/Oil Removal	1U	1G
606	Misc Sheet and Tin Mill NCCW, Various Temper Mill NCCW, 5 Stand Cold Reduction Mill NCCW, Various Annealing NCCW, No. 6 Galvanizing Line NCCW, Waste Acid Recycling NCCW, Internal Outfall 608	4.1 MGD Long Term Average Continuous	Final Oil Separator	1U	1G
	No. 6 Galvanizing Line NCCW	Continuous when in Operation	Gravity Filters	1U	
	Waste Acid Recycling Facility NCCW	Intermittent			
	Old S- and T-pumpstations & 48" lift station NCCW	Intermittent			
	Steam Condensate from the Sheet and Tin Mills	Intermittent			
	Stormwater (a portion of drainage area #22)	Intermittent			
608	Tin Free Steel line and No. 4 basement sumps; process water from No. 5 and No. 6 Electrolytic Tinning lines	0.6 MGD Est.	Equalization Tank, Reduction Tanks, pH Adjustment, Flocculation, Clarifier	1U, 2L	2K, 1G, 1U
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
604	Waste acid facility overflow	As needed						
604, 605, 606	Steam condensate	As needed						
604, 608	Basement waters	As needed						
604	Demin. Plant filter backwash & regenerant	As needed						
604, 605	Boiler Feedwater Softener backwash & regenerant	As needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

X YES *(complete Item III-B)* ☐ NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

X YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

See Table ES-2 for detailed Outfall 604/608 (combined 609) and Outfall 605 related production information.

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS a. NO.	2. AFFECTED OUTFALLS b. SOURCE OF DISCHARGE	3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE a. REQUIRED	4. FINAL COMPLIANCE DATE b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

X YES *(identify the test(s) and describe their purpose below)* ☐ NO *(go to Section VIII)*

Outfall 034

Date	Species	Acute Toxicity			Chronic Toxicity				
		LC_{50}	TUa (100/LC50)	Compliance Point Pass/Fail	IC25	NOEC	TUc (100/NOEC)	TUc (100/IC25)	Compliance Point Pass/Fail
Mar-16	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	1.0	PASS
Mar-17	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	1.0	PASS
June-18	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS
June-19	Ceriodaphnia dubia	>100	< 1.0	PASS	>100	100	1.0	< 1.0	PASS

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All except WET Testing
Ramboll	201 Summit View Drive Suite 300 Brentwood, TN 37027	(615) 277-7570	Whole Effluent Toxicity (WET) Testing

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) — OUTFALL NO. 034

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	18.0	2911	13.2	2202	8.1	1326	497/50	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	7.5						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	1,200						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	20	3,486					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	12.9		11.5		8.9		1522/50	mg/L						
Total Dissolved Solids (TDS) Cas No. E-10173	440	76,695					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	9.3	1,622	6.3	1097	5.6	953	7/2	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	41.0	6603	12.5	2089	6.4	1069	441/50	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.23	37.4	0.13	19.2	0.045	7.4	434/50	mg/L	lb/day					
Flow	VALUE 34.1		VALUE 24.6		VALUE 19.3		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 87		VALUE 81		VALUE 66		1154/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 90		VALUE 88		VALUE 83		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	300	52,292					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.8	MAXIMUM 8.8	MINIMUM 7.2	MAXIMUM 8.2			1522/50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	034

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X) a. Be-lieved Pre-sent	2. MARK (X) b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. a. (2) Mass	4. b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		74	12,899					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		1309/44	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5							CPU						
Fluoride Cas No. 16984-48-8	X		< 0.067						1	mg/L						
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.83	145					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		1.0	174					1	mg/L	lb/day					
Oil & Grease Cas No. E-10140	X		4.53	815	1.97	357	1.52	248	1091/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0560	9.8					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		160	27,889					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		0.60	105					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0576	10.0					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0172	3.0					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0675	11.8					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.00030						1	mg/L						
Iron Cas No. 7439-89-6	X		0.516	89.9					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		10.8	1,883					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.018	3.2					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 034

1. POLLUTANT	2. MARK (*X*) a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0160	2.8					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.00410	0.71					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.00166	0.29					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		1.1	192					1	mg/L	lb/day					
Nitrate Cas No. 14797-55-8	X		0.71	124					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0	X		0.054	8.1	0.028	4.2	0.026	4.0	7/1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	034

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X	X		0.000694	0.12					1	mg/L	lb/day					
Arsenic Cas No. 7440-38-2	X	X		0.00112	0.20					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.000440						1	mg/L						
Cadmium Cas No. 7440-43-9	X	X		0.00038	0.063	0.00016	0.027	0.00008	0.014	62/6	mg/L	lb/day					
Chromium Cas No. 7440-47-3	X	X		0.044	7.5	0.012	2.1	0.007	1.2	441/50	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.000314	0.055					1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.0260	3.79	0.0126	2.05	0.0058	0.95	441/50	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0110	1.78	0.0021	0.36	0.0007	0.13	441/50	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		3.5	0.00065	3.5	0.00065	0.45	0.00008	45/44	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.0051	1.11	0.0037	0.59	0.0026	0.42	31/4	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X		X	< 0.00100						1	mg/L						
Silver Cas No. 7440-22-4	X	X		0.000050	0.01	0.000050	0.01	0.000050	0.01	112/50	mg/L	lb/day					
Thallium Cas No. 7440-28-0	X		X	< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		0.000781	0.14					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.11	15.7	0.027	4.1	0.012	2.0	441/50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		< 0.0015						1	mg/L		Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		< 0.002000						1	mg/L						
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.036	6.04	0.014	2.22	0.005	0.80	230/50	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)*				IND005444062							Outfall Number	034					
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5	X	X		< 0.21						1	ug/L						
Acetaldehyde Cas No. 75-07-0	X	X		49	7.8			42	6.8	3	ug/L	lb/day					
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X	X		61	10.2			52.4	8.6	3	ug/L	lb/day					
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46						1	ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40						1	ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X	X		< 0.52						1	ug/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	ug/L						
Acetone Cas No. 67-64-1	X	X		< 1.1						1	ug/L						
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	ug/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	ug/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	034					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		0.42	0.073	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		0.71	0.12	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X		X	< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 034

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)	
	a. Testing Required	b. Believed Present	c. Believed Absent	a. Maximum Daily Values		b. Maximum 30 Day Values (*if available*)		c. Long Term Average (*if available*)		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (*if available*)		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	ug/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075						1	ug/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	ug/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	ug/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	ug/L						

EPA Identification Number (*copy from Item 1 of Form 1*) IND005444062											Outfall Number 034						
1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	(2) Mass	c. Long Term Average (*if available*) (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS (*specify if blank*) a. Concentration	b. Mass	4. INTAKE (*optional*) a. Long Term Average Value (*if available*) (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*) a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	ug/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	ug/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	< 0.40						1	ug/L						
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	ug/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	ug/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X		X	< 0.038						1	ug/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	ug/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	ug/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X		X	< 0.036						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	034

1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5	X		X	< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 034						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
PCB-1242 Cas No. 534469-21-9			X	< 0.046						1	ug/L	lb/day					
PCB-1254 Cas No. 11097-69-1			X	< 0.028						1	ug/L	lb/day					
PCB-1221 Cas No. 11104-28-2			X	< 0.046						1	ug/L	lb/day					
PCB-1232 Cas No. 11141-16-5			X	< 0.046						1	ug/L	lb/day					
PCB-1248 Cas No. 12672-29-6			X	< 0.046						1	ug/L	lb/day					
PCB-1260 Cas No. 11096-82-5			X	< 0.028						1	ug/L	lb/day					
PCB-1016 Cas No. 12674-11-2			X	< 0.046						1	ug/L	lb/day					
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X	See Outfall 034 Form 2C page 4 (Section VII) for available WET data.													
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		1.5	0.26					1	ug/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 604

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	14.2	2,032					1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	2,200						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	34	4,866					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	5.90	844					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	600	85,879					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	13	1,861					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	16	2,018	7.9	940	4.4	553	436/50	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.049	7.0					1	mg/L	lb/day					
Flow	VALUE 26.7		VALUE 20.6		VALUE 14.8		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 79.0		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	180	25,764					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 8.1	MAXIMUM 8.1	MINIMUM	MAXIMUM			1	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	604

PART B - Mark “X” in column 2-a for each pollutant you know or have reason to believe is present. Mark “X” in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		97	13,884					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02						1	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8		X	< 0.067						1	mg/L						
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.079	11.3					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		2.20	315					1	mg/L	lb/day					
Oil & Grease Cas No. E-10140	X		5.63	708	1.90	281	1.52	193	1087/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.111	15.9					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		250	35,783					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		1.70	243					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0711	10.2					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0121	1.7					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.102	14.6					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.0642	9.2					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		7.24	1,036					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.0163	2.3					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 604

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	b. Maximum 30 Day Values (*if available*) (2) Mass	c. Long Term Average (*if available*) (1) Concentration	c. Long Term Average (*if available*) (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (*if available*) (1) Concentration	a. Long Term Average Value (*if available*) (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.00254	0.36					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.0122	1.7					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6		X	< 0.0014						1	mg/L						
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264	X		2.2	315					1	mg/L	lb/day					
Nitrate Cas No. 14797-55-8	X		< 0.046						1	mg/L						
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	604

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark “X” in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark “X” in column 2-b for each pollutant you know or have reason to believe is present. Mark “X” in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0	X	X		0.00102	0.15					1	mg/L	lb/day					
Arsenic Cas No. 7440-38-2	X		X	< 0.0011						1	mg/L						
Beryllium Cas No. 7440-41-7	X		X	< 0.00044						1	mg/L						
Cadmium Cas No. 7440-43-9	X	X		0.00057	0.075			0.00013	0.017	17	mg/L	lb/day					
Chromium Cas No. 7440-47-3	X	X		0.11	13.8	0.036	4.45	0.016	1.99	496/50	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X			Inadvertantly not included in the permit renewal sampling plan. Sampling and analysis is anticipated to be done in May 2020 with submission of the data to follow.													
Copper Cas No. 7440-50-8	X	X		0.025	4.04	0.0084	1.5	0.0042	0.56	436/50	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.00360	0.491	0.00150	0.201	0.00023	0.029	436/50	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		0.58	0.00008	0.39	0.00005	0.29	0.00004	7/6	**ng/L**						
Nickel Cas No. 7440-02-0	X	X		0.0074	0.90			0.0029	0.37	17	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X		X	< 0.001						1	mg/L						
Silver Cas No. 7440-22-4	X	X		0.0002	0.022	0.0001	0.015	0.0001	0.007	100/50	mg/L	lb/day					
Thallium Cas No. 7440-28-0	X		X	< 0.0003						1	mg/L						
Vanadium Cas No. 7440-62-2	X	X		0.000993	0.14					1	mg/L	lb/day					
Zinc Cas No. 7440-66-6	X	X		0.022	2.8	0.016	2.15	0.0072	0.90	436/50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X		X	< 0.0015						1	mg/L		Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.0021	0.34			0.002	0.25	17	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X		X	< 0.0025						1	mg/L						
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	604						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5	X	X		1.40	0.20	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					
Acetaldehyde Cas No. 75-07-0	X	X		147	21.0					1	µg/L	lb/day					
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X	X		128	18.2					1	µg/L	lb/day					
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	µg/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	< 0.46						1	µg/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	µg/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	µg/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	< 0.40						1	µg/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	µg/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	µg/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	µg/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	µg/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	µg/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	µg/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	µg/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	µg/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	µg/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X	X		1.00	0.14	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	µg/L						
Acetone Cas No. 67-64-1	X	X		10	1.4					1	µg/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.30						1	µg/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	µg/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	µg/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	604					
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	µg/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	µg/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	µg/L						
Chlorodibromomethane Cas No. 124-48-1	X		X	< 0.40						1	µg/L						
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	µg/L						
Dichlorobromomethane Cas No. 75-27-4	X		X	< 0.49						1	µg/L						
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	µg/L						
Ethylene glycol Cas No. 107-21-1			X	< 0.94						1	µg/L						
Methanol Cas No. 67-56-1			X	< 0.62						1	µg/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	µg/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	µg/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	µg/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	µg/L						
Propylene glycol Cas No. 57-55-6			X	< 0.55						1	µg/L						
Tetrachloroethene Cas No. 127-18-4	X	X		0.28	0.060	0.28	0.052	0.27	0.035	435/50	µg/L	lb/day					
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	µg/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	µg/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	µg/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	µg/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	µg/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	µg/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.60						1	µg/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.55						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 604						
1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	µg/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	µg/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	µg/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	µg/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.20						1	µg/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	µg/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	µg/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	µg/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	µg/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	µg/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	µg/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	µg/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	µg/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	µg/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	µg/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.42						1	µg/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	µg/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	µg/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	µg/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	µg/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	µg/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	µg/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075						1	µg/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	µg/L						
Benzidine Cas No. 92-87-5	X		X	< 2.00						1	µg/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	µg/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	604

1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.03						1	µg/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	µg/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	µg/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	µg/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	µg/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	< 0.4						1	µg/L						
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.3						1	µg/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	µg/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	µg/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.530						1	µg/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	µg/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.230						1	µg/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.170						1	µg/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.180						1	µg/L						
Fluoranthene Cas No. 206-44-0	X		X	< 0.038						1	µg/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	µg/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.440						1	µg/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.280						1	µg/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	µg/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.210						1	µg/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	µg/L						
Isophorone Cas No. 78-59-1	X		X	< 0.340						1	µg/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.350						1	µg/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.480						1	µg/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.490						1	µg/L						
Naphthalene Cas No. 91-20-3	X	X		3.20	0.38	0.40	0.053	0.08	0.010	433/50	µg/L	lb/day					
Nitrobenzene Cas No. 98-95-3	X		X	< 0.260						1	µg/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	µg/L						
Pyrene Cas No. 129-00-0	X		X	< 0.036						1	µg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	604					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5	X		X	< 0.33						1	µg/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	604					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
PCB-1242 Cas No. 534469-21-9			X														
PCB-1254 Cas No. 11097-69-1			X														
PCB-1221 Cas No. 11104-28-2			X														
PCB-1232 Cas No. 11141-16-5			X														
PCB-1248 Cas No. 12672-29-6			X														
PCB-1260 Cas No. 11096-82-5			X														
PCB-1016 Cas No. 12674-11-2			X														
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		0.64	0.092	Result is a J flagged value between the method detection limit and reporting limit.				1	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 605

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.00						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	4						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	50	1,132					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	6.70	152					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	460	10,416					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	13	294					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	61	507	26.6	144	8	61	431/50	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.130	2.9					1	mg/L	lb/day					
Flow	VALUE 5.58		VALUE 1.48		VALUE 0.58		1406/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 80.0		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	190	4,302					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 8.0	MAXIMUM 8.0	MINIMUM	MAXIMUM			1	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	605

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)* a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		190	4,302					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5	X		0.46	10.4					1	mg/L	lb/day					
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8		X	< 0.067						1	mg/L						
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.090	2.0					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		51	549	12.84	64	4.96	22	1398/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0153	0.35					1	mg/L						
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		32	725					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0137	0.31					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0135	0.31					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0716	1.6					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.000300						1	mg/L						
Iron Cas No. 7439-89-6	X		0.358	8.1					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		18.2	412					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.108	2.4					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 605

1. POLLUTANT	2. MARK (*X*) a. Be-lieved Pre-sent	2. MARK (*X*) b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0298	0.67					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.000400						1	mg/L						
Titanium Cas No. 7440-32-6		X	< 0.00140						1	mg/L						
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.10	2.3					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	605

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0	X	X		0.00159	0.036					1	mg/L	lb/day					
Arsenic Cas No. 7440-38-2	X	X		0.00161	0.036					1	mg/L	lb/day					
Beryllium Cas No. 7440-41-7	X		X	< 0.000440						1	mg/L						
Cadmium Cas No. 7440-43-9	X		X	< 0.000200						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		< 0.000700						1	mg/L						
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.000032	0.0007	Result is a J flagged value between the method detection limit and reporting limit.				1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.00969	0.22					1	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.00103	0.023					1	mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		< 0.20		< 0.20		< 0.20		7/6	**ng/L**						
Nickel Cas No. 7440-02-0	X	X		0.00758	0.17					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X		X	< 0.00100						1	mg/L						
Silver Cas No. 7440-22-4	X		X	< 0.000500						1	mg/L						
Thallium Cas No. 7440-28-0	X		X	< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X		X	< 0.000600						1	mg/L						
Zinc Cas No. 7440-66-6	X	X		0.00719	0.16					1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.0026	0.059					1	mg/L	lb/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		< 0.0020						1	mg/L						
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X		X	< 0.0025						1	mg/L						
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	605						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5	X	X		0.71	0.016	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Acetaldehyde Cas No. 75-07-0	X	X		65.3	0.70					1	ug/L	lb/day					
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X	X		149	1.59					1	ug/L	lb/day					
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46						1	ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40						1	ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X		X	< 0.52						1	ug/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	ug/L						
Acetone Cas No. 67-64-1	X	X		58	1.3					1	ug/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	ug/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	ug/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	605					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		0.72	0.016	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		2.0	0.045					1	ug/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X		X	< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 605						
1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	ug/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.075						1	ug/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	ug/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	ug/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 605						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	ug/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	ug/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	0.40						1	ug/L						
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	ug/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	ug/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X		X	< 0.038						1	ug/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	ug/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	ug/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X		X	< 0.036						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 605						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5	X		X	< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 605						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
PCB-1242 Cas No. 534469-21-9			X														
PCB-1254 Cas No. 11097-69-1			X														
PCB-1221 Cas No. 11104-28-2			X														
PCB-1232 Cas No. 11141-16-5			X														
PCB-1248 Cas No. 12672-29-6			X														
PCB-1260 Cas No. 11096-82-5			X														
PCB-1016 Cas No. 12674-11-2			X														
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Chloroform	X	X		11	0.249					1	µg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) (Continued from page 3)

OUTFALL NO. 606

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.00						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	135						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	200						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	12	102					1	mg/L	lb/day					
Dissolved Oxygen (DO) Cas No. E-14539	7.90	67.4					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	200	1707					1	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	4.8	41.0					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	2.21	18.9						mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.0780	0.67					1	mg/L	lb/day					
Flow	VALUE 17.35		VALUE 8.13		VALUE 4.06		1514/52	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE		VALUE		VALUE					VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 73.0		VALUE		VALUE		1	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	150	1280					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 8.2	MAXIMUM 8.2	MINIMUM	MAXIMUM			1	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	606

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X)		2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. Maximum 30 Day Values (if available) (2) Mass	c. Long Term Average (if available) (1) Concentration	c. Long Term Average (if available) (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available) (1) Concentration	a. Long Term Average Value (if available) (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		24	205					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5	X		0.06	0.51					1	mg/L	lb/day					
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8		X	< 0.120						1	mg/L						
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.24	2.0					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		4.1	242	2.2	101	1.5	49	217/52	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0378	0.32					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		33	282					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0435	0.37					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0223	0.19					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0268	0.23					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.000300						1	mg/L						
Iron Cas No. 7439-89-6	X		0.405	3.5					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		13.4	114					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00124	0.011					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 606						
1. POLLUTANT	2. MARK *(X)* a. Be-lieved Pre-sent	2. MARK *(X)* b. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.0238	0.20					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.000605	0.0052					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6		X	< 0.00140						1	mg/L						
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.24	2.0					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	606

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark “X” in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark “X” in column 2-b for each pollutant you know or have reason to believe is present. Mark “X” in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0	X		X	< 0.000400						1	mg/L						
Arsenic Cas No. 7440-38-2	X		X	< 0.00110						1	mg/L						
Beryllium Cas No. 7440-41-7	X		X	< 0.000440						1	mg/L						
Cadmium Cas No. 7440-43-9	X		X	< 0.000200						1	mg/L						
Chromium Cas No. 7440-47-3	X	X		0.0042	0.347	0.0008	0.012	0.0009	0.034	51/1	mg/L	lb/day					
Chromium, Hex. (dissolved) Cas No. 18540-29-9	X	X		0.000207	0.0018	Result is a J flagged value between the method detection limit and reporting limit.				1	mg/L	lb/day					
Copper Cas No. 7440-50-8	X	X		0.00853	0.073					1	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0041	0.32	0.0007	0.01	0.0008	0.03		mg/L	lb/day					
Mercury Cas No. 7439-97-6	X	X		1.4	0.000049	1.4	0.00005	0.5	0.000019	8/7	**ng/L**	lb/day					
Nickel Cas No. 7440-02-0	X	X		0.000882	0.0075					1	mg/L	lb/day					
Selenium Cas No. 7782-49-2	X		X	< 0.00100						1	mg/L						
Silver Cas No. 7440-22-4	X		X	< 0.000500						1	mg/L						
Thallium Cas No. 7440-28-0	X		X	< 0.000300						1	mg/L						
Vanadium Cas No. 7440-62-2	X		X	< 0.000600						1	mg/L						
Zinc Cas No. 7440-66-6	X	X		0.043	3.78	0.004	0.07	0.014	0.50	51/1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5	X	X		0.0037	0.032					1	mg/L	lb/day	Free Cyanide measured as Weak Acid Dissociable (WAD) Cyanide.				
Cyanide, Total Cas No. 57-12-5	X	X		0.00408	0.035					1	mg/L	lb/day					
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.008	0.36			0.004	0.11	50	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 606						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5	X		X	< 0.21						1	ug/L						
Acetaldehyde Cas No. 75-07-0	X		X	< 38						1	ug/L						
Bis(chloromethyl)ether Cas No. 542-88-1			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Dibutyl amine * Cas No. 111-92-2			X	No test method available for analysis.													
Dimethylpropyl phenol * Cas No. 80-46-6			X	No test method available for analysis.													
Formaldehyde Cas No. 5-00-0	X		X	< 43						1	ug/L						
Tributyl tin oxide * Cas No. 56-35-9			X	No test method available for analysis.													
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5	X		X	< 0.38						1	ug/L						
1,1,2-Trichloroethane Cas No. 79-00-5	X		X	<0.46						1	ug/L						
l,l,l-Trichloroethane Cas No. 71-55-6	X		X	< 0.46						1	ug/L						
1,1-Dichloroethane Cas No. 75-34-3	X		X	< 0.44						1	ug/L						
1,1-Dichloroethene Cas No. 75-35-4	X		X	<0.40						1	ug/L						
1,2,4-Trimethylbenzene Cas No. 95-63-6	X		X	< 0.45						1	ug/L						
1,2-Dichlorethane Cas No. 107-06-2	X		X	< 0.44						1	ug/L						
1,2-Dichloroethene, Trans Cas No. 156-60-5	X		X	< 0.48						1	ug/L						
1,2-Dichloropropane Cas No. 78-87-5	X		X	< 0.48						1	ug/L						
1,3,5-Trimethylbenzene Cas No. 108-67-8	X		X	< 0.65						1	ug/L						
1,3-Dichloropropane Cas No. 142-28-9	X		X	< 0.40						1	ug/L						
1,3-Dichloropropene, Cis Cas No. 10061-01-5	X		X	< 0.57						1	ug/L						
1,3-Dichloropropene, Trans Cas No. 10061-02-6	X		X	< 0.38						1	ug/L						
1,3-Dichloropropylene Cas No. 542-75-6	X		X	< 0.57						1	ug/L						
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3	X		X	< 0.52						1	ug/L						
2-Chloroethyl vinyl ether Cas No. 110-75-8	X		X	< 0.82						1	ug/L						
Acetone Cas No. 67-64-1	X	X		1.3	0.011	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Acrolein Cas No. 1070-20-8	X		X	< 7.3						1	ug/L						
Acrylonitrile Cas No. 107-13-1	X		X	< 0.50						1	ug/L						
Benzene Cas No. 71-43-2	X		X	< 0.46						1	ug/L						
Bromoform Cas No. 75-25-2	X		X	< 0.56						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	606

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0	X		X	< 0.49						1	ug/L						
Carbon Tetrachloride Cas No. 56-23-5	X		X	< 0.40						1	ug/L						
Chlorobenzene Cas No. 108-90-7	X		X	< 0.40						1	ug/L						
Chlorodibromomethane Cas No. 124-48-1	X	X		0.78	0.0067	Result is a J flagged value between the method detection limit and reporting limit.				1	ug/L	lb/day					
Chloroethane Cas No. 75-00-3	X		X	< 0.68						1	ug/L						
Dichlorobromomethane Cas No. 75-27-4	X	X		1.5	0.013					1	ug/L	lb/day					
Dichlorodifluoromethane Cas No. 75-71-8			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Ethylbenzene Cas No. 100-41-4	X		X	< 0.34						1	ug/L						
Ethylene glycol Cas No. 107-21-1	X		X	< 0.94						1	ug/L						
Methanol Cas No. 67-56-1	X		X	< 0.62						1	ug/L						
Methyl Bromide (Bromomethane) Cas No. 74-83-9	X		X	< 0.90						1	ug/L						
Methyl chloride (Chloromethane) Cas No. 74-87-3	X		X	< 0.83						1	ug/L						
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4	X		X	< 0.45						1	ug/L						
Methylamine * Cas No. 74-89-5			X	No test method available for analysis.													
Methylene chloride Cas No. 75-09-2	X		X	< 0.86						1	ug/L						
Propylene glycol Cas No. 57-55-6	X		X	< 0.55						1	ug/L						
Tetrachloroethene Cas No. 127-18-4	X		X	< 0.39						1	ug/L						
Trichloroethene Cas No. 79-01-6	X		X	< 0.43						1	ug/L						
Trichlorofluoromethane Cas No. 75-69-4			X	Per 46 Federal Register 2264, this analyte was removed from the Priority Pollutant List.													
Toluene Cas No. 108-88-3	X		X	< 0.45						1	ug/L						
Vinyl chloride Cas No. 75-01-4	X		X	< 0.53						1	ug/L						
Xylene Cas No. 1330-20-7	X		X	< 0.81						1	ug/L						
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2	X		X	< 0.35						1	ug/L						
2,4-Dimethylphenol Cas No. 105-67-9	X		X	< 0.36						1	ug/L						
2,4-Dinitrophenol Cas No. 51-28-5	X		X	< 2.6						1	ug/L						
2,4,6-Trichlorophenol Cas No. 88-06-2	X		X	< 0.25						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 606

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8	X		X	< 0.23						1	ug/L						
2-Nitrophenol Cas No. 88-75-5	X		X	< 0.34						1	ug/L						
4-Nitrophenol Cas No. 100-02-7	X		X	< 0.24						1	ug/L						
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1	X		X	< 0.27						1	ug/L						
Benzoic acid Cas No. 65-85-0	X		X	< 6.2						1	ug/L						
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7	X		X	< 0.26						1	ug/L						
Pentachlorophenol Cas No. 87-86-5	X		X	< 0.97						1	ug/L						
Phenol Cas No. 108-95-2	X		X	< 0.21						1	ug/L						
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1	X		X	< 0.41						1	ug/L						
1,2-Dichlorobenzene Cas No. 95-50-1	X		X	< 0.39						1	ug/L						
1,2-Diphenylhydrazine Cas No. 122-66-7	X		X	< 0.14						1	ug/L						
1,3-Dichlorobenzene Cas No. 541-73-1	X		X	< 0.65						1	ug/L						
1,4-Dichlorobenzene Cas No. 106-46-7	X		X	< 0.32						1	ug/L						
2-Chloronaphthalene Cas No. 91-58-7	X		X	< 0.075						1	ug/L						
2-Methylnaphthalene Cas No. 91-57-6	X		X	< 0.065						1	ug/L						
2.4-Dinitrotoluene Cas No. 121-14-2	X		X	< 0.21						1	ug/L						
2.6-Dinitrotoluene Cas No. 606-20-2	X		X	< 0.11						1	ug/L						
3,3-Dichlorobenzidine Cas No. 91-94-1	X		X	< 0.46						1	ug/L						
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2	X		X	< 0.051						1	ug/L						
4-Bromophenyl phenyl ether Cas No. 101-55-3	X		X	< 0.33						1	ug/L						
4-Chlorophenyl phenyl ether Cas No. 7005-72-3	X		X	< 0.31						1	ug/L						
Acenaphthene Cas No. 83-32-9	X		X	< 0.081						1	ug/L						
Acenaphthylene Cas No. 208-96-8	X		X	< 0.081						1	ug/L						
Anthracene Cas No. 120-12-7	X		X	< 0.028						1	ug/L						
Benzidine Cas No. 92-87-5	X		X	< 2.0						1	ug/L						
Benzo(a)anthracene Cas No. 56-55-3	X		X	< 0.099						1	ug/L						
Benzo(a)pyrene Cas No. 50-32-8	X		X	< 0.044						1	ug/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 606

1. POLLUTANT	2. MARK (X)			2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)			5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.)	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	b. (2) Mass	c. Long Term Average (if available) (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (if available) (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2	X		X	< 0.030						1	ug/L						
Benzo(k)fluoranthene Cas No. 207-06-9	X		X	< 0.048						1	ug/L						
Bis(2-chloroethoxy)methane Cas No. 111-91-1	X		X	< 0.29						1	ug/L						
Bis(2-chloroethyl) ether Cas No. 111-44-4	X		X	< 0.37						1	ug/L						
Bis(2-chloroisopropyl) ether Cas No. 108-60-1	X		X	< 0.23						1	ug/L						
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7	X		X	20*	0.17*			17.0*	0.13*	2	µg/L	lb/day					
Butyl benzyl phthalate Cas No. 85-68-7	X		X	< 0.30						1	ug/L						
Chrysene Cas No. 218-01-9	X		X	< 0.048						1	ug/L						
Di-n-butyl phthalate Cas No. 84-74-2	X		X	< 0.21						1	ug/L						
Di-n-octyl phthalate Cas No. 117-84-0	X		X	< 0.53						1	ug/L						
Dibenzo(a,h)anthracene Cas No. 53-70-3	X		X	< 0.073						1	ug/L						
Dibenzofuran Cas No. 132-64-9	X		X	< 0.23						1	ug/L						
Diethylphthalate Cas No. 84-66-2	X		X	< 0.17						1	ug/L						
Dimethylphthalate Cas No. 131-11-3	X		X	< 0.18						1	ug/L						
Fluoranthene Cas No. 206-44-0	X		X	< 0.038						1	ug/L						
Fluorene Cas No. 86-73-7	X		X	< 0.051						1	ug/L						
Hexachlorobenzene Cas No. 118-74-1	X		X	< 0.44						1	ug/L						
Hexachlorobutadiene Cas No. 87-68-3	X		X	< 0.28						1	ug/L						
Hexachlorocyclopentadiene Cas No. 77-47-4	X		X	< 1.1						1	ug/L						
Hexachloroethane Cas No. 67-72-1	X		X	< 0.21						1	ug/L						
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5	X		X	< 0.067						1	ug/L						
Isophorone Cas No. 78-59-1	X		X	< 0.34						1	ug/L						
N-nitrosodi-n-propyl amine Cas No. 621-64-7	X		X	< 0.35						1	ug/L						
N-nitrosodimethyl amine Cas No. 62-75-9	X		X	< 0.48						1	ug/L						
N-nitrosodiphenyl amine Cas No. 86-30-6	X		X	< 0.49						1	ug/L						
Naphthalene Cas No. 91-20-3	X		X	< 0.067						1	ug/L						
Nitrobenzene Cas No. 98-95-3	X		X	< 0.26						1	ug/L						
Phenanthrene Cas No. 85-01-8	X		X	< 0.081						1	ug/L						
Pyrene Cas No. 129-00-0	X		X	< 0.036						1	ug/L						

* Detection believed due to contamination from sample tubing. Initial result was a detection but no equipment blank was available for comparison. Resampling w/collection of an equipment blank yielded a detection (14 ug/L) for the sample and a detection (100 ug/L) for the equipment blank.

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 606						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. Maximum 30 Day Values *(if available)* (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. Long Term Average *(if available)* (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. Long Term Average Value *(if available)* (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5	X		X	< 0.33						1	ug/L						
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number (copy from Item 1 of Form 1)	IND005444062										Outfall Number	606					
1. POLLUTANT	2. MARK (X) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values (if available) (1) Concentration	(2) Mass	c. Long Term Average (if available) (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS (specify if blank) a. Concentration	b. Mass	4. INTAKE (optional) a. Long Term Average Value (if available) (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD (list method used and detection limit achieved by lab.) a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9			X														
PCB-1254 Cas No. 11097-69-1			X														
PCB-1221 Cas No. 11104-28-2			X														
PCB-1232 Cas No. 11141-16-5			X														
PCB-1248 Cas No. 12672-29-6			X														
PCB-1260 Cas No. 11096-82-5			X														
PCB-1016 Cas No. 12674-11-2			X														
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														
ADDITIONAL ANALYSES																	
Chloroform	X	X		2.30	0.020					1	ug/L	lb/day					

Outfalls 035:

Form 2C Pages 1-4
Form 2C Part V for Outfall 035

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE 1. DEG.	2. MIN.	3. SEC.	C. LONGITUDE 1. DEG.	2. MIN.	3. SEC.	D. RECEIVING WATER *(name)*
035	41	37	29.3	87	19	35.8	Lake Michigan

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW a. OPERATION	b. AVERAGE FLOW *(Include units)*	3. TREATMENT a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
035		138.3 MGD Long Term Average	Dechlorination	2E	4A
	No. 14 Blast Furnace NCCW	Continuous when in operation			
	Steam Turbine Gen (Co-Gen Turbo Gen) NCCW	Continuous			
	No 5. Power Station NCCW	Continuous			
	Steam Condensates (No. 5 Power Station, No. 14 Blast Furnace, Turbo Gen.)	Intermittent			
	Stormwater (Drainage Area #24)	Intermittent			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
035	Steam Condensates	As Needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE See the General Information Form for the certification signature	D. DATE SIGNED

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 035

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	2.17	2,301					1	mg/L	lb/day					
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	3						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	10						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	7.70	8,165					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	190	201,603			163.3	181477	3	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	2.5	2,651					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	82	86,743					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	71	76			51	55	2	mg/L	lb/day					
Flow	VALUE 156.8		VALUE 156.8		VALUE 138.3		1522/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 92		VALUE 88		VALUE 68		1154/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 94		VALUE 99		VALUE 94		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	150	159,065					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 7.1	MAXIMUM 8.4	MINIMUM	MAXIMUM			50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062											Outfall Number	035			
b																
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		17	18,027					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/24	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.12	127					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.28	297					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		4.50	5419	2.18	2569	1.46	1672	218/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0	X		0.0975	103					1	mg/L	lb/day					
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		43	45,626			33	35,807	2	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8	X		0.72	764					1	mg/L	lb/day					
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.96	1,021			0.58	627	2	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0315	33.4					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0213	22.6					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4	X		0.000774	0.82					1	mg/L	lb/day					
Iron Cas No. 7439-89-6	X		3.61	3,828					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		23.6	25,026					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00139	1.5					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 035						
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.00139	1.5					1	mg/L	lb/day					
Tin Cas No. 74400-31-5	X		0.000539	0.57					1	mg/L	lb/day					
Titanium Cas No. 7440-32-6	X		0.0513	54.4					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.34	361					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	035

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.012	12.9			0.0059	6.5	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.0046	4.9			0.0015	1.66	4	mg/L	lb/day					
Mercury Cas No. 7439-97-6		X															
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.0235	24.9			0.0080	8.8	4	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5			X														
Cyanide, Total Cas No. 57-12-5			X														
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253			X														
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062	Outfall Number 035

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
OTHER																		
4-Methylphenol Cas No. 106-44-5			X															
Acetaldehyde Cas No. 75-07-0			X															
Bis(chloromethyl)ether Cas No. 542-88-1			X															
Dibutyl amine * Cas No. 111-92-2			X															
Dimethylpropyl phenol * Cas No. 80-46-6			X															
Formaldehyde Cas No. 5-00-0			X															
Tributyl tin oxide * Cas No. 56-35-9			X															
VOLATILE ORGANIC																		
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X															
1,1,2-Trichloroethane Cas No. 79-00-5			X															
l,l,l-Trichloroethane Cas No. 71-55-6			X															
1,1-Dichloroethane Cas No. 75-34-3			X															
1,1-Dichloroethene Cas No. 75-35-4			X															
1,2,4-Trimethylbenzene Cas No. 95-63-6			X															
1,2-Dichlorethane Cas No. 107-06-2			X															
1,2-Dichloroethene, Trans Cas No. 156-60-5			X															
1,2-Dichloropropane Cas No. 78-87-5			X															
1,3,5-Trimethylbenzene Cas No. 108-67-8			X															
1,3-Dichloropropane Cas No. 142-28-9			X															
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X															
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X															
1,3-Dichloropropylene Cas No. 542-75-6			X															
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X															
2-Chloroethyl vinyl ether Cas No. 110-75-8			X															
Acetone Cas No. 67-64-1			X															
Acrolein Cas No. 1070-20-8			X															
Acrylonitrile Cas No. 107-13-1			X															
Benzene Cas No. 71-43-2			X															
Bromoform Cas No. 75-25-2			X															

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 035

1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4.6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 035						
1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	035					
1. POLLUTANT	2. MARK *(X)* a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062												Outfall Number 035					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 035

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE (*optional*)			5. ANALYTICAL METHOD (*list method used and detection limit achieved by lab.*)	
	a. Testing Required	b. Believed Present	c. Believed Absent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values (*if available*) (1) Concentration	b. Maximum 30 Day Values (*if available*) (2) Mass	c. Long Term Average (*if available*) (1) Concentration	c. Long Term Average (*if available*) (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value (*if available*) (1) Concentration	a. Long Term Average Value (*if available*) (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.048						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.048						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.048						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.048						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.048						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Iron, Dissolved	X		X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.000743	0.84	Results are a mixture of non-detects and J flagged values between the method detection limit & reporting limit.		0.00065	0.77	3	mg/L	lb/day					
Lead, Dissolved			X	< 0.00040				< 0.00040		3	mg/L						

Outfalls 037:

Form 2C Pages 1-4
Form 2C Part V for Outfall 037

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
037	41	37	39	87	21	25	Lake Michigan

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
037		3.0 MGD Long Term Average	Dechlorination	2E	4A
	Box Anneal North Mill Furnaces NCCW	Continuous			
	North Sheet Mill No. 10 Air Compressor NCCW	Intermittent			
	80" Temper Mill NCCW	Intermittent			
	North Sheet Mill Steam Condensates	Intermittent			
	Stormwater (Drainage Area #26)	Intermittent			
	5-Stand Cold Reduction, No. 6 & No. 8 Galvanized lines NCCW	Continuous when in Operation			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
037	North Sheet Mill No. 10 Air Compressor NCCW	As needed						
037	80" Temper Mill NCCW	As needed						
037	North Sheet Mill Steam Condensates	As needed						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
None			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)* X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE See the General Information Form for the certification signature	D. DATE SIGNED

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) | OUTFALL NO. 037

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.0						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	< 6.1						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	8.00	200					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	150	3,755			150	3,755	2	mg/L	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	4.2	105					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	1	25.8					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.0367	0.92					1	mg/L	lb/day					
Flow	VALUE 3		VALUE 3		VALUE 3		767/50	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 85		VALUE 76		VALUE 60		1154/38	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 93		VALUE 85		VALUE 80		368/12	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	140	3,503					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.5	MAXIMUM 8.2	MINIMUM	MAXIMUM			50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	037

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank*)		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		16	400					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/24	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.092	2.3					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.20	5.0					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9		X	< 1.0						1	mg/L						
Oil & Grease Cas No. E-10140	X		3.30	82.6	1.98	49.4	1.43	35.7	217/50	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0		X	< 0.011						1	mg/L						
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		24	600					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0428	1.1					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0205	0.51					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.02	0.50					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6	X		0.0682	1.7					1	mg/L	lb/day					
Magnesium Cas No. 7439-95-4	X		12.2	305					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00114	0.029					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062									Outfall Number	037					
1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Manganese Cas No. 7439-96-5	X		0.00865	0.22					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.0004						1	mg/L						
Titanium Cas No. 7440-32-6	X		0.00195	0.049					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.22	5.5					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	037

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis daily / monthly average	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.00665	0.17			0.0040	0.10	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.00066	0.017					1	mg/L	lb/day					
Mercury Cas No. 7439-97-6		X															
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.036	0.90			0.011	0.27	50	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5																	
Cyanide, Total Cas No. 57-12-5																	
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253	X	X		0.018	0.45			0.003	0.081	50	mg/L	lb/day					
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 037						
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 037						
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4,6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	037

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062												Outfall Number 037					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062												Outfall Number 037					
1. POLLUTANT	2. MARK *(X)*			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Testing Required	b. Believed Present	c. Believed Absent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	037

1. POLLUTANT	2. MARK (*X*) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.048						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.026						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.048						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.048						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.048						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.026						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.048						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Iron, Dissolved			X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.00264	0.066	All results are J flagged values between the method detection limit & reporting limit.		0.0014	0.035	3	mg/L	lb/day					

Outfalls 039:

Form 2C Pages 1-4
Form 2C Part V for Outfall 039

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE 1. DEG.	2. MIN.	3. SEC.	C. LONGITUDE 1. DEG.	2. MIN.	3. SEC.	D. RECEIVING WATER *(name)*
039	41	37	45.8	87	21	59.8	Lake Michigan

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW a. OPERATION	b. AVERAGE FLOW *(Include units)*	3. TREATMENT a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
039		28.8 MGD Long Term Average	Dechlorination	2E	4A
	84" Hot Strip Mill (HSM)				
	Reheat Furnace NCCW	Continuous			
	Fire Water Distribution NCCW	Intermittent			
	Roughing and Finishing Mills Oil Tanks & Filters NCCW	Continuous			
	Steam condensates	Intermittent			
	84" HSM Roughing Mill Emergency Overflow	Emergency only			
	Stormwater (Drainage Area #27)	Intermittent			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
039	Steam condensates	As needed						
039	HSM Fire Water System NCCW	As needed						
039	84" HSM Roughing Mill Emergency Overflow	Emergency only						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
none			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)*   X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3) — OUTFALL NO. 039

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
a. Biochemical Oxygen Demand, Carbonaceous Cas No. E10106	< 2.0						1	mg/L						
b. Escherichia coli (E-coli - units in count/100ml) Cas No. I-1000	< 1.0						1	MPN						
Fecal coliform (units in count/100 ml) Cas No. I-1000	< 1.0						1	CFU						
Chemical Oxygen Demand (COD) Cas No. E10107	< 6.1						1	mg/L						
Dissolved Oxygen (DO) Cas No. E-14539	8.70	2,026					1	mg/L	lb/day					
Total Dissolved Solids (TDS) Cas No. E-10173	160	37,279			150	35,288	2	mg/l	lb/day					
Total Organic Carbon (TOC) Cas No. E-10195	4.3	1,001					1	mg/L	lb/day					
Total Suspended Solids (TSS) Cas No. E-10162	0.61	142					1	mg/L	lb/day					
Ammonia (as N) Cas No. 7664-41-7	0.022	5.1					1	mg/L	lb/day					
Flow	VALUE 55		VALUE 55		VALUE 28.8		1470/35	MGD		VALUE				
Temperature (Winter) Cas No. E-14540	VALUE 83		VALUE 74		VALUE 55		1154/28	°F		VALUE				
Temperature (Summer) Cas No. E-14540	VALUE 87		VALUE 81		VALUE 76		368/9	°F		VALUE				
Hardness, Total (as (CaCO3) Cas No. E-11778	130	30,271					1	mg/L	lb/day					
pH (S.U.) Cas No. E-10139	MINIMUM 6.9	MAXIMUM 8.1	MINIMUM	MAXIMUM			50	S.U.						

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	039

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. Pollutants for which you mark column 2-a , you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT	2. MARK (*X*)		2. EFFLUENT							3. UNITS (*specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	a. Maximum Daily Values (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
Bromide Cas No. 7726-95-6		X	< 0.032						1	mg/L						
Chloride Cas No. 1688-70-6	X		16	3,726					1	mg/L	lb/day					
Chlorine, Total Residual Cas No. 7782-50-5		X	< 0.02		< 0.02		< 0.02		623/17	mg/L						
Color (C.U.) Cas No. E-11712		X	< 2.5						1	PCU						
Fluoride Cas No. 16984-48-8	X		0.098	22.8					1	mg/L	lb/day					
Nitrate/Nitrite (as N) Cas No. E-10128	X		0.20	46.6					1	mg/L	lb/day					
Nitrogen, Total Organic (as N) Cas No. 7727-37-9	X		0.20	46.6					1	mg/L	lb/day					
Oil & Grease Cas No. E-10140	X		5.80	1400	3.00	737	1.49	370	218/35	mg/L	lb/day					
Phosphorus, Total Cas No. 7723-14-0		X	< 0.011						1	mg/L						
Radioactivity																
(1) Radioactivity: Alpha, Total (pCi/L) Cas No. 12587-46-1		X	---	---												
(2) Radioactivity: Beta, Total (pCi/L) Cas No. 12587-47-2		X	---	---												
(3) Radioactivity: Radium ,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
(4) Radioactivity: Radium 226,Total (pCi/L) Cas No. 13982-63-3		X	---	---												
Sulfate (as SO4) Cas No. 14808-79-8	X		24	5,588					1	mg/L	lb/day					
Sulfide (as S) Cas No. 18496-25-8		X	< 0.42						1	mg/L						
Sulfite (as SO3) Cas No. 14264-45-3		X	< 2.0						1	mg/L						
Surfactants (MBAS) Cas No. 61-73-4		X	< 0.12						1	mg/L						
Aluminum Cas No. 7429-90-5	X		0.0281	6.5					1	mg/L	lb/day					
Barium Cas No. 7440-39-3	X		0.0198	4.6					1	mg/L	lb/day					
Boron Cas No. 7440-42-8	X		0.0194	4.5					1	mg/L	lb/day					
Cobalt Cas No. 7440-48-4		X	< 0.0003						1	mg/L						
Iron Cas No. 7439-89-6		X	< 0.0412						1	mg/L						
Magnesium Cas No. 7439-95-4	X		12	2,794					1	mg/L	lb/day					
Molybdenum Cas No. 7439-98-7	X		0.00114	0.27					1	mg/L	lb/day					

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062										Outfall Number 039						
1. POLLUTANT	2. MARK *(X)*		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Be-lieved Pre-sent	b. Be-lieved Ab-sent	a. Maximum Daily Values		b. Maximum 30 Day Values *(if available)*		c. Long Term Average *(if available)*		d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)*		b. No. of Analysis	a. Method	b. **Reporting** Limit
			(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass			
Manganese Cas No. 7439-96-5	X		0.00291	0.68					1	mg/L	lb/day					
Tin Cas No. 74400-31-5		X	< 0.0004						1	mg/L						
Titanium Cas No. 7440-32-6	X		0.00172	0.40					1	mg/L	lb/day					
OTHER CONVENTIONAL																
Kjeldahl Nitrogen, Total Cas No. E-10264		X	< 0.87						1	mg/L						
Nitrate Cas No. 14797-55-8	X		0.2	46.6					1	mg/L	lb/day					
Nitrite Cas No. 14797-65-0		X	< 0.016						1	mg/L						

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 039

Part C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2C-2 in the instructions to determine which of the GC/MS fractions you must test for Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. Pollutants for which you mark column 2-a or 2-b, you must provide a minimum of twelve (12) samples (three (3) samples per month for a period of four (4) months). You must use, or require your contract laboratory to use, an analytical method with detection level low enough to provide a detectable value for the pollutant of concern. Please provide the method used and the detection limit achieved by the laboratory. You must provide data or an explanation for the presence of the pollutant in your discharge. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT	2. MARK (X) a. Test-ing Re-quired	2. MARK (X) b. Be-lieved Pre-sent	2. MARK (X) c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis daily / monthly average	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
METALS																	
Antimony Cas No. 7440-36-0			X														
Arsenic Cas No. 7440-38-2			X														
Beryllium Cas No. 7440-41-7			X														
Cadmium Cas No. 7440-43-9			X														
Chromium Cas No. 7440-47-3			X														
Chromium, Hex. (dissolved) Cas No. 18540-29-9			X														
Copper Cas No. 7440-50-8	X	X		0.0107	2.5			0.0057	1.5	4	mg/L	lb/day					
Lead Cas No. 7439-92-1	X	X		0.000504	0.12					1	mg/L	lb/day					
Mercury Cas No. 7439-97-6		X															
Nickel Cas No. 7440-02-0			X														
Selenium Cas No. 7782-49-2			X														
Silver Cas No. 7440-22-4			X														
Thallium Cas No. 7440-28-0			X														
Vanadium Cas No. 7440-62-2			X														
Zinc Cas No. 7440-66-6	X	X		0.00325	0.76					1	mg/L	lb/day					
CYANIDE																	
Cyanide, Free Cas No. 57-12-5			X														
Cyanide, Total Cas No. 57-12-5			X														
TOTAL PHENOLS																	
Phenols, Total (4AAP) Cas No. E-10253			X														
DIOXIN																	
2,3,7,8-Tetrachloro dibenzo-P-Dioxin Cas No. 1746-01-6			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 039

1. POLLUTANT	2. MARK (*X*)			2. EFFLUENT							3. UNITS *(specify if blank)*		.			5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)*	
	a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	a. Concentration	b. Mass	a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	a. Method	b. **Reporting** Limit
OTHER																	
4-Methylphenol Cas No. 106-44-5			X														
Acetaldehyde Cas No. 75-07-0			X														
Bis(chloromethyl)ether Cas No. 542-88-1			X														
Dibutyl amine * Cas No. 111-92-2			X														
Dimethylpropyl phenol * Cas No. 80-46-6			X														
Formaldehyde Cas No. 5-00-0			X														
Tributyl tin oxide * Cas No. 56-35-9			X														
VOLATILE ORGANIC																	
1,1,2,2-Tetrachloroethane Cas No. 79-34-5			X														
1,1,2-Trichloroethane Cas No. 79-00-5			X														
l,l,l-Trichloroethane Cas No. 71-55-6			X														
1,1-Dichloroethane Cas No. 75-34-3			X														
1,1-Dichloroethene Cas No. 75-35-4			X														
1,2,4-Trimethylbenzene Cas No. 95-63-6			X														
1,2-Dichlorethane Cas No. 107-06-2			X														
1,2-Dichloroethene, Trans Cas No. 156-60-5			X														
1,2-Dichloropropane Cas No. 78-87-5			X														
1,3,5-Trimethylbenzene Cas No. 108-67-8			X														
1,3-Dichloropropane Cas No. 142-28-9			X														
1,3-Dichloropropene, Cis Cas No. 10061-01-5			X														
1,3-Dichloropropene, Trans Cas No. 10061-02-6			X														
1,3-Dichloropropylene Cas No. 542-75-6			X														
2-Butanone (Methyl Ethyl Ketone) Cas No. 78-93-3			X														
2-Chloroethyl vinyl ether Cas No. 110-75-8			X														
Acetone Cas No. 67-64-1			X														
Acrolein Cas No. 1070-20-8			X														
Acrylonitrile Cas No. 107-13-1			X														
Benzene Cas No. 71-43-2			X														
Bromoform Cas No. 75-25-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062	Outfall Number	039

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
Carbon disulfide Cas No. 75-15-0			X														
Carbon Tetrachloride Cas No. 56-23-5			X														
Chlorobenzene Cas No. 108-90-7			X														
Chlorodibromomethane Cas No. 124-48-1			X														
Chloroethane Cas No. 75-00-3			X														
Dichlorobromomethane Cas No. 75-27-4			X														
Dichlorodifluoromethane Cas No. 75-71-8			X														
Ethylbenzene Cas No. 100-41-4			X														
Ethylene glycol Cas No. 107-21-1			X														
Methanol Cas No. 67-56-1			X														
Methyl Bromide (Bromomethane) Cas No. 74-83-9			X														
Methyl chloride (Chloromethane) Cas No. 74-87-3			X														
Methyl tert-butyl ether (MTBE) Cas No. 1634-04-4			X														
Methylamine * Cas No. 74-89-5			X														
Methylene chloride Cas No. 75-09-2			X														
Propylene glycol Cas No. 57-55-6			X														
Tetrachloroethene Cas No. 127-18-4			X														
Trichloroethene Cas No. 79-01-6			X														
Trichlorofluoromethane Cas No. 75-69-4			X														
Toluene Cas No. 108-88-3			X														
Vinyl chloride Cas No. 75-01-4			X														
Xylene Cas No. 1330-20-7			X														
SEMI-VOLATILE ORGANIC-ACID																	
2,4-Dichlorophenol Cas No. 120-83-2			X														
2,4-Dimethylphenol Cas No. 105-67-9			X														
2,4-Dinitrophenol Cas No. 51-28-5			X														
2,4,6-Trichlorophenol Cas No. 88-06-2			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062

Outfall Number 039

1. POLLUTANT	2. MARK (*X*) a. Testing Required	2. MARK (*X*) b. Believed Present	2. MARK (*X*) c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	2. EFFLUENT a. Maximum Daily Values (2) Mass	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (1) Concentration	2. EFFLUENT b. Maximum 30 Day Values *(if available)* (2) Mass	2. EFFLUENT c. Long Term Average *(if available)* (1) Concentration	2. EFFLUENT c. Long Term Average *(if available)* (2) Mass	2. EFFLUENT d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	3. UNITS *(specify if blank)* b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (2) Mass	4. INTAKE *(optional)* b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	5. ANALYTICAL METHOD b. **Reporting** Limit
2-Chlorophenol Cas No. 95-57-8			X														
2-Nitrophenol Cas No. 88-75-5			X														
4-Nitrophenol Cas No. 100-02-7			X														
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol) Cas No. 534-52-1			X														
Benzoic acid Cas No. 65-85-0			X														
p-Chloro-m-cresol (4-chloro-3-methylphenol) Cas No. 59-50-7			X														
Pentachlorophenol Cas No. 87-86-5			X														
Phenol Cas No. 108-95-2			X														
SEMI-VOLATILE ORGANIC-BASE																	
1,2,4-Trichlorobenzene Cas No. 120-82-1			X														
1,2-Dichlorobenzene Cas No. 95-50-1			X														
1,2-Diphenylhydrazine Cas No. 122-66-7			X														
1,3-Dichlorobenzene Cas No. 541-73-1			X														
1,4-Dichlorobenzene Cas No. 106-46-7			X														
2-Chloronaphthalene Cas No. 91-58-7			X														
2-Methylnaphthalene Cas No. 91-57-6			X														
2.4-Dinitrotoluene Cas No. 121-14-2			X														
2.6-Dinitrotoluene Cas No. 606-20-2			X														
3,3-Dichlorobenzidine Cas No. 91-94-1			X														
3,4-Benzofluoranthene (benzo(b)fluoranthene) Cas No. 205-99-2			X														
4-Bromophenyl phenyl ether Cas No. 101-55-3			X														
4-Chlorophenyl phenyl ether Cas No. 7005-72-3			X														
Acenaphthene Cas No. 83-32-9			X														
Acenaphthylene Cas No. 208-96-8			X														
Anthracene Cas No. 120-12-7			X														
Benzidine Cas No. 92-87-5			X														
Benzo(a)anthracene Cas No. 56-55-3			X														
Benzo(a)pyrene Cas No. 50-32-8			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062											Outfall Number 039						
1. POLLUTANT	2. MARK (*X*) a. Test-ing Re-quired	b. Be-lieved Pre-sent	c. Be-lieved Ab-sent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Benzo(ghi)perylene Cas No. 191-24-2			X														
Benzo(k)fluoranthene Cas No. 207-06-9			X														
Bis(2-chloroethoxy)methane Cas No. 111-91-1			X														
Bis(2-chloroethyl) ether Cas No. 111-44-4			X														
Bis(2-chloroisopropyl) ether Cas No. 108-60-1			X														
Bis(2-ethylhexyl)phthalate Cas No. 117-81-7			X														
Butyl benzyl phthalate Cas No. 85-68-7			X														
Chrysene Cas No. 218-01-9			X														
Di-n-butyl phthalate Cas No. 84-74-2			X														
Di-n-octyl phthalate Cas No. 117-84-0			X														
Dibenzo(a,h)anthracene Cas No. 53-70-3			X														
Dibenzofuran Cas No. 132-64-9			X														
Diethylphthalate Cas No. 84-66-2			X														
Dimethylphthalate Cas No. 131-11-3			X														
Fluoranthene Cas No. 206-44-0			X														
Fluorene Cas No. 86-73-7			X														
Hexachlorobenzene Cas No. 118-74-1			X														
Hexachlorobutadiene Cas No. 87-68-3			X														
Hexachlorocyclopentadiene Cas No. 77-47-4			X														
Hexachloroethane Cas No. 67-72-1			X														
Indeno(1,2,3-cd) Pyrene Cas No. 193-39-5			X														
Isophorone Cas No. 78-59-1			X														
N-nitrosodi-n-propyl amine Cas No. 621-64-7			X														
N-nitrosodimethyl amine Cas No. 62-75-9			X														
N-nitrosodiphenyl amine Cas No. 86-30-6			X														
Naphthalene Cas No. 91-20-3			X														
Nitrobenzene Cas No. 98-95-3			X														
Phenanthrene Cas No. 85-01-8			X														
Pyrene Cas No. 129-00-0			X														

EPA Identification Number *(copy from Item 1 of Form 1)*	IND005444062										Outfall Number	039					
1. POLLUTANT	2. MARK *(X)* a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	(2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	(2) Mass	c. Long Term Average *(if available)* (1) Concentration	(2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	(2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
Styrene Cas No. 100-42-5			X														
PESTICIDES																	
2,4-Dichlorophenoxy Acetic Acid Cas No. 94-75-7			X														
Alachlor Cas No. 15972-60-8			X														
Aldrin Cas No. 309-00-2			X														
Atrazine Cas No. 1912-24-9			X														
BHC-Alpha Cas No. 319-84-6			X														
BHC-Beta Cas No. 319-85-7			X														
BHC-Gamma (Lindane) Cas No. 58-89-9			X														
BHC-Delta Cas No. 319-86-8			X														
Chlordane Cas No. 57-74-9			X														
DDD Cas No. 72-54-8			X														
DDE Cas No. 72-55-9			X														
DDT Cas No. 50-29-3			X														
Dieldrin Cas No. 60-57-1			X														
Endosulfan Sulfate Cas No. 1031-07-8			X														
Endosulfan, Alpha Cas No. 959-98-8			X														
Endosulfan, Beta Cas No. 33213-65-9			X														
Endrin Cas No. 72-20-8			X														
Endrin Aldehyde Cas No. 7421-93-4			X														
Heptachlor Cas No. 76-44-8			X														
Heptachlor Epoxide Cas No. 1024-57-3			X														
Methoxychlor Cas No. 72-43-5			X														
Metolachlor Cas No. 51218-45-2			X														
Mirex Cas No. 2385-85-5			X														
Parathion ethyl Cas No. 56-38-2			X														
Parathion methyl Cas No. 56-38-2			X														
Simazine Cas No. 122-34-9			X														

EPA Identification Number *(copy from Item 1 of Form 1)* IND005444062 | Outfall Number 039

1. POLLUTANT	2. MARK (X) a. Testing Required	b. Believed Present	c. Believed Absent	2. EFFLUENT a. Maximum Daily Values (1) Concentration	a. (2) Mass	b. Maximum 30 Day Values *(if available)* (1) Concentration	b. (2) Mass	c. Long Term Average *(if available)* (1) Concentration	c. (2) Mass	d. No. of Analysis	3. UNITS *(specify if blank)* a. Concentration	b. Mass	4. INTAKE *(optional)* a. Long Term Average Value *(if available)* (1) Concentration	a. (2) Mass	b. No. of Analysis	5. ANALYTICAL METHOD *(list method used and detection limit achieved by lab.)* a. Method	b. **Reporting** Limit
PCB-1242 Cas No. 534469-21-9	X		X	< 0.046						1	µg/L						
PCB-1254 Cas No. 11097-69-1	X		X	< 0.028						1	µg/L						
PCB-1221 Cas No. 11104-28-2	X		X	< 0.046						1	µg/L						
PCB-1232 Cas No. 11141-16-5	X		X	< 0.046						1	µg/L						
PCB-1248 Cas No. 12672-29-6	X		X	< 0.046						1	µg/L						
PCB-1260 Cas No. 11096-82-5	X		X	< 0.028						1	µg/L						
PCB-1016 Cas No. 12674-11-2	X		X	< 0.046						1	µg/L						
Toxaphene Cas No. 8001-35-2			X														
WHOLE EFFLUENT TOXICITY																	
Acute, Freshwater Organisms Cas No. I-1100			X														
Chronic Freshwater Organisms Cas No. I-1101			X														

ADDITIONAL ANALYSES																	
Iron, Dissolved	X		X	< 0.0412						1	mg/L						
Copper, Dissolved			X	0.000785	0.229	Results are a mixture of non-detects and J flagged values between the method detection limit & reporting limit.		0.00071	0.191	3	mg/L	lb/day					

Pump Station Backwashes 1, 2, 3, 4, and 5:

Form 2C Pages 1-4
Attachment Intake A1. Pumpstation Intake Data
Attachment Intake A2. Pumpstation Intake Mercury Data

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
BW-1	41	36	58.7	87	19	41.2	Lake Michigan
BW-2	41	37	27.1	87	19	31.4	Lake Michigan
BW-3	41	36	36	87	19	21.7	Lake Michigan
BW-4	41	36	55.4	87	19	14	Lake Michigan
BW-5	41	37	52	87	22	26.8	Lake Michigan

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
BW-1	No 1. Service Water Pumping Station Intake Screen Backwash	Intermittent (see Section C.)	None		4A
BW-2	No. 2 Service Water Pumping Station Intake Screen Backwash	Intermittent (see Section C.)	None		4A
BW-3	No. 3 Service Water Pumping Station Intake Screen Backwash	Intermittent (see Section C.)	None		4A
BW-4	No. 4 Service Water Pumping Station Intake Screen Backwash	Intermittent (see Section C.)	None		4A
BW-5	No. 5 Service Water Pumping Station Intake Screen Backwash	Intermittent (see Section C.)	None		4A
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)* 1. LONG TERM AVERAGE	a. FLOW RATE *(in mgd)* 2. MAXIMUM DAILY	b. TOTAL VOLUME *(specify with units)* 1. LONG TERM AVERAGE	b. TOTAL VOLUME *(specify with units)* 2. MAXIMUM DAILY	c. DURATION *(in days)*
BW-1	Intake Screen Backwash	As needed						As needed
BW-2	Intake Screen Backwash	As needed						As needed
BW-3	Intake Screen Backwash	As needed						As needed
BW-4	Intake Screen Backwash	As needed						As needed
BW-5	Intake Screen Backwash	As needed						As needed

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
none			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

X YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED
For Intake Data (representative of BWs) ALS Environmental	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	**D. DATE SIGNED**
See the General Information Form for the certification signature	

Table Intake A1. Intake Pump Station Data

Parameter	No.1 Pump Station	No. 2 Pump Station	No. 4 PS Pump Station	Lakeside Pump Station	Units
Part V. IDEM Table A Parameters					
Carbonaceous Biochemical Oxygen Demand	<2.0	<2.0	<2.0	<2.0	mg/L
Escherichia coli	<1	<1	<1	<1	MPN
Fecal Coliform	<1	<1	<1	<1	CFU
Chemical Oxygen Demand	<6.1	10	10	10	mg/L
Dissolved Oxygen	8.10	8.70	7.50	10.5	mg/L
Total Dissolved Solids	190	180	190	160	mg/L
Total Organic Carbon	2.2	2.5	2.2	4.2	mg/L
Total Suspended Solids (See Note A)	0.941	Ave: 6.7 Max: 112	0.819	Ave: 7.2 Max: 92	mg/L
Ammonia as N (See Note B)	0.0734	Average: 0.024 Max: 0.160	0.0216	0.0216	mg/L
Temperature (See Note C)	73.0	Summer Ave: 71.3 Summer Max: 79.1 Winter Ave: 47.9 Winter Max 72.2	72.0	Summer Ave: 67.3 Summer Max: 77.3 Winter Ave: 46.2 Winter Max 70.8	°F
Total Hardness	130	140	130	140	mg/L
pH	7.9	8.4	7.4	8.5	s.u.
Part V. IDEM Table B Parameters					
Bromide	<0.032	<0.032	<0.032	<0.032	mg/L
Chloride	18	16	21	15	mg/L
Chlorine, Total Residual (See Note D)	0.30	<0.02	0.20	0.20	mg/L
Color (See Note E)	10	10	15.0	10	PCU
Fluoride	0.10	0.091	0.14	0.096	mg/L
Nitrate + Nitrite as N	0.24	0.29	0.25	0.17	mg/L
Nitrate	0.25	0.29	0.25	0.18	mg/L
Nitrite	<0.016	<0.016	<0.016	<0.016	mg/L
Nitrogen, Total Organic as N	<1.0	<1.0	<1.0	<1.0	mg/L
Total Kjeldahl Nitrogen	<0.87	<0.87	<0.87	<0.87	mg/L
Nitrogen, Total	0.24	0.29	0.25	0.17	mg/L
Oil and Grease	<1.3	<1.3	<1.3	<1.3	mg/L
Phosphorus as P, Total	<0.0110	0.0147	<0.0110	<0.0110	mg/L
Sulfate as SO4	23	36	25	21	mg/L
Sulfide as S	<0.42	<0.42	<0.42	<0.42	mg/L
Sulfite as SO3	<2.0	<2.0	<2.0	<2.0	mg/L
Surfactants (MBAS)	<0.12	<0.12	<0.12	<0.12	mg/L
Aluminum, Total	0.0322	0.0171	0.0943	0.0307	mg/L
Barium, Total	0.0202	0.0200	0.0222	0.0201	mg/L
Boron, Total	0.0236	0.0208	0.0238	0.0263	mg/L
Cobalt, Total	<0.000300	<0.000300	<0.000300	<0.000300	mg/L
Iron, Total	0.130	<0.412	0.262	<0.412	mg/L
Iron, Dissolved	<0.412	<0.412	<0.412	<0.412	mg/L
Magnesium, Total	11.9	11.7	12.3	12.2	mg/L
Molybdenum, Total	0.00151	0.00120	0.00146	0.00107	mg/L

Table Intake A1. Intake Pump Station Data

Parameter	No.1 Pump Station	No. 2 Pump Station	No. 4 PS Pump Station	Lakeside Pump Station	Units
Manganese, Total	0.00871	0.00483	0.0465	0.00352	mg/L
Tin, Total	<0.000400	<0.000400	<0.000400	<0.000400	mg/L
Titanium, Total	0.00200	<0.00140	0.00375	0.00181	mg/L
Part V. IDEM Table C. Priority Pollutant Metals, Cyanide, & Phenols Parameters					
Antimony, Total	<0.000400	<0.000400	<0.000400	<0.000400	mg/L
Arsenic, Total	<0.001100	<0.001100	<0.001100	<0.001100	mg/L
Beryllium, Total	<0.000440	<0.000440	<0.000440	<0.000440	mg/L
Cadmium, Total	<0.00200	<0.00200	0.000297	<0.00200	mg/L
Chromium, Total	<0.000700	<0.000700	0.000893	<0.000700	mg/L
Chromium, Hexavalent dissolved)	0.000166	0.000161	0.000159	0.000143	mg/L
Copper, Total	0.00448	0.00903	0.00903	0.00317	mg/L
Lead, Total	0.00117	0.000826	0.00111	0.000995	mg/L
Mercury, Total	Mercury data for Intake Pump Stations listed in Table Intake A2.				ng/L
Nickel, Total	0.000568	<0.000500	0.00106	<0.000500	mg/L
Selenium, Total	<0.00100	<0.00100	<0.00100	<0.00100	mg/L
Silver, Total	<0.000500	<0.000500	<0.000500	<0.000500	mg/L
Thallium, Total	<0.000300	<0.000300	<0.000300	<0.000300	mg/L
Vanadium	0.000670	<0.000600	0.000877	<0.000600	mg/L
Zinc, Total	0.00552	0.00539	0.00419	0.00197	mg/L
Cyanide, WAD	<0.0015	<0.0015	<0.0015	<0.0015	mg/L
Cyanide, Total	<0.00200	<0.00200	<0.00200	<0.00200	mg/L
Phenols, Total ("4AAP Phenolics")	<0.0025	<0.0025	<0.0025	<0.0025	mg/L

Notes:

A: Data from 3/1/2018 - 2/29/2020. 729 results for No. 2 Pump Station and 731 results for Lakeside Pump Station

B. Data from 3/1/2018 to 11/26/2018 and 8/5/2019. 272 results.

C. Data from 11/1/2015 - 12/31/2019 Permit required monitoring associated with BTU limitation calculations.

D. Due to the sampling location, residual levels of chlorine may be present. However, water associated with the intake screen backwash discharges is not chlorinated. As part of the previous permit renewal application, all 5 backwash locations were tested for TRC in August 2013. All results were non-detect (< 0.02 mg/L).

E. Color data from previous permit renewal sampling (August 2013).

Table Intake A2. Intake Pump Station Mercury Data

--- indicates no sample collected.
Invalid data not included. Reasons include mercury detections in blanks or associated QC outside of criteria.
If field duplicates were collected, the average of sample and field duplicate results are presented.

Date	No. 1 PS Mercury ng/L	No. 2 PS Mercury ng/L
Max Avg	2.8 0.56	1.8 0.49
11/05/15	Invalid	Invalid
12/10/15	0.39	0.30
01/14/16	0.62	0.68
02/17/16	0.57	0.54
03/09/16	0.42	0.50
04/14/16	0.36	0.77
05/05/16	0.65	0.40
06/08/16	0.51	0.31
07/07/16	0.30	0.30
08/09/16	0.26	0.42
09/07/16	0.40	0.25
10/11/16	0.48	0.33
11/10/16	0.28	0.28
12/21/16	0.34	0.30
01/10/17	0.88	0.49
02/07/17	0.40	0.29
03/14/17	0.40	0.37
04/20/17	1.7	1.8
05/15/17	0.49	0.22
06/07/17	0.88	0.39
07/18/17	0.50	0.40
07/25/17	0.40	---
08/03/17	0.29	0.20
09/13/17	0.45	0.24
10/04/17	0.20	< 0.20
11/09/17	0.46	0.21
12/19/17	0.34	< 0.20
01/16/18	1.4	0.78
02/13/18	0.45	0.37
03/14/18	1.0	0.71
04/12/18	0.37	0.35
05/10/18	0.60	0.36
06/21/18	0.54	< 0.20
07/19/18	0.63	0.33
08/23/18	0.34	0.30
09/20/18	0.26	0.25
10/11/18	0.48	0.52
11/15/18	0.26	0.28
12/13/18	0.44	1.8
02/13/19	Invalid	1.5
04/17/19	0.65	1.2
06/20/19	0.30	0.4
08/22/19	0.31	0.37
10/17/19	0.41	0.40
12/17/19	2.80	0.6
02/12/20	0.61	0.4

Date	No. 4 PS Mercury ng/L
Max Avg	75.0 7.03
11/16/15	Invalid
01/13/16	1.6
02/16/16	2.8
03/09/16	3.1
04/13/16	4.7
05/04/16	2.3
06/07/16	26
07/05/16	49
08/08/16	33
09/06/16	7.8
10/10/16	12.0
11/09/16	2.1
12/20/16	0.84
01/10/17	1.50
02/06/17	0.95
03/08/17	2.53
04/04/17	1.10
05/15/17	3.4
06/07/17	1.7
07/19/17	5.9
08/02/17	4.5
09/11/17	4.1
10/12/17	3.7
11/08/17	1.5
12/18/18	Invalid
01/22/18	1.1
02/12/18	0.49
03/13/18	1.4
04/09/18	1.0
05/07/18	1.5
06/20/18	1.9
07/16/18	2.1
08/21/18	3.0
09/17/18	75
10/10/18	16
11/12/18	1.7
12/11/18	2.0
02/11/19	3.2
04/16/19	1.7
06/17/19	2.1
08/19/19	0.83
10/14/19	0.40
12/16/19	4.20
02/12/20	0.38

Date	Lakeside-PS Mercury ng/L
Max Avg	2.2 0.45
11/05/15	Invalid
12/10/15	< 0.20
01/14/16	0.52
02/17/16	0.38
03/09/16	0.59
04/14/16	0.49
05/05/16	0.50
06/08/16	0.45
07/07/16	0.33
08/09/16	0.35
09/07/16	0.47
10/18/16	0.47
11/10/16	0.43
12/21/16	0.28
01/10/17	< 0.20
02/07/17	0.25
03/14/17	0.41
04/06/17	2.2
05/11/17	0.67
06/07/17	0.64
07/18/17	0.64
08/03/17	0.53
09/12/17	0.27
10/02/17	< 0.20
11/09/17	0.22
12/28/17	< 0.20
01/16/18	0.82
02/13/18	0.26
03/14/18	0.96
04/12/18	0.48
05/10/18	< 0.20
06/21/18	0.22
07/19/18	0.39
08/23/18	0.33
09/20/18	0.30
10/11/18	0.41
11/15/18	0.28
12/13/18	0.48
02/13/19	0.48
04/17/19	0.40
06/20/19	0.41
08/22/19	0.27
10/17/19	0.51
12/17/19	0.33
02/12/20	0.52

Sanitary Lift Station Emergency Overflows:

Form 2C Pages 1-4

No Form 2C Part V – no discharge

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
SOF1	41	36	28.4	87	20	12.8	Grand Calumet River
SOF2	41	36	43.2	87	20	14.3	Grand Calumet River via Outfall 028/030 via GW11
SOF3	41	36	49	87	20	58.2	Grand Calumet River via Outfall 032
SOF4	41	36	55.8	87	20	4.9	Grand Calumet River via Outfall 028/030 via GW10
SOF5	41	36	36.7	87	19	33.6	Lake Michigan
SOF6	41	36	49.7	87	19	42.2	Grand Calumet River via Outfall 018
SOF11	41	36	25.9	87	20	6.4	Grand Calumet River via Outfall 023
SOF17	41	37	12.7	87	20	10	Grand Calumet River via Outfall 028/030 via GW10
SOF51	41	37	1.9	87	21	20.5	Grand Calumet River via Outfall 033

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
SOF1	Broadway Sanitary Lift St. Emergency Overflow	NA			
SOF2	Buchanan St Sanitary Lift St. Emergency Overflow	NA			
SOF3	Sanitary Lift Station Emergency Overflow	NA			
SOF4	Sanitary Lift Station Emergency Overflow	NA			
SOF5	Sanitary Lift Station Emergency Overflow	NA			
SOF6	Sanitary Lift Station Emergency Overflow	NA			
SOF11	Sanitary Lift Station Emergency Overflow	NA			
SOF17	Sanitary Lift Station Emergency Overflow	NA			
SOF51	Sanitary Lift Station Emergency Overflow	NA			
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
SOF1	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF2	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF3	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF4	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF5	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF6	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF11	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF17	Sanitary Lift Station Emergency Overflow	Emergency Only						
SOF51	Sanitary Lift Station Emergency Overflow	Emergency Only						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
Characterization data are not required			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)* X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

☐ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* X NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE See the General Information Form for the certification signature	D. DATE SIGNED

Process Wastewater Overflow 1:

Form 2C Pages 1-4
No Form 2C Part V – no discharge

APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS

(OWQ Industrial NPDES Application 2C)

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
POF1	41	36	28.1	87	20	2.4	Grand Calumet River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities) provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. **(See Attachment 2C-B)**

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION	b. AVERAGE FLOW *(Include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
POF1	GW-10 Pump Station Emergency Overflow:	NA			
	#1BOP, Q-BOP, Nos 1 & 2 Continuous Caster				
	Wastewater Treatment System				
OFFICIAL USE ONLY *(effluent guidelines sub-categories)*					

EPA Identification Number *(copy from Item 1 of Form 1*
IND005444062

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

X Yes (*complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER	2. OPERATION(s) CONTRIBUTING FLOW	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	
POF1	Emergency Overflow from GW-10 Pump Station	NA						

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* X NO *(go to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of operation)?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guidelines, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in the application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* X NO *(go to Section IV)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. Optional : You may attach additional sheets describing any additional water pollutant control programs *(or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-10.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
In the event of an emergency discharge from POF1 and water will have characteristics similar to Outfalls 603, 028 and/or 030 as given in this application for those outfalls.			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* X NO *(go to Item VI-B)*

EPA Identification Number *(copy from Item 1 of Form 1)*
IND005444062

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)*   X NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analysis reported in Item V performed by a contract laboratory or consulting firm?

☐ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   X NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANT ANALYZED

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Daniel Killeen; Vice President – Gary Works	
C. SIGNATURE	D. DATE SIGNED
See the General Information Form for the certification signature	

Attachment 2C-A
Characterization Information

Approach and Database Summary
Table 2CA. Analytical Methods and Detection Limits
Table 2C-B. Dissolved Metals Data
Table 2C-C. Data Summaries for no RPE Requests
Table 2C-D. Lake Michigan Intake (No. 2 Pump Station) TSS Data

ATTACHMENT 2C-A CHARACTERIZATION INFORMATION

Section V of Form 2C requires the presentation of effluent characterization data (concentration and mass) for select constituents. As part of this characterization, a “Believed Absent and Believed Present” assessment for constituents is required in Form 2C Part V-B. U. S. Steel used the following steps to determine whether a constituent would be "Believed Present" in outfall effluent:

1. Is there an identifiable U. S. Steel source of constituent?
2. Is it anticipated that the constituent would not be removed or degraded by wastewater treatment system?
3. Was a constituent analytically detected (including at an associated internal monitoring point)?

If the answer to any step was "yes", then the constituent was considered to have potential to be present in the discharge.

In regard to sampling and analyses, permit-required conditions were followed. Where no permit requirements were listed, sampling and analyses followed 40 CFR Part 136. A summary of effluent characterization procedures is provided below.

<u>For all data:</u>

- For Outfall temperature, summer was defined as July 1 through September 30 and winter was defined as October 1 through June 30.
- The number of analyses has been presented for both the daily values and the monthly average values.
- Monthly average values were generated only if there was more than one sample in the calendar month. The only exception to this is for mercury where individual values were used as monthly averages when testing only occurred once within a month.
- Mass values were not calculated if all data for a parameter were non-detect.
- Data were reported to the method detection limit; the method detection limit (denoted with a “<” symbol) was conservatively substituted for non-detect results for the purpose of calculating averages.
- Estimated values between the method detection limit and method reporting limit were used as reported.
- For parameter data sets containing detections and non-detections, all results were used in the statistical calculations. Due to changes in the method detection limit, this can result in some instances where the maximum value a non-detect value (indicated by a “<”). In those cases, the maximum detected value (instead of the maximum non-detect value) is utilized. This occurred for:
  - Outfall 034: Silver – Daily Max and Max Monthly Average. Initial method detection limits were 0.07 ug/L were higher than more recent method detection limits of 0.04 to 0.05 ug/L.

<u>For parameters currently monitored under the NPDES Permit (including WET):</u>

- For both Form 2C and Form 2F, the DMR database from November 1, 2015 to December 31, 2019 was utilized with the following exceptions:

  - Outfall 015 – data is from May 10, 2017 to December 31, 2019. This timeframe represents discharges following the closure of Outfall 005 and the re-route of Outfall 501 to discharge via Outfall 015.

- Outfall 607 – data is from January 1, 2017 to December 31, 2019. This timeframe represents discharges after the 2015-2016 Leachate Treatment Plant upgrades.
- Outfall 018 and 019 – mercury data from November 27-30, 2019 was not included. Data from this timeframe is not considered representative of normal operations. For this period, only flood waters resulting from the rupture of a 36” intake pipe were discharged.
- Outfall 608 – this Outfall (effluent from the new Chrome Treatment Plant) was added to the modified permit effective July 1, 2019. Data is not currently available for Outfall 608 as the new Chromium Wastewater Treatment Plant began treatment of process wastewaters on April 14, 2020 but the commissioning phase is still in process. The estimated timeframe for completion of the commissioning phase is by the end of May 2020 with expected submission of the representative DMR data for the post commissioning period (~2 months of data) by the end of August 2020. If circumstances cause significant shifts in the timeframe, U. S. Steel with notify IDEM of the revised timeframe.

<u>For parameters not currently monitored under the NPDES Permit:</u>

- For other required Form 2C data, the majority of Outfall samples were collected for the required Form 2C parameters in August 2019. Additional sampling for select parameters and outfall locations also occurred in January, February and March 2020. As available, data from special sampling programs or process control monitoring were also used as follows:

  - Outfall 501 TSS[1] data from February 2017 and November 2018 – December 2020
  - Outfall 501 Total Cyanide[2] data from February 2017
  - Outfall 501 Naphthalene[3] data from February 2017
  - Outfall 034 Nitrite data from November 2015
  - Outfall 034 Total Organic Carbon data from November and December 2015
  - Intake and Outfalls 501, 607, 603, 604, 605, & 605 Mercury – data is from periodic sampling throughout the course of the permit cycle
  - Intake temperatures (No. 2 and Lakeside Pump Station) are from Permit required monitoring associated with calculation of BTU discharges
  - Intake TSS (No. 2 and Lakeside Pump Station) and ammonia (No. 2 Pump Station) data are from periodic monitoring over the course of the current permit cycle.

- Outfall 608 Data. The new Chromium Wastewater Treatment Plant began treatment of process wastewaters on April 14, 2020 but the commissioning phase is still in process. As such, monitoring data for non-permit required Form 2C parameters is not currently included. A permit renewal addendum with an updated Form 2C inclusive of results for these parameters (1 event) and representative DMR data (~2 months of data) for the post commissioning timeframe will be submitted at a future date. The estimated timeframe for completion of the commissioning phase is by the end of May 2020 with expected submission of the aforementioned data by the end of August 2020. If circumstances cause significant shifts in the timeframe, U. S. Steel with notify IDEM of the revised timeframe.

- Outfall 604 monitoring of hexavalent chromium was inadvertently omitted from the permit renewal sampling plan. Sampling of hexavalent chromium is only required by the permit if either the No. 6 or No. 8 Galvanizing Lines and their associated fume scrubbers are in

[1] Permit required TSS monitoring of Outfall 501 was not required after February 2017. The TSS database for Outfall 501 used is for November 2015 - February 2017 plus November 2018 – December 2020.
[2] Permit required Total Cyanide monitoring of Outfall 501 was not required after February 2017. The Total Cyanide database for Outfall 501 used is for November 2015 - February 2017 plus August 2019.
[3] Permit required Naphthalene monitoring of Outfall 501 was not required after February 2017. The Naphthalene database for Outfall 501 used is for November 2015 - February 2017 plus August 2019.

operation. Both of these lines remained idled throughout the current permit cycle. Sampling of Outfall 604 for hexavalent chromium is planned for May 2020 with submission of results by the end of June 2020.

- Outfall samples were collected for the required Form 2F parameters in September 2019. The exception to this is for SW-02. Discharge from this stormwater monitoring point has not occurred since December 2018. If discharge occurs in the future, the remaining Form 2F parameters will be monitored and a permit renewal addendum submitted.

- Samples of intake water (Nos. 1, 2, 4 Pump Stations and Lakeside Pump Station) were collected in August 2019. In addition, the Pump Stations were periodically monitored for mercury throughout the permit cycle. The results for the intake water are considered equivalent to the intake screen backwash flows (BW1, BW2, BW3, BW4, and BW5) except for residual chlorine. Residual levels of chlorine from seasonal mussel control may be present at the intake sampling location. However, water associated with the intake screen backwash discharge is not chlorinated. Intake backwash water data from the previous permit renewal application (August 2013 sampling) was non-detect (< 0.02 mg/L) for all five BW locations. In place of a Form 2C Section V, the results are presented as table attachments Intake A1 and Intake A2.

Specific Data/Information:

- The analytical methods and detection limits information requested by Section V of Form 2C is included as Table 2C-A.
- Outfall 603: data in the Form 2C is presented for the combined effluent (based on analysis of samples from the five separate monitoring locations).
- Outfall 604: data in the Form 2C presented is prior to startup of the new Chromium Treatment Plant associated with new Outfall 608. Therefore, the Outfall 604 dataset is inclusive of treated wastewater that in the future will be associated with Outfall 608.
- Required analysis for direct Lake Michigan discharges are presented in the associated Form 2C (Section V). Non-standard parameters have been added to page V-10 of Section V.
- Bis (2-ethylhexyl) phthalate: As noted in the Form 2C Section V pages, this compound was detected for certain locations. Based on further investigation, U. S. Steel has concluded that these detections were due to incidental contamination from sample tubing. The sample type for bis (2-ethylhexyl) phthalate is a composite and bis (2-ethylhexyl) phthalate is common plasticizer used in the sampling tubing. The Section V footnotes provide details of the investigation which included successive rounds of sampling following the initial detections. It should be noted that the program evolved over time into (for the external outfalls which originally had detections – Outfalls 015, 028, and 030) same day collection of manual (3 grabs over 24 hours collection without use of sample tubing) composites and collection of automatic 24-hr composites using pre-rinsed sample tubing (from which an equipment blank is collected prior to initiation of sample collection). U. S. Steel continues to periodically monitor Outfalls 015, 028, and 030 in the manner described above (same day collection using both manual and automatic composites).

Dissolved Metals Data:

For select locations and parameters, dissolved metals data were also collected. These data are presented in Table 2C-B. U. S. Steel requests that these dissolved metal data be utilized in IDEM's Reasonable Potential to Exceed (RPE) analysis (i.e., dissolved Projected Effluent Quality (PEQ) be generated for comparison to dissolved Preliminary Effluent Limits (PEL)). Receiving water data for these same parameters is also presented.

Specific No RPE Data Summaries:

As indicated in the Executive Summary, U. S. Steel is requesting removal of various permit limits and monitoring requirements on the basis of that there is no reasonable potential to exceed the associated water quality criteria. Statistical data summaries for these parameters is presented in Table 2C-C. Upon request U. S. Steel can provide Excel versions of the datasets utilized to generate the summary table.

Intake No. 2 Pump Station TSS Dataset:

Available No. 2 Pump Station TSS is provided in Table 2C-D. This data is included to support the request for a TSS intake allowance or credits associated with the current TBEL based TSS limitations at Outfalls 028/030. The current limits are based on applicable TBELs for Outfall 603 (BOP & Q-BOP, Vacuum Degassing, Continuous Casting) and the 160"/210" Plate Mill operations. As indicated by the data, intake waters (that make up the majority of the flow to Outfalls 028/030 as non-contact cooling water) can contribute substantial amounts of TSS to the discharge.

Table 2C-A. Analytical Methods and Detection Limits

Note: Most commonly achieved limits are shown in the table.

Parameter	Analytical Method	Method Detection Limits	Reporting Limits	Units
PART V. IDEM TABLE A.				
Carbonaceous Biochemical Oxygen Demand (cBOD)	5210 B	2	2	mg/L
Escherichia coli (E-coli)	9223B	1.0	1.0	MPN
Fecal Coliform	9222D	1.0	1.0	CFU
Chemical Oxygen Demand (COD)	410.4 R2.0	6.1	20	mg/L
Dissolved Oxygen	4500-O G (probe)	0	0	mg/L
Total Dissolved Solids	2540C	22	30	mg/L
Total Organic Carbon (TOC)	5310B, C or D	0.14-2.8	0.5-10	mg/L
Total Suspended Solids (TSS)	2540D	.0.333-0.706	2.22-4.71	mg/L
Ammonia as N	350.1 Rev 2	0.0098	0.032	mg/L
Temperature	2550 B	0.1 sensitivity		°F
Total Hardness	2340C	2.2	5	mg/L
pH	4500-H^+ B	0.1 sensitivity		s.u.
PART V. IDEM TABLE B.				
Bromide	300.0	0.032	0.2	mg/L
Chloride	300.0	0.31-3.1	1-10	mg/L
Chlorine, Total Residual	4500-Cl G	0.01	0.01	mg/L
Color	2120B	2.5	2.5	PCU
Fluoride	300.0	0.067	0.1	mg/L
Nitrate + Nitrite (as N)	353.2 R2.0	0.006	0.02	mg/L
Nitrate	300.0	0.046	0.1	mg/L
Nitrite	300.0	0.016	0.1	mg/L
Nitrogen, Total Organic (as N)	TKN minus Amm-N	1	1	mg/L
Total Kjeldahl Nitrogen (Amm-N + Org-N)	4500NH3 G	0.87	1	mg/L
Nitrogen, Total (TKN+Nitrate+Nitrite)	TKN+Nitrate+Nitrite	0	1	mg/L
Oil and Grease (hexane)	(Hexane) 1664A	1.3	2	mg/L
Phosphorus (as P), Total	365.1 Rev 2	0.011	0.05	mg/L
Sulfate (as SO4)	300.0	0.28	5	mg/L
Sulfide (as S)	4500-S2 F	0.42	1	mg/L
Sulfite (as SO3)	4500SO3 B	1	2	mg/L
Surfactants (MBAS)	5540 C	0.12	0.4	mg/L
Aluminum, Total	200.8	0.0076	0.01	mg/L
Barium, Total	200.8	0.00067	0.005	mg/L
Boron, Total	200.8	0.0135	0.02	mg/L
Cobalt, Total	200.8	0.0003	0.005	mg/L
Iron, Total	200.8	0.0412	0.08	mg/L
Iron, Dissolved	200.8	0.0412	0.08	mg/L
Magnesium, Total	200.8	0.0269	0.2	mg/L
Molybdenum, Total	200.8	0.0003	0.005	mg/L
Manganese, Total	200.8	0.0004	0.005	mg/L
Tin, Total	200.8	0.0004	0.002	mg/L
Titanium, Total	200.8	0.0014	0.005	mg/L
PART V. IDEM TABLE C. Priority Pollutant Metals, Cyanide, Phenols				
Antimony, Total	200.8	0.4	5	ug/L

Table 2C-A. Analytical Methods and Detection Limits

Note: Most commonly achieved limits are shown in the table.

Parameter	Analytical Method	Method Detection Limits	Reporting Limits	Units
Arsenic, Total	200.8	1.1	5	ug/L
Beryllium, Total	200.8	0.44	2	ug/L
Cadmium, Total	200.8	0.2	0.2	ug/L
Chromium, Total	200.8	0.7	5	ug/L
Chromium, Hexavalent (dissolved)	218.6	0.026	0.25	ug/L
Copper, Total	200.8	0.6	5	ug/L
Lead, Total	200.8	0.4	5	ug/L
Mercury, Total for non-sw locations	1631E	0.2	0.5	ng/L
Mercury, Total for sw locations	245	160	200	ng/L
Nickel, Total	200.8	0.5	5	ug/L
Selenium, Total	200.8	1	5	ug/L
Silver, Total	200.8	0.5	5	ug/L
Thallium, Total	200.8	0.3	5	ug/L
Vanadium	200.8	0.6	5	ug/L
Zinc, Total	200.8	1.3	10	ug/L
Cyanide, WAD	4500-CN I	1.5	5	ug/L
Cyanide, Total	4500-CN E	2	5	ug/L
Phenols, Total ("4AAP Phenolics")	420.4	2.5	6.4	ug/L
PART V. IDEM TABLE C. Volatile Compounds				
Acetaldehyde	8315A	38	50	ug/L
Formaldehyde	8315A	43	50	ug/L
Ethylene glycol	8015C	0.94	5	ug/L
Methanol	8015C	0.62	5	ug/L
Propylene glycol	8015C	0.55	5	ug/L
Methyl tert-butyl ether (MTBE)	624	0.45	1	ug/L
Xylene	624	0.81	2	ug/L
1,1,2,2-Tetrachloroethane	624	0.38	1	ug/L
1,1,2-Trichloroethane	624	0.46	1	ug/L
1,1,1-Trichloroethane	624	0.46	1	ug/L
1,1-Dichloroethane	624	0.44	1	ug/L
1,1-Dichloroethene	624	0.4	1	ug/L
1,2,4-Trimethylbenzene	624	0.45	1	ug/L
1,2-Dichloroethane	624	0.44	1	ug/L
1,2-Dichloroethylene, Trans	624	0.48	1	ug/L
1,2-Dichloropropane	624	0.48	1	ug/L
1,3,5-Trimethylbenzene	624	0.65	1	ug/L
1,3-Dichloropropane	624	0.4	1	ug/L
1,3-Dichloropropene, Cis	624	0.57	1	ug/L
1,3-Dichloropropene, Trans	624	0.38	1	ug/L
1,3-Dichloropropylene	624	0.57	2	ug/L
2-Butanone (Methyl Ethyl Ketone)	624	0.52	5	ug/L
2-Chloroethylvinyl Ether	624	0.82	1	ug/L
Acetone	624	6.2	10	ug/L
Acrolein	624	7.3	20	ug/L
Acrylonitrile	624	0.5	1	ug/L
Benzene	624	0.46	1	ug/L
Bromoform	624	0.56	1	ug/L
Carbon disulfide	624	0.49	1	ug/L
Carbon Tetrachloride	624	0.4	1	ug/L
Chlorobenzene	624	0.4	1	ug/L

Table 2C-A. Analytical Methods and Detection Limits

Note: Most commonly achieved limits are shown in the table.

Parameter	Analytical Method	Method Detection Limits	Reporting Limits	Units
Chlorodibromomethane	624	0.4	1	ug/L
Chloroethane	624	0.68	1	ug/L
Chloroform	624	0.46	1	ug/L
Dichlorobromomethane	624	0.49	1	ug/L
Ethylbenzene	624	0.34	1	ug/L
Methyl Bromide (Bromomethane)	624	0.9	1	ug/L
Methyl Chloride (Chloromethane)	624	0.83	1	ug/L
Methylene Chloride	624	0.86	5	ug/L
Styrene	624	0.33	1	ug/L
Tetrachloroethene	624	0.39	1	ug/L
Trichloroethene	624	0.43	1	ug/L
Toluene	624	0.45	1	ug/L
Vinyl Chloride	624	0.53	1	ug/L
PART V. IDEM TABLE C. Semi-Volatile Organic Acid Compounds				
2,4-Dichlorophenol	625	0.35	5	ug/L
2,4-Dimethylphenol	625	0.36	5	ug/L
2,4-Dinitrophenol	625	2.6	5	ug/L
2,4,6-Trichlorophenol	625	0.25	5	ug/L
2-Chlorophenol	625	0.23	5	ug/L
2-Nitrophenol	625	0.34	5	ug/L
4-Nitrophenol	625	0.24	5	ug/L
4,6-Dinitro-o-cresol (2-methyl-4,6-dinitrophenol)	625	0.27	5	ug/L
Benzoic Acid	625	6.2	20	ug/L
p-Chloro-m-cresol (4-chloro-3-methylphenol)	625	0.26	5	ug/L
Pentachlorophenol	625	0.97	5	ug/L
Phenol	625	0.21	5	ug/L
PART V. IDEM TABLE C. Semi-Volatile Organic Base Compounds				
1,2,4-Trichlorobenzene	625	0.41	5	ug/L
1,2-Dichlorobenzene	625	0.39	5	ug/L
1,2-Diphenyl hydrazine (Azobenzene)	625	0.14	5	ug/L
1,3-Dichlorobenzene	625	0.65	5	ug/L
1,4-Dichlorobenzene	625	0.32	5	ug/L
2-Chloronaphthalene	625	0.075	0.1	ug/L
2-Methylnaphthalene	625	0.065	0.1	ug/L
4-Methylphenol	625	0.21	5	ug/L
2,4-Dinitrotoluene	625	0.42	5	ug/L
2,6-Dinitrotoluene	625	0.11	5	ug/L
3,3'-Dichlorobenzidine	625	0.46	5	ug/L
3,4-Benzofluoranthene (benzo [b] fluoranthene)	625	0.051	0.1	ug/L
4-Bromophenyl Phenyl Ether	625	0.33	5	ug/L
4-Chlorophenyl Phenyl Ether	625	0.31	5	ug/L
Acenaphthene	625	0.081	0.1	ug/L
Acenaphthylene	625	0.075	0.1	ug/L
Anthracene	625	0.028	0.1	ug/L
Benzidine	625	2	10	ug/L

Table 2C-A.   Analytical Methods and Detection Limits

Note: Most commonly achieved limits are shown in the table.

Parameter	Analytical Method	Method Detection Limits	Reporting Limits	Units
Benzo (a) anthracene	625	0.099	0.1	ug/L
Benzo (a) pyrene	625	0.044	0.1	ug/L
Benzo (ghi) perylene	625	0.03	0.1	ug/L
Benzo (k) fluoranthene	625	0.048	0.1	ug/L
Bis (2-Chloroethoxy) Methane	625	0.29	5	ug/L
Bis (2-Chloroethyl) Ether	625	0.37	5	ug/L
Bis (2-Chloroisopropyl) Ether	625	0.23	5	ug/L
Bis (2-Ethylhexyl) Phthalate	625	0.4	5	ug/L
Butyl Benzyl Phthalate	625	0.3	5	ug/L
Chrysene	625	0.048	0.1	ug/L
Di-N-Butyl Phthalate	625	0.21	5	ug/L
Di-N-Octyl Phthalate	625	0.53	5	ug/L
Dibenzo (a,h) anthracene	625	0.073	0.1	ug/L
Dibenzofuran	625	0.23	5	ug/L
Diethyl Phthalate	625	0.17	5	ug/L
Dimethyl Phthalate	625	0.18	5	ug/L
Fluoranthene	625	0.038	0.1	ug/L
Fluorene	625	0.051	0.1	ug/L
Hexachlorobenzene	625	0.44	5	ug/L
Hexachlorobutadiene	625	0.28	5	ug/L
Hexachlorocyclopentadiene	625	1.1	5	ug/L
Hexachloroethane	625	0.21	5	ug/L
Indeno(1,2,3-cd) pyrene	625	0.067	0.1	ug/L
Isophorone	625	0.34	5	ug/L
N-Nitrosodi-N-propylamine	625	0.35	5	ug/L
N-Nitrosodimethylamine	625	0.48	5	ug/L
N-Nitrosodiphenylamine	625	0.49	5	ug/L
Naphthalene	625	0.067	0.1	ug/L
Nitrobenzene	625	0.26	5	ug/L
Phenanthrene	625	0.081	0.1	ug/L
Pyrene	625	0.036	0.1	ug/L
PART V. IDEM TABLE C. GC/MS Fraction - Pesticides and PCBs				
PCB-1242	608	0.046	0.2	ug/L
PCB-1254	608	0.028	0.2	ug/L
PCB-1221	608	0.046	0.2	ug/L
PCB-1232	608	0.046	0.2	ug/L
PCB-1248	608	0.046	0.2	ug/L
PCB-1260	608	0.028	0.2	ug/L
PCB-1016	608	0.046	0.2	ug/L

Table 2C-B. Dissolved Metals Data

Notes:
"<" indicates a non-detect value at the method detection limit
"J" indicates an estimated value between the method detection limit and reporting limit.

COPPER DATA

Outfall 015	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	5.15	1.35 J
2/24/2020	11.3	0.92 J
3/25/2020	1.48 J	0.89 J

Outfall 018	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	8.13	2.11 J
2/24/2020	20.2	0.63 J
3/25/2020	3.07 J	0.90 J

Outfall 019	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	5.29	1.21 J
2/24/2020	6.4	0.69 J
3/25/2020	1.18 J	0.69 J

Outfall 021	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	6.18	0.82 J
2/24/2020	4.16 J	< 0.60
3/25/2020	1.28 J	0.67 J

Outfall 028	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	6.68	1.70 J
2/24/2020	7.74	1.72 J
3/25/2020	4.48 J	1.65 J

Outfall 030	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	5.9	1.77 J
2/24/2020	8.05	1.79 J
3/25/2020	4.16 J	1.53 J

Outfall 032	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	6.95	1.89 J
2/24/2020	11.7	1.93 J
3/25/2020	2.76 J	1.58 J

Outfall 035	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/28/2020	6.31	0.74 J
2/24/2020	4.53 J	< 0.60
3/25/2020	< 0.60	< 0.60

Outfall 037	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/28/2020	3.09 J	0.96 J
2/25/2020	2.93 J	< 0.60
3/26/2020	3.42 J	2.64 J

Outfall 039	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/28/2020	3.93 J	< 0.60
2/25/2020	7.21	0.76 J
3/26/2020	1.14 J	0.79 J

Lake Michigan Intakes	Total Copper (ug/L)	Dissolved Copper (ug/L)
No. 1 PS	1.69 J	< 0.60
No. 2 PS	1.02 J	< 0.60
No. 4 PS	2.28 J	< 0.60
Lakeside PS	0.69 J	< 0.60

PS = Pump station. No. 1, 2, and 4 PS locations sampled 1/29/2020. Lakeside PS sampled 1/28/2020.

Grand Calumet River Headwaters	Total Copper (ug/L)	Dissolved Copper (ug/L)
1/29/2020	1.43 J	< 0.60

LEAD DATA

Outfall 035	Total Lead (ug/L)	Dissolved Lead (ug/L)
1/28/2020	< 0.40	< 0.40
2/24/2020	0.66 J	< 0.40
3/25/2020	< 0.40	< 0.40

Lake Michigan Intakes	Total Lead (ug/L)	Dissolved Lead (ug/L)
No. 1 PS	< 0.40	< 0.40
No. 2 PS	< 0.40	< 0.40
No. 4 PS	< 0.40	< 0.40
PS LS	< 0.40	< 0.40

PS = Pump station. No. 1, 2, and 4 PS locations sampled 1/29/2020. Lakeside PS sampled 1/28/2020.

Table 2C-C. Data Summaries for no RPE Requests
Notes: "<" indicates a non-detect value at the method detection limit

Outfall 018

Free Cyanide	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.0018	0.0018
# of Results	68	50
Coefficient of Variation (CV)	0.18	0.0004
Permit Monitoring Frequency 1/month		
Minimum (mg/L)	< 0.0010	< 0.0010
Average (mg/L)	0.0014	0.0013

Ammonia	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.250	0.107
# of Results	117	50
Coefficient of Variation (CV)	0.37	0.02
Permit Monitoring Frequency 2/month		
Minimum (mg/L)	< 0.010	0.030
Average (mg/L)	0.068	0.065

Outfall 019

Free Cyanide	Daily Data	Monthly Average Data
Maximum Value (**ug/L**)	2.40	1.85
# of Results	117	50
Coefficient of Variation (CV)	0.22	0.20
Permit Monitoring Frequency 2/month		
Minimum (ug/L)	< 1.00	< 1.00
Average (ug/L)	1.34	1.31

Ammonia	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.140	0.104
# of Results	117	50
Coefficient of Variation (CV)	0.41	0.36
Permit Monitoring Frequency 2/month		
Minimum (mg/L)	< 0.0098	0.012
Average (mg/L)	0.053	0.054

Outfall 020

Lead	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.0016	0.00117
# of Results	100	50
Coefficient of Variation (CV)	0.74	0.62
Permit Monitoring Frequency 2/month		
Minimum (mg/L)	< 0.0001	0.00013
Average (mg/L)	0.00037	0.00037

Zinc	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.035	0.024
# of Results	100	50
Coefficient of Variation (CV)	0.79	0.71
Permit Monitoring Frequency 2/month		
Minimum (mg/L)	< 0.0006	0.002
Average (mg/L)	0.0093	0.009

Outfall 034

Ammonia	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.230	0.130
# of Results	434	50
Coefficient of Variation (CV)	0.69	0.47
Permit Monitoring Frequency 2/week		
Minimum (mg/L)	< 0.004	0.013
Average (mg/L)	0.045	0.045

Outfall 037

Zinc	Daily Data	Monthly Average Data
Maximum Value (mg/L)	0.0360	0.0360
# of Results	50	50
Coefficient of Variation (CV)	0.58	0.58
Permit Monitoring Frequency 1/month		
Minimum (mg/L)	0.0014	0.0014
Average (mg/L)	0.0108	0.0108

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
Monthly Average Stats			
Average	7.0	16.2	919
Min	1.6	12.4	184
Max	18.6	19.6	1,887
Count	25	25	25
Daily Value Stats			
Average	7.0	16.1	917
Min	0.3	4.0	36
Max	153	23.5	18,657
Count	773	771	771
75th Percentile	7.6	18.2	1,023
95th Percentile	26.0	20.6	3,047
Monthly Averages			
Mar-18	8.8	19.6	1,453
Apr-18	13.0	17.0	1,838
May-18	3.8	16.2	515
Jun-18	5.4	13.3	597
Jul-18	2.9	15.6	374
Aug-18	2.2	18.2	334
Sep-18	2.9	18.4	464
Oct-18	4.0	16.1	526
Nov-18	5.3	14.4	664
Dec-18	18.6	12.4	1,887
Jan-19	12.8	13.8	1,475
Feb-19	3.0	14.7	362
Mar-19	6.1	16.0	778
Apr-19	11.2	17.3	1,702
May-19	5.5	16.9	768
Jun-19	3.3	18.1	499
Jul-19	2.7	16.7	348
Aug-19	3.2	16.3	441
Sep-19	1.6	14.1	184
Oct-19	4.4	18.3	691
Nov-19	9.9	17.1	1,307
Dec-19	7.0	18.1	1,123
Jan-20	9.8	15.8	1,257
Feb-20	12.5	15.9	1,657
Mar-20	14.9	13.6	1,727

Table 2C-D - Intake No. 2 PS TSS Data

Notes:

(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
Daily Values			
3/1/2018	4.7	19.95	782
3/2/2018	5.7	16.69	794
3/3/2018	3.2	20.05	535
3/4/2018	11	19.17	1,760
3/5/2018	4.8	18.15	727
3/6/2018	6.9	18.26	1,051
3/7/2018	10	18.03	1,505
3/8/2018	8.5	16.14	1,145
3/9/2018	5.6	17.89	836
3/10/2018	7.9	19.06	1,256
3/11/2018	4.3	18.97	681
3/12/2018	4.7	17.36	681
3/13/2018	12	16.17	1,619
3/14/2018	5.2	19.01	825
3/15/2018	10	17.67	1,474
3/16/2018	14	20.92	2,444
3/17/2018	17	20.95	2,972
3/18/2018	4.5	22.10	830
3/19/2018	11	22.17	2,035
3/20/2018	24	22.16	4,438
3/21/2018	11	22.11	2,030
3/22/2018	5.5	22.98	1,055
3/23/2018	26	20.83	4,520
3/24/2018	9.6	22.45	1,798
3/25/2018	2.9	22.76	551
3/26/2018	4.5	22.45	843
3/27/2018	5.0	22.12	923
3/28/2018	7.7	20.93	1,345
3/29/2018		19.32	
3/30/2018	8.6	15.13	1,086
3/31/2018	8.4	14.83	1,039
4/1/2018	26	16.53	3,586
4/2/2018	4.8	17.35	695
4/3/2018	8.3	12.71	881
4/4/2018	17	13.00	1,844
4/5/2018	12	16.43	1,645
4/6/2018	19	16.04	2,543
4/7/2018	16	16.73	2,234
4/8/2018	4.0	17.72	592
4/9/2018	3.5	18.54	542
4/10/2018	3.0	17.03	426
4/11/2018	4.1	16.44	563
4/12/2018	2.6	18.03	391
4/13/2018	7.0	17.85	1,042
4/14/2018	56	17.34	8,104
4/15/2018	16	19.89	2,656
4/16/2018	17	17.63	2,501

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
4/17/2018	10	17.01	1,420
4/18/2018	9.1	17.08	1,297
4/19/2018	14	15.15	1,769
4/20/2018	9.1	13.74	1,044
4/21/2018	8.9	16.84	1,251
4/22/2018	3.3	15.45	425
4/23/2018	7.7	18.52	1,190
4/24/2018	3.2	18.29	488
4/25/2018	17	17.81	2,527
4/26/2018	7.1	16.24	962
4/27/2018	35	17.06	4,983
4/28/2018	34	18.80	5,333
4/29/2018	8.8	19.27	1,415
4/30/2018	5.1	18.89	804
5/1/2018		18.46	
5/2/2018	7.1	17.27	1,023
5/3/2018	3.6	15.25	458
5/4/2018	2.3	16.77	322
5/5/2018	9.2	16.53	1,269
5/6/2018	2.4	17.54	351
5/7/2018	2.6	18.33	398
5/8/2018	3.8	18.26	579
5/9/2018	2.5	12.26	256
5/10/2018	2.7	7.63	172
5/11/2018	3.4	14.54	413
5/12/2018	7.6	17.05	1,081
5/13/2018	1.6	17.44	233
5/14/2018	2.7	16.60	374
5/15/2018	3.4	14.39	408
5/16/2018	4.3	12.81	460
5/17/2018	10	15.67	1,307
5/18/2018	7.2	16.26	977
5/19/2018	7.6	16.50	1,046
5/20/2018	2.8	17.05	398
5/21/2018	2.7	16.26	366
5/22/2018	3.9	17.37	565
5/23/2018	2.2	17.59	323
5/24/2018	1.2	18.06	181
5/25/2018	1.1	18.04	166
5/26/2018	9.9	18.91	1,562
5/27/2018	0.93	18.38	143
5/28/2018	1.1	16.66	153
5/29/2018	1.5	16.15	202
5/30/2018	0.72	18.66	112
5/31/2018	1.6	10.25	137
6/1/2018	3.4	14.37	408
6/2/2018	4.5	13.38	502
6/3/2018	2.4	15.90	318

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
6/4/2018	1.9	14.32	227
6/5/2018	9.4	13.68	1,073
6/6/2018	2.3	13.11	252
6/7/2018	2.4	12.90	258
6/8/2018	1.9	13.56	215
6/9/2018	5.3	17.04	754
6/10/2018	6.9	13.18	759
6/11/2018	2.6	13.44	292
6/12/2018	1.4	13.24	155
6/13/2018	1.3	14.40	156
6/14/2018	1.2	14.92	149
6/15/2018	61	13.72	6,986
6/16/2018	18	11.61	1,744
6/17/2018	7.9	12.27	809
6/18/2018	2.0	13.77	230
6/19/2018	0.31	14.72	38
6/20/2018	1.2	14.75	148
6/21/2018	1.2	14.88	149
6/22/2018	3.4	13.05	370
6/23/2018	0.34	12.80	36
6/24/2018	9.7	13.95	1,129
6/25/2018	1.0	8.94	75
6/26/2018	3.7	10.86	335
6/27/2018	0.51	14.74	63
6/28/2018	0.74	11.16	69
6/29/2018	1.8	8.84	133
6/30/2018	0.84	11.06	78
7/1/2018	0.82	12.27	84
7/2/2018	0.53	9.53	42
7/3/2018	9.2	11.88	912
7/4/2018	3.3	12.74	351
7/5/2018	18	14.70	2,208
7/6/2018	3.1	12.91	334
7/7/2018	9.5	14.47	1,147
7/8/2018	0.73	11.18	68
7/9/2018	1.3	12.99	141
7/10/2018	1.1	13.64	125
7/11/2018	7.6	15.53	985
7/12/2018	0.51	11.90	51
7/13/2018	1.9	15.56	247
7/14/2018	3.8	17.65	560
7/15/2018	2.1	8.89	156
7/16/2018	1.0	19.46	162
7/17/2018	0.42	18.98	67
7/18/2018	0.51	18.69	80
7/19/2018	1.8	20.29	305
7/20/2018	3.3	19.90	548
7/21/2018	3.5	20.34	594

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
7/22/2018	0.42	13.15	46
7/23/2018	1.3	18.79	204
7/24/2018	0.41	17.65	60
7/25/2018	0.51	16.24	69
7/26/2018	0.90	17.27	130
7/27/2018	5.3	18.13	802
7/28/2018	3.2	16.23	433
7/29/2018	2.2	20.21	371
7/30/2018	0.52	17.46	76
7/31/2018	2.0	14.82	247
8/1/2018	0.51	14.71	63
8/2/2018	0.96	14.67	118
8/3/2018	1.7	17.73	251
8/4/2018	1.4	18.09	211
8/5/2018	2.3	15.83	304
8/6/2018	3.2	18.06	482
8/7/2018	0.63	12.98	68
8/8/2018	0.95	17.36	138
8/9/2018	0.91	15.42	117
8/10/2018	2.2	20.06	368
8/11/2018	3.5	19.36	566
8/12/2018	3.9	12.84	418
8/13/2018	0.70	19.18	112
8/14/2018	0.60	19.06	95
8/15/2018	2.4	18.29	366
8/16/2018	2.9	19.49	472
8/17/2018	3.6	19.02	571
8/18/2018	3.5	21.93	641
8/19/2018	2.8	19.16	448
8/20/2018	1.2	18.30	183
8/21/2018	5.5	20.43	938
8/22/2018	3.6	18.75	563
8/23/2018	2.2	19.09	350
8/24/2018	1.9	17.78	282
8/25/2018	1.7	18.45	262
8/26/2018	3.6	20.30	610
8/27/2018	1.0	20.57	172
8/28/2018	1.0	20.37	170
8/29/2018	1.0	21.51	180
8/30/2018	1.5	16.63	208
8/31/2018	4.1	18.42	630
9/1/2018	1.8	20.39	306
9/2/2018	2.5	19.40	405
9/3/2018	2.2	16.60	305
9/4/2018	0.6	19.33	97
9/5/2018	1.9	19.97	317
9/6/2018	2.1	20.26	355
9/7/2018	3.4	17.91	508

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
9/8/2018	3.2	18.17	485
9/9/2018	18	22.71	3,412
9/10/2018	1.3	18.22	198
9/11/2018	5.2	19.45	844
9/12/2018	1.5	19.53	244
9/13/2018	0.72	18.41	111
9/14/2018	1.0	15.43	129
9/15/2018	1.3	16.49	179
9/16/2018	0.81	18.81	127
9/17/2018	4.6	19.26	739
9/18/2018	1.3	18.89	205
9/19/2018	0.60	18.46	92
9/20/2018	3.1	18.94	490
9/21/2018	6.5	18.26	990
9/22/2018	7.5	19.04	1,192
9/23/2018	2.5	19.83	414
9/24/2018	1.0	18.70	156
9/25/2018	0.83	15.80	109
9/26/2018	4.5	15.50	582
9/27/2018	2.2	15.02	276
9/28/2018	2.7	16.99	383
9/29/2018	0.94	16.86	132
9/30/2018	0.92	18.48	142
10/1/2018	1.4	16.20	189
10/2/2018	2.7	18.12	408
10/3/2018	1.5	16.95	212
10/4/2018	7.1	17.24	1,022
10/5/2018	9.3	15.46	1,200
10/6/2018	7.8	16.28	1,060
10/7/2018	1.6	18.21	243
10/8/2018	3.1	16.88	437
10/9/2018	1.4	17.62	206
10/10/2018	1.1	17.46	160
10/11/2018	2.7	18.01	406
10/12/2018	2.1	16.84	295
10/13/2018	5.8	16.34	791
10/14/2018	1.4	19.05	223
10/15/2018	2.0	15.99	267
10/16/2018	2.7	16.08	362
10/17/2018	4.2	15.96	559
10/18/2018	1.0	16.09	134
10/19/2018	19	15.49	2,456
10/20/2018	3.3	13.23	364
10/21/2018	3.0	16.49	413
10/22/2018	2.8	16.35	382
10/23/2018	3.5	16.07	469
10/24/2018	2.7	11.83	267
10/25/2018	2.2	15.49	284

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
10/26/2018	16	12.69	1,695
10/27/2018	4.8	16.33	654
10/28/2018	2.0	17.90	299
10/29/2018	3.6	13.10	393
10/30/2018	2.0	14.25	238
10/31/2018	1.7	15.58	221
11/1/2018	2.2	14.71	270
11/2/2018	5.2	13.62	591
11/3/2018	3.7	14.81	457
11/4/2018	15	17.24	2,158
11/5/2018	1.4	13.69	160
11/6/2018	4.7	17.06	669
11/7/2018	1.2	12.83	128
11/8/2018	3.0	12.44	311
11/9/2018	4.8	19.99	801
11/10/2018	6.5	18.66	1,012
11/11/2018	0.91	16.67	127
11/12/2018	1.2	16.24	163
11/13/2018	5.6	15.60	729
11/14/2018	2.5	15.46	323
11/15/2018	0.63	16.22	85
11/16/2018	8.6	18.37	1,318
11/17/2018	7.5	13.27	831
11/18/2018	0.80	8.71	58
11/19/2018	0.42	11.05	39
11/20/2018	2.6	14.00	304
11/21/2018	1.6	10.99	147
11/22/2018	3.7	10.95	338
11/23/2018	3.7	12.11	374
11/24/2018	1.4	14.74	172
11/25/2018	7.6	9.94	630
11/26/2018	10	13.46	1,123
11/27/2018	14	15.49	1,809
11/28/2018	12	13.73	1,375
11/29/2018	12	16.26	1,628
11/30/2018	15	14.28	1,787
12/1/2018	40	12.76	4,258
12/2/2018	17	14.79	2,099
12/3/2018	38	17.58	5,576
12/4/2018	25	16.49	3,441
12/5/2018	15	16.33	2,044
12/6/2018	20	15.62	2,607
12/7/2018	34	9.32	2,645
12/8/2018	32	9.34	2,493
12/9/2018	7.8	14.06	915
12/10/2018	13	11.51	1,248
12/11/2018	6.7	10.00	559
12/12/2018	7.6	15.93	1,011

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
12/13/2018	16	13.62	1,818
12/14/2018	29	9.89	2,393
12/15/2018	30	10.10	2,529
12/16/2018	5.2	10.76	467
12/17/2018	5.5	11.39	523
12/18/2018	5.5	10.26	471
12/19/2018	5.2	12.50	542
12/20/2018	34	11.25	3,193
12/21/2018	5.6	10.44	488
12/22/2018	73	9.62	5,863
12/23/2018	11	14.32	1,315
12/24/2018	4.1	13.60	465
12/25/2018	8.0	12.71	849
12/26/2018	21	9.18	1,609
12/27/2018	6.7	12.76	713
12/28/2018	4.0	11.28	377
12/29/2018	45	13.12	4,928
12/30/2018	4.9	10.83	443
12/31/2018	5.3	13.78	609
1/1/2019	18	13.38	2,010
1/2/2019	5.9	11.20	552
1/3/2019	12	6.22	623
1/4/2019	50	8.68	3,622
1/5/2019	18	4.63	696
1/6/2019	6.0	5.65	283
1/7/2019	4.8	7.30	292
1/8/2019	17	14.24	2,019
1/9/2019	5.5	16.26	746
1/10/2019	13	16.06	1,743
1/11/2019	3.5	15.24	445
1/12/2019	93	16.58	12,868
1/13/2019	3.6	15.20	457
1/14/2019	1.9	12.75	202
1/15/2019	2.0	15.82	264
1/16/2019	3.1	12.98	336
1/17/2019	5.6	13.54	633
1/18/2019	2.2	15.03	276
1/19/2019	8.6	16.44	1,180
1/20/2019	5.2	15.95	692
1/21/2019	4.5	16.33	613
1/22/2019	5.5	15.90	730
1/23/2019	6.5	13.83	750
1/24/2019	17	11.91	1,689
1/25/2019	34	16.91	4,797
1/26/2019	20	17.42	2,907
1/27/2019	3.5	13.59	397
1/28/2019	3.5	16.93	494
1/29/2019	4.0	16.52	552

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
1/30/2019	13	19.07	2,069
1/31/2019	5.5	16.95	778
2/1/2019	10.0	12.53	1,046
2/2/2019	2.1	15.96	280
2/3/2019	2.4	16.04	321
2/4/2019	7.5	11.85	741
2/5/2019	2.7	11.81	266
2/6/2019	2.0	14.92	249
2/7/2019	5.5	14.55	668
2/8/2019	1.5	14.47	181
2/9/2019	9.1	15.77	1,198
2/10/2019	1.5	14.18	177
2/11/2019	1.6	14.32	191
2/12/2019	1.1	14.41	132
2/13/2019	1.3	15.61	169
2/14/2019	4.3	13.52	485
2/15/2019	2.9	18.41	446
2/16/2019	11	15.82	1,452
2/17/2019	1.2	15.04	151
2/18/2019	1.4	15.91	186
2/19/2019	1.2	15.08	151
2/20/2019	0.71	15.58	92
2/21/2019	2.3	14.71	282
2/22/2019	0.50	14.28	60
2/23/2019	2.1	15.81	277
2/24/2019	0.82	14.90	102
2/25/2019	1.5	12.99	163
2/26/2019	1.0	13.89	116
2/27/2019	0.71	13.03	77
2/28/2019	3.7	15.33	473
3/1/2019	0.61	13.36	68
3/2/2019	16	11.73	1,566
3/3/2019	0.40	18.14	61
3/4/2019	0.92	15.46	119
3/5/2019	8.2	15.34	1,049
3/6/2019	0.82	16.14	110
3/7/2019	3.7	16.56	511
3/8/2019	6.4	16.84	899
3/9/2019	9.3	15.86	1,231
3/10/2019	0.70	14.33	84
3/11/2019	0.30	17.34	43
3/12/2019	0.60	18.06	90
3/13/2019	0.51	17.46	74
3/14/2019	2.7	17.28	389
3/15/2019	0.71	16.73	99
3/16/2019	8.8	17.71	1,300
3/17/2019	0.40	14.15	47
3/18/2019	0.51	16.03	68

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
3/19/2019	0.60	16.56	83
3/20/2019	0.30	16.41	41
3/21/2019	2.1	16.19	284
3/22/2019	1.0	15.16	127
3/23/2019	23	15.85	3,043
3/24/2019	1.3	16.76	182
3/25/2019	6.1	16.86	858
3/26/2019	1.8	17.00	255
3/27/2019	1.4	16.79	196
3/28/2019	4.0	16.14	539
3/29/2019	26	18.18	3,945
3/30/2019	33	21.11	5,814
3/31/2019	28	4.02	938
4/1/2019	2.4	17.65	353
4/2/2019	2.3	17.78	341
4/3/2019	3.0	17.44	437
4/4/2019	5.6	17.65	825
4/5/2019	2.2	16.67	306
4/6/2019	27	18.45	4,156
4/7/2019	1.8	16.21	243
4/8/2019	1.6	17.84	238
4/9/2019	1.2	17.91	179
4/10/2019	7.1	18.37	1,088
4/11/2019	7.2	18.86	1,133
4/12/2019	31	21.19	5,483
4/13/2019	27	17.30	3,899
4/14/2019	5.5	19.33	887
4/15/2019	2.8	18.26	427
4/16/2019	3.0	17.85	447
4/17/2019	2.2	17.00	312
4/18/2019	3.4	18.86	535
4/19/2019	112	18.99	17,746
4/20/2019	33	18.12	4,989
4/21/2019	3.0	15.31	383
4/22/2019	2.4	18.53	371
4/23/2019	2.2	19.89	365
4/24/2019	1.8	17.26	259
4/25/2019	6.5	15.02	814
4/26/2019	2.6	12.96	281
4/27/2019	31	15.86	4,102
4/28/2019	1.7	11.94	169
4/29/2019	1.2	16.04	161
4/30/2019	1.0	14.91	124
5/1/2019	0.80	17.12	114
5/2/2019	6.5	16.55	898
5/3/2019	2.2	16.27	299
5/4/2019	15	15.25	1,908
5/5/2019	1.1	16.08	148

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
5/6/2019	0.80	16.07	107
5/7/2019	3.7	14.60	451
5/8/2019	1.1	15.04	138
5/9/2019	4.0	17.80	594
5/10/2019	19.0	19.23	3,050
5/11/2019	8.0	16.33	1,090
5/12/2019	6.6	15.45	851
5/13/2019	1.2	18.52	185
5/14/2019	1.3	17.23	187
5/15/2019	0.93	17.45	135
5/16/2019	2.6	14.22	309
5/17/2019	1.1	17.66	162
5/18/2019	13	17.35	1,882
5/19/2019	1.7	17.82	253
5/20/2019	11	18.62	1,709
5/21/2019	13	17.41	1,889
5/22/2019	11	17.01	1,562
5/23/2019	4.1	15.70	537
5/24/2019	11	18.24	1,674
5/25/2019	13	15.83	1,717
5/26/2019	1.0	18.70	156
5/27/2019	1.8	20.04	301
5/28/2019	0.91	18.93	144
5/29/2019	1.1	19.02	175
5/30/2019	1.7	19.61	278
5/31/2019	11	10.01	919
6/1/2019	7.3	17.96	1,094
6/2/2019	0.80	17.92	120
6/3/2019	0.80	16.41	110
6/4/2019	0.91	15.20	115
6/5/2019	0.91	16.84	128
6/6/2019	2.7	16.63	375
6/7/2019	1.0	17.53	146
6/8/2019	22	18.17	3,335
6/9/2019	7.1	16.86	999
6/10/2019	1.2	18.46	185
6/11/2019	1.0	19.03	159
6/12/2019	1.1	17.03	156
6/13/2019	6.4	17.95	959
6/14/2019	1.9	19.75	313
6/15/2019	14	19.27	2,251
6/16/2019	0.76	18.18	115
6/17/2019	0.60	18.89	95
6/18/2019	0.40	17.71	59
6/19/2019	0.70	19.47	114
6/20/2019	2.2	21.75	399
6/21/2019	8.1	22.89	1,547
6/22/2019	4.8	19.52	782

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
6/23/2019	1.4	22.19	259
6/24/2019	0.70	20.25	118
6/25/2019	0.40	21.62	72
6/26/2019	0.50	20.94	87
6/27/2019	2.8	16.65	389
6/28/2019	0.80	14.78	99
6/29/2019	4.9	7.42	303
6/30/2019	0.60	14.82	74
7/1/2019	0.40	11.95	40
7/2/2019	1.7	14.37	204
7/3/2019	1.9	12.76	202
7/4/2019	1.2	12.98	130
7/5/2019	2.0	14.88	248
7/6/2019	11	12.35	1,134
7/7/2019	0.40	22.27	74
7/8/2019	0.80	16.39	109
7/9/2019	0.50	17.93	75
7/10/2019	0.60	18.75	94
7/11/2019	3.1	14.98	387
7/12/2019	9.7	14.04	1,137
7/13/2019	15.4	15.28	1,963
7/14/2019	0.7	13.42	75
7/15/2019	0.3	16.01	40
7/16/2019	3.0	14.26	357
7/17/2019	0.50	16.97	71
7/18/2019	1.4	22.00	257
7/19/2019	1.4	18.11	212
7/20/2019	0.92	15.31	118
7/21/2019	1.0	13.62	114
7/22/2019	1.5	18.69	234
7/23/2019	0.82	16.90	116
7/24/2019	0.91	21.19	161
7/25/2019	1.1	18.97	174
7/26/2019	3.9	19.99	651
7/27/2019	14	17.46	2,040
7/28/2019	0.92	16.81	129
7/29/2019	0.30	22.06	55
7/30/2019	0.70	19.11	112
7/31/2019	0.52	17.05	74
8/1/2019	2.7	18.54	418
8/2/2019	6.6	21.95	1,209
8/3/2019	2.1	13.77	241
8/4/2019	0.70	15.96	93
8/5/2019	1.2	17.61	176
8/6/2019	1.6	17.41	233
8/7/2019	1.3	16.82	182
8/8/2019	0.51	15.44	66
8/9/2019	0.82	17.82	122

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
8/10/2019	5.5	20.58	944
8/11/2019	0.40	17.58	59
8/12/2019	0.60	17.21	86
8/13/2019	1.0	20.13	168
8/14/2019	1.8	18.26	274
8/15/2019	2.8	15.24	356
8/16/2019	0.80	16.96	113
8/17/2019	24	12.98	2,600
8/18/2019	7.5	15.46	968
8/19/2019	3.7	18.27	564
8/20/2019	1.1	11.78	108
8/21/2019	2.8	16.72	391
8/22/2019	3.7	15.89	491
8/23/2019	6.1	18.99	967
8/24/2019	5.2	15.79	685
8/25/2019	0.94	10.67	84
8/26/2019	1.0	12.89	108
8/27/2019	0.70	12.51	73
8/28/2019	1.0	15.18	127
8/29/2019	2.2	13.23	243
8/30/2019	0.93	15.27	119
8/31/2019	8.7	19.32	1,402
9/1/2019	1.3	9.97	108
9/2/2019	0.60	14.72	74
9/3/2019	0.70	15.67	92
9/4/2019	0.92	14.32	110
9/5/2019	2.0	14.22	237
9/6/2019	1.3	13.47	146
9/7/2019	9.1	13.20	1,002
9/8/2019	0.81	13.29	90
9/9/2019	0.51	12.19	52
9/10/2019	1.0	14.64	122
9/11/2019	0.62	14.04	73
9/12/2019	1.4	14.80	173
9/13/2019	0.71	14.85	88
9/14/2019	1.1	17.25	158
9/15/2019	0.82	10.98	75
9/16/2019	0.50	12.47	52
9/17/2019	0.70	12.49	73
9/18/2019	0.50	14.78	62
9/19/2019	0.70	12.16	71
9/20/2019	3.5	18.19	531
9/21/2019	3.5	10.35	302
9/22/2019	0.70	17.77	104
9/23/2019	0.52	13.40	58
9/24/2019	0.50	13.92	58
9/25/2019	0.51	15.22	65
9/26/2019	0.80	16.51	110

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
9/27/2019	1.3	16.28	177
9/28/2019	7.0	15.68	916
9/29/2019	1.0	15.60	130
9/30/2019	2.3	11.56	222
10/1/2019	2.1	15.44	271
10/2/2019	0.42	14.17	50
10/3/2019	3.3	17.62	485
10/4/2019	13	19.04	2,065
10/5/2019	8.7	18.91	1,373
10/6/2019	2.4	13.31	266
10/7/2019	1.4	16.68	195
10/8/2019	0.80	18.68	125
10/9/2019	1.4	20.04	234
10/10/2019	0.90	19.24	144
10/11/2019	0.40	18.53	62
10/12/2019	2.4	20.54	411
10/13/2019	1.9	16.22	257
10/14/2019	1.9	16.60	263
10/15/2019	3.1	19.06	493
10/16/2019	7.5	19.31	1,209
10/17/2019	5.7	19.18	913
10/18/2019	3.1	18.64	482
10/19/2019	5.1	21.81	928
10/20/2019	2.3	15.98	307
10/21/2019	1.8	18.89	284
10/22/2019	2.4	18.27	366
10/23/2019	1.1	19.58	180
10/24/2019	2.1	20.88	366
10/25/2019	6.2	20.86	1,079
10/26/2019	9.0	23.48	1,764
10/27/2019	3.5	14.45	422
10/28/2019	2.8	19.71	460
10/29/2019	5.6	16.84	787
10/30/2019	18	16.09	2,416
10/31/2019	17	19.37	2,748
11/1/2019	7.4	19.66	1,214
11/2/2019	19	19.75	3,132
11/3/2019	3.6	16.68	501
11/4/2019	3.0	15.92	399
11/5/2019	4.1	16.24	556
11/6/2019	4.3	16.46	591
11/7/2019	8.7	17.26	1,253
11/8/2019	9.3	17.22	1,336
11/9/2019	3.9	17.59	573
11/10/2019	7.2	19.91	1,196
11/11/2019	12.3	17.52	1,798
11/12/2019	8.7	17.30	1,256
11/13/2019	10.0	18.00	1,502

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
11/14/2019	6.2	16.78	868
11/15/2019	36.0	17.39	5,225
11/16/2019	2.9	21.11	511
11/17/2019	8.6	18.80	1,349
11/18/2019	3.3	19.13	527
11/19/2019	5.6	13.73	642
11/20/2019	6.6	13.42	739
11/21/2019	4.0	13.81	461
11/22/2019	2.7	14.16	319
11/23/2019	46.0	15.83	6,077
11/24/2019	9.1	15.59	1,184
11/25/2019	2.5	16.52	345
11/26/2019	2.8	18.61	435
11/27/2019	4.9		
11/28/2019	7.0		
11/29/2019	2.4		
11/30/2019	45.0		
12/1/2019	12	19.34	1,937
12/2/2019	13	17.31	1,877
12/3/2019	6.3	18.48	971
12/4/2019	4.9	18.49	756
12/5/2019	7.6	18.80	1,192
12/6/2019	26	18.25	3,960
12/7/2019	12	18.01	1,803
12/8/2019	5.4	19.21	866
12/9/2019	2.8	17.79	416
12/10/2019	6.1	16.33	831
12/11/2019	7.2	19.16	1,151
12/12/2019	4.0	17.52	585
12/13/2019	1.5	16.02	200
12/14/2019	9.1	20.32	1,543
12/15/2019	9.5	21.22	1,682
12/16/2019	2.3	18.02	346
12/17/2019	3.0	18.07	452
12/18/2019	5.6	19.43	908
12/19/2019	3.5	18.52	541
12/20/2019	1.4	19.35	226
12/21/2019	2.8	18.29	427
12/22/2019	8.3	18.92	1,311
12/23/2019	3.1	17.47	452
12/24/2019	2.9	17.06	413
12/25/2019	2.5	16.81	351
12/26/2019	2.0	16.45	275
12/27/2019	14	20.65	2,412
12/28/2019	33	22.93	6,314
12/29/2019	2.8	16.78	392
12/30/2019	1.0	18.20	152
12/31/2019	1.1	7.82	72

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
1/1/2020	1.0	15.91	133
1/2/2020	1.6	17.66	236
1/3/2020	1.2	16.57	166
1/4/2020	12	16.76	1,678
1/5/2020	3.1	17.51	453
1/6/2020	1.9	16.75	266
1/7/2020	3.6	16.60	499
1/8/2020	3.1	17.42	451
1/9/2020	2.3	16.41	315
1/10/2020	2.7	16.55	373
1/11/2020	6.9	15.56	896
1/12/2020	12	13.24	1,326
1/13/2020	25	11.73	2,448
1/14/2020	12	12.11	1,213
1/15/2020	10	18.75	1,564
1/16/2020	14	17.78	2,078
1/17/2020	6.2	13.89	719
1/18/2020	80	15.49	10,338
1/19/2020	21	13.07	2,290
1/20/2020	9.3	14.73	1,144
1/21/2020	6.7	15.90	889
1/22/2020	8.9	17.12	1,272
1/23/2020	6.1	16.38	834
1/24/2020	5.7	15.32	729
1/25/2020	16	18.55	2,477
1/26/2020	2.9	14.19	343
1/27/2020	5.7	15.69	746
1/28/2020	6.6	14.84	817
1/29/2020	6.3	15.26	802
1/30/2020	6.2	15.16	785
1/31/2020	5.1	16.40	698
2/1/2020	10	15.42	1,287
2/2/2020	3.0	19.27	482
2/3/2020	3.5	17.11	500
2/4/2020	19	18.29	2,899
2/5/2020	5.0	16.93	706
2/6/2020	7.1	16.47	976
2/7/2020	3.0	16.48	413
2/8/2020	9.0	16.95	1,273
2/9/2020	3.3	17.80	490
2/10/2020	5.6	17.64	824
2/11/2020	2.6	17.71	384
2/12/2020	13	15.87	1,722
2/13/2020	19	17.07	2,706
2/14/2020	11	16.04	1,473
2/15/2020	18	13.28	1,995
2/16/2020	4.7	18.74	735
2/17/2020	85	17.84	12,653

Table 2C-D - Intake No. 2 PS TSS Data

Notes:
(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
2/18/2020	12	12.44	1,246
2/19/2020	10	19.53	1,630
2/20/2020	4.0	15.83	528
2/21/2020	6.7	15.09	844
2/22/2020	13	17.97	1,949
2/23/2020	20	13.44	2,243
2/24/2020	2.6	16.51	358
2/25/2020	5.3	10.58	468
2/26/2020	7.3	11.45	697
2/27/2020	6.8	14.59	828
2/28/2020	5.9	13.12	646
2/29/2020	48	12.75	5,107
3/1/2020	6.3	12.09	635
3/2/2020	5.7	12.93	615
3/3/2020	4.4	10.88	399
3/4/2020	3.9	6.15	200
3/5/2020	5.2	11.10	482
3/6/2020	28	11.99	2,801
3/7/2020	6	13.37	669
3/8/2020	29	18.05	4,368
3/9/2020	4.8	6.28	252
3/10/2020	7.2	11.20	673
3/11/2020	6.2	13.56	702
3/12/2020	4.5	12.86	483
3/13/2020	44	13.02	4,782
3/14/2020	24	10.67	2,137
3/15/2020	3.7	11.51	356
3/16/2020	4.3	11.70	420
3/17/2020	3.7	16.66	514
3/18/2020	3.1	10.33	267
3/19/2020	2.6	21.45	465
3/20/2020	11	14.75	1,354
3/21/2020	39	12.30	4,003
3/22/2020	3.7	20.89	645
3/23/2020	153	14.61	18,657
3/24/2020	5.7	15.01	714
3/25/2020	2.8	15.46	361
3/26/2020	2.8	16.36	382
3/27/2020	3.9	14.18	461
3/28/2020	21	17.19	3,013
3/29/2020	8.8	14.71	1,080
3/30/2020	6.7	13.91	778
3/31/2020	6.7	15.81	884
4/1/2020	2.9	15.85	384
4/2/2020	2.5	15.01	313
4/3/2020	4.7	20.70	812
4/4/2020	19	18.03	2,858
4/5/2020	9.2	8.33	640

Table 2C-D - Intake No. 2 PS TSS Data

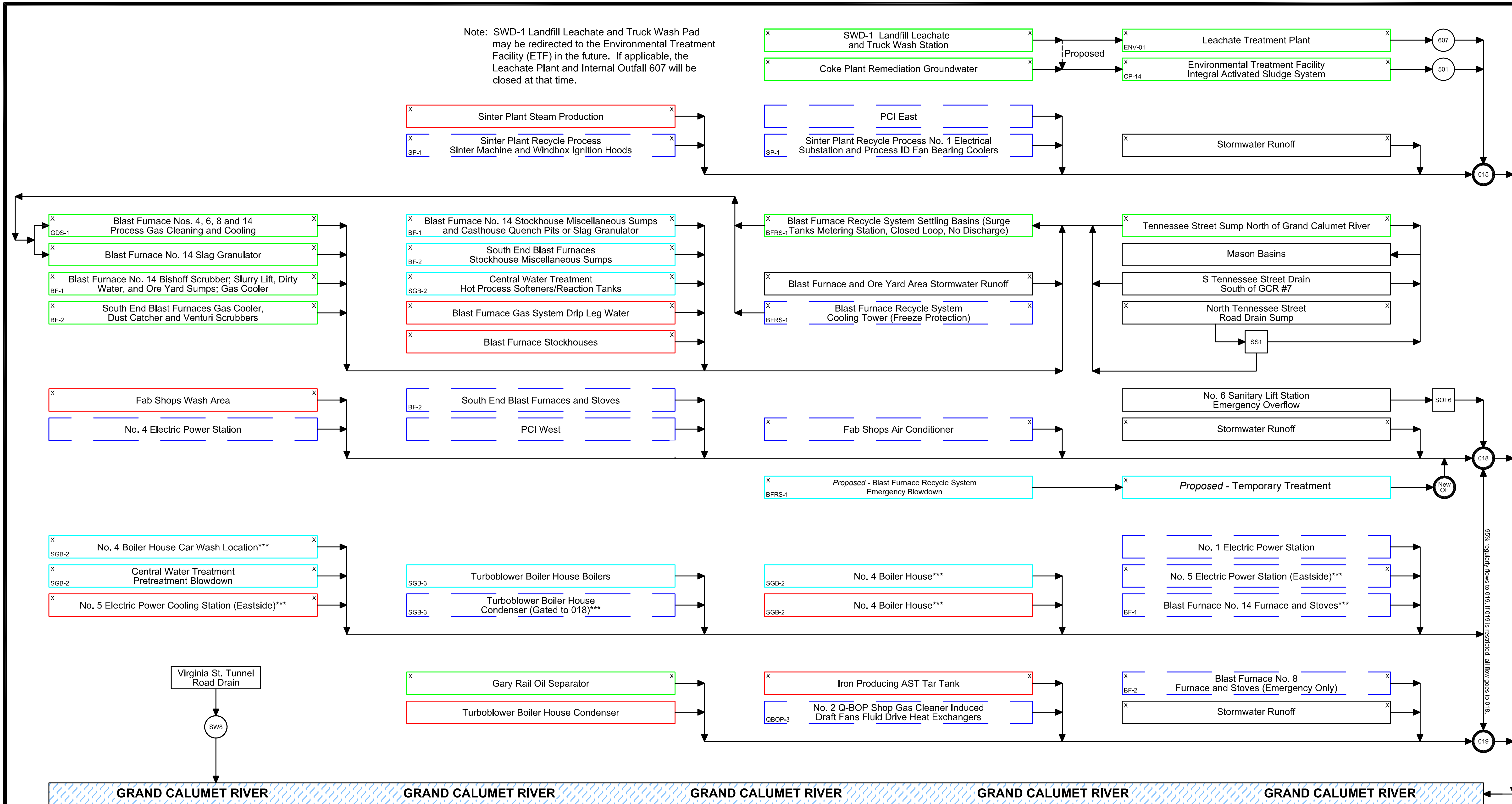
Notes:

(1) TSS data from composite sampling of No. 2 Pump Station. Non-detects are not noted; data reported to the method detection limit.
(2) Flow = NCCW Flow = 028 Flow + 030 Flow - 603 Flow*
(3) No flow or mass values included for Nov 27 - 30, 2019 due to non-normal flows related to rupture of an intake pipe.

#2 Pump Station (PS) = NCCW Estimate			
Values	No. 2 PS (Measured)	Estimated NCCW contribution to 028/030 (Based on No. 2 PS measured TSS mg/L and estimated NCCW flow)	
	TSS	Flow*	TSS
	mg/L	**MGD**	**lbs/day**
4/6/2020	3.7	13.91	430
4/7/2020	2.1	14.49	254
4/8/2020	1.7	14.66	208
4/9/2020	3.5	16.23	474
4/10/2020	11	15.27	1,402
4/11/2020	21	16.89	2,961
4/12/2020	5.1	12.47	531
4/13/2020	3.9	17.11	557

Attachment 2C-B

Water Balance / Flow Diagrams



*** Majority of flow is distributed to Outfall 019 with small percentage routed to Outfall 018 because of elevation change.

FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

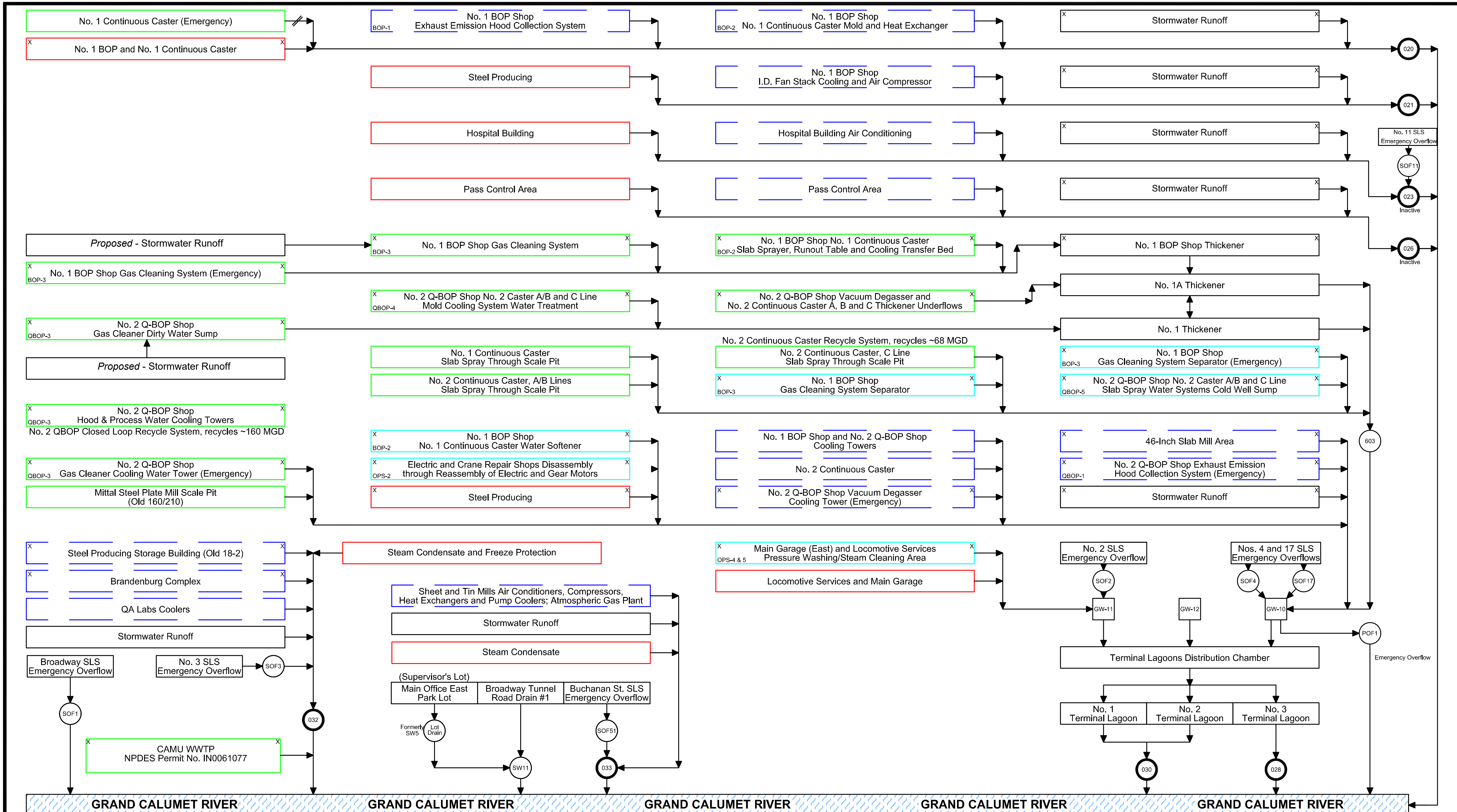
NON-CONTACT COOLING WATER	
CONDENSATE	X PUMP STATION
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT
PROCESS WATER	# OUTFALL

Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-02

FIGURE LDD-02

U.S. Steel - Gary Works Line Discharge Diagram
Outfalls: 015, 018, 019, 501 & New OF



FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER	
CONDENSATE	X PUMP STATION
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT
PROCESS WATER	# OUTFALL

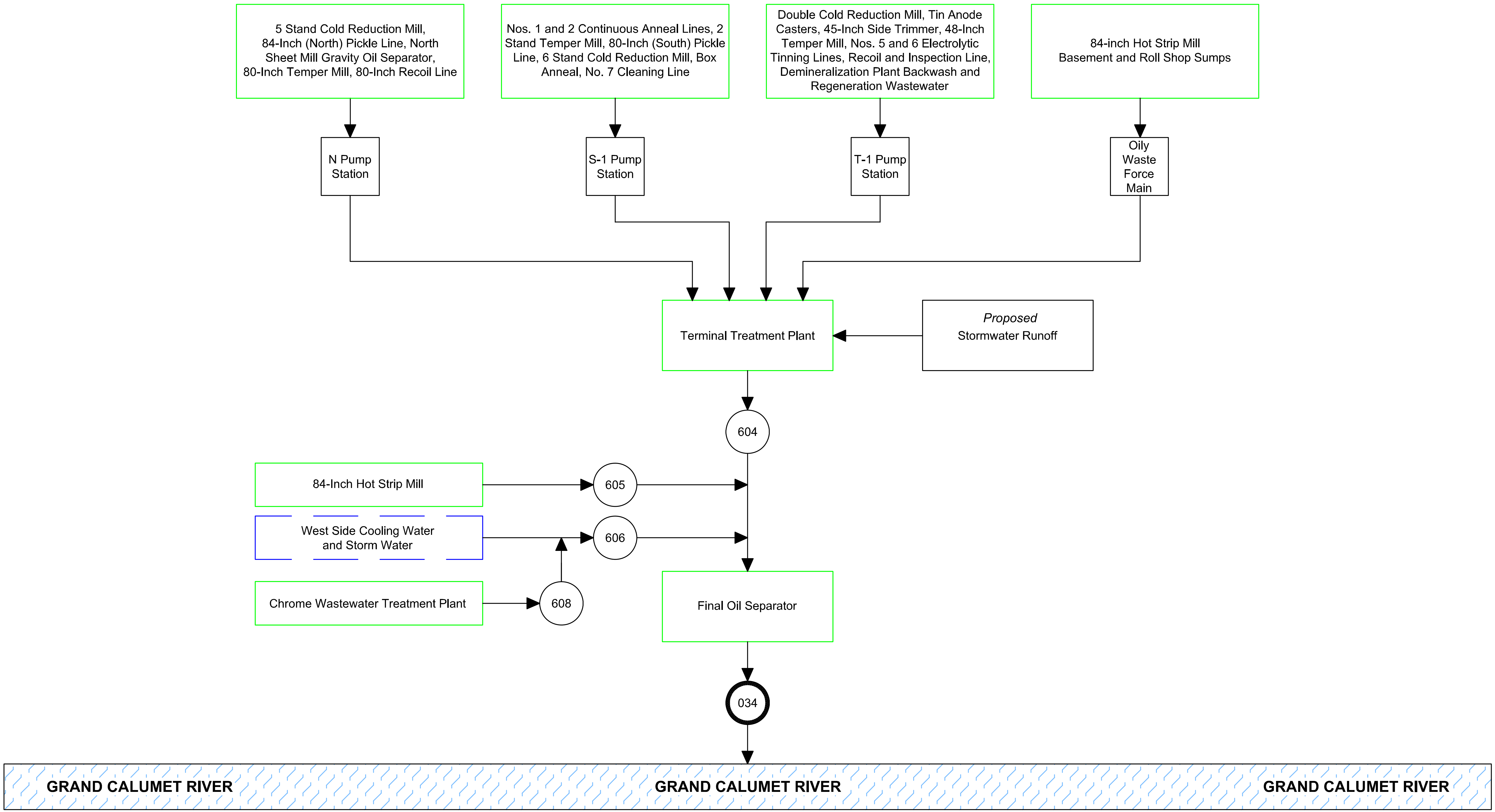
Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-03 Detail

FIGURE LDD-03 Detail

U.S. Steel - Gary Works Line Discharge Diagram

Outfalls: 020, 021, 023 (Inactive), 026 (Inactive), 028, 030, 032 and 033



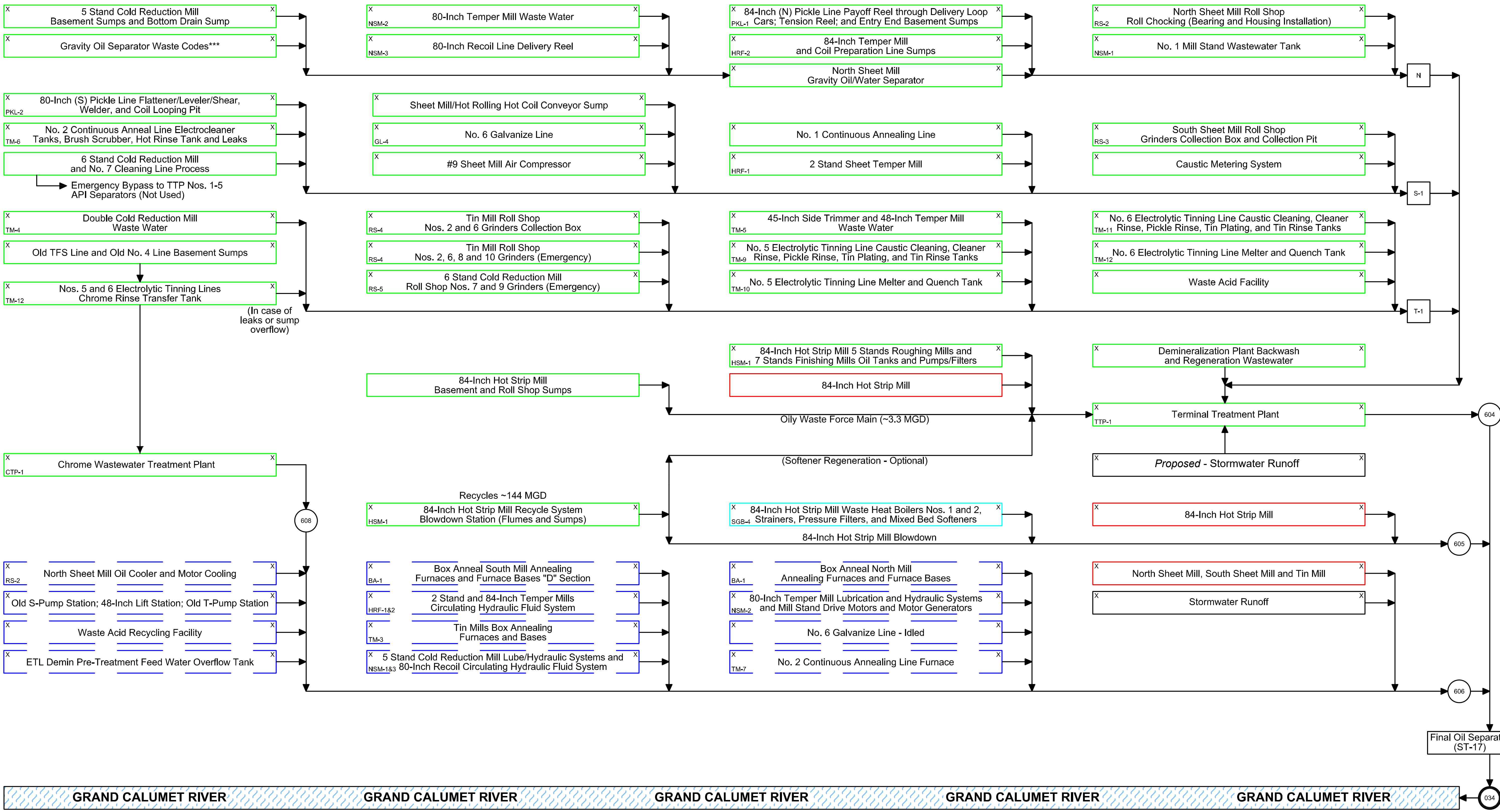
FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER		
CONDENSATE	PUMP STATION	REVISION DATE: 04/28/2020-1
BACKWASH, WASHDOWN, BLOWDOWN	INTERNAL MONITORING OR DISCHARGE POINT	FILE PATH: USSGW/Drawings/LDDs/20xx xxxx
PROCESS WATER	OUTFALL	FILE NAME: LDD-04 Overflow

Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

FIGURE LDD-04 Overview

U.S. Steel - Gary Works Line Discharge Diagram
Internal Monitoring Point: 604, 605, 606, 608
Outfall: 034



*** Note: See Gary Works Environmental Control Gravity Oil Separator Waste Codes.

FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER	
CONDENSATE	X PUMP STATION
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT
PROCESS WATER	# OUTFALL

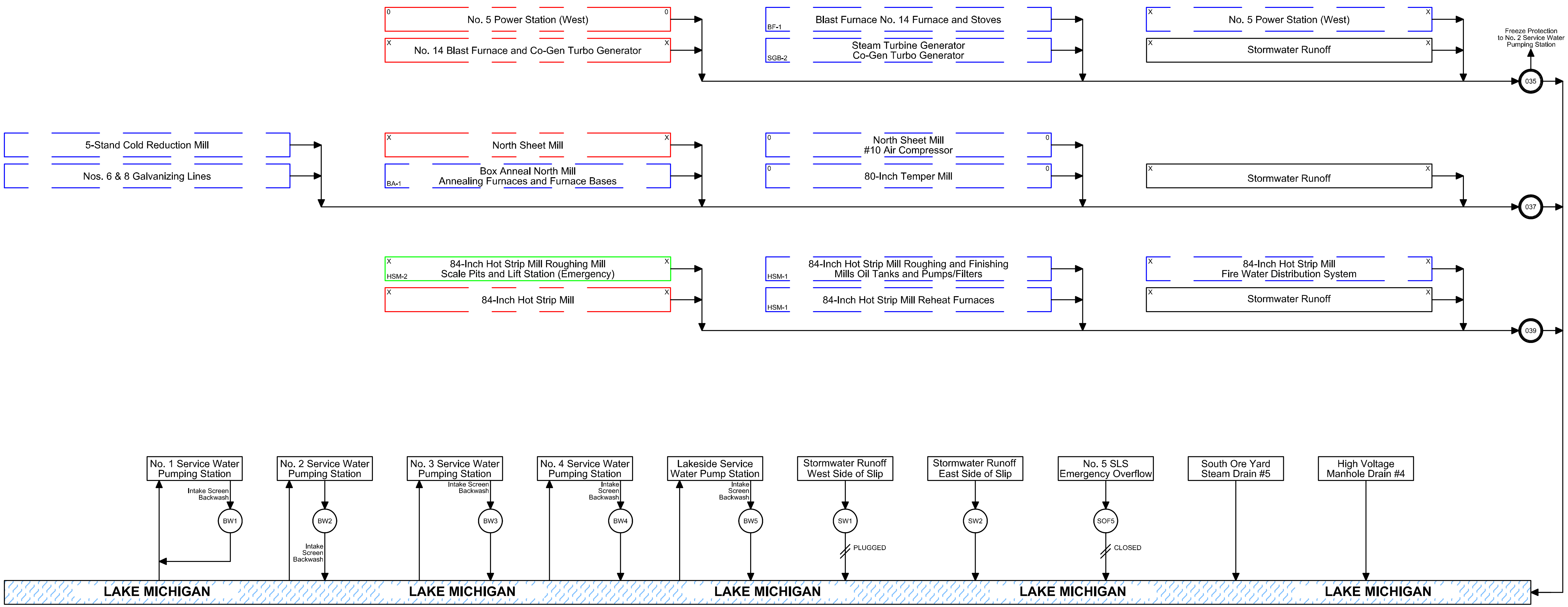
Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020-1
FILE PATH:	USSGW/Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-04 Detail

FIGURE LDD-04 Detail

U.S. Steel - Gary Works Line Discharge Diagram

Outfall: 034



FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER	
CONDENSATE	X PUMP STATION
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT
PROCESS WATER	# OUTFALL

Drawing By:
ST Environmental LLC, PO Box 2557, Chesterton, IN 46304
Phone: (219) 728-6312

REVISION DATE:	03/11/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-05

USS

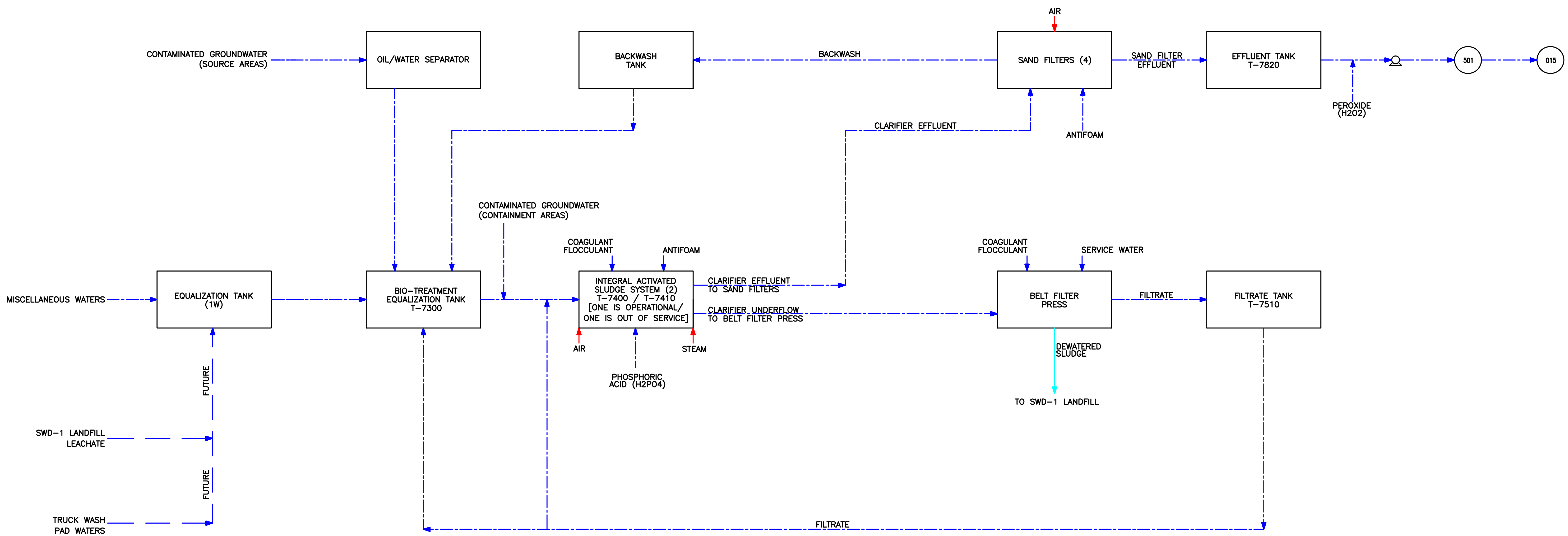
FIGURE LDD-05

U.S. Steel - Gary Works Line Discharge Diagram

Outfalls: 035, 037 and 039

Attachment 2C-C

Treatment Schematics



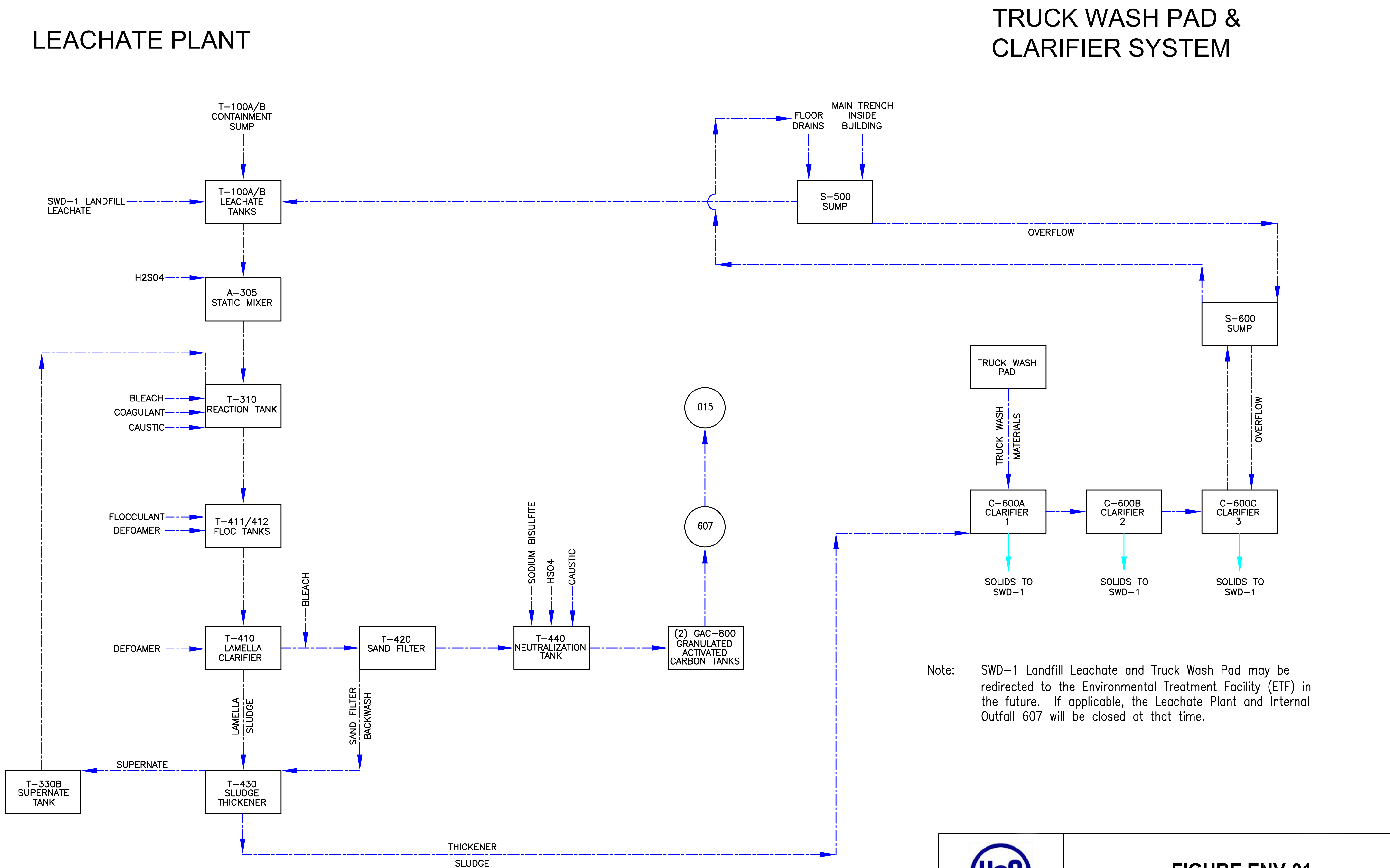
Note: SWD–1 Landfill Leachate and Truck Wash Pad may be redirected to the Environmental Treatment Facility (ETF) in the future. If applicable, the Leachate Plant and Internal Outfall 607 will be closed at that time.

PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE:	02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH:	Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME:	CP-14

ST Environmental LLC
PO Box 40129
Austin, TX 78704
(219) 728-6312

FIGURE CP-14

U.S. Steel - Gary Works Process Flow Diagram
Former Coke Plant/Coal Chemical Area
Environmental Treatment Facility (ETF)
Water Treatment Process



PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE:	02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH:	Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME:	CP-14

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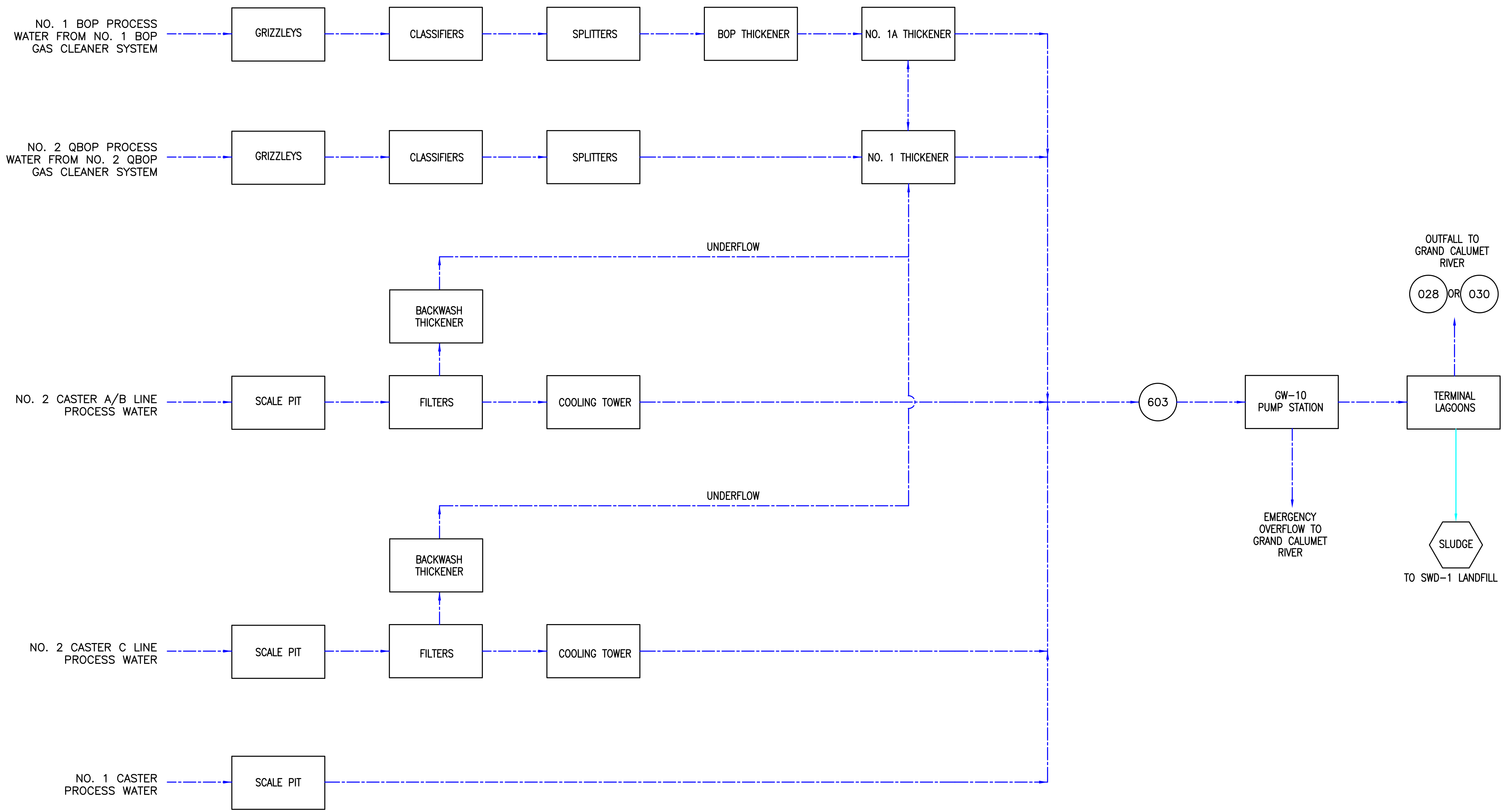
PO Box 40129
Austin, TX 78704
(219) 728-6312

FIGURE ENV-01
U.S. Steel - Gary Works Process Flow Diagram
SWD-1 Landfill
Leachate Treatment Plant



Outfalls 603, 028 and 030

U.S. Steel - Gary Works Process Flow Diagram
Steel Shops Wastewater Treatment Overview

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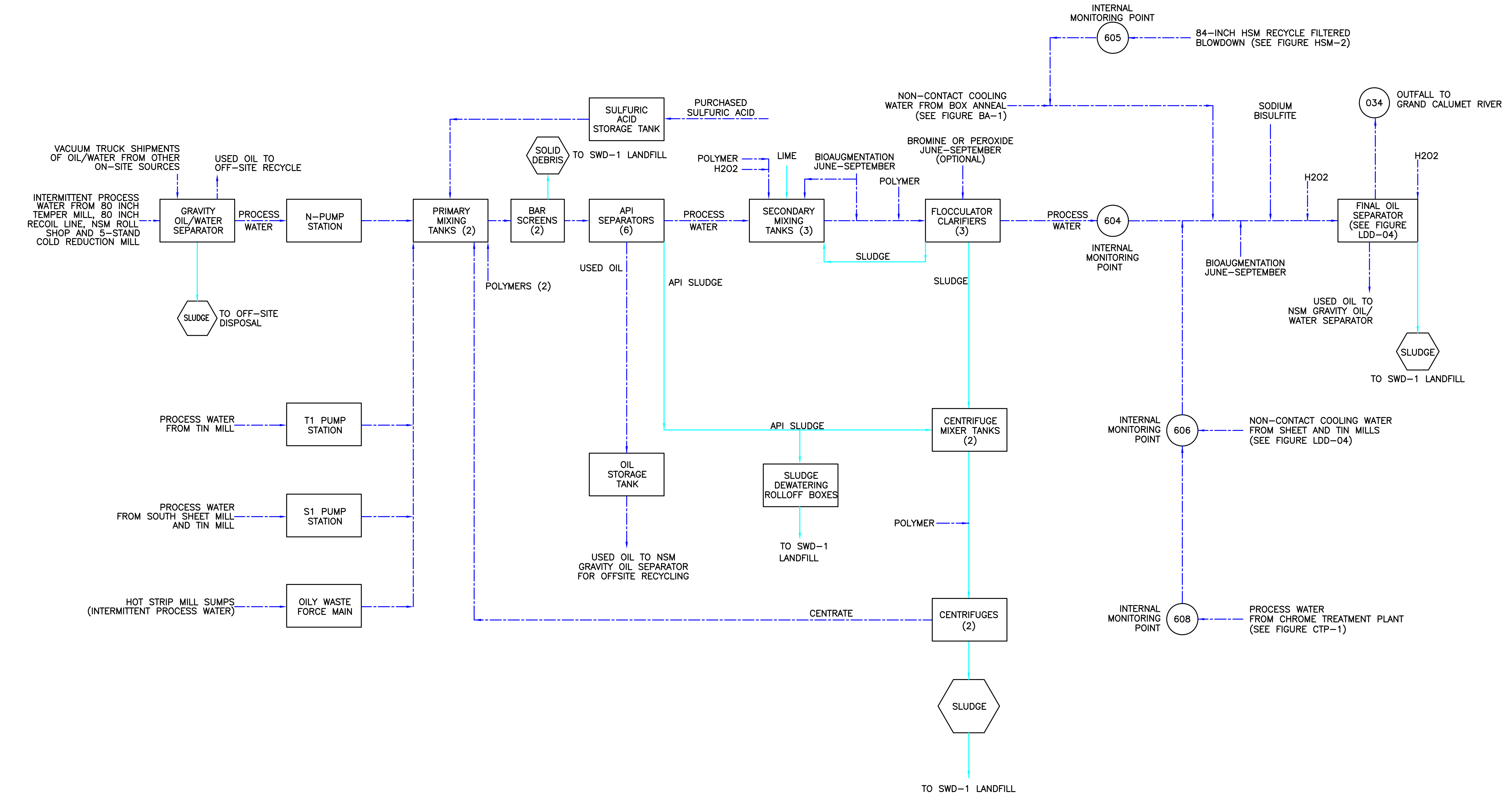
(219) 728-6312

PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE:	02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH:	Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME:	Outfalls 603,028,030 Steel



NOTE:

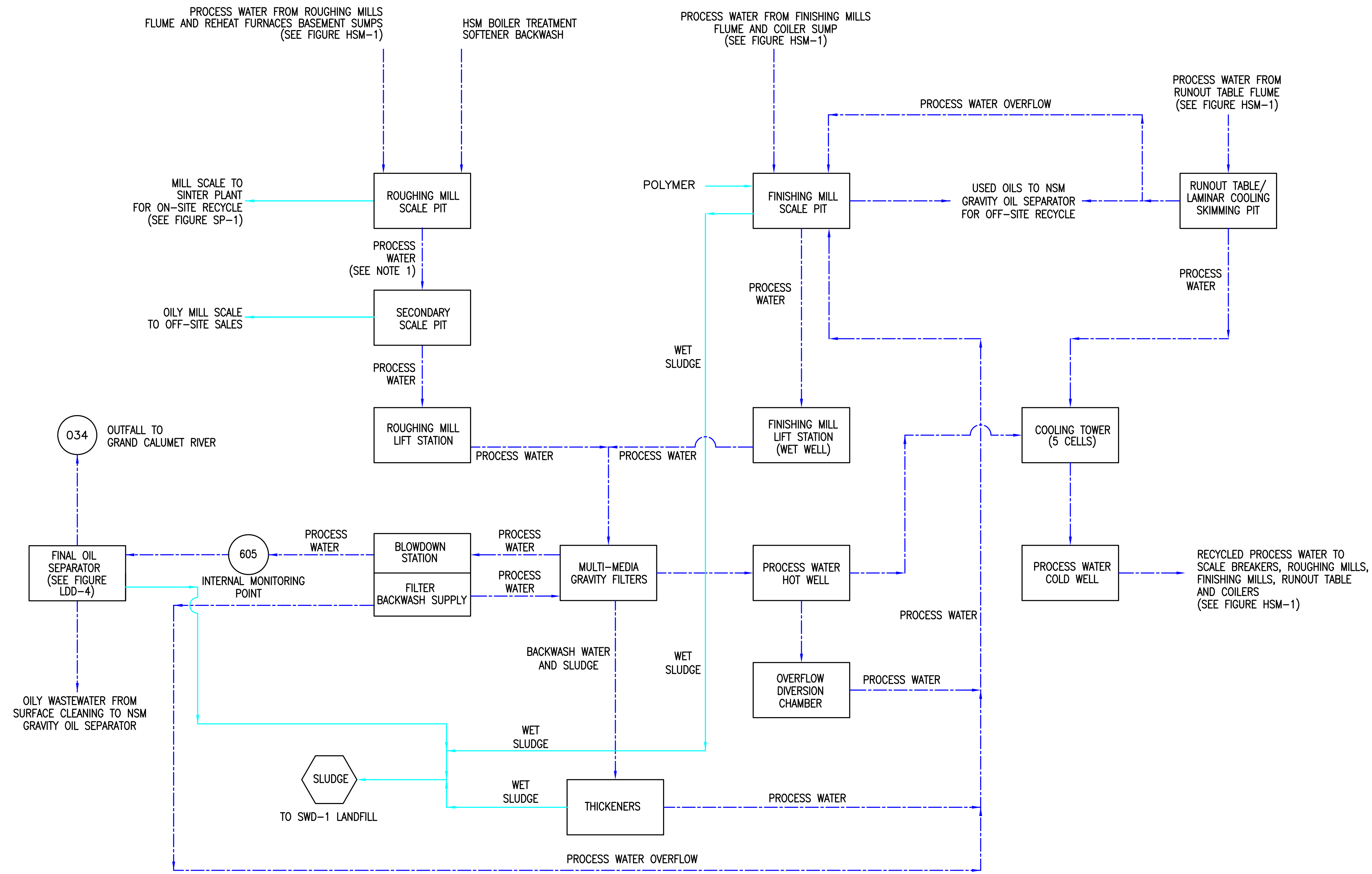
1. PROCESS WATER MAY INCLUDE USED LUBRICATING OILS/GREASES, HYDRAULIC FLUIDS, ROLLING OILS, COATING OILS, AND SPENT PROCESS SOLUTIONS.

PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE: 02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH: Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME: TTP-1

ST Environmental LLC
PO Box 40129
Austin, TX 78704
(219) 728-6312

FIGURE TTP-1

U.S. Steel - Gary Works Process Flow Diagram
Terminal Treatment Plant



NOTE:

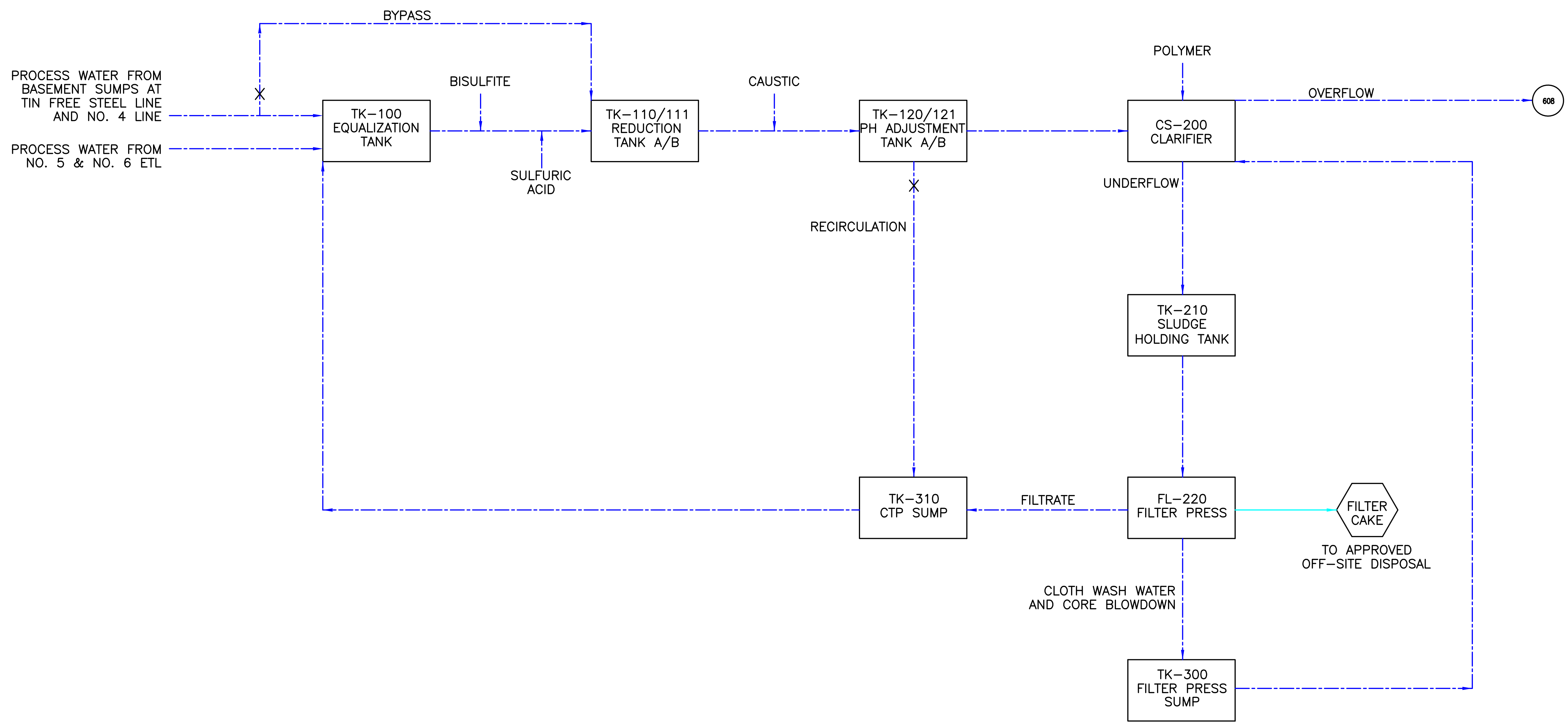
1. PROCESS WATER MAY INCLUDE LUBRICATING OILS/GREASES AND HYDRAULIC FLUIDS FROM LEAKS.

PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE: 02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH: Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME: HSM-2

ST Environmental LLC
PO Box 40129
Austin, TX 78704
(219) 728-6312

FIGURE HSM-2

U.S. Steel - Gary Works Process Flow Diagram
84-Inch Hot Strip Mill
84-Inch Hot Strip Mill Recycle System



PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE: 02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH: Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME: CTP-1

ST Environmental LLC
PO Box 40129
Austin, TX 78704
(219) 728-6312

FIGURE CTP-1

U.S. Steel - Gary Works Process Flow Diagram
Chrome Treatment Plant

Form 2F

Please print or type in the unshaded areas only

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)
IND005444062

Form Approved OMB No 2040-0086
Approval expires 5-31-92

FORM **2F** NPDES — **EPA**

United States Environmental Protection Agency

Application for Permit To Discharge Stormwater Discharges Associated with Industrial Activity

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 28.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM 223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER (*list*)	B. LATITUDE 1. DEG	2. MIN	3. SEC	C. LONGITUDE 1. DEG	2. MIN	3. SEC	D. RECEIVING WATER (*name*)
SW01	N41	37	2.6	W87	19	27.8	Lake Michigan
SW02	N41	36	52.6	W87	19	31.4	Lake Michigan
SW08	N41	36	27.4	W87	19	47.6	Grand Calumet River
SW11	N41	36	28.1	W87	20	13.6	Grand Calumet River
SW32	N41	36	34.6	W87	20	51.4	Grand Calumet River
SW33	N41	36	26.0	W87	21	11.0	Grand Calumet River

II. Improvements

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls number	source of discharge	3. Brief Description of Project	4. Final Compliance Date a. req.	b. proj.
Not applicable					

B. You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including: each if its intake and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive stormwater discharges from the facility. **See Attachment 2F-III.**

 Continued on Page 2

Continued from the Front

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of surfaces (including paved areas and building roofs) drained to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface *(provide units)*	Total Area Drained *(provide units)*	Outfall Number	Area of Impervious Surface *(provide units)*	Total Area Drained *(provide units)*
SW01	55 acres	100 acres			
SW02	55 acres	100 acres			
SW08	1 acres	1 acres			
SW11	0.066 acres	0.066 acres			
SW32	40 acres	150 acres			
SW33	35 acres	210 acres			

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management practices employed in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

Appendix B of the facility SWPPP includes tables detailing potential sources of stormwater pollution. Appendix B-1 is the Oil Storage Inventory associated with SPCC requirements and includes information on materials, amounts, locations, containment, possible drainage pathways and release impacts, as well as leak detection and overfill protection methods. Appendix B-2 is for all other potential sources of stormwater pollution. Materials, locations, possible exposure methods and pathways, structural and non-structural control are addressed along with an assessment of the overall risk to stormwater and any planned measures.

Appendix D of the facility SWPPP details where pesticides, herbicides or fertilizers are applied. These materials are applied manually on a seasonal as needed basis by a landscaping consultant. Application of herbicides by plant personnel is only allowed in very small areas as needed with a hand-held sprayer (consumer-scale).

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List Codes from Table 2F-1

The Appendix B tables of the facility SWPPP provide listings of structural and non-structural controls. Commonly utilized structural controls include: plugged drain(s) in secondary containment dike(s) to prevent drainage of contaminated storm water; secondary containment such dikes, pallets, berms, double walls, etc; berms or diversionary walls/structures or swales; bank erosion control systems (rip-rap, sheet piling or other structures); vegetation along banks and in open areas to prevent erosion and wash out; modified equipment such as valves, piping, flanges, etc. to prevent releases; raised, sealed or plugged storm sewer manhole(s)/inlet(s)/pipe(s) to prevent contaminated storm water from entering the storm sewer. In addition, there are various facilities onsite that retain, process, and treat stormwater (see Section 11.1.2 of the SWPPP). Commonly used non-structural controls/practices include: follow procedures for loading and unloading operations; follow procedures for drum and mobile container(s) storage and handling operations; storage of oily and contaminated equipment and spare parts indoors and dispose of obsolete parts and equipment, where possible; truck and equipment washing operations only in designated areas; follow street sweeping and dust suppressant procedures identified in the Gary Works Fugitive Dust Control Plan; practice inventory controls for materials that are potential storm water pollutant sources; maintain a spill kits in the areas of concern; control traffic through the area to minimize tracking, deposition and runoff; regular inspections of oil storage tank systems in accordance with SPCC Plan; maintain drainage system culverts and piping to prevent flooding, specifically in areas that drain into storm water treatment systems; quarterly SWPPP inspections of designated SW pollution sources; regular maintenance outages and inspections; housekeeping practices; awareness training. Proper procedures regarding spill response and clean up, spill reporting, and routine maintenance and inspection of spill response/clean-up materials and equipment are outlined in the Gary Works Integrated Contingency Plan (ICP). Oil spill prevention is outlined in the SPCC Plan.

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the presence of nonstormwater discharges, and that all nonstormwater discharges form these outfall(s) are identified in either an accompanying Form 2C or Form 2E application for the outfall.

Name and Official Title *type or print)*	Signature	Date Signed
Daniel Killeen; Vice President - Gary Works	See the General Information Form for the certification signature	

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test.

Visual inspection during dry weather for SW01, SW02, SW08, and SW11. Outfalls 032 and 033 are permitted to have non-stormwater discharges. Form2Cs for Outfalls 032 and 033 are included in this application.

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutant at the facility in the last three years, including the approximate date and location of the spill or leak, and the type and amount of material released.

Reportable spills for the most recent 3 year period (May 2017 - Apr 2020) are listed below.

02/05/2020	- QBOP Hood quench water release to sewer discharging through Outfalls 019/021; 80,000 gallons; impacted Outfalls 019 and 021
01/29/2020	- K062 release at South Pickle from spent acid sump recirculation piping; ~ 20 gallons; no impact to stormwater
11/26/2019	- Failure of 36 inch service water main in Iron Producing Area resulting in major catastrophic flooding of area, unknown volume released through outfalls 018 and 019 - worked with IDEM to perform daily monitoring of impact to Grand Calumet River
11/05/2019	- K062 release at South Pickle line caused by a failed pump flange on spent pickle acid pump system; ~50 gallons to soil; no impact to stormwater
05/02/2019	- Sheen observed at Outfall 019 due to soil contamination from Gary Railway Diesel Fuel Loading station; Outfall 019 impacted with intermittent sheen until demolition of Loading Station and excavation of impacted soil (completed 1st Q 2020)
03/25/2019	- Failed hose clamp caused a disconnect resulting in release of Tin Mill Demineralization Plant filter backwash to storm sewer discharging through internal Outfall 606 and final outfall 034; approximately 20 gallons sent to storm sewer; no impact to 034 discharge
09/18/2019	- Discoloration at Outfall 034 due to high turbidity, suspected to be related to increased lime addition at TTP and/or HSM maintenance activities involving major concrete saw cutting and fines being washed into the sewer; no impact to Outfall 034 observed other than turbidity
05/17/2018	- Failure of underground non-chrome process water line causing soil flooding; ~1000 gallons to soil and ~100 gallons to storm sewer, resulting in unauthorized discharge; no impact to stormwater observed visually outfall or via analytical data
04/06/2019	- ArcelorMittal Plate Mill Scale Pit flooded resulting in oil being sent to Outfalls 028/030 and sheen being present. Volume of oil unknown, estimated <100 gallons; sheen present at 028/030 until oil removed by vac truck upstream from C-Lot lagoons
03/05/2018	- K062 Release at South Pickle caused by failed serial interface module causing error in level reading in tank; ~145 gallons to soil; no impact to stormwater
08/09/2017	- At South Pickle, leak on HCL process tank resulted in contaminated soil in the vicinity of the adjacent storm sewer and infiltrated the storm sewer; internal Outfall 606 impacted but no impact was observed at Outfall 034 as determined by Outfall 034 pH readings
07/12/2017	- Very light sheen observed at Outfall 018, no source could be identified from inspection and fingerprint analysis; estimated volume of oil released <1 gallon; sheen observed at Outfall 018

 Continue on Page 3

Continued from Page 2

EPA ID Number *(Copy from Item I of Form 1)*
IND005444062

VII. Discharge Information

A, B, C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E. Potential discharges not covered by analysis - is any pollutant listed in Table 2F-2, 2F-3, 2F-4 a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

[X] Yes *(list all such pollutants below)*   [ ] No *(go to Section IX)*

Adequate information to assess potential stormwater pollutants is provided in the following:

Form 2C, Section V's

Form 2F, Pages VII-1 and VII-2

VIII. Biological Toxicity Testing Data

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

[ ] Yes *(list all such pollutants below)*   [X] No *(go to Section IX)*

IX. Contract Analysis Information

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

[X] Yes *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)*   [ ] No *(go to Section X)*

A. Name	B. Address	C. Area Code & Phone No.	Pollutants Analyzed
ALS - Indiana	3352 128th Avenue Holland, Michigan 49424	(616) 399-6070	All

X. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name & Official Title *(type or print)*	B. Area Code & Phone No.
Daniel Killeen; Vice President - Gary Works	
C. Signature	**D. Date Signed**
See the General Information Form for the certification signature	

Outfall SW01	EPA ID Number *(copy from Item I of Form 1)* IND005444062	Form Approved. OMB No. 2040-0086 Approval expires 5-31-92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A. You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Oil and Grease	8.2 mg/L	NA	4.2 mg/L	NA	7	SEE ATTACHMENT 2F-III APPENDIX B of USS Gary SWPPP provides a detailed inventory SW01 sampling point is located between mooring posts 35 and 36 along the east side of the Slip. It is representative for the east side of the Slip (part of Drainage Area #11) and discharges to Lake Michigan.
Carbonaceous Biological Oxygen Demand (cBOD5)	50.3 mg/L	NA	11.6 mg/L	NA	7	
Chemical Oxygen Demand (COD)	2300 mg/L	NA	695 mg/L	NA	7	
Total Suspended Solids (TSS)	3880 mg/L	NA	1567 mg/L	NA	7	
Total Nitrogen	<1 mg/L	NA	NA	NA	1	
Total Phosphorus	22.2 mg/L	NA	4.48 mg/L	NA	7	
	Minimum (grab)	Maximum (grab)	Minimum (comp)	Maximum (comp)		
pH	9.4 s.u.	10.2 s.u.	NA	NA	7	

Part B. List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements. Note: Part A compounds are not repeated in Part B.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Ammonia	0.36 mg/L	NA	0.16 mg/L	NA	7	See Above
Nitrate + Nitrite	3.1 mg/L	NA	0.831 mg/L	NA	7	
TKN	7 mg/L	NA	3.11 mg/L	NA	7	
Copper	0.22 mg/L	NA	0.069 mg/L	NA	7	
Lead	1.2 mg/L	NA	0.35 mg/L	NA	10	
Zinc	6.4 mg/L	NA	1.96 mg/L	NA	7	
Dissolved Oxygen	8.2 mg/L	NA	NA	NA	1	
Total Dissolved Solids	240 mg/L	NA	NA	NA	1	
Temperature	69.1 °F	NA	NA	NA	1	
Chlorine, Total Residual	<0.02 mg/L	NA	NA	NA	1	
Fluoride	0.5 mg/L	NA	NA	NA	1	
Iron, Total	24 mg/L	NA	NA	NA	1	
Manganese, Total	1.95 mg/L	NA	NA	NA	1	
Cadmium, Total	0.000876 mg/L	NA	NA	NA	1	
Chromium, Total	0.0704 mg/L	NA	NA	NA	1	
Chromium, Hexavalent (dissolved)	0.0014 mg/L	NA	NA	NA	1	
Mercury, Total	<0.00016 mg/L	NA	NA	NA	1	
Nickel, Total	0.00732 mg/L	NA	NA	NA	1	
Selenium, Total	0.00191 mg/L	NA	NA	NA	1	
Silver, Total	<0.0005 mg/L	NA	NA	NA	1	
Cyanide, WAD	<0.002 mg/L	NA	NA	NA	1	
Cyanide, Total	<0.002 mg/L	NA	NA	NA	1	
Phenols, Total ("4AAP Phenolics")	0.0049 mg/L	NA	NA	NA	1	
Benzene	<0.46 **ug/L**	NA	NA	NA	1	
Tetrachloroethene	<0.39 **ug/L**	NA	NA	NA	1	
Benzo (a) pyrene	<0.088 **ug/L**	NA	NA	NA	1	

Continued from the Front Outfall SW01

Part C.	List each pollutant shown in Tables 2F-2. 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.					
Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Adequate information to assess potential stormwater pollutants is provided in the following:						
	Form 2C, Section V's					
	Form 2F, Pages VII-1 and VII-2					

Part D. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*
11/17/15	130	0.29	>72 Hours	1-1.5 fps	
03/24/16	340	0.99	>72 Hours	0.5 fps	
06/15/16	120	0.81	>72 Hours	1.5 fps	
11/02/16	240	2.73	>72 Hours	0.3 fps	
03/25/17	45	0.17	<72 Hours	0.4 fps	
09/19/17	240	1.23	<72 Hours	0.4 fps	
05/14/18	45	0.39	>72 Hours	0.6 fps	
12/01/18	180	0.27	<72 Hours	0.2 fps	
09/22/19	50	0.19	>72 Hours	0.5 fps	
11/21/19	120	0.53	>72 Hours	0.6 fps	

9. Provide a description of the method of flow measurement or estimate.

A velocity meter is used to take feet per second readings. The "stick" velocity meter is directly inserted into the discharge stream w/in the storm sewer.

Outfall SW02

EPA ID Number *(copy from Item I of Form 1)*
IND005444062

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A. You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Oil and Grease	18 mg/L	NA	5.5 mg/L	NA	7	SEE ATTACHMENT 2F-III APPENDIX B of USS Gary SWPPP provides a detailed inventory SW02 sampling point is a drain pipe (Mooring Post 51) along Plant Route 1. It is representative for the west side of the Slip (part of Drainage Area #11) and discharges to Lake Michigan.
Carbonaceous Biological Oxygen Demand (cBOD5)	16.4 mg/L	NA	8.7 mg/L	NA	7	
Chemical Oxygen Demand (COD)	2900 mg/L	NA	562 mg/L	NA	7	
Total Suspended Solids (TSS)	7870 mg/L	NA	2291 mg/L	NA	7	
Total Nitrogen	TBD	NA	NA	NA		
Total Phosphorus	8.3 mg/L	NA	2.5 mg/L	NA	7	
pH	Minimum (grab)	Maximum (grab)	Minimum (comp)	Maximum (comp)	7	
	8.8 s.u.	10.8 s.u.	NA	NA		

Part B. List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements. Note: Part A compounds are not repeated in Part B.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Ammonia	0.42 mg/L	NA	0.18 mg/L	NA	7	See Above
Nitrate + Nitrite	7.8 mg/L	NA	1.51 mg/L	NA	7	
TKN	3.4 mg/L	NA	1.6 mg/L	NA	7	
Copper, Total	0.15 mg/L	NA	0.058 mg/L	NA	7	
Iron, Total	230 mg/L	NA	103 mg/L	NA	7	
Lead, Total	0.47 mg/L	NA	0.145 mg/L	NA	12	
Manganese, Total	32 mg/L	NA	11.2 mg/L	NA	7	
Zinc, Total	7.3 mg/L	NA	2.5 mg/L	NA	7	
Dissolved Oxygen	Due to inadequate discharge flows, monitoring of this location has not been performed since December 2018. Should a future event provide adequate flow, these parameters (and total nitrogen) will be tested at that time.	NA	NA	NA		
Total Dissolved Solids		NA	NA	NA		
Temperature		NA	NA	NA		
Chlorine, Total Residual		NA	NA	NA		
Fluoride		NA	NA	NA		
Cadmium, Total		NA	NA	NA		
Chromium, Total		NA	NA	NA		
Chromium, Hexavalent (dissolved)		NA	NA	NA		
Mercury, Total		NA	NA	NA		
Nickel, Total		NA	NA	NA		
Selenium, Total		NA	NA	NA		
Silver, Total		NA	NA	NA		
Cyanide, WAD		NA	NA	NA		
Cyanide, Total		NA	NA	NA		
Phenols, Total ("4AAP Phenolics")		NA	NA	NA		
Benzene		NA	NA	NA		
Tetrachloroethene		NA	NA	NA		
Benzo (a) pyrene		NA	NA	NA		

Continued from the Front Outfall SW02

Part C.	List each pollutant shown in Tables 2F-2. 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.					
Pollutant and CAS Number *(if available)*	Maximum Values *(include units)* Grab Sample Taken During First 20 Minutes	Maximum Values *(include units)* Flow-Weighted Composite	Average Values *(include units)* Grab Sample Taken During First 20 Minutes	Average Values *(include units)* Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Adequate information to assess potential stormwater pollutants is provided in the following:						
	Form 2C, Section V's					
	Form 2F, Pages VII-1 and VII-2					

Part D. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*
11/17/15	130	0.29	>72 Hours	1-1.5 fps	
03/24/16	340	0.99	>72 Hours	0.5 fps	
06/15/16	120	0.81	>72 Hours	1.5 fps	
09/26/16	75	0.10	>72 Hours	0.4 fps	
11/02/16	240	2.73	>72 Hours	1.5 fps	
03/25/17	45	0.17	<72 Hours	0.8 fps	
06/29/17	240	1.10	>72 Hours	0.4 fps	
09/19/17	240	1.23	<72 Hours	0.8 fps	
01/08/18	NA-Snow Melt	NA-Snow Melt	NA	Flow too low to register	
05/14/18	45	0.39	>72 Hours	0.8 fps	
08/20/18	60	0.34	>72 Hours	0.1 fps	
12/01/18	180	0.27	<72 Hours	0.4 fps	

9. Provide a description of the method of flow measurement or estimate.

A velocity meter is used to take feet per second readings. The "stick" velocity meter is directly inserted into the discharge stream w/in the storm sewer.

Outfall SW08

EPA ID Number *(copy from Item I of Form 1)*
IND005444062

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A. You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)* Grab Sample Taken During First 20 Minutes	Maximum Values *(include units)* Flow-Weighted Composite	Average Values *(include units)* Grab Sample Taken During First 20 Minutes	Average Values *(include units)* Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Oil and Grease	4.5 mg/L	NA	3.2 mg/L	NA	9	SEE ATTACHMENT 2F-III APPENDIX B of USS Gary SWPPP provides a detailed inventory Drainage Area #32 drains stormwater through Outfall SW08 (to the Grand Calumet River) from the roadway surrounding the security and employee check-in building at the Virginia Street entrance.
Carbonaceous Biological Oxygen Demand (cBOD5)	17.4 mg/L	NA	8.6 mg/L	NA	9	
Chemical Oxygen Demand (COD)	230 mg/L	NA	99 mg/L	NA	9	
Total Suspended Solids (TSS)	708 mg/L	NA	363 mg/L	NA	9	
Total Nitrogen	<1 mg/L	NA	NA	NA	1	
Total Phosphorus	1.4 mg/L	NA	0.582 mg/L	NA	9	
	Minimum (grab)	Maximum (grab)	Minimum (comp)	Maximum (comp)		
pH	7.2 s.u.	9.8 s.u.	NA	NA	9	

Part B. List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements. Note: Part A compounds are not repeated in Part B.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)* Grab Sample Taken During First 20 Minutes	Maximum Values *(include units)* Flow-Weighted Composite	Average Values *(include units)* Grab Sample Taken During First 20 Minutes	Average Values *(include units)* Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Ammonia	0.58 mg/L	NA	0.24 mg/L	NA	9	See Above
Nitrate + Nitrite	1.4 mg/L	NA	0.48 mg/L	NA	9	
TKN	2 mg/L	NA	1 mg/L	NA	9	
Copper, Total	0.07 mg/L	NA	0.0351 mg/L	NA	9	
Lead, Total	1.2 mg/L	NA	0.207 mg/L	NA	17	
Zinc, Total	6.3 mg/L	NA	2.15 mg/L	NA	9	
Dissolved Oxygen	8.7 mg/L	NA	8.7 mg/L	NA	1	
Total Dissolved Solids	170 mg/L	NA	170 mg/L	NA	1	
Temperature	69.8 °F	NA	NA	NA	1	
Chlorine, Total Residual	<0.02 mg/L	NA	<0.02 mg/L	NA	1	
Fluoride	0.3 mg/L	NA	0.3 mg/L	NA	1	
Iron, Total	7.51 mg/L	NA	NA	NA	1	
Cadmium, Total	0.00067 mg/L	NA	NA	NA	1	
Chromium, Total	0.0329 mg/L	NA	NA	NA	1	
Chromium, Hexavalent (dissolved)	0.011 mg/L	NA	NA	NA	1	
Mercury, Total	<0.00016 mg/L	NA	NA	NA	1	
Nickel, Total	0.00217 mg/L	NA	NA	NA	1	
Selenium, Total	<0.001 mg/L	NA	NA	NA	1	
Silver, Total	<0.0005 mg/L	NA	NA	NA	1	
Cyanide, WAD	<0.002 mg/L	NA	NA	NA	1	
Cyanide, Total	0.0038 mg/L	NA	NA	NA	1	
Phenols, Total ("4AAP	0.0067 mg/L	NA	NA	NA	1	
Benzene	<0.46 **ug/L**	NA	NA	NA	1	
Tetrachloroethene	<0.39 **ug/L**	NA	NA	NA	1	
Benzo (a) pyrene	<0.088 **ug/L**	NA	NA	NA	1	

Continued from the Front Outfall SW08

Part C. List each pollutant shown in Tables 2F-2. 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Adequate information to assess potential stormwater pollutants is provided in the following:						
	Form 2C, Section V's					
	Form 2F, Pages VII-1 and VII-2					

Part D. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*
11/17/15	130	0.29	>72 Hours	0.8-1.5 fps	
03/24/16	340	0.99	>72 Hours	0.3 fps	
06/15/16	120	0.81	>72 Hours	0.75 fps	
09/26/16	75	0.10	>72 Hours	0.2 fps	
11/02/16	240	2.73	>72 Hours	0.8 fps	
03/25/17	45	0.17	<72 Hours	0.2 fps	
06/29/17	240	1.10	>72 Hours	0.5 fps	
09/19/17	240	1.23	<72 Hours	0.6 fps	
01/08/18	NA-Snow Melt	NA-Snow Melt	NA	Flow too low to register	
03/27/18	180	0.17	>72 Hours	0.3 fps	
05/14/18	45	0.39	>72 Hours	0.2 fps	
08/20/18	60	0.34	>72 Hours	0.1 fps	
12/01/18	180	0.27	<72 Hours	0.2 fps	
01/07/19	180	0.12	<72 Hours	0.3 fps	
05/16/19	75	0.16	>72 Hours	0.8 fps	
09/22/19	50	0.19	>72 Hours	0.8 fps	
11/21/19	120	0.53	>72 Hours	0.3 fps	

9. Provide a description of the method of flow measurement or estimate.

A velocity meter is used to take feet per second readings. The "stick" velocity meter is directly inserted into the discharge stream w/in the storm sewer.

Outfall SW11

EPA ID Number *(copy from Item I of Form 1)*
IND005444062

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A. You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*: Grab Sample Taken During First 20 Minutes	Maximum Values *(include units)*: Flow-Weighted Composite	Average Values *(include units)*: Grab Sample Taken During First 20 Minutes	Average Values *(include units)*: Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Oil and Grease	25 mg/L	NA	6.7 mg/L	NA	9	SEE ATTACHMENT 2F-III APPENDIX B of USS Gary SWPPP provides a detailed inventory Stormwater run-off from Broadway Street and the immediate area drains to the Grand Calumet River via SW11.
Carbonaceous Biological Oxygen Demand (cBOD5)	47 mg/L	NA	9.8 mg/L	NA	9	
Chemical Oxygen Demand (COD)	820 mg/L	NA	135 mg/L	NA	9	
Total Suspended Solids (TSS)	3670 mg/L	NA	747 mg/L	NA	9	
Total Nitrogen	<1 mg/L	NA	NA	NA	1	
Total Phosphorus	3 mg/L	NA	0.97 mg/L	NA	9	
pH	Minimum (grab) 6.3 s.u.	Maximum (grab) 9.4 s.u.	Minimum (comp) NA	Maximum (comp) NA	9	

Part B. List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements. Note: Part A compounds are not repeated in Part B.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*: Grab Sample Taken During First 20 Minutes	Maximum Values *(include units)*: Flow-Weighted Composite	Average Values *(include units)*: Grab Sample Taken During First 20 Minutes	Average Values *(include units)*: Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Ammonia as N	1.12 mg/L	NA	0.341 mg/L	NA	9	See Above
Nitrate + Nitrite	0.66 mg/L	NA	0.42 mg/L	NA	9	
TKN	2.8 mg/L	NA	1.14 mg/L	NA	9	
Copper, Total	0.24 mg/L	NA	0.052 mg/L	NA	9	
Lead, Total	0.29 mg/L	NA	0.0885 mg/L	NA	18	
Zinc, Total	3.4 mg/L	NA	0.815 mg/L	NA	9	
Dissolved Oxygen	8.3 mg/L	NA	NA	NA	1	
Total Dissolved Solids	560 mg/L	NA	NA	NA	1	
Temperature	67.4 °F	NA	NA	NA	1	
Chlorine, Total Residual	<0.02 mg/L	NA	NA	NA	1	
Fluoride	0.56 mg/L	NA	NA	NA	1	
Iron, Total	19.7 mg/L	NA	NA	NA	1	
Cadmium, Total	0.000696 mg/L	NA	NA	NA	1	
Chromium, Total	0.154 mg/L	NA	NA	NA	1	
Chromium, Hexavalent (dissolved)	0.000909 mg/L	NA	NA	NA	1	
Mercury, Total	<0.00016 mg/L	NA	NA	NA	1	
Nickel, Total	0.00614 mg/L	NA	NA	NA	1	
Selenium, Total	<0.00171 mg/L	NA	NA	NA	1	
Silver, Total	<0.0005 mg/L	NA	NA	NA	1	
Cyanide, WAD	0.0026 mg/L	NA	NA	NA	1	
Cyanide, Total	0.0184 mg/L	NA	NA	NA	1	
Phenols, Total ("4AAP Phenolics")	<0.002 mg/L	NA	NA	NA	1	
Benzene	<0.46 **ug/L**	NA	NA	NA	1	
Tetrachloroethene	<0.39 **ug/L**	NA	NA	NA	1	
Benzo (a) pyrene	<0.044 **ug/L**	NA	NA	NA	1	

Continued from the Front Outfall SW11

Part C.	List each pollutant shown in Tables 2F-2. 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.					
Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Adequate information to assess potential stormwater pollutants is provided in the following:						
	Form 2C, Section V's					
	Form 2F, Pages VII-1 and VII-2					

Part D. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*
11/17/15	130	0.29	>72 hours	0.8-1.5 fps	
03/24/16	340	0.99	>72 hours	0.3 fps	
06/15/16	120	0.81	>72 hours	0.5 fps	
09/26/16	75	0.10	>72 hours	0.2 fps	
11/02/16	240	2.73	>72 hours	0.3 fps	
03/25/17	45	0.17	<72 hours	0.4 fps	
06/29/17	240	1.10	>72 hours	0.4 fps	
09/19/17	240	1.23	<72 hours	0.7 fps	
12/22/17	30	0.02	<72 hours	Flow too low to register	
01/08/18	N/A- Snow Melt	N/A- Snow Melt	NA	Flow too low to register	
03/27/18	180	0.17	> 72 hours	0.3 fps	
05/09/18	45	0.39	> 72 hours	0.2 fps	
08/20/18	60	0.34	>72 hours	0.4 fps	
12/01/18	180	0.27	<72 hours	0.2 fps	
01/07/19	180	0.12	<72 hours	0.3 fps	
05/16/19	75	0.16	>72 hours	0.9 fps	
09/22/19	50	0.19	>72 hours	0.4 fps	
11/21/19	120	0.53	>72 hours	0.4 fps	

9. Provide a description of the method of flow measurement or estimate.

A velocity meter is used to take feet per second readings. The "stick" velocity meter is directly inserted into the discharge stream w/in the storm sewer.

Outfall SW32

EPA ID Number *(copy from Item I of Form 1)*
IND005444062

Form Approved. OMB No. 2040-0086

Approval expires 5-31-92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A. You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Oil and Grease	2.2 mg/L	NA	1.6 mg/L	NA	9	SEE ATTACHMENT 2F-III APPENDIX B of USS Gary SWPPP provides a detailed inventory During stormevents Outfall 032 recieves stormwater from Drainage Area #20: stormwater collected from the vicinity of the vacated Bar Mill area and Billet Storage area.
Carbonaceous Biological Oxygen Demand (cBOD5)	4.2 mg/L	NA	2.4 mg/L	NA	9	
Chemical Oxygen Demand (COD)	34 mg/L	NA	15.6 mg/L	NA	9	
Total Suspended Solids (TSS)	37 mg/L	NA	12.5 mg/L	NA	9	
Total Nitrogen	<1 mg/L	NA	NA	NA	1	
Total Phosphorus	0.13 mg/L	NA	0.065 mg/L	NA	9	
pH	Minimum (grab) 6.7 s.u.	Maximum (grab) 8.5 s.u.	Minimum (comp) NA	Maximum (comp) NA	9	

Part B. List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements. Note: Part A compounds are not repeated in Part B.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Ammonia as N	0.171 mg/L	NA	0.171 mg/L	NA	1	See Above
Nitrate + Nitrite	0.69 mg/L	NA	0.41 mg/L	NA	9	
TKN	0.87 mg/L	NA	0.5 mg/L	NA	9	
Copper, Total	0.0137 mg/L	NA	0.052 mg/L	NA	9	
Lead, Total	0.00612 mg/L	NA	0.0885 mg/L	NA	18	
Zinc, Total	0.17 mg/L	NA	0.043 mg/L	NA	9	
Dissolved Oxygen	7.6 mg/L	NA	NA	NA	1	
Total Dissolved Solids	180 mg/L	NA	NA	NA	1	
Temperature	70.7 deg.F	NA	NA	NA	1	
Chlorine, Total Residual	<0.02 mg/L	NA	NA	NA	1	
Fluoride	0.50 mg/L	NA	NA	NA	1	
Iron, Total	0.804 mg/L	NA	NA	NA	1	
Cadmium, Total	<0.0002 mg/L	NA	NA	NA	1	
Chromium, Total	0.00239 mg/L	NA	NA	NA	1	
Chromium, Hexavalent (dissolved)	0.000153 mg/L	NA	NA	NA	1	
Mercury, Total	<0.00016 mg/L	NA	NA	NA	1	
Nickel, Total	0.00137 mg/L	NA	NA	NA	1	
Selenium, Total	<0.001 mg/L	NA	NA	NA	1	
Silver, Total	<0.0005 mg/L	NA	NA	NA	1	
Cyanide, WAD	<0.002 mg/L	NA	NA	NA	1	
Cyanide, Total	<0.002 mg/L	NA	NA	NA	1	
Phenols, Total ("4AAP Phenolics")	0.0025 mg/L	NA	NA	NA	1	
Benzene	<0.46 **ug/L**	NA	NA	NA	1	
Tetrachloroethene	<0.39 **ug/L**	NA	NA	NA	1	
Benzo (a) pyrene	<0.044 **ug/L**	NA	NA	NA	1	

Continued from the Front Outfall SW32

Part C. List each pollutant shown in Tables 2F-2. 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Adequate information to assess potential stormwater pollutants is provided in the following:						
	Form 2C, Section V's					
	Form 2F, Pages VII-1 and VII-2					

Part D. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*
11/17/15	130	0.29	>72 hours	0.5-1.0 fps	
06/15/16	120	0.81	>72 hours	0.5 fps	
11/02/16	240	2.73	>72 hours	0.9 fps	
06/29/17	240	1.10	>72 hours	0.9 fps	
09/19/17	240	1.23	<72 hours	1.7 fps	
05/09/18	45	0.39	> 72 hours	1.2 fps	
08/20/18	60	0.34	>72 hours	0.8 fps	
05/16/19	75	0.16	>72 hours	1.3 fps	
09/22/19	50	0.19	>72 hours	1.7 fps	

9. Provide a description of the method of flow measurement or estimate.

A velocity meter is used to take feet per second readings. The "stick" velocity meter is directly inserted into the discharge stream w/in the storm sewer.

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A. You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)* Grab Sample Taken During First 20 Minutes	Maximum Values Flow-Weighted Composite	Average Values *(include units)* Grab Sample Taken During First 20 Minutes	Average Values Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Oil and Grease	3.9 mg/L	NA	1.8 mg/L	NA	9	SEE ATTACHMENT 2F-III APPENDIX B of USS Gary SWPPP provides a detailed inventory During stormevents Outfall 033 recieves stormwater from Drainage Area #21 (stormwater from the Number 7 and 10 Tin Plate Warehouse, Tin Plate Storage area, Atmospheric Gas Plant, and the Sheet Mill). The discharge is to the Grand Calumet River via Outfall 033.
Carbonaceous Biological Oxygen Demand (cBOD5)	5.4 mg/L	NA	2.5 mg/L	NA	9	
Chemical Oxygen Demand (COD)	130 mg/L	NA	26 mg/L	NA	9	
Total Suspended Solids (TSS)	280 mg/L	NA	39.7 mg/L	NA	9	
Total Nitrogen	<1 mg/L	NA	NA mg/L	NA	1	
Total Phosphorus	0.4 mg/L	NA	0.078 mg/L	NA	9	
pH	Minimum (grab) 6.4 s.u.	Maximum (grab) 8.8 s.u.	Minimum (comp) NA	Maximum (comp) NA	9	

Part B. List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements. Note: Part A compounds are not repeated in Part B.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)* Grab Sample Taken During First 20 Minutes	Maximum Values Flow-Weighted Composite	Average Values *(include units)* Grab Sample Taken During First 20 Minutes	Average Values Flow-Weighted Composite	Number of Storm Events Sampled	Sources of Pollutants
Ammonia as N	0.177 mg/L	NA	0.177 mg/L	NA	1	See Above
Nitrate + Nitrite	0.39 mg/L	NA	0.34 mg/L	NA	9	
TKN	1.3 mg/L	NA	0.65 mg/L	NA	9	
Copper, Total	0.00398 mg/L	NA	0.052 mg/L	NA	9	
Lead, Total	0.00524 mg/L	NA	0.0885 mg/L	NA	18	
Zinc, Total	0.2 mg/L	NA	0.041 mg/L	NA	9	
Dissolved Oxygen	7.8 mg/L	NA	NA	NA	1	
Total Dissolved Solids	460 mg/L	NA	NA	NA	1	
Temperature	68.8 °F	NA	NA	NA	1	
Chlorine, Total Residual	<0.02 mg/L	NA	NA	NA	1	
Fluoride	0.38 mg/L	NA	NA	NA	1	
Iron, Total	3.47 mg/L	NA	NA	NA	1	
Cadmium, Total	<0.0002 mg/L	NA	NA	NA	1	
Chromium, Total	0.00588 mg/L	NA	NA	NA	1	
Chromium, Hexavalent (dissolved)	0.000554 mg/L	NA	NA	NA	1	
Mercury, Total	<0.00016 mg/L	NA	NA	NA	1	
Nickel, Total	0.00115 mg/L	NA	NA	NA	1	
Selenium, Total	<0.001 mg/L	NA	NA	NA	1	
Silver, Total	<0.0005 mg/L	NA	NA	NA	1	
Cyanide, WAD	<0.002 mg/L	NA	NA	NA	1	
Cyanide, Total	0.00215 mg/L	NA	NA	NA	1	
Phenols, Total ("4AAP Phenolics")	0.0070 mg/L	NA	NA	NA	1	
Benzene	<0.46 **ug/L**	NA	NA	NA	1	
Tetrachloroethene	<0.39 **ug/L**	NA	NA	NA	1	
Benzo (a) pyrene	<0.044 **ug/L**	NA	NA	NA	1	

Continued from the Front Outfall SW33

Part C. List each pollutant shown in Tables 2F-2. 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-Weighted Composite		
Adequate information to assess potential stormwater pollutants is provided in the following:						
	Form 2C, Section V's					
	Form 2F, Pages VII-1 and VII-2					

Part D. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*
11/17/15	130	0.29	>72 hours	0.5-0.6 fps	
06/15/16	120	0.81	>72 hours	0.7 fps	
11/02/16	240	2.73	>72 hours	0.2 fps	
06/29/17	240	1.10	>72 hours	0.3 fps	
09/19/17	240	1.23	<72 hours	0.5 fps	
05/09/18	45	0.39	> 72 hours	0.3 fps	
08/20/18	60	0.34	>72 hours	0.3 fps	
05/16/19	75	0.16	>72 hours	0.6 fps	
09/22/19	50	0.19	>72 hours	0.2 fps	

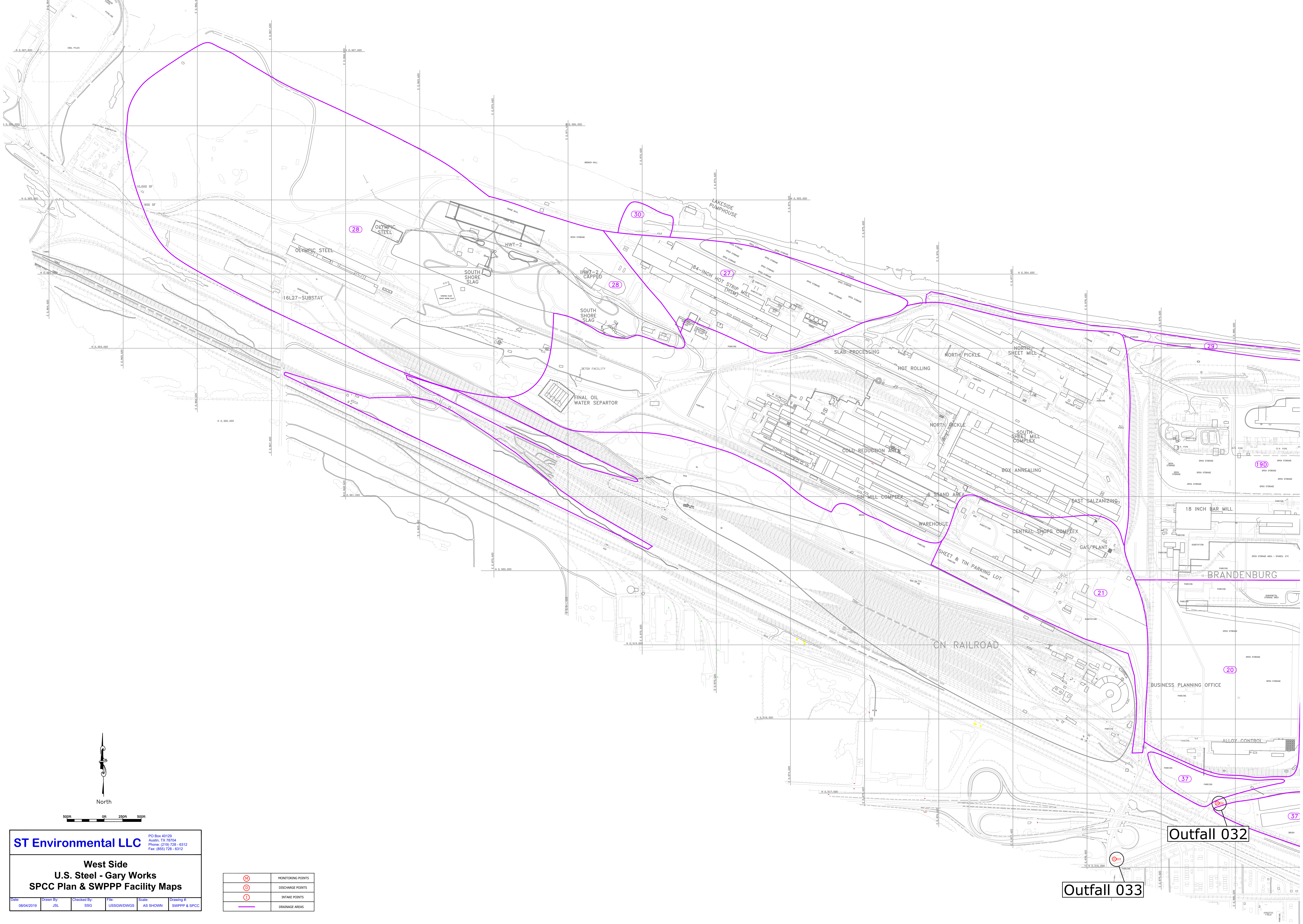
9. Provide a description of the method of flow measurement or estimate.

A velocity meter is used to take feet per second readings. The "stick" velocity meter is directly inserted into the discharge stream w/in the storm sewer.

Attachment 2F-III

West Side Site Drainage Overview Map
East Side Site Drainage Overview Map
West Side SWPPP/SPCC Map
East Side SWPPP/SPCC Map

West Side Site Drainage Overview Map



ST Environmental LLC

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Austin, TX 78704
Phone: (219) 728 - 6312
Fax: (855) 728 - 6312

West Side
U.S. Steel - Gary Works
SPCC Plan & SWPPP Facility Maps

Date:	Drawn By:	Checked By:	File:	Scale:	Drawing #:
08/04/2019	JSL	SSG	USSGW/DWGS	AS SHOWN	SWPPP & SPCC

M	MONITORING POINTS
D	DISCHARGE POINTS
I	INTAKE POINTS
	DRAINAGE AREAS

East Side Site Drainage Overview Map

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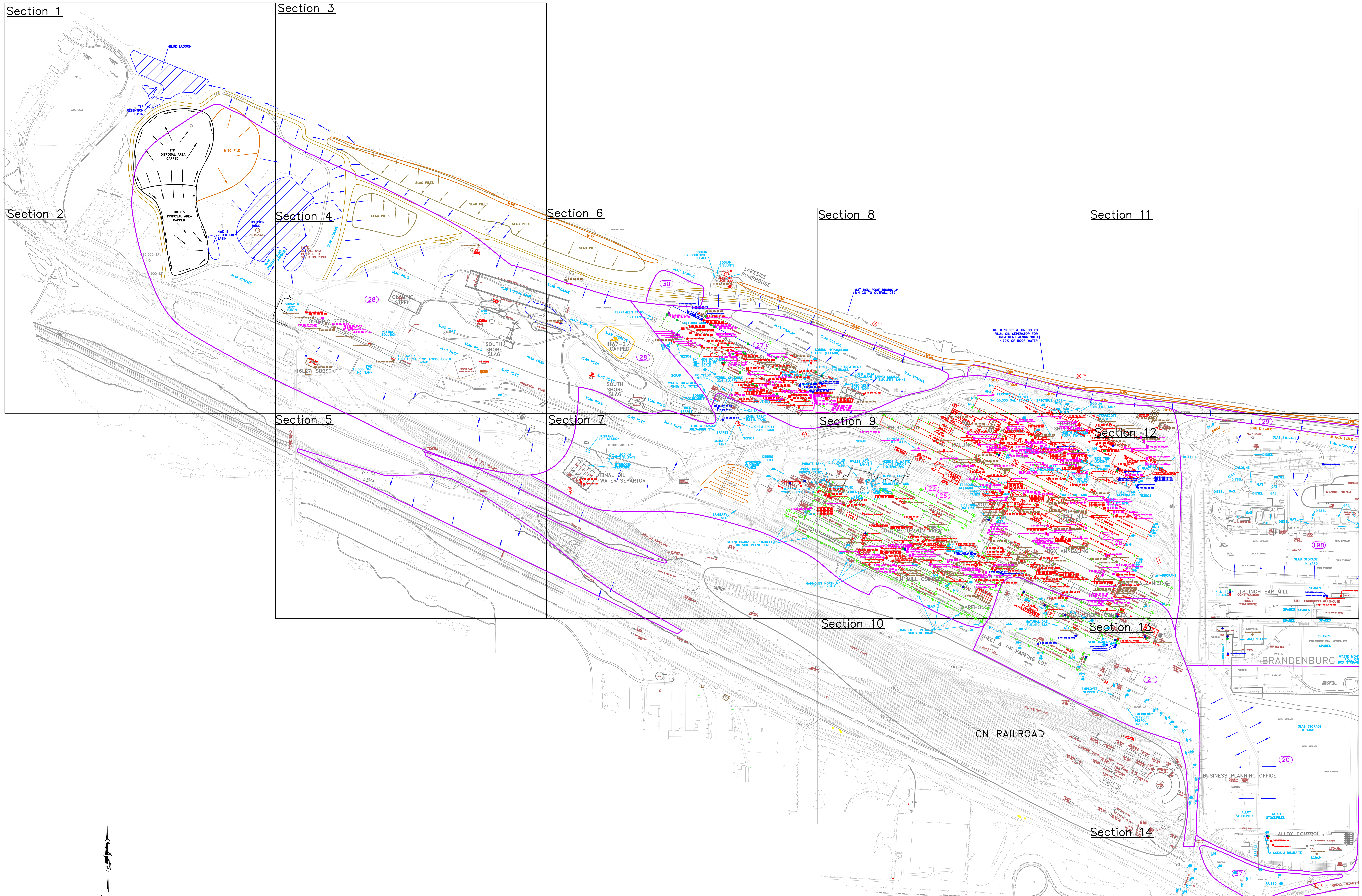
East Side
U.S. Steel - Gary Works
SPCC Plan & SWPPP Facility Maps

Date:	Drawn By:	Checked By:	File:	Scale:	Drawing #:
08/04/2019	JSL	SSG	USSGW/DWGS	AS SHOWN	SWPPP & SPCC

M	MONITORING POINTS
D	DISCHARGE POINTS
I	INTAKE POINTS
	DRAINAGE AREAS



SINGLE TANK	MULTIPLE TANKS	LOCATION DESCRIPTION
		INDOORS - MILL FLOOR LEVEL
		INDOORS - BASEMENT LEVEL
		OUTDOORS
		PROCESS TANK
		TRANSFORMERS, SUBSTATIONS
M		MONITORING POINTS
D		DISCHARGE POINTS
I		INTAKE POINTS
		DRAINAGE AREAS

WASTE SYMBOLS	WASTE DESCRIPTIONS
	AEROSOL CANS
	BATTERIES
	BULBS
	HILTI CARTRIDGES

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West Side
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Date:	Drawn By:	Checked By:	File:	Scale:	Drawing #:
08/04/2019	JSL	SSG	USSGW/DWGS	AS SHOWN	SWPPP & SPCC

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U.S. Steel - Gary Works
SPCC Plan & SWPPP Facility Maps

Date:	Drawn By:	Checked By:	File:	Scale:	Drawing #:
08/04/2019	JSL	SSG	USSGW/DWGS	AS SHOWN	SWPPP & SPCC

WASTE SYMBOLS	WASTE DESCRIPTIONS
	AEROSOL CANS
	BATTERIES
	BULBS
	HILTI CARTRIDGES

SINGLE TANK	MULTIPLE TANKS	LOCATION DESCRIPTION
		INDOORS - MILL FLOOR LEVEL
		INDOORS - BASEMENT LEVEL
		OUTDOORS
		PROCESS TANK
		TRANSFORMERS, SUBSTATIONS
M		MONITORING POINTS
D		DISCHARGE POINTS
I		INTAKE POINTS
		DRAINAGE AREAS

500ft 0ft 250ft 500ft

North

Attachment I

Water Treatment Additives Information

ATTACHMENT I - U. S. STEEL GARY WORKS - WATER TREATMENT ADDITIVES (PREVIOUSLY APPROVED)

Notes: All MSDSs and dosage data have previously been submitted.
Approval request for ChemTreat CT-708 and CL-5690 usage associated with Outfall 034 submitted on 4/30/2020.
* Usage originally listed in association with now closed Outfall 005; applicable discharges re-routed to Outfall 015.

Outfall	Water Treatment Additive / Trade Name	Purpose / Use
015	ChemTreat BL-126	Dechlorination
015*	ChemTreat CL-1370	Scale Inhibitor
015*	ChemTreat CL-4074	Scale Inhibitor
015*	ChemTreat CL-5002	Tracer Dye for Test Purposes
015*	ChemTreat CT-775	WWTP - Biological Nutrient
015*	ChemTreat CT-930	WWTP - Dewatering Aid
015*	ChemTreat CT-936	Surfactant
015*	ChemTreat FO-120	Antifoam
015	ChemTreat FO-180	Antifoam
015*	ChemTreat P-817E	WWTP - Flocculant
015*	ChemTreat P-823L	WWTP - Coagulant
015*	ChemTreat P-825L	WWTP - Coagulant
015*	ChemTreat P-835E	WWTP - Flocculant
015	ChemTreat P-8905L	WWTP - Coagulant
015	ChemTreat P-891L	WWTP - Coagulant
015*	Hydrochloric (Muriatic) Acid	WWTP - pH Control
015	Perlite / Sil-Kleer	WWTP - Dewatering Aid
015*	Magnesium Hydroxide	WWTP - pH / Alkalinity Control
015	Sodium Bisulfite & Sodium Metabisulfite	Dechlorination prior to discharge
015	Sodium Hydroxide	WWTP - pH Adjustment / Alkalinity Control
015	Sodium Hypochlorite	Biocide for Zebra Mussel Control & Microbial Control
015	Sulfuric Acid	WWTP - pH Adjustment / Ammonia Absorbing Aid
018/019	ChemTreat BL-122	Dechlorination
018/019	ChemTreat BL-126	Dechlorination
018/019	ChemTreat BL-1253	Dechlorination
018/019	ChemTreat BL-1302	Dechlorination
018/019	ChemTreat BL-1350	Boiler Water Dispersant
018/019	ChemTreat BL-1513	Amine for Corrosion Control
018/019	ChemTreat BL-197	Defoamer
018/019	ChemTreat CL-1355	Service Water Deposit Control
018/019	ChemTreat CL-1376	Scale Inhibitor
018/019	ChemTreat CT-709	Corrosion Inhibitor
018/019	ChemTreat FO-180	Antifoam
018/019	ChemTreat CL-5002	Tracer Dye for Test Purposes
018/019	ChemTreat RL-9007	Antiscalent (RO system)
018/019	Lime	pH / Alkalinity Control
018/019	Sodium Bisulfite	Dechlorination prior to discharge and for the CWTP system
018/019	Sodium Chloride (Salt)	Boiler Feed Water Treatment / Softener Regeneration
018/019	Sodium Hydroxide	pH Control (UF & RO System)
018/019	Sodium Hypochlorite	Biocide for Zebra Mussel Control and Microbiological Control
020	ChemTreat CL-1355	Service Water Deposit Control
020	ChemTreat FO-180	Antifoam
020	Sodium Bisulfite or ChemTreat BL-122	Dechlorination prior to discharge
020	Sodium Hypochlorite	Biocide for Zebra Mussel Control
021	Sodium Bisulfite	Dechlorination prior to discharge
021	Sodium Hypochlorite	Biocide for Zebra Mussel Control
023	Sodium Bisulfite	Dechlorination prior to discharge
023	Sodium Hypochlorite	Biocide for Zebra Mussel Control
026	Sodium Bisulfite	Dechlorination prior to discharge
026	Sodium Hypochlorite	Biocide for Zebra Mussel Control
028/030	ChemTreat CL-1355	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-1370	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-1375	Dispersant / Scale inhibitor
028/030	ChemTreat BL-1377	Corrosion Inhibitor

ATTACHMENT I - U. S. STEEL GARY WORKS - WATER TREATMENT ADDITIVES (PREVIOUSLY APPROVED)

Notes: All MSDSs and dosage data have previously been submitted.
Approval request for ChemTreat CT-708 and CL-5690 usage associated with Outfall 034 submitted on 4/30/2020.
* Usage originally listed in association with now closed Outfall 005; applicable discharges re-routed to Outfall 015.

Outfall	Water Treatment Additive / Trade Name	Purpose / Use
028/030	ChemTreat CL-1427	Dispersant / Scale inhibitor
028/030	ChemTreat CL-2005	Dispersant / Scale inhibitor
028/030	ChemTreat CL-206	Biocide
028/030	ChemTreat CL-2840	Dispersant / Scale inhibitor
028/030	ChemTreat CL-2900	Dispersant / Scale inhibitor
028/030	ChemTreat CL-3857	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-4074	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-4075	Dispersant / Scale inhibitor
028/030	ChemTreat CL-4125	Dispersant / Scale inhibitor
028/030	Chemtreat CL-41	Microbiological Control
028/030	ChemTreat CL-4437	Service Water Deposit Control
028/030	ChemTreat CL-4442	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-4800	Dispersant / Scale Inhibitor
028/030	ChemTreat CL-49	Dispersant / Scale inhibitor
028/030	ChemTreat CL-5695	Dispersant / Scale inhibitor
028/030	ChemTreat FO-120	Antifoam
028/030	Chemtreat CL-5691	Scale / Corrosion Inhibitor
028/030	ChemTreat FO-180	Antifoam
028/030	ChemTreat P-813E	WWTP - Flocculant
028/030	ChemTreat P-817E	WWTP - Flocculant
028/030	ChemTreat P-841L	WWTP - Coagulant
028/030	ChemTreat P-873L	WWTP - Coagulant
028/030	ChemTreat P-891L	WWTP - Coagulant
028/030	ChemTreat P-894L	WWTP - Coagulant
028/030	ChemTreat P-895L	WWTP - Coagulant
028/030	ChemTreat S-101	WWTP - Polymer
028/030	Hydrochloric (Muriatic) Acid	WWTP - pH Control
028/030	ChemTreat P-8905L	WWTP - Coagulant
028/030	Potassium Hydroxide	pH / Alkalinity Control
028/030	Sodium Bisulfite	Dechlorination prior to discharge
028/030	Sodium Hydroxide	pH / Alkalinity Control
028/030	Sodium Hypochlorite	Biocide for Zebra Mussel Control & Microfouling Control in Caster Systems
028/030	Sulfuric Acid	pH Control
028/030	ChemTreat CT708	Antiscalent at QBOP Hood Cooling water system
028/030	ChemTreat CL5690	Antiscalent at QBOP Hood Cooling water system
032	Sodium Bisulfite	Dechlorination prior to discharge
032	Sodium Hypochlorite	Biocide for Zebra Mussel Control
033	Sodium Bisulfite	Dechlorination prior to discharge
033	Sodium Hypochlorite	Biocide for Zebra Mussel Control
034	ChemTreat BL-124	Corrosion Inhibitor
034	ChemTreat BL-1301	Dispersant
034	ChemTreat BL-1304	Boiler Water Treatment
034	ChemTreat BL-1349	Corrosion Inhibitor
034	ChemTreat CL-1355	Dispersant / Scale Inhibitor
034	ChemTreat BL-1513	Corrosion Inhibitor
034	ChemTreat BL-1547	Corrosion Inhibitor
034	ChemTreat CL-1439	Dispersant / Scale inhibitor
034	ChemTreat CL-454	Catalyst used with oxidizer
034	ChemTreat CL-49	Dispersant / Scale inhibitor
034	ChemTreat CT-709	Corrosion Inhibitor
034	ChemTreat CT-804	Bacteria Supplement
034	ChemTreat CT-907	Surfactant
034	ChemTreat CT-930	Demulsifier
034	ChemTreat FO-180	Antifoam

ATTACHMENT I - U. S. STEEL GARY WORKS - WATER TREATMENT ADDITIVES (PREVIOUSLY APPROVED)

Notes: All MSDSs and dosage data have previously been submitted.
Approval request for ChemTreat CT-708 and CL-5690 usage associated with Outfall 034 submitted on 4/30/2020.
* Usage originally listed in association with now closed Outfall 005; applicable discharges re-routed to Outfall 015.

Outfall	Water Treatment Additive / Trade Name	Purpose / Use
034	ChemTreat P-802E	WWTP - Flocculant
034	ChemTreat P-813E	WWTP - Flocculant
034	ChemTreat P-817E	WWTP - Flocculant
034	ChemTreat P-819L	WWTP - Coagulant
034	ChemTreat P-835E	WWTP - Flocculant
034	ChemTreat P-841L	WWTP - Coagulant
034	ChemTreat P-846E	WWTP - Flocculant
034	ChemTreat P-873L	WWTP - Coagulant
034	ChemTreat P-8005L	Chromium Reduction
034	ChemTreat P-8905L	WWTP - Coagulant
034	ChemTreat P-891L	WWTP - Coagulant
034	ChemTreat P-895L	WWTP - Coagulant
034	Chlorine Dioxide	Oxidizer
034	Copper Sulfate	Biocide
034	Hydrochloric (Muriatic) Acid	WWTP - pH Control
034	Ferric Chloride	Demineralization System
034	Hydrogen Peroxide	Oxidizer / Odor Control
034	Lime	pH / Alkalinity Control
034	Purate	Chlorine Dioxide Generation
034	Sodium Bisulfite	Dechlorination prior to discharge and for the Demin System
034	Sodium Hydroxide	pH / Alkalinity Control / Demin Regeneration
034	Sodium Hypochlorite	Biocide for Zebra Mussel Control & Microfouling Control in Hot Strip Mill Recycle System
034	Sulfuric Acid	pH control / Demin Regeneration / Chlorine Dioxide Generation
035	ChemTreat CL-1355	Dispersant / Scale Inhibitor
035	ChemTreat CT-709	Corrosion Inhibitor
035	Sodium Bisulfite	Dechlorination prior to discharge
035	Sodium Hypochlorite	Biocide for Zebra Mussel Control
037	ChemTreat CL-4358	Dispersant / Scale Inhibitor
037	ChemTreat CT-709	Corrosion Inhibitor
037	Sodium Bisulfite	Dechlorination prior to discharge
037	Sodium Hypochlorite	Biocide for Zebra Mussel Control
039	Sodium Bisulfite	Dechlorination prior to discharge
039	Sodium Hypochlorite	Biocide for Zebra Mussel Control

Attachment II

316(a) Alternative Thermal Effluent Limits Information

ATTACHMENT II – ALTERNATIVE THERMAL EFFLUENT LIMITS REQUEST FOR INSTREAM MONITORING LOCATIONS 220 AND 230

U. S. Steel requests continued recognition of the Clean Water Act 316(a) (thermal demonstration) alternate thermal effluent limits (ATELs) applied at in-stream Grand Calumet River (GCR) monitoring points 220 (100 feet downstream of Outfall 020) and 230 (100 feet downstream of Outfall 030) approved by IDEM. These were first incorporated into a modified Permit (effective January 1, 2013) and continued in the November 1, 2015 renewed Permit. Pursuant to Part III.A.g. of the current Permit, U. S. Steel has re-evaluated the need for ATELs since elimination of the Outfall 005 thermal discharge associated with coke production[1]. Continued authorization of the existing ATELs for these locations is requested.

Month	Current 220 and 230 ATEL Monthly Average Limits (°F)	Current 220 and 230 ATEL Daily Maximum Limits (°F)
January		59
February		58
March		69
April		73
May		83
June	90	93
July	90	93
August	90	93
September	90	93
October		83
November		75
December		63

The current ATELs are based in part on an in-steam GCR temperature dataset (measured at Broadway Street) spanning the timeframe of October 2006 through March 2012. Monthly maximum daily temperatures + 3 °F were considered in order to account for the intermittent, unexpected, and uncontrolled occurrence of extended periods of elevated ambient temperatures. The current ATELs were also established to match compliance thresholds with the thermal trends, ranges, and patterns that have historically occurred and currently exist in the Grand Calumet River. This same historical thermal pattern and range has dictated (and continues to dictate) the assemblage of fish[2] that have been recorded to occur in the Grand Calumet River over the past approximately 30+ years.

For the re-evaluation, in-stream monitoring data from locations 220 and 230 over the timeframe of January 2016 through December 2019 was examined in a similar manner as the original dataset on which the current ATELs are based. Data is summarized in Tables 1 and 2. Table 1 shows that almost all instances, the measured maximum daily values + 3°F are above the applicable in-stream criteria in the absence of ATELs. Table 2 compares the measured values and those values + 3°F to the current ATELs. These tables indicate that even in the absence of the Outfall 005 thermal source, the current ATELs are necessary and appropriate. Figures 1 and 2 visually show this by comparing measured maximum 220 and 230 data to the non-ATEL criteria and the

[1] Coke production ceased on March 30, 2015.
[2] Results of a Permit required Fish Community Study were submitted to IDEM in July 2015.

current daily maximum ATELs. Figures 3 and 4 show that Lake Michigan intake temperatures closely trend with the temperatures measured at 220 and 230 in the GCR. U. S. Steel has no control on the temperature of water withdrawn from Lake Michigan. It is possible that elevated temperatures in the GCR even greater than those observed over 2016-2019 may result from the effects of drought and/or combined with extended periods of hot weather over which U. S. Steel has no control.

U. S. Steel is requesting continued authorization of the existing ATELs for in-stream monitoring locations 220 and 230. The current ATELs are based on maximum historical temperature values that still assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in the Grand Calumet River. The current ATELs are in keeping with long-standing historical conditions that support existing communities in the Grand Calumet River. U. S. Steel is not requesting to increase the heat discharged from any of the existing outfalls.

Table 1. Comparison of Measured Max Temp + 3°F to non-ATEL In-Stream Criteria

Month	In-Stream Daily Max Criteria w/o ATELs (°F)	220 Measured Maximum Daily Value +3 (°F)	230 Measured Maximum Daily Value + 3 (°F)
January	50	59.7	59.6
February	50	58.3	60.3
March	60	64.1	64.1
April	70	70.3	71.5
May	80	77.0	79.0
June	90	89.6	89.6
July	90	94.9	93.8
August	90	94.0	93.7
September	90	92.4	90.8
October	78	85.8	85.3
November	70	75.3	76.3
December	57	64.0	64.3

Note: Measured 220 and 230 values from the January 1, 2016 - December 31, 2019 dataset.

Table 2. Comparison of Measured Data to Current ATELs

In-Stream Monitoring Location 220				
Month	Measured Maximum Daily Value (°F)	Measured Maximum Daily Value + 3 (°F)	Current ATEL Monthly Average Limit (°F)	Current ATEL Daily Maximum Limit (°F)
January	56.7	59.7		59.0
February	55.3	58.3		58.0
March	61.1	64.1		69.0
April	67.3	70.3		73.0
May	74.0	77.0		83.0
June	86.6	89.6	90	93.0
July	91.9	94.9	90	93.0
August	91.0	94.0	90	93.0
September	89.4	92.4	90	93.0
October	82.8	85.8		83.0
November	72.3	75.3		75.0
December	61.0	64.0		63.0

In-Stream Monitoring Location 230				
Month	Measured Maximum Daily Value (°F)	Measured Maximum Daily Value + 3 (°F)	Current ATEL Monthly Average Limit (°F)	Current ATEL Daily Maximum Limit (°F)
January	56.6	59.6		59.0
February	57.3	60.3		58.0
March	61.1	64.1		69.0
April	68.5	71.5		73.0
May	76.0	79.0		83.0
June	86.6	89.6	90	93.0
July	90.8	93.8	90	93.0
August	90.7	93.7	90	93.0
September	87.8	90.8	90	93.0
October	82.3	85.3		83.0
November	73.3	76.3		75.0
December	61.3	64.3		63.0

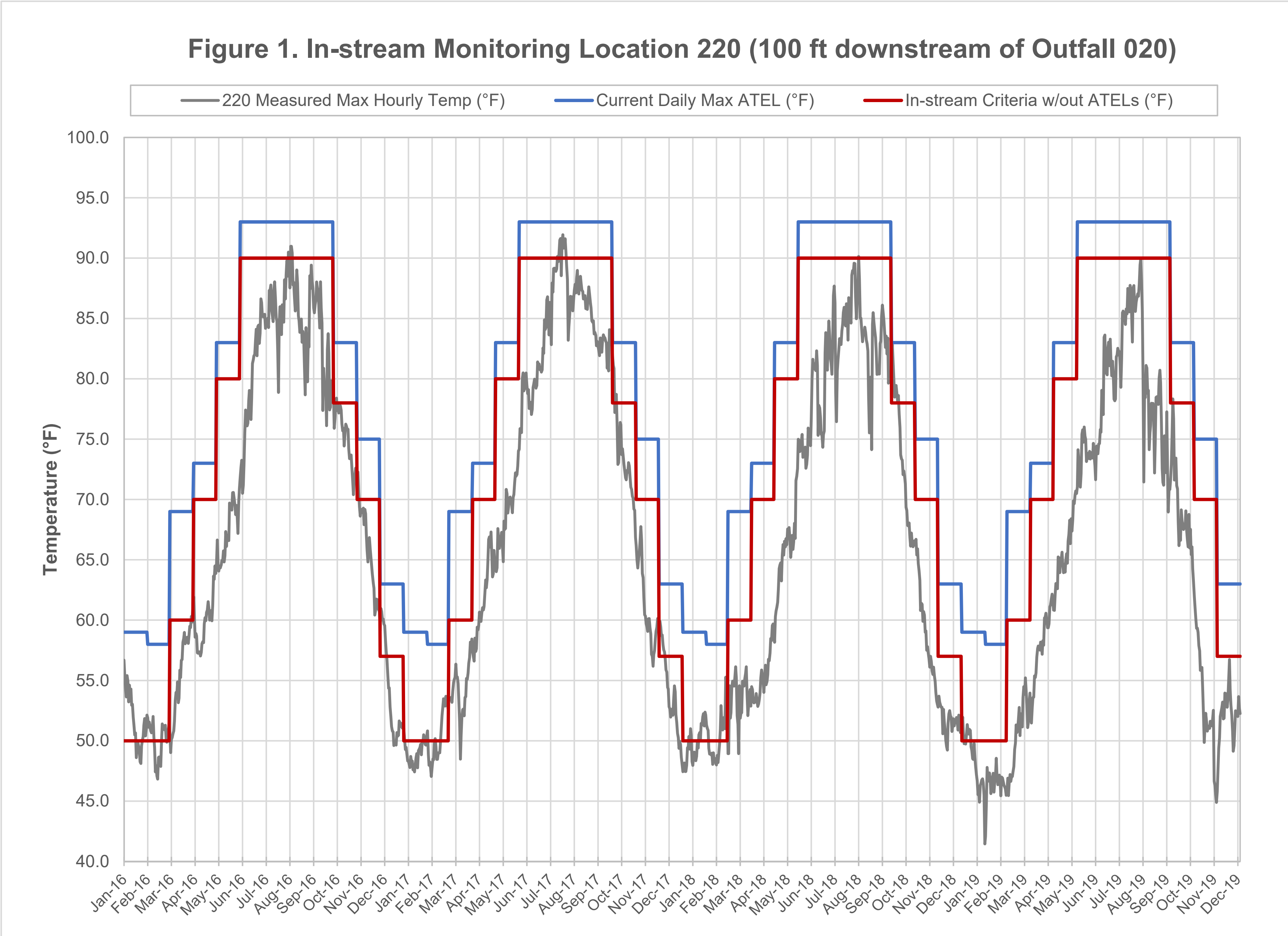
Figure 1. In-stream Monitoring Location 220 (100 ft downstream of Outfall 020)
220 Measured Max Hourly Temp (°F)
Current Daily Max ATEL (°F)
In-stream Criteria w/out ATELs (°F)
Temperature (°F)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Jan-16 Feb-16 Mar-16 Apr-16 May-16 Jun-16 Jul-16 Aug-16 Sep-16 Oct-16 Nov-16 Dec-16
Jan-17 Feb-17 Mar-17 Apr-17 May-17 Jun-17 Jul-17 Aug-17 Sep-17 Oct-17 Nov-17 Dec-17
Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18 Nov-18 Dec-18
Jan-19 Feb-19 Mar-19 Apr-19 May-19 Jun-19 Jul-19 Aug-19 Sep-19 Oct-19 Nov-19 Dec-19

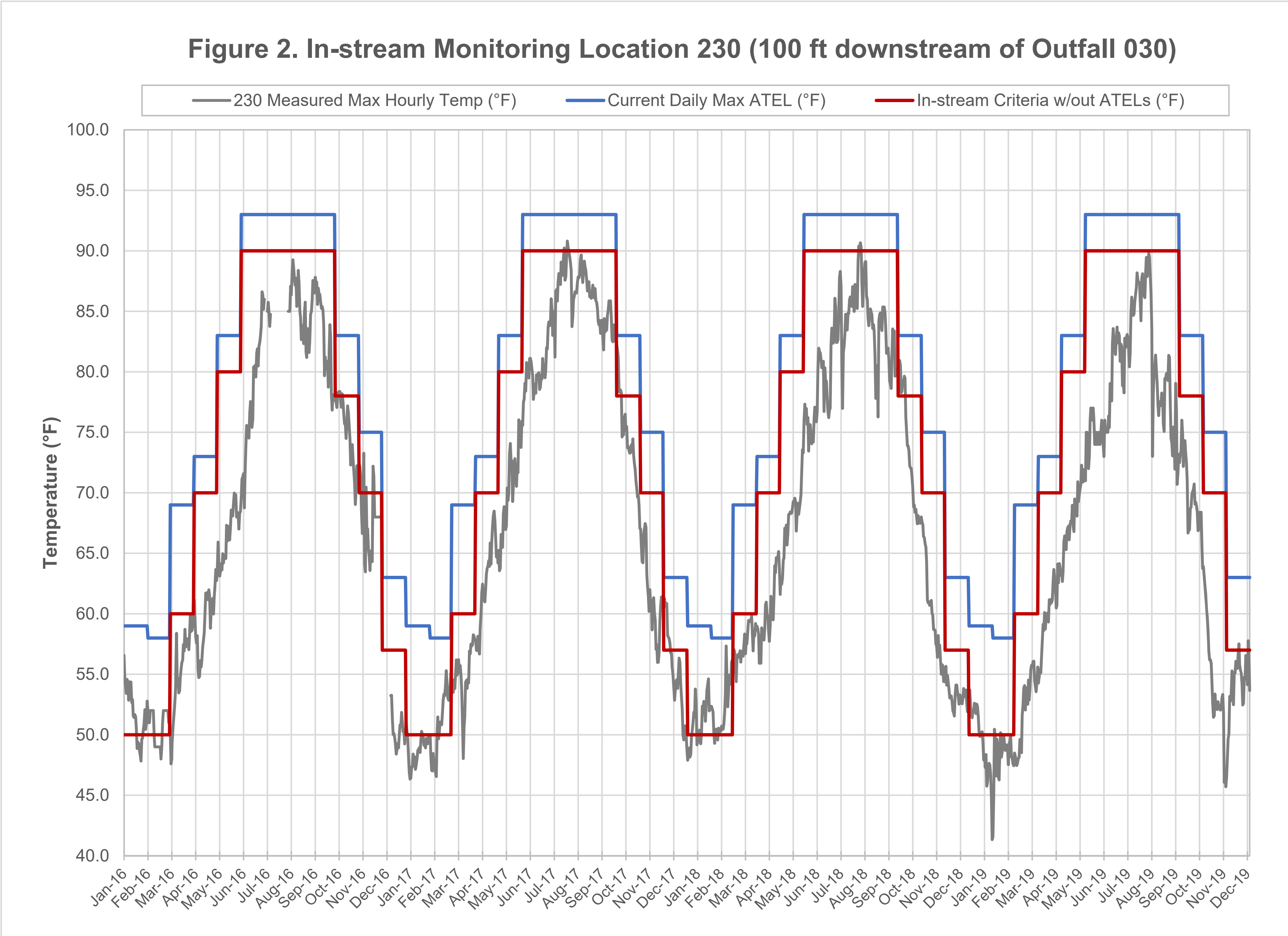

Figure 2. In-stream Monitoring Location 230 (100 ft downstream of Outfall 030)
230 Measured Max Hourly Temp (°F)
Current Daily Max ATEL (°F)
In-stream Criteria w/out ATELs (°F)
Temperature (°F)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
Jan-16 Feb-16 Mar-16 Apr-16 May-16 Jun-16 Jul-16 Aug-16 Sep-16 Oct-16 Nov-16 Dec-16 Jan-17 Feb-17 Mar-17 Apr-17 May-17 Jun-17 Jul-17 Aug-17 Sep-17 Oct-17 Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18 Nov-18 Dec-18 Jan-19 Feb-19 Mar-19 Apr-19 May-19 Jun-19 Jul-19 Aug-19 Sep-19 Oct-19 Nov-19 Dec-19

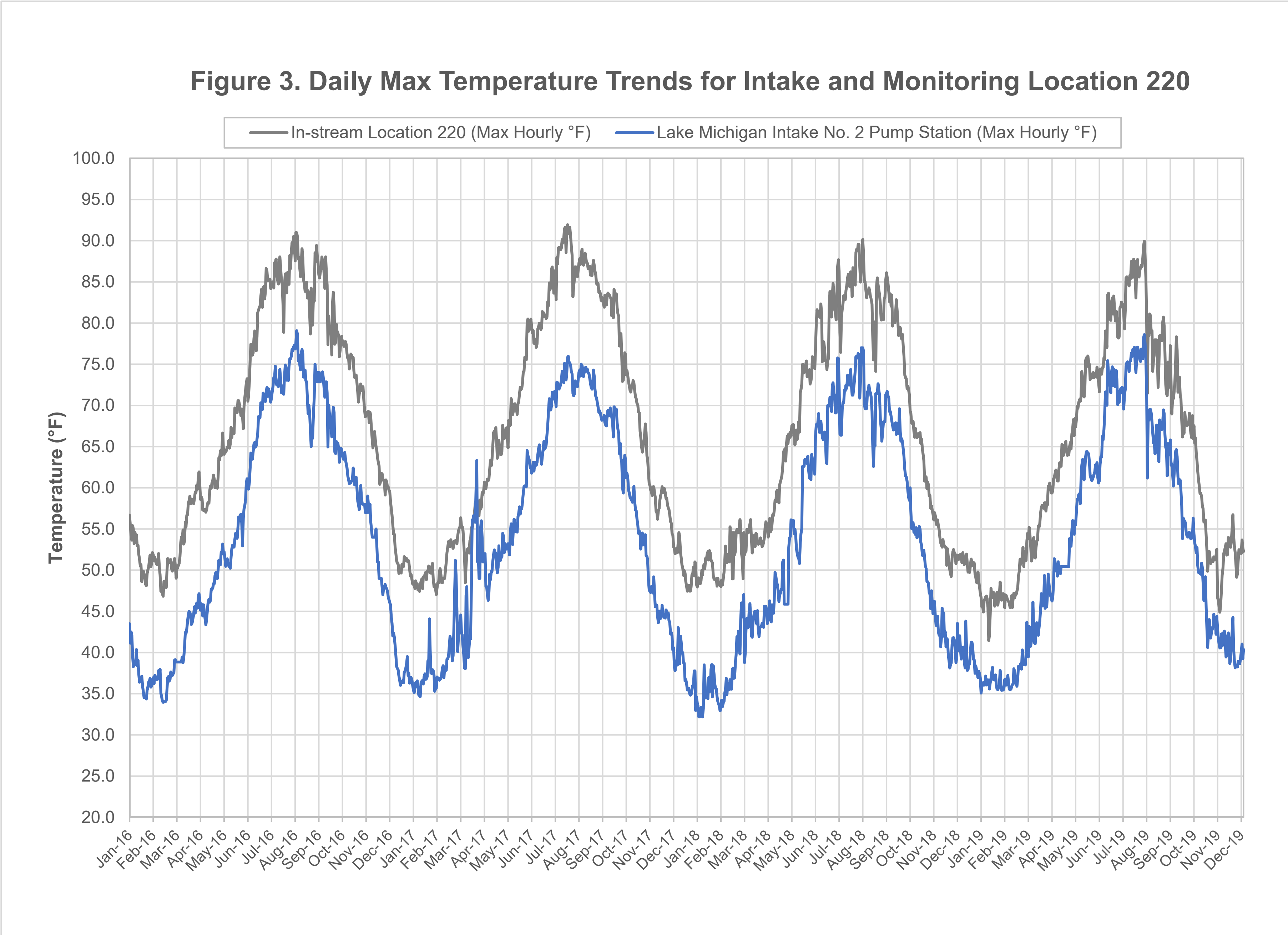
Figure 3. Daily Max Temperature Trends for Intake and Monitoring Location 220
In-stream Location 220 (Max Hourly °F)
Lake Michigan Intake No. 2 Pump Station (Max Hourly °F)
Temperature (°F)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
Jan-16 Feb-16 Mar-16 Apr-16 May-16 Jun-16 Jul-16 Aug-16 Sep-16 Oct-16 Nov-16 Dec-16 Jan-17 Feb-17 Mar-17 Apr-17 May-17 Jun-17 Jul-17 Aug-17 Sep-17 Oct-17 Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18 Nov-18 Dec-18 Jan-19 Feb-19 Mar-19 Apr-19 May-19 Jun-19 Jul-19 Aug-19 Sep-19 Oct-19 Nov-19 Dec-19

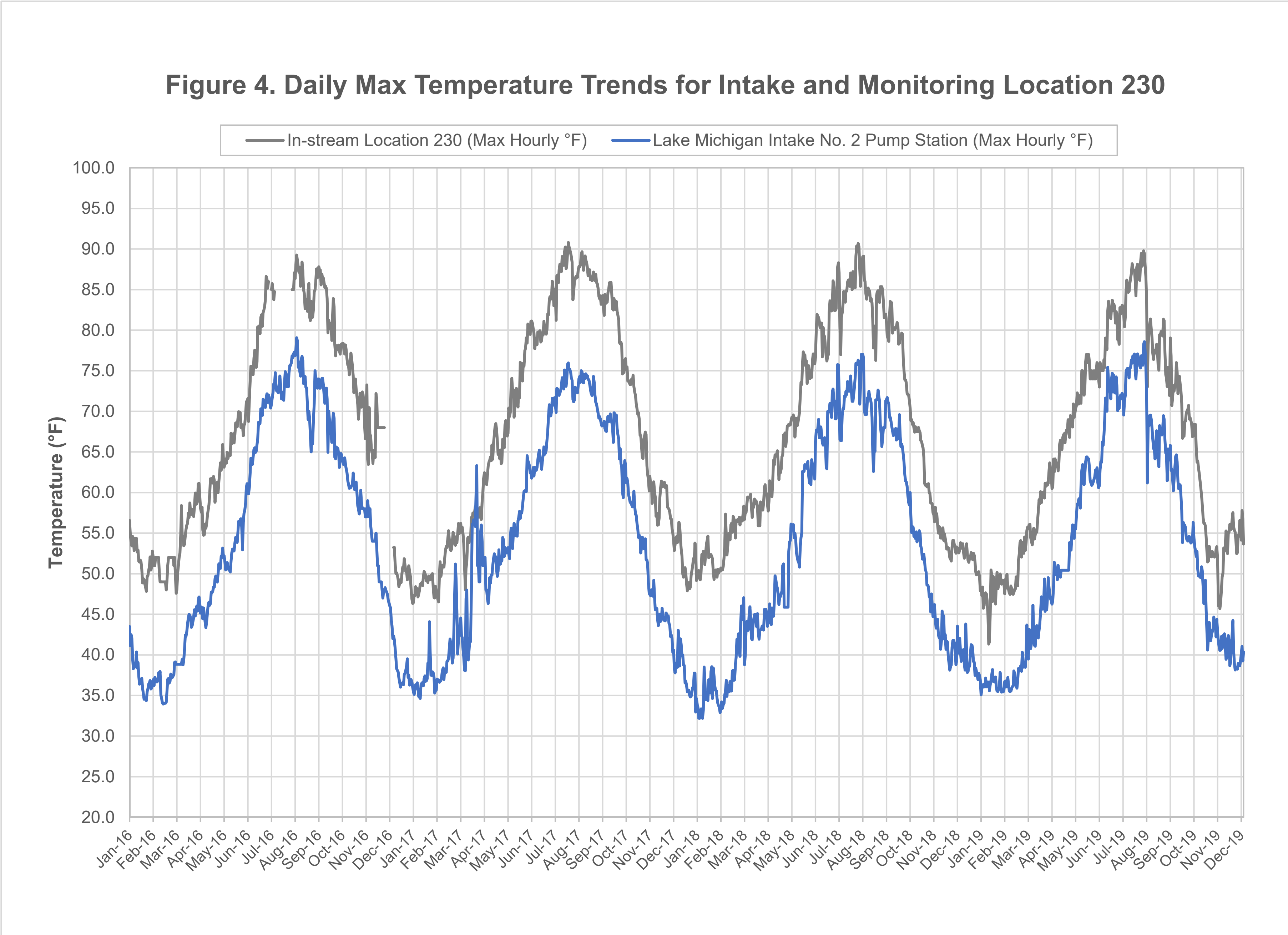

Figure 4. Daily Max Temperature Trends for Intake and Monitoring Location 230
In-stream Location 230 (Max Hourly °F)
Lake Michigan Intake No. 2 Pump Station (Max Hourly °F)
Temperature (°F)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
Jan-16 Feb-16 Mar-16 Apr-16 May-16 Jun-16 Jul-16 Aug-16 Sep-16 Oct-16 Nov-16 Dec-16 Jan-17 Feb-17 Mar-17 Apr-17 May-17 Jun-17 Jul-17 Aug-17 Sep-17 Oct-17 Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18 Nov-18 Dec-18 Jan-19 Feb-19 Mar-19 Apr-19 May-19 Jun-19 Jul-19 Aug-19 Sep-19 Oct-19 Nov-19 Dec-19

Attachment III

SMV Renewal Request for Outfalls 018, 019, 020
SMV Renewal Request for Outfalls 028/030
SMV Request for Outfall 015

Summary of Stream-lined Mercury Variance (SMV) Requests

SMV Renewal Requests for Outfalls 018, 019, & 020 and Outfalls 028/030

U. S. Steel previously applied for and received SMVs for Outfalls 018, 019, & 020 and Outfalls 028/030. The current interim limits (average of daily maximum values measured over the most recent (rolling) 12-month period) for mercury at these Outfalls are

- Outfall 018: 2.8 ng/L total mercury
- Outfall 019: 2.3 ng/L total mercury
- Outfall 020: 2.2 ng/L total mercury
- Outfall 028: 3.2 ng/L total mercury
- Outfall 030: 3.0 ng/L total mercury

U. S. Steel requests renewal of the these SMVs with the following interim limits. The proposed interim limits are based on application of the methodology listed in 327 IAC 5-3.5-8 (SMV interim discharge limit) and using the lower of the existing SMV and maximum of the most recent 2-year period of monitoring data (March 2018 to February 2020).

- Outfall 018: Retain existing limit of 2.8 ng/L total mercury
  - Maximum from the most recent 2-yr period[1]: 8.1 ng/L (12/03/2019)
- Outfall 019: Retain existing limit of 2.3 ng/L total mercury
  - Maximum from the most recent 2-yr period[1]: 2.6 ng/L (01/11/2020)
- Outfall 020: Retain existing limit of 2.2 ng/L total mercury
  - Maximum from the most recent 2-yr period: 8.9 ng/L (01/30/2020)
- Outfall 028: Retain existing limit of 3.2 ng/L total mercury
  - Maximum from the most recent 2-yr period: 6.0 ng/L (01/08/2020)
- Outfall 030: Retain existing limit of 3.0 ng/L total mercury
  - Maximum from the most recent 2-yr period: 6.8 ng/L (01/22/2020)

The following materials are included in this attachment for each of the SMV renewal requests (018, 019, & 020 and 028/030) and comprise the SMV renewal application for Outfalls 018, 019, and 020.

- Narrative
- Industrial SMV Application Form
- Updated Pollutant Minimization Program Plans (PMPP) for Mercury, including:
  - Mercury monitoring results for the most recent 2-year period
  - Proof of Public Notice for the updated PMPPs

[1] Note that these statistics do not include data from November 27 – November 30, 2019 for Outfalls 018 and 019. Data from this period (following rupture of a large service water line) is not considered representative of normal operations for Outfall 018 and Outfall 019. Data for this period were reported as required by the Permit; but excluded for the purposes characterizing typical mercury levels in these discharges.

- 2019 Annual Progress Reports for the Mercury PMPPs

<u>SMV Request for Outfall 015</u>

U. S. Steel requests approval of an SMV for Outfall 015. Outfall 015 mercury limits are subject to a 60-month compliance schedule which began on February 1, 2017 and ends on January 31, 2022.

U. S. Steel requests approval of an SMV for Outfall 015 with the following interim limits. The proposed interim limits are based on application of the methodology listed in 327 IAC 5-3.5-8 (SMV interim discharge limit) and using the maximum of the most recent 2-year period of monitoring data (March 2018 to February 2020).

- Outfall 015: 14.0 ng/L total mercury (12/31/2019 result)

The following materials are included in this attachment for the Outfall 015 SMV comprise the SMV application for Outfall 015.

- Narrative
- Industrial SMV Application Form
- Pollutant Minimization Program Plan (PMPP) form Mercury, including:
  - Mercury monitoring results for the most recent 2-year period
  - Proof of Public Notice for the updated PMPP

<u>Public Notice of Mercury PMPPs</u>

The PMPPs associated with these SMV requests were public noticed (for a 30-day period) in March 2020. Supporting documentation for this is included as part of the PMPPs. No comments or requests for the PMPP were received during the public notice period. The following changes and updates were made to the PMPP since completion of the Public Notice Period and submission of this application:

Universal Changes and/or Updates:

- Calendar dates have been made current.
- Various typographical errors have been corrected.
- The most recent 2-year period for data has been revised from January 2018-Decebmer 2019 to March 2018-February 2020. As such the following have been updated as needed:
  - Revision the statistics in the “Analysis of Mercury in Water Discharges” sections for each PMPP.
  - Revision of the data tables for the most recent 2-yr datasets
- Revision of “Section 5.0: Proof of Public Notice.” The original wording below was replaced with specific details of the public notice period.

  “As required by Part Five A of the SMV Application, U. S. Steel will provide proof of completion of public notice activities of this PMPP as part of the completed SMV application. Comments received during the public notice period and U. S. Steel's responses to those comments will be provided as part of the completed SMV application submitted to IDEM."

- Addition of the "Proof of Public Notice" attachments.
- References to the date of the most recent Permit Modification have been updated to reflect the recently issued modification which is set to become effective May 1, 2020.

Specific Changes and/or Updates:

- For the Outfall 015 PMPP:
  - Addition of Outfall 015 data for December 23 and 26, 2019 which were inadvertently omitted from the prior version of the data tables.
  - References to the June 2019 Permit Modification request for the proposed re-routing of the waters currently treated by the Leachate Treatment Plant to the Environmental Treatment Facility have been updated to reflect that authorization for this option has been issued and a modified permit allowing this is set to become effective May 1, 2020.
- For the Outfall 018, 019, 020 PMPP: revision of the timeframe considered non representative of normal operations for Outfalls 018 and 019. The timeframe was revised from November 27 – December 1, 2019 to November 27 – November 30, 2019.

SMV Renewal Request for Outfalls 018, 019, 020

Stream-lined Mercury Variance Renewal Request for Outfalls 018, 019, and 020

The following materials serve as the application for renewal of the stream-lined mercury variance (SMV) interim limits for total mercury at Outfalls 018, 019, and 020. Outfall 018, 019, and 020 discharges are primarily once-through non-contact cooling water (NCCW) which is withdrawn from Lake Michigan via Nos. 1 and 2 Pump Stations. The current interim limits (average of daily maximum values measured over the most recent (rolling) 12-month period) are:

- Outfall 018: 2.9 ng/L total mercury (as a 12-month rolling average)
- Outfall 019: 3.2 ng/L total mercury (as a 12-month rolling average)
- Outfall 020: 7.8 ng/L total mercury (as a 12-month rolling average)

This SMV renewal application attachment includes the following items:

1. Industrial SMV Application Form
2. April 2020 Revision of the Pollutant Minimization Program Plan (PMPP) for Mercury for Outfalls 018, 019, and 020 including:
   – Mercury monitoring results for the most recent 2-year period (PMPP Tables III-1 and III-2)
   – Proof of Public Notice for the updated PMPP (PMPP Attachment V)
3. The 2019 Annual Progress Report for the Mercury PMPP for Outfalls 018, 019, and 020 ("2019 Progress Report")

Pursuant to 327 IAC 5-3.5-7(d), U. S. Steel is required to do one of the following:

a) Revise the PMPP if demonstrable progress in minimizing the discharge of mercury has not been made; or
b) Provide information that demonstrates there is no known reasonable additional action that will reduce the mercury and thereby additional revisions to the PMPP would not be required.

Pursuant to the PMPP, U. S. Steel has committed to the following on-going or implemented activities:

- Compilation and maintenance of an inventory of mercury-containing materials
- Review of the purchasing procedures as it relates to chemicals/equipment that may contain mercury;
- Expansion of mercury awareness training;
- Continued implementation of several programs and/or standard operating procedures (SOPs) that aim to increase awareness, prevent/minimize spills, and/or provide instructions for safe handling of spills:
  - Good Housekeeping Program
  - Spill Prevention - various SOPs, the Storm Water Pollution Prevention Plan, and the Spill Prevention Control and Countermeasure Plan
  - Maintenance/Disposal SOPs including one for decommissioning/removal of mercury-containing equipment should any be encountered (note that all

known mercury containing equipment and devices been removed from the site)
    - Spill Response – various SOPs including those specific to mercury-containing materials such as broken mercury thermometers and mercury-containing bulbs/lamps
- Tracking of disposed-of or recycled quantities of mercury containing materials such as instrumentation, equipment, electronics, bulbs/lamps, and batteries;
- Mercury characterization of chemicals that have the potential to be associated with Outfalls 018, 019, and/or 020 discharges:
    - Chlorination and Dechlorination chemicals
    - Boiler Water Treatment and Other Water Treatment chemicals
    - Chemicals stored in Outfall 018, 019, and/or 020 associated drainage areas
- Mercury characterization of condensates associated with Outfall 018, 019, and/or 020 discharges;
- Review and evaluation of specific equipment/operations with the intent of assuring procedures/operations are adequate for preventing/minimizing leaks or release of untreated stormwaters:
    - Heat exchanger inspection SOPs
    - Gary Rail Oil/Water Separator operations and capacity
- Performance (on a case-by-case and as needed basis) of an alternatives/reduction evaluation for mercury-containing chemicals or equipment. Specifically, the chemicals used for mussel control and dechlorination (sodium hypochlorite and sodium bisulfite) were investigated.

Additional details relating to the implementation of these activities have been provided in submitted Annual Progress Reports which are required pursuant to Section 6.0 of the PMPP and 327 IAC 5-3.5-9(a)(8) and the annual report requirement from Part V of the NPDES Permit. The most recent progress report (2019 Progress Report) is included with this application.

These PMPP activities, when implemented, provide a means of minimizing the potential to release mercury into waters discharged from Outfalls 018, 019, and 020. Though these activities may not result in an analytically quantifiable reduction in mercury concentrations in final discharge waters, the actions are focused on reducing or eliminating the risk of mercury addition from controllable sources.

However, the primary source of mercury is not controllable since the majority of flows for Outfalls 018, 019, and 020 are NCCW with effluent mercury concentrations predominantly dependent on mercury present in the intake water (see PMPP Section 2.3 and Table III-1 for mercury statistics and data associated with the intakes). As such, it is difficult to assess the effectiveness of the PMPP activities directly via the measurement of mercury in the discharges. U. S. Steel continues to implement the PMPP and made demonstrable progress (through documentable and measurable activities) in understanding potential mercury sources and management of mercury-containing materials and chemicals associated with Outfalls 018, 019, and 020.

Given the nature of the discharges and the implemented/ongoing PMPP activities, there are no additional known actions that will reduce mercury discharges from Outfalls 018, 019, and 020.

U. S. Steel requests renewal of the SMVs for Outfalls 018, 019, and 020 with the following interim limits. The proposed interim limits are based on application of the methodology listed in 327 IAC 5-3.5-8 (SMV interim discharge limit) and using the lower of the maximum result most recent 2-year period of monitoring data (March 2018 – February 2020) and the existing SMV interim limitations.

- Outfall 018: Retain existing limit of 2.8 ng/L total mercury
  - Maximum from the most recent 2-yr period[1]: 8.1 ng/L (12/03/2019)
- Outfall 019: Retain existing limit of 2.3 ng/L total mercury
  - Maximum from the most recent 2-yr period[1]: 2.6 ng/L (01/11/2020)
- Outfall 020: Retain existing limit of 2.2 ng/L total mercury
  - Maximum from the most recent 2-yr period: 8.9 ng/L (01/30/2020)

[1] Note that these statistics do not include data from November 27 – November 30, 2019 for Outfalls 018 and 019. Data from this period (following rupture of a large service water line) is not considered representative of normal operations for Outfall 018 and Outfall 019. Data for this period were reported as required by the Permit; but excluded for the purposes characterizing typical mercury levels in these discharges.

SMV Application Form for Outfalls 018, 019, 020

INDUSTRIAL STREAMLINED MERCURY VARIANCE (SMV) APPLICATION

State Form 52111 (5-05)
Approved by State Board of Accounts, 2005
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Indiana Department of Environmental Management
Office of Water Quality – Mail Code 65-42
NPDES Permits Branch
100 North Senate Avenue
Indianapolis, Indiana 46204-2251

PART ONE: General Information

Name of Facility U. S. Steel Gary Works		
Facility Address One North Broadway		
City or Town Gary		
State Indiana	ZIP Code 46402	County Lake
National Pollutant Discharge Elimination System (NPDES) Permit No.:IN0000281		
Name of Person in Responsible Charge Daniel Killeen		
Title Vice President - Gary Works		
Address One North Broadway		
City or Town Gary		
State Indiana	ZIP Code 46402	
Name of Primary Contact Person Brandon Miller		
Address One North Broadway		
City or Town Gary		
State Indiana	ZIP code 46402	Telephone No. 219-888-3369
E-mail Address (if available) BSMiller@uss.com		
NPDES Outfall(s) Affected by Streamlined Mercury Variance Request: 018, 019, 020		
Receiving Stream(s) Affected by Streamlined Mercury Variance Request: Grand Calumet River		
Average Daily Flow: Outfall 018 = 59.9 mgd, Outfall 019 = 73.9 mgd, Outfall 020 = 47.6 mgd (long term averages Nov 2015 – Dec 2019)		
Provide a brief description of all operations contributing to the permitted discharge(s): U. S. Steel Gary Works is a fully integrated steel producer. Operations within the referenced outfall areas includes steelmaking, continuous casting, and ancillary operations. The outfalls discharge primarily NCCW, with other intermittent flows such as steam condensates, boiler blowdowns, water treatment system regenerant and backwashes and stormwater. See Section 1.3 of the Outfall 018, 019, 020 PMPP for more information.		

SIGNATURE BLOCK

This application must be signed by a person in responsible charge (see 327 IAC 5-2-22) to be valid. This signature attests to the following:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name Daniel Killeen	Title Vice President - Gary Works
Signature See the General Information Form for the certification signature	Date Signed *(month, day, year)*

Return the completed SMV application package (Parts I - V) and $50 application fee (see IC 13-18-20-12(a)(4)) to mailing address listed above.

PART TWO – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) INVENTORY/IDENTIFICATION

A. Provide a preliminary inventory of potential uses and sources of mercury in all buildings and departments, as well as a preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites. The following checklist* includes many of the chemicals, equipment, locations, etc. where mercury may be present at your site. For the purpose of satisfying the requirements of this section, you may submit the completed checklist as a preliminary inventory/identification. While the checklist is intended to facilitate the inventory/identification process, it should not be considered as all-inclusive for purposes of establishing a complete inventory. *(see 327 IAC 5-3.5-9(a)(1) and 327 IAC 5-3.5-9(a)(2))*

LABORATORY EQUIPMENT

☐ Manometers	☐ Ion exchange cartridges for lab water purification system
☐ Barometers	☐ Hanging mercury drop electrodes for polarographic analyzers
☐ Thermometers	☐ Mercury Hallow Cathode lamp for AA analysis

LABORATORY CHEMICALS

☐ COD analysis reagent *(mercuric sulfate)*	☐ Mercury or mercurous chloride
☐ TKN and TP analysis digestion reagents	☐ Mercury iodide
☐ Nessler reagent	☐ Mercury nitrate
☐ Mercury analytical standards	☐ Mercury (II) oxide
☐ Gas chromatograph sample interferences *(elemental mercury)*	☐ Mercury (II) sulfate
☒ Sodium hypochlorite *(Clorox)*	☐ Merthiolate

BULK CHEMICALS

☐ Phosphorus removal chemicals	☒ Chlorine
☒ Dechlorination chemicals	☒ Sodium hypochlorite
☐ Sludge thickening polymers	☒ Sulfuric acid
☐ Potassium hydroxide	☐ Nitric acid
☒ Sodium hydroxide	☐ Ferric or ferrous chloride
☒ Sodium chloride	☐ Pickling liquor *(for phosphorus removal)*

PROCESS CONTROL AND MEASURING EQUIPMENT

☐ Accustats	☐ Ring balances
☐ Barometers	☐ Shunt trips
☐ Counterweights	☐ Steam flow meters
☐ Elemental mercury for refilling mercury-containing equipment	☐ Stokes gauges Switches and relays:
☐ Flow meters	☐ Displacement plunger relays
☐ Gas regulators and meters	☐ Mercoid control switches
☐ Gyroscopes	☐ Pressure control switches *(mounted on bourdon tube or diaphragm)*
☐ Hydrometers with thermometers	☐ Relay switches
☐ Level and rotation sensors	☐ Mercury wetted relays
☐ Manometers, pressure gauges and vacuum gauges	☐ Mercury displacement relays (found in motors)
☐ Mercury-sealed pistons	☐ Sump pump, bilge pump and other float controls
☐ Permeters	☐ Tilt switches
☐ Pressure-trols	☐ Thermometers *(including industrial dial face thermostats with capillary tubes)*
☐ Pyrometers	☐ Thermostats and thermoregulators
☐ Rectifiers	☐ Transmitters

BUILDINGS

☐ DC watt-hour meters	Hydronic and warm air controls with tilt switches such as:
☐ Flame sensors *(found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)*	☐ Aquastats
	☐ Pressurestats
	☐ Firestats
	☐ Fan limit controls
* This checklist was borrowed from the Delta Institute	☐ Pressure/flow controls on air handling units.

PART TWO (CONTINUED)	
BUILDINGS *(continued)*	
Switches and relays:	
☐ Fire alarm box switches	☐ Mercury displacement relays *(found in lighting, resistance heating and motors)*
☐ Silent light switches	
☐ Relay switches	☐ Sump pump, bilge pump, flow monitor, float switches, and other float controls
☐ Mercury wetted relays	
	☐ Tilt switches
Phosphorus removal chemicals:	
☐ Ferric or ferrous chloride	
☐ Pickling liquor	
☐Thermostats	
BEARINGS AND SEALS	
☐ Trickling filter Pivot Arm Bearings *(mercury bearings/water seals)*	
LAMPS	
X Fluorescent	X Mercury vapor lamps
X High-pressure sodium	X Metal halide
☐ Mercury arc	☐ Ultraviolet disinfection
BATTERIES	
X Mercury-zinc *(button)* batteries	X Mercury alkaline batteries
X Mercury-cadmium batteries	X Mercury oxide batteries
PAINT	
☐ Old latex-paint (pre-1990)	☐ Marine paint
FIRST AID/MEDICAL	
☐ Mercurochrome	☐ Thermometers
☐ Sphygmomanometers	☐ Thimerosal *(contained in eye wash)*
OTHER	
☐ Old pesticides, fungicides and herbicides	☐ Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps
☐ Tree root growth control products	
X Computer monitors	
COLLECTION SYSTEM	
☐ Lift station equipment	☐ Sewer lines with accumulated mercury
☐ Traps with accumulated mercury	☐ Other mercury containing equipment
☐ Sumps with accumulated mercury	☐ Mercury-containing chemicals used and/or stored on-site
MERCURY STORAGE SITES	
☐ Elemental mercury	☐ Mercury-containing items collected for disposal

B. Provide a plan and schedule for providing a complete inventory initiated under Section A. above. *(see 327 IAC 5-3.5-9(a)(1))* The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

A complete inventory should include an estimate of quantities *(i.e., volume of chemicals used annually, or numbers of mercury containing equipment)* for each item identified in Part II.A. Additionally, a complete inventory should include documentation from chemical suppliers and equipment suppliers of the mercury content in your most commonly purchased items. Mercury may not be present in a concentration great enough to appear on an MSDS, yet still contribute to the overall level of mercury in the influent.

See Outfall 018, 019, 020 PMPP Section 2.2 and Attachment II-B.

* This checklist was borrowed from the Delta Institute

PART THREE - POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) PLANNED ACTIVITIES

A. Provide a list of planned activities to be conducted to eliminate or minimize the release of mercury to waters of the state. The list of planned activities may consider technical and economic feasibility and must include, at a minimum: *(see 327 IAC 5-3.5-9(a)(3))*

1. A review of purchasing policies and procedures.

See Outfall 018, 019, 020 PMPP Section 3.2 and Attachment IV

2. Necessary training and awareness for facility staff.

See Outfall 018, 019, 020 PMPP Section 3.2 and Attachment IV

3. Evaluation of alternatives to the use of any mercury-containing equipment or materials.

See Outfall 018, 019, 020 PMPP Section 3.2 and Attachment IV

4. Other specific activities designed to reduce or eliminate mercury loadings.

See Outfall 018, 019, 020 PMPP Section 3.2 and Attachment IV

5. An identification of the facility's responsibilities under P.L.225-2001 *(also known as House Enrolled Act 1901 of the 2001 legislative session)*. P.L.225-2001 outlines the restrictions on the sale or supply of mercury-added novelties, mercury-added products, and mercury commodities, and on the use or purchase of mercury commodities, compounds, or mercury-added instructional equipment and materials by public and non-public schools. In order to satisfy the requirement of this part, include a written statement that attests to the fact that an identification of the responsibilities under P.L.225-2001 has been undertaken.

See Outfall 018, 019, 020 PMPP Section 3.3

B. For each planned activity identified under section A. above, include the following: *(see 327 IAC 5-3.5-9(a)(4))*

1. The goal to be accomplished.

See Outfall 018, 019, 020 PMPP Attachment IV

2. A measure of performance.

See Outfall 018, 019, 020 PMPP Attachment IV

3. A schedule for action. The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

See Outfall 018, 019, 020 PMPP Attachment IV

C. Provide an identification of the resources and staff necessary to implement the Pollutant Minimization Program Plan (PMPP). *(see 327 IAC 5-3.5-9(a)(6))* The identification should indicate the source and amount of funding available to implement the PMPP, as well as the number and position of employees that will be devoted to PMPP implementation.

See Outfall 018, 019, 020 PMPP Section 3.5

PART FOUR – MERCURY MONITORING DATA

Provide all available influent and effluent mercury data for the two-year period preceding submittal of this application. Additionally, provide any information on mercury in biosolids for the two-year period preceding submittal of this application, if available. The data may be supplied on a separate form, but must include results for each individual sample *(including unit of measurement and U.S. EPA method)*, the date the sample was taken, and the analytical laboratory where the analysis was performed. *(see 327 IAC 5-3.5-9(a)(5))*

Influent

Date *(month, day, year)*	Result	ng/l	U.S. EPA Method	Analytical Laboratory
See Outfall 018, 019, 020 PMPP – Table III-1				

PART FOUR (CONTINUED)

Effluent

Date *(month, day, year)*	Result	ng/l	U.S. EPA Method	Analytical Laboratory
See Outfall 018, 019, 020 PMPP – Table III-2				

Biosolids

Date *(month, day, year)*	Result	Unit	U.S. EPA Method	Analytical Laboratory
No biosolids associated with these outfalls.				

PART FIVE – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) ADDITIONAL REQUIREMENTS

A. <u>Proof of Public Notice Activities</u>: Provide proof of the public notice activities identified below: *(see 327 IAC 5-3.5-9(c))*
For the notice of availability required under Section A.1. provide a copy of the notice as it appears in the newspaper. For the posting requirements under Section A.2. attest to that fact that the information was posted as required in a written statement.

1. Publish notice of the availability of the draft pollutant minimization program plan (PMPP) in a daily or weekly newspaper of general circulation throughout the area affected by the discharge.

2. Post a copy of the information required by this section at the following:

   a. Principal office of the municipality or political subdivision affected by the facility or discharge.
   b. The United States post office.
   c. If one is available, the library serving those premises.

3. All notices published under this section shall contain the following information: *(see 327 IAC 5-3.5-9(d))*

   a. The name and address of the applicant that prepared the PMPP.
   b. A general description of the elements of the PMPP.
   c. A brief description of the activities or operations that result in the discharge for which an SMV is being requested.
   d. A brief description of the purpose of this notice and the comment procedures.
   e. The name of a contact person, a mailing address, an Internet address, if available, and a telephone number where interested persons may obtain additional information and a copy of the PMPP.

   See 018, 019, 020 PMPP Section 5.0 and Attachment V

4. The applicant shall do the following: *(see 327 IAC 5-3.5-9(e))*

   a. Provide a minimum comment period of thirty (30) days.
   b. Include a copy of the comments received and the applicant's responses to those comments in the SMV application submitted to the department.

B. <u>Annual Reports:</u> Provide a schedule for the submission of the annual reports required under 327 IAC 5-3.5-9(a)(8). Generally, the annual reports should be submitted each year on the anniversary of the effective date of the NPDES permit that incorporates the approved SMV. A proposed schedule with an alternative submittal date is subject to IDEM's approval. The annual reports shall include a description of the facility's progress toward fulfilling each PMPP requirement, mercury monitoring results, and steps taken to implement each planned activity developed under the PMPP.

See 018, 019, 020 PMPP Section 6.0. The most recent annual report (Nov 2019) is also provided as part of this SMV renewal application.

Outfalls 018, 019, 020
Pollutant Minimization Program Plan for Mercury
(Revised April 2020)

Pollutant Minimization Program Plan for Mercury Outfalls 018, 019, and 020

NPDES Permit IN0000281

Prepared for:

United States Steel Corporation Gary Works
Gary, Indiana

Submitted to:

The Indiana Department of Environmental Management
IGC North – 13th Floor
100 N. Senate Avenue
Indianapolis, Indiana

Date:

April 2020
(Original October 2011)

Contents

List of Attachments

1.0 Introduction

1.1 Background

U. S. Steel – Gary Works (U. S. Steel) operates an integrated steel manufacturing plant in Gary, Indiana (Lake County). Intermediate and final products include sinter, iron, raw steel, cast steel, plate, hot strip, cold rolled strip and coated steels. The plant also includes ancillary facilities to support the production processes, such as boiler houses, maintenance facilities, environmental control systems such as scale pits, oil-water separators, and wastewater treatment (WWT) facilities, business administration operations, and shipping and receiving facilities. The facility operates continuously.

U. S. Steel is currently authorized to discharge from Outfalls 018, 019, and 020 to the Grand Calumet River pursuant to NPDES Permit IN0000281 (NPDES Permit).[1] The current Permit (renewed permit effective November 1, 2015 with the latest modification scheduled to be effective May 1, 2020) includes interim and final water quality-based effluent limits (WQBELs) for mercury at Outfalls 018, 019, and 020. The interim mercury limits are based on the Streamlined Mercury Variances (SMV) process[2] (327 Indiana Administrative Code (IAC) 5-3.5) that allows for an interim limit for mercury discharges that is based on representative effluent data. The following interim discharge limits for mercury have been incorporated into the current NPDES Permit (effective November 1, 2015).[3]

- Outfall 018: 2.8 ng/L total mercury (as a 12-month rolling average)
- Outfall 019: 2.3 ng/L total mercury (as a 12-month rolling average)
- Outfall 020: 2.2 ng/L total mercury (as a 12-month rolling average)

Pursuant to 327 IAC 5-3.5 and SMV requirements, U. S. Steel has prepared[4] this Pollutant Minimization Program Plan (PMPP) for mercury. As required by 327 IAC 5-3.5-9(a), this PMPP includes:

1. Results of a preliminary inventory of potential uses and sources of mercury, excluding raw materials, in all buildings and departments[5] and a plan and schedule for providing IDEM results of a complete inventory;
2. Preliminary identification of known mercury-bearing equipment, waste streams, and mercury storage sites[4];

[1] The NPDES Permit authorizes discharges from other outfalls, however, this PMPP pertains only to Outfalls 018, 019, and 020.
[2] IDEM's SMV FAQ Document uses the following to compare an individual variance to the SMV process: "While an individual variance focuses on pollutant removal (treatment) technologies, the SMV is a streamlined process focusing on pollution prevention and source control to achieve mercury effluent reductions due to a recognized lack of economically viable end-of-pipe treatment options."
[3] Per the NPDES Permit, submission of both a daily maximum value and annual average value is required for each reporting period. The annual average value is to be calculated as the average of daily maximum values measured over the most recent (rolling) 12-month period. Compliance will be assessed with respect to the annual average value. For clarity, this report will refer to the annual average value as the 12-month rolling average.
[4] The original PMPP was developed, public noticed and submitted as part of a SMV request in 2011. SMVs for Outfalls 018, 019, and 020 were subsequently incorporated into the Permit in April 2012. Since then U. S. Steel has implemented the PMPP and submitted required annual reports. This version of the PMPP has been revised to present more current information in support of a SMV renewal request that will be submitted to IDEM with U. S. Steel's 2020 permit renewal application.
[5] Within the Outfall 018, 019, and 020 drainage areas.

3. A list of planned activities to be conducted to eliminate or minimize the potential release of mercury to the water, and for each activity, the goal to be accomplished, the measure of performance, and a schedule for action;
4. All available mercury monitoring data for Outfalls 018, 019, and 020 for a 2-year period preceding the submittal of an SMV application;
5. Identification of the resources and staff necessary to implement the PMPP;
6. Proof of completion of public notice activities required under 327 IAC 5-3.5; and
7. Annual reporting according to a schedule in this PMPP.

1.2 Purpose of the Pollutant Minimization Program

The purpose of the Pollutant Minimization Program is to establish guidelines and procedures that, when implemented, provide a process (and schedule) for minimizing the potential to release mercury into waters discharged from Outfalls 018, 019, and 020. As such, the Pollutant Minimization Program identifies documentable and measurable activities related to management or reduction of mercury within the areas encompassing the Outfall 018, 019, and 020 drainage areas. Though these activities may not result in an analytically quantifiable reduction in mercury concentrations in discharge waters, the actions are focused on reducing or eliminating the risk of mercury addition from a controllable mercury source. This PMPP has been developed to satisfy the requirements of the SMV regulations presented in 327 IAC 5-3.5-9.

1.3 Outfalls 018, 019 and 020 Area Summary

Outfalls 018, 019, and 020 are located within the drainage areas encompassing the iron-making (blast furnaces) and steel-making (No. 1-BOP, No. 2 Q-BOP, and No. 1 Caster) facilities to the west of the vessel slip. The majority of the water discharged from Outfalls 018, 019, and 020 to the Grand Calumet River is once-through NCCW[6] which is withdrawn from Lake Michigan via Nos. 1 and 2 Pump Stations, (both located on the west side of the vessel slip). Water treatment additives are currently added to the NCCW for seasonal mussel control and biofouling treatment. These and other chemicals associated with these outfalls are presented in the inventory which is addressed in Section 2.

Pursuant to the NPDES Permit Fact Sheet, U. S. Steel is authorized to discharge the following specific waters to the Grand Calumet River as follows:

Outfall 018 (59.9 mgd average for November 2015 – December 2019)

- Blast furnace NCCW
- No. 4 Electric Power Station Fab Shop condensate and air conditioner NCCW
- Pulverized Coal Injection Facility West NCCW
- Stormwater runoff
- Outfall 019 discharges are also authorized for discharge through Outfall 018. The Outfall 018 and Outfall 019 sewer systems are interconnected and if flow is restricted at Outfall 019, then Outfall 019 discharges will flow through Outfall 018.

Outfall 019 (73.9 mgd average for November 2015 – December 2019)

- No. 4 Boiler House car wash pad waters[7]

[6] The once-through NCCW is utilized to reduce process-related heat via closed-circuit plate and frame and shell and tube heat exchangers (i.e., NCCW does not come into contact with product or process water). The volume of other authorized wastewaters is minor compared to the volume of the NCCW.
[7] Though authorized pursuant to the NPDES Permit, car washing no longer performed at the No. 4 Boiler House car wash pad.

- Central Water Treatment discharges[8]
- No. 5 Electric Power Cooling Station condensate and NCCW
- Turboblower Boiler House boiler blowdown, NCCW and condensate
- No. 4 Boiler House boiler blowdown and condensate
- No. 1 Electric Power Station NCCW
- Blast Furnace No. 14 Furnace and Stove NCCW
- Gary Rail Oil Separator waters
- Iron producing above ground storage Tar Tank condensate
- No. 2 Q-BOP Shop Gas Cleaner induced draft fans fluid drive heat exchanger NCCW
- Stormwater runoff

Outfall 020 (47.6 mgd average for November 2015 – December 2019)

- No. 1 BOP shop NCCW and condensate
- No. 1 Continuous Caster mold and heat exchanger NCCW and condensate
- Stormwater runoff

Attachment I, Figures LLD-2 and LDD-3 presents the flow diagram depicting the above sources to each outfall.

[8] Boiler blowdown, brine regenerant and ultrafiltration backwash, reverse osmosis concentrate and softener backwash/regenerate.

2.0 Pollution Minimization Program Plan Inventory/Identification (327 IAC 5-3.5-9(a))

2.1 Inventory of Potential Uses and Sources of Mercury (327 IAC 5-3.5-9(a)(1))

Part Two, Section A of the draft SMV application[9] presented in Attachment II-A allows for a determination of a preliminary inventory of equipment, chemicals, and other mercury-containing devices that may be present or have the potential to come in contact with discharge waters. The table in Attachment II-B gives additional inventory details beyond that provided in Part Two, Section A of the draft SMV application.

Based on the results of the inventory, potential sources of mercury that may be present or have the potential to come in contact with waters discharged from Outfalls 018, 019, and 020 include:

- Intake water from Lake Michigan[10];
- Stormwater from rainfall[11];
- Water treatment chemicals[12];
- Boiler water treatment chemicals[13]; and
- Other stored chemicals and fuel[14].

As summarized in the Attachment II-B table, no other sources of mercury are anticipated to be present in discharges as none have been identified on the preliminary inventory in Part Two, Section A of the completed SMV application. U. S. Steel, in collaboration with other Northwest Indiana steel mills, has previously[15] conducted an extensive evaluation into mercury-containing equipment and devices prevalent in steel manufacturing (including switches, thermometers, and gauges). As an outcome of this joint venture, the mercury-containing equipment and devices found across the U. S. Steel Facility were subsequently removed. All of the mercury-containing equipment and devices have been removed in the areas that could potentially come into contact with wastewaters discharged from Outfalls 018, 019, and 020.

2.2 Schedule for Providing Complete Inventory (327 IAC 5-3.5-9(a)(2))

The complete inventory of mercury and mercury-containing materials is included as Attachment II-B and gives an estimate of quantities for identified items. The inventory also includes mercury content estimates based on available information (e.g., provided by suppliers, vendors, manufactures, or direct measurement.)

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[9] A completed SMV application form, including a final version of Part Two (Section A), will be submitted with this PMPP as part of a SMV renewal request submittal to IDEM.

[10] This is the primary source given the discharges from Outfalls 018, 019, and 020 primarily consist of once-through NCCW.

[11] As per National Wildlife Federation Cycle of Harm: Mercury's Pathway from Rain to Fish in the Environment. May 2003, 2nd edition rainwater in Indiana can contain high concentrations of mercury (up to 10.9 ng/L). U.S. Steel uses best management practices in controlling storm water pollution via the Storm Water Pollution Prevention Plan (SWPPP).

[12] This includes chemicals for mussel and biofouling control, pH control, foam control, antiscalent, deposit control, water softener regeneration, and dechlorination purposes.

[13] Though low, there is potential for these chemicals to reach the Outfalls 018, 019, and 020 discharge waters via boiler blowdown and condensate.

[14] Chemicals and fuel generally stored in tanks located within the Outfalls 018, 019, and 020 drainage areas that could reach surface waters via open stormwater manholes.

[15] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001), and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

U. S. Steel will provide applicable updates to the completed inventory with the required annual progress reports (Section 6.0).

2.3 Analysis of Mercury in Water Discharges

In support of this PMPP, mercury sampling was performed at the Nos. 1 and 2 Pump Station intakes (listed as PS-1 and PS-2 respectively) and external Outfalls 018, 019, and 020. Attachment III provides details of the mercury sample results over the most recent 2-year period. A summary for each location is listed below:

- <u>Intake Water from Lake Michigan Statistics</u>
  The intakes supply water to the operations associated with Outfall 018, 019, and 020 discharges. Given that majority of discharge flow is NCCW (essentially pass through intake lake water). As such, no specific activities for control of mercury in Lake Michigan intake waters are identified in this PMPP.

  Long term (February 2009 – February 2020)
  - Averages: 0.84 ng/L for PS-1 and 0.56 ng/L for PS-2
  - Geometric Means: 0.52 ng/L for PS-1 and 0.42 ng/L for PS-2
  - Maximum: 31 ng/L for PS-2 and 4.1 ng/L for PS-2

  Most recent two-year period (March 2018 – February 2020)
  - Averages: 0.62 ng/L for PS-1 and 0.58 ng/L for PS-2
  - Geometric Means: 0.50 ng/L for PS-1 and 0.47 ng/L for PS-2
  - Maximum: 2.8 ng/L for PS-2 and 1.8 ng/L for PS-2

- <u>Outfall 018 Statistics</u>[16]
  Long term (February 2009 – February 2020)
  - Average of 0.84 ng/L; Geometric mean is 0.61 ng/L
  - Maximum of 8.1 ng/L

  Most recent two-year period (March 2018 – February 2020) are:
  - Average of 1.13 ng/L; Geometric mean is 0.83 ng/L
  - Maximum of 8.1 ng/L

- <u>Outfall 019 Statistics</u>[16]
  Long term (February 2009 – February 2020)
  - Average of 0.63 ng/L; Geometric mean is 0.52 ng/L
  - Maximum of 3.6 ng/L

  Most recent two-year period (March 2018 – February 2020)
  - Average of 0.66 ng/L; Geometric mean is 0.58 ng/L
  - Maximum of 2.6 ng/L

- <u>Outfall 020</u>
  Long term (February 2009 – February 2020) statistics are:
  - Average of 0.76 ng/L; Geometric mean is 0.56 ng/L
  - Maximum of 8.9 ng/L

[16] Note that these statistics do not include data from November 27 – November 30, 2019. Data from this period (following rupture of a large service water line) is not considered representative of normal operations for Outfall 018 and Outfall 019. Data for this period were reported as required by the Permit; but excluded in this PMPP for the purposes characterizing typical mercury levels in these discharges.

Statistics for the most recent two-year period (March 2018 – February 2020) are:

- Average of 0.80 ng/L; Geometric mean is 0.63 ng/L
- Maximum of 8.9 ng/L

The details of any activities planned as a result of these analyses are discussed in Section 3.

3.0 Planned Activities to Eliminate or Minimize Releases of Mercury to the Water

3.1 Overall Basis of the Planned Activities

Planned activities target both types of potential mercury sources listed in the inventory: those that may impact or come in contact with discharge waters, as well as those that are risk based. However, the main focus is concentrated on targeting specific chemicals or equipment that have the potential to release mercury to waters that discharge via Outfalls 018, 019, and 020.

Given the focus on the discharge waters, the U. S. Steel mercury monitoring program included analysis of intake data in addition to the NPDES Permit required monitoring of external Outfalls 018, 019, and 020. U. S. Steel utilized the dataset generated, combined with operational and process information, to determine which items on the mercury inventory have the most potential to release mercury to the discharge waters. Actions were then generated to address these potential sources with one (or more) of the three following types of activities in mind.

- Type 1: Source Characterization – additional investigation to understand the contribution from a potential source, including confirmation of potential sources as well as tasks to rank the likelihood of impacting discharges.

- Type 2: Alternatives for Reduction Evaluation - exploration into means of reducing or eliminating an identified source. Investigations may include research into best management practices, material substitution, or reduction technologies. Evaluations to determine overall feasibility and benefits may include mercury content and contribution, operability, reliability, economic impact, and effectiveness of alternative practices or materials.

- Type 3: Awareness and Containment Control Implementation – education of personnel and application of specific handling, housekeeping, and disposal practices for potential mercury-containing materials or equipment.

3.2 Plan and Schedule of Activities (327 IAC 5-3.5-9(a)(3))

In accordance with SMV requirements, U. S. Steel will implement a plan and schedule of activities to reduce or minimize the potential to release mercury to waters discharged to the Grand Calumet River via Outfalls 018, 019, and 020. Attachment IV contains the plan and schedule of activities for U. S. Steel based on the results of the source data and associated inventory summarized in Section 2 of this PMPP. U. S. Steel will implement the following activities according to the associated schedule of action as summarized in Attachment IV. Some activities may be staged or staggered so that results from initial activities can be used to guide and effectively focus resources in subsequent activities. In addition, some activities that address chemicals/equipment with a higher potential for discharge to surface waters (as identified in Attachment II) will have a higher priority than those with lower potential. It is also possible that the results of Type 1 activities (i.e. source characterizations) may disprove initially identified potential sources – if so, further activities specific to that source may not be required.

3.2.1 Summary of Activities

Several activities will impact more than one item or type of material that may contain mercury. These actions or policies are summarized below:

3.2.1.1 Source Characterization (Type 1 Activity)

Where potential sources of mercury have been identified, additional investigation will be made to first confirm the potential source. Once confirmed, an understanding of contribution of the source will be explored. Activities towards these goals include:

- Researching the amount of mercury in materials that have the potential to contribute mercury to waters discharged to the Grand Calumet River through Outfalls 018, 019, and 020. This is typically accomplished through discussions with vendors, review of literature, and/or direct measurement.

- Estimation of the magnitude of the source. This is typically done via quantification of the amount of mercury that may be discharged based on the amount of chemicals used, the volumes of the waste streams, and/or the number of mercury-containing materials present.

3.2.1.2 Alternatives for Reduction Evaluation (Type 2 Activity)

U. S. Steel, along with other steel mills in Northwest Indiana, previously[17] conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site. U. S. Steel policy is that mercury added equipment/devices are not to be supplied with the exclusion of equipment where there is no alternative (i.e. bulbs, batteries, etc.). Furthermore, mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Should a material on the non-approved list be encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Chemicals that do not have mercury as an added constituent but are known to contain trace amounts of mercury will be evaluated on a case by case basis. For example, evaluations will be prioritized based on not just mercury content, but also the potential risk of impacting the associated final discharge. Chemicals with a higher potential (e.g., water treatment additives used in final treatment steps) will be examined prior to those with a lower risk (e.g., process chemicals or water treatment additives such as flocculants and those used in closed-loop systems). Alternative consideration may include investigations into materials that have less (or no) mercury, alternative activities or processes in which there is less potential for mercury to be discharged (such as different laboratory practices), and/or other improved treatment technologies as applied to a known source. Information such as mercury content and magnitude of the source contribution along with the operability, reliability, effectiveness and economic impact of potential alternatives may be used to determine the overall feasibility and benefit of alternative materials, processes, and/or technologies.

Based on the results of chemical or equipment evaluations, U. S. Steel may consider alternatives to mercury-containing chemicals that have a high potential for reaching the surface waters (i.e., mussel control and biofouling chemicals). Any identified alternatives that require significant capital to implement would be

[17] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001); and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

evaluated with respect to feasibility, ease of operation/execution, and cost-effectiveness through a corporate-specific review process. The review process requires approval from multiple departments (e.g., procurement, environmental, work control) before implementation is approved.

3.2.1.3 Review of Purchasing Policies and Procedures (Type 3 Activity)

U. S. Steel has completed a review of purchasing policies and procedures with the objective of addressing the mercury content of purchases.

Mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Furthermore, if a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

For non-chemicals, U. S. Steel policy is that mercury added equipment/devices are not to be supplied or used with the exclusion of equipment/devices where there is no feasible alternative (e.g bulbs, batteries). Additionally, U. S. Steel fluorescent bulb purchases are of the low-mercury (also called "green bulbs") type.

3.2.1.4 Awareness Training for Facility Staff (Type 3 Activity)

U. S. Steel's training program for facility staff includes mercury awareness and disposal restrictions related to mercury. Additional training is provided to personnel with responsibility for maintaining mercury containing equipment[18], if applicable. The additional training consists of the following topics:

- Purchasing policies;
- Good housekeeping practices;
- Maintenance and cleaning practices;
- Recycling practices;
- Proper handling and disposal procedures;
- Spill kit locations; and
- Spill containment procedures.

These practices continue, however in support of this activity, U. S. Steel has worked to increase mercury awareness by highlighting mercury in a format outside of the normal training environment via distribution of a Mercury Awareness Bulletin.

3.2.1.5 Good Housekeeping Practices (Type 3 Activity)

U. S. Steel has implemented a good housekeeping program. Good housekeeping is the practice of maintaining a clean and orderly work environment. Providing a clean and orderly work area reduces the possibility of accidental spills and releases from equipment and materials. Good housekeeping is one of the focus areas for discussion during the awareness training, the details of which are described previously in Section 3.2.1.4.

[18] As previously discussed, U. S. Steel does not believe that there is any mercury-containing equipment (with the exception of lamps, bulbs, and batteries) in the drainage areas encompassing the Outfalls 018, 019, and 020 drainage areas. U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered.

3.2.1.6 Maintenance and Cleaning Activities (Type 3 Activity)

U. S. Steel has implemented procedures to be followed during maintenance and cleaning activities to minimize the release of mercury to the environment from equipment as well as chemicals used for maintenance and cleaning activities (e.g., solvents and oils). U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered. U. S. Steel, along with other steel mills in Northwest Indiana, has previously conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site.

3.2.1.7 Standard Operating Practices: Spill Response and Prevention (Type 3 Activity)

U. S. Steel has SOPs that address safe and proper techniques for addressing spills and leaks of various chemicals (including solvents used for maintenance and cleaning activities and oils such as lube oil used for equipment maintenance activities). Specific to mercury-containing materials are SOPs that address broken mercury thermometers, disposal of bulbs and lamps, and decommissioning/removal of mercury-containing equipment. Each of these SOPs address spill response efforts. Although all known mercury-containing equipment and thermometers have been removed from the site, these SOPs are conservatively written as though these types of mercury-containing equipment are still present. If a mercury spill occurs, a qualified contractor will be utilized for containment and clean up. For minor releases such as thermometers in on-site laboratories, a qualified contractor or mercury spill kit can be utilized.

With respect to spill prevention, U. S. Steel has SOPs that require inspections of the condition of above-ground storage tanks and associated secondary containment structures to reduce the possibility of a potential release to surface waters. For example, both the Storm Water Pollution Prevention Plan and Spill Prevention Control and Countermeasure Plan address spill prevention and include inspection requirements.

3.2.1.8 Disposal Practices of Mercury-Containing Chemicals/Items (Type 3 Activity)

U. S. Steel continues, through its E-Waste and Universal Waste Collection programs, to properly recycle/re-use/dispose of several types of items (which may or may not contain mercury). Data from this program is now utilized to track and estimate disposal of mercury PMPP related materials. Items that are specifically addressed by the PMPP include the following:

- Bulbs/Lamps – spent mercury-containing bulbs and lamps (e.g. fluorescent or sodium vapor lamps);
- Batteries – known mercury-containing batteries are lead-acid batteries[19] primarily used for standby emergency power and alkaline button cell batteries. The program involves collection of all batteries independent of mercury content;
- LCD-screens – for example computer monitors and laptop screens
- Mercury-Containing Equipment – could include mercury-containing equipment, vials or ampoules of mercury removed from equipment;

Note that U. S. Steel does not believe that any mercury-containing equipment remains within the Outfall 018/019/020 drainage area. As part of the multi-steel mill mercury inventory study that U. S. Steel participated in, U. S. Steel conducted facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these

[19] Mercury is not added in the manufacture of this type of battery; trace mercury that may be present is associated with the electrolytic acid solution.

materials from the property. However, as discussed in Section 3.2.1.3, if mercury (as a material on the U. S. Steel non-approved list) is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Proper disposal of mercury-containing materials varies by material type; however, disposal or recycling of items/chemicals containing mercury complies with applicable disposal/recycling regulations. U. S. Steel will provide updated quantities in each annual PPMP progress report.

3.2.2 Specific Application of Activities

U. S. Steel will utilize an integrated approach to address specific groups or types of items or materials. In each case, more than one activity will be employed towards the overall objective of minimizing the potential to release mercury through discharge waters.

3.2.2.1 Water Treatment Additives and Boiler Treatment Chemicals

The chemicals identified to potentially contain mercury are summarized in Attachment II. This includes water treatment additives (WTAs) used for mussel control, biofouling control, water conditioning including those for boiler feed waters, as well as pH and foam control chemicals. The following are applicable to these chemicals:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff;
- Source Characterization; and
- Alternatives for Reduction Evaluation (if deemed necessary by the results of the source characterization).

3.2.2.2 Other Chemicals and Materials

The Outfall 018, 019, and 020 drainages area may include storage of fuel or storage/use of other chemicals not already discussed in Section 3.2.2.1. Though not directly associated with Outfalls 018, 019, or 020 processes or water treatment, these materials[20] could reach surface waters via storm water conveyance. The potential is anticipated to be minimal given the various in-place preventive measures (e.g. secondary containment, the Spill Prevention Control and Countermeasure Plan, the Fugitive Dust Plan, and the Storm Water Pollution Prevention Plan).

3.2.2.3 Equipment that Contains Mercury

As previously discussed, no equipment that contains mercury exists within the Outfall 018, 019, and 020 drainage areas.

3.2.2.4 Bulbs/Lamps That Contain Mercury

A preliminary listing of the known bulbs/lamps that contain mercury are summarized in Part Two A of the SMV application. U. S. Steel has already implemented a program whereby out-of-service mercury-

[20] This includes materials stored in the area (i.e. chemicals and fuels) as well as dust suppressant and de-icing (i.e. road salt) chemicals that are applied to limited surface areas.

containing bulbs/lamps are disposed of and replaced with low mercury bulbs/lamps. Collected bulbs are sent offsite for recovery/recycling of mercury. For example, for the period of 2014 – September 2019, an estimated 0.16 to 3.8 pounds of mercury was reclaimed from thousands of bulbs facility-wide. If available, spent bulbs and lamps are replaced with low-mercury versions. Additionally, used globe style bulbs containing mercury, such as Metal Halide and Sodium Vapor lamps, are collected for recycling.

These practices will continue with support from the following:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff; and
- Disposal Practices for Mercury-Containing Items.

3.2.2.5 Batteries That May Contain Mercury

The known batteries that may contain mercury, which are summarized in Attachment II, are lead-acid batteries primarily used for standby emergency power.[21] U. S. Steel has already implemented a policy whereby out-of-service batteries are properly disposed of.

These practices will continue with support from the following:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response);
- Awareness Training for Facility Staff; and
- Disposal Practices for Mercury-Containing Items.

3.2.2.6 Discharge Waters

The waters that discharge to the Grand Calumet River via Outfalls 018, 019, and 020 have been discussed in Sections 1.3 and 2.3.

In addition to the ongoing management of these waters to meet current limits, the planned activities are outlined in Attachment IV. Activities may be sequentially staggered so that results from initial activities can be used to guide and effectively focus resources in subsequent activities. It is also possible that source characterizations may not confirm initially identified potential sources – if so, further activities specific to that source may not be required.

Many activities involve ongoing or as needed tasks. These include various tracking and monitoring tasks that will provide information to assess the possible need for other activities. Examples of critical activities are:

- Mercury characterization of all WTAs not already characterized and new WTAs. The characterization of WTAs may be tiered; for instance, those WTAs identified to have a high

[21]Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

potential to reach surface waters will be examined before those determined to have a low potential.

- Alternatives for Reduction Evaluation of chemicals (To be determined based on characterizations of water treatment chemicals).

3.2.2.7 Specific Activities Already Implemented

U. S. Steel has already performed an evaluation for some potential sources of mercury and has implemented, initiated, or completed the following:

- Review of purchasing policies, disposal tracking, and implementation of various SOPs related to spill prevention, response, and maintenance.

- A facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these materials.

- Characterization of all but one[22] WTA associated with Outfall 018, 019, and 020 discharges. Already completed characterization information is included in Attachment III.

- Performed characterization and an alternatives analysis for reduction evaluation of sodium hypochlorite and sodium bisulfite used for mussel control and dechlorination respectively. Usage rates of these chemicals have been examined previously as part of U. S. Steel's Total Residual Chlorine (TRC) Pollution Minimization Program (PMP) Control Strategy. The U. S. Steel Permit allows year-round chlorination for control of zebra and quagga mussel populations. However, usage typically occurs from April through November only. Other use of sodium hypochlorite for biofouling control also occurs on an as needed basis. The usage rates for effective treatment in both situations are adjusted by monitoring the chlorine demand (as indicated by TRC) of the system. For example, with respect to feed rates for the intake pump stations, TRC is measured at least daily at multiple locations and sodium hypochlorite usage rates adjusted accordingly to maintain set residual levels. The set residual levels are necessary to provide effective mussel and/or biofouling control.

  Prior to final outfall discharge, dechlorination occurs with the addition of sodium bisulfite. The water quality-based effluent limitations (8 ug/L as a monthly average; 18 ug/L as a daily maximum) for TRC are lower than the analytical detection limit (20 ug/L). Therefore, a mass balance approach is used to ensure the effluent limitations are met. The usage rates of sodium bisulfite are determined such that there is a mass balance of sodium bisulfite to the historical maximum TRC measured at the associated intakes (or other locations where sodium hypochlorite is used). U. S. Steel has developed a mass balance model for each month within the mussel control season that uses the historical max TRC for that specific to that month. This aims to minimize sodium bisulfate usage while still 1) accounting for how chlorine demand can vary significantly over the course of mussel control season; and 2) maintaining compliance with the TRC Permit limitations.

  As described above, further reducing the usage rates of sodium hypochlorite and sodium bisulfite to minimize the discharge potential from trace mercury within these chemicals is not feasible. U. S. Steel's preliminary and refined additional characterization for the specific sources (vendor/manufacturer) of sodium bisulfite and sodium hypochlorite confirmed that

[22] Characterization for the remaining WTA (RL9007) is scheduled to be complete by May 2020.

these remain significant potential water treatment additive sources of mercury. U. S. Steel is not aware of reduced mercury-content versions of either chemicals. As such, no further PMPP activities are planned with respect to these chemicals.

- Source characterization of condensate streams such as those associated with the Iron-Producing Tar Tank. The evaluation lead to the conclusion that the mercury content of condensate streams are comparable to those observed for intake water. The contributions from these mercury sources are anticipated to be insignificant given the minimal concentrations of mercury measured in similar condensate streams and the low volume of condensate flows. As such, no further PMPP activities were performed or are planned with respect to condensates.

- A review of practices related to heat exchangers to assure that any leaks, if occurring, would not result in additional process wastewaters reaching Outfalls 018, 019, or 020. U. S. Steel has SOPs in place that require evaluation (visual inspection) of heat exchanger equipment for leaks and other operational issues. Some equipment is designed to automatically trigger an alarm and shutdown in the event of a loss of a set amount of oil. If the alarm is tripped, the SOP requires pressure testing to evaluate if the loss is due to normal uses (e.g. new fittings, bearings) or a leak.

- Evaluation of Gary Rail Oil Water Separator and potential for stormwater infiltration overwhelming system. An evaluation of the capacity of the Gary Rail Oil Water Separator indicated adequate capacity under several different storm scenarios; therefore, no further PMPP activities were performed or are planned with respect to the Gary Rail Oil Water Separator.

3.3 Identification of Facility Responsibilities under P.L.225-2001

U. S. Steel is aware of their responsibilities under Public Law (P.L.) 225-2001 (also known as the House Enrolled Act 1901 of the 2001 legislative session and codified at IC 13-20-17.5) and will comply with all applicable requirements under the Act and associated Indiana Code.

3.4 Goals of Performance (327 IAC 5-3.5-9(a)(4))

For each activity identified in Section 3.2, this PMPP will also identify:

(A) The goal to be accomplished;

(B) A measure of performance; and

(C) A schedule for action.

As part of the required annual reports required pursuant to 327 IAC 5-3.5-9(a)(8), U. S. Steel will update IDEM on the progress of the activities identified in this section.

3.5 Resources and Staff Necessary (327 IAC 5-3.5-9(a)(6))

Pursuant to Part Three C of the SMV Application, the following key staff is responsible for implementing this PMPP:

Facility Personnel -
Environmental Water Compliance Manager
Procurement Buyer

Off-site Personnel –
- Environmental Specialist
- Technical Consultant
- Analytical and Sampling Support

Additional resources may be utilized when necessary and if appropriate.

With respect to funding, U. S. Steel will commit the funds necessary to commit to the schedule of planned activities pursuant to Section 3.2.

4.0 Mercury Monitoring Data (327 IAC 5-3.5-9(a)(5))

In support of renewing the interim SMV limitations and as required pursuant to Part Four of the SMV Application, U. S. Steel has collected at least two years of mercury data from Outfalls 018, 019, and 020 and the associated intakes. Sampling occurred throughout the year and is representative of the four seasons. Sampling was performed utilizing modified EPA Method 1669 sampling techniques. Analyses for mercury were in accordance with EPA Method 1631, Revision E. Mercury data was reviewed for applicable QA/QC requirements and deemed valid, unless noted.

As discussed in Section 2.3, the data collected over the most recent two-year period are presented in Attachment III. The maximum mercury results for Outfalls 018, 019, and 020 in the most recent two-year period (March 2018 – February 2020)[23] are:

- Outfall 018: 8.1 ng/L (from December 3, 2019)
- Outfall 019: 2.6 ng/L (from January 11, 2020)
- Outfall 020: 8.9 ng/L (from January 30, 2020)

[23] Note that these statistics do not include data from November 27 – November 30, 2019 for Outfalls 018 and 019. Data from this period (following rupture of a large service water line) is not considered representative of normal operations for Outfall 018 and Outfall 019. Data for this period were reported as required by the Permit; but excluded in this PMPP for the purposes characterizing typical mercury levels in these discharges.

5.0 Proof of Completion of Public Notice Activities (327 IAC 5-3.5-9(c))

As required by Part Five A of the SMV Application, U. S. Steel published notice of availability of the PMPP and provided a comment period of thirty (30) days that started on March 2, 2020. No requests for a copy of the PMPP nor comments were received.

The notice of availability was published the notice in the Northwest Indiana Times on March 2, 2020 and posted at both the Gary Indiana Public Library and Gary Indiana Town Hall. Attachment V includes proof of these notices. Permission to post the notice was denied by both the Gary Indiana and Merrillville Indiana branches of United States Post Offices.

6.0 Annual Reports (327 IAC 5-3.5-9(a)(8))

U. S. Steel will provide annual reports to IDEM based on the schedule required in the current NPDES. Each of the reports will describe the following:

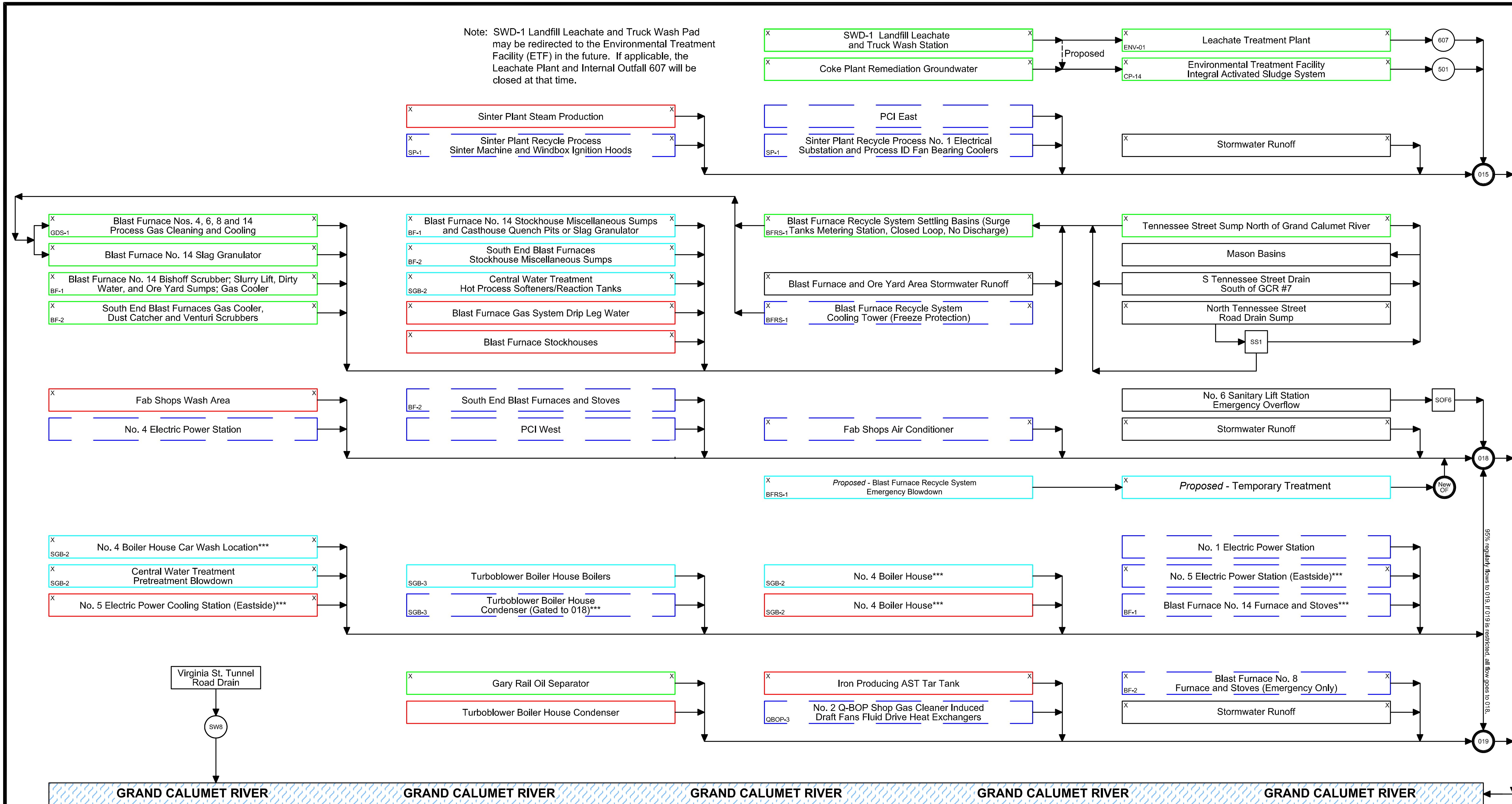
(A) U. S. Steel progress toward fulfilling each of the requirements of this PMPP;

(B) The results of the mercury monitoring collected during the intervening period; and

(C) The steps taken to implement each planned activity developed as part of this PMPP under Section 3.2 to reduce or eliminate mercury from Outfalls 018, 019, and 020 discharges, as applicable.

Attachment I:

Figure LLD-2 (Flow Diagram w/Outfall 018 and 019)
Figure LLD-3 (Flow Diagram w/Outfall 020)



*** Majority of flow is distributed to Outfall 019 with small percentage routed to Outfall 018 because of elevation change.

FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER		
CONDENSATE	X PUMP STATION	
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT	
PROCESS WATER	# OUTFALL	

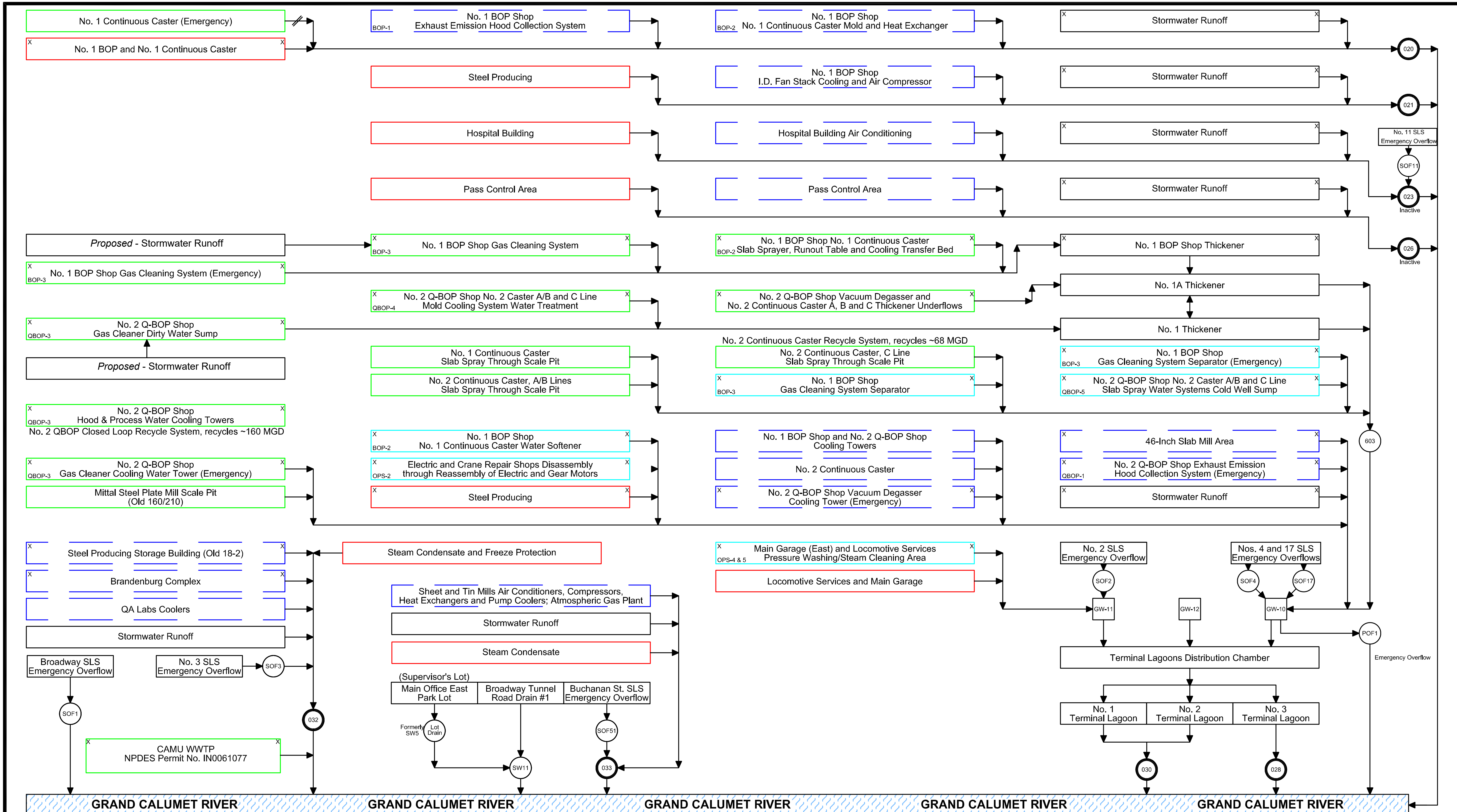
Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-02

FIGURE LDD-02

U.S. Steel - Gary Works Line Discharge Diagram

Outfalls: 015, 018, 019, 501 & New OF



FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER	
CONDENSATE	X PUMP STATION
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT
PROCESS WATER	# OUTFALL

Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-03 Detail

USS

FIGURE LDD-03 Detail

U.S. Steel - Gary Works Line Discharge Diagram

Outfalls: 020, 021, 023 (Inactive), 026 (Inactive), 028, 030, 032 and 033

Attachment II:

II-A. Part Two, Section A of the Draft SMV Application
II-B. Inventory of Mercury-Containing Materials

PART TWO – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) INVENTORY/IDENTIFICATION

A. Provide a preliminary inventory of potential uses and sources of mercury in all buildings and departments, as well as a preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites. The following checklist* includes many of the chemicals, equipment, locations, etc. where mercury may be present at your site. For the purpose of satisfying the requirements of this section, you may submit the completed checklist as a preliminary inventory/identification. While the checklist is intended to facilitate the inventory/identification process, it should not be considered as all-inclusive for purposes of establishing a complete inventory. *(see 327 IAC 5-3.5-9(a)(1) and 327 IAC 5-3.5-9(a)(2))*

LABORATORY EQUIPMENT	
☐ Manometers	☐ Ion exchange cartridges for lab water purification system
☐ Barometers	☐ Hanging mercury drop electrodes for polarographic analyzers
☐ Thermometers	☐ Mercury Hallow Cathode lamp for AA analysis

LABORATORY CHEMICALS	
☐ COD analysis reagent *(mercuric sulfate)*	☐ Mercury or mercurous chloride
☐ TKN and TP analysis digestion reagents	☐ Mercury iodide
☐ Nessler reagent	☐ Mercury nitrate
☐ Mercury analytical standards	☐ Mercury (II) oxide
☐ Gas chromatograph sample interferences *(elemental mercury)*	☐ Mercury (II) sulfate
☒ Sodium hypochlorite *(Clorox)*	☐ Merthiolate

BULK CHEMICALS	
☐ Phosphorus removal chemicals	☒ Chlorine
☒ Dechlorination chemicals	☒ Sodium hypochlorite
☐ Sludge thickening polymers	☒ Sulfuric acid
☐ Potassium hydroxide	☐ Nitric acid
☒ Sodium hydroxide	☐ Ferric or ferrous chloride
☒ Sodium chloride	☐ Pickling liquor *(for phosphorus removal)*

PROCESS CONTROL AND MEASURING EQUIPMENT	
☐ Accustats	☐ Ring balances
☐ Barometers	☐ Shunt trips
☐ Counterweights	☐ Steam flow meters
☐ Elemental mercury for refilling mercury-containing equipment	☐ Stokes gauges
	Switches and relays:
☐ Flow meters	☐ Displacement plunger relays
☐ Gas regulators and meters	☐ Mercoid control switches
☐ Gyroscopes	☐ Pressure control switches *(mounted on bourdon tube or diaphragm)*
☐ Hydrometers with thermometers	☐ Relay switches
☐ Level and rotation sensors	☐ Mercury wetted relays
☐ Manometers, pressure gauges and vacuum gauges	☐ Mercury displacement relays (found in motors)
☐ Mercury-sealed pistons	☐ Sump pump, bilge pump and other float controls
☐ Permeters	☐ Tilt switches
☐ Pressure-trols	☐ Thermometers *(including industrial dial face thermostats with capillary tubes)*
☐ Pyrometers	☐ Thermostats and thermoregulators
☐ Rectifiers	☐ Transmitters

BUILDINGS	
☐ DC watt-hour meters	Hydronic and warm air controls with tilt switches such as:
☐ Flame sensors *(found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)*	☐ Aquastats
	☐ Pressurestats
	☐ Firestats
	☐ Fan limit controls
* This checklist was borrowed from the Delta Institute	☐ Pressure/flow controls on air handling units.

PART TWO (CONTINUED)	
BUILDINGS *(continued)*	
Switches and relays:	
☐ Fire alarm box switches	☐ Mercury displacement relays *(found in lighting, resistance heating and motors)*
☐ Silent light switches	
☐ Relay switches	☐ Sump pump, bilge pump, flow monitor, float switches, and other float controls
☐ Mercury wetted relays	
	☐ Tilt switches
Phosphorus removal chemicals:	
☐ Ferric or ferrous chloride	
☐ Pickling liquor	
☐Thermostats	
BEARINGS AND SEALS	
☐ Trickling filter Pivot Arm Bearings *(mercury bearings/water seals)*	
LAMPS	
☒ Fluorescent	☒ Mercury vapor lamps
☒ High-pressure sodium	☒ Metal halide
☐ Mercury arc	☐ Ultraviolet disinfection
BATTERIES	
☒ Mercury-zinc *(button)* batteries	☒ Mercury alkaline batteries
☒ Mercury-cadmium batteries	☒ Mercury oxide batteries
PAINT	
☐ Old latex-paint (pre-1990)	☐ Marine paint
FIRST AID/MEDICAL	
☐ Mercurochrome	☐ Thermometers
☐ Sphygmomanometers	☐ Thimerosal *(contained in eye wash)*
OTHER	
☐ Old pesticides, fungicides and herbicides	☐ Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps
☐ Tree root growth control products	
☒ Computer monitors	
COLLECTION SYSTEM	
☐ Lift station equipment	☐ Sewer lines with accumulated mercury
☐ Traps with accumulated mercury	☐ Other mercury containing equipment
☐ Sumps with accumulated mercury	☐ Mercury-containing chemicals used and/or stored on-site
MERCURY STORAGE SITES	
☐ Elemental mercury	☐ Mercury-containing items collected for disposal

B. Provide a plan and schedule for providing a complete inventory initiated under Section A. above. *(see 327 IAC 5-3.5-9(a)(1))* The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

A complete inventory should include an estimate of quantities *(i.e., volume of chemicals used annually, or numbers of mercury containing equipment)* for each item identified in Part II.A. Additionally, a complete inventory should include documentation from chemical suppliers and equipment suppliers of the mercury content in your most commonly purchased items. Mercury may not be present in a concentration great enough to appear on an MSDS, yet still contribute to the overall level of mercury in the influent.

See PMPP

* This checklist was borrowed from the Delta Institute

ATTACHMENT II-B. INVENTORY OF MERCURY-CONTAINING MATERIALS FOR OUTFALLS 018/019/020 MERCURY PMPP

Item or Material	Purpose/Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Location; Storage Method	Potential to Reach Surface Water?(C)
WATER TREATMENT CHEMICALS						
13% Sodium Hypochlorite	Mussel Control (No. 1 & No 2 PS Intakes): ~Apr 1 to Nov 30	840 - 2064 gpd (for PS 1 + PS2)	18 - 300 ng/L	21.53 - 473.69 mg/yr (D)	HDPE tanks w/secondary containment	High
13% Sodium Hypochlorite	Microbial Control (No. 1 Caster service water): ~Dec 1 - Mar 31	10 - 25 gpd (020 related use)	18 - 300 ng/L	0.08 - 3.43 mg/yr	HDPE tanks w/secondary containment	High
13% Sodium Hypochlorite	UF & RO water treatment system - UF microbiological control (associated with Outfall 019 and if needed 018)	8000 gallons/yr	18 - 300 ng/L	0.55 - 9.1 mg/yr	Tanks w/secondary containment	High
Sodium Bisulfite	Dechlorination for Outfalls 018, 019, 020 w/in Mussel Control Season (~Apr 1 - Nov 30)	204 - 727 gpd (for 018 + 019 + 020 in mussel control season; Note I)	790 - 6600 ng/L	309 - 2605.3 mg/yr (I)	HDPE tanks w/secondary containment	High
Sodium Bisulfite	Dechlorination for Outfall 020 outside of Mussel Control Season (~Dec 1 - Mar 31)	6 - 7 gpd (for 020 outside in mussel control season)	790 - 6600 ng/L	2.17 - 21.35 mg/yr	HDPE tanks w/secondary containment	High
Sodium Bisulfite	UF & RO water treatment system - dechlorination prior to RO (associated with Outfall 019 and if needed 018)	2000 gallons/yr	790 - 6600 ng/L	5.98 - 50 mg/yr	Tanks w/secondary containment	High
CL1355	Deposit control for the service water at No. 1 Caster	5 - 15 gpd (020 related use)	14.2 ng/L	0.1 - 0.29 mg/yr	Tote storage	Low
FO180	Defoamer	018 - 10 gpd (est < 30 days/yr) 019 - no use 020 - 10 gpd (est daily)	25 ng/L	0.35 - 0.37 mg/yr (E)	Tanks w/secondary containment	Low
RL9007	UF water treatment system - RO membrane antiscalent (associated with Outfall 019 and if needed 018)	1500 gallons/yr	to be determined	to be determined	Tanks w/secondary containment	High
Lime (Calcium Hydroxide)	pH control (associated with 018/019)	56000 lbs/shipment	< 69 ng/kg	<1.75 mg per shipment	Silo storage	Low
Caustic (Sodium Hydroxide)	Usage for pH control and aiding in precipitation is associated with the #1 Caster process water. That stream is normally discharged to Outfalls 028 and 030, however in an emergency, this can be routed to Outfall 020. Since this is not a typical discharge to Outfall 020, no mercury contribution estimate will be determined for the 018/019/020 inventory.				Tanks w/secondary containment	Low
Sodium Hydroxide	UF & RO water treatment system - permeate pH control (associated with Outfall 019 and if needed 018)	25750 gallons/yr	737 - 940 ng/L	71.83 - 91.6 mg/yr	Tanks w/secondary containment	Low
Salt (Sodium Chloride)	Brine for Water Softener Regen. (associated with 018/019)	48000 lbs/shipment	<30 ng/L	<0.3 mg per shipment	Concrete vault	Low

ATTACHMENT II-B. INVENTORY OF MERCURY-CONTAINING MATERIALS FOR OUTFALLS 018/019/020 MERCURY PMPP

Item or Material	Purpose/Use	Estimated # of Items or Amount [A]	Estimated Mercury Content [B] per Item	Estimated Mercury Content [B] Total	Location; Storage Method	Potential to Reach Surface Water?[C]
BOILER WATER TREATMENT CHEMICALS [C]						
BL122	Bisulfite	15 - 50 gpd (for 018/019)	<297 ng/L	<6.15 - <20.52 mg/yr	Tote storage	Low
BL197	Defoamer	0.5 - 3 gpd (for 018/019)	<246 ng/L	<0.17 - <1.02 mg/yr	Tote storage	Low
BL1350	Dispersant	4 - 12 gpd (for 018/019)	<288 ng/L	<1.59 - <4.77 mg/yr	Tote storage	Low
BL1513	Amine for corrosion control	7 - 22 gpd (for 018/019)	<239 ng/L	<2.31 - <7.26 mg/yr	Tanks w/secondary containment	Low
CL1376	Scale inhibitor	0.1 - 4 gpd (for 018/019)	575 ng/L	0.08 - 3.18 mg/yr	Tote storage	Low
STORED CHEMICALS AND MATERIALS WITH THE POTENTIAL TO ENTER STORMWATER [F]						
Betz 281165 Ferrameen	Coke oven gas conditioner	1000 gal tank	<206 ng/L	<0.78 mg per tank	Materials are stored in tanks with secondary containment. These tanks are near (within 500 ft) of stormwater open manhole(s).	Very low
CL 1370	Scale inhibitor	850 gal tank	<308 ng/L	<0.99 mg per tank		Very low
CL 1370	Scale inhibitor	550 gal tank	<308 ng/L	<0.64 mg per tank		Very low
CL 4800	Dispersant	1000 gal tank	<263 ng/L	<1 mg per tank		Very low
P841L	Coagulant	1200 gal tank	755 ng/L	3.43 mg per tank		Very low
Diesel fuel	Fuel	750 gal tank	4.2 - 339 ng/L	0.01 - 0.96 mg per tank		Very low
Gasoline	Fuel	500 gal tank	52 - 1050 ng/L	0.1 - 1.99 mg per tank		Very low
Tar (not currently used)	Additive	10000 gal tank	Mercury content was not determined. If use is resumed mercury analysis will be performed.			Very low
Mag Lime	Additive	9000 gal tank	204 ng/L (G)	6.95 mg per tank (G)	Material is stored in tanker trailer with no secondary containment. Tanks are within 300 ft of open stormwater manhole.	Very low

ATTACHMENT II-B. INVENTORY OF MERCURY-CONTAINING MATERIALS FOR OUTFALLS 018/019/020 MERCURY PMPP

Item or Material	Purpose/Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Location; Storage Method	Potential to Reach Surface Water?(C)
IN-SERVICE EQUIPMENT						
All in-service equipment that contained Hg has been removed.						
BULB/LAMPS						
Sodium Vapor Lamps	Lighting	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	0.02 grams - 0.145 grams	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	Various	Very Low
Mercury Vapor Lamps			0.025 grams - 0.225 grams			
Metal Halide			0.005 - 0.150 grams			
Linear Fluorescent Bulbs			0.003 - 0.05 grams			
OTHER ITEMS						
Lead-acid Batteries (H)	Standby emergency power and power for mechanical equipment (e.g., fork lifts)	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.			Various	Very Low
Other Batteries (e.g., mercury-zinc, mercury alkaline, mercury-cadmium, mercury oxide)	Portable power supply	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.		Various	Very Low
LCD type computer monitors	Visual display	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	0 - 0.010 grams average (0.005 grams) used for estimate	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	Various	Very Low
Laptop LCD screens						
LCD type HDTV screen						
OUTFALL DISCHARGES						
Outfall 018	NPDES Permitted Discharges as described in Section 1.3 of the PMPP.		Results of mercury analysis for Outfalls are discussed in Section 2.3 of the PMPP.		na	These are the final discharges to surface water.
Outfall 019						
Outfall 020						

Notes:

(A): Chemical usage rates are estimated ranges based on averages or purchasing records; day to day usage rates may vary. Other chemicals that may be approved for usages associated with Outfall 018/019/020 but are not currently being used are not included. If usage resumes, they will be added to this inventory and characterized.

(B): The mercury values listed for chemicals are based on mercury characterization via direct analytical measurement or information available in the literature. Equipment mercury content was estimated from the mass of the ampoule of elemental mercury utilized in the equipment itself or comparable pieces of equipment. Lamp and bulb mercury content information was generated from publically accessible sources including the National Electrical Manufacturers Association.

(C): Though low in potential, boiler water treatment chemicals that may discharge to outfalls via boiler blowdown or condensate.

(D): The listed total estimated mercury content is overly conservative as it assumes all of the No. 1 and 2 PS intake water is distributed to Outfall 018, 019, and 020. However, No. 1 and 2 PS intake waters

(E): Assumes daily use at Outfall 020 and a maximum of 30 days use at Outfall 018.

(F): Though very low in potential, stored chemicals and fuel that may be discharged to outfalls within stormwater via open manholes.

(G): Mag Lime is a mixture of lime and free metallic magnesium. Mercury content estimates are based on mercury estimates from lime (2040 ng/L) and the weight percentage of lime in the mag lime mixture.

(H): Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

(I): Estimate based on 2016 usage rates (Apr-Oct) for Outfall 018, 019, 020, and 021. The Outfall 021 contribution to these totals is small given the relative flow of Outfall 021 to the other outfalls.

Attachment III:
Mercury Data

Table III-1: Intake Mercury and TSS Data for the Most Recent 2-Years

Table III-2: Outfall 018, 019, & 020 Mercury and TSS Data for the Most Recent 2-Years

ATTACHMENT III. TABLE III-1. INTAKE MERCURY AND TSS DATA FOR THE MOST RECENT 2-YEARS

Sample Date	PS-1 Total Mercury Sample (ng/L)	PS-1 Total Mercury Duplicate[3] (ng/L)	PS-1 Total Mercury Average (ng/L)	PS-1 Mercury Flag	PS-1 TSS (mg/L)	PS-2 Total Mercury Sample (ng/L)	PS-2 Total Mercury Duplicate[3] (ng/L)	PS-2 Total Mercury Average (ng/L)	PS-2 Mercury Flag	PS-2 TSS (mg/L)
03/14/18	1.0	---	1.0		14.9	0.71	---	0.71		16.4
04/12/18	0.37	---	0.37	J	2.7	0.35	---	0.35	J	3.4
05/10/18	0.60	---	0.60		3.7	0.36	---	0.36	J	4.3
06/21/18	0.54	---	0.54		2.9	< 0.20	---	< 0.20		2.3
07/19/18	0.63	---	0.63		3.9	0.33	---	0.33	J	2.6
08/23/18	0.32	0.36	0.34	J	4.0	0.30	---	0.30	J	2.9
09/20/18	0.31	< 0.20	0.26	J	4.8	0.25	---	0.25	J	0.9
10/11/18	0.57	0.39	0.48	J	2.2	0.52	---	0.52		1.7
11/15/18	0.26	---	0.26	J	1.4	0.27	0.29	0.28	J	7.3
12/13/18	0.34	0.53	0.44	J	2.1	1.8	---	1.8		13.6
02/13/19	*	---	*	B1	3.0	1.5	---	1.5		14.4
04/17/19	0.65	---	0.65		6.1	1.2	---	1.2		5.6
06/20/19	0.30	---	0.30	J	2.7	0.35	---	0.35	J	2.4
08/22/19	0.31	---	0.31	J	1.0	0.37	---	0.37	J	1.7
10/17/19	0.41	---	0.41	J	6.8	0.42	0.37	0.40	J	5.7
12/17/19	2.8	---	2.8		0.9	0.57	---	0.57		7.6
02/12/20	0.61	---	0.61			0.47	0.42	0.45	J	

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by ALS Laboratory Group. All Mercury and TSS data from single grab samples unless noted otherwise.
3. All duplicate data presented are from field duplicate results.
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated data flag(s).
6. Mercury data flags:

   "B1" indicates that associated field blank had a mercury detection outside of the criteria for blanks (whichever is greater: <0.5 ng/L or up to 1/5 the amount in associated samples). Sample considered invalid.

   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (0.20 ng/L).

ATTACHMENT III. TABLE III-2. OUTFALL 018, 019, & 020 MERCURY AND TSS DATA FOR THE MOST RECENT 2-YEARS

Sample Date	Outfall 018					Outfall 019					Outfall 020				
	Total Mercury				TSS	Total Mercury				TSS	Total Mercury				TSS
	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)
03/14/18	0.55	0.54	0.55		6.8	0.69	---	0.69		13.4	0.84	---	0.84		10.5
04/12/18	0.46	0.40	0.43	J	2.2	0.26	---	0.26	J	2.6	0.38	---	0.38	J	2.5
05/10/18	0.50	---	0.50		1.6	0.69	0.43	0.56	J	16.7	0.23	---	0.23	J	2.7
06/21/18	0.85	0.82	0.83	R	6.2	0.23	---	0.23	J	1.2	1.1	---	1.1		3.6
07/19/18	0.60	---	0.60		1.9	0.40	---	0.40	J	0.9	1.3	---	1.3	J	8.8
08/23/18	0.31	---	0.31	J	2.0	1.0	---	1.0		33.4	0.58	---	0.58		3.5
09/20/18	0.37	---	0.37	J	0.8	0.35	---	0.35	J	2.2	0.39	---	0.39	J	2.0
10/11/18	0.69	---	0.69		3.6	0.41	---	0.41	J	3.5	0.74	---	0.74		1.8
11/15/18	0.45	---	0.45	J	4.7	0.34	---	0.34	J	2.6	0.62	---	0.62		3.1
12/13/18	0.49	---	0.49	J	11.1	0.52	---	0.52		10.7	1.0	---	1.0		14.1
02/13/19	0.46	0.43	0.45	J	2.7	0.74	---	0.74		1.8	0.53	---	0.53		2.4
04/17/19	0.78	0.63	0.71		7.6	0.58	---	0.58		10.9	0.93	---	0.93		12.6
06/20/19	0.38	0.49	0.44	J	0.73 E	0.55	---	0.55	FB	3.1	0.66	---	0.66		3.4
08/22/19	0.50	---	0.50		0.80 E	0.36	---	0.36	J	0.8	0.57	---	0.57		3.8
10/17/19	0.33	---	0.33	J	---	0.43	---	0.43	J	---	0.33	---	0.33	J	2.5
11/27/19	620	---	620	NR	120 A	2.0	---	2.0	NR	80 A	---	---	---		---
11/28/19	37	---	37	NR	5.2	710	---	710	NR	4	---	---	---		---
11/29/19	640	---	640	NR	6.0	36	---	36.0	NR	2.7	---	---	---		---
11/30/19	16	---	16	NR	2.3	3.4	---	3.4	NR	2.2	---	---	---		---
12/01/19	6.9	---	6.9		5.6	1.1	---	1.1		8.0	---	---	---		---
12/02/19	1.8	---	1.8		2.3	1.3	---	1.3		7.0	---	---	---		---
12/03/19	8.1	---	8.1		2.4	< 0.20	---	< 0.20		4	---	---	---		---
12/04/19	4.1	---	4.1		2.8	0.87	---	0.87		2.4	---	---	---		---
12/05/19	1.2	---	1.2		3.6	0.68	---	0.68		3.1	---	---	---		---
12/06/19	*	---	*	M	1.7	*	---	*	M	2.8	---	---	---		---
12/07/19	1.4	---	1.4	FB	1.3	1.0	---	1.0	FB	6.1	---	---	---		---
12/08/19	1.0	---	1.0	FB	3.3	1.1	---	1.1	FB	2.3	---	---	---		---
12/09/19	1.2	---	1.2	FB	3.9	1.3	---	1.3	FB	2.8	---	---	---		---
12/10/19	0.61	---	0.61		6.6	0.50	---	0.50		10.8	---	---	---		---
12/11/19	1.2	---	1.2		4.0	1.0	---	1.0		3.0	---	---	---		---
12/12/19	3.5	---	3.5		9.0	1.5	---	1.5		2.0	---	---	---		---
12/13/19	1.6	---	1.6		2.3	1.4	---	1.4		1.8	---	---	---		---
12/14/19	0.67	---	0.67		1.7	0.51	---	0.51		1.8	---	---	---		---
12/15/19	0.48	---	0.48	J	5.8	0.39	---	0.39	J	2.2	---	---	---		---
12/16/19	0.56	---	0.56		1.0	0.42	---	0.42	J	1.8	---	---	---		---
12/17/19	0.58	---	0.58		1.2	0.28	---	0.28	J	1.7	0.55	---	0.55		5.8
12/18/19	0.77	---	0.77		1.4	0.51	---	0.51		2.8	---	---	---		---
12/19/19	0.49	---	0.49	J	---	0.46	---	0.46	J	---	0.56	---	0.56		---
12/20/19	0.46	---	0.46	J	---	0.52	---	0.52		---	0.46	---	0.46	J	---
12/21/19	0.62	---	0.62		---	0.33	---	0.33	J	---	0.57	---	0.57		---
12/22/19	0.45	---	0.45	J	---	0.99	---	0.99		---	1.9	---	1.9		---

ATTACHMENT III. TABLE III-2. OUTFALL 018, 019, & 020 MERCURY AND TSS DATA FOR THE MOST RECENT 2-YEARS

Sample Date	Outfall 018					Outfall 019					Outfall 020				
	Total Mercury				TSS	Total Mercury				TSS	Total Mercury				TSS
	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)
12/23/19	0.79	---	0.79		---	0.83	---	0.83		---	1.7	---	1.7		---
12/24/19	0.63	---	0.63		---	0.44	---	0.44	J	---	0.53	---	0.53		---
12/25/19	2.4	---	2.4		---	2.4	---	2.4		---	0.60	---	0.60		---
12/26/19	0.40	---	0.40	J	---	0.30	---	0.30	J	---	0.27	---	0.27	J	---
12/27/19	0.47	---	0.47	J	---	0.34	---	0.34	J	---	0.62	---	0.62		---
12/28/19	0.44	---	0.44	J	---	0.39	---	0.39	J	---	0.94	---	0.94		---
12/29/19	0.48	---	0.48	J	---	0.57	---	0.57		---	1.7	---	1.7		---
12/30/19	0.54	---	0.54		---	0.36	---	0.36	J	---	0.43	---	0.43	J	---
12/31/19	0.39	---	0.39	J	---	0.25	---	0.25	J	---	0.50	---	0.50		---
01/01/20	0.69	---	0.69		---	0.47	---	0.47	J	---	0.42	---	0.42	J	---
01/02/20	1.6	---	1.6		---	0.53	---	0.53		---	0.32	---	0.32	J	---
01/03/20	1.0	---	1.0		---	0.42	---	0.42		---	0.42	---	0.42		---
01/04/20	1.1	---	1.1		---	0.75	---	0.75		---	0.43	---	0.43	J	---
01/05/20	1.0	---	1.0		---	1.2	---	1.2		---	1.8	---	1.80		---
01/06/20	1.5	---	1.5		---	0.85	---	0.85		---	0.69	---	0.69		---
01/07/20	1.7	---	1.7		---	0.51	---	0.51		---	0.50	---	0.50		---
01/08/20	1.8	---	1.8		---	0.47	---	0.47		---	0.58	---	0.58		---
01/09/20	1.5	---	1.5		---	0.35	---	0.35	J	---	0.40	---	0.40	J	---
01/10/20	2.2	---	2.2		---	0.56	---	0.56		---	0.58	---	0.58		---
01/11/20	5.6	---	5.6		---	2.6	---	2.6		---	1.3	---	1.3		---
01/12/20	2.2	---	2.2		---	0.95	---	0.95		---	2.4	---	2.4		---
01/13/20	3.0	---	3.0		---	0.79	---	0.79		---	1.4	---	1.4		---
01/14/20	2.0	---	2.0		---	0.70	---	0.70		---	1.7	---	1.7		---
01/15/20	2.6	---	2.6		---	0.79	---	0.79		---	0.6	---	0.62		---
01/16/20	1.2	---	1.2		---	0.46	---	0.46	J	---	0.46	---	0.46	J	---
01/17/20	1.2	---	1.2		---	0.52	---	0.52		---	0.50	---	0.50		---
01/18/20	1.1	---	1.1		---	0.50	---	0.50		---	0.55	---	0.55		---
01/19/20	1.7	---	1.7		---	0.54	---	0.54		---	0.70	---	0.70		---
01/20/20	1.4	---	1.4		---	1.1	---	1.1		---	0.78	---	0.78		---
01/21/20	0.49	---	0.49	J	---	0.49	---	0.49	J	---	0.51	---	0.51		---
01/22/20	0.61	---	0.61		---	0.43	---	0.43	J	---	1.8	---	1.8		---
01/23/20	*	---	*	M, FB	---	0.51	---	0.51		---	0.53	---	0.53		---
01/24/20	0.88	---	0.88		---	0.41	---	0.41	J	---	0.42	---	0.42	J	---
01/25/20	*	---	*	M	---	0.61	---	0.61		---	0.46	---	0.46	J	---
01/26/20	0.58	---	0.58		---	0.35	---	0.35	J	---	0.57	---	0.57		---
01/27/20	0.55	---	0.55		---	0.64	---	0.64		---	0.37	---	0.37	J	---
01/28/20	0.81	---	0.81		---	0.44	---	0.44	J	---	0.40	---	0.40	J	---
01/29/20	1.1	---	1.1		---	0.57	---	0.57		---	0.38	---	0.38	J	---
01/30/20	0.47	---	0.47	J	---	0.39	---	0.39	J	---	8.9	---	8.9		---
01/31/20	0.56	---	0.56		---	0.41	---	0.41	J	---	0.40	---	0.40	J	---
02/01/20	0.39	---	0.39	J	---	0.34	---	0.34	J	---	0.43	---	0.43	J	---

ATTACHMENT III. TABLE III-2. OUTFALL 018, 019, & 020 MERCURY AND TSS DATA FOR THE MOST RECENT 2-YEARS

Sample Date	Outfall 018					Outfall 019					Outfall 020				
	Total Mercury				TSS	Total Mercury				TSS	Total Mercury				TSS
	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)
02/02/20	0.44	---	0.44	J	---	0.30	---	0.30	J	---	0.49	---	0.49	J	---
02/03/20	0.43	---	0.43	J	---	0.33	---	0.33	J	---	0.39	---	0.39	J	---
02/04/20	0.51	---	0.51		---	0.35	---	0.35	J	---	0.33	---	0.33	J	---
02/05/20	0.61	---	0.61		---	0.54	---	0.54		---	0.58	---	0.58		---
02/06/20	0.46	---	0.46	J	---	0.63	---	0.63		---	0.49	---	0.49	J	---
02/07/20	0.72	---	0.72		---	0.62	---	0.62		---	0.61	---	0.61		---
02/08/20	1.0	---	1.0		---	0.47	---	0.47	J	---	0.47	---	0.47	J	---
02/09/20	0.67	---	0.67		---	0.53	---	0.53		---	0.57	---	0.57		---
02/10/20	0.62	---	0.62		---	1.1	---	1.1		---	0.68	---	0.68		---
02/11/20	0.44	---	0.44	J	---	0.47	---	0.47	J	---	0.36	---	0.36	J	---
02/12/20	0.78	---	0.78		---	0.46	---	0.46	J	---	0.52	---	0.52		---
02/13/20	1.2	---	1.2		---	0.98	---	0.98		---	1.3	---	1.3		---
02/14/20	0.61	---	0.61		---	0.68	---	0.68		---	0.69	---	0.69		---
02/15/20	0.55	---	0.55		---	1.2	---	1.2		---	0.66	---	0.66		---
02/16/20	0.39	---	0.39	J	---	0.79	---	0.79		---	0.52	---	0.52		---
02/17/20	0.76	---	0.76		---	2.0	---	2.0		---	0.57	---	0.57		---
02/18/20	0.76	---	0.76		---	0.63	---	0.63		---	0.70	---	0.70		---
02/19/20	0.66	---	0.66		---	0.88	---	0.88		---	0.41	---	0.41	J	---
02/24/20	0.48	---	0.48	J	---	0.45	---	0.45	J	---	---	---	---		---

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by ALS Laboratory Group. All Mercury and TSS data from single grab samples unless noted otherwise.
3. All duplicate data presented are from field duplicate results.
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated data flag(s).
6. Mercury data flags:

   "FB" indicates that the associated field blank had a detection greater than the analytical method reporting limit and within 1/5 of the sample result 1.1 ng/l; however, as the field sample result is below the rolling 12 month average limit, the sample result is used based on EPA guidance for Method 1631E: field sample results that are associated with contaminated blanks, but also are still below the regulatory compliance threshold, may be used to demonstrate permit compliance.

   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (0.20 ng/L).

   "R" indicates that the sample and duplicate were re-run due to high relative percent difference. All results were used to calculate the overall average result.

   "M" indicates that the matrix spike and/or matrix spike duplicate recovery or relative percent difference was outside of the acceptable limits. Sample considered invalid.

   "NR" indicates that the result is not considered representative of normal operations. This is the case for Outfall 018 and 019 data from November 27 - November 30, 2019 (following rupture of a large service water line).

Attachment IV:
Plan and Schedule of Activities

ATTACHMENT IV. PLAN AND SCHEDULE OF ACTIVITIES FOR OUTFALLS 018/019/020 MERCURY PMPP

Row ID	Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action	Current Status
1	Complete Inventory		Finalize the inventory.	Submittal of completed inventory to IDEM.	Within 6 months of SMV approval.	Complete
2	*Outfalls 018, 019, and 020* Source Characterization: Mussel and Biofouling Control Chemicals	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Already implemented.	Complete
3	*Boiler Water Treatment Chemicals* (A) Characterization	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 6 months of SMV approval.	Complete
4	*Stored Chemicals and Materials* (B) Characterization	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 6 months of SMV approval.	Complete
5	Condensate Characterization (C)	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete
6	Alternatives for Reduction Evaluation: *Mercury-Containing Chemicals and Materials*	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	Within 9 months of SMV approval.	Implemented/Ongoing
7	Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Collect mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Adoption/Implementation of Policies and Procedures that address the mercury content of materials.	Within 9 months of SMV approval.	Implemented/Ongoing
8	Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Within 9 months of SMV approval.	Implemented/Ongoing
9	Good Housekeeping Practices: *Mercury Containing Chemicals and Materials*	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Already implemented.	Implemented/Ongoing
10	Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Within 9 months of SMV approval.	Implemented/Ongoing
11	Standard Operating Practices: Spill Response: *Chemicals and Materials*	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills.	Training of employees on proper and safe spill response for dealing with chemical spills.	Already implemented.	Implemented/Ongoing
12	Standard Operating Practices: Spill Prevention: *Stored Chemicals and Materials*	Type 3: Awareness and Containment Control	Evaluation of above-ground storage tanks for proper secondary containment that eliminates possibility of chemical release.	Tracking/documentation of inspections and preventive measures implemented, if appropriate.	Within 9 months of SMV approval.	Implemented/Ongoing

ATTACHMENT IV. PLAN AND SCHEDULE OF ACTIVITIES FOR OUTFALLS 018/019/020 MERCURY PMPP

Row ID	**Planned Activity**	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
13	Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Already implemented. Updates will be provided as part of the Annual Progress Report.	Implemented/Ongoing
14	Disposal Practices of Mercury-Containing Items: *Bulbs/Lamps*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Already implemented. Updates will be provided as part of the Annual Progress Report.	Implemented/Ongoing
15	Disposal Practices of Mercury-Containing Items: *Batteries*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Within 3 months of SMV approval.	Implemented/Ongoing
16	*Outfalls 018, 019, and 020* Heat Exchanger Evaluation	Type 3: Awareness and Containment Control	Evaluate pressure differentials to assure that any leaks, if occurring, would not result in additional process wastewaters from potentially reaching outfalls.	Documentation of evaluation.	Within 9 months of SMV approval.	Implemented/Ongoing
17	Gary Rail Oil Water Separator Waters and Stormwater Evaluation	Type 3: Awareness and Containment Control	Evaluate operation of Gary Rail OWS to assure adequate capacity of the system during storm events.	Documentation of evaluation.	Within 9 months of SMV approval.	Complete
18	Characterization of FO-120, Salt, and Lime	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	By submission of the Annual Progress Report that is due 04/01/2014	Complete
19	Characterization of FO-180	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	By submission of the Annual Progress Report that is due 04/01/2016	Complete
20	*Source Characterization:* New Water Treatment Additives and Boiler Treatment Chemicals	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	For new water treatment additives and boiler treatment chemicals, w/in1 year of beginning use.	Ongoing as needed
21	*Source Characterization:* CL1355	Type 1: Source Characterization	Perform additional mercury characterization of CL1355 in order to better assess the magnitude of the potential mercury contribution.	Documentation of evaluation.	By the due date of the 2017 progress report.	Complete
22	*Alternatives for Reduction Evaluation:* FO180	Type 2: Alternatives for Reduction Evaluation	Investigate the current usage practices of FO180 in order to better assess the potential for impacts to the 018/019/020 discharge.	Documentation of evaluation.	By the due date of the 2018 progress report.	Complete

Notes:

(A): Chemicals that may be discharged via boiler blowdown to Outfalls 018 and 019.

(B): Chemicals that may be discharged via stormwater from above-ground tanks.

(C): Though anticipated to be very low probability, the potential for condensate to be a source of mercury will be evaluated, as applicable.

Attachment V:
Proof of Public Notice

USS Public Notice PMPP (3)

Details for USS Public Notice PMPP (3)

15 hrs ago

NOTICE OF AVAILABILITY POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) U. S. Steel Gary Works One North Broadway Gary, Indiana 46402-3199 A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage areas for Outfalls 018, 019, and 020. Outfalls 018, 019, and 020 drainage areas encompass the iron-making (blast furnaces) and steel-making (No. 1-BOP, No. 2 Q-BOP, and No. 1 Caster) facilities to the west of the vessel slip. The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Stations Nos. 1 and 2. Pursuant to 327 Indiana Administrative Code 5-3.5, U. S. Steel is seeking to obtain renewed variance limits from the Indiana Department of Environmental Management for the aforementioned outfalls. As part of the approval process U. S. Steel is issuing this Notice on the PMPP and will receive public comments for 30 days. Interested parties should contact U. S. Steel for additional information or a copy of the PMPP: Meghan Cox 600 Grant Street, Suite 1881 Pittsburgh, PA 15219 (412) 433-6777 3/2 -37967 -hspaxlp

*** Proof of Publication ***

State of Indiana)
) ss:
Lake County)

Personally appeared before me, a notary public in and for said county and state, the undersigned Nicole Muscari who, being duly sworn, says that She/he is Legal Clerk of the Northwest Indiana Times newspaper of general circulation printed and published in the English language in the Town of Munster in state and county afore-said, and that the printed matter attached hereto is a true copy, which was duly published in said paper for 1 time(s), the date(s) of publication being as follows:
March 2, 2020

United States Steel - Environmental Affairs / Lega

Brian Lasko

1350 PENN AVENUE – SUITE 200

PITTSBURGH IN 15222-4211

ORDER NUMBER 37967

The undersigned further states that the Northwest Indiana Times newspaper maintains an Internet website, which is located at www.nwi.com website and that a copy of the above referenced printed matter was posted on such website on the date(s) of publication set forth above.

Nicole Muscari, Legal Clerk

By: Sallie Guerra

Subscribed and sworn to before me this 2 day of March 2020

Dawn Renee Heili
Notary Public

My commission expires:

DAWN RENEE HEILI
Notary Public, State of Indiana
Lake County
Commission #696125
My Commission Expires 01/31/25

Section: Legals

Category: 198 Legal - Lake County

PUBLISHED ON: 03/02/2020

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FILED ON: 3/2/2020

NOTICE OF AVAILABILITY
POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP)
U. S. Steel Gary Works
One North Broadway
Gary, Indiana 46402-3199

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Meghan Cox
600 Grant Street, Suite 1881
Pittsburgh, PA 15219
(412) 433-6777
3/2 -37967 -hspaxlp

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General Form No. 99P (Rev. 2009A)

United States Steel
Environmental Affairs
(Governmental Unit)

To: The Times Media Company

Lake County, Indiana

601-45th Avenue, Munster, IN 46321

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37967

DATA FOR COMPUTING COST

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Title: Legal Clerk

By: [signature]

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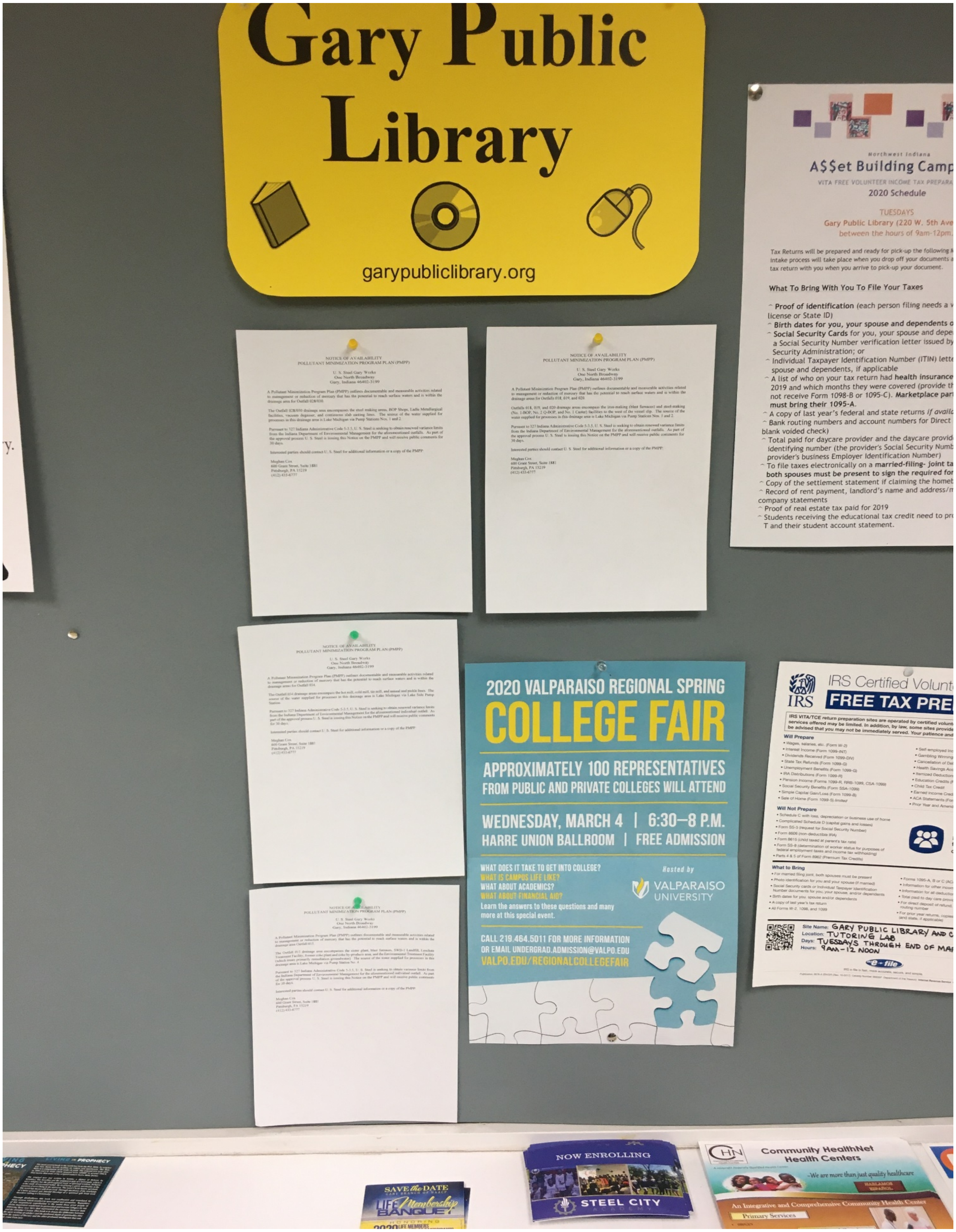

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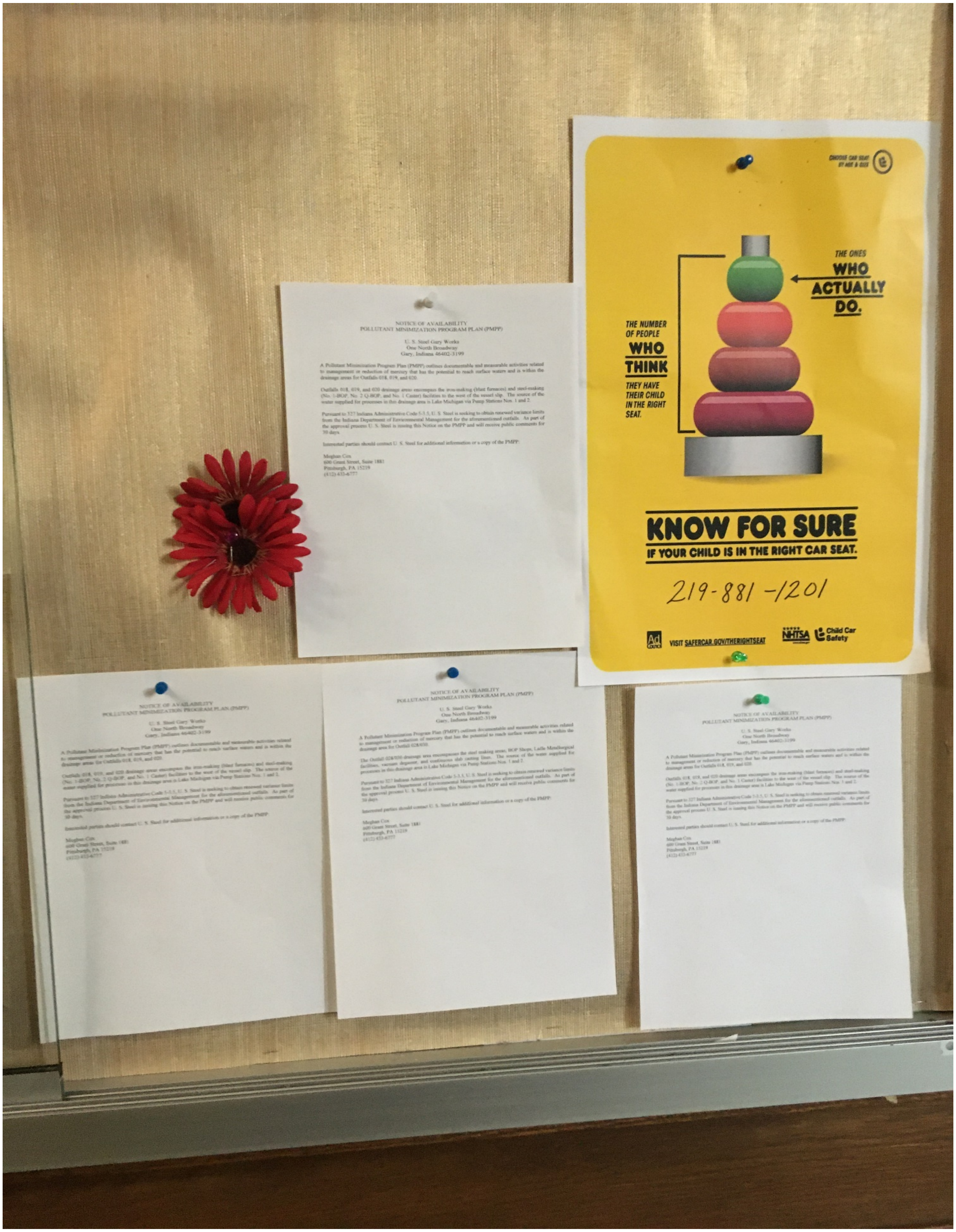

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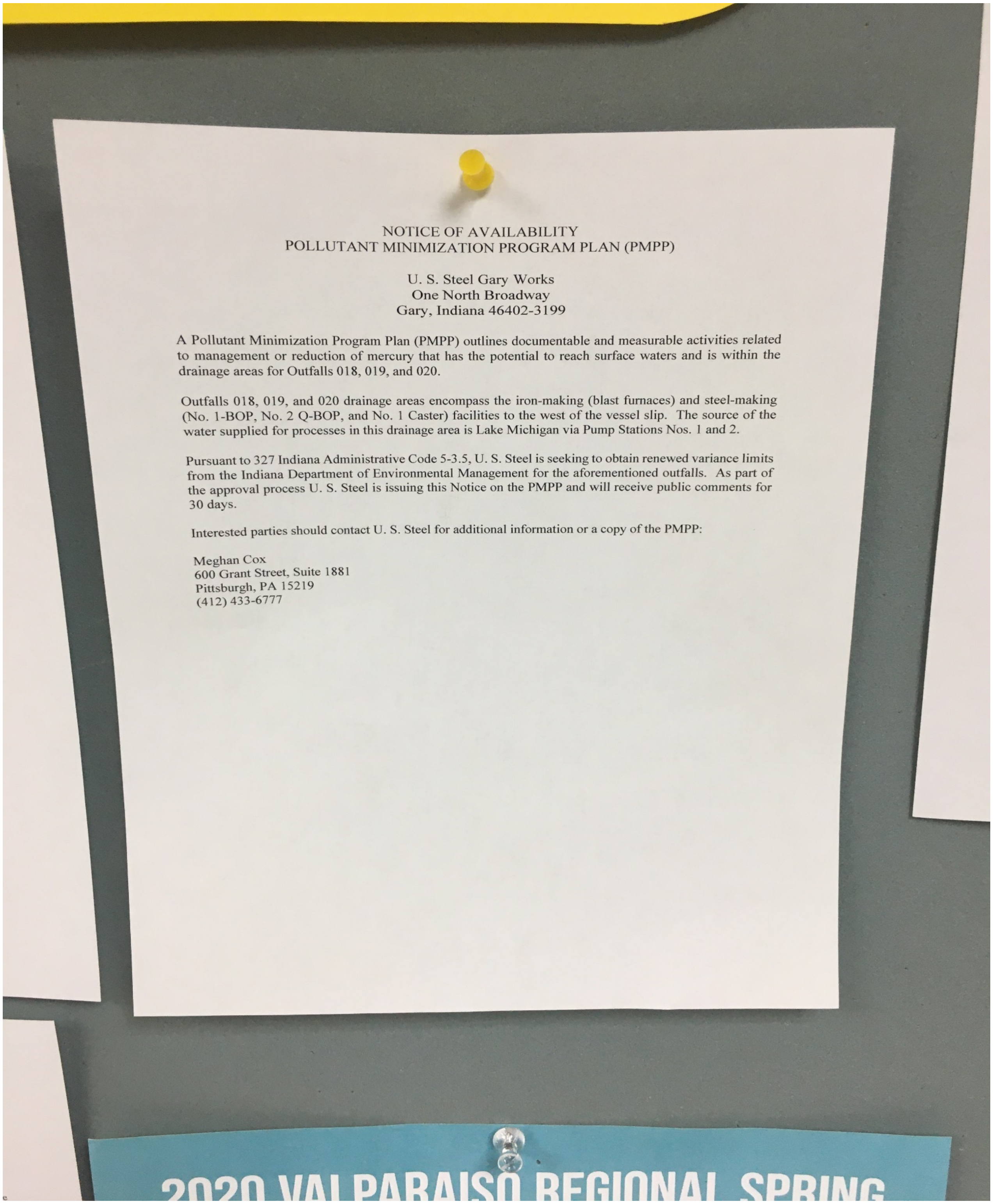
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U. S. Steel Gary Works
One North Broadway
Gary, Indiana 46402-3199

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Interested parties should contact U. S. Steel for additional information or a copy of the PMPP:

Meghan Cox
600 Grant Street, Suite 1881
Pittsburgh, PA 15219
(412) 433-6777

Outfalls 018, 019, 020
2019 Annual Progress Report
for the Mercury PMPP

2019 Annual Progress Report for the Mercury Pollutant Minimization Program Plan for Outfalls 018, 019, and 020

NPDES Permit IN0000281

Prepared for:

United States Steel Corporation Gary Works
Gary, Indiana

Submitted to:

The Indiana Department of Environmental Management
IGC North – 13th Floor
100 N. Senate Avenue
Indianapolis, Indiana

Date:

October 2019

Contents

List of Tables

1.0 Introduction

1.1 Background

U. S. Steel – Gary Works (U. S. Steel) operates an integrated steel manufacturing plant in Gary, Indiana (Lake County). U. S. Steel is currently authorized to discharge from Outfalls 018, 019, and 020 to the Grand Calumet River pursuant to NPDES Permit IN0000281 (NPDES Permit).

Outfalls 018, 019, and 020 are located within the drainage areas encompassing the iron-making (blast furnaces) and steel-making (No. 1-BOP, No. 2 Q-BOP, and No. 1 Caster) facilities to the west of the vessel slip. Essentially all of the water discharged from Outfalls 018, 019, and 020 to the Grand Calumet River consists of once-through NCCW[1] which is withdrawn from Lake Michigan via Nos. 1 and 2 Pump Stations (both located on the west side of the vessel slip).

The source of the water supplied for processes in this drainage area, which primarily consist of NCCW, is Lake Michigan via both No.1 and 2 Pump Stations (PS). The intake waters are treated with sodium hypochlorite as needed for mussel and biofouling control, and sodium bisulfite is added prior to discharge for dechlorination.[2]

These outfalls are currently subject to Streamlined Mercury Variances (SMV). The following interim discharge limits for mercury have been incorporated into the current NPDES Permit (effective November 1, 2015).[3]

- Outfall 018: 2.8 ng/L total mercury (as a 12-month rolling average)
- Outfall 019: 2.3 ng/L total mercury (as a 12-month rolling average)
- Outfall 020: 2.2 ng/L total mercury (as a 12-month rolling average)

As part of SMV requirements U. S. Steel developed and implemented a Pollution Minimization Program Plan (PMPP) for Mercury. In Section 6.0 of the PMPP and pursuant to 327 IAC 5-3.5-9(a)(8), U. S. Steel must submit annual reports that describe the following:

- The results of the mercury monitoring over the intervening period;
- U. S. Steel's progress toward fulfilling each of the PMPP requirements; and
- The steps taken to implement each planned activity (PMPP Attachment V) to reduce or eliminate mercury from waters discharged to the Grand Calumet River.

This report addresses each of the above items and is submitted to fulfill the requirements of Section 6.0 of the PMPP, 327 IAC 5-3.5-9(a)(8), and the annual report requirement from Part IV of the NPDES Permit.

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[1] The once-through NCCW is utilized to reduce process-related heat via closed-circuit plate and frame and shell and tube heat exchangers (i.e., NCCW does not come into contact with product or process water). Stormwater and condensates also be present in discharges but in volumes much smaller than the NCCW. For Outfall 018 and 019 other authorized flows (also minimal in comparison to the NCCW flow) are discharges from the Central Water Treatment Plant: boiler blowdown, brine regenerant and UF, RO, & softener backwash waters.

[2] The NPDES Permit allows year round chlorination, however usage typically occurs seasonally.

[3] Per the NPDES Permit (Parts I.P.3) submission of both a daily maximum value and annual average value is required for each reporting period. The annual average value is to be calculated as the average of daily maximum values measured over the most recent (rolling) 12-month period. Compliance will be assessed with respect to the annual average value. For clarity, this report will refer to the annual average value as the 12-month rolling average.

2.0 Mercury Monitoring Data

2.1 Outfall 018, Outfall 019, and Outfall 020 Data

Pursuant to Parts I.A.5, I.A.6, and I.A.7, bimonthly monitoring of Outfall 018, Outfall 019, and Outfall 020 for mercury is required. Individual mercury data and associated TSS data are shown in Table 1. Twelve (12) month rolling averages[4] from October 2018 through September 2019 for Outfall 018, 019, and 020 are listed in Table 2.

2.2 Intake Data

Lake Michigan is the intake source water for the U. S. Steel facility. No. 1 and No. 2 Pump Stations (No. 1 and No. 2 PS) provide service water for Outfall 018, 019, and 020 non-contact cooling and other uses. Intake mercury monitoring is not required by the NPDES Permit or the PMPP. However, U. S. Steel has maintained a schedule of monitoring the intakes associated with supply waters for Outfall 018, Outfall 019, and Outfall 020. Intake mercury and TSS data are summarized in Table 3.

[4] It should be noted that the rolling averages presented only represent a small portion of the entire dataset available and therefore care must be used in reviewing the data. Recall that each of these outfalls consists of essentially Lake Michigan intake water used as non-contact cooling water. The intake mercury levels are variable (and not controllable), however the small dataset presented does not necessarily show that variability.

3.0 Progress and Implementation of the PMPP Activities

The list of activities identified in the PMPP (Attachment IV of the PMPP) is presented in Table 4. The table has been modified from the version in the Mercury PMPP to include the "Current Status" column and any newly added activities. All activities required have been completed or implemented. Below is a summary of activities (ongoing, completed, etc.).

3.1 Complete Inventory (Row ID 1)

A current complete inventory of mercury and mercury-containing materials is listed in Table 5. In summary, U. S. Steel has updated the estimated mercury content for various chemicals as well as some chemical usage rates.

Since the 2018 Annual Progress Report, revisions to the inventory are as follows:

- Removal of three water treatment additives (UC226, CL41, and CL5691) that are not associated with Outfall 018, 019, or 020 discharges;
- Addition of 4 water treatment additive listings associated with the ultrafiltration (UF) and reverse osmosis (RO) water treatment system[5]; and
- Revision of estimated usage rates for the water treatment chemical FO180

As the specific activities of the mercury PMPP are implemented, the inventory of mercury-containing materials may be revised if applicable. U. S. Steel therefore anticipates including an updated inventory with subsequent annual progress reports.

3.2 Chemicals Characterization (Row ID 2, 3, 4, 18, 19, 20, and 21)

As indicated in the previous Annual Progress Reports, chemicals were previously characterized for mercury content either through direct analysis or from data in available literature. To date, all but 1 new in-use water treatment additives and boiler treatment chemicals have been characterized for mercury content and updated information is provided in Table 5. There may be other water treatment additives that have previously been approved for use but are currently not in-use. These are not included in Table 5; however, if usage resumes, they will be added to the inventory and characterized. The 1 new water treatment additives (along with any other new ones) will be characterized for mercury within 1 year of commencing usage (Table 4, Row ID 20).

When the maximum potential contribution from all in use water treatment additives associated with Outfalls 018, 019, and 020 is combined, the possible contribution relative to total mercury loading is minimal. However, in keeping with the goal of the PMP (to eliminate/reduce potential sources of controllable mercury to the discharge waters), water treatment additives known to contain trace amounts of mercury will be evaluated on a case by case basis. Evaluations may include additional mercury characterization, investigations into possible alternatives, or feasible opportunities for reducing the potential contribution to the Outfall 018, 019, and 020 discharges. Specific chemicals already examined or planned for evaluation are listed below:

1) The mussel and biofouling control and dechlorination chemicals sodium hypochlorite and sodium bisulfite remain as the most significant potential chemical sources of mercury. Expanded mercury characterization of these chemicals has already been performed and efforts into

[5] These new system components came online in May 2019.

examining options of reducing the potential mercury contributions from these specific chemicals are discussed in Section 3.4.1.

2) Based on mercury content and overall range of usage rates, CL1355 (a deposit control chemical) also has a high potential to contribute mercury (specifically to Outfall 020). In 2017, U. S. Steel performed additional characterization of CL1355 (Table 4, Row ID 21) in order to better assess the magnitude of the potential mercury contribution. The initial analysis result (<283 ng/L) was an elevated non-detect whereas the new analysis methodology (with less sample dilution) resulted in a much lower result of 14.2 ng/L. As a result, the overall potential mercury contribution from CL1355 is much reduced.

3.3 Condensate Characterization (Row ID 5)

As indicated in the previous Annual Progress Report, investigations lead to the conclusion that the mercury content of condensate streams are comparable to those observed for intake water. The contributions from these mercury sources are anticipated to be insignificant given the minimal concentrations of mercury measured in similar condensate streams and the low volume of condensate flows. As such, no further PMPP activities were performed or are planned with respect to condensates.

3.4 Alternatives for Reduction Evaluation (Row ID 6)

U. S. Steel, along with other steel mills in Northwest Indiana, previously[6] conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site. U. S. Steel policy is that mercury added equipment/devices are not to be supplied with the exclusion of equipment where there is no alternative (i.e. bulbs, batteries, etc.). Furthermore, mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Should a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Chemicals that do not have mercury as an added constituent but are known to contain trace amounts of mercury will be evaluated on a case by case basis. For example, evaluations will be prioritized based on not just mercury content, but also the potential risk for impacting the associated final discharge. Chemicals with a higher potential (e.g., water treatment additives used in final treatment steps) will be examined prior to those with a lower risk (e.g. process chemicals and water treatment additives such as flocculants and those used in closed-loop systems). Alternatives consideration may include investigations into materials that have less (or no) mercury, alternative activities or processes in which there is less potential for mercury to be discharged (such as different laboratory practices), and/or other improved treatment technologies as applied to a known source. Information such as mercury content and magnitude of the source contribution along with the operability, reliability, effectiveness and economic impact of potential alternatives may be used to determine the overall feasibility and benefit of alternative materials, processes, and/or technologies.

[6] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001); and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

Based on the results of chemical or equipment evaluations, U. S. Steel may consider alternatives to mercury-containing chemicals that have a high potential for reaching the surface waters (i.e., mussel control and biofouling chemicals). Any identified alternatives that require significant capital to implement would be evaluated with respect to feasibility, ease of operation/execution, and cost-effectiveness through a corporate-specific review process. The review process requires approval from multiple departments (e.g., procurement, environmental, work control) before implementation is approved.

At this time, no specific evaluations are underway or planned. Descriptions of previous investigations are presented in the next section (Section 3.4.1 for sodium hypochlorite and sodium bisulfite; Section 3.4.2 for FO180, Section 3.4.3 for sodium hydroxide).

3.4.1 *Sodium Hypochlorite and Sodium Bisulfite*

As noted in Section 3.2, the mussel and biofouling control and dechlorination chemicals (sodium hypochlorite and sodium bisulfite) are the most significant potential chemical sources of mercury. Usage rates of these chemicals have previously been examined previously as part of U. S. Steel's Total Residual Chlorine (TRC) Pollution Minimization Program (PMP) Control Strategy.

The U. S. Steel Permit allows year round chlorination for control of zebra and quagga mussel populations. However, usage typically occurs from April through November only. The usage rates for effective treatment in both situations are adjusted by monitoring the chlorine demand (as indicated by TRC levels) of the system. For example with respect to feed rates for the intake pump stations, TRC is measured at least daily at multiple locations and sodium hypochlorite usage rates adjusted accordingly to maintain set residual levels. The set residual levels are necessary to provide effective mussel and/or biofouling control.

Prior to final outfall discharge, dechlorination occurs with the addition of sodium bisulfite. The water quality-based effluent limitations (8 ug/L as a monthly average; 18 ug/L as a daily maximum) for TRC are lower than the analytical detection limit (20 ug/L). Therefore, a mass balance approach is used to ensure the effluent limitations are met. The usage rates of sodium bisulfite are determined such that there is a mass balance of sodium bisulfite to the historical maximum TRC measured at the associated intakes (or other locations where sodium hypochlorite is used). U. S. Steel has developed a mass balance model for each month within the mussel control season that uses the historical max TRC specific to that month. This minimizes sodium bisulfate usage while still 1) accounting for the variable chlorine demand over the course of mussel control season; and 2) maintaining compliance with the TRC NPDES Permit limitations.

As demonstrated above, further reducing the usage rates of sodium hypochlorite and sodium bisulfite to minimize the discharge potential from trace mercury within these chemicals[7] is not feasible. U. S. Steel's initial and recent additional characterization (discussed in Section 3.2) for the specific sources (vendor/manufacturer) of sodium hypochlorite and sodium bisulfite confirmed these are the most significant potential water treatment additive sources of mercury. U. S. Steel is not aware of reduced mercury-content versions of either chemical but may investigate this further with vendors, especially for sodium bisulfite.

3.4.2 *FO180 (Row ID 22)*

U. S. Steel also investigated the current usage practices of the water treatment chemical FO180 in order to better assess the potential for impacts to the Outfall 018/019/020 discharge. The previous upper usage estimate (100 gpd combined for Outfalls 018, 019 and 020) used in the 2017 inventory was based on the

[7] Recall that the estimated mercury content from the sodium hypochlorite is overly conservative as it assumes all of the No. 1 and No. 2 PS intake water is distributed to Outfall 018, 019, and 020. However, No. 1 and No. 2 PS intake waters supply other outfalls as well.

maximum approved usage rates. However, it was determined that this value was a gross overestimate compared to actual feed pump capacities (10 gpd) and frequency of use. The current usage estimates assume a max of 30 days/year use at Outfall 018 (10 gpd), no use at Outfall 019, and daily use for Outfall 020 (10 gpd). This may still be an overly conservative estimate given that use at Outfall 020 may not occur daily and that thus far Outfall 018 use has only occurred for about half of the estimated days. At this time, no further activities associated with FO180 are planned.

3.4.3 *Sodium Hydroxide*

Based on estimated mercury levels and overall usage rates, sodium hydroxide (associated with pH control of the permeate from the UF & RO water treatment system) the third most significant potential water treatment additive source of mercury. It should be noted that the estimate is likely overly conservative given that the usage is associated with the permeate (or product water) and not the backwashes that are discharged to the associated outfalls. However, in association with other facility uses of sodium hydroxide, U. S. Steel has characterized this material multiple times. The levels of mercury observed in the tested sodium hydroxide are comparable to expected levels for either membrane grade or diaphragm grade sodium hydroxide. According to the Draft Wisconsin Mercury Sourcebook[8], membrane and diaphragm grade sodium hydroxide levels are expected to have the lowest mercury concentrations when compared to other grades/production methods (mercury cell and rayon grade). Given this, it is unlikely that further reduced mercury concentration versions of sodium hydroxide for water treatment are available and no additional activities related to sodium hydroxide are planned.

3.5 Review of Purchasing Policies and Procedures (Row ID 7)

Mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it is should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Furthermore, if a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

For non-chemicals, U. S. Steel policy is that mercury added equipment/devices are not to be supplied or used with the exclusion of equipment/devices where there is no feasible alternative (e.g bulbs, batteries). Additionally, U. S. Steel fluorescent bulb purchases are of the low-mercury (also called "green bulbs") type.

3.6 Awareness Training for Facility Staff (Row ID 8)

As indicated in the submitted PMPP, U. S. Steel training of facility staff includes the topics of mercury awareness and disposal restrictions related to mercury. This practice continues, however in support of the activity in Row ID 8, U. S. Steel has worked to increase mercury awareness by highlighting mercury in a format outside of the normal training environment via distribution of a Mercury Awareness Bulletin.

3.7 Good Housekeeping Practices (Row ID 9)

U. S. Steel continues to implement its previously identified good housekeeping program. Good housekeeping is the practice of maintaining a clean and orderly work environment. Providing a clean and orderly work area reduces the possibility of accidental spills and releases from equipment and materials.

[8] Draft Wisconsin Mercury Sourcebook. Wisconsin Department of Natural Resources. May 1997.

3.8 Maintenance and Cleaning Activities (Row ID 10)

U. S. Steel has implemented procedures to be followed during maintenance and cleaning activities to minimize the release of mercury to the environment from equipment as well as chemicals used for maintenance and cleaning activities (e.g., solvents and oils). U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered. As indicated in Section 3.4, U. S. Steel has previously conducted an extensive evaluation of mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility and subsequently removed most of the mercury-containing equipment and devices found.

3.9 Standard Operating Practices: Spill Response and Prevention (Row ID 11 and 12)

U. S. Steel has Standard Operating Practices (SOPs) that address safe and proper techniques for addressing spills and leaks of various chemicals (including solvents used for maintenance and cleaning activities and oils such as lube oil used for equipment maintenance activities). Specific to mercury-containing materials are SOPs that address broken mercury thermometers, disposal of bulbs and lamps, and decommissioning/removal of mercury-containing equipment. Each of these SOPs address spill response efforts. Although all known mercury-containing equipment and thermometers have been removed from the site, these SOPs are conservatively written as though these types of mercury-containing equipment are still present. If a mercury spill occurs, a qualified contractor will be utilized for containment and clean up. For minor releases such as thermometers in on-site laboratories, a qualified contractor or mercury spill kit can be utilized.

With respect to spill prevention, U. S. Steel has Standard Operating Practices (SOPs) that require inspections of the condition of above-ground storage tanks and associated secondary containment structures to reduce the possibility of a potential release to surface waters. For example, both the Storm Water Pollution Prevention Plan and Spill Prevention Control and Countermeasure Plan address spill prevention and include inspection requirements.

3.10 Disposal Practices (Row ID 13, 14, and 15)

U. S. Steel continues, through its E-Waste and Universal Waste Collection programs, to properly recycle/re-use/dispose of several types of items (which may or may not contain mercury). Data from this program is now utilized to track and estimate disposal of mercury PMPP related materials. Items that are specifically addressed by the PMPP include the following:

- Bulbs/Lamps – spent mercury-containing bulbs and lamps (e.g. fluorescent or sodium vapor lamps);
- Batteries – known mercury-containing batteries are lead-acid batteries[9] primarily used for standby emergency power and alkaline button cell batteries. The program involves collection of all batteries independent of mercury content;
- LCD-screens – for example computer monitors and laptop screens
- Mercury-Containing Equipment – could include mercury-containing equipment, vials or ampoules of mercury removed from equipment;

Note that U. S. Steel does not believe that any mercury-containing equipment remains within the Outfall 018, 019, and 020 drainage areas. As part of the multi-steel mill mercury inventory study that U. S. Steel participated in, U. S. Steel conducted facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these

[9] Mercury is not added in the manufacture of this type of battery; trace mercury that may be present is associated with the electrolytic acid solution.

materials from the property. However, as discussed in Section 3.5, if mercury (as a material on the U. S. Steel non-approved list) is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Estimated quantities of materials disposed of (or recycled) are provided in Table 6. Where possible, mercury contents have been estimated however, some materials (e.g. alkaline button cell batteries) are not tracked separately by type. Proper disposal of mercury-containing materials varies by material type; however disposal or recycling of items/chemicals containing mercury complies with applicable disposal/recycling regulations. U. S. Steel plans to provide updated quantities in each annual PPMP progress report.

3.11 Heat Exchanger Evaluation (Row ID 16)

U. S. Steel has SOPs in place that require evaluation (visual inspection) of heat exchanger equipment for leaks and other operational issues. Some equipment is designed to automatically trigger an alarm and shutdown in the event of a loss of a set amount of oil. If the alarm is tripped, the SOP requires pressure testing to evaluate if the loss is due to normal uses (e.g. new fittings, bearings) or a leak.

3.12 Gary Rail Oil Water Separator Evaluation (Row ID 17)

As discussed in the 2013 Annual Progress report, an evaluation of the capacity of the Gary Rail Oil Water Separator indicated adequate capacity under several different storm scenarios; therefore no further PMPP activities were performed or are planned with respect to the Gary Rail Oil Water Separator.

4.0 Continuing PMPP Activities

U. S. Steel will continue to execute the Mercury PMPP already in place. Status updates for all PMPP activities will be included in the next progress report.

TABLE 1. OUTFALL MERCURY AND TSS DATA

Sample Date	Outfall 018					Outfall 019					Outfall 020				
	Total Mercury				TSS	Total Mercury				TSS	Total Mercury				TSS
	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)	Sample (ng/L)	Duplicate[3] (ng/L)	Average (ng/L)	Mercury Flag	(mg/L)
10/11/18	0.69	---	0.69		3.6	0.41	---	0.41	J	3.5	0.74	---	0.74		1.8 E
11/15/18	0.45	---	0.45	J	4.7	0.34	---	0.34	J	2.6	0.62	---	0.62		3.1
12/13/18	0.49	---	0.49	J	11.1	0.52	---	0.52		10.7	1.0	---	1.0		14.1
02/13/19	0.46	0.43	0.45	J	2.7	0.74	---	0.74		1.8 E	0.53	---	0.53		2.4
04/17/19	0.78	0.63	0.71		7.6	0.58	---	0.58		10.9	0.93	---	0.93		12.6
06/20/19	0.38	0.49	0.44	J	0.73 E	0.55	---	0.55	FB	3.1	0.66	---	0.66		3.4
08/22/19	0.50	---	0.50		0.80 E	0.36	---	0.36	J	0.80 E	0.57	---	0.57		3.8

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by ALS Laboratory Group. All Mercury and TSS data from single grab samples unless noted otherwise.
3. All duplicate data presented are from field duplicate results.
4. "---" indicates no sample was collected.
5. Mercury data flags:

   "FB" indicates that the 6/20/19 Outfall 019 sample Field Blank had a detection at 1.1 ng/l; however, as the field sample result is below the rolling 12 month average limit, the sample result is used based on EPA guidance for Method 1631E: field sample results that are associated with contaminated blanks, but also are still below the regulatory compliance threshold, may be used to demonstrate permit compliance.

   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (0.20 ng/L).
6. "E" flag for TSS results indicates estimated values between the reporting limit and method detection limit. However, for TSS these limits are variable and therefore not listed here.
7. Data collected prior to October 2018 were previously submitted either with the initial SMV application or with previous Annual Progress Reports.

TABLE 2. OUTFALL MERCURY 12-MONTH ROLLING AVERAGES

Reporting Period	12-month Dataset	Total Mercury (ng/L) 12-Month Rolling Average		
		Outfall 018	Outfall 019	Outfall 020
Oct 2018	Nov 2017 - Oct 2018	0.51	0.46	0.62
Nov 2018	Dec 2017 - Nov 2018	0.51	0.46	0.64
Dec 2018	Jan 2018 - Dec 2018	0.54	0.48	0.70
Jan 2019	Feb 2018 - Jan 2019	0.51	0.46	0.72
Feb 2019	Mar 2018 - Feb 2019	0.52	0.50	0.70
Mar 2019	Apr 2018 - Mar 2019	0.51	0.48	0.69
Apr 2019	May 2018 - Apr 2019	0.54	0.51	0.74
May 2019	Jun 2018 - May 2019	0.54	0.51	0.80
Jun 2019	Jul 2018 - Jun 2019	0.50	0.54	0.75
Jul 2019	Aug 2018 - Jul 2019	0.49	0.56	0.68
Aug 2019	Sep 2018 - Aug 2019	0.51	0.48	0.68
Sep 2019	Oct 2018 - Sep 2019	0.53	0.50	0.72

Notes:

1) Only valid data (as indicated in Table 1) were utilized to calculate the 12-month rolling averages.

2) It should be noted that the rolling averages presented only represent a small portion of the entire dataset available and therefore care must be used in reviewing the data. Recall that each of these outfalls consists of essentially Lake Michigan intake water used as non-contact cooling water. The intake mercury levels are variable (and not controllable), however the small dataset presented does not necessarily show that variability.

3) 12-month rolling averages prior to October 2018 were submitted in previous Annual Progress Reports.

TABLE 3. INTAKE MERCURY AND TSS DATA

Sample Date	PS-1 Total Mercury Sample (ng/L)	PS-1 Total Mercury Duplicate[3] (ng/L)	PS-1 Total Mercury Average (ng/L)	PS-1 Mercury Flag	PS-1 TSS (mg/L)	PS-2 Total Mercury Sample (ng/L)	PS-2 Total Mercury Duplicate[3] (ng/L)	PS-2 Total Mercury Average (ng/L)	PS-2 Mercury Flag	PS-2 TSS (mg/L)
10/11/18	0.57	0.39	0.48	J	2.2 E	0.52	---	0.52		1.7 E
11/15/18	0.26	---	0.26	J	1.4 E	0.27	0.29	0.28	J	7.3
12/13/18	0.34	0.53	0.44	J	2.1 E	1.8	---	1.8		13.6
02/13/19	*	---	*	B1	3.0	1.5	---	1.5		14.4
04/17/19	0.65	---	0.65		6.1	1.2	---	1.2		5.6
06/20/19	0.30	---	0.30	J	2.7	0.35	---	0.35	J	2.4
08/22/19	0.31	---	0.31	J	1.0 E	0.37	---	0.37	J	1.7 E

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by ALS Laboratory Group. All Mercury and TSS data from single grab samples unless noted otherwise.
3. All duplicate data presented are from field duplicate results.
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated data flag(s).
6. Mercury data flags:

   "B1" indicates that associated field blank had a mercury detection outside of the criteria for blanks (whichever is greater: <0.5 ng/L or up to 1/5 the amount in associated samples). Sample considered invalid.

   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (0.20 ng/L).
7. "E" flag for TSS results indicates estimated values between the reporting limit and method detection limit. However, for TSS these limits are variable and therefore not listed here.
8. Data collected prior to October 2018 were previously submitted either with the initial SMV application or with previous Annual Progress Reports.

TABLE 4. SCHEDULE AND STATUS OF PLANNED ACTIVITIES FROM MERCURY PMPP

Row ID	Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action	Current Status
1	Complete Inventory		Finalize the inventory.	Submittal of completed inventory to IDEM.	Within 6 months of SMV approval.	Complete (see Section 3.1)
2	*Outfalls 018, 019, and 020* Source Characterization: Mussel and Biofouling Control Chemicals	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Already implemented.	Complete (see Section 3.2)
3	*Boiler Water Treatment Chemicals* (A) Characterization	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 6 months of SMV approval.	Complete (see Section 3.2)
4	*Stored Chemicals and Materials* (B) Characterization	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 6 months of SMV approval.	Complete (see Section 3.2)
5	Condensate Characterization (C)	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete (see Section 3.3)
6	Alternatives for Reduction Evaluation: *Mercury-Containing Chemicals and Materials*	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.4)
7	Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Collect mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Adoption/Implementation of Policies and Procedures that address the mercury content of materials.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.5)
8	Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.6)
9	Good Housekeeping Practices: *Mercury Containing Chemicals and Materials*	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Already implemented.	Implemented/Ongoing (see Section 3.7)
10	Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.8)
11	Standard Operating Practices: Spill Response: *Chemicals and Materials*	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills.	Training of employees on proper and safe spill response for dealing with chemical spills.	Already implemented.	Implemented/Ongoing (see Section 3.9)
12	Standard Operating Practices: Spill Prevention: *Stored Chemicals and Materials*	Type 3: Awareness and Containment Control	Evaluation of above-ground storage tanks for proper secondary containment that eliminates possibility of chemical release.	Tracking/documentation of inspections and preventive measures implemented, if appropriate.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.9)

TABLE 4. SCHEDULE AND STATUS OF PLANNED ACTIVITIES FROM MERCURY PMPP

Row ID	Planned Activity	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
13	Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Already implemented. Updates will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.10)
14	Disposal Practices of Mercury-Containing Items: *Bulbs/Lamps*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Already implemented. Updates will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.10)
15	Disposal Practices of Mercury-Containing Items: *Batteries*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Within 3 months of SMV approval.	Implemented/Ongoing (see Section 3.10)
16	*Outfalls 018, 019, and 020* Heat Exchanger Evaluation	Type 3: Awareness and Containment Control	Evaluate pressure differentials to assure that any leaks, if occurring, would not result in additional process wastewaters from potentially reaching outfalls.	Documentation of evaluation.	Within 9 months of SMV approval.	Implemented/Ongoing (see Section 3.11)
17	Gary Rail Oil Water Separator Waters and Stormwater Evaluation	Type 3: Awareness and Containment Control	Evaluate operation of Gary Rail OWS to assure adequate capacity of the system during storm events.	Documentation of evaluation.	Within 9 months of SMV approval.	Complete (see Section 3.12)
18	Characterization of FO-120, Salt, and Lime	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	By submission of the Annual Progress Report that is due 04/01/2014	Complete (see Section 3.2)
19	Characterization of FO-180	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	By submission of the Annual Progress Report that is due 04/01/2016	Complete (see Section 3.2)
20	*Source Characterization:* New Water Treatment Additives and Boiler Treatment Chemicals	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	For new water treatment additives and boiler treatment chemicals, w/in1 year of beginning use.	Ongoing as needed (see Section 3.2)
21	*Source Characterization:* CL1355	Type 1: Source Characterization	Perform additional mercury characterization of CL1355 in order to better assess the magnitude of the potential mercury contribution.	Documentation of evaluation.	By the due date of the 2017 progress report.	Complete (see Section 3.2)
22	*Alternatives for Reduction Evaluation:* FO180	Type 2: Alternatives for Reduction Evaluation	Investigate the current usage practices of FO180 in order to better assess the potential for impacts to the 018/019/020 discharge.	Documentation of evaluation.	By the due date of the 2018 progress report.	Complete (see Section 3.4.2)

Notes:

(A): Chemicals that may be discharged via boiler blowdown to Outfalls 018 and 019.

(B): Chemicals that may be discharged via stormwater from above-ground tanks.

(C): Though anticipated to be very low probability, the potential for condensate to be a source of mercury will be evaluated, as applicable.

TABLE 5. UPDATED INVENTORY OF MERCURY-CONTAINING MATERIALS FOR OUTFALLS 018/019/020 MERCURY PMPP

Item or Material	Purpose/Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Location; Storage Method	Potential to Reach Surface Water?(C)
WATER TREATMENT CHEMICALS						
13% Sodium Hypochlorite	Mussel Control (No. 1 & No 2 PS Intakes): ~Apr 1 to Nov 30	840 - 2064 gpd (for PS 1 + PS2)	18 - 300 ng/L	21.53 - 473.69 mg/yr (D)	HDPE tanks w/secondary containment	High
13% Sodium Hypochlorite	Microbial Control (No. 1 Caster service water): ~Dec 1 - Mar 31	10 - 25 gpd (020 related use)	18 - 300 ng/L	0.08 - 3.43 mg/yr	HDPE tanks w/secondary containment	High
13% Sodium Hypochlorite	UF & RO water treatment system - UF microbiological control (associated with Outfall 019 and if needed 018)	8000 gallons/yr	18 - 300 ng/L	0.55 - 9.1 mg/yr	Tanks w/secondary containment	High
Sodium Bisulfite	Dechlorination for Outfalls 018, 019, 020 w/in Mussel Control Season (~Apr 1 - Nov 30)	204 - 727 gpd (for 018 + 019 + 020 in mussel control season; Note I)	790 - 6600 ng/L	309 - 2605.3 mg/yr (I)	HDPE tanks w/secondary containment	High
Sodium Bisulfite	Dechlorination for Outfall 020 outside of Mussel Control Season (~Dec 1 - Mar 31)	6 - 7 gpd (for 020 outside in mussel control season)	790 - 6600 ng/L	2.17 - 21.35 mg/yr	HDPE tanks w/secondary containment	High
Sodium Bisulfite	UF & RO water treatment system - dechlorination prior to RO (associated with Outfall 019 and if needed 018)	2000 gallons/yr	790 - 6600 ng/L	5.98 - 50 mg/yr	Tanks w/secondary containment	High
CL1355	Deposit control for the service water at No. 1 Caster	5 - 15 gpd (020 related use)	14.2 ng/L	0.1 - 0.29 mg/yr	Tote storage	Low
FO180	Defoamer	018 - 10 gpd (est < 30 days/yr) 019 - no use 020 - 10 gpd (est daily)	25 ng/L	0.35 - 0.37 mg/yr (E)	Tanks w/secondary containment	Low
RL9007	UF water treatment system - RO membrane antiscalent (associated with Outfall 019 and if needed 018)	1500 gallons/yr	to be determined	to be determined	Tanks w/secondary containment	High
Lime (Calcium Hydroxide)	pH control (associated with 018/019)	56000 lbs/shipment	< 69 ng/kg	<1.75 mg per shipment	Silo storage	Low
Caustic (Sodium Hydroxide)	Usage for pH control and aiding in precipitation is associated with the #1 Caster process water. That stream is normally discharged to Outfalls 028 and 030, however in an emergency, this can be routed to Outfall 020. Since this is not a typical discharge to Outfall 020, no mercury contribution estimate will be determined for the 018/019/020 inventory.				Tanks w/secondary containment	Low
Sodium Hydroxide	UF & RO water treatment system - permeate pH control (associated with Outfall 019 and if needed 018)	25750 gallons/yr	737 - 940 ng/L	71.83 - 91.6 mg/yr	Tanks w/secondary containment	Low
Salt (Sodium Chloride)	Brine for Water Softener Regen. (associated with 018/019)	48000 lbs/shipment	<30 ng/L	<0.3 mg per shipment	Concrete vault	Low

TABLE 5. UPDATED INVENTORY OF MERCURY-CONTAINING MATERIALS FOR OUTFALLS 018/019/020 MERCURY PMPP

Item or Material	Purpose/Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Location; Storage Method	Potential to Reach Surface Water? (C)
BOILER WATER TREATMENT CHEMICALS (C)						
BL122	Bisulfite	15 - 50 gpd (for 018/019)	<297 ng/L	<6.15 - <20.52 mg/yr	Tote storage	Low
BL197	Defoamer	0.5 - 3 gpd (for 018/019)	<246 ng/L	<0.17 - <1.02 mg/yr	Tote storage	Low
BL1350	Dispersant	4 - 12 gpd (for 018/019)	<288 ng/L	<1.59 - <4.77 mg/yr	Tote storage	Low
BL1513	Amine for corrosion control	7 - 22 gpd (for 018/019)	<239 ng/L	<2.31 - <7.26 mg/yr	Tanks w/secondary containment	Low
CL1376	Scale inhibitor	0.1 - 4 gpd (for 018/019)	575 ng/L	0.08 - 3.18 mg/yr	Tote storage	Low
STORED CHEMICALS AND MATERIALS WITH THE POTENTIAL TO ENTER STORMWATER (F)						
Betz 281165 Ferrameen	Coke oven gas conditioner	1000 gal tank	<206 ng/L	<0.78 mg per tank	Materials are stored in tanks with secondary containment. These tanks are near (within 500 ft) of stormwater open manhole(s).	Very low
CL 1370	Scale inhibitor	850 gal tank	<308 ng/L	<0.99 mg per tank		Very low
CL 1370	Scale inhibitor	550 gal tank	<308 ng/L	<0.64 mg per tank		Very low
CL 4800	Dispersant	1000 gal tank	<263 ng/L	<1 mg per tank		Very low
P841L	Coagulant	1200 gal tank	755 ng/L	3.43 mg per tank		Very low
Diesel fuel	Fuel	750 gal tank	4.2 - 339 ng/L	0.01 - 0.96 mg per tank		Very low
Gasoline	Fuel	500 gal tank	52 - 1050 ng/L	0.1 - 1.99 mg per tank		Very low
Tar (not currently used)	Additive	10000 gal tank	Mercury content was not determined. If use is resumed mercury analysis will be performed.			Very low
Mag Lime	Additive	9000 gal tank	204 ng/L (G)	6.95 mg per tank (G)	Material is stored in tanker trailer with no secondary containment. Tanks are within 300 ft of open stormwater manhole.	Very low

TABLE 5. UPDATED INVENTORY OF MERCURY-CONTAINING MATERIALS FOR OUTFALLS 018/019/020 MERCURY PMPP

Item or Material	Purpose/Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Location; Storage Method	Potential to Reach Surface Water? (C)
IN-SERVICE EQUIPMENT						
All in-service equipment that contained Hg has been removed.						
BULB/LAMPS						
Sodium Vapor Lamps	Lighting	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	0.02 grams - 0.145 grams	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	Various	Very Low
Mercury Vapor Lamps			0.025 grams - 0.225 grams			
Metal Halide			0.005 - 0.150 grams			
Linear Fluorescent Bulbs			0.003 - 0.05 grams			
OTHER ITEMS						
Lead-acid Batteries (H)	Standby emergency power and power for mechanical equipment (e.g., fork lifts)	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.			Various	Very Low
Other Batteries (e.g., mercury-zinc, mercury alkaline, mercury-cadmium, mercury oxide)	Portable power supply	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.		Various	Very Low
LCD type computer monitors	Visual display	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	0 - 0.010 grams average (0.005 grams) used for estimate	These will not be individually inventoried. See Table 6 for estimated yearly disposed of quantities.	Various	Very Low
Laptop LCD screens						
LCD type HDTV screen						
OUTFALL DISCHARGES						
Outfall 018	NPDES Permitted Discharges as described in Section 1.3 of the PMPP.		Results of mercury analysis for Outfalls are discussed in Section 2.3 of the PMPP.		See Figure I-1 of the PMPP.	These are the final discharges to surface water.
Outfall 019						
Outfall 020						

Notes:

(A): Chemical usage rates are estimated ranges based on averages or purchasing records; day to day usage rates may vary. Other chemicals that may be approved for usages associated with Outfall 018/019/020 but are not currently being used are not included. If usage resumes, they will be added to this inventory and characterized.

(B): The mercury values listed for chemicals are based on mercury characterization via direct analytical measurement or information available in the literature. Equipment mercury content was estimated from the mass of the ampoule of elemental mercury utilized in the equipment itself or comparable pieces of equipment. Lamp and bulb mercury content information was generated from publically accessible sources including the National Electrical Manufacturers Association.

(C): Though low in potential, boiler water treatment chemicals that may discharge to outfalls via boiler blowdown or condensate.

(D): The listed total estimated mercury content is overly conservative as it assumes all of the No. 1 and 2 PS intake water is distributed to Outfall 018, 019, and 020. However, No. 1 and 2 PS intake waters

(E): Assumes daily use at Outfall 020 and a maximum of 30 days use at Outfall 018.

(F): Though very low in potential, stored chemicals and fuel that may be discharged to outfalls within stormwater via open manholes.

(G): Mag Lime is a mixture of lime and free metallic magnesium. Mercury content estimates are based on mercury estimates from lime (2040 ng/L) and the weight percentage of lime in the mag lime mixture.

(H): Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

(I): Estimate based on 2016 usage rates (Apr-Oct) for Outfall 018, 019, 020, and 021. The Outfall 021 contribution to these totals is small given the relative flow of Outfall 021 to the other outfalls.

TABLE 6. ESTIMATED QUANTITIES OF MATERIALS SHIPPED OFFSITE FOR RECYCLING OR DISPOSAL

Estimated Material Totals

Material	**Oct 2018 - Sep 2019** (through 9/17/19 for LCD Screens)
Bulbs - Florescent (Note A)	4,886 lbs
Bulbs - HID types (Note B)	614 lbs
LCD-type Screens (Note C)	179 screens
Lead Acid Batteries	28,541 lbs
Alkaline Batteries	1,916 lbs

Estimated Mercury Content of Materials

Material	**Oct 2018 - Sep 2019** (through 9/17/19 for LCD Screens)
Bulbs - Florescent and/or other mercury-containing (Note A)	19.5 to 325.7 grams (0.0043 to 0.718 lbs)
Bulbs - HID types (Note B)	4.1 to 42.5 grams (0.009 to 0.094 lbs)
LCD-type Screens (Note C)	0.895 grams (0.0020 lbs)
Lead Acid Batteries	Note D
Alkaline Batteries	Note E

Notes:

A: The estimated mercury content is based on florescent bulb weight (~0.75 lbs per bulb) and mercury content (~0.003 to 0.050 grams of mercury per bulb).

B: Includes HID mercury-containing bulbs such as mercury vapor, sodium vapor, and metal halide. Estimated mercury content based on 2.5 lbs per bulb. Mercury content range of 0.0167 to 0.173 grams of mercury per bulb is average of ranges for mercury vapor, sodium vapor, and metal halide lamps.

C: Total includes flat panel displays (e.g., monitors, televisions) and notebook screens. Assumes all notebook/laptop screens disposed were LCD-type. Estimated mercury content based on an average 0.005 grams per LCD-type screen.

D: Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution. An estimate of the mercury content of the solution is not available.

E: The majority of alkaline batteries do not contain mercury. The exception are button cell type alkaline batteries (estimated average content 11 mg). For disposal purposes, the estimates are not divided beyond the major type. Therefore no specific estimate of the mercury content from alkaline button cell batteries has been made.

F: Other batteries (e.g. lithium and nickel-cadmium) are also tracked, however since they do not contain mercury, they are not listed here.

SMV Renewal Request for Outfalls 028/030

Stream-lined Mercury Variance Renewal Request for Outfalls 028 and 030

The following materials serve as the application for renewal of the stream-lined mercury variance (SMV) interim limits for total mercury at Outfalls 028 and 030. The majority of flows through Outfalls 028 and 030 are once-through non-contact cooling water (NCCW) which is withdrawn from Lake Michigan via Nos. 1 and 2 Pump Stations. The current interim limits (average of daily maximum values measured over the most recent (rolling) 12-month period) are:

- Outfall 028: 3.2 ng/L total mercury (as a 12-month rolling average)
- Outfall 030: 3.0 ng/L total mercury (as a 12-month rolling average)

This SMV renewal application attachment includes the following items:

1. Industrial SMV Application Form
2. April 2020 Revision of the Pollutant Minimization Program Plan (PMPP) for Mercury for Outfalls 028 and 030 including:
   - Mercury monitoring results for the most recent 2-year period (PMPP Tables III-1 and III-2)
   - Proof of Public Notice for the updated PMPP (PMPP Attachment V)
3. The 2019 Annual Progress Report for the Mercury PMPP for Outfalls 028 and 030 ("2019 Progress Report")

Pursuant to 327 IAC 5-3.5-7(d), U. S. Steel is required to do one of the following:

a) Revise the PMPP if demonstrable progress in minimizing the discharge of mercury has not been made; or
b) Provide information that demonstrates there is no known reasonable additional action that will reduce the mercury and thereby additional revisions to the PMPP would not be required.

Pursuant to the PMPP, U. S. Steel has committed to the following on-going or implemented activities:

- Compilation and maintenance of an inventory of mercury-containing materials.
- Review of the purchasing procedures as it relates to chemicals/equipment that may contain mercury.
- Expansion of mercury awareness training.
- Continued implementation of several programs and/or standard operating procedures (SOPs) that aim to increase awareness, prevent/minimize spills, and/or provide instructions for safe handling of spills:
  - Good Housekeeping Program
  - Spill Prevention - various SOPs, the Storm Water Pollution Prevention Plan, and the Spill Prevention Control and Countermeasure Plan
  - Maintenance/Disposal SOPs including one for decommissioning/removal of mercury-containing equipment should any be encountered (note that all

known mercury containing equipment and devices been removed from the site)
    - Spill Response – various SOPs including those specific to mercury-containing materials such as broken mercury thermometers and mercury-containing bulbs/lamps
- Tracking of disposed-of or recycled quantities of mercury containing materials such as instrumentation, equipment, electronics, bulbs/lamps, and batteries.
- Mercury characterization of chemicals that have the potential to be associated with Outfalls 028 and 030 discharges:
    - Water and Wastewater Treatment chemicals
    - Main Process chemicals
- Mercury characterization of condensates similar to those associated with Outfall 028 and 030 discharges.
- Performance (on a case-by-case and as needed basis) of an alternatives/reduction evaluation for mercury-containing chemicals or equipment. Specifically, the chemicals used for mussel control and dechlorination (sodium hypochlorite and sodium bisulfite) were investigated.
- Source survey of various wastewaters contributing to Outfalls 028 and 030. These evaluations included GW-10, GW-11 and internal Outfall 603 contributions.
- Characterization of the type or form of mercury (dissolved or 0.45 micron filterable) present in Outfalls 603, 028, and 030.
- Evaluation of the mercury removal by the C-Lot Lagoons
- Review of usage practices associated with Caster Mold Fluxes

Additional details relating to the implementation of these activities have been provided in submitted Annual Progress Reports which are required pursuant to Section 6.0 of the PMPP and 327 IAC 5-3.5-9(a)(8) and the annual report requirement from Part V of the NPDES Permit. The most recent progress report (2019 Progress Report) is included with this application.

These PMPP activities, when implemented, provide a means of minimizing the potential to release mercury into waters discharged from Outfalls 028 and 030. Though these activities may not result in an analytically quantifiable reduction in mercury concentrations in final discharge waters, the actions are focused on reducing or eliminating the risk of mercury addition from controllable sources.

However, the primary source of mercury is not controllable since the majority of flows for Outfalls 028 and 030 are NCCW with effluent mercury concentrations predominantly dependent on mercury present in the intake water (see PMPP Section 2.3 and Table III-1 for mercury statistics and data associated with the intakes). As such, it is difficult to assess the effectiveness of the PMPP activities directly via the measurement of mercury in the discharges. U. S. Steel continues to implement the PMPP and made demonstrable progress (through documentable and measurable activities) in understanding potential mercury sources and management of mercury-containing materials and chemicals associated with Outfalls 028 and 030.

Given the nature of the discharges and the implemented/ongoing PMPP activities, there are no additional known actions that will reduce mercury discharges from Outfalls 028 and 030.

U. S. Steel requests renewal of the SMVs for Outfalls 028 and 030 with the following interim limits. The proposed interim limits are based on application of the methodology listed in 327 IAC 5-3.5-8 (SMV interim discharge limit) and using the lower of the maximum result most recent 2-year period of monitoring data (March 2018 – February 2020) and the existing SMV interim limitations.

- Outfall 028: Retain existing limit of 3.2 ng/L total mercury
    - Maximum from the most recent 2-yr period: 6.0 ng/L (01/08/2020)
- Outfall 030: Retain existing limit of 3.0 ng/L total mercury
    - Maximum from the most recent 2-yr period: 6.8 ng/L (01/22/2020)

SMV Application Form for Outfalls 028/030

INDUSTRIAL STREAMLINED MERCURY VARIANCE (SMV) APPLICATION

State Form 52111 (5-05)
Approved by State Board of Accounts, 2005
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Indiana Department of Environmental Management
Office of Water Quality – Mail Code 65-42
NPDES Permits Branch
100 North Senate Avenue
Indianapolis, Indiana 46204-2251

PART ONE: General Information

Name of Facility
U. S. Steel Gary Works

Facility Address
One North Broadway

City or Town
Gary

State	ZIP Code	County
Indiana	46402	Lake

National Pollutant Discharge Elimination System (NPDES) Permit No.: IN0000281

Name of Person in Responsible Charge
Daniel Killeen

Title
Vice President - Gary Works

Address
One North Broadway

City or Town
Gary

State	ZIP Code
Indiana	46402

Name of Primary Contact Person
Brandon Miller

Address
One North Broadway

City or Town
Gary

State	ZIP code	Telephone No.
Indiana	46402	219-888-3369

E-mail Address (if available)
BSMiller@uss.com

NPDES Outfall(s) Affected by Streamlined Mercury Variance Request:
028 and 030

Receiving Stream(s) Affected by Streamlined Mercury Variance Request:
Grand Calumet River

Average Daily Flow:
Outfall 028 = 7.3 mgd, Outfall 030 = 17.2 mgd (long term averages Nov 2015 – Dec 2019)

Provide a brief description of all operations contributing to the permitted discharge(s):
U. S. Steel Gary Works is a fully integrated steel producer. Operations within the referenced outfall areas includes steelmaking, facilities. The outfall discharges primarily non-contact cooling water and treated steel-making process waters and contact cooling waters. See Section 1.3 of the Outfall 028/030 PMPP for more information.

SIGNATURE BLOCK

This application must be signed by a person in responsible charge (see 327 IAC 5-2-22) to be valid. This signature attests to the following:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name	Title
Daniel Killeen	Vice President - Gary Works
Signature See the General Information Form for the certification signature	Date Signed *(month, day, year)*

Return the completed SMV application package (Parts I - V) and $50 application fee (see IC 13-18-20-12(a)(4)) to mailing address listed above.

PART TWO – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) INVENTORY/IDENTIFICATION

A. Provide a preliminary inventory of potential uses and sources of mercury in all buildings and departments, as well as a preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites. The following checklist* includes many of the chemicals, equipment, locations, etc. where mercury may be present at your site. For the purpose of satisfying the requirements of this section, you may submit the completed checklist as a preliminary inventory/identification. While the checklist is intended to facilitate the inventory/identification process, it should not be considered as all-inclusive for purposes of establishing a complete inventory. *(see 327 IAC 5-3.5-9(a)(1) and 327 IAC 5-3.5-9(a)(2))*

LABORATORY EQUIPMENT

☐ Manometers	☐ Ion exchange cartridges for lab water purification system
☐ Barometers	☐ Hanging mercury drop electrodes for polarographic analyzers
☐ Thermometers	☐ Mercury Hallow Cathode lamp for AA analysis

LABORATORY CHEMICALS

☐ COD analysis reagent *(mercuric sulfate)*	☐ Mercury or mercurous chloride
☐ TKN and TP analysis digestion reagents	☐ Mercury iodide
☐ Nessler reagent	☐ Mercury nitrate
☐ Mercury analytical standards	☐ Mercury (II) oxide
☐ Gas chromatograph sample interferences *(elemental mercury)*	☐ Mercury (II) sulfate
[X] Sodium hypochlorite *(Clorox)*	☐ Merthiolate

BULK CHEMICALS

☐ Phosphorus removal chemicals	[X] Chlorine
[X] Dechlorination chemicals	[X] Sodium hypochlorite
☐ Sludge thickening polymers	☐ Sulfuric acid
☐ Potassium hydroxide	☐ Nitric acid
[X] Sodium hydroxide	☐ Ferric or ferrous chloride
[X] Sodium chloride	☐ Pickling liquor *(for phosphorus removal)*

PROCESS CONTROL AND MEASURING EQUIPMENT

☐ Accustats	☐ Ring balances
☐ Barometers	☐ Shunt trips
☐ Counterweights	☐ Steam flow meters
☐ Elemental mercury for refilling mercury-containing equipment	☐ Stokes gauges Switches and relays:
☐ Flow meters	☐ Displacement plunger relays
☐ Gas regulators and meters	☐ Mercoid control switches
☐ Gyroscopes	☐ Pressure control switches *(mounted on bourdon tube or diaphragm)*
☐ Hydrometers with thermometers	☐ Relay switches
☐ Level and rotation sensors	☐ Mercury wetted relays
☐ Manometers, pressure gauges and vacuum gauges	☐ Mercury displacement relays (found in motors)
☐ Mercury-sealed pistons	☐ Sump pump, bilge pump and other float controls
☐ Permeters	☐ Tilt switches
☐ Pressure-trols	☐ Thermometers *(including industrial dial face thermostats with capillary tubes)*
☐ Pyrometers	☐ Thermostats and thermoregulators
☐ Rectifiers	☐ Transmitters

BUILDINGS

☐ DC watt-hour meters	Hydronic and warm air controls with tilt switches such as:
☐ Flame sensors *(found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)*	☐ Aquastats
	☐ Pressurestats
	☐ Firestats
	☐ Fan limit controls
* This checklist was borrowed from the Delta Institute	☐ Pressure/flow controls on air handling units.

PART TWO (CONTINUED)

BUILDINGS *(continued)*

Switches and relays:

☐ Fire alarm box switches	☐ Mercury displacement relays *(found in lighting, resistance heating and motors)*
☐ Silent light switches	
☐ Relay switches	☐ Sump pump, bilge pump, flow monitor, float switches, and other float controls
☐ Mercury wetted relays	
	☐ Tilt switches

Phosphorus removal chemicals:

☐ Ferric or ferrous chloride

☐ Pickling liquor

☐Thermostats

BEARINGS AND SEALS

☐ Trickling filter Pivot Arm Bearings *(mercury bearings/water seals)*

LAMPS

X Fluorescent	X Mercury vapor lamps
X High-pressure sodium	X Metal halide
☐ Mercury arc	☐ Ultraviolet disinfection

BATTERIES

X Mercury-zinc *(button)* batteries	X Mercury alkaline batteries
X Mercury-cadmium batteries	X Mercury oxide batteries

PAINT

☐ Old latex-paint (pre-1990)	☐ Marine paint

FIRST AID/MEDICAL

☐ Mercurochrome	☐ Thermometers
☐ Sphygmomanometers	☐ Thimerosal *(contained in eye wash)*

OTHER

☐ Old pesticides, fungicides and herbicides	☐ Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps
☐ Tree root growth control products	
X Computer monitors	

COLLECTION SYSTEM

☐ Lift station equipment	☐ Sewer lines with accumulated mercury
☐ Traps with accumulated mercury	☐ Other mercury containing equipment
☐ Sumps with accumulated mercury	☐ Mercury-containing chemicals used and/or stored on-site

MERCURY STORAGE SITES

☐ Elemental mercury	☐ Mercury-containing items collected for disposal

B. Provide a plan and schedule for providing a complete inventory initiated under Section A. above. *(see 327 IAC 5-3.5-9(a)(1))* The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

A complete inventory should include an estimate of quantities *(i.e., volume of chemicals used annually, or numbers of mercury containing equipment)* for each item identified in Part II.A. Additionally, a complete inventory should include documentation from chemical suppliers and equipment suppliers of the mercury content in your most commonly purchased items. Mercury may not be present in a concentration great enough to appear on an MSDS, yet still contribute to the overall level of mercury in the influent.

See Outfall 028/030 PMPP Section 2.2 and Attachment II-B.

* This checklist was borrowed from the Delta Institute

PART THREE - POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) PLANNED ACTIVITIES

A. Provide a list of planned activities to be conducted to eliminate or minimize the release of mercury to waters of the state. The list of planned activities may consider technical and economic feasibility and must include, at a minimum: *(see 327 IAC 5-3.5-9(a)(3))*

1. A review of purchasing policies and procedures.

See Outfall 028/030 PMPP Section 3.2 and Attachment IV

2. Necessary training and awareness for facility staff.

See Outfall 028/030 PMPP Section 3.2 and Attachment IV

3. Evaluation of alternatives to the use of any mercury-containing equipment or materials.

See Outfall 028/030 PMPP Section 3.2 and Attachment IV

4. Other specific activities designed to reduce or eliminate mercury loadings.

See Outfall 028/030 PMPP Section 3.2 and Attachment IV

5. An identification of the facility's responsibilities under P.L.225-2001 *(also known as House Enrolled Act 1901 of the 2001 legislative session)*. P.L.225-2001 outlines the restrictions on the sale or supply of mercury-added novelties, mercury-added products, and mercury commodities, and on the use or purchase of mercury commodities, compounds, or mercury-added instructional equipment and materials by public and non-public schools. In order to satisfy the requirement of this part, include a written statement that attests to the fact that an identification of the responsibilities under P.L.225-2001 has been undertaken.

See Outfall 028/030 PMPP Section 3.3

B. For each planned activity identified under section A. above, include the following: *(see 327 IAC 5-3.5-9(a)(4))*

1. The goal to be accomplished.

See Outfall 028/030 PMPP Attachment IV

2. A measure of performance.

See Outfall 028/030 PMPP Attachment IV

3. A schedule for action. The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

See Outfall 028/030 PMPP Attachment IV

C. Provide an identification of the resources and staff necessary to implement the Pollutant Minimization Program Plan (PMPP). *(see 327 IAC 5-3.5-9(a)(6))* The identification should indicate the source and amount of funding available to implement the PMPP, as well as the number and position of employees that will be devoted to PMPP implementation.

See Outfall 028/030 PMPP Section 3.5

PART FOUR – MERCURY MONITORING DATA

Provide all available influent and effluent mercury data for the two-year period preceding submittal of this application. Additionally, provide any information on mercury in biosolids for the two-year period preceding submittal of this application, if available. The data may be supplied on a separate form, but must include results for each individual sample *(including unit of measurement and U.S. EPA method)*, the date the sample was taken, and the analytical laboratory where the analysis was performed. *(see 327 IAC 5-3.5-9(a)(5))*

Influent

Date *(month, day, year)*	Result	ng/l	U.S. EPA Method	Analytical Laboratory
See Outfall 028/030 PMPP – Table III-1				

PART FOUR (CONTINUED)

Effluent

Date *(month, day, year)*	Result	ng/l	U.S. EPA Method	Analytical Laboratory
See Outfall 028/030 PMPP – Table III-2				

Biosolids

Date *(month, day, year)*	Result	Unit	U.S. EPA Method	Analytical Laboratory
No mercury monitoring of relevant biosolids associated with this outfall.				

PART FIVE – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) ADDITIONAL REQUIREMENTS

A. **<u>Proof of Public Notice Activities</u>: Provide proof of the public notice activities identified below: *(see 327 IAC 5-3.5-9(c))***
For the notice of availability required under Section A.1. provide a copy of the notice as it appears in the newspaper. For the posting requirements under Section A.2. attest to that fact that the information was posted as required in a written statement.

1. Publish notice of the availability of the draft pollutant minimization program plan (PMPP) in a daily or weekly newspaper of general circulation throughout the area affected by the discharge.

2. Post a copy of the information required by this section at the following:

   a. Principal office of the municipality or political subdivision affected by the facility or discharge.
   b. The United States post office.
   c. If one is available, the library serving those premises.

3. All notices published under this section shall contain the following information: *(see 327 IAC 5-3.5-9(d))*

   a. The name and address of the applicant that prepared the PMPP.
   b. A general description of the elements of the PMPP.
   c. A brief description of the activities or operations that result in the discharge for which an SMV is being requested.
   d. A brief description of the purpose of this notice and the comment procedures.
   e. The name of a contact person, a mailing address, an Internet address, if available, and a telephone number where interested persons may obtain additional information and a copy of the PMPP.

   See 028/030 PMPP Section 5.0 and Attachment V

4. The applicant shall do the following: *(see 327 IAC 5-3.5-9(e))*

   a. Provide a minimum comment period of thirty (30) days.
   b. Include a copy of the comments received and the applicant's responses to those comments in the SMV application submitted to the department.

B. **<u>Annual Reports:</u> Provide a schedule for the submission of the annual reports required under 327 IAC 5-3.5-9(a)(8). Generally, the annual reports should be submitted each year on the anniversary of the effective date of the NPDES permit that incorporates the approved SMV. A proposed schedule with an alternative submittal date is subject to IDEM's approval. The annual reports shall include a description of the facility's progress toward fulfilling each PMPP requirement, mercury monitoring results, and steps taken to implement each planned activity developed under the PMPP.**

See 028/030 PMPP Section 6.0. The most recent annual report (Nov 2019) is also provided as part of this SMV renewal application.

Outfalls 028/030
Pollutant Minimization Program Plan for Mercury
(Revised April 2020)

Pollutant Minimization Program Plan for Mercury
Outfalls 028 and 030

NPDES Permit IN0000281

Prepared for:

United States Steel Corporation Gary Works
Gary, Indiana

Submitted to:

The Indiana Department of Environmental Management
IGC North – 13^{th} Floor
100 N. Senate Avenue
Indianapolis, Indiana

Date:

April 2020
(Original August 2013)

Contents

1.0 Introduction

1.1 Background

U. S. Steel – Gary Works (U. S. Steel) operates an integrated steel manufacturing plant in Gary, Indiana (Lake County). Intermediate and final products include sinter, iron, raw steel, cast steel, plate, hot strip, cold rolled strip and coated steels. The plant also includes ancillary facilities to support the production processes, such as boiler houses, maintenance facilities, environmental control systems such as scale pits, oil-water separators, and wastewater treatment (WWT) facilities, business administration operations, and shipping and receiving facilities. The facility operates continuously.

U. S. Steel is currently authorized to discharge from Outfalls 028 and 030 to the Grand Calumet River pursuant to NPDES Permit IN0000281 (NPDES Permit).[1] The current Permit (renewed permit effective November 1, 2015 with the latest modification scheduled to become effective May 1, 2020) includes interim and final water quality-based effluent limits (WQBELs) for mercury at Outfalls 028 and 030. The interim mercury limits are based on the Streamlined Mercury Variances (SMV) process[2] (327 Indiana Administrative Code (IAC) 5-3.5) that allows for an interim limit for mercury discharges that is based on representative effluent data. The following interim discharge limits for mercury have been incorporated into the current NPDES Permit (effective November 1, 2015).[3]

- Outfall 028: 3.2 ng/L total mercury (as a 12-month rolling average)
- Outfall 030: 3.0 ng/L total mercury (as a 12-month rolling average)

Pursuant to 327 IAC 5-3.5 and SMV requirements, U. S. Steel has prepared[4] this Pollutant Minimization Program Plan (PMPP) for mercury. As required by 327 IAC 5-3.5-9(a), this PMPP includes:

1. Results of a preliminary inventory of potential uses and sources of mercury, excluding raw materials, in all buildings and departments[5] and a plan and schedule for providing IDEM results of a complete inventory;
2. Preliminary identification of known mercury-bearing equipment, waste streams, and mercury storage sites[4];
3. A list of planned activities to be conducted to eliminate or minimize the potential release of mercury to the water, and for each activity, the goal to be accomplished, the measure of performance, and a schedule for action;

[1] The NPDES Permit authorizes discharges from other outfalls, however, this PMPP pertains only to Outfalls 028 and 030.
[2] IDEM's SMV FAQ Document uses the following to compare an individual variance to the SMV process: "While an individual variance focuses on pollutant removal (treatment) technologies, the SMV is a streamlined process focusing on pollution prevention and source control to achieve mercury effluent reductions due to a recognized lack of economically viable end-of-pipe treatment options."
[3] Per the NPDES Permit, submission of both a daily maximum value and annual average value is required for each reporting period. The annual average value is to be calculated as the average of daily maximum values measured over the most recent (rolling) 12-month period. Compliance will be assessed with respect to the annual average value. For clarity, this report will refer to the annual average value as the 12-month rolling average.
[4] The original PMPP was developed, public noticed and submitted as part of a SMV request in 2013. SMVs for Outfalls 028 and 030 were subsequently incorporated into the Permit in December 2014. Since then U. S. Steel has implemented the PMPP and submitted required annual reports. This version of the PMPP has been revised to present more current information in support of a SMV renewal request that will be submitted to IDEM with U. S. Steel's 2020 permit renewal application.
[5] Within the Outfall 028 and 030 drainage areas.

4. All available mercury monitoring data for Outfalls 028 and 030 for a 2-year period preceding the submittal of an SMV application;
5. Identification of the resources and staff necessary to implement the PMPP;
6. Proof of completion of public notice activities required under 327 IAC 5-3.5; and
7. Annual reporting according to a schedule in this PMPP.

1.2 Purpose of the Pollutant Minimization Program

The purpose of the Pollutant Minimization Program is to establish guidelines and procedures that, when implemented, provide a process (and schedule) for minimizing the potential to release mercury into waters discharged from Outfalls 028 and 030. As such, the Pollutant Minimization Program identifies documentable and measurable activities related to management or reduction of mercury within the areas encompassing the Outfall 028 and 030 drainage areas. Though these activities may not result in an analytically quantifiable reduction in mercury concentrations in discharge waters, the actions are focused on reducing or eliminating the risk of mercury addition from a controllable mercury source. This PMPP has been developed to satisfy the requirements of the SMV regulations presented in 327 IAC 5-3.5-9.

1.3 Outfalls 028 and 030 Area Summary

Outfalls 028/030 are located within the drainage area primarily encompassing the steel-making facilities that primarily consist of the following:

- Two Basic Oxygen Furnace Shops (Quelle-Basic Oxygen Process (Q-BOP) and 1-BOP) (the "Steel Shops") that houses the steel-making vessels (3 per Shop) in which molten iron (from the Blast Furnaces) and scrap is converted to liquid steel. A Controlled Argon Stirring-Oxygen Blow (CASOB) unit is also part of the Steel Shops; here the steel chemistry is refined and subjected to additional heating. Gas cleaning system process water is treated before being recycled and/or sent to the final thickeners (No. 1 and No. 1A) before discharge via Internal Outfall 603. The main process chemicals utilized in the Q-BOP and 1-BOP conversion process is flux (which primarily consists of lime). During the process aluminum and various alloys (including silicon, copper, manganese, titanium) can be added to vary the chemistry of the heat and hence final steel. Wastewater treatment chemicals are utilized for solids removal and consist of flocculants and coagulants. Other water treatment chemicals used here are for the area cooling systems and include those for microbiofouling control as well as corrosion and scale inhibitors.

- Three Ladle Metallurgical Facilities (LMFs) and a CASOB Reheat Ladle, which refine the steel chemistry and maintain temperature of the liquid steel. Alloys such as silicon, copper, manganese, titanium, and aluminum can be added depending on the desired chemistry desired. Process chemicals utilized at the LMFs and the CASOB include lime. However, there are no wastewater discharges from the LMFs or the CASOB.

- One RH Vacuum Degasser, which is used to remove contaminant gases in the molten steel. Like the LMF, lime and various alloys can be utilized in this process. However, there is a lamella/thickener local solids removal treatment system. The local thickener underflow wastewater is sent to the final thickeners (either No. 1 or No. 1A) before discharge via Internal Outfall 603. Associated water treatment additives include flocculants, which is used to enhance the settling of the solids.

- Four Continuous Casters (No. 1 Caster and No. 2 Caster (A, B, and C lines)), which mold the liquid steel from the Furnace Shops (and subsequent LMFs and RH Degasser Facilities) into slabs for further processing in the Hot Strip Mill, the Plate Mill, or shipment off-site. Caster contact cooling waters are treated for solids removal and are re-used after cooling via the No. 1 Caster scale pit, the No. 2 Caster A/B lines local filtration/thickener, and the No. 2 Caster C line filtration/thickener. The No. 1 Caster scale pit (about 6 to 8 MGD) and the No. 2 Caster A/B (about 300,000 gpd) and C lines (about 200,000 gpd) local wastewater thickeners blowdown are sent to the final thickeners (either No.1 or No 1A) before discharge via Internal Outfall 603. In addition, a percentage of filtered water is continuously blown down to Internal Outfall 603. Process chemicals used for the continuous casting process are caster mold fluxes and hydraulic oils with water treatment chemicals consisting primarily of coagulants for the local solids removal treatment systems. Other water treatment chemicals are those used for the area cooling systems and include those for microbiofouling control as well as corrosion and scale inhibitors.

- The Plate Mill (160” and 210”) is currently owned by ArcelorMittal. The Plate Mill produces plates from the slabs. Cooling waters for the slabs are recycled via a scale pit. Scale pit blowdown is normally directed to GW-10; however there are currently no process water discharges from the Plate Mill operations since associated operations that generate wastewater (North Lines of the Plate Mill) are currently idled and not anticipated to be re-started.

In addition to the processes above, other associated facilities include electric and crane repair shops, Main Garage (East) and Locomotive Services and pressure washing/steam cleaning areas, WWT facilities consisting of the thickeners mentioned above (Nos. 1 and 1A), the Terminal Lagoons (C-Lot Lagoons)[6], and outside storage areas (primarily slabs, reclaimable slag, and scrap). The majority of wastewaters to Outfall 028/030 (including Outfall 603) are routed to GW-10 pump station. GW-10 also receives storm water from the northwest side of the No. 2 Caster and Broadway Avenue (the area north of the tunnel). Minimal flows (Main Garage (east) and Locomotive services) are routed through GW-11 pump station. GW-12 pump station can also send storm water flows to Outfall 028/030. The flows from these pump stations are combined in the Terminal Lagoon Distribution Chamber before being routed to the Terminal Lagoons for final discharge via Outfalls 028 and 030.

The source of the water supplied for processes in this drainage area is Lake Michigan via the Nos. 1 and 2 Pump Stations. The intake waters are treated as needed for mussel and biofouling control with sodium hypochlorite[7] and prior to discharge, sodium bisulfite is added for dechlorination prior to discharge.

Attachment I, Figure LLD-3 presents the flow diagram depicting the above sources to Outfalls 028 and 030.

The Outfall 028/030 discharges are required to be both protective of water quality of the Grand Calumet River in addition to meeting best available technology-based effluent limit guidelines (ELGs) applicable to iron and steel production facilities (Title 40 Code of the Federal Regulations (CFR), Section 420). Specifically, pursuant to the NPDES Permit, U. S. Steel is authorized to discharge the following waters to the Grand Calumet River via Outfall 028/030:

- # 2 Continuous Caster and miscellaneous non-contact cooling waters (NCCW)
- #1BOP/QBOP Cooling Tower Blowdown
- Stormwater

[6] The C-Lot Lagoons comprise 3 separate lagoons (Nos. 1, 2, and 3 Lagoons). Treated effluent from Nos. 1 and 2 Lagoons is discharged via Outfall 028 and treated effluent from No. 3 Lagoon is discharged via Outfall 030.
[7] The NPDES Permit allows year round chlorination, however usage typically occurs seasonally.

- Steam Condensates
- ArcelorMittal Plate Mill Scale Pit Wastewaters[8]
- Internal Outfall 603 (Slab Spray cooling, QBOP Vacuum Degasser overflow, #1BOP, Vacuum Degasser, QBOP, #2 Continuous Caster A/B Line, and #1 Continuous Caster Line)

Water treatment additives (WTAs) associated with Outfalls 028/030 include those used for the above treatment schemes, mussel and biofouling chemicals for the intake waters, biofouling and water conditioning (e.g., softeners, corrosion inhibitors), and dechlorination chemicals. These WTAs and the main process chemicals associated with Outfalls 028/030 are described above and presented in the inventory which is addressed in Section 2.

[8] The North Lines of the Plate Mill, the source of process wastewaters, are idled and are anticipated to be idle long term. The Plate Mill Scale Pit does not currently discharge process wastewater; non-contact cooling waters are discharged.

2.0 Pollution Minimization Program Plan Inventory/Identification (327 IAC 5-3.5-9(a))

2.1 Inventory of Potential Uses and Sources of Mercury (327 IAC 5-3.5-9(a)(1))

Part Two, Section A of the draft SMV application[9] presented in Attachment II-A allows for a determination of a preliminary inventory of equipment, chemicals, and other mercury-containing devices that may be present or have the potential to come in contact with discharge waters. The tables in Attachment II-B gives additional inventory details beyond that provided in Part Two, Section A of the draft SMV application.

Based on the results of the inventory, potential sources of mercury that may be present or have the potential to come in contact with waters discharged from Outfalls 028 and 030 include:

- Intake water from Lake Michigan;
- Stormwater from rainfall[10];
- Water treatment chemicals;
- Main process chemicals; and
- Other stored chemicals and fuel[11].

As summarized in the Attachment II-B tables, no other sources of mercury are anticipated to be present in discharges as none have been identified on the preliminary inventory in Part Two, Section A of the completed SMV application. U. S. Steel, in collaboration with other Northwest Indiana steel mills, has previously[12] conducted an extensive evaluation into mercury-containing equipment and devices prevalent in steel manufacturing (including switches, thermometers, and gauges). As an outcome of this joint venture, the mercury-containing equipment and devices found across the U. S. Steel Facility were subsequently removed. All of the mercury-containing equipment and devices have been removed in the areas that could potentially come into contact with wastewaters discharged from Outfalls 028 and 030.

2.2 Schedule for Providing Complete Inventory (327 IAC 5-3.5-9(a)(2))

The complete inventory of mercury and mercury-containing materials is included as Attachment II-B (Tables 1, 2, and 3) and gives an estimate of quantities for identified items. The inventory also includes mercury content estimates based on available information (e.g., provided by suppliers, vendors, manufactures, or direct measurement.)

U. S. Steel will provide applicable updates to the completed inventory with the required annual progress reports (Section 6.0).

[9] A completed SMV application form, including a final version of Part Two (Section A), will be submitted with this PMPP as part of a SMV renewal request submittal to IDEM.

[10] As per National Wildlife Federation Cycle of Harm: Mercury's Pathway from Rain to Fish in the Environment. May 2003, 2nd edition rainwater in Indiana can contain high concentrations of mercury (up to 10.9 ng/L). U.S. Steel uses best management practices in controlling storm water pollution via the Storm Water Pollution Prevention Plan (SWPPP).

[11] Chemicals and fuel generally stored in tanks located within the Outfalls 028 and 030 drainage areas that could reach surface waters via open stormwater manholes.

[12] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001), and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

2.3 Analysis of Mercury in Water Discharges

In support of this PMPP, mercury sampling was performed at the Nos. 1 and 2 Pump Station intakes (listed as PS-1 and PS-2 respectively), internal Outfall 603, and external Outfalls 028 and 030. Attachment III, Table III-1 provides details of the mercury sample results over the most recent 2-year period for the Intakes and Outfalls 028/030. Table III-2 shows the combined Outfall 603 results from periodic monitoring. A summary for each location is listed below:

- <u>Intake Water from Lake Michigan Statistics</u>
  The intakes supply water to the operations associated with Outfall 028 and 030 discharges. Though not required by the NPDES Permit, mercury analysis of the intakes is typically performed at the same time as Outfall 028 and 030 sampling.

  Long term (February 2009 – February 2020)
  - Averages: 0.84 ng/L for PS-1 and 0.56 ng/L for PS-2
  - Geometric Means: 0.52 ng/L for PS-1 and 0.42 ng/L for PS-2
  - Maximum: 31 ng/L for PS-2 and 4.1 ng/L for PS-2

  Most recent two-year period (March 2018 – February 2020)
  - Averages: 0.62 ng/L for PS-1 and 0.58 ng/L for PS-2
  - Geometric Means: 0.50 ng/L for PS-1 and 0.47 ng/L for PS-2
  - Maximum: 2.8 ng/L for PS-2 and 1.8 ng/L for PS-2

- <u>Outfall 603 Statistics</u>
  Outfall 603 is an internal outfall to Outfalls 028/030. Per the NPDES Permit, Outfall 603 is the combined discharge of the following five discharge points: No. 1 Thickener, No. 1A Thickener, No. 1 Caster scale pit, No. 2 Caster A/B Line filter blowdown, and No. 2 Caster C Line filter blowdown. Though not required by the NPDES Permit, mercury analysis of all five above listed streams has periodically been performed.

  Outfall 603 Long term (Events in 2009-2010, 2015, and 2017)
  - Average of 0.73 ng/L; Geometric mean is 0.57 ng/L
  - Maximum of 3.5 ng/L

- <u>Outfall 028 Statistics</u>
  Long term (February 2009 – February 2020)
  - Average of 1.1 ng/L; Geometric mean is 0.88 ng/L
  - Maximum of 6.0 ng/L

  Most recent two-year period (March 2018 – February 2020) are:
  - Average of 1.2 ng/L; Geometric mean is 1.1 ng/L
  - Maximum of 6.0 ng/L

- <u>Outfall 030 Statistics</u>
  Long term (February 2009 – February 2020)
  - Average of 1.1 ng/L; Geometric mean is 0.88 ng/L
  - Maximum of 6.8 ng/L

  Most recent two-year period (March 2018 – February 2020)
  - Average of 1.4 ng/L; Geometric mean is 1.1 ng/L
  - Maximum of 6.8 ng/L

The details of any activities planned as a result of these analyses are discussed in Section 3.

3.0 Planned Activities to Eliminate or Minimize Releases of Mercury to the Water

3.1 Overall Basis of the Planned Activities

Planned activities target both types of potential mercury sources listed in the inventory: those that may impact or come in contact with discharge waters, as well as those that are risk based. However, the main focus is concentrated on targeting specific chemicals or equipment that have the potential to release mercury to waters that discharge via Outfalls 028 and 030.

Given the focus on the discharge waters, the U. S. Steel mercury monitoring program included analysis of intake and internal outfalls in addition to the NPDES Permit required monitoring of external Outfalls 028 and 030. U. S. Steel utilized the dataset generated, combined with operational and process information, to determine which items on the mercury inventory have the most potential to release mercury to the discharge waters. Actions were then generated to address these potential sources with one (or more) of the three following types of activities in mind.

- Type 1: Source Characterization – additional investigation to understand the contribution from a potential source, including confirmation of potential sources as well as tasks to rank the likelihood of impacting discharges.

- Type 2: Alternatives for Reduction Evaluation - exploration into means of reducing or eliminating an identified source. Investigations may include research into best management practices, material substitution, or reduction technologies. Evaluations to determine overall feasibility and benefits may include mercury content and contribution, operability, reliability, economic impact, and effectiveness of alternative practices or materials.

- Type 3: Awareness and Containment Control Implementation – education of personnel and application of specific handling, housekeeping, and disposal practices for potential mercury-containing materials or equipment.

3.2 Plan and Schedule of Activities (327 IAC 5-3.5-9(a)(3))

In accordance with SMV requirements, U. S. Steel will implement a plan and schedule of activities to reduce or minimize the potential to release mercury to waters discharged to the Grand Calumet River via Outfalls 028 and 030. Attachment IV contains the plan and schedule of activities for U. S. Steel based on the results of the source data and associated inventory summarized in Section 2 of this PMPP. U. S. Steel will implement the following activities according to the associated schedule of action as summarized in Attachment IV. Some activities may be staged or staggered so that results from initial activities can be used to guide and effectively focus resources in subsequent activities. In addition, some activities that address chemicals/equipment with a higher potential for discharge to surface waters (as identified in Attachment II) will have a higher priority than those with lower potential. It is also possible that the results of Type 1 activities (i.e. source characterizations) may disprove initially identified potential sources – if so, further activities specific to that source may not be required.

3.2.1 Summary of Activities

Several activities will impact more than one item or type of material that may contain mercury. These actions or policies are summarized below:

3.2.1.1 Source Characterization (Type 1 Activity)

Where potential sources of mercury have been identified, additional investigation will be made to first confirm the potential source. Once confirmed, an understanding of contribution of the source will be explored. Activities towards these goals include:

- Researching the amount of mercury in materials that have the potential to contribute mercury to waters discharged to the Grand Calumet River through Outfalls 028 and 030. This is typically accomplished through discussions with vendors, review of literature, and/or direct measurement.

- Estimation of the magnitude of the source. This is typically done via quantification of the amount of mercury that may be discharged based on the amount of chemicals used, the volumes of the waste streams, and/or the number of mercury-containing materials present.

3.2.1.2 Alternatives for Reduction Evaluation (Type 2 Activity)

U. S. Steel, along with other steel mills in Northwest Indiana, previously[13] conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site. U. S. Steel policy is that mercury added equipment/devices are not to be supplied with the exclusion of equipment where there is no alternative (i.e. bulbs, batteries, etc.). Furthermore, mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Should a material on the non-approved list be encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Chemicals that do not have mercury as an added constituent but are known to contain trace amounts of mercury will be evaluated on a case by case basis. For example, evaluations will be prioritized based on not just mercury content, but also the potential risk of impacting the associated final discharge. Chemicals with a higher potential (e.g., water treatment additives used in final treatment steps) will be examined prior to those with a lower risk (e.g., process chemicals or water treatment additives such as flocculants and those used in closed-loop systems). Alternative consideration may include investigations into materials that have less (or no) mercury, alternative activities or processes in which there is less potential for mercury to be discharged (such as different laboratory practices), and/or other improved treatment technologies as applied to a known source. Information such as mercury content and magnitude of the source contribution along with the operability, reliability, effectiveness and economic impact of potential alternatives may be used to determine the overall feasibility and benefit of alternative materials, processes, and/or technologies.

Based on the results of chemical or equipment evaluations, U. S. Steel may consider alternatives to mercury-containing chemicals that have a high potential for reaching the surface waters (i.e., mussel control and biofouling chemicals). Any identified alternatives that require significant capital to implement would be

[13] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001); and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

evaluated with respect to feasibility, ease of operation/execution, and cost-effectiveness through a corporate-specific review process. The review process requires approval from multiple departments (e.g., procurement, environmental, work control) before implementation is approved.

3.2.1.3 Review of Purchasing Policies and Procedures (Type 3 Activity)

U. S. Steel has completed a review of purchasing policies and procedures with the objective of addressing the mercury content of purchases.

Mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Furthermore, if a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

For non-chemicals, U. S. Steel policy is that mercury added equipment/devices are not to be supplied or used with the exclusion of equipment/devices where there is no feasible alternative (e.g bulbs, batteries). Additionally, U. S. Steel fluorescent bulb purchases are of the low-mercury (also called "green bulbs") type.

3.2.1.4 Awareness Training for Facility Staff (Type 3 Activity)

U. S. Steel's training program for facility staff includes mercury awareness and disposal restrictions related to mercury. Additional training is provided to personnel with responsibility for maintaining mercury containing equipment[14], if applicable. The additional training consists of the following topics:

- Purchasing policies;
- Good housekeeping practices;
- Maintenance and cleaning practices;
- Recycling practices;
- Proper handling and disposal procedures;
- Spill kit locations; and
- Spill containment procedures.

These practices continue, however in support of this activity, U. S. Steel has worked to increase mercury awareness by highlighting mercury in a format outside of the normal training environment via distribution of a Mercury Awareness Bulletin.

3.2.1.5 Good Housekeeping Practices (Type 3 Activity)

U. S. Steel has implemented a good housekeeping program. Good housekeeping is the practice of maintaining a clean and orderly work environment. Providing a clean and orderly work area reduces the possibility of accidental spills and releases from equipment and materials. Good housekeeping is one of the focus areas for discussion during the awareness training, the details of which are described previously in Section 3.2.1.4.

[14] As previously discussed, U. S. Steel does not believe that there is any mercury-containing equipment (with the exception of lamps, bulbs, and batteries) in the drainage areas encompassing the Outfalls 028 and 030 drainage areas. U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered.

3.2.1.6 Maintenance and Cleaning Activities (Type 3 Activity)

U. S. Steel has implemented procedures to be followed during maintenance and cleaning activities to minimize the release of mercury to the environment from equipment as well as chemicals used for maintenance and cleaning activities (e.g., solvents and oils). U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered. U. S. Steel, along with other steel mills in Northwest Indiana, has previously conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site.

3.2.1.7 Standard Operating Practices: Spill Response and Prevention (Type 3 Activity)

U. S. Steel has SOPs that address safe and proper techniques for addressing spills and leaks of various chemicals (including solvents used for maintenance and cleaning activities and oils such as lube oil used for equipment maintenance activities). Specific to mercury-containing materials are SOPs that address broken mercury thermometers, disposal of bulbs and lamps, and decommissioning/removal of mercury-containing equipment. Each of these SOPs address spill response efforts. Although all known mercury-containing equipment and thermometers have been removed from the site, these SOPs are conservatively written as though these types of mercury-containing equipment are still present. If a mercury spill occurs, a qualified contractor will be utilized for containment and clean up. For minor releases such as thermometers in on-site laboratories, a qualified contractor or mercury spill kit can be utilized.

With respect to spill prevention, U. S. Steel has SOPs that require inspections of the condition of above-ground storage tanks and associated secondary containment structures to reduce the possibility of a potential release to surface waters. For example, both the Storm Water Pollution Prevention Plan and Spill Prevention Control and Countermeasure Plan address spill prevention and include inspection requirements.

3.2.1.8 Disposal Practices of Mercury-Containing Chemicals/Items (Type 3 Activity)

U. S. Steel continues, through its E-Waste and Universal Waste Collection programs, to properly recycle/re-use/dispose of several types of items (which may or may not contain mercury). Data from this program is now utilized to track and estimate disposal of mercury PMPP related materials. Items that are specifically addressed by the PMPP include the following:

- Bulbs/Lamps – spent mercury-containing bulbs and lamps (e.g. fluorescent or sodium vapor lamps);
- Batteries – known mercury-containing batteries are lead-acid batteries[15] primarily used for standby emergency power and alkaline button cell batteries. The program involves collection of all batteries independent of mercury content;
- LCD-screens – for example computer monitors and laptop screens
- Mercury-Containing Equipment – could include mercury-containing equipment, vials or ampoules of mercury removed from equipment;

Note that U. S. Steel does not believe that any mercury-containing equipment remains within the Outfall 028/030 drainage area. As part of the multi-steel mill mercury inventory study that U. S. Steel participated in, U. S. Steel conducted facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these materials from

[15] Mercury is not added in the manufacture of this type of battery; trace mercury that may be present is associated with the electrolytic acid solution.

the property. However, as discussed in Section 3.2.1.3, if mercury (as a material on the U. S. Steel non-approved list) is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Proper disposal of mercury-containing materials varies by material type; however, disposal or recycling of items/chemicals containing mercury complies with applicable disposal/recycling regulations. U. S. Steel will provide updated quantities in each annual PPMP progress report.

3.2.2 Specific Application of Activities

U. S. Steel will utilize an integrated approach to address specific groups or types of items or materials. In each case, more than one activity will be employed towards the overall objective of minimizing the potential to release mercury through discharge waters.

3.2.2.1 Water Treatment Additives and Main Process Chemicals

The chemicals identified to potentially contain mercury are summarized in Attachment II. This includes water treatment additives (WTAs) used for a variety of purposes and the main process chemicals associated with production. The following are applicable to these chemicals:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff;
- Source Characterization; and
- Alternatives for Reduction Evaluation (if deemed necessary by the results of the source characterization).

3.2.2.2 Other Chemicals and Materials

The Outfall 028 and 030 drainages area may include storage of fuel or storage/use of other chemicals not already discussed in Section 3.2.2.1. Though not directly associated with Outfalls 028 or 030 processes or water treatment, these materials[16] could reach surface waters via storm water conveyance. The potential is anticipated to be minimal given the various in-place preventive measures (e.g. secondary containment, the Spill Prevention Control and Countermeasure Plan, the Fugitive Dust Plan, and the Storm Water Pollution Prevention Plan).

3.2.2.3 Equipment that Contains Mercury

As previously discussed, no equipment that contains mercury exists within the Outfall 028 and 030 drainage areas.

3.2.2.4 Bulbs/Lamps That Contain Mercury

A preliminary listing of the known bulbs/lamps that contain mercury are summarized in Part Two A of the SMV application. U. S. Steel has already implemented a program whereby out-of-service mercury-containing bulbs/lamps are disposed of and replaced with low mercury bulbs/lamps. Collected bulbs are

[16] This includes materials stored in the area (i.e. chemicals and fuels) as well as dust suppressant and de-icing (i.e. road salt) chemicals that are applied to limited surface areas.

sent offsite for recovery/recycling of mercury. For example, for the period of 2014 – September 2019, an estimated 0.16 to 3.8 pounds of mercury was reclaimed from thousands of bulbs facility-wide. If available, spent bulbs and lamps are replaced with low-mercury versions. Additionally, used globe style bulbs containing mercury, such as Metal Halide and Sodium Vapor lamps, are collected for recycling.

These practices will continue with support from the following:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff; and
- Disposal Practices for Mercury-Containing Items.

3.2.2.5 Batteries That May Contain Mercury

The known batteries that may contain mercury, which are summarized in Attachment II, are lead-acid batteries primarily used for standby emergency power.[17] U. S. Steel has already implemented a policy whereby out-of-service batteries are properly disposed of.

These practices will continue with support from the following:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response);
- Awareness Training for Facility Staff; and
- Disposal Practices for Mercury-Containing Items.

3.2.2.6 Discharge Waters

The waters that discharge to the Grand Calumet River via Outfalls 028 and 030 have been discussed in Sections 1.3 and 2.3.

In addition to the ongoing management of these waters to meet current limits, the planned activities are outlined in Attachment IV. Activities may be sequentially staggered so that results from initial activities can be used to guide and effectively focus resources in subsequent activities. It is also possible that source characterizations may not confirm initially identified potential sources – if so, further activities specific to that source may not be required.

Many activities involve ongoing or as needed tasks. These include various tracking and monitoring tasks that will provide information to assess the possible need for other activities. Examples of critical activities are:

- Mercury characterization of all WTAs not already characterized and new WTAs. The characterization of WTAs may be tiered; for instance, those WTAs identified to have a high potential to reach surface waters will be examined before those determined to have a low potential.

[17]Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

- Mercury characterization of the main process chemicals. Characterization will be performed for process chemicals that are estimated to account for more than 1% by weight of all listed process chemicals (associated with the same final outfalls) or is estimated to be used in quantities larger than 10 tons/year. When there are several process chemicals of a similar type and purpose in use, the characterization information from one chemical may be used to estimate values for the others. For example, this approach was utilized for the Caster Mold Fluxes used as process chemicals.
- Alternatives for Reduction Evaluation of chemicals (To be determined based on characterizations of water treatment chemicals).

3.2.2.7 Specific Activities Already Implemented

U. S. Steel has already performed an evaluation for some potential sources of mercury and has implemented, initiated, or completed the following:

- Review of purchasing policies, disposal tracking, and implementation of various SOPs related to spill prevention, response, and maintenance.

- A facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these materials.

- Characterization of all WTAs and main process chemicals associated with Outfall 028 and 030 discharges. This information is included in Attachment II-B.

- Performed characterization and an alternatives analysis for reduction evaluation of sodium hypochlorite and sodium bisulfite used for mussel control and dechlorination respectively. Usage rates of these chemicals have been examined previously as part of U. S. Steel's Total Residual Chlorine (TRC) Pollution Minimization Program (PMP) Control Strategy. The U. S. Steel Permit allows year-round chlorination for control of zebra and quagga mussel populations. However, usage typically occurs from April through November only. Other use of sodium hypochlorite for biofouling control also occurs on an as needed basis. The usage rates for effective treatment in both situations are adjusted by monitoring the chlorine demand (as indicated by TRC) of the system. For example, with respect to feed rates for the intake pump stations, TRC is measured at least daily at multiple locations and sodium hypochlorite usage rates adjusted accordingly to maintain set residual levels. The set residual levels are necessary to provide effective mussel and/or biofouling control.

  Prior to final outfall discharge, dechlorination occurs with the addition of sodium bisulfite. The water quality-based effluent limitations (8 ug/L as a monthly average; 18 ug/L as a daily maximum) for TRC are lower than the analytical detection limit (20 ug/L). Therefore, a mass balance approach is used to ensure the effluent limitations are met. The usage rates of sodium bisulfite are determined such that there is a mass balance of sodium bisulfite to the historical maximum TRC measured at the associated intakes (or other locations where sodium hypochlorite is used). U. S. Steel has developed a mass balance model for each month within the mussel control season that uses the historical max TRC for that specific to that month. This aims to minimize sodium bisulfate usage while still 1) accounting for how chlorine demand can vary significantly over the course of mussel control season; and 2) maintaining compliance with the TRC Permit limitations.

As described above, further reducing the usage rates of sodium hypochlorite and sodium bisulfite to minimize the discharge potential from trace mercury within these chemicals is not feasible. U. S. Steel's preliminary and refined additional characterization for the specific sources (vendor/manufacturer) of sodium bisulfite and sodium hypochlorite confirmed that these remain significant potential water treatment additive sources of mercury. U. S. Steel is not aware of reduced mercury-content versions of either chemicals. As such, no further PMPP activities are planned with respect to these chemicals.

- Source characterization of condensate streams similar to those discharged to Outfall 028/030. The contributions from the sources of mercury from these sources are anticipated to be insignificant given the minimal concentrations of mercury measured in similar condensate streams and the low volume of condensate flows.

- Evaluation and Source Characterization of Internal Outfall 603
  - Outfall 603 is an internal outfall to Outfalls 028/030. Per the NPDES Permit, Outfall 603 is the combined discharge of the following five discharge points: No. 1 Thickener, No. 1A Thickener, No. 1 Caster scale pit, No. 2 Caster A/B Line filter blowdown, and No. 2 Caster C Line filter blowdown. Though not required by the NPDES Permit, mercury analysis of all five of the above listed streams was performed from July 2009 through December 2010 in support of a preliminary source survey. This data indicated that Outfall 603 does not significantly contribute to the mercury mass at Outfalls 028/030. Subsequent sampling (of all five 603 sources) in 2015 supported this conclusion though field blank detections and concurrent operational events complicated data evaluation. Therefore, in 2017 additional sampling of all five 603 sources (with concurrent sampling of GW-10 and Outfalls 028/030) was performed (data were presented in the 2017 annual report). The 2017 results suggested that the Outfall 603 contribution to Outfall 028/030 has not increased. As such, no further activities associated with GW-11 are planned at this time.
  - In addition to total mercury analysis, the 2017 sampling included dissolved mercury analysis in order to more fully understand the type (insoluble vs. soluble) of mercury present. As expected, the data (also previously presented in the 2017 annual reports) suggest that on average there is a larger fraction of mercury that is insoluble (meaning the fraction that is not dissolved - removed by 0.45 micron filtration) and believed associated with particulate matter when the TSS increases.

- GW-10 Source Survey and GW-11 Characterization.
  - Since the various Outfall 603 source surveys indicate that Outfall 603 is not the primary mercury contributor to Outfalls 028/030, additional source survey sampling was conducted during 2012, 2015, and 2017 in an effort to identify (or eliminate) other streams as significant sources of mercury to Outfalls 028/030. Sampling of the sewer system upstream of and including GW-10 was performed at select locations to isolate the various contributing branches. Though no conclusive primary source of mercury has been identified by any of the three surveys, the results helped to identify potential housekeeping improvements related to storm water and narrow the area focus for future investigations.
  - In 2018, U. S. Steel revisited the approach and assumptions (e.g. estimated flows and contributing wastewaters) used to evaluate the source survey data. In reviewing possible contributions to Outfalls 028/030, it was determined that it may not be a reasonable assumption to consider the GW-11 insignificant. Previously, potential

mercury contributions from GW-11 were considered negligible since the associated flows are intermittent. Though the flows are intermittent, the potential mercury contribution was selected for further assessment. 2019 characterization efforts included multiple sampling events and comparison of potential GW-10 and GW-11 mercury contributions to Outfall 028/030. The data support the initial conclusion that on average the potential mercury contribution from GW-11 is minimal especially compared to GW-10. As such, no further activities associated with GW-11 are planned at this time.

- Characterization of the type or form of mercury (dissolved or 0.45 micron filterable) present in Outfall 028/030 discharges. The data indicated that mercury is present mainly as filterable.

- Evaluation of the mercury removal efficiencies in the C-Lot Lagoons and the effect of various chemical treatment schemes. Results of the evaluations indicated that C-Lot Lagoons, because they are designed for and performing well at reducing solids, may be effective in removing filterable mercury. However, additional mercury removal efficiencies were not observed through the implementation of various chemical schemes. Given that U. S. Steel believes the study was performed appropriately and the C-Lot Lagoons demonstrated effective solids removal, no further C-Lot Lagoon mercury removal efficiency studies are planned.

- Reviewed usage practices associated with Caster Mold Flux process chemicals. Caster Mold Flux process chemicals account for the majority of the main process chemicals that have the potential to be associated with Outfall 028/030 discharges. As such, they have the highest calculated potential mercury contributions from process chemicals, so U. S. Steel reviewed the usage practices associated with these materials.
  - Caster Mold Fluxes are such a necessary and key component of the casting process that the usage of these materials has been extensively researched and there are specific “recipes” (e.g. type and amount of flux, line speed, grade of steel, etc.) that dictate their use. In addition to impacting product quality (by preventing oxidation), the Caster Mold Fluxes prevent the partially cooled steel from sticking or pulling when exiting the mold. If sticking or pulling were to occur catastrophic damage to both life and equipment could occur as molten steel would be released from the partially cooled product slab. Therefore, it is not feasible to reduce flux usage amounts which are carefully controlled in the production process. However, the manner of use and subsequent processing of associated wastewaters support the supposition the total estimated mercury content values for Caster Mold Fluxes listed Attachment II, Table 2 are overly conservative.
  - The calculations assume the entire quantity (lb/yr) of each process chemical will impact the final discharge. However, in the process, any flux (or flux residue) that is not consumed forms a solid scale-like layer on the product slabs. This layer is removed by a series of rollers and a water rinse. The wastewater is then sent to a scale pit for treatment where solids are settled and removed. It is expected that the mercury will be preferentially associated with the solids and that the scale pit wastewater (which ultimately is discharged via Outfalls 028/030) does not contain the total estimated content values listed in Attachment II-B, Table 2. Both the strictly controlled usage practices and subsequent processing of wastewaters combined demonstrate that measures are in place to minimize the potential to impact Outfall 028/030 mercury concentrations and that the values in Attachment II-B, Table 2 are overly conservative. However, the approach used to calculate the values will remain the same since no alternative methodology is available (e.g., it is not feasible to determine a factor which

would estimate the reduced potential achieved). As such no further PMPP activities are planned with respect to Caster Mold Fluxes.

3.3 Identification of Facility Responsibilities under P.L.225-2001

U. S. Steel is aware of their responsibilities under Public Law (P.L.) 225-2001 (also known as the House Enrolled Act 1901 of the 2001 legislative session and codified at IC 13-20-17.5) and will comply with all applicable requirements under the Act and associated Indiana Code.

3.4 Goals of Performance (327 IAC 5-3.5-9(a)(4))

For each activity identified in Section 3.2, this PMPP will also identify:

(A) The goal to be accomplished;

(B) A measure of performance; and

(C) A schedule for action.

As part of the required annual reports required pursuant to 327 IAC 5-3.5-9(a)(8), U. S. Steel will update IDEM on the progress of the activities identified in this section.

3.5 Resources and Staff Necessary (327 IAC 5-3.5-9(a)(6))

Pursuant to Part Three C of the SMV Application, the following key staff is responsible for implementing this PMPP:

Facility Personnel -
- Environmental Water Compliance Manager
- Procurement Buyer

Off-site Personnel –
- Environmental Specialist
- Technical Consultant
- Analytical and Sampling Support

Additional resources may be utilized when necessary and if appropriate.

With respect to funding, U. S. Steel will commit the funds necessary to commit to the schedule of planned activities pursuant to Section 3.2.

4.0 Mercury Monitoring Data (327 IAC 5-3.5-9(a)(5))

In support of renewing the interim SMV limitations and as required pursuant to Part Four of the SMV Application, U. S. Steel has collected at least two years of mercury data from Outfalls 028 and 030 and the associated intakes. Sampling occurred throughout the year and is representative of the four seasons. Sampling was performed utilizing modified EPA Method 1669 sampling techniques. Analyses for mercury were in accordance with EPA Method 1631, Revision E. Mercury data was reviewed for applicable QA/QC requirements and deemed valid, unless noted.

As discussed in Section 2.3, the data collected over the most recent two-year period are presented in Attachment III. The maximum mercury results for Outfalls 028 and 030 in the most recent two-year period (March 2018 – February 2020) are:

- Outfall 028: 6.0 ng/L (from January 08, 2020)
- Outfall 030: 6.8 ng/L (from January 22, 2020)

5.0 Proof of Completion of Public Notice Activities (327 IAC 5-3.5-9(c))

As required by Part Five A of the SMV Application, U. S. Steel published notice of availability of the PMPP and provided a comment period of thirty (30) days that started on March 2, 2020. No requests for a copy of the PMPP nor comments were received.

The notice of availability was published the notice in the Northwest Indiana Times on March 2, 2020 and posted at both the Gary Indiana Public Library and Gary Indiana Town Hall. Attachment V includes proof of these notices. Permission to post the notice was denied by both the Gary Indiana and Merrillville Indiana branches of United States Post Offices.

6.0 Annual Reports (327 IAC 5-3.5-9(a)(8))

U. S. Steel will provide annual reports to IDEM based on the schedule required in the current NPDES. Each of the reports will describe the following:

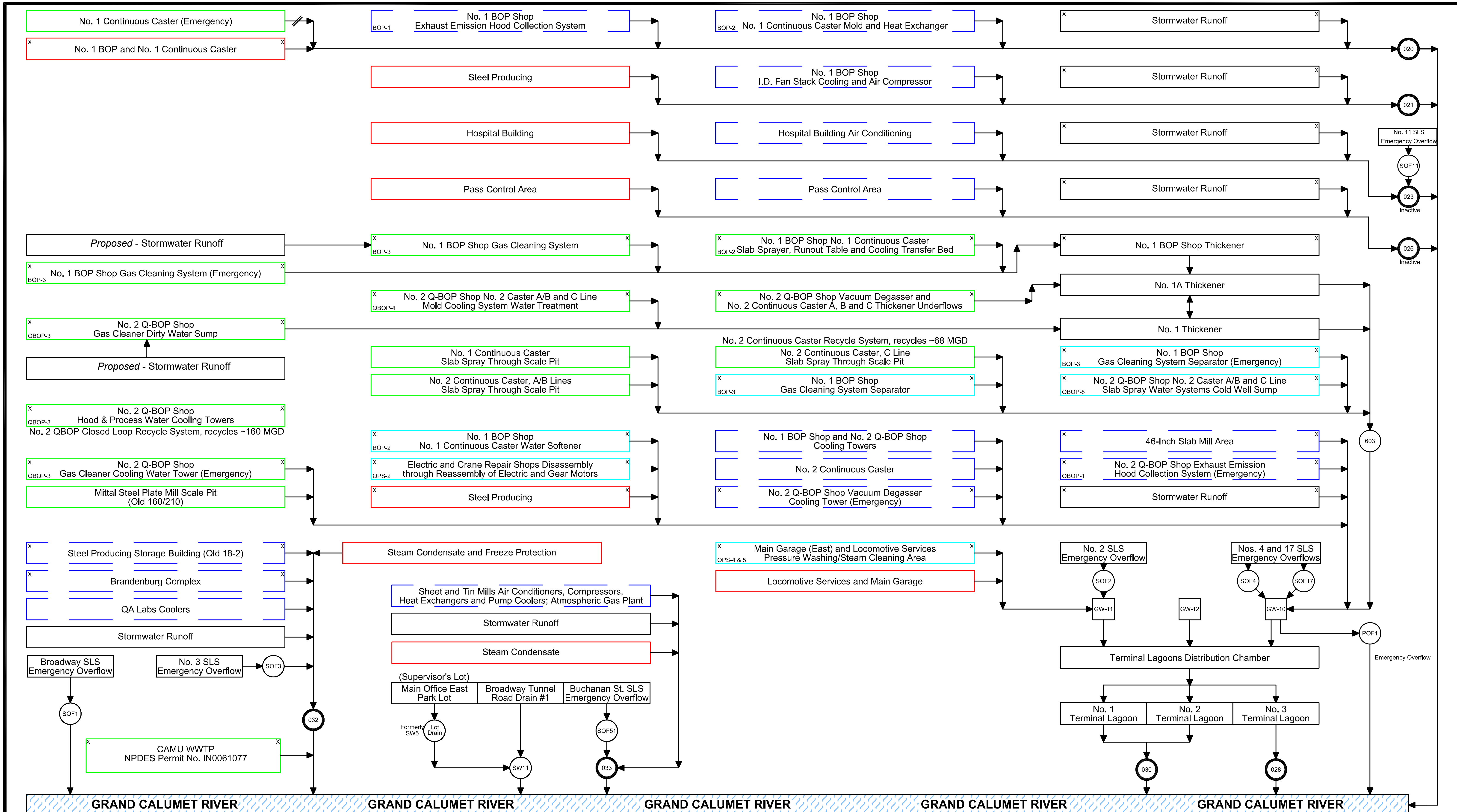
(A) U. S. Steel progress toward fulfilling each of the requirements of this PMPP;

(B) The results of the mercury monitoring collected during the intervening period; and

(C) The steps taken to implement each planned activity developed as part of this PMPP under Section 3.2 to reduce or eliminate mercury from Outfalls 028 and 030 discharges, as applicable.

Attachment I:

Figure LLD-3 (Flow Diagram w/Outfalls 028 and 030)



FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER		
CONDENSATE	☒ PUMP STATION	
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT	
PROCESS WATER	# OUTFALL	

Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-03 Detail

FIGURE LDD-03 Detail

U.S. Steel - Gary Works Line Discharge Diagram
Outfalls: 020, 021, 023 (Inactive), 026 (Inactive), 028, 030, 032 and 033

Attachment II:

II-A. Part Two, Section A of the Draft SMV Application

II-B. Inventory of Mercury-Containing Materials

Table 1. Water Treatment Additives

Table 2. Main Process Chemicals

Table 3. Other Materials and Discharges

PART TWO – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) INVENTORY/IDENTIFICATION

A. Provide a preliminary inventory of potential uses and sources of mercury in all buildings and departments, as well as a preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites. The following checklist* includes many of the chemicals, equipment, locations, etc. where mercury may be present at your site. For the purpose of satisfying the requirements of this section, you may submit the completed checklist as a preliminary inventory/identification. While the checklist is intended to facilitate the inventory/identification process, it should not be considered as all-inclusive for purposes of establishing a complete inventory. *(see 327 IAC 5-3.5-9(a)(1) and 327 IAC 5-3.5-9(a)(2))*

LABORATORY EQUIPMENT

☐ Manometers	☐ Ion exchange cartridges for lab water purification system
☐ Barometers	☐ Hanging mercury drop electrodes for polarographic analyzers
☐ Thermometers	☐ Mercury Hallow Cathode lamp for AA analysis

LABORATORY CHEMICALS

☐ COD analysis reagent *(mercuric sulfate)*	☐ Mercury or mercurous chloride
☐ TKN and TP analysis digestion reagents	☐ Mercury iodide
☐ Nessler reagent	☐ Mercury nitrate
☐ Mercury analytical standards	☐ Mercury (II) oxide
☐ Gas chromatograph sample interferences *(elemental mercury)*	☐ Mercury (II) sulfate
☒ Sodium hypochlorite *(Clorox)*	☐ Merthiolate

BULK CHEMICALS

☐ Phosphorus removal chemicals	☒ Chlorine
☒ Dechlorination chemicals	☒ Sodium hypochlorite
☐ Sludge thickening polymers	☐ Sulfuric acid
☐ Potassium hydroxide	☐ Nitric acid
☒ Sodium hydroxide	☐ Ferric or ferrous chloride
☒ Sodium chloride	☐ Pickling liquor *(for phosphorus removal)*

PROCESS CONTROL AND MEASURING EQUIPMENT

☐ Accustats	☐ Ring balances
☐ Barometers	☐ Shunt trips
☐ Counterweights	☐ Steam flow meters
☐ Elemental mercury for refilling mercury-containing equipment	☐ Stokes gauges Switches and relays:
☐ Flow meters	☐ Displacement plunger relays
☐ Gas regulators and meters	☐ Mercoid control switches
☐ Gyroscopes	☐ Pressure control switches *(mounted on bourdon tube or diaphragm)*
☐ Hydrometers with thermometers	☐ Relay switches
☐ Level and rotation sensors	☐ Mercury wetted relays
☐ Manometers, pressure gauges and vacuum gauges	☐ Mercury displacement relays (found in motors)
☐ Mercury-sealed pistons	☐ Sump pump, bilge pump and other float controls
☐ Permeters	☐ Tilt switches
☐ Pressure-trols	☐ Thermometers *(including industrial dial face thermostats with capillary tubes)*
☐ Pyrometers	☐ Thermostats and thermoregulators
☐ Rectifiers	☐ Transmitters

BUILDINGS

☐ DC watt-hour meters	Hydronic and warm air controls with tilt switches such as:
☐ Flame sensors *(found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)*	☐ Aquastats
	☐ Pressurestats
	☐ Firestats
	☐ Fan limit controls
* This checklist was borrowed from the Delta Institute	☐ Pressure/flow controls on air handling units.

PART TWO (CONTINUED)

BUILDINGS *(continued)*

Switches and relays:

☐ Fire alarm box switches	☐ Mercury displacement relays *(found in lighting, resistance heating and motors)*
☐ Silent light switches	
☐ Relay switches	☐ Sump pump, bilge pump, flow monitor, float switches, and other float controls
☐ Mercury wetted relays	
	☐ Tilt switches

Phosphorus removal chemicals:

- ☐ Ferric or ferrous chloride
- ☐ Pickling liquor

☐Thermostats

BEARINGS AND SEALS

☐ Trickling filter Pivot Arm Bearings *(mercury bearings/water seals)*

LAMPS

☒ Fluorescent	☒ Mercury vapor lamps
☒ High-pressure sodium	☒ Metal halide
☐ Mercury arc	☐ Ultraviolet disinfection

BATTERIES

☒ Mercury-zinc *(button)* batteries	☒ Mercury alkaline batteries
☒ Mercury-cadmium batteries	☒ Mercury oxide batteries

PAINT

☐ Old latex-paint (pre-1990)	☐ Marine paint

FIRST AID/MEDICAL

☐ Mercurochrome	☐ Thermometers
☐ Sphygmomanometers	☐ Thimerosal *(contained in eye wash)*

OTHER

☐ Old pesticides, fungicides and herbicides	☐ Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps
☐ Tree root growth control products	
☒ Computer monitors	

COLLECTION SYSTEM

☐ Lift station equipment	☐ Sewer lines with accumulated mercury
☐ Traps with accumulated mercury	☐ Other mercury containing equipment
☐ Sumps with accumulated mercury	☐ Mercury-containing chemicals used and/or stored on-site

MERCURY STORAGE SITES

☐ Elemental mercury	☐ Mercury-containing items collected for disposal

B. Provide a plan and schedule for providing a complete inventory initiated under Section A. above. *(see 327 IAC 5-3.5-9(a)(1))* The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

A complete inventory should include an estimate of quantities *(i.e., volume of chemicals used annually, or numbers of mercury containing equipment)* for each item identified in Part II.A. Additionally, a complete inventory should include documentation from chemical suppliers and equipment suppliers of the mercury content in your most commonly purchased items. Mercury may not be present in a concentration great enough to appear on an MSDS, yet still contribute to the overall level of mercury in the influent.

See PMPP

* This checklist was borrowed from the Delta Institute

ATTACHMENT II-B. TABLE 1. INVENTORY OF WATER TREATMENT ADDITIVES FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Potential to Reach Surface Water?(C)
CL1355	dispersant/scale inhib.	No 1 Caster (cooling systems)	5 - 15 gpd	<283 ng/L	<1.95 - <5.86 mg/yr	High
CL1370	scale inhibitor	No. 2 Caster, A/B lines (cooling systems)	0 - 15 gpd	<308 ng/L	0 - <6.38 mg/yr	High
CL1370	scale inhibitor	No. 2 Caster, C line (cooling systems)	5 - 15 gpd	<308 ng/L	<2.13 - <6.38 mg/yr	High
CL1370	scale inhibitor	No. 2 QBOP (cooling systems)	5 - 45 gpd	<308 ng/L	<2.13 - <19.15 mg/yr	High
CL1377	corrosion inhibitor	No. 2 QBOP (cooling systems)	2 - 20 gpd	<20 ng/L	<0.06 - <0.55 mg/yr	High
CL1427	corrosion inhibitor	No. 2 Caster, A/B lines (cooling systems)	5 - 18 gpd	<20 ng/L	<0.14 - <0.5 mg/yr	High
CL1427	corrosion inhibitor	No. 2 Caster, C line (cooling systems)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	High
CL206	biocide	No 1 Caster	0 - 0.15 gpd	<50 ng/L	<0 - <0.01 mg/yr	High
CL2840	corrosion inhibitor	No 1 Caster (cooling systems)	0 - 10 gpd	1413 ng/L	0 - 20 mg/yr	High
CL2840	corrosion inhibitor	No. 2 Caster, A/B lines (cooling systems)	0 - 10 gpd	1413 ng/L	0 - 20 mg/yr	High
CL2840	corrosion inhibitor	No. 2 Caster, C line (cooling systems)	0 - 15 gpd	1413 ng/L	0 - 29 mg/yr	High
CL41	microbiological treatment	QBOP hood cooling system	1825 gallons per year	<8 ng/L	<0.06 mg/yr	Low
CL4074	scale inhibitor	No. 1 BOP (tank)	3 - 12 gpd	<20 ng/L	<0.08 - <0.33 mg/yr	High
CL4074	scale inhibitor	No. 1 BOP (tote)	2 - 10 gpd	<20 ng/L	<0.06 - <0.28 mg/yr	High
CL4437	dispersant (deposit control)	No. 2 Caster, A/B lines (cooling systems)	10 - 70 gpd	<20 ng/L	<0.28 - <1.93 mg/yr	High
CL4437	dispersant (deposit control)	No. 2 Caster, C line (cooling systems)	10 - 60 gpd	<20 ng/L	<0.28 - <1.66 mg/yr	High
CL4442	dispersant	No 1 Caster (discharge rack)	5 - 15 gpd	<20 ng/L	<0.14 - <0.41 mg/yr	High
CL4800	dispersant	No. 2 QBOP (cooling systems)	5 - 30 gpd	<263 ng/L	<1.82 - <10.9 mg/yr	High
CL5691	scale and corrosion inhibitor	QBOP hood cooling system	12775 gallons per year	264 ng/L	12.8 mg/yr	Low
FO180	defoamer	Outfalls 028/030	0 - 54 gpd	<25 ng/L	<0 - <1.87 mg/yr	High
Hydrochloric Acid (Muriatic Acid)	pH adjustment	C-Lot Lagoons	Not used in several years (emergency use only)	23 ng/L	Not used in several years; therefore, a total estimate will not be determined	High
P817E	flocculant	Degasser	2 - 8 gpd (upset only)	<50 ng/L	<0.14 - <0.55 mg/yr	Low
P817E	flocculant	GW-10	4 - 5 gpd	<50 ng/L	<0.28 - <0.35 mg/yr	High
P817E	flocculant	No. 1 BOP	3 - 12 gpd	<50 ng/L	<0.21 - <0.83 mg/yr	Low
P817E	flocculant	No. 2 QBOP (thickeners)	2 - 30 gpd	<50 ng/L	<0.14 - <2.07 mg/yr	High
P873L	coagulant/filter aid	No. 2 Caster, C line (filters)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	Low
P873L	coagulant/filter aid	No. 2 Caster, A/B lines (filters)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	Low
P8905L	coagulant	GW-10	5 - 30 gpd	<20 ng/L	<0.14 - <0.83 mg/yr	High

ATTACHMENT II-B. TABLE 1. INVENTORY OF WATER TREATMENT ADDITIVES FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Potential to Reach Surface Water?(C)
P891L	coagulant	Degasser	5 - 15 gpd	<20 ng/L	<0.14 - <0.41 mg/yr	Low
P891L	coagulant	GW-10	40 - 110 gpd	<20 ng/L	<1.11 - <3.04 mg/yr	High
P891L	coagulant	No. 2 Caster, C line (filters)	5 - 15 gpd	<20 ng/L	<0.14 - <0.41 mg/yr	Low
P891L	coagulant	No. 2 Caster, A/B lines (filters)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	Low
P891L	coagulant	No. 2 QBOP (thickener No. 1)	40 - 150 gpd	<20 ng/L	<1.11 - <4.14 mg/yr	High
P891L	coagulant	No. 2 QBOP (thickener No. 1A)	10 - 75 gpd	<20 ng/L	<0.28 - <2.07 mg/yr	High
S101	polymer	QBOP No.1 Thickener	10 - 21 gpd	<20 ng/L	<0.28 - <0.58 mg/yr	Low
Sodium Bisulfite	Dechlorination Prior to Discharge w/in Mussel Control Season	C-Lot Lagoons (~Apr 1 - Nov 30)	45 - 97 gpd (based on 2016 May-Oct usage)	790 - 6600 ng/L	46.6 - 392.2 mg/yr	High
Sodium Bisulfite	Dechlorination Prior to Discharge Outside of Mussel Control Season	C-Lot Lagoons (~Dec 1 - March 31)	57 - 60 gpd	790 - 6600 ng/L	20.95 - 175.03 mg/yr	High
Sodium Hydroxide (Caustic Soda)	alkalinity control	No 1 Caster (discharge rack)	10 - 30 gpd	737 - 940 ng/L	11.58 - 34.75 mg/yr	High
Sodium Hydroxide (Caustic Soda)	alkalinity control	No. 2 Caster, A/B lines (cooling systems)	10 - 50 gpd	737 - 940 ng/L	11.58 - 57.92 mg/yr	High
Sodium Hydroxide (Caustic Soda)	alkalinity control	No. 2 Caster, C line (cooling systems)	10 - 50 gpd	737 - 940 ng/L	11.58 - 57.92 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No 1 Caster (cooling systems)	5 - 15 gpd	18 - 300 ng/L	0.12 - 6.22 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No. 2 Caster, A/B lines (cooling systems)	154 - 308 gpd	18 - 300 ng/L	3.83 - 127.65 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No. 2 Caster, C line (cooling systems)	34 - 62 gpd	18 - 300 ng/L	0.85 - 25.7 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No. 2 QBOP (cooling systems)	15 - 50 gpd	18 - 300 ng/L	0.37 - 20.72 mg/yr	High
13% Sodium Hypochlorite (Bleach)	Biocide for Mussel Control	Intake - No. 1 & 2 Pump Stations (~Apr 1 - Nov 30)	840 - 2108 gpd	18 - 300 ng/L	13.96 - 584.05 mg/yr (D)	High

Notes
(A): Chemical usage rates are estimated ranges based on averages or purchasing records; day to day usage rates may vary. Other chemicals that may be approved for usages associated with Outfall 028/030 but are not currently being used are not included. If usage resumes, they will be added to this inventory and characterized.
(B): The mercury values listed are based on mercury characterization via direct analytical measurement.
(C): Low potential water treatment additives are those utilized at locations or wastewater treatment steps that undergo additional treatment prior to the C-lot lagoons and final discharge via Outfall 028/030.
(D): The listed total estimated mercury content is overly conservative as it assumes all of the No. 1 and No. 2 Pump Station intake water is distributed to Outfall 028/030.
However, No. 1 and 2 Pump Station intake waters supply other outfalls as well.

ATTACHMENT II-B. TABLE 2. INVENTORY OF MAIN PROCESS CHEMICALS FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B and D) Total	Potential to Reach Surface Water?(D)
Stollberg ST-SP 403-C	Caster mold fluxes	Steel North and South	822,465 lb/yr (A2)	0.52 mg/kg	193996 mg/yr	Low
Stollberg ST-SP 325	Caster mold fluxes	Steel North and South	471,210 lb/yr (A2)	0.015 mg/kg	3206 mg/yr	Low
Stollberg ST-SP 405	Caster mold fluxes	Steel North and South	1,019,490 lb/yr (A2)	0.03 mg/kg	13873 mg/yr	Low
VITROBOND	bonding agent	Steel North and South	690,800 lb/yr (A1)	0.013 mg/kg	4074 mg/yr	Very Low
MOP-AHG-8A Mold Powder	Caster mold fluxes	Steel North (2 Caster)	215,600 lb/yr (A2)	0.1 mg/kg (C)	9780 mg/yr	Low
MOP-LBG-60 Mold Powder	Caster mold fluxes	No. 2 Caster - A/B/C Lines	376,200 lb/yr (A2)	0.1 mg/kg (C)	17064 mg/yr	Low
MOP-LBG-5M Mold Powder	Caster mold fluxes	Steel North and South	1,546,600 lb/yr (A2)	0.1 mg/kg	70154 mg/yr	Low

Notes:
(A1): Estimated quantities based on historical (2012) purchased quantities.
(A2): Estimated quantities based on recent (2015-2016) purchasing records.
(B): Unless noted, mercury content for chemicals are based on direct analytical measurements. Any process chemical that is estimated to account for more than 1% by weight of all listed process chemicals (associated with the same final outfalls) or is estimated to be used in quantities larger than 10 tons/year will be characterized. This means that only chemicals with usage amounts below both of these criteria will not be characterized.
(C): Estimated mercury content based on direct characterization of Mold Powder MOP-LBG-5M.
(D) There are SOPs and BMPs in place to minimize the potential discharge of process chemicals and the majority of spent process chemicals are also typically reclaimed/recycled or disposed of off-site further minimizing the potential to impact the final discharge waters. Therefore, the total estimated mercury content values are likely significantly higher than the realistic potential mercury contribution from process chemicals.
(E): A Low ranking is for chemicals primarily used in a rinse bath or could be incidentally washed off into a stream that could be discharged to the surface waters. A Very Low ranking is a process chemical that is added directly at the process area and has minimal potential from being in contact with process waters that could be ultimately discharged via Outfall 028/030.

ATTACHMENT II-B. TABLE 3. INVENTORY OF OTHER MATERIALS AND DISCHARGES FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Use	Estimated # of Items or Amount	Estimated Mercury Content [(A)] per Item	Estimated Mercury Content [(A)] Total	Location; Storage Method	Potential to Reach Surface Water?
IN-SERVICE EQUIPMENT						
All known in-service equipment that contained Hg has been removed.						
BULB/LAMPS						
Sodium Vapor Lamps	Lighting	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	0.02 grams - 0.145 grams	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	Various	Very Low
Mercury Vapor Lamps			0.025 grams - 0.225 grams			
Metal Halide			0.005 - 0.150 grams			
Linear Fluorescent Bulbs			0.003 - 0.05 grams			
OTHER ITEMS						
Lead-acid Batteries [(B)]	Standby emergency power and power for mechanical equipment (e.g., fork lifts)	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.			Various	Very Low
Other Batteries (e.g., mercury-zinc, mercury alkaline, mercury-cadmium, mercury oxide)	Portable power supply	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.		Various	Very Low
LCD type computer monitors	Visual display	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	0 - 0.010 grams average (0.005 grams) used for estimate	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	Various	Very Low
Laptop LCD screens						
LCD type HDTV screen						
OUTFALL DISCHARGES						
Outfalls 028 and 030 and Outfall 603	NPDES Permitted Discharge as described in Section 1.3 of the PMPP.		Results of mercury analysis for Outfalls are discussed in Section 2.3 of the PMPP.		na	Outfalls 028 and 030 are the final discharge to surface water.

Notes:

(A): When available, mercury content for chemicals was estimated from direct analytical measurement with EPA Method 1631E or vendor specifications and/or certificates of analysis. Equipment mercury content was estimated from the mass of the ampoule of elemental mercury utilized in the equipment itself or comparable pieces of equipment. Lamp and bulb mercury content information was generated from publically accessible sources including the National Electrical Manufacturers Association.

(B): Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

Attachment III:
Mercury Data

Table III-1. Intake and Outfall 028/030 Data for the Most Recent 2-Years

Table III-2. Combined Outfall 603 Monitoring Data

ATTACHMENT III. TABLE III-1. INTAKE AND OUTFALL 028/030 DATA FOR THE MOST RECENT 2-YEARS

Sample Date	No. 1 Pump Station Total Mercury (ng/L)				No. 1 Pump Station TSS	No. 2 Pump Station Total Mercury (ng/L)				No. 2 Pump Station TSS	Outfall 028 Total Mercury (ng/L)				Outfall 028 TSS	Outfall 030 Total Mercury (ng/L)				Outfall 030 TSS
	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)
03/14/18	1.0	---	1.0		14.9	0.71	---	0.71		16.4	1.6	---	1.6		7.8	1.7	---	1.7		7.5
04/12/18	0.37	---	0.37	J	2.7	0.35	---	0.35	J	3.4	0.97	---	0.97		19.0	1.0	---	1.0		6.6
05/10/18	0.60	---	0.60		3.7	0.36	---	0.36	J	4.3	0.87	---	0.87		11.8	0.51	---	0.51		5.4
06/21/18	0.54	---	0.54		2.9	< 0.20	---	< 0.20		2.3	0.56	---	0.56		3.2	0.51	---	0.51		4.8
07/19/18	0.63	---	0.63		3.9	0.33	---	0.33	J	2.6	1.6	1.9	1.8		5.3	2.7	---	2.7		4.7
08/23/18	0.32	0.36	0.34	J	4.0	0.30	---	0.30	J	2.9	1.1	---	1.1		9.5	1.9	---	1.9		11.0
09/20/18	0.31	< 0.20	0.26	J	4.8	0.25	---	0.25	J	0.88	0.88	---	0.88		5.6	0.56	---	0.56		4.0
10/11/18	0.57	0.39	0.48	J	2.2	0.52	---	0.52		1.7	1.4	---	1.4		7.4	1.1	---	1.1		8.0
11/15/18	0.26	---	0.26	J	1.4	0.27	0.29	0.28	J	7.3	4.7	---	4.7		21.2	3.7	---	3.7		9.2
12/13/18	0.34	0.53	0.44	J	2.1	1.8	---	1.8		13.6	0.63	---	0.63		22.5	0.66	---	0.66		15.4
02/13/19	*	---	*	B1	3.0	1.5	---	1.5		14.4	2.0	---	2.0		7.8	2.3	---	2.3		7.1
04/17/19	0.65	---	0.65		6.1	1.2	---	1.2		5.6	1.5	---	1.5		21.7	1.4	---	1.4		14.5
06/20/19	0.30	---	0.30	J	2.7	0.35	---	0.35	J	2.4	2.0	---	2.0		11.3	1.3	---	1.3		18.0
08/22/19	0.31	---	0.31	J	1.0	0.37	---	0.37	J	1.7	0.77	---	0.77		2.8	1.3	0.88	1.1		4.1
10/17/19	0.41	---	0.41	J	6.8	0.42	0.37	0.40	J	5.7	0.75	---	0.75		5.1	0.65	---	0.65		4.4
12/17/19	2.80	---	2.80		0.9	0.57	---	0.57		7.6	0.71	---	0.71		5.0	0.69	0.37	0.53	J	4.9
12/19/19	---	---	---		---	---	---	---		---	0.64	---	0.64		---	0.59	---	0.59		---
12/20/19	---	---	---		---	---	---	---		---	0.54	---	0.54		---	0.78	---	0.78		---
12/21/19	---	---	---		---	---	---	---		---	0.63	---	0.63		---	0.60	---	0.60		---
12/22/19	---	---	---		---	---	---	---		---	0.77	---	0.77		---	0.74	---	0.74		---
12/23/19	---	---	---		---	---	---	---		---	0.82	---	0.82		---	0.64	---	0.64		---
12/24/19	---	---	---		---	---	---	---		---	2.4	---	2.4		---	0.90	---	0.90		---
12/25/19	---	---	---		---	---	---	---		---	0.93	---	0.93		4.4	1.8	---	1.8		4.0
12/26/19	---	---	---		---	---	---	---		---	0.50	---	0.50		---	0.35	---	0.35	J	---
12/27/19	---	---	---		---	---	---	---		---	0.55	---	0.55		8.1	0.68	---	0.68		4.9
12/28/19	---	---	---		---	---	---	---		---	0.86	---	0.86		---	0.75	---	0.75		---
12/29/19	---	---	---		---	---	---	---		---	2.0	---	2.0		---	0.88	---	0.88		---
12/30/19	---	---	---		---	---	---	---		---	1.1	---	1.1		4.6	1.1	---	1.1		4.4
12/31/19	---	---	---		---	---	---	---		---	0.76	---	0.76		3.9	0.83	---	0.83		3.5
01/01/20	---	---	---		---	---	---	---		---	1.0	---	1.0		3.6	1.3	---	1.3		4.3
01/02/20	---	---	---		---	---	---	---		---	0.73	---	0.7		5.0	1.6	---	1.6		5.9
01/03/20	---	---	---		---	---	---	---		---	0.86	---	0.9		3.7	0.74	---	0.74		4.3
01/04/20	---	---	---		---	---	---	---		---	1.4	---	1.4		---	1.2	---	1.2		---
01/05/20	---	---	---		---	---	---	---		---	0.23	---	0.23	J	---	0.27	---	0.3	J	---
01/06/20	---	---	---		---	---	---	---		---	0.62	---	0.6		6.0	0.52	---	0.5		3.7
01/07/20	---	---	---		---	---	---	---		---	1.2	---	1.2		4.3	6.1	---	6.1		5.5
01/08/20	---	---	---		---	---	---	---		---	6.0	---	6.0		3.8	1.0	---	1.0		5.5
01/09/20	---	---	---		---	---	---	---		---	0.99	---	0.99		4.1	0.78	---	0.8		3.7
01/10/20	---	---	---		---	---	---	---		---	1.3	---	1.3		6.9	2.0	---	2.0		5.5
01/11/20	---	---	---		---	---	---	---		---	1.2	---	1.2		---	0.89	---	0.9		---
01/12/20	---	---	---		---	---	---	---		---	1.2	---	1.2		---	1.0	---	1.0		---
01/13/20	---	---	---		---	---	---	---		---	1.2	---	1.2		8.4	0.87	---	0.9		6.9
01/14/20	---	---	---		---	---	---	---		---	2.1	---	2.1		8.8	2.0	---	2.0		7.2
01/15/20	---	---	---		---	---	---	---		---	1.7	---	1.7		---	1.4	---	1.4		7.3
01/16/20	---	---	---		---	---	---	---		---	1.2	---	1.2		7.4	1.1	---	1.1		6.2
01/17/20	---	---	---		---	---	---	---		---	1.7	---	1.7		8.0	1.9	---	1.9		6.6
01/18/20	---	---	---		---	---	---	---		---	1.3	---	1.3		14	1.2	---	1.2		6.0

ATTACHMENT III. TABLE III-1. INTAKE AND OUTFALL 028/030 DATA FOR THE MOST RECENT 2-YEARS

Sample Date	No. 1 Pump Station Total Mercury (ng/L)				No. 1 Pump Station TSS	No. 2 Pump Station Total Mercury (ng/L)				No. 2 Pump Station TSS	Outfall 028 Total Mercury (ng/L)				Outfall 028 TSS	Outfall 030 Total Mercury (ng/L)				Outfall 030 TSS
	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)
01/19/20	---	---	---		---	---	---	---		---	1.6	---	1.6		---	*	---	*	M	---
01/20/20	---	---	---		---	---	---	---		---	1.2	---	1.2		11	1.8	---	1.8		9.0
01/21/20	---	---	---		---	---	---	---		---	1.9	---	1.9		8.4	3.0	---	3.0		9.3
01/22/20	---	---	---		---	---	---	---		---	1.5	---	1.5		7.0	6.8	---	6.8		7.4
01/23/20	---	---	---		---	---	---	---		---	1.3	---	1.3		7.3	2.0	---	2.0		5.9
01/24/20	---	---	---		---	---	---	---		---	1.1	---	1.1		10	1.0	---	1.0		9.1
01/25/20	---	---	---		---	---	---	---		---	0.90	---	0.90		---	0.99	---	1.0		---
01/26/20	---	---	---		---	---	---	---		---	1.1	---	1.1		---	0.63	---	0.63		---
01/27/20	---	---	---		---	---	---	---		---	1.0	---	1.0		7.3	1.0	---	1.0		6.2
01/28/20	---	---	---		---	---	---	---		---	1.1	---	1.1		6.3	0.73	---	0.73		9.0
01/29/20	---	---	---		---	---	---	---		---	0.82	---	0.8		5.0	0.68	---	0.68		8.7
01/30/20	---	---	---		---	---	---	---		---	0.92	---	0.9		7.6	1.2	---	1.2		7.9
01/31/20	---	---	---		---	---	---	---		---	1.0	---	1.0		9.9	1.0	---	1.0		7.2
02/01/20	---	---	---		---	---	---	---		---	0.70	---	0.70		---	0.61	---	0.61		---
02/02/20	---	---	---		---	---	---	---		---	1.4	---	1.4		---	0.90	---	0.90		---
02/03/20	---	---	---		---	---	---	---		---	1.2	---	1.2		4.4	0.48	---	0.48		5.5
02/04/20	---	---	---		---	---	---	---		---	0.71	---	0.71		6.6	1.3	---	1.3		8.1
02/05/20	---	---	---		---	---	---	---		---	0.75	---	0.75		6.7	0.99	---	0.99		9.6
02/06/20	---	---	---		---	---	---	---		---	1.2	---	1.2		9.7	1.7	---	1.7		9.6
02/07/20	---	---	---		---	---	---	---		---	1.7	---	1.7		6.5	1.8	---	1.8		7.7
02/08/20	---	---	---		---	---	---	---		---	0.97	---	0.97		6.9	1.2	---	1.2		7.3
02/09/20	---	---	---		---	---	---	---		---	1.9	---	1.9		6.7	4.3	---	4.3		3.9
02/10/20	---	---	---		---	---	---	---		---	1.2	---	1.2		5.4	1.5	---	1.5		9.0
02/11/20	---	---	---		---	---	---	---		---	1.0	---	1.0		6.1	1.2	---	1.2		7.4
02/12/20	0.61	---	0.61		---	0.47	0.42	0.45	J	---	0.86	---	0.9		6.6	1.2	---	1.2		9.2
02/13/20	---	---	---		---	---	---	---		---	1.7	---	1.7		8.8	1.3	---	1.3		9.0
02/14/20	---	---	---		---	---	---	---		---	0.83	---	0.83		11.0	1.2	---	1.2		17.0
02/15/20	---	---	---		---	---	---	---		---	0.87	---	0.87		---	1.1	---	1.1		---
02/16/20	---	---	---		---	---	---	---		---	0.98	---	0.98		---	2.9	---	2.9		---
02/17/20	---	---	---		---	---	---	---		---	1.3	---	1.3		10.0	1.8	---	1.8		13.0
02/18/20	---	---	---		---	---	---	---		---	1.1	---	1.1		7.6	1.4	---	1.4		14.0
02/19/20	---	---	---		---	---	---	---		---	0.86	---	0.86		8.2	1.5	---	1.5		8.9
02/24/20	---	---	---		---	---	---	---		---	---	---	---		6.3	---	---	---		16.0

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by ALS Laboratory Group. All Mercury and TSS data from single grab samples unless noted otherwise.
3. All duplicate data presented are from field duplicate results.
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated data flag(s).
6. Mercury data flags:

   "B1" indicates that associated field blank had a mercury detection outside of the criteria for blanks (whichever is greater: <0.5 ng/L or up to 1/5 the amount in associated samples). Sample considered invalid.

   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (0.20

   "M" indicates that the matrix spike and/or matrix spike duplicate recovery or relative percent difference was outside of the acceptable limits. Sample considered invalid.

ATTACHMENT III. TABLE III-2. COMBINED OUTFALL 603 RESULTS

Sample Date	Combined Outfall 603 Result (note 7) Total Mercury (ng/L)	Mercury Flag	TSS (mg/L)
07/09/09	0.42	J, ND	3.2
07/23/09	0.65	J, ND	7.3
08/11/09	0.92	ND	4.5
08/19/09	0.46	J, ND	7.5
09/02/09	0.30	ND	7.5
09/22/09	0.35	J, ND	7.3
10/07/09	0.87		11
10/21/09	0.87	J	6.3
11/04/09	2.4	J	5.2
11/19/09	0.93	J	8.4
12/02/09	3.0	J	12
12/16/09	0.58	J	15
01/12/10	0.47	J, ND	10
01/27/10	0.44	J	4.2
02/03/10	0.47	J	4.0
02/17/10	0.48	J	3.5
04/07/10	0.70	J	21
04/21/10	0.64	J	14
05/12/10	0.36	J	7.0
05/19/10	0.55	J	9.5
06/09/10	1.7	J	6.9
06/16/10	0.32	J	6.8
07/07/10	0.24	J, ND	6.0
07/22/10	0.38	J, ND	6.9
08/04/10	0.27	J, ND	8.1
08/18/10	0.43	J	3.3
09/08/10	0.26	J, ND	9.3
09/22/10	0.28	J, ND	6.2
10/06/10	0.51	J	42
10/20/10	0.23	J, ND	10
11/03/10	0.33	J	8.0
11/17/10	0.34	J, ND	7.3
12/08/10	0.77		8.7
12/14/10	3.5		36
05/07/15	0.49	J	9
08/18/15	0.53	J, ND	16
10/13/15	*	B1	9
11/05/15	*	B1	7
12/10/15 ^^	0.60 ^^	^^	9.5 ^^
09/13/17	0.77	J	11
09/27/17	0.59	J	19
10/04/17	0.92	J	16

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by TestAmerica prior to March 2015. Starting in March 2015, all analyses have been performed by ALS Laboratory Group.
3. When field duplicates were collected, duplicate and sample results were averaged.
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated data flag(s).
6. Mercury Flags:
   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit and method detection limit.
   "B1" indicates that associated field blank had a mercury detection outside of the criteria for blanks (whichever is greater: <0.5 ng/L or up to 1/5 the amount in associated samples). Sample considered invalid.
   "^^" indicates that the mercury and TSS data from the 12/10/15 samples are suspect due to an oil and grease issue that caused a downstream sheen at the C-Lot Lagoons and subsequently Outfalls 028/030. This issue originated at the No. 1 Caster Scale Pits when oil overcame the capabilities of the treatment system.
   "ND" indicates that at least one result used to determine the average is a non-detect mercury value at the method detection limit.
7. Combined Outfall 603 combined values are the result of a mass balance calculation. The combined Outfall 603 values were only calculated when data for all 5 contributing streams were valid.

Attachment IV:
Plan and Schedule of Activities

ATTACHMENT IV. PLAN AND SCHEDULE OF ACTIVITIES FOR OUTFALLS 028/030 MERCURY PMPP

Row ID	**Planned Activity**	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
1	Complete Inventory	Type 1: Source Characterization	Finalize the inventory of listed equipment/materials, and usage rates.	Submittal of completed inventory to IDEM.	Within 9 months of SMV approval. Updated inventory will be provided as part of the Annual Progress Report.	Complete
2	Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Review mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Implementation of Policies and Procedures that address the mercury content of materials.	Implemented/Ongoing.	Implemented/Ongoing
3	Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Implemented/Ongoing.	Implemented/Ongoing
4	Good Housekeeping Practices: *Mercury Containing Chemicals and Materials*	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Implemented/Ongoing.	Implemented/Ongoing
5	Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Implemented/Ongoing.	Implemented/Ongoing
6	Standard Operating Practices: Spill Prevention and Response: *Chemicals and Materials*	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills. Reduce possibility of accidental spills and releases.	Training of employees on proper and safe spill prevention and response for dealing with chemical spills.	Implemented/Ongoing.	Implemented/Ongoing
7	Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing
8	Disposal Practices of Mercury-Containing Items: *Bulbs/Lamps*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing
9	Disposal Practices of Mercury-Containing Items: *Batteries*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing

ATTACHMENT IV. PLAN AND SCHEDULE OF ACTIVITIES FOR OUTFALLS 028/030 MERCURY PMPP

Row ID	Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action	Current Status
10	*Outfall 028/030* Source Characterization: Water Treatment Chemicals - High Potential	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	ORIGINAL: Within 9 months of SMV approval. REVISED: For new water treatment additives, w/in 1 year of beginning use.	Implemented/Ongoing
11	*Outfall 028/030* Source Characterization: Water Treatment Chemicals - Low Potential	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	ORIGINAL: Within 12 months of SMV approval. REVISED: For new water treatment additives, w/in 1 year of beginning use.	Implemented/Ongoing
12	*Outfall 028/030* Source Characterization: Sodium Hypochlorite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium hypochlorite used for mussel control at the intake.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete
13	*Outfall 028/030* Source Characterization: Sodium Bisulfite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium bisulfite used for dechlorination of the final Outfall 028/030 discharge.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete
14	*Outfall 028/030* Source Characterization: Process Chemicals - Low Potential	Type 1: Source Characterization	ORIGINAL ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information. REVISED ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information for the low potential process chemicals that meet the usage threshold criteria (A).	Documentation that mercury has been quantified.	ORIGINAL: Within 9 months of SMV approval. REVISED: For new process chemicals, w/in1 year of beginning use.	Implemented/Ongoing
15	*Outfalls 028/030* Source Characterization: Process Chemicals - Very Low Potential	Type 1: Source Characterization	ORIGINAL ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information. REVISED ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information for the very low potential process chemicals that meet the usage threshold criteria (A).	Documentation that mercury has been quantified.	ORIGINAL: Within 12 months of SMV approval. REVISED: For process chemicals, w/in 1 year of beginning use.	Implemented/Ongoing
16	Condensate Characterization (B)	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Already implemented.	Complete
17	*Outfall 603* Source Characterization	Type 1: Source Characterization	Perform additional mercury monitoring of internal Outfall 603 sources for comparison to previously collected mercury data for these locations.	Documentation of evaluation.	ORIGINAL: Within 12 months of SMV approval. REVISED: Repeat in 2017.	Complete
18	*GW-10* Source Characterization	Type 1: Source Characterization	Perform additional source survey sampling for GW-10 and the select areas identified by the 2012 source survey program.	Documentation of evaluation.	ORIGINAL: Within 12 months of SMV approval. REVISED: Repeat in 2017.	Complete

ATTACHMENT IV. PLAN AND SCHEDULE OF ACTIVITIES FOR OUTFALLS 028/030 MERCURY PMPP

Row ID	**Planned Activity**	***Activity Type***	***Goal***	***Measure of Performance***	***Schedule of Action***	***Current Status***
19	*ArcelorMittal Plate Mill* Source Characterization	Type 1: Source Characterization	Mercury characterization of associated water treatment and/or process chemicals.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined if process wastewater producing operations are resumed.	On hold
20	Alternatives for Reduction Evaluation: *Mercury-Containing Chemicals and Materials*	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined based on the outcome of the various source characterization activities.	Ongoing as needed
21	*Source Characterization:* Sodium Hydroxide	Type 1: Source Characterization	Perform additional mercury characterization of Sodium Hydroxide in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2017 progress report.	Complete
22	*Source Characterization:* CL2840	Type 1: Source Characterization	Perform additional mercury characterization of CL2840 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	ORIGINAL: By the due date of the 2017 progress report. REVISED: Repeat again by the due date of the 2018 progress report.	Original Complete; Revised Complete
23	Alternatives for Reduction Evaluation: *Caster Mold Fluxes*	Type 2: Alternatives for Reduction Evaluation	Investigate the current usage (including BMPs) practices of Caster Mold Fluxes in order to better assess the potential for impacts to the 028/030 discharge.	Documentation of evaluation.	By the due date of the 2017 progress report.	Complete
24	GW-10 Source Characterization	Type 1: Source Characterization	Revisit (in order to confirm/revise) the approach and assumption used in evaluation of the GW-10 Source Characterization sampling data (Row ID 18).	Documentation of evaluation.	By the due date of the 2018 progress report.	Complete
25	GW-11 Characterization	Type 1: Source Characterization	Perform mercury characterization of GW-11.	Documentation of evaluation.	By the due date of the 2019 progress report.	Complete
26	*Source Characterization:* CL1370	Type 1: Source Characterization	Perform additional mercury characterization of CL1370 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2020 progress report.	In Progress

Notes:
(A): Any process chemical that is estimated to account for more than 1% by weight of all listed process chemicals (associated with the same final outfalls) or is estimated to be used in quantities larger than 10 tons/year will be characterized. This means that only chemicals with usage amounts below both of these criteria will not be characterized.
(B): Condensates are not anticipated to be a significant source of mercury as discussed in Section 3.2.2.8 of the PMPP.

Attachment V:
Proof of Public Notice

USS Public Notice PMPP (4)

Details for USS Public Notice PMPP (4)

15 hrs ago

NOTICE OF AVAILABILITY POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) U. S. Steel Gary Works One North Broadway Gary, Indiana 46402-3199 A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage area for Outfall 028/030. The Outfall 028/030 drainage area encompasses the steel making areas, BOP Shops, Ladle Metallurgical facilities, vacuum degasser, and continuous slab casting lines. The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Stations Nos. 1 and 2. Pursuant to 327 Indiana Administrative Code 5-3.5, U. S. Steel is seeking to obtain renewed variance limits from the Indiana Department of Environmental Management for the aforementioned outfalls. As part of the approval process U. S. Steel is issuing this Notice on the PMPP and will receive public comments for 30 days. Interested parties should contact U. S. Steel for additional information or a copy of the PMPP: Meghan Cox 600 Grant Street, Suite 1881 Pittsburgh, PA 15219 (412) 433-6777 3/2 -37968 -hspaxlp

*** Proof of Publication ***

State of Indiana)
) ss:
Lake County)

Personally appeared before me, a notary public in and for said county and state, the undersigned Nicole Muscari who, being duly sworn, says that She/he is Legal Clerk of the Northwest Indiana Times newspaper of general circulation printed and published in the English language in the Town of Munster in state and county afore-said, and that the printed matter attached hereto is a true copy, which was duly published in said paper for 1 time(s), the date(s) of publication being as follows:
March 2, 2020

United States Steel - Environmental Affairs / Lega
Brian Lasko
1350 PENN AVENUE – SUITE 200
PITTSBURGH IN 15222-4211

ORDER NUMBER 37968

The undersigned further states that the Northwest Indiana Times newspaper maintains an Internet website, which is located at www.nwi.com website and that a copy of the above referenced printed matter was posted on such website on the date(s) of publication set forth above.

Nicole Muscari, Legal Clerk
By: Sallie Ferrara

Subscribed and sworn to before me this 2 day of March 2020.

Dawn Renee Heili
Notary Public

My commission expires:

DAWN RENEE HEILI
Notary Public, State of Indiana
Lake County
Commission #696125
My Commission Expires 01/31/25

Section: Legals
Category: 198 Legal - Lake County
PUBLISHED ON: 03/02/2020

TOTAL AD COST: 174.00
FILED ON: 3/2/2020

NOTICE OF AVAILABILITY
POLLUTANT MINIMIZATION
PROGRAM PLAN (PMPP)
U. S. Steel Gary Works
One North Broadway
Gary, Indiana 46402-3199

A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage area for Outfall 028 /030.

The Outfall 028/030 drainage area encompasses the steel making areas, BOP Shops, Ladle Metallurgical facilities, vacuum degasser, and continuous slab casting lines. The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Stations Nos. 1 and 2.

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Interested parties should contact U. S. Steel for additional information or a copy of the PMPP:
Meghan Cox
600 Grant Street, Suite 1881
Pittsburgh, PA 15219
(412) 433-6777
3/2 -37968 -hspaxlp

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Prescribed by State Board of Accounts

General Form No. 99P (Rev. 2009A)

United States Steel
Environmental Affairs
(Governmental Unit)

To: The Times Media Company

Lake County, Indiana

601-45th Avenue, Munster, IN 46321

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Total number of lines in notice ....

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...42... lines, ...1... columns wide equals ...42... equivalent lines at 4.00 (-1 line) cents per line ---------- $ 164.00

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TOTAL AMOUNT OF CLAIM ---------- $ 174.00

37968

DATA FOR COMPUTING COST

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Pursuant to the provisions and penalties of IC 5-11-10-1, I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid.

I also certify that the printed matter attached hereto is a true copy, of the same column width and type size, which was duly published in said paper ...1... times. The dates of publication being as follows:

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Date ....3/2/2020...., ...

Nicole L. Muscari ..Nicole L. M..

Title: Legal Clerk

By: ..Sallie Greene..

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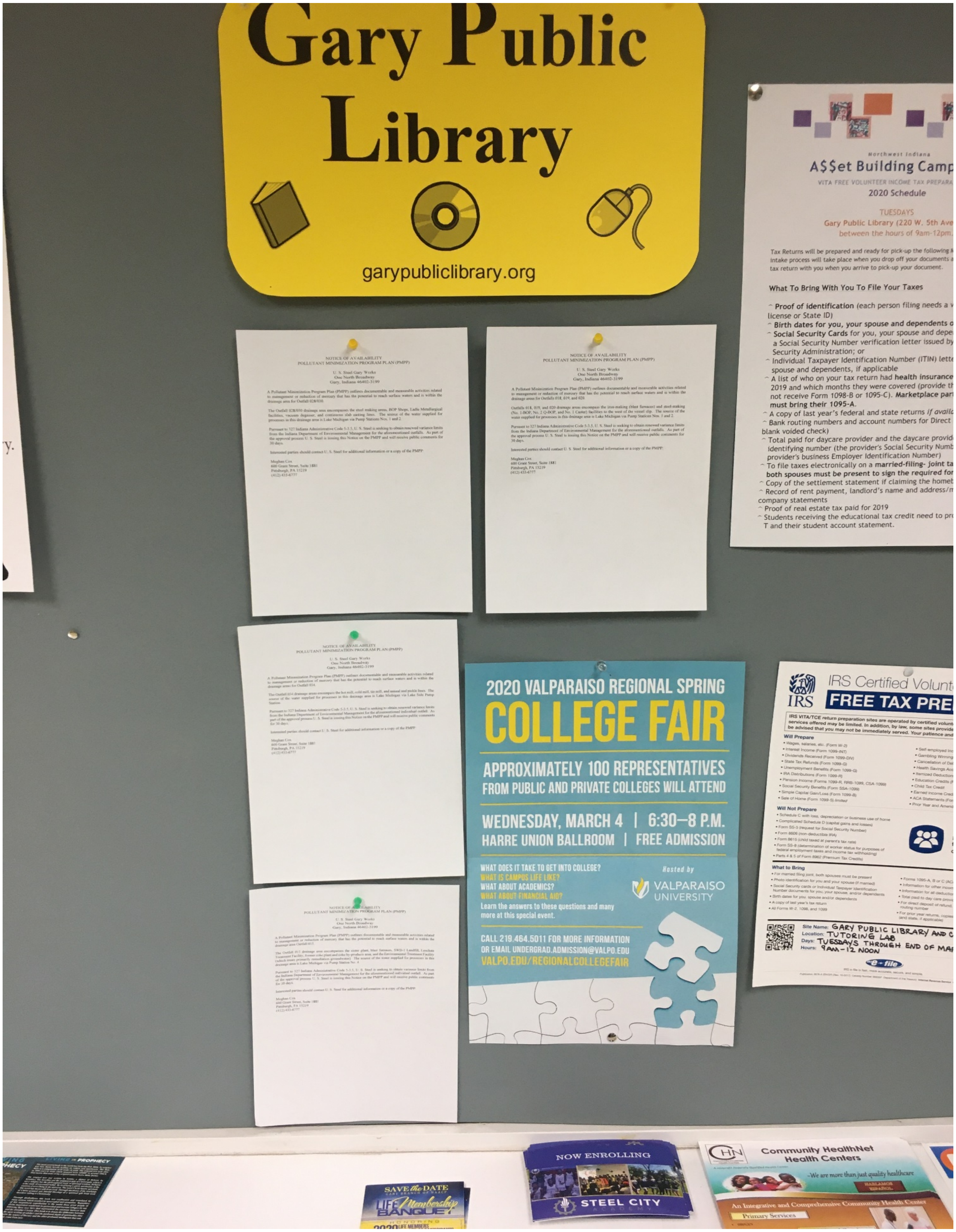

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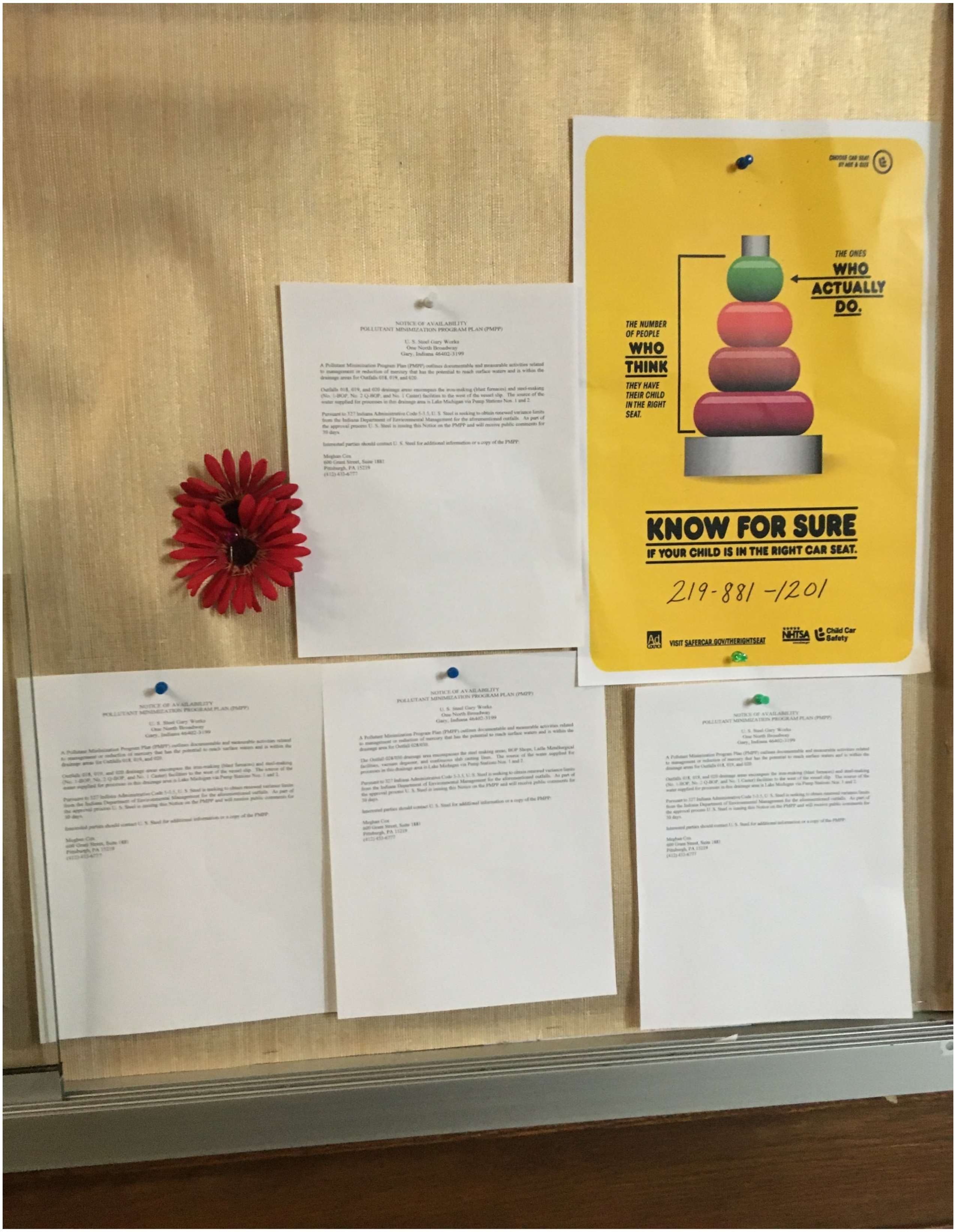

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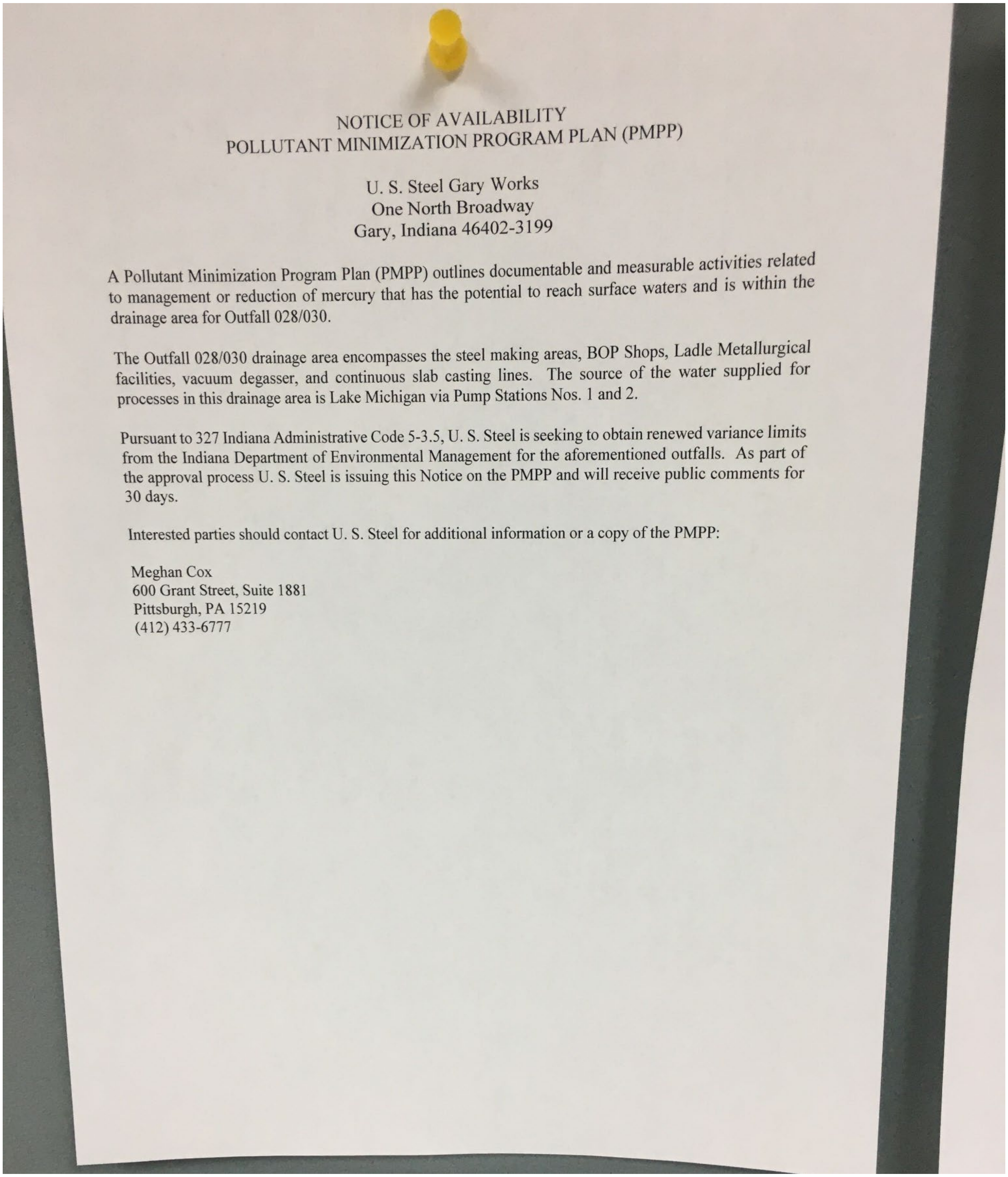

NOTICE OF AVAILABILITY
POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP)

U. S. Steel Gary Works
One North Broadway
Gary, Indiana 46402-3199

A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage area for Outfall 028/030.

The Outfall 028/030 drainage area encompasses the steel making areas, BOP Shops, Ladle Metallurgical facilities, vacuum degasser, and continuous slab casting lines. The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Stations Nos. 1 and 2.

Pursuant to 327 Indiana Administrative Code 5-3.5, U. S. Steel is seeking to obtain renewed variance limits from the Indiana Department of Environmental Management for the aforementioned outfalls. As part of the approval process U. S. Steel is issuing this Notice on the PMPP and will receive public comments for 30 days.

Interested parties should contact U. S. Steel for additional information or a copy of the PMPP:

Meghan Cox
600 Grant Street, Suite 1881
Pittsburgh, PA 15219
(412) 433-6777

Outfalls 028/030
2019 Annual Progress Report
for the Mercury PMPP

2019 Annual Progress Report for the Mercury Pollutant Minimization Program Plan for Outfalls 028/030

NPDES Permit IN0000281

Prepared for:

United States Steel Corporation Gary Works
Gary, Indiana

Submitted to:

The Indiana Department of Environmental Management
IGC North – 13th Floor
100 N. Senate Avenue
Indianapolis, Indiana

Date:

October 2019

Contents

List of Tables

1.0 Introduction

1.1 Background

U. S. Steel – Gary Works (U. S. Steel) operates an integrated steel manufacturing plant in Gary, Indiana (Lake County). U. S. Steel is currently authorized to discharge from Outfalls 028 and 030 to the Grand Calumet River pursuant to NPDES Permit IN0000281 (NPDES Permit).

Outfalls 028/030 are located within the drainage area primarily encompassing the steel-making facilities which consist of two Basic Oxygen Furnace Shops (Q-BOP and 1-BOP) each with three steel making vessels, three Ladle Metallurgical Facilities (LMF) and CASOB Reheat Ladle, one RH Vacuum Degasser, four Continuous Casters (No. 1 Caster and No. 2 Caster A, B, and C Lines), and the ArcelorMittal Plate Mill. The majority of wastewaters to Outfall 028/030 (including Outfall 603) are routed to GW-10 pump station. GW-10 also receives storm water from the northwest side of the No. 2 Caster and Broadway Avenue (the area north of the tunnel). Minimal flows (Main Garage (east) and Locomotive services) are routed through GW-11 pump station. GW-12 pump station can also send storm water flows to Outfall 028/030. The flows from these pump stations are combined in the Terminal Lagoon Distribution Chamber before being routed to the Terminal Lagoons for final discharge via Outfalls 028 and 030.

The source of the water supplied for processes in this drainage area is Lake Michigan via the No. 1 and 2 Pump Stations (PS). The intake waters are treated as needed for mussel and biofouling control with sodium hypochlorite and prior to discharge, sodium bisulfite is added for dechlorination.[1]

Outfalls 028 and 030 mercury limits are currently subject to Streamlined Mercury Variances. The following interim discharge limits for mercury have been incorporated into the current NPDES Permit (effective November 1, 2015).[2]

- Outfall 028: 3.2 ng/L total mercury (as a 12-month rolling average)
- Outfall 030: 3.0 ng/L total mercury (as a 12-month rolling average)

As part of SMV requirements U. S. Steel developed and implemented a Pollution Minimization Program Plan (PMPP) for Mercury. In Section 6.0 of the PMPP and pursuant to 327 IAC 5-3.5-9(a)(8), U. S. Steel must submit annual reports that describe the following:

- The results of the mercury monitoring over the intervening period;
- U. S. Steel's progress toward fulfilling each of the PMPP requirements; and
- The steps taken to implement each planned activity (PMPP Attachment V) to reduce or eliminate mercury from waters discharged to the Grand Calumet River.

This report addresses each of the above items and is submitted to fulfill the requirements of Section 6.0 of the PMPP, 327 IAC 5-3.5-9(a)(8), and the annual report requirement from Part V.3 of the NPDES Permit.

---

[1] The NPDES Permit allows year round chlorination, however usage typically occurs seasonally.

[2] Per the NPDES Permit (Part I.P.3.) submission of both a daily maximum value and annual average value is required for each reporting period. The annual average value is to be calculated as the average of daily maximum values measured over the most recent (rolling) 12-month period. Compliance will be assessed with respect to the annual average value; however, reporting of the annual average value for mercury is not required during the first year of the permit term for Outfalls 028 and 030. For clarity, this report will refer to the annual average value as the 12-month rolling average.

2.0 Mercury Monitoring Data

2.1 Outfalls 028/030 Data

Pursuant to Parts I.A.11, bimonthly monitoring of Outfall 600 (combined discharge of Outfalls 028 and 030) for mercury is required. Individual mercury data and associated TSS data from October 2018 through September 2019 are shown in Table 1-A. Table 1-B presents the 12-month rolling averages[3] for the same timeframe.

2.2 Intake Data

Lake Michigan is the intake source water for the U. S. Steel facility. No. 1 and No. 2 Pump Stations (No. 1 and PS provide service water to steel producing for non-contact cooling and processing which are ultimately discharged to the Grand Calumet River via Outfall 028/030. Intake mercury monitoring is not required by the NPDES Permit or the PMPP. However, U. S. Steel has maintained a schedule of monitoring the intake associated with supply waters for Outfalls 028/30. Intake mercury and TSS data from October 2018 through September 2019 are also summarized in Table 1-A.

[3] It should be noted that the rolling averages presented only represent a small portion of the entire dataset available and therefore care must be used in reviewing the data. Recall that each of these outfalls consists of essentially Lake Michigan intake water used as non-contact cooling water. The intake mercury levels are variable (and not controllable), however the small dataset presented does not necessarily show that variability.

3.0 Progress and Implementation of the PMPP Activities

The list of activities identified in the PMPP (Attachment IV of the PMPP) is presented in Table 2. The table has been modified from the version in the Mercury PMPP to include the "Current Status" column. Additionally, due to changing circumstances, certain activities have been modified and as needed new activities created.

3.1 Complete Inventory (Row ID 1)

A current complete inventory of mercury and mercury-containing materials is listed in Table 3 (Table 3-A, 3-B, and 3-C). In summary, U. S. Steel has updated the estimated mercury content for various chemicals as well as some chemical usage rates.

Since the 2018 Annual Progress Report, revisions to the inventory are as follows:

- Addition of 2 water treatment additive listings (CL41 and CL5691) that are associated with QBOP hood cooling system

As the specific activities of the mercury PMPP are implemented, the inventory of mercury-containing materials may be revised if applicable. U. S. Steel therefore anticipates including an updated inventory with subsequent annual progress reports.

3.2 Review of Purchasing Policies and Procedures (Row ID 2)

Mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it is should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Furthermore, if a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

For non-chemicals, U. S. Steel policy is that mercury added equipment/devices are not to be supplied or used with the exclusion of equipment/devices where there is no feasible alternative (e.g bulbs, batteries). Additionally, U. S. Steel fluorescent bulb purchases are of the low-mercury (also called "green bulbs") type.

3.3 Awareness Training for Facility Staff (Row ID 3)

As indicated in the submitted PMPP, U. S. Steel training of facility staff includes the topics of mercury awareness and disposal restrictions related to mercury. This practice continues, however in support of the activity in Row ID 3, U. S. Steel has worked to increase mercury awareness by highlighting mercury in a format outside of the normal training environment via distribution of a Mercury Awareness Bulletin.

3.4 Good Housekeeping Practices (Row ID 4)

U. S. Steel continues to implement its good housekeeping program. Good housekeeping is the practice of maintaining a clean and orderly work environment. Providing a clean and orderly work area reduces the possibility of accidental spills and releases from equipment and materials.

3.5 Maintenance and Cleaning Activities (Row ID 5)

U. S. Steel has implemented procedures to be followed during maintenance and cleaning activities to minimize the release of mercury to the environment from equipment as well as chemicals used for maintenance and cleaning activities (e.g., solvents and oils). U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered. U. S. Steel, along with other steel mills in Northwest Indiana, has previously[4] conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site.

3.6 Standard Operating Practices: Spill Response and Prevention (Row ID 6)

U. S. Steel has SOPs that addresses safe and proper techniques for addressing spills and leaks of various chemicals (including solvents used for maintenance and cleaning activities and oils such as lube oil used for equipment maintenance activities). Specific to mercury-containing materials, are SOPs that address broken mercury thermometers, disposal of bulbs and lamps, and decommissioning/removal of mercury-containing equipment. Each of these SOPs address spill response efforts. Although all known mercury-containing equipment and thermometers have been removed from the site, these SOPs are conservatively written as though these types of mercury-containing equipment are still present. If a mercury spill occurs, a qualified contractor will be utilized for containment and clean up. For minor releases such as thermometers in on-site laboratories, a qualified contractor or mercury spill kit can be utilized.

With respect to spill prevention, U. S. Steel has SOPs that require inspections of the condition of above-ground storage tanks and associated secondary containment structures to reduce the possibility of a potential release to surface waters. For example, both the Storm Water Pollution Prevention Plan and Spill Prevention Control and Countermeasure Plan address spill prevention and include inspection requirements.

3.7 Disposal Practices (Row ID 7, 8, and 9)

U. S. Steel continues, through its E-Waste and Universal Waste Collection programs, to properly recycle/re-use/dispose of several types of items (which may or may not contain mercury). Data from this program is now utilized to track and estimate disposal of mercury PMPP related materials. Items that are specifically addressed by the PMPP include the following:

- Bulbs/Lamps – spent mercury-containing bulbs and lamps (e.g. fluorescent or sodium vapor lamps);
- Batteries – known mercury-containing batteries are lead-acid batteries[5] primarily used for standby emergency power and alkaline button cell batteries. The program involves collection of all batteries independent of mercury content;
- LCD-screens – for example computer monitors and laptop screens; and,
- Mercury-Containing Equipment – could include mercury-containing equipment, vials or ampoules of mercury removed from equipment.

[4] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001); and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).
[5] Mercury is not added in the manufacture of this type of battery; trace mercury that may be present is associated with the electrolytic acid solution.

Note that U. S. Steel does not believe that any mercury-containing equipment remains within the Outfall 028/030 drainage area. As part of the multi-steel mill mercury inventory study that U. S. Steel participated in, U. S. Steel conducted facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these materials from the property. However, as discussed in Section 3.2, if mercury (as a material on the U. S. Steel non-approved list) is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Estimated quantities of materials disposed (or recycled) are provided in Table 4. Where possible, mercury contents have been estimated; however some materials (e.g. alkaline button cell batteries) are not tracked separately by type. Proper disposal of mercury-containing materials varies by material type; however disposal or recycling of items/chemicals containing mercury complies with applicable disposal/recycling regulations. U. S. Steel plans to provide updated quantities in each annual PPMP progress report.

3.8 Chemicals Characterization (Row ID 10, 11, 12, 13, 14, 15, 21, 22, and 26)

In the 2013 PMPP mercury content information was only available for a limited number of chemicals. Therefore, several activities focused on characterizing materials for mercury content through direct analysis or other available means (e.g., vendor information, values published in literature, etc.). In recognition of possible future changes the PMPP activities in Row ID 10, 11, 14 and 15 have been slightly revised. The revised activities include a provision to analyze any new additives and chemicals within 1 year of commencing usage.

3.8.1 Water Treatment Additives (Row ID 10, 11, 12, 13, 21, 22, and 26)

All in-use water treatment additives (including the two new listings) have been characterized for mercury content and updated information is provided in Table 3-A. There may be other water treatment additives that have previously been approved for use, but are currently not in-use. These are not included in Table 3-A; however, if usage resumes, they will be added to the inventory and characterized.

When the maximum potential contribution from all in use water treatment additives associated with Outfall 028/030 is combined, the possible contribution relative to total mercury loading is minimal. However, in keeping with the goal of the PMP (to eliminate/reduce potential sources of controllable mercury to the discharge waters), water treatment additives known to contain trace amounts of mercury will be evaluated on a case by case basis. Evaluations may include additional mercury characterization, investigations into possible alternatives, or feasible opportunities for reducing the potential contribution to the Outfall 028/030 discharge. Specific chemicals already examined or planned for evaluation are listed below:

A. *Row IDs 12 and 13.* The mussel and biofouling control and dechlorination chemicals (sodium hypochlorite and sodium bisulfite) are the most significant potential water treatment additive sources of mercury. Expanded mercury characterization of these chemicals has already been performed and details are described in Section 3.8.2. Usage rates of these chemicals have previously been examined as part of U. S. Steel's Total Residual Chlorine (TRC) Pollution Minimization Program (PMP) Control Strategy (discussed in Section 3.13).

B. *Row IDs 21 and 22.* Based on mercury content and overall range of usage rates, sodium hydroxide (used for alkalinity control) and CL2840 (a corrosion inhibitor) also have high potential mercury contributions to the Outfall 028/030 discharge. In 2017, U. S. Steel performed additional characterization of these materials in order to confirm and refine the listed potential contributions to better assess the magnitude of the potential mercury contribution. For CL2840, investigations continued in 2018. Brief summaries of results are listed below.

i. *Row ID 21.* The additional 2017 characterization of sodium hydroxide yielded similar results to the previous characterization. The levels of mercury observed in the tested sodium hydroxide are comparable to expected levels for either membrane grade or diaphragm grade sodium hydroxide. According to the Draft Wisconsin Mercury Sourcebook[6], membrane and diaphragm grade sodium hydroxide levels are expected to have the lowest mercury concentrations when compared to other grades/production methods (mercury cell and rayon grade). Given this, it is unlikely that further reduced mercury concentration versions of sodium hydroxide for water treatment are available and no additional activities related to sodium hydroxide are planned. The "estimated mercury content total" values in Table 3-A are based on the average of results (along with high and low usage rate estimates).

ii. *Row ID 22.* The 2017 additional characterization of CL2840 yielded vastly different results (13.4 ng/L of mercury) than the previous 2014 characterization (2,890 ng/L of mercury). It is unknown if the difference is due to variability in the product or perhaps sample contamination (of the first characterization sample). Therefore U. S. Steel committed to additional analyses in 2018. Two different (2) lots of CL2840 were tested in 2018 with very similar results: 1390 and 1360 ng/L. These results are also similar to the average of all 4 results: 1413 ng/L. Therefore, the "estimated mercury content total" in Table 3-A is based on the average of all available mercury results. This more realistic approach (vs. a conservative approach of using the maximum value) results in a reduction (by about half) of the estimated potential mercury loading associated with CL2840. At this time, no further activities related to CL2840 are planned.

C. *Row ID 26.* Based on mercury content and overall range of usage rates, CL1370 (a scale inhibitor chemical) also has a high potential to contribute mercury. However, this based on one analysis result (<308 ng/L) that is an elevated non-detection and may be an overestimate. As such a new activity (Row ID 26) has been created to further characterize P846E before the next annual progress report.

3.8.2 Sodium Hypochlorite and Sodium Bisulfite (Row ID 12 and 13)

The 2013 PMPP included preliminary mercury content information for the mussel and biofouling control chemicals (sodium hypochlorite and sodium bisulfite). Table 3-A contains updated information based on direct analysis of 4 different lots of each chemical from the vendor/manufacturer supplying these chemicals to U. S. Steel. The data from this analysis is more representative than the initial characterization data and indicates the following:

- Sodium hypochlorite potential estimated mercury content is significantly reduced (e.g. ~9 times less for the upper range estimate) compared to the initial estimate. The range of values observed for the 4 lots (18 to 300 ng/L) was also significantly less than used in the initial estimate (122 to 2,690 ng/L)
- Sodium bisulfite potential estimated mercury content is higher (e.g. ~ 5 times more for the upper range estimate; ranging from 790 to 6,600 ng/L) compared to the initial estimate (1,220 ng/L).

[6] Draft Wisconsin Mercury Sourcebook. Wisconsin Department of Natural Resources. May 1997.

The range of mercury results for the 4 lots was greater for sodium bisulfite than that observed for the sodium hypochlorite.

These two chemicals remain as the most significant potential water treatment additive sources of mercury. Note however, that the estimated mercury content from the sodium hypochlorite is overly conservative as it assumes all of the No. 1 and 2 PS intake waters are distributed to Outfall 028/030 sources. However, these intake waters supply other outfalls as well. Already completed efforts into examining options of reducing the potential mercury contributions from these specific chemicals are discussed in Section 3.13.

3.8.3 Main Process Chemicals (Row ID 14 and 15)

Various U. S. Steel practices aim to either minimize chemical usage or minimize the discharge of process chemicals (e.g. good housekeeping practices, spill prevention SOPs, etc.). However, some process chemicals have the potential to be present in, or come into contact with, waters discharged via Outfalls 028/030. Depending on the process chemical, the potential is considered low or very low as listed in the inventory (Table 3-B). In order to further focus characterization plans for those process chemicals, U. S. Steel has developed a usage criteria threshold so that efforts are focused on potential chemicals with higher usage rates/amounts instead of process chemicals with insignificant usage amounts. Any listed process chemical that is estimated to account for more than 1% by weight of all listed process chemicals (associated with the same final outfalls) or is estimated to be used in quantities larger than 10 tons/year[7] will be characterized. This means that only chemicals with usage amounts below both of these criteria will not be characterized. Characterization may take the form of direct analysis or use of information from other sources (e.g., published literature, vendor information, etc.). As such, when there are several process chemicals of a similar type and purpose in use, the characterization information from one chemical may be used to estimate values for the others. For example, this approach was utilized for the Caster Mold Fluxes used as process chemicals. Characterization information for the main process chemicals is listed in Table 3-B. Results of the Caster Mold Flux process chemicals investigation are described in Section 3.13.

The total estimated mercury content values listed in Table 3-B are overly conservative in that the calculations assume the entire quantity (lb/yr) of each process chemical will impact the final discharge. However, there are SOPs and BMPs in place for optimizing use and to minimize the uneconomical loss of process chemicals to the wastewater stream. The majority of spent process chemicals are also typically reclaimed/recycled or disposed of off-site further minimizing the potential to impact the final discharge waters. Therefore, the total estimated mercury content values are likely significantly higher than the realistic potential mercury contribution from process chemicals.

3.9 Condensate Characterization (Row ID 16)

As indicated in the PMPP, source characterization of condensate streams similar to those associated with the steel-making facilities has already been performed. The contributions from these mercury sources are anticipated to be insignificant given the minimal concentrations of mercury measured in similar condensate streams and the love volume of condensate flows. As such, no further PMPP activities were performed or are planned with respect to condensates.

[7] Revision of the ton/year threshold from 1 ton/year to 10 tons/year allows resources and efforts to focus on large quantity use materials instead of those used in minimal quantities. In addition, the 1% by weight of all listed process chemicals will also be in effect. With the current totals for process chemicals, if a chemical were to be used at a rate of 10 tons/year, it would comprise (individually) less than 0.4% by weight of all listed process chemicals; in essence negligible percentages compared to the total.

3.10 Internal Outfall 603 Source Characterization (Row ID 17)

Outfall 603 is an internal outfall to Outfalls 028/030. Per the NPDES Permit, Outfall 603 is the combined discharge of the following five discharge points: No. 1 Thickener, No. 1A Thickener, No. 1 Caster scale pit, No. 2 Caster A/B Line filter blowdown, and No. 2 Caster C Line filter blowdown. Though not required by the NPDES Permit, mercury analysis of all five of the above listed streams was performed from July 2009 through December 2010 in support of a preliminary source survey. This data indicated that Outfall 603 does not significantly contribute to the mercury mass at Outfalls 028/030. Subsequent sampling (of all five 603 sources) in 2015 supported this conclusion though field blank detections and concurrent operational events complicated data evaluation. Therefore, in 2017 additional sampling of all five 603 sources (with concurrent sampling of GW-10 and Outfalls 028/030) was performed (data were presented in the 2017 annual report). The 2017 results suggested that the Outfall 603 contribution to Outfall 028/030 has not increased.

In addition to total mercury analysis, the 2017 sampling included dissolved mercury analysis in order to more fully understand the type (insoluble vs. soluble) of mercury present. As expected, the data[8] (also previously presented in the 2017 annual reports) suggest that on average there is a larger fraction of mercury that is insoluble (meaning the fraction that is not dissolved - removed by 0.45 micron filtration) and believed associated with particulate matter when the TSS increases.

At this time no further activities associated with Outfall 603 are planned.

3.11 GW-10 Source Survey and GW-11 Characterization (Row IDs 18, 24, and 25)

Since the various Outfall 603 source surveys indicate that Outfall 603 is not the primary mercury contributor to Outfalls 028/030, additional source survey sampling was conducted during 2012, 2015, and 2017 in an effort to identify (or eliminate) other streams as significant sources of mercury to Outfalls 028/030. Sampling of the sewer system upstream of and including GW-10 was performed at select locations to isolate the various contributing branches. Though no conclusive primary source of mercury has been identified by any of the three surveys, the results helped to identify potential housekeeping improvements related to storm water and narrow the area focus for future investigations.

In 2018, U. S. Steel revisited the approach and assumptions (e.g. estimated flows and contributing wastewaters) used to evaluate the source survey data. In reviewing possible contributions to Outfalls 028/030, it was determined that it may not be a reasonable assumption to consider the GW-11 insignificant. Previously, potential mercury contributions from GW-11 were considered negligible since the associated flows are intermittent. Though the flows are intermittent, the potential mercury contribution needs further assessment. As such, a new activity (Row ID 25) was created for mercury characterization of GW-11 wastewaters. 2019 characterization efforts included multiple sampling events and comparison of potential GW-10 and GW-11 mercury contributions to Outfall 028/030. The data support the initial conclusion that on average the potential mercury contribution from GW-11 is minimal especially compared to GW-10. As such, no further activities associated with GW-11 are planned at this time.

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[8] For three samples (603 No. 2 Caster A/B, 603 No. 3 Caster C, and Outfall 028) on 10/4/17, the dissolved mercury result is much higher than the total mercury result. Dissolved sample contamination during the filtration step is suspected and the dissolved result is questionable for these three samples.

3.12 ArcelorMittal Plate Mill Source Characterization (Row ID 19)

The ArcelorMittal Plate Mill located at U. S. Steel Gary Works discharges to Outfall 603 when in operation. The Plate Mill has not operated during the most recent five year look-back period. However, the ArcelorMittal Plate Mill is owned and operated by ArcelorMittal, a third party, and as such, it may operate should business conditions allow. At the time of this Annual Report submittal, only non-contact cooling waters are discharged from this source to Outfall 603. The scope and schedule of this activity will be determined if process wastewater producing operations are resumed.

3.13 Alternatives for Reduction Evaluation (Row ID 20 and 23)

U. S. Steel, along with other steel mills in Northwest Indiana, previously[9] conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site. U. S. Steel policy is that mercury added equipment/devices are not to be supplied with the exclusion of equipment where there is no alternative (i.e. bulbs, batteries, etc.). Furthermore, mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Should a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Chemicals that do not have mercury as an added constituent but are known to contain trace amounts of mercury will be evaluated on a case by case basis. For example, evaluations will be prioritized based on not just mercury content, but also the potential risk of impacting the associated final discharge. Chemicals with a higher potential (e.g., water treatment additives used in final treatment steps) will be examined prior to those with a lower risk (e.g., process chemicals or water treatment additives such as flocculants and those used in closed-loop systems). Alternatives consideration may include investigations into materials that have less (or no) mercury, alternative activities or processes in which there is less potential for mercury to be discharged (such as different laboratory practices), and/or other improved treatment technologies as applied to a known source. Information such as mercury content and magnitude of the source contribution along with the operability, reliability, effectiveness and economic impact of potential alternatives may be used to determine the overall feasibility and benefit of alternative materials, processes, and/or technologies.

Based on the results of chemical or equipment evaluations, U. S. Steel may consider alternatives to mercury-containing chemicals that have a high potential for reaching the surface waters (i.e., mussel control and biofouling chemicals). Any identified alternatives that require significant capital to implement would be evaluated with respect to feasibility, ease of operation/execution, and cost-effectiveness through a corporate-specific review process. The review process requires approval from multiple departments (e.g., procurement, environmental, work control) before implementation is approved.

At this time, no specific evaluations are underway or planned for water treatment additives. A description of the already performed investigation into options for sodium hypochlorite and sodium bisulfite is

[9] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001); and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

presented in Section 3.13.1., and Section 3.13.2 describes efforts related to the Caster Mold Flux process chemicals.

3.13.1 Sodium Hypochlorite and Sodium Bisulfite

As noted in Section 3.8, the mussel and biofouling control and dechlorination chemicals (sodium hypochlorite and sodium bisulfite) are the most significant potential water treatment additive sources of mercury. Usage rates of these chemicals have previously been examined as part of U. S. Steel's Total Residual Chlorine (TRC) Pollution Minimization Program (PMP) Control Strategy.

The U. S. Steel Permit allows year round chlorination for control of zebra and quagga mussel populations. However, usage typically occurs from April through November only. The use of sodium hypochlorite for biofouling control also occurs on an as needed basis. The usage rates for effective treatment in both situations are adjusted by monitoring the chlorine demand (as indicated by TRC) of the system. For example with respect to feed rates for the intake pump stations, TRC is measured at least daily at multiple locations and sodium hypochlorite usage rates are adjusted accordingly to maintain set residual levels. The set residual levels are necessary to provide effective mussel and/or biofouling control.

Prior to final outfall discharge, dechlorination occurs with the addition of sodium bisulfite. The water quality-based effluent limitations (8 ug/L as a monthly average; 18 ug/L as a daily maximum) for TRC are lower than the analytical detection limit (20 ug/L). Therefore a mass balance approach is used to ensure the effluent limitations are met. The usage rates of sodium bisulfite are determined such that there is a mass balance of sodium bisulfite to the historical maximum TRC measured at the associated intakes (or other locations where sodium hypochlorite is used). U. S. Steel has developed a mass balance model for each month within the mussel control season that uses the historical max TRC for that specific to that month. This minimizes sodium bisulfate usage while still 1) accounting for the variable chlorine demand over the course of mussel control season; and 2) maintaining compliance with the TRC Permit limitations.

As demonstrated above, further reducing the usage rates of sodium hypochlorite and sodium bisulfite to minimize the discharge potential from trace mercury within these chemicals is not feasible. U. S. Steel's preliminary and refined additional characterization (discussed in Section 3.8) for the specific sources (vendor/manufacturer) of sodium hypochlorite and sodium bisulfite confirmed these are the most significant potential water treatment additive sources of mercury. U. S. Steel is not aware of reduced mercury-content versions of either chemicals but may investigate this further with vendors especially for sodium bisulfite.

3.13.2 Caster Mold Fluxes (Row ID 23)

Caster Mold Flux process chemicals account for all but 2 of the main process chemicals that have the potential to be associated with Outfall 028/030 discharges. As such, they have the highest calculated potential mercury contributions in Table 3-B and so U. S. Steel reviewed the usage practices associated with Caster Mold Flux process chemicals (Activity Row ID 23).

Caster Mold Fluxes are such a necessary and key component of the casting process that the usage of these materials has been extensively researched and there are specific "recipes" (e.g. type and amount of flux, line speed, grade of steel, etc.) that dictate their use. In addition to impacting product quality (by preventing oxidation), the Caster Mold Fluxes prevent the partially cooled steel from sticking or pulling when exiting the mold. If sticking or pulling were to occur catastrophic damage to both life and equipment could occur as molten steel would be released from the partially cooled product slab. Therefore it is not feasible to reduce flux usage amounts which are carefully controlled in the production process. However, the manner of use and subsequent processing of associated wastewaters support the supposition the total estimated mercury content values for Caster Mold Fluxes listed Table 3-B are overly conservative.

The calculations assume the entire quantity (lb/yr) of each process chemical will impact the final discharge. However, in the process, any flux (or flux residue) that is not consumed forms a solid scale-like layer on the product slabs. This layer is removed by a series rollers and a water rinse. The wastewater is then sent to a scale pit for treatment where solids are settled and removed. It is expected that the mercury will be preferentially associated with the solids and that the scale pit wastewater (which ultimately is discharged via Outfalls 028/030) does not contain the total estimated content values listed in Table 3-B. Both the strictly controlled usage practices and subsequent processing of wastewaters combined demonstrate that measures are in place to minimize the potential to impact Outfall 028/030 mercury concentrations and that the values in Table 3-B are overly conservative. However, the approach used to calculate the values will remain the same since no alternative methodology is available (e.g., it is not feasible to determine a factor which would estimate the reduced potential achieved). As such no further PMPP activities are planned with respect to Caster Mold Fluxes.

4.0 Continuing PMPP Activities

U. S. Steel will continue to execute the Mercury PMPP already in place. Status updates for all PMPP activities will be included in the next progress report.

TABLE 1-A. MERCURY AND TSS DATA FOR OUTFALLS 028/030 AND NO. 1 & NO. 2 PUMP STATIONS

Sample Date	No. 1 Pump Station					No. 2 Pump Station					Outfall 028					Outfall 030				
	Total Mercury (ng/L)				TSS	Total Mercury (ng/L)				TSS	Total Mercury (ng/L)				TSS	Total Mercury (ng/L)				TSS
	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)	Sample	Duplicate	Average	Flag	(mg/L)
10/11/18	0.57	0.39	0.48	J	2.2 E	0.52	---	0.52		1.7 E	1.4	---	1.4		7.4	1.1	---	1.1		8.0
11/15/18	0.26	---	0.26	J	1.4 E	0.27	0.29	0.28	J	7.3	4.7	---	4.7		21.2	3.7	---	3.7		9.2
12/13/18	0.34	0.53	0.44	J	2.1 E	1.8	---	1.8		13.6	0.63	---	0.63		22.5	0.66	---	0.66		15.4
02/13/19	*	---	*	B1	3.0	1.5	---	1.5		14.4	2.0	---	2.0		7.8	2.3	---	2.3		7.1
04/17/19	0.65	---	0.65		6.1	1.2	---	1.2		5.6	1.5	---	1.5		21.7	1.4	---	1.4		14.5
06/20/19	0.30	---	0.30	J	2.7	0.35	---	0.35	J	2.4	2.0	---	2.0		11.3	1.3	---	1.3		18.0
08/22/19	0.31	---	0.31	J	1.0 E	0.37	---	0.37	J	1.7 E	0.77	---	0.77		2.8	1.3	0.88	1.1		4.1

Notes:

1. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. Mercury and TSS analyzed by ALS Laboratory Group. All Mercury and TSS data from single grab samples unless noted otherwise.
3. All duplicate data presented are from field duplicate results.
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated data flag(s).
6. Mercury data flags:

   "B1" indicates that associated field blank had a mercury detection outside of the criteria for blanks (whichever is greater: <0.5 ng/L or up to 1/5 the amount in associated samples). Sample considered invalid.

   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (0.20 ng/L).
7. "E" flag for TSS results indicates estimated values between the reporting limit and method detection limit. However, for TSS these reporting and method detection limits are variable and therefore not listed here.
8. Data collected prior to October 2018 were previously submitted either with the initial SMV application or with previous Annual Progress Reports.

TABLE 1-B. OUTFALL 028/030 MERCURY 12-MONTH ROLLING AVERAGES

Reporting Period	12-month Dataset	Total Mercury (ng/L) 12-Month Rolling Average	
		Outfall 028	Outfall 030
Oct 2018	Nov 2017 - Oct 2018	1.1	1.2
Nov 2018	Dec 2017 - Nov 2018	1.4	1.4
Dec 2018	Jan 2018 - Dec 2018	1.4	1.3
Jan 2019	Feb 2018 - Jan 2019	1.4	1.3
Feb 2019	Mar 2018 - Feb 2019	1.5	1.5
Mar 2019	Apr 2018 - Mar 2019	1.5	1.5
Apr 2019	May 2018 - Apr 2019	1.5	1.5
May 2019	Jun 2018 - May 2019	1.6	1.6
Jun 2019	Jul 2018 - Jun 2019	1.8	1.7
Jul 2019	Aug 2018 - Jul 2019	1.8	1.6
Aug 2019	Sep 2018 - Aug 2019	1.7	1.5
Sep 2019	Oct 2018 - Sep 2019	1.9	1.7

Notes:

1) Only valid data (as indicated in Table 1-A) was utilized to calculate the 12-month rolling averages.

2) It should be noted that the rolling averages presented only represent a small portion of the entire dataset available and therefore care must be used in reviewing the data. The overall variability may not be evident from review just the of the 12-month rolling averages.

3) 12-month rolling averages prior to October 2018 were submitted in previous Annual Progress Reports.

TABLE 2. SCHEDULE AND STATUS OF PLANNED ACTIVITIES FROM THE 028/030 MERCURY PMPP

Row ID	**Planned Activity**	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
1	Complete Inventory	Type 1: Source Characterization	Finalize the inventory of listed equipment/materials, and usage rates.	Submittal of completed inventory to IDEM.	Within 9 months of SMV approval. Updated inventory will be provided as part of the Annual Progress Report.	Complete (see Section 3.1)
2	Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Review mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Implementation of Policies and Procedures that address the mercury content of materials.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.2)
3	Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.3)
4	Good Housekeeping Practices: *Mercury Containing Chemicals and Materials*	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.4)
5	Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.5)
6	Standard Operating Practices: Spill Prevention and Response: *Chemicals and Materials*	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills. Reduce possibility of accidental spills and releases.	Training of employees on proper and safe spill prevention and response for dealing with chemical spills.	Implemented/Ongoing.	Implemented/Ongoing (see Section 3.6)
7	Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.7)
8	Disposal Practices of Mercury-Containing Items: *Bulbs/Lamps*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.7)
9	Disposal Practices of Mercury-Containing Items: *Batteries*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.	Implemented/Ongoing (see Section 3.7)

TABLE 2. SCHEDULE AND STATUS OF PLANNED ACTIVITIES FROM THE 028/030 MERCURY PMPP

Row ID	Planned Activity	Activity Type	Goal	Measure of Performance	Schedule of Action	Current Status
10	*Outfall 028/030* Source Characterization: Water Treatment Chemicals - High Potential	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	ORIGINAL: Within 9 months of SMV approval. REVISED: For new water treatment additives, w/in 1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
11	*Outfall 028/030* Source Characterization: Water Treatment Chemicals - Low Potential	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	ORIGINAL: Within 12 months of SMV approval. REVISED: For new water treatment additives, w/in 1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
12	*Outfall 028/030* Source Characterization: Sodium Hypochlorite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium hypochlorite used for mussel control at the intake.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete (see Section 3.8)
13	*Outfall 028/030* Source Characterization: Sodium Bisulfite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium bisulfite used for dechlorination of the final Outfall 028/030 discharge.	Documentation that mercury has been quantified.	Within 9 months of SMV approval.	Complete (see Section 3.8)
14	*Outfall 028/030* Source Characterization: Process Chemicals - Low Potential	Type 1: Source Characterization	ORIGINAL ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information. REVISED ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information for the low potential process chemicals that meet the usage threshold criteria [A].	Documentation that mercury has been quantified.	ORIGINAL: Within 9 months of SMV approval. REVISED: For new process chemicals, w/in1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
15	*Outfalls 028/030* Source Characterization: Process Chemicals - Very Low Potential	Type 1: Source Characterization	ORIGINAL ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information. REVISED ACTIVITY: Estimate the amount of mercury via direct sampling, literature review, and/or vendor information for the very low potential process chemicals that meet the usage threshold criteria [A].	Documentation that mercury has been quantified.	ORIGINAL: Within 12 months of SMV approval. REVISED: For process chemicals, w/in 1 year of beginning use.	Implemented/Ongoing (see Section 3.8)
16	Condensate Characterization [B]	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Already implemented.	Complete (see Section 3.9)

TABLE 2. SCHEDULE AND STATUS OF PLANNED ACTIVITIES FROM THE 028/030 MERCURY PMPP

Row ID	**Planned Activity**	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
17	*Outfall 603* Source Characterization	Type 1: Source Characterization	Perform additional mercury monitoring of internal Outfall 603 sources for comparison to previously collected mercury data for these locations.	Documentation of evaluation.	ORIGINAL: Within 12 months of SMV approval. REVISED: Repeat in 2017.	Complete (see Section 3.10)
18	*GW-10* Source Characterization	Type 1: Source Characterization	Perform additional source survey sampling for GW-10 and the select areas identified by the 2012 source survey program.	Documentation of evaluation.	ORIGINAL: Within 12 months of SMV approval. REVISED: Repeat in 2017.	Complete (see Section 3.11)
19	*ArcelorMittal Plate Mill* Source Characterization	Type 1: Source Characterization	Mercury characterization of associated water treatment and/or process chemicals.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined if process wastewater producing operations are resumed.	On hold (see Section 3.12
20	Alternatives for Reduction Evaluation: *Mercury-Containing Chemicals and Materials*	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined based on the outcome of the various source characterization activities.	Ongoing as needed (see Section 3.13)
21	*Source Characterization:* Sodium Hydroxide	Type 1: Source Characterization	Perform additional mercury characterization of Sodium Hydroxide in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2017 progress report.	Complete (see Section 3.8.)
22	*Source Characterization:* CL2840	Type 1: Source Characterization	Perform additional mercury characterization of CL2840 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	ORIGINAL: By the due date of the 2017 progress report. REVISED: Repeat again by the due date of the 2018 progress report.	Original Complete; Revised Complete (see Section 3.8)
23	Alternatives for Reduction Evaluation: *Caster Mold Fluxes*	Type 2: Alternatives for Reduction Evaluation	Investigate the current usage (including BMPs) practices of Caster Mold Fluxes in order to better assess the potential for impacts to the 028/030 discharge.	Documentation of evaluation.	By the due date of the 2017 progress report.	Complete (see Section 3.13)
24	GW-10 Source Characterization	Type 1: Source Characterization	Revisit (in order to confirm/revise) the approach and assumption used in evaluation of the GW-10 Source Characterization sampling data (Row ID 18).	Documentation of evaluation.	By the due date of the 2018 progress report.	Complete (see Section 3.11)
25	GW-11 Characterization	Type 1: Source Characterization	Perform mercury characterization of GW-11.	Documentation of evaluation.	By the due date of the 2019 progress report.	Complete (see Section 3.11)

TABLE 2. SCHEDULE AND STATUS OF PLANNED ACTIVITIES FROM THE 028/030 MERCURY PMPP

Row ID	**Planned Activity**	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*	*Current Status*
26	*Source Characterization:* CL1370	Type 1: Source Characterization	Perform additional mercury characterization of CL1370 in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	By the due date of the 2020 progress report.	In Progress (see Section 3.8)

Notes:
(A): Any process chemical that is estimated to account for more than 1% by weight of all listed process chemicals (associated with the same final outfalls) or is estimated to be used in quantities larger than 10 tons/year will be characterized. This means that only chemicals with usage amounts below both of these criteria will not be characterized.
(B): Condensates are not anticipated to be a significant source of mercury as discussed in Section 3.2.2.8 of the PMPP.

TABLE 3-A. UPDATED INVENTORY: WATER TREATMENT ADDITIVES FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount [A]	Estimated Mercury Content [B] per Item	Estimated Mercury Content [B] Total	Potential to Reach Surface Water? [C]
CL1355	dispersant/scale inhib.	No 1 Caster (cooling systems)	5 - 15 gpd	<283 ng/L	<1.95 - <5.86 mg/yr	High
CL1370	scale inhibitor	No. 2 Caster, A/B lines (cooling systems)	0 - 15 gpd	<308 ng/L	0 - <6.38 mg/yr	High
CL1370	scale inhibitor	No. 2 Caster, C line (cooling systems)	5 - 15 gpd	<308 ng/L	<2.13 - <6.38 mg/yr	High
CL1370	scale inhibitor	No. 2 QBOP (cooling systems)	5 - 45 gpd	<308 ng/L	<2.13 - <19.15 mg/yr	High
CL1377	corrosion inhibitor	No. 2 QBOP (cooling systems)	2 - 20 gpd	<20 ng/L	<0.06 - <0.55 mg/yr	High
CL1427	corrosion inhibitor	No. 2 Caster, A/B lines (cooling systems)	5 - 18 gpd	<20 ng/L	<0.14 - <0.5 mg/yr	High
CL1427	corrosion inhibitor	No. 2 Caster, C line (cooling systems)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	High
CL206	biocide	No 1 Caster	0 - 0.15 gpd	<50 ng/L	<0 - <0.01 mg/yr	High
CL2840	corrosion inhibitor	No 1 Caster (cooling systems)	0 - 10 gpd	1413 ng/L	0 - 20 mg/yr	High
CL2840	corrosion inhibitor	No. 2 Caster, A/B lines (cooling systems)	0 - 10 gpd	1413 ng/L	0 - 20 mg/yr	High
CL2840	corrosion inhibitor	No. 2 Caster, C line (cooling systems)	0 - 15 gpd	1413 ng/L	0 - 29 mg/yr	High
CL41	microbiological treatment	QBOP hood cooling system	1825 gallons per year	<8 ng/L	<0.06 mg/yr	Low
CL4074	scale inhibitor	No. 1 BOP (tank)	3 - 12 gpd	<20 ng/L	<0.08 - <0.33 mg/yr	High
CL4074	scale inhibitor	No. 1 BOP (tote)	2 - 10 gpd	<20 ng/L	<0.06 - <0.28 mg/yr	High
CL4437	dispersant (deposit control)	No. 2 Caster, A/B lines (cooling systems)	10 - 70 gpd	<20 ng/L	<0.28 - <1.93 mg/yr	High
CL4437	dispersant (deposit control)	No. 2 Caster, C line (cooling systems)	10 - 60 gpd	<20 ng/L	<0.28 - <1.66 mg/yr	High
CL4442	dispersant	No 1 Caster (discharge rack)	5 - 15 gpd	<20 ng/L	<0.14 - <0.41 mg/yr	High
CL4800	dispersant	No. 2 QBOP (cooling systems)	5 - 30 gpd	<263 ng/L	<1.82 - <10.9 mg/yr	High
CL5691	scale and corrosion inhibitor	QBOP hood cooling system	12775 gallons per year	264 ng/L	12.8 mg/yr	Low
FO180	defoamer	Outfalls 028/030	0 - 54 gpd	<25 ng/L	<0 - <1.87 mg/yr	High
Hydrochloric Acid (Muriatic Acid)	pH adjustment	C-Lot Lagoons	Not used in several years (emergency use only)	23 ng/L	Not used in several years; therefore, a total estimate will not be determined	High
P817E	flocculant	Degasser	2 - 8 gpd (upset only)	<50 ng/L	<0.14 - <0.55 mg/yr	Low
P817E	flocculant	GW-10	4 - 5 gpd	<50 ng/L	<0.28 - <0.35 mg/yr	High
P817E	flocculant	No. 1 BOP	3 - 12 gpd	<50 ng/L	<0.21 - <0.83 mg/yr	Low
P817E	flocculant	No. 2 QBOP (thickeners)	2 - 30 gpd	<50 ng/L	<0.14 - <2.07 mg/yr	High
P873L	coagulant/filter aid	No. 2 Caster, C line (filters)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	Low
P873L	coagulant/filter aid	No. 2 Caster, A/B lines (filters)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	Low
P8905L	coagulant	GW-10	5 - 30 gpd	<20 ng/L	<0.14 - <0.83 mg/yr	High

TABLE 3-A. UPDATED INVENTORY: WATER TREATMENT ADDITIVES FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount [(A)]	Estimated Mercury Content [(B)] per Item	Estimated Mercury Content [(B)] Total	Potential to Reach Surface Water?[(C)]
P891L	coagulant	Degasser	5 - 15 gpd	<20 ng/L	<0.14 - <0.41 mg/yr	Low
P891L	coagulant	GW-10	40 - 110 gpd	<20 ng/L	<1.11 - <3.04 mg/yr	High
P891L	coagulant	No. 2 Caster, C line (filters)	5 - 15 gpd	<20 ng/L	<0.14 - <0.41 mg/yr	Low
P891L	coagulant	No. 2 Caster, A/B lines (filters)	5 - 20 gpd	<20 ng/L	<0.14 - <0.55 mg/yr	Low
P891L	coagulant	No. 2 QBOP (thickener No. 1)	40 - 150 gpd	<20 ng/L	<1.11 - <4.14 mg/yr	High
P891L	coagulant	No. 2 QBOP (thickener No. 1A)	10 - 75 gpd	<20 ng/L	<0.28 - <2.07 mg/yr	High
S101	polymer	QBOP No.1 Thickener	10 - 21 gpd	<20 ng/L	<0.28 - <0.58 mg/yr	Low
Sodium Bisulfite	Dechlorination Prior to Discharge w/in Mussel Control Season	C-Lot Lagoons (~Apr 1 - Nov 30)	45 - 97 gpd (based on 2016 May-Oct usage)	790 - 6600 ng/L	46.6 - 392.2 mg/yr	High
Sodium Bisulfite	Dechlorination Prior to Discharge Outside of Mussel Control Season	C-Lot Lagoons (~Dec 1 - March 31)	57 - 60 gpd	790 - 6600 ng/L	20.95 - 175.03 mg/yr	High
Sodium Hydroxide (Caustic Soda)	alkalinity control	No 1 Caster (discharge rack)	10 - 30 gpd	737 - 940 ng/L	11.58 - 34.75 mg/yr	High
Sodium Hydroxide (Caustic Soda)	alkalinity control	No. 2 Caster, A/B lines (cooling systems)	10 - 50 gpd	737 - 940 ng/L	11.58 - 57.92 mg/yr	High
Sodium Hydroxide (Caustic Soda)	alkalinity control	No. 2 Caster, C line (cooling systems)	10 - 50 gpd	737 - 940 ng/L	11.58 - 57.92 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No 1 Caster (cooling systems)	5 - 15 gpd	18 - 300 ng/L	0.12 - 6.22 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No. 2 Caster, A/B lines (cooling systems)	154 - 308 gpd	18 - 300 ng/L	3.83 - 127.65 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No. 2 Caster, C line (cooling systems)	34 - 62 gpd	18 - 300 ng/L	0.85 - 25.7 mg/yr	High
Sodium Hypochlorite (bleach)	microbiofouling control	No. 2 QBOP (cooling systems)	15 - 50 gpd	18 - 300 ng/L	0.37 - 20.72 mg/yr	High
13% Sodium Hypochlorite (Bleach)	Biocide for Mussel Control	Intake - No. 1 & 2 Pump Stations (~Apr 1 - Nov 30)	840 - 2108 gpd	18 - 300 ng/L	13.96 - 584.05 mg/yr (D)	High

Notes
(A): Chemical usage rates are estimated ranges based on averages or purchasing records; day to day usage rates may vary. Other chemicals that may be approved for usages associated with Outfall 028/030 but are not currently being used are not included. If usage resumes, they will be added to this inventory and characterized.
(B): The mercury values listed are based on mercury characterization via direct analytical measurement.
(C): Low potential water treatment additives are those utilized at locations or wastewater treatment steps that undergo additional treatment prior to the C-lot lagoons and final discharge via Outfall 028/030.
(D): The listed total estimated mercury content is overly conservative as it assumes all of the No. 1 and No. 2 Pump Station intake water is distributed to Outfall 028/030.
However, No. 1 and 2 Pump Station intake waters supply other outfalls as well.

TABLE 3-B. UPDATED INVENTORY: MAIN PROCESS CHEMICALS FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B and D) Total	Potential to Reach Surface Water?(D)
Stollberg ST-SP 403-C	Caster mold fluxes	Steel North and South	822,465 lb/yr (A2)	0.52 mg/kg	193996 mg/yr	Low
Stollberg ST-SP 325	Caster mold fluxes	Steel North and South	471,210 lb/yr (A2)	0.015 mg/kg	3206 mg/yr	Low
Stollberg ST-SP 405	Caster mold fluxes	Steel North and South	1,019,490 lb/yr (A2)	0.03 mg/kg	13873 mg/yr	Low
VITROBOND	bonding agent	Steel North and South	690,800 lb/yr (A1)	0.013 mg/kg	4074 mg/yr	Very Low
MOP-AHG-8A Mold Powder	Caster mold fluxes	Steel North (2 Caster)	215,600 lb/yr (A2)	0.1 mg/kg (C)	9780 mg/yr	Low
MOP-LBG-60 Mold Powder	Caster mold fluxes	No. 2 Caster - A/B/C Lines	376,200 lb/yr (A2)	0.1 mg/kg (C)	17064 mg/yr	Low
MOP-LBG-5M Mold Powder	Caster mold fluxes	Steel North and South	1,546,600 lb/yr (A2)	0.1 mg/kg	70154 mg/yr	Low

Notes:
(A1): Estimated quantities based on historical (2012) purchased quantities.
(A2): Estimated quantities based on recent (2015-2016) purchasing records.
(B): Unless noted, mercury content for chemicals are based on direct analytical measurements. Any process chemical that is estimated to account for more than 1% by weight of all listed process chemicals (associated with the same final outfalls) or is estimated to be used in quantities larger than 10 tons/year will be characterized. This means that only chemicals with usage amounts below both of these criteria will not be characterized.
(C): Estimated mercury content based on direct characterization of Mold Powder MOP-LBG-5M.
(D) There are SOPs and BMPs in place to minimize the potential discharge of process chemicals and the majority of spent process chemicals are also typically reclaimed/recycled or disposed of off-site further minimizing the potential to impact the final discharge waters. Therefore, the total estimated mercury content values are likely significantly higher than the realistic potential mercury contribution from process chemicals.
(E): A Low ranking is for chemicals primarily used in a rinse bath or could be incidentally washed off into a stream that could be discharged to the surface waters. A Very Low ranking is a process chemical that is added directly at the process area and has minimal potential from being in contact with process waters that could be ultimately discharged via Outfall 028/030.

TABLE 3-C. UPDATED INVENTORY: OTHER MATERIALS AND DISCHARGES FOR OUTFALL 028/030 MERCURY PMPP

Item or Material	Use	Estimated # of Items or Amount	Estimated Mercury Content (A) per Item	Estimated Mercury Content (A) Total	Location; Storage Method	Potential to Reach Surface Water?
IN-SERVICE EQUIPMENT						
All known in-service equipment that contained Hg has been removed.						
BULB/LAMPS						
Sodium Vapor Lamps	Lighting	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	0.02 grams - 0.145 grams	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	Various	Very Low
Mercury Vapor Lamps			0.025 grams - 0.225 grams			
Metal Halide			0.005 - 0.150 grams			
Linear Fluorescent Bulbs			0.003 - 0.05 grams			
OTHER ITEMS						
Lead-acid Batteries (B)	Standby emergency power and power for mechanical equipment (e.g., fork lifts)	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.			Various	Very Low
Other Batteries (e.g., mercury-zinc, mercury alkaline, mercury-cadmium, mercury oxide)	Portable power supply	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.		Various	Very Low
LCD type computer monitors	Visual display	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	0 - 0.010 grams average (0.005 grams) used for estimate	These will not be individually inventoried. The annual progress reports will include estimated yearly disposed of quantities (facility-wide).	Various	Very Low
Laptop LCD screens						
LCD type HDTV screen						
OUTFALL DISCHARGES						
Outfalls 028 and 030 and Outfall 603	NPDES Permitted Discharge as described in Section 1.3 of the PMPP.		Results of mercury analysis for Outfalls are discussed in Section 2.3 of the PMPP.		See Attachment I of the PMPP.	Outfalls 028 and 030 are the final discharge to surface water.

Notes:

(A): When available, mercury content for chemicals was estimated from direct analytical measurement with EPA Method 1631E or vendor specifications and/or certificates of analysis. Equipment mercury content was estimated from the mass of the ampoule of elemental mercury utilized in the equipment itself or comparable pieces of equipment. Lamp and bulb mercury content information was generated from publically accessible sources including the National Electrical Manufacturers Association.

(B): Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

TABLE 4. ESTIMATED QUANTITIES OF MATERIALS SHIPPED OFFSITE FOR RECYCLING OR DISPOSAL

Estimated Material Totals

Material	**Oct 2018 - Sep 2019** (through 9/17/19 for LCD Screens)
Bulbs - Florescent (Note A)	4,886 lbs
Bulbs - HID types (Note B)	614 lbs
LCD-type Screens (Note C)	179 screens
Lead Acid Batteries	28,541 lbs
Alkaline Batteries	1,916 lbs

Estimated Mercury Content of Materials

Material	**Oct 2018 - Sep 2019** (through 9/17/19 for LCD Screens)
Bulbs - Florescent and/or other mercury-containing (Note A)	19.5 to 325.7 grams (0.0043 to 0.718 lbs)
Bulbs - HID types (Note B)	4.1 to 42.5 grams (0.009 to 0.094 lbs)
LCD-type Screens (Note C)	0.895 grams (0.0020 lbs)
Lead Acid Batteries	Note D
Alkaline Batteries	Note E

Notes:

A: The estimated mercury content is based on florescent bulb weight (~0.75 lbs per bulb) and mercury content (~0.003 to 0.050 grams of mercury per bulb).

B: Includes HID mercury-containing bulbs such as mercury vapor, sodium vapor, and metal halide. Estimated mercury content based on 2.5 lbs per bulb. Mercury content range of 0.0167 to 0.173 grams of mercury per bulb is average of ranges for mercury vapor, sodium vapor, and metal halide lamps.

C: Total includes flat panel displays (e.g., monitors, televisions) and notebook screens. Assumes all notebook/laptop screens disposed were LCD-type. Estimated mercury content based on an average 0.005 grams per LCD-type screen.

D: Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution. An estimate of the mercury content of the solution is not available.

E: The majority of alkaline batteries do not contain mercury. The exception are button cell type alkaline batteries (estimated average content 11 mg). For disposal purposes, the estimates are not divided beyond the major type. Therefore no specific estimate of the mercury content from alkaline button cell batteries has been made.

F: Other batteries (e.g. lithium and nickel-cadmium) are also tracked, however since they do not contain mercury, they are not listed here.

SMV Renewal Request for Outfall 015

Stream-lined Mercury Variance Request for Outfall 015

The current NPDES Permit for U. S. Steel includes monitoring and final water quality-based effluent limits (WQBELs) for mercury at Outfall 015 with a 5-year compliance schedule. The interim requirements for total mercury include monitoring and reporting on a bimonthly basis. The final effluent limits for total mercury will become effective no later than February 1, 2022. The SMV process allows for an interim limit for mercury discharges that is based on representative effluent data. U. S. Steel is seeking to obtain SMV interim discharge limits for Outfall 015 pursuant to 327 Indiana Administrative Code (IAC) 5-3.5.

Pursuant to 327 Indiana Administrative Code (IAC) 5-3.5-1, U. S. Steel is eligible to apply for a Streamlined Mercury Variance. The enclosed SMV application with a Pollutant Minimization Program Plan (PMPP) is submitted in accordance with the requirements listed in 327 IAC 5-3.5-4 and 327 IAC 5-3.5-9 (PMPP requirements).

The PMPP addresses the current Outfall 015 configuration (w/internal outfall 501 associated with the Environmental Treatment Facility or ETF and internal outfall 607 associated with the Leachate Treatment Plant or LTP) as well as the future configuration (treatment of current LTP wastewaters by the ETF and closure internal outfall 607) authorized by the Permit Modification set to become effective May 1, 2020. The data presented in the PMPP is both representative of discharges under the current configuration and serves as a reasonable estimate of future discharges under the proposed configuration.

As specified, notice of availability was published and posted for the PMPP and a thirty (30) day comment period provided. No comments were received as a result of this process and only minimal changes (listed in SMV request summary) to the public notice version of the PMPP have been made for this SMV application submittal.

Based on application of the methodology listed in 327 IAC 5-3.5-8 (SMV interim discharge limit) the proposed interim limit for mercury is:

- 14.0 ng/L total mercury at Outfall 018 (as a 12-month rolling average)

In accordance with 327 IAC 5-3.5-8, U. S. Steel understands that compliance with the interim limit is achieved if the average of the measured effluent daily values over the rolling twelve (12) month period is less than the interim limit.

SMV Application Form for Outfall 015

INDUSTRIAL STREAMLINED MERCURY VARIANCE (SMV) APPLICATION

State Form 52111 (5-05)
Approved by State Board of Accounts, 2005
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Indiana Department of Environmental Management
Office of Water Quality – Mail Code 65-42
NPDES Permits Branch
100 North Senate Avenue
Indianapolis, Indiana 46204-2251

PART ONE: General Information

Name of Facility U. S. Steel Gary Works		
Facility Address One North Broadway		
City or Town Gary		
State Indiana	ZIP Code 46402	County Lake
National Pollutant Discharge Elimination System (NPDES) Permit No.: IN0000281		
Name of Person in Responsible Charge Daniel Killeen		
Title Vice President - Gary Works		
Address One North Broadway		
City or Town Gary		
State Indiana	ZIP Code 46402	
Name of Primary Contact Person Brandon Miller		
Address One North Broadway		
City or Town Gary		
State Indiana	ZIP code 46402	Telephone No. 219-888-3369
E-mail Address (if available) BSMiller@uss.com		
NPDES Outfall(s) Affected by Streamlined Mercury Variance Request: 015		
Receiving Stream(s) Affected by Streamlined Mercury Variance Request: Grand Calumet River		
Average Daily Flow: Outfall 015 = 2.1 mgd (long term averages May 10, 2017 – Dec 2019)		
Provide a brief description of all operations contributing to the permitted discharge(s): U. S. Steel Gary Works is a fully integrated steel producer. Operations within the referenced outfall areas includes sintering, blast furnace operations, the special waste landfill and the Leachate Treatment Plant (LTP), and the Environmental Treatment Facility (ETF). The outfall discharges primarily non-contact cooling water, steam condensate, treated wastewaters from the LTP (e.g. landfill leachate) and treated wastewaters from the ETF (e.g., remediation groundwater). See Section 1.3 of the Outfall 015 PMPP for more information.		

SIGNATURE BLOCK

This application must be signed by a person in responsible charge (see 327 IAC 5-2-22) to be valid. This signature attests to the following:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name Daniel Killeen	Title Vice President - Gary Works
Signature See the General Information Form for the certification signature	Date Signed *(month, day, year)*
Return the completed SMV application package (Parts I - V) and $50 application fee (see IC 13-18-20-12(a)(4)) to mailing address listed above.	

PART TWO – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) INVENTORY/IDENTIFICATION

A. Provide a preliminary inventory of potential uses and sources of mercury in all buildings and departments, as well as a preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites. The following checklist* includes many of the chemicals, equipment, locations, etc. where mercury may be present at your site. For the purpose of satisfying the requirements of this section, you may submit the completed checklist as a preliminary inventory/identification. While the checklist is intended to facilitate the inventory/identification process, it should not be considered as all-inclusive for purposes of establishing a complete inventory. *(see 327 IAC 5-3.5-9(a)(1) and 327 IAC 5-3.5-9(a)(2))*

LABORATORY EQUIPMENT

☐ Manometers	☐ Ion exchange cartridges for lab water purification system
☐ Barometers	☐ Hanging mercury drop electrodes for polarographic analyzers
☐ Thermometers	☐ Mercury Hallow Cathode lamp for AA analysis

LABORATORY CHEMICALS

☐ COD analysis reagent *(mercuric sulfate)*	☐ Mercury or mercurous chloride
☐ TKN and TP analysis digestion reagents	☐ Mercury iodide
☐ Nessler reagent	☐ Mercury nitrate
☐ Mercury analytical standards	☐ Mercury (II) oxide
☐ Gas chromatograph sample interferences *(elemental mercury)*	☐ Mercury (II) sulfate
X Sodium hypochlorite *(Clorox)*	☐ Merthiolate

BULK CHEMICALS

☐ Phosphorus removal chemicals	X Chlorine
X Dechlorination chemicals	X Sodium hypochlorite
☐ Sludge thickening polymers	X Sulfuric acid
☐ Potassium hydroxide	☐ Nitric acid
X Sodium hydroxide	☐ Ferric or ferrous chloride
☐ Sodium chloride	☐ Pickling liquor *(for phosphorus removal)*

PROCESS CONTROL AND MEASURING EQUIPMENT

☐ Accustats	☐ Ring balances
☐ Barometers	☐ Shunt trips
☐ Counterweights	☐ Steam flow meters
☐ Elemental mercury for refilling mercury-containing equipment	☐ Stokes gauges Switches and relays:
☐ Flow meters	☐ Displacement plunger relays
☐ Gas regulators and meters	☐ Mercoid control switches
☐ Gyroscopes	☐ Pressure control switches *(mounted on bourdon tube or diaphragm)*
☐ Hydrometers with thermometers	☐ Relay switches
☐ Level and rotation sensors	☐ Mercury wetted relays
☐ Manometers, pressure gauges and vacuum gauges	☐ Mercury displacement relays (found in motors)
☐ Mercury-sealed pistons	☐ Sump pump, bilge pump and other float controls
☐ Permeters	☐ Tilt switches
☐ Pressure-trols	☐ Thermometers *(including industrial dial face thermostats with capillary tubes)*
☐ Pyrometers	☐ Thermostats and thermoregulators
☐ Rectifiers	☐ Transmitters

BUILDINGS

☐ DC watt-hour meters	Hydronic and warm air controls with tilt switches such as:
☐ Flame sensors *(found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)*	☐ Aquastats ☐ Pressurestats ☐ Firestats ☐ Fan limit controls
* This checklist was borrowed from the Delta Institute	☐ Pressure/flow controls on air handling units.

PART TWO (CONTINUED)	
BUILDINGS *(continued)*	
Switches and relays:	
☐ Fire alarm box switches	☐ Mercury displacement relays *(found in lighting, resistance heating and motors)*
☐ Silent light switches	
☐ Relay switches	☐ Sump pump, bilge pump, flow monitor, float switches, and other float controls
☐ Mercury wetted relays	
	☐ Tilt switches
Phosphorus removal chemicals:	
☐ Ferric or ferrous chloride	
☐ Pickling liquor	
☐Thermostats	
BEARINGS AND SEALS	
☐ Trickling filter Pivot Arm Bearings *(mercury bearings/water seals)*	
LAMPS	
X Fluorescent	X Mercury vapor lamps
X High-pressure sodium	X Metal halide
☐ Mercury arc	☐ Ultraviolet disinfection
BATTERIES	
X Mercury-zinc *(button)* batteries	X Mercury alkaline batteries
X Mercury-cadmium batteries	X Mercury oxide batteries
PAINT	
☐ Old latex-paint (pre-1990)	☐ Marine paint
FIRST AID/MEDICAL	
☐ Mercurochrome	☐ Thermometers
☐ Sphygmomanometers	☐ Thimerosal *(contained in eye wash)*
OTHER	
☐ Old pesticides, fungicides and herbicides	☐ Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps
☐ Tree root growth control products	
X Computer monitors	
COLLECTION SYSTEM	
☐ Lift station equipment	☐ Sewer lines with accumulated mercury
☐ Traps with accumulated mercury	☐ Other mercury containing equipment
☐ Sumps with accumulated mercury	☐ Mercury-containing chemicals used and/or stored on-site
MERCURY STORAGE SITES	
☐ Elemental mercury	☐ Mercury-containing items collected for disposal

B. Provide a plan and schedule for providing a complete inventory initiated under Section A. above. *(see 327 IAC 5-3.5-9(a)(1))* The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

A complete inventory should include an estimate of quantities *(i.e., volume of chemicals used annually, or numbers of mercury containing equipment)* for each item identified in Part II.A. Additionally, a complete inventory should include documentation from chemical suppliers and equipment suppliers of the mercury content in your most commonly purchased items. Mercury may not be present in a concentration great enough to appear on an MSDS, yet still contribute to the overall level of mercury in the influent.

See Outfall 015 PMPP Section 2.2 and Attachment III.

* This checklist was borrowed from the Delta Institute

PART THREE - POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) PLANNED ACTIVITIES

A. Provide a list of planned activities to be conducted to eliminate or minimize the release of mercury to waters of the state. The list of planned activities may consider technical and economic feasibility and must include, at a minimum: *(see 327 IAC 5-3.5-9(a)(3))*

1. A review of purchasing policies and procedures.

See Outfall 015 PMPP Section 3.2 and Attachment V

2. Necessary training and awareness for facility staff.

See Outfall 015 PMPP Section 3.2 and Attachment V

3. Evaluation of alternatives to the use of any mercury-containing equipment or materials.

See Outfall 015 PMPP Section 3.2 and Attachment V

4. Other specific activities designed to reduce or eliminate mercury loadings.

See Outfall 015 PMPP Section 3.2 and Attachment V

5. An identification of the facility's responsibilities under P.L.225-2001 *(also known as House Enrolled Act 1901 of the 2001 legislative session)*. P.L.225-2001 outlines the restrictions on the sale or supply of mercury-added novelties, mercury-added products, and mercury commodities, and on the use or purchase of mercury commodities, compounds, or mercury-added instructional equipment and materials by public and non-public schools. In order to satisfy the requirement of this part, include a written statement that attests to the fact that an identification of the responsibilities under P.L.225-2001 has been undertaken.

See Outfall 015 PMPP Section 3.3

B. For each planned activity identified under section A. above, include the following: *(see 327 IAC 5-3.5-9(a)(4))*

1. The goal to be accomplished.

See Outfall 015 PMPP Attachment V

2. A measure of performance.

See Outfall 015 PMPP Attachment V

3. A schedule for action. The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

See Outfall 015 PMPP Attachment V

C. Provide an identification of the resources and staff necessary to implement the Pollutant Minimization Program Plan (PMPP). *(see 327 IAC 5-3.5-9(a)(6))* The identification should indicate the source and amount of funding available to implement the PMPP, as well as the number and position of employees that will be devoted to PMPP implementation.

See Outfall 015 PMPP Section 3.5

PART FOUR – MERCURY MONITORING DATA

Provide all available influent and effluent mercury data for the two-year period preceding submittal of this application. Additionally, provide any information on mercury in biosolids for the two-year period preceding submittal of this application, if available. The data may be supplied on a separate form, but must include results for each individual sample *(including unit of measurement and U.S. EPA method)*, the date the sample was taken, and the analytical laboratory where the analysis was performed. *(see 327 IAC 5-3.5-9(a)(5))*

Influent

Date *(month, day, year)*	Result	ng/l	U.S. EPA Method	Analytical Laboratory
See Outfall 015 PMPP – Table IV-1				

PART FOUR (CONTINUED)

Effluent

Date *(month, day, year)*	Result	ng/l	U.S. EPA Method	Analytical Laboratory
See Outfall 015 PMPP – Table VI-2				

Biosolids

Date *(month, day, year)*	Result	Unit	U.S. EPA Method	Analytical Laboratory
No mercury monitoring of relevant biosolids associated with this outfall.				

PART FIVE – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) ADDITIONAL REQUIREMENTS

A. <u>Proof of Public Notice Activities</u>: Provide proof of the public notice activities identified below: *(see 327 IAC 5-3.5-9(c))*
For the notice of availability required under Section A.1. provide a copy of the notice as it appears in the newspaper. For the posting requirements under Section A.2. attest to that fact that the information was posted as required in a written statement.

1. Publish notice of the availability of the draft pollutant minimization program plan (PMPP) in a daily or weekly newspaper of general circulation throughout the area affected by the discharge.

2. Post a copy of the information required by this section at the following:

   a. Principal office of the municipality or political subdivision affected by the facility or discharge.
   b. The United States post office.
   c. If one is available, the library serving those premises.

3. All notices published under this section shall contain the following information: *(see 327 IAC 5-3.5-9(d))*

   a. The name and address of the applicant that prepared the PMPP.
   b. A general description of the elements of the PMPP.
   c. A brief description of the activities or operations that result in the discharge for which an SMV is being requested.
   d. A brief description of the purpose of this notice and the comment procedures.
   e. The name of a contact person, a mailing address, an Internet address, if available, and a telephone number where interested persons may obtain additional information and a copy of the PMPP.

   See 015 PMPP Section 5.0 and Attachment VI

4. The applicant shall do the following: *(see 327 IAC 5-3.5-9(e))*

   a. Provide a minimum comment period of thirty (30) days.
   b. Include a copy of the comments received and the applicant's responses to those comments in the SMV application submitted to the department.

B. <u>Annual Reports:</u> Provide a schedule for the submission of the annual reports required under 327 IAC 5-3.5-9(a)(8). Generally, the annual reports should be submitted each year on the anniversary of the effective date of the NPDES permit that incorporates the approved SMV. A proposed schedule with an alternative submittal date is subject to IDEM's approval. The annual reports shall include a description of the facility's progress toward fulfilling each PMPP requirement, mercury monitoring results, and steps taken to implement each planned activity developed under the PMPP.

See 015 PMPP Section 6.0.

Outfall 015
Pollutant Minimization Program Plan for Mercury
(April 2020)

Mercury Pollutant Minimization Program Plan for Outfall 015

NPDES Permit IN0000281

Prepared for:

United States Steel Corporation Gary Works
Gary, Indiana

Submitted to:

The Indiana Department of Environmental Management
IGC North – 13th Floor
100 N. Senate Avenue
Indianapolis, Indiana

Date:

April 2020

Contents

1.0 Introduction

1.1 Background

U. S. Steel – Gary Works (U. S. Steel) operates an integrated steel mill in Gary, Indiana (Lake County). Intermediate and final products include sinter, iron, raw steel, cast steel, plate, hot strip, cold rolled strip and coated steels. The plant also includes ancillary facilities to support the production processes, such as boiler houses, maintenance facilities, environmental control systems such as scale pits, oil-water separators, a restricted waste type I landfill, and wastewater treatment (WWT) facilities, business administration operations, and shipping and receiving facilities. The facility operates continuously.

U. S. Steel is currently authorized to discharge waters including non-contact cooling waters (NCCW), stormwater, and/or process wastewaters from Outfalls 015, 018, 019, 020, 021, 023, 026, 028/030, 032, 033, and 034 to the Grand Calumet River and from Outfalls 035, 037, 039, 041A/B[1] to Lake Michigan pursuant to NPDES Permit IN0000281 (Permit).

The current Permit (renewed permit effective November 1, 2015 with the latest modification set to become effective May 1, 2020) includes monitoring and water quality-based effluent limits (WQBELs) for mercury at external Outfall 015 with a 5-year compliance schedule.[2] The interim effluent limits for total recoverable mercury require monitoring and reporting on a bi-monthly basis. The final effluent limits are as follows:

Hg Daily Maximum (ng/L)	Hg Monthly Average (ng/L)	Hg Daily Maximum (lb/d)	Hg Monthly Average (lb/d)
3.2	1.3	0.000045	0.000018

The Indiana Department of Environmental Management (IDEM) implemented the Streamlined Mercury Variance (SMV) process[3] (327 Indiana Administrative Code (IAC) 5-3.5) that allows for an interim limit for mercury discharges that is based on representative effluent data. U. S. Steel is seeking to obtain an SMV interim discharge limit for Outfall 015 pursuant to 327 Indiana Administrative Code (IAC) 5-3.5.

Pursuant to 327 IAC 5-3.5, U. S. Steel has prepared this Pollutant Minimization Program Plan (PMPP) for mercury. As required by 327 IAC 5-3.5-9(a), this PMPP includes:

1. Results of a preliminary inventory of potential uses and sources of mercury, excluding raw materials, in all buildings and departments[4] and a plan and schedule for providing IDEM results of a complete inventory;
2. Preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites[3];

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[1] Though authorized for discharges, Outfalls 041A/B are not currently in use.
[2] Please note that other outfalls also have mercury limitations but this Pollutant Minimization Program Plan (PMPP) pertains only to Outfall 015. The Outfall 015 60-month Schedule of Compliance schedule period for mercury began on the effective date of the modified Permit, February 1, 2017.
[2] IDEM's SMV FAQ Document uses the following to compare an individual variance to the SMV process: "While an individual variance focuses on pollutant removal (treatment) technologies, the SMV is a streamlined process focusing on pollution prevention and source control to achieve mercury effluent reductions due to a recognized lack of economically viable end-of-pipe treatment options."
[4] Within the Outfall 015 drainage area.

3. A list of planned activities to be conducted to eliminate or minimize the potential release of mercury to the water, and for each activity, the goal to be accomplished, the measure of performance, and a schedule for action;
4. All available mercury monitoring data for Outfall 015 for at least a 2-year period preceding the submittal of an SMV application;
5. Identification of the resources and staff necessary to implement the PMPP;
6. Proof of completion of public notice activities required under 327 IAC 5-3.5; and
7. Annual reporting according to a schedule in this PMPP.

1.2 Purpose of the Pollutant Minimization Program

The purpose of the Pollutant Minimization Program is to establish guidelines and procedures that, when implemented, provide a process (and schedule) for minimizing the potential to release mercury into waters discharged from Outfall 015. As such, the Pollutant Minimization Program identifies documentable and measurable activities related to management or reduction of mercury within the area encompassing the Outfall 015 drainage area. Though these activities may not result in an analytically quantifiable reduction in mercury concentrations in discharge waters, the actions are focused on reducing or eliminating the risk of mercury addition from a controllable mercury source. This PMPP has been developed to satisfy the requirements of the SMV regulations presented in 327 IAC 5-3.5-9.

1.3 Current Outfall 015 Description

The Outfall 015 discharge is required to be protective of the water quality of the Grand Calumet River. There are no technology-based effluent limit guidelines (ELGs) applicable to the type of wastewaters discharged from Outfall 015 for iron and steel production facilities (Title 40 Code of the Federal Regulations (CFR), Section 420). Specifically, U. S. Steel is currently[5] authorized to discharge the following waters to the Grand Calumet River via Outfall 015 (average flow of 2.1 MGD, maximum monthly average of 2.4 MGD[6]): Sinter Plant non-contact cooling water, PCI East non-contact cooling water, steam condensate, storm water runoff, Internal Outfall 607, and Internal Outfall 501. Additional details regarding the origin of these discharges are presented below. PMPP Attachment I, PMPP Figure 1 includes a line discharge diagram for discharge sources to Outfall 015.

- Non-contact cooling water and steam condensate from the No. 3 Sinter Plant. The Sinter Plant process heats iron ore fines and other feed material at high temperature to agglomerate all materials into the sinter product which can then be charged into the blast furnaces. Feed material includes ore fines, coke, reverts (including blast furnace dust, mill scale, and other by-products of steelmaking), recycled hot and cold fines from the sintering process, and trim materials (e.g., limestone, calcite fines, and other supplemental materials needed to produce a sinter product). These feed materials are fused together through the combustion of natural gas and/or COG, plus the ignition of coal and coke fines in the sinter feed.
- Non-contact cooling water from Pulverized Coal Injection East (PCI East). PCI East is the facility in which coal is pulverized and then subsequently blown into the blast furnaces.
- Treated wastewater from Outfall 607 which is the discharge from the Leachate Treatment Plant (LTP). Treated wastewater is primarily of SWD-1 leachate along with vacuum truck wastewater

[5] Previously, internal Outfall 501 was routed to discharge through Outfall 005. In May 2017, Outfall 005 was closed and internal Outfall 501 re-routed to discharge through Outfall 015.
[6] Flows based on the timeframe of May 2017 – December 2019.

and truck wash decant pad water. SWD-1 is an onsite Restricted Waste Type I Landfill comprised of nonhazardous, special wastes from iron and steel making processes. High volume wastes disposed of at the SWD-1 Landfill include No. 1 Basic Oxygen Process (BOP) classifier sludge, BOP wastewater treatment sludge, No. 2 Quelle-Basic Oxygen Process (Q-BOP) classifier sludge, Q-BOP wastewater treatment sludge and Blast Furnace Recycle System Sludge. Addition of any new waste stream requires characterization and approval from the permitting agency.

  - The LTP was upgraded in 2015-2016 to address the need to treat increasing volumes of leachate (related to increased open, active SWD-1 landfill acreage). The revised treatment system is not designed specifically for low-level mercury removal but rather general leachate constituent treatment. Starting in January 2017, LTP treatment consists of equalization, clarification, sand filtration, and granulated activated carbon. PMPP Attachment I, PMPP Figure 2 presents a diagram of the LTP system.

- Treated wastewater from Outfall 501 which is the discharge from the Environmental Treatment Facility (ETF). Current wastewaters[7] include the following: remediation groundwater, boiler feedwater pre-treatment, freeze protection water; boiler blowdown and condensate; precipitation and stormwater; and miscellaneous intermittent water (e.g. former coke plant area clean-up wastewaters).
  - ETF treatment consists of equalization, activated sludge biological treatment, and sand filtration. A belt press is used to dewater the excess activated sludge. In the last several years (since shutdown of the coke batteries) the composition of wastewater through the ETF has been subject to changes related to processing of the remaining process wastewater inventory, periodic treatment of clean up waters from the coking area, and the addition wastewater from new remediation boilers along with increased remediation groundwater volume due to more wells. PMPP Attachment I, PMPP Figure 3 presents a diagram of the ETF system.
- Stormwater from the following drainage areas: sinter plant, four blast furnaces, and the SWD-1 facility.

The source of the water supplied for processes in this drainage area, which is on average about 50% non-contact cooling water, is Lake Michigan via the No. 4 Pump Station[8]. The intake waters are treated as needed for mussel and biofouling control with sodium hypochlorite and sodium bisulfite prior to discharge for dechlorination.

Water treatment additives associated with Outfall 015 include those used as part of wastewater treatment for both the LTP and the ETF, mussel and biofouling chemicals for the intake waters, biofouling and water conditioning chemicals (e.g., softeners, corrosion inhibitors), and dechlorination chemicals. These chemicals associated with Outfall 015 discharges are presented in the preliminary inventory which is addressed in Section 2.

1.4 Future Potential Changes to Outfall 015

U. S. Steel is investigating future plans to potentially redirect the wastewaters currently treated by the LTP to the ETF for treatment. Under this scenario, all wastewaters associated with current internal Outfall 607 and 501 would be treated by the ETF and the LTP eliminated.[9] PMPP Attachment I, PMPP Figure 3 shows the potential discharges to the ETF and Outfall 015 under this possible scenario. No new treatment technologies are proposed to be installed or upgraded at the ETF as part of this potential change. This

[7] Prior to shutdown of all coke batteries in 2015, the ETF also treated coke plant wastewater.
[8] No. 3 Pump Station can also supply intake water but is not currently being utilized.
[9] Pursuant to the latest permit modification (set to become effective May 1, 2020) U. S. Steel is authorized to proceed with these described changes.

proposed change is not expected to result in significant differences to Outfall 015 mercury concentration and mass levels. As such, this PMPP is considered applicable to both the current Outfall 015 discharge and the proposed potential future Outfall 015 discharge. In fact, PMPP activities are already included in Attachment V should the proposed change occur.

2.0 Pollution Minimization Program Plan Inventory/Identification (327 IAC 5-3.5-9(a))

2.1 Inventory of Potential Uses and Sources of Mercury (327 IAC 5-3.5-9(a)(1))

Part Two, Section A of the draft SMV application[10] contains the preliminary inventory of equipment, chemicals, and other mercury-containing devices that may be present or have the potential to come in contact with waters discharging to Outfall 015 (see PMPP Attachment II). The tables in PMPP Attachment III give additional inventory details beyond that provided in Part Two, Section A of the draft SMV application.

Based on the results of the preliminary inventory, potential sources of mercury that may be present or have the potential to come in contact with waters discharging to Outfall 015 include:

- Intake water from Lake Michigan[11];
- Storm water[12];
- Sludges disposed of in the SWD-1 Landfill;
- Remediation groundwater;
- Water treatment chemicals
- Other stored chemicals and fuel[13].

As summarized in PMPP Attachment III, no other sources of mercury are anticipated to be present in discharges as none have been identified on the preliminary inventory in Part Two, Section A of the completed SMV application. U. S. Steel, in collaboration with other Northwest Indiana steel mills, has previously[14] conducted an extensive evaluation into mercury-containing equipment and devices prevalent in steel manufacturing (including switches, thermometers, and gauges). As an outcome of this joint venture, the mercury-containing equipment and devices found across the U. S. Steel Facility were subsequently removed. All of the mercury-containing equipment and devices have been removed in the areas that could potentially come into contact with wastewaters discharged from Outfall 015.

2.2 Schedule for Providing Complete Inventory (327 IAC 5-3.5-9(a)(2))

The inventory of mercury and mercury-containing materials is included as PMPP Attachment III and gives a location and estimate of quantities for each item identified in Part Two, Section A of the draft SMV application. The inventory also includes estimates based on available information (e.g., provided by suppliers, vendors, manufactures, or direct measurement.)

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[10] The completed SMV application form, including Part Two (Section A), will be submitted with this PMPP as part of the complete SMV Application submittal to IDEM.

[11] On average this may be 84% of the flow (as once-through NCCW) to Outfall 015.

[12] As per National Wildlife Federation Cycle of Harm: Mercury's Pathway from Rain to Fish in the Environment. May 2003, 2nd edition rainwater in Indiana can contain high concentrations of mercury (up to 10.9 ng/L). U.S. Steel uses best management practices in controlling storm water pollution via the Storm Water Pollution Prevention Plan (SWPPP).

[13] Chemicals and fuel generally stored in tanks located within the Outfall 015 drainage area that has the potential to reach surface waters via open storm water manholes in the event of a leak. The potential is minimal given various in place preventive measures (e.g. secondary containment, the Spill Prevention Control and Countermeasure (SPCC) Plan, and the Storm Water Pollution Prevention Plan (SWPPP)).

[14] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001), and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

U. S. Steel will provide applicable updates to the completed inventory with the required annual progress reports (Section 6.0).

2.3 Analysis of Mercury in Water Discharges

In support of this PMPP, mercury sampling was performed at the associated intake (No. 4 Pump Station), external Outfall 015, internal Outfall 607, and internal Outfall 501 (see PMPP Attachment IV for details of the mercury sample results). As a conservative measure, if the sample result was non-detect, the method detection limit was used in the calculation of the average and geometric mean. A brief summary for each location is listed below:

- Intake Water (No. 4 Pump Station) from Lake Michigan Total mercury monitoring from February 2009 through February 2020 yield the following results:
  - Average of 2.5 ng/L; Geometric mean is 0.77 ng/L;
  - Maximum of 75 ng/L (September 2018). This is also the maximum result for the most recent two-year period (March 2018 – February 2020).

- Outfall 607: Total mercury monitoring from January 2017 (when the upgraded LTP system was started) to February 2020 yield the following results:
  - Average of 26.4 ng/L; Geometric mean of 18.3 ng/L
  - Maximum of 168.5 ng/L (March 2018). The is also the maximum result for the most recent two-year period (March 2018 – February 2020).

- Outfall 501: Total mercury monitoring from May 2017 (when Outfall 501 was re-routed to discharge through Outfall 015) to February 2020 yielded the following results:
  - Average of 11.4 ng/L; Geometric mean of 9.2 ng/L
  - Maximum of 30.6 ng/L (January 2018). For the most recent two-year period (March 2018 – February 2020) the maximum result is 11.7 (April 2018).

- Outfall 015: Total mercury monitoring from May 2017 (when Outfall 501 was re-routed to discharge through Outfall 015) to February 2020 yield the following results:
  - Average of 2.5 ng/L; Geometric mean of 2.0 ng/L
  - Maximum of 14 ng/L (December 2019). The is also the maximum result for the most recent two-year period (March 2018 – February 2020).

On average (May 2017 – December 2019), the combined Outfall 501 and Outfall 607 flow contribute approximately 17% of the overall flow to Outfall 015 with the remainder being comprised primarily of non-contact cooling water. When potential mercury contributions to Outfall 015 from these three sources is evaluated on an overall average mass basis, the non-contact cooling water[15] is determined to have the highest potential contribution[16] of mercury to Outfall 015.

The details of any mercury related activities planned within the Outfall 015 drainage area are discussed in Section 3.

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[15] Intake mercury concentrations were utilized as reasonable estimate of non-contact cooling water mercury levels whereas actual Outfall 501 and Outfall 607 mercury monitoring data were utilized.

[16] On a relative and average basis (May 2017 – December 2019 dataset), the non-contact cooling water is about 48% of the combined mass for all three sources (Outfall 501, Outfall 607, and estimated non-contact cooling water) whereas Outfall 501 and Outfall 607 were 24% and 28% respectively.

3.0 Planned Activities to Eliminate or Minimize Releases of Mercury to the Water

3.1 Overall Basis of the Planned Activities

Planned activities target both types of potential mercury sources listed in the inventory: those that may impact or come in contact with discharge waters, as well as those that are risk based. However, the main focus is concentrated on targeting specific chemicals or equipment that has the potential to release mercury to waters that discharge via Outfall 015.

To determine impacts of non-contact cooling water on Outfall 015 discharge, U. S. Steel has monitored the intake and internal outfalls (607 and 501) in addition to monitoring of NPDES required discharges. U. S. Steel utilized the dataset generated, combined with operational and process information, to determine which items on the mercury inventory have the most potential to release mercury to the discharge water. Actions were then generated to address these potential sources with one (or more) of the three following types of activities.

- Type 1: Source Characterization – additional investigation to understand the contribution from a potential source, including confirmation of potential sources as well as tasks to rank of likelihood of impacting discharges.

- Type 2: Alternatives for Reduction Evaluation - exploration into means of reducing or eliminating an identified source. Investigations may include research into best management practices, material substitution, or reduction technologies. Evaluations to determine overall feasibility and benefits may include mercury content and contribution, operability, reliability, economic impact, and effectiveness of alternative practices or materials.

- Type 3: Awareness and Containment Control Implementation – education of personnel and application of specific handling, housekeeping, and disposal practices for potential mercury-containing materials or equipment.

3.2 Plan and Schedule of Activities (327 IAC 5-3.5-9(a)(3))

Pursuant to Part Three A and B of the SMV Application, U. S. Steel will implement a plan and schedule of activities to reduce or minimize the potential to release mercury to waters discharged to the Grand Calumet River via Outfall 015. PMPP Attachment V contains the plan and schedule of activities that was developed based on the results of the source data and associated inventory summarized in Section 2 of this PMPP. U. S. Steel will implement the following activities according to the associated schedule of action as summarized in PMPP Attachment V. Some activities are staged or staggered so that results from initial activities can be used to guide and effectively focus resources in subsequent activities. In addition, some activities that address chemicals/equipment with a higher potential for discharge to surface waters (as identified in Attachment II) will have a higher priority than those with lower potential. It is also possible that the results of Type 1 activities (i.e. source characterizations) may disprove initially identified potential sources – if so, further activities specific to that source may not be required.

3.2.1 Summary of Activities

Several activities may impact more than one item or type of material that may contain mercury. These actions or policies are summarized below.

3.2.1.1 Source Characterization (Type 1 Activity)

Where potential sources of mercury have been identified, additional investigation will be made to confirm the potential source. Once confirmed, an understanding of contribution of the source to the final discharge will be explored. Activities towards these goals include:

- Researching the amount of mercury in materials that have the potential to contribute mercury to waters discharged to the Grand Calumet River through Outfall 015. This is typically accomplished through discussions with vendors, review of literature, and/or direct measurement.

- Estimation of the magnitude of the source. This is typically done via quantification of the amount of mercury that may be discharged based on the amount of chemicals used, the volumes of the waste streams, and/or the number of mercury-containing materials present.

3.2.1.2 Alternatives for Reduction Evaluation (Type 2 Activity)

U. S. Steel, along with other steel mills in Northwest Indiana, previously[17] conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site. U. S. Steel policy is that mercury added equipment/devices are not to be supplied with the exclusion of equipment where there is no alternative (i.e. bulbs, batteries, etc.). Furthermore, mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Should a material on the non-approved list be encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Chemicals that do not have mercury as an added constituent but are known to contain trace amounts of mercury will be evaluated on a case by case basis. For example, evaluations will be prioritized based on not just mercury content, but also the potential risk of impacting the associated final discharge. Chemicals with a higher potential (e.g., water treatment additives used in final treatment steps) will be examined prior to those with a lower risk (e.g., process chemicals or water treatment additives such as flocculants and those used in closed-loop systems). Alternative consideration may include investigations into materials that have less (or no) mercury, alternative activities or processes in which there is less potential for mercury to be discharged (such as different laboratory practices), and/or other improved treatment technologies as applied to a known source. Information such as mercury content and magnitude of the source contribution along with the operability, reliability, effectiveness and economic impact of potential alternatives may be used to determine the overall feasibility and benefit of alternative materials, processes, and/or technologies.

Based on the results of chemical or equipment evaluations, U. S. Steel may consider alternatives to mercury-containing chemicals that have a high potential for reaching the surface waters (i.e., mussel control and biofouling chemicals). Any identified alternatives that require significant capital to implement would be

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[17] See the following documents: "A Guide to Mercury Reduction in Industrial and Commercial Settings, a Joint Effort by Ispat Inland Indiana Harbor Works, Bethlehem Steel Burns Harbor Division, US Steel Gary Works, The Delta Institute, and the Lake Michigan Forum" (July 2001); and "Mercury Agreement Reduction Program of: International Steel Group, Burns Harbor; Ispat Inland, East Chicago, and US Steel, Gary" (January 2004).

evaluated with respect to feasibility, ease of operation/execution, and cost-effectiveness through a corporate-specific review process. The review process requires approval from multiple departments (e.g., procurement, environmental, work control) before implementation is approved.

3.2.1.3 Review of Purchasing Policies and Procedures (Type 3 Activity)

U. S. Steel has completed a review of purchasing policies and procedures with the objective of addressing the mercury content of purchases.

Mercury is included in U. S. Steel's list of non-approved and restricted substances. Mercury is designated as a non-approved substance which means that it should not be purchased, nor permitted on-site for contractor use. All new chemicals are subject to an approval process. The Material Hazards Review associated with the approval process includes a review of the SDS. If on the SDS, mercury is noted to be present in the chemical, it will not be approved for use. Furthermore, if a material on the non-approved list is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

For non-chemicals, U. S. Steel policy is that mercury added equipment/devices are not to be supplied or used with the exclusion of equipment/devices where there is no feasible alternative (e.g bulbs, batteries). Additionally, U. S. Steel fluorescent bulb purchases are of the low-mercury (also called "green bulbs") type.

3.2.1.4 Awareness Training for Facility Staff (Type 3 Activity)

U. S. Steel's training program for facility staff includes mercury awareness and disposal restrictions related to mercury. Additional training is provided to personnel with responsibility for maintaining mercury containing equipment[18], if applicable. The additional training consists of the following topics:

- Purchasing policies;
- Good housekeeping practices;
- Maintenance and cleaning practices;
- Recycling practices;
- Proper handling and disposal procedures;
- Spill kit locations; and
- Spill containment procedures.

These practices continue, however in support of this activity, U. S. Steel has worked to increase mercury awareness by highlighting mercury in a format outside of the normal training environment via distribution of a Mercury Awareness Bulletin.

3.2.1.5 Good Housekeeping Practices (Type 3 Activity)

U. S. Steel has implemented a good housekeeping program. Good housekeeping is the practice of maintaining a clean and orderly work environment. Providing a clean and orderly work area reduces the possibility of accidental spills and releases from equipment and materials. Good housekeeping is one of

[18] As previously discussed, U. S. Steel does not believe that there is any mercury-containing equipment with the exception of lamps, bulbs, and batteries in the drainage areas encompassing the Outfall 015 drainage area. U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered.

the focus areas for discussion during the awareness training, the details of which are described previously in Section 3.2.1.4.

3.2.1.6 Maintenance and Cleaning Activities (Type 3 Activity)

U. S. Steel has implemented procedures to be followed during maintenance and cleaning activities to minimize the release of mercury to the environment from equipment as well as chemicals used for maintenance and cleaning activities (e.g., solvents and oils). U. S. Steel also has a specific Standard Operating Practice (SOP) for decommissioning/removal of mercury-containing equipment should any be encountered. U. S. Steel, along with other steel mills in Northwest Indiana, has previously conducted an extensive evaluation into mercury-containing equipment and devices (including switches, thermometers, and gauges) across the U. S. Steel Facility. All known mercury-containing equipment and devices are believed to have been removed from the site.

3.2.1.7 Standard Operating Practices: Spill Response and Prevention (Type 3 Activity)

U. S. Steel has SOPs that address safe and proper techniques for addressing spills and leaks of various chemicals (including solvents used for maintenance and cleaning activities and oils such as lube oil used for equipment maintenance activities). Specific to mercury-containing materials are SOPs that address broken mercury thermometers, disposal of bulbs and lamps, and decommissioning/removal of mercury-containing equipment. Each of these SOPs address spill response efforts. Although all known mercury-containing equipment and thermometers have been removed from the site, these SOPs are conservatively written as though these types of mercury-containing equipment are still present. If a mercury spill occurs, a qualified contractor will be utilized for containment and clean up. For minor releases such as thermometers in on-site laboratories, a qualified contractor or mercury spill kit can be utilized.

With respect to spill prevention, U. S. Steel has SOPs that require inspections of the condition of above-ground storage tanks and associated secondary containment structures to reduce the possibility of a potential release to surface waters. For example, both the Storm Water Pollution Prevention Plan and Spill Prevention Control and Countermeasure Plan address spill prevention and include inspection requirements.

3.2.1.8 Disposal Practices of Mercury-Containing Chemicals/Items (Type 3 Activity)

U. S. Steel continues, through its E-Waste and Universal Waste Collection programs, to properly recycle/re-use/dispose of several types of items (which may or may not contain mercury). Data from this program is now utilized to track and estimate disposal of mercury PMPP related materials. Items that are specifically addressed by the PMPP include the following:

- Bulbs/Lamps – spent mercury-containing bulbs and lamps (e.g. fluorescent or sodium vapor lamps);
- Batteries – known mercury-containing batteries are lead-acid batteries[19] primarily used for standby emergency power and alkaline button cell batteries. The program involves collection of all batteries independent of mercury content;
- LCD-screens – for example computer monitors and laptop screens
- Mercury-Containing Equipment – could include mercury-containing equipment, vials or ampoules of mercury removed from equipment;

[19] Mercury is not added in the manufacture of this type of battery; trace mercury that may be present is associated with the electrolytic acid solution.

Note that U. S. Steel does not believe that any mercury-containing equipment remains within the Outfall 015 drainage area. As part of the multi-steel mill mercury inventory study that U. S. Steel participated in, U. S. Steel conducted facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these materials from the property. However, as discussed in Section 3.2.1.3, if mercury (as a material on the U. S. Steel non-approved list) is encountered on-site, there is a requirement to notify the Industrial Hygiene/Safety Department for the purposes of evaluating substitute products/materials and eliminate future purchases of the substance.

Proper disposal of mercury-containing materials varies by material type; however, disposal or recycling of items/chemicals containing mercury complies with applicable disposal/recycling regulations. U. S. Steel will provide updated quantities in each annual PPMP progress report.

3.2.2 Specific Application of Activities

U. S. Steel will utilize an integrated approach to address specific groups or types of items or materials. In each case, more than one activity will be employed towards the overall objective of minimizing the potential to release mercury through discharge waters.

3.2.2.1 Water Treatment Additives including Boiler Treatment Chemicals

The chemicals identified to potentially contain mercury are summarized in Attachment III. This includes water treatment additives used for mussel control, biofouling control, water conditioning including those for boiler feed waters, and chemicals (e.g. coagulants, flocculants) used in the various treatment schemes described in Section 1.3. The following are applicable to water treatment additives:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff;
- Source Characterization; and
- Alternatives for Reduction Evaluation (if deemed necessary by the results of the source characterization).

3.2.2.2 Stored and Other Chemicals

The Outfall 015 drainage area may include storage of fuel or storage/use of other chemicals not already discussed in Sections 3.2.2.1 or 3.2.2.2. Though not directly associated with Outfall 015 processes or water treatment, these materials[20] could reach surface waters via storm water conveyance. The potential is anticipated to be minimal given the various in-place preventive measures (e.g. secondary containment, the Spill Prevention Control and Countermeasure Plan, the Fugitive Dust Plan, and the Storm Water Pollution Prevention Plan).

3.2.2.3 Equipment that Contains Mercury

As previously discussed, no equipment that contains mercury exists within the Outfall 015 drainage area.

[20] This includes materials stored in the area (i.e. chemicals and fuels) as well as dust suppressant and de-icing (i.e. road salt) chemicals that are applied to limited surface areas.

3.2.2.4 Bulbs/Lamps That Contain Mercury

A preliminary listing of the known bulbs/lamps that contain mercury are summarized in Part Two A of the SMV application. U. S. Steel has already implemented a program whereby out-of-service mercury-containing bulbs/lamps are disposed of and replaced with low mercury bulbs/lamps. Collected bulbs are sent offsite for recovery/recycling of mercury. For example, for the period of Jan 2016 – September 2018, an estimated 0.1 to 1.3 pounds of mercury was reclaimed from thousands of bulbs facility-wide. If available, spent bulbs and lamps are replaced with low-mercury versions. Additionally, used globe style bulbs containing mercury, such as Metal Halide and Sodium Vapor lamps, are collected for recycling.

These practices will continue with support from the following:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff; and
- Disposal Practices for Mercury-Containing Items.

3.2.2.5 Batteries That May Contain Mercury

The known batteries that may contain mercury, which are summarized in Attachment II, are lead-acid batteries primarily used for standby emergency power.[21] U. S. Steel has already implemented a policy whereby out-of-service batteries are properly disposed of.

These practices will continue with support from the following:

- Purchasing Policies and Procedures;
- Good Housekeeping Practices;
- Maintenance and Cleaning Practices;
- Standard Operating Practices (Spill Response and Prevention);
- Awareness Training for Facility Staff; and
- Disposal Practices for Mercury-Containing Items.

3.2.2.6 Discharge Waters

The waters that discharge to the Grand Calumet River via Outfall 015 have been discussed in Sections 1.3 and 2.3.

In addition to the ongoing management of these waters to meet current limits, the planned activities are outlined in Attachment V. Activities may be sequentially staggered so that results from initial activities can be used to guide and effectively focus resources in subsequent activities. It is also possible that source characterizations may not confirm initially identified potential sources – if so, further activities specific to that source may not be required.

[21] Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

Many activities involve ongoing or as needed tasks. These include various tracking and monitoring tasks that will provide information to assess the possible need for other activities. Examples of critical activities are:

- Mercury characterization of all WTAs not already characterized and new WTAs. The characterization of WTAs may be tiered; for instance, those WTAs identified to have a high potential to reach surface waters will be examined before those determined to have a low potential.

- Periodic mercury monitoring of source waters to Outfall 015 (e.g. landfill leachate, Outfall 607, remediation groundwater, Outfall 501) for comparison of the results to historical data.

- Periodic evaluations of the ETF and LTP treatment systems with respect to mercury removal.

- Alternatives for Reduction Evaluation of chemicals (To be determined based on characterizations of water treatment and main process chemicals).

3.2.2.7 Specific Activities Already Implemented

U. S. Steel has already performed an evaluation for some potential sources of mercury and has implemented, initiated, or completed the following:

- Review of purchasing policies, disposal tracking, and implementation of various SOPs related to spill prevention, response, and maintenance.

- A facility-wide inventory of mercury containing equipment including switches, thermometers, and gauges and subsequently implemented a program to remove/replace these materials.

- Characterization of WTA's associated with 015 discharges. Already completed characterization information is included in Attachment III.

- Performed characterization and an alternatives analysis for reduction evaluation of sodium hypochlorite and sodium bisulfite used for mussel control and dechlorination respectively. Usage rates of these chemicals have been examined previously as part of U. S. Steel's Total Residual Chlorine (TRC) Pollution Minimization Program (PMP) Control Strategy. The U. S. Steel Permit allows year-round chlorination for control of zebra and quagga mussel populations. However, usage typically occurs from April through November only. Other use of sodium hypochlorite for biofouling control also occurs on an as needed basis. The usage rates for effective treatment in both situations are adjusted by monitoring the chlorine demand (as indicated by TRC) of the system. For example, with respect to feed rates for the intake pump stations, TRC is measured at least daily at multiple locations and sodium hypochlorite usage rates adjusted accordingly to maintain set residual levels. The set residual levels are necessary to provide effective mussel and/or biofouling control.

  Prior to final outfall discharge, dechlorination occurs with the addition of sodium bisulfite. The water quality-based effluent limitations (8 ug/L as a monthly average; 18 ug/L as a daily maximum) for TRC are lower than the analytical detection limit (20 ug/L). Therefore, a mass balance approach is used to ensure the effluent limitations are met. The usage rates of sodium bisulfite are determined such that there is a mass balance of sodium bisulfite to the historical maximum TRC measured at the associated intakes (or other locations where sodium hypochlorite is used). U. S. Steel has developed a mass balance model for each month within the mussel control season that uses the historical max TRC for that specific to that month. This aims to minimize sodium bisulfate usage while still 1) accounting for how chlorine demand can vary significantly over the course of mussel control season; and 2) maintaining compliance with the TRC Permit limitations.

As described above, further reducing the usage rates of sodium hypochlorite and sodium bisulfite to minimize the discharge potential from trace mercury within these chemicals is not feasible. U. S. Steel's preliminary and refined additional characterization for the specific sources (vendor/manufacturer) of sodium bisulfite and sodium hypochlorite confirmed that these remain significant potential water treatment additive sources of mercury. U. S. Steel is not aware of reduced mercury-content versions of either chemicals. As such, no further PMPP activities are planned with respect to these chemicals.

- Performed characterization and an alternatives analysis for reduction evaluation of sulfuric acid utilized at the LTP. Based on mercury content and overall range of usage rates sulfuric acid is a significant potential water treatment additive source of mercury to the Outfall 015 discharge. U. S. Steel performed additional characterization of sulfuric acid in order to confirm and refine the listed potential contribution which was based on one mercury analysis result. When multiple samples of the currently used material were tested, the results were wide ranging (~ 600 to ~14,500 ng/L). However, these values are well below common specifications for mercury in bulk sulfuric acid: 0.1 to 1 mg/L (100,000 ng/L to 1,000,000 ng/L). Based on a survey of sulfuric acid suppliers carried out by U.S. Steel's consultant, the lowest specifications for non-specialized (e.g. not semi-conductor industry grade material) for bulk sulfuric acid that vendors would commit to was in the 7,000-10,000 ng/L range. This is comparable to the concentrations observed for the material that U. S. Steel is currently using. As such, no further PMPP activities are planned with respect to sulfuric acid. The current estimated mercury content total in Attachment III is based on the average of the characterization results.

- Source characterization of condensate streams similar to those discharged to Outfall 015. The contributions from the sources of mercury from these sources are anticipated to be insignificant given the minimal concentrations of mercury measured in similar condensate streams and the low volume of condensate flows.

- Characterization of the remediation groundwater treated at the ETF. Groundwater is collected from two different areas for treatment at the ETF. 2019 data indicated variable mercury concentrations from both sources with one groundwater source having much higher concentrations of mercury. For both groundwater sources, the majority of the mercury was present as filterable[22] mercury.

- Evaluation of mercury removal by the sand filters (the final treatment step in the ETF system) including characterization of the type or form of mercury (dissolved or 0.45 micron filterable) present. Though the sand filters were not designed for removal of mercury, evaluation of the data indicates that mercury is also removed by the sand filters. Since the majority of mercury is present as filterable mercury, mercury removal across the sand filters is directly associated with solids removal.

- Characterization of the landfill leachate treated at the LTP. 2018-2019 data is relatively consistent in terms of typical total mercury concentrations. Though less dissolved (0.45 micron

[22] As measured by dissolved mercury following 0.45 micron filtration.

filtered) mercury data is available, concentrations were also relatively consistent and indicate the mercury is typically present as dissolved mercury.

- Evaluation of the current LTP treatment scheme with respect to mercury removal. This included characterization of the type or form of mercury (dissolved or 0.45 micron filterable) present at the various steps in the process. Evaluation of the data shows that the system is effective at removing filterable mercury (i.e. this mercury is bound to particulates); however, in general, the mercury is typically present as dissolved mercury.

- Characterization of non-contact cooling water (as represented by intake mercury concentrations), Outfall 501 and Outfall 607 for mercury and development of a rough mass balance for potential mercury contributions to Outfall 015. The evaluation indicates that the non-contact cooling has the highest potential mercury contribution to Outfall 015 (see Section 2.3 for more information).

3.3 Identification of Facility Responsibilities under P.L.225-2001

U. S. Steel is aware of their responsibilities under Public Law (P.L.) 225-2001 (also known as the House Enrolled Act 1901 of the 2001 legislative session and codified at IC 13-20-17.5) and will comply with all applicable requirements under the Act and associated Indiana Code.

3.4 Goals of Performance (327 IAC 5-3.5-9(a)(4))

For each activity identified in Section 3.2, this PMPP will also identify:

(A) The goal to be accomplished;

(B) A measure of performance; and

(C) A schedule for action.

As part of the required annual reports required pursuant to 327 IAC 5-3.5-9(a)(8), U. S. Steel will update IDEM on the progress of the activities identified in this section.

3.5 Resources and Staff Necessary (327 IAC 5-3.5-9(a)(6))

Pursuant to Part Three C of the SMV Application, the following key staff is responsible for implementing this PMPP:

Facility Personnel -
- Environmental Water Compliance Manager
- Procurement Buyer

Off-site Personnel –
- Environmental Specialist
- Technical Consultants
- Analytical and Sampling Support

Additional resources may be utilized when necessary and if appropriate.

With respect to funding, U. S. Steel will commit the funds necessary to complete to the schedule of planned activities pursuant to Section 3.2.

4.0 Mercury Monitoring Data (327 IAC 5-3.5-9(a)(5))

In support of obtaining an interim SMV limitation and as required pursuant to Part Four of the SMV Application, U. S. Steel has collected at least two years of mercury data from Outfall 015. In order to ensure that data was representative of the four seasons, sampling occurred in each calendar month of the year at least once over the course of the sampling program. Sampling was performed utilizing EPA Method 1669 sampling techniques. Analyses for mercury were in accordance with EPA Method 1631, Revision E. Mercury data was reviewed for applicable QA/QC requirements and deemed valid, unless noted.

As discussed in Section 2.3, the data collected are summarized in PMPP Attachment IV. The maximum mercury result for Outfall 015 in the most recent two-year period (March 2018 – February 2020) is 14.0 ng/L.

5.0 Proof of Completion of Public Notice Activities (327 IAC 5-3.5-9(c))

5.1 Public Notice Details

As required by Part Five A of the SMV Application, U. S. Steel published notice of availability of the PMPP and provided a comment period of thirty (30) days that started on March 2, 2020. No requests for a copy of the PMPP nor comments were received.

The notice of availability was published the notice in the Northwest Indiana Times on March 2, 2020 and posted at both the Gary Indiana Public Library and Gary Indiana Town Hall. Attachment VI includes proof of these notices. Permission to post the notice was denied by both the Gary Indiana and Merrillville Indiana branches of United States Post Offices.

6.0 Annual Reports (327 IAC 5-3.5-9(a)(8))

U. S. Steel will provide annual reports to IDEM based on the schedule required in the modified NPDES Permit that incorporates the SMV for Outfall 015. Each of the reports will describe the following:

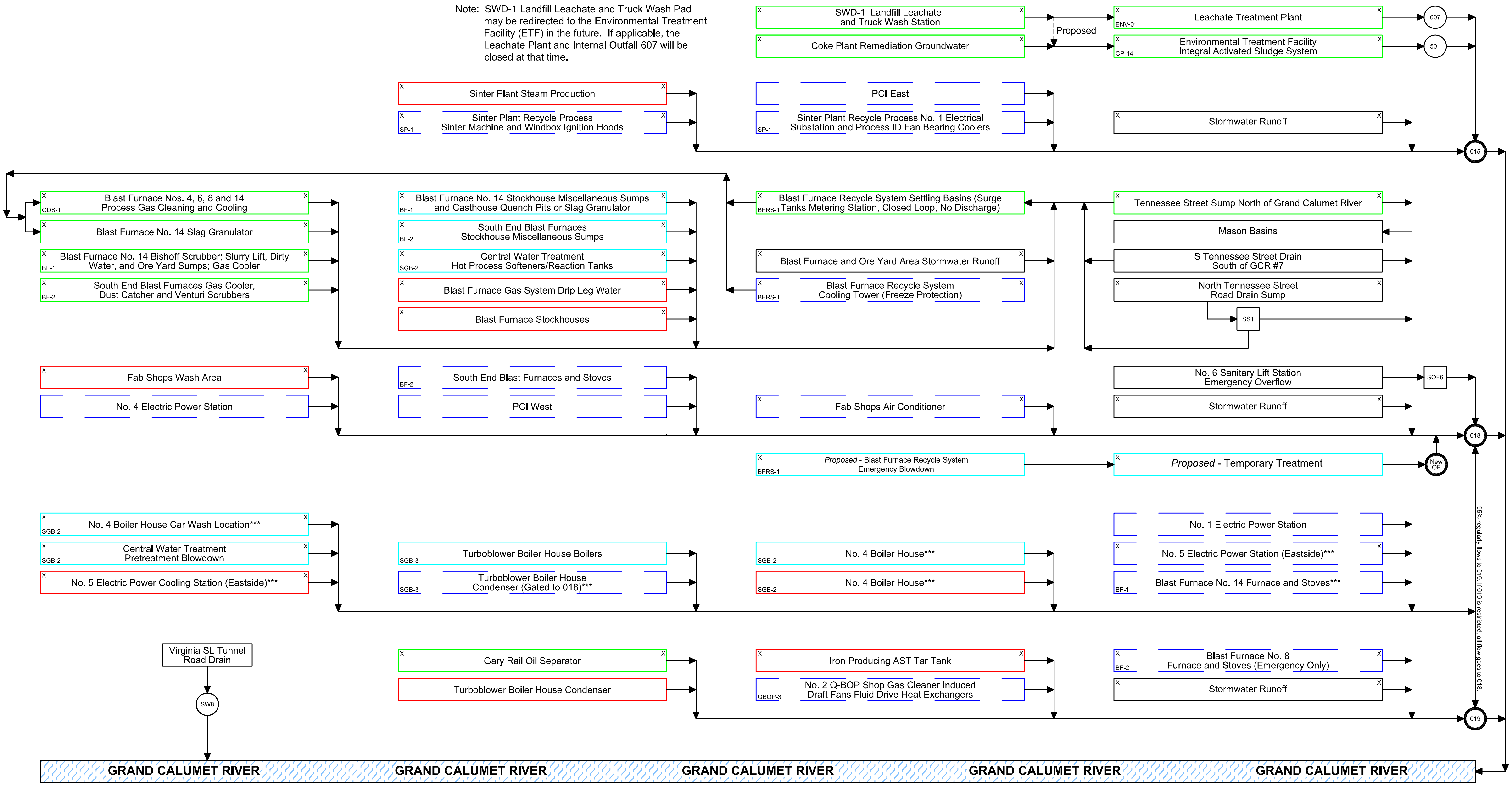
(A) U. S. Steel progress toward fulfilling each of the requirements of this PMPP;

(B) The results of the mercury monitoring collected during the intervening period; and

(C) The steps taken to implement each planned activity developed as part of this PMPP under Section 3.2 to reduce or eliminate mercury from Outfall 015 discharge, as applicable.

Attachment I: Figures

PMPP Figure 1 (LLD-02): Line Discharge Diagram for Outfall 015
PMMP Figure 2 (ENV-01): Leachate Treatment Plant Diagram
PMPP Figure 3 (CP-14): Environmental Treatment Facility Diagram



*** Majority of flow is distributed to Outfall 019 with small percentage routed to Outfall 018 because of elevation change.

FLOW DATA FROM MEASURED FLOW STATISTICS FOR PERIOD XXXX THROUGH XXXX.

NON-CONTACT COOLING WATER	
CONDENSATE	X PUMP STATION
BACKWASH, WASHDOWN, BLOWDOWN	# INTERNAL MONITORING OR DISCHARGE POINT
PROCESS WATER	# OUTFALL

Drawing By:
ST Environmental LLC, PO Box 40129, Austin, TX 78704
Phone: (219) 728-6312

REVISION DATE:	04/28/2020
FILE PATH:	Drawings/LDDs/20xx xxxx
FILE NAME:	LDD-02

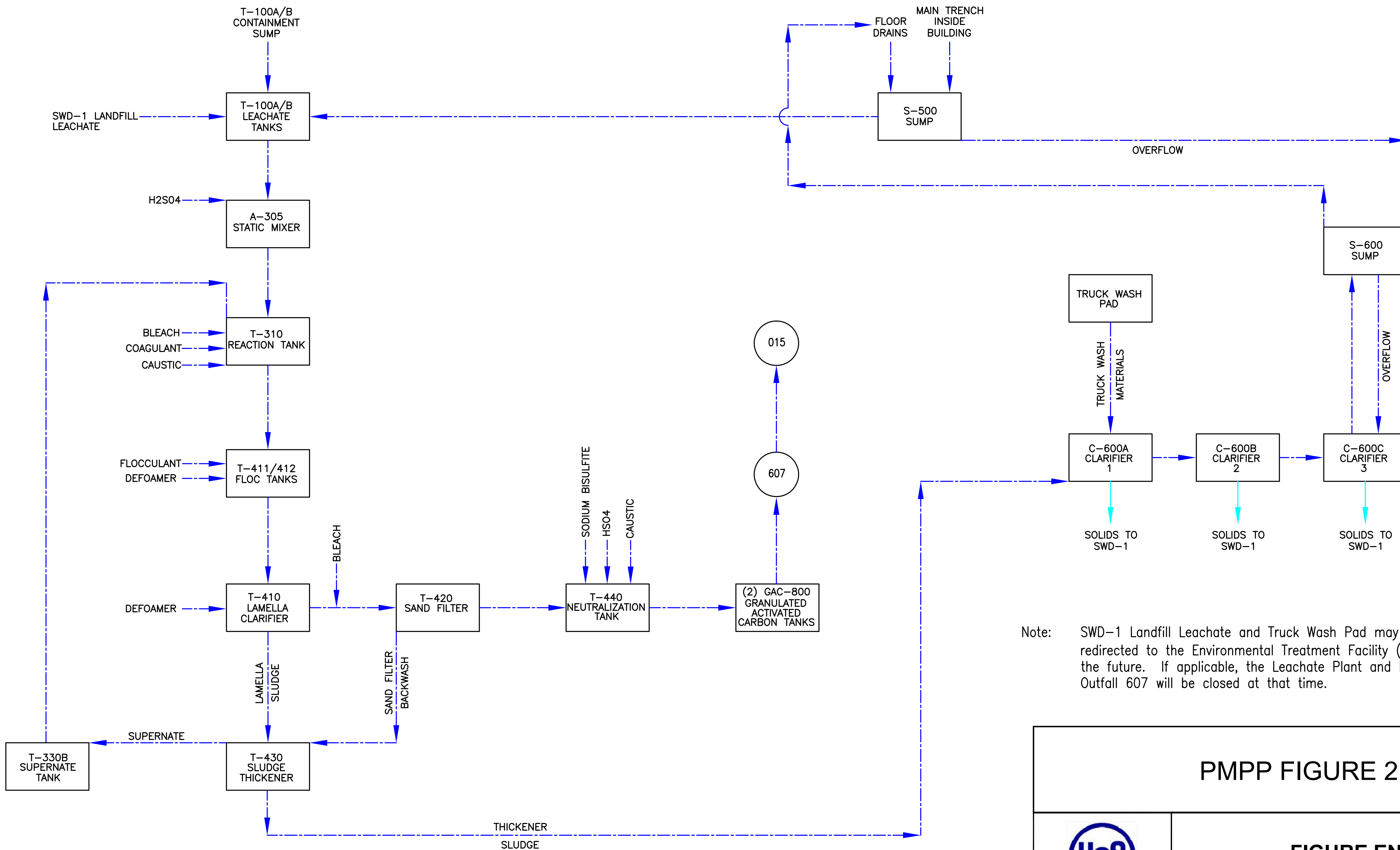
FIGURE LDD-02

U.S. Steel - Gary Works Line Discharge Diagram

Outfalls: 015, 018, 019, 501 & New OF

LEACHATE PLANT

TRUCK WASH PAD & CLARIFIER SYSTEM



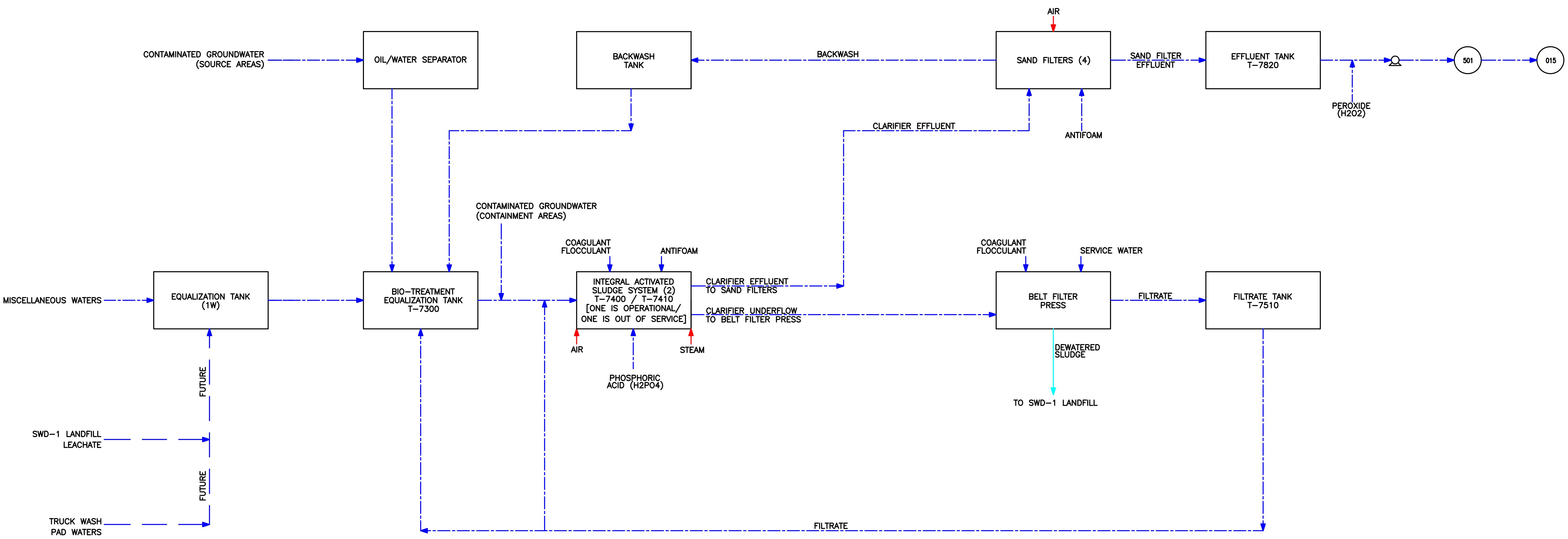
Note: SWD-1 Landfill Leachate and Truck Wash Pad may be redirected to the Environmental Treatment Facility (ETF) in the future. If applicable, the Leachate Plant and Internal Outfall 607 will be closed at that time.

PMPP FIGURE 2

FIGURE ENV-01
U.S. Steel - Gary Works Process Flow Diagram
SWD-1 Landfill
Leachate Treatment Plant

ST Environmental LLC
PO Box 40129
Austin, TX 78704
(219) 728-6312

PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE:	02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH:	Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME:	CP-14



Note: SWD-1 Landfill Leachate and Truck Wash Pad may be redirected to the Environmental Treatment Facility (ETF) in the future. If applicable, the Leachate Plant and Internal Outfall 607 will be closed at that time.

PMPP FIGURE 3

FIGURE CP-14

U.S. Steel - Gary Works Process Flow Diagram
Former Coke Plant/Coal Chemical Area
Environmental Treatment Facility (ETF)
Water Treatment Process

ST Environmental LLC
PO Box 40129
Austin, TX 78704
(219) 728-6312

PRODUCT OR PROCESS THROUGHPUT	GASEOUS MATERIAL STREAMS	OUTFALL NUMBER	REVISION DATE:	02/04/2020
LIQUID MATERIAL STREAMS		AIR EMISSION SOURCE	FILE PATH:	Drawings/PFDs/20xx xxxx
SOLID MATERIAL STREAMS		SOLID WASTE STREAM	FILE NAME:	CP-14

Attachment II:
Draft Version – Part Two of the
Streamlined Mercury Variance Application

PART TWO – POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) INVENTORY/IDENTIFICATION

A. Provide a preliminary inventory of potential uses and sources of mercury in all buildings and departments, as well as a preliminary identification of known mercury-bearing equipment, wastestreams, and mercury storage sites. The following checklist* includes many of the chemicals, equipment, locations, etc. where mercury may be present at your site. For the purpose of satisfying the requirements of this section, you may submit the completed checklist as a preliminary inventory/identification. While the checklist is intended to facilitate the inventory/identification process, it should not be considered as all-inclusive for purposes of establishing a complete inventory. *(see 327 IAC 5-3.5-9(a)(1) and 327 IAC 5-3.5-9(a)(2))*

LABORATORY EQUIPMENT

☐ Manometers	☐ Ion exchange cartridges for lab water purification system
☐ Barometers	☐ Hanging mercury drop electrodes for polarographic analyzers
☐ Thermometers	☐ Mercury Hallow Cathode lamp for AA analysis

LABORATORY CHEMICALS

☐ COD analysis reagent *(mercuric sulfate)*	☐ Mercury or mercurous chloride
☐ TKN and TP analysis digestion reagents	☐ Mercury iodide
☐ Nessler reagent	☐ Mercury nitrate
☐ Mercury analytical standards	☐ Mercury (II) oxide
☐ Gas chromatograph sample interferences *(elemental mercury)*	☐ Mercury (II) sulfate
☒ Sodium hypochlorite *(Clorox)*	☐ Merthiolate

BULK CHEMICALS

☐ Phosphorus removal chemicals	☒ Chlorine
☒ Dechlorination chemicals	☒ Sodium hypochlorite
☐ Sludge thickening polymers	☒ Sulfuric acid
☐ Potassium hydroxide	☐ Nitric acid
☒ Sodium hydroxide	☐ Ferric or ferrous chloride
☐ Sodium chloride	☐ Pickling liquor *(for phosphorus removal)*

PROCESS CONTROL AND MEASURING EQUIPMENT

☐ Accustats	☐ Ring balances
☐ Barometers	☐ Shunt trips
☐ Counterweights	☐ Steam flow meters
☐ Elemental mercury for refilling mercury-containing equipment	☐ Stokes gauges Switches and relays:
☐ Flow meters	☐ Displacement plunger relays
☐ Gas regulators and meters	☐ Mercoid control switches
☐ Gyroscopes	☐ Pressure control switches *(mounted on bourdon tube or diaphragm)*
☐ Hydrometers with thermometers	☐ Relay switches
☐ Level and rotation sensors	☐ Mercury wetted relays
☐ Manometers, pressure gauges and vacuum gauges	☐ Mercury displacement relays (found in motors)
☐ Mercury-sealed pistons	☐ Sump pump, bilge pump and other float controls
☐ Permeters	☐ Tilt switches
☐ Pressure-trols	☐ Thermometers *(including industrial dial face thermostats with capillary tubes)*
☐ Pyrometers	☐ Thermostats and thermoregulators
☐ Rectifiers	☐ Transmitters

BUILDINGS

☐ DC watt-hour meters	Hydronic and warm air controls with tilt switches such as:
☐ Flame sensors *(found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)*	☐ Aquastats ☐ Pressurestats ☐ Firestats ☐ Fan limit controls ☐ Pressure/flow controls on air handling units.

* This checklist was borrowed from the Delta Institute

PART TWO (CONTINUED)

BUILDINGS *(continued)*

Switches and relays:

☐ Fire alarm box switches	☐ Mercury displacement relays *(found in lighting, resistance heating and motors)*
☐ Silent light switches	
☐ Relay switches	☐ Sump pump, bilge pump, flow monitor, float switches, and other float controls
☐ Mercury wetted relays	
	☐ Tilt switches

Phosphorus removal chemicals:

- ☐ Ferric or ferrous chloride
- ☐ Pickling liquor

☐Thermostats

BEARINGS AND SEALS

☐ Trickling filter Pivot Arm Bearings *(mercury bearings/water seals)*

LAMPS

☒ Fluorescent	☒ Mercury vapor lamps
☒ High-pressure sodium	☒ Metal halide
☐ Mercury arc	☐ Ultraviolet disinfection

BATTERIES

☒ Mercury-zinc *(button)* batteries	☒ Mercury alkaline batteries
☒ Mercury-cadmium batteries	☒ Mercury oxide batteries

PAINT

☐ Old latex-paint (pre-1990)	☐ Marine paint

FIRST AID/MEDICAL

☐ Mercurochrome	☐ Thermometers
☐ Sphygmomanometers	☐ Thimerosal *(contained in eye wash)*

OTHER

☐ Old pesticides, fungicides and herbicides	☐ Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps
☐ Tree root growth control products	
☒ Computer monitors	

COLLECTION SYSTEM

☐ Lift station equipment	☐ Sewer lines with accumulated mercury
☐ Traps with accumulated mercury	☐ Other mercury containing equipment
☐ Sumps with accumulated mercury	☐ Mercury-containing chemicals used and/or stored on-site

MERCURY STORAGE SITES

☐ Elemental mercury	☐ Mercury-containing items collected for disposal

B. Provide a plan and schedule for providing a complete inventory initiated under Section A. above. *(see 327 IAC 5-3.5-9(a)(1))* The schedule required under this part should be expressed in terms of months from the date of NPDES permit issuance, renewal, or modification that incorporates the approved SMV. It is recommended that the schedule required under this part be developed in conjunction with the other schedules for action required by the SMV application.

A complete inventory should include an estimate of quantities *(i.e., volume of chemicals used annually, or numbers of mercury containing equipment)* for each item identified in Part II.A. Additionally, a complete inventory should include documentation from chemical suppliers and equipment suppliers of the mercury content in your most commonly purchased items. Mercury may not be present in a concentration great enough to appear on an MSDS, yet still contribute to the overall level of mercury in the influent.

See PMPP

* This checklist was borrowed from the Delta Institute

Attachment III:
Inventory of Mercury Containing Materials

Attachment III. Inventory of Mercury Containing Materials

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Potential to Reach Surface Water?
GROUNDWATER AND OUTFALL 501 AREA WATER TREATMENT CHEMICALS						
CL1370	Scale Inhibitor	Groundwater Remediation Wells	Not currently used	<308 ng/L	Not currently used	High
CL4070	Scale Inhibitor	Groundwater Remediation Wells	0 - 10 gpd	32.2 ng/L	0 - 0.89 mg/yr	High
CT775	Biological Nutrient	ETF (3W)	2 - 10 gpd	<50 ng/L	<0 - <0.69 mg/yr	Low
CT930	Demulsifier / Dewatering Aid	ETF	Not currently used	<20 ng/L	Not currently used	Low
FO180/FO120	Defoamer	ETF (3W)	0 - 55 gpd (F)	<77.5 ng/L	<0 - <5.89 mg/yr	High
Magnesium Hydroxide	pH Control	ETF (3W)	0 - 100 gpd	<25 ng/L	<0 - <3.45 mg/yr	High
P817E	Flocculant	ETF (3W)	10 - 40 gpd	<50 ng/L	<0.07 - <0.27 mg/yr	Low
P823L	Coagulant	ETF (3W)	8 - 20 gpd	242 ng/L	2.67 - 6.69 mg/yr	Low
P825L	Coagulant	ETF (1W)	Not currently used	11.7 ng/L	Not currently used	Low
P835E	Flocculant	ETF (1W)	1.5 - 8 gpd	<20 ng/L	<0.04 - <0.22 mg/yr	Low
P835E	Flocculant	ETF (3W)	1.5 - 8 gpd	<20 ng/L	<0.04 - <0.22 mg/yr	Low
P891L	Coagulant	ETF (1W)	0 - 60 gpd	<20 ng/L	<0 - <1.66 mg/yr	Low
P891L	Coagulant	ETF (3W)	1 - 4 gpd	<20 ng/L	<0.03 - <0.11 mg/yr	Low
OUTFALL 607 AREA WATER TREATMENT CHEMCIALS						
FO-180	Defoamer	Leachate Treatment Plant	0 - 2 gpd	25 ng/L	0.05 - 0.26 mg/yr	High
P8905L	Coagulant	Leachate Treatment Plant	Not currently used	<20 ng/L	Not currently used	Low
P891L	Coagulant	Leachate Treatment Plant	2 - 15 gpd	<20 ng/L	<0.21 - <0.41 mg/yr	Low
P817E	Flocculant	Leachate Treatment Plant	0.1 - 1 gpd	<50 ng/L	<0.02 - <0.09 mg/yr	Low

Attachment III. Inventory of Mercury Containing Materials

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount [(A)]	Estimated Mercury Content [(B)] per Item	Estimated Mercury Content [(B)] Total	Potential to Reach Surface Water?
Sodium Hydroxide / Caustic Soda	pH Control	Leachate Treatment Plant	Not currently used	25 ng/L	Not currently used	High
Sodium Hypochlorite (Bleach)	Biofouling Control and Ammonia Control	Leachate Treatment Plant	25 - 100 gpd	29 ng/L	1 - 5.61 mg/yr	High
Sodium Metabisulfite Solution	Dechlorination	Leachate Treatment Plant	20 - 60 gpd	26 ng/L	0.72 - 2.16 mg/yr	High
Sulfuric Acid	pH Control	Leachate Treatment Plant	5 - 80 gpd	612 - 14500 ng/L	9.46 - 151.3 mg/yr (E)	High
BOILER WATER TREATMENT CHEMICALS (not used for Outfall 015 but have a very limited potential to be present - see note D)						
BL-122	Bisulfite	No. 4 Boiler House	22 - 31 gpd (D)	297 ng/L	9.03 - 12.72 mg/yr	Low
BL197	Defoamer	No. 4 Boiler House	0.5 - 3 gpd (D)	<246 ng/L	<0.17 - <1.02 mg/yr	Low
BL1350	Dispersant	No. 4 Boiler House	4 - 12 gpd (D)	<288 ng/L	<1.59 - <4.77 mg/yr	Low
BL1513	Amine for Corrosion Control	No. 4 Boiler House	7 - 22 gpd (D)	<239 ng/L	<2.31 - <7.26 mg/yr	Low
CL1376	Scale Inhibitor	No. 4 Boiler House	0.1 - 4 gpd (D)	575 ng/L	0.08 - 3.18 mg/yr	Low
OTHER WATER TREATMENT CHEMCIALS						
13% Sodium Hypochlorite (Bleach)	Biocide for Mussel Control	Intake No. 4 Pump Station (~Apr 1 - Nov 30)	50 - 160 gpd	18 - 300 ng/L	0.83 - 44.33 mg/yr	High
FO180	Defoamer	Outfall 015	0 - 55 gpd (C)	<25 ng/L	<0 - <1.9 mg/yr	High
Sodium Bisulfite (SBS)	Dechlorination Prior to Discharge	Outfall 015 (~Apr 1 - Nov 30)	015: 7 - 16 gpd (based on 2016 May-Oct usage)	790 - 6600 ng/L	5.9 - 49.9 mg/yr	High

Attachment III. Inventory of Mercury Containing Materials

Item or Material	Purpose/Use	Area/Location of Use	Estimated # of Items or Amount (A)	Estimated Mercury Content (B) per Item	Estimated Mercury Content (B) Total	Potential to Reach Surface Water?
IN-SERVICE EQUIPMENT						
All known in-service equipment that contained Hg has been removed.						
BULB/LAMPS						
Sodium Vapor Lamps	Lighting	Various Locations	Will not be individually inventoried. Progress reports will include est. disposed of quantities (facility-wide).	0.02 grams - 0.145 grams	Will not be individually inventoried. Progress reports will include est. disposed of quantities (facility-wide).	Very Low
Mercury Vapor Lamps				0.025 grams - 0.225 grams		
Metal Halide				0.005 - 0.150 grams		
Linear Fluorescent Bulbs				0.003 - 0.05 grams		
OTHER ITEMS						
Lead-acid Batteries (G)	Standby emergency power & power for mechanical equipment (e.g., fork lifts)	Various Locations	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.			Very Low
Other Batteries (e.g., mercury-zinc, mercury alkaline, mercury-cadmium, mercury oxide)	Portable power supply	Various Locations	Will not be individually inventoried. Progress reports will include est. disposed of quantities (facility-wide).	Estimated mercury content will not be determined. Disposal or recycling of items/chemicals containing mercury will comply with any applicable regulations.		Very Low
LCD type screens (computer monitors, laptop screens, HDTV screens)	Visual display	Various Locations	Will not be individually inventoried. Progress reports will include est. disposed of quantities (facility-wide).	0 - 0.010 grams average (0.005 grams) used for estimate	Will not be individually inventoried. Progress reports will include est. disposed of quantities (facility-wide).	Very Low

Notes:
(A): Chemical usage rates are estimated ranges based on averages or purchasing records; day to day usage rates may vary. Other chemicals that may be approved for usages associated with Outfall 015 but are not currently being used are not included. If usage resumes, they will be added to this inventory and characterized.
(B): The mercury values listed for chemicals are based on mercury characterization via direct analytical measurement. Equipment mercury content was estimated from the mass of the ampoule of elemental mercury utilized in the equipment itself or comparable pieces of equipment. Lamp and bulb mercury content information was generated from publically accessible sources including the National Electrical Manufacturers Association.
(C): Actual chemical usage is intermittent as needed.
(D): Steam for the No. 3 Sinter Plant is produced by the No. 4 Boiler House. No. 4 Boiler House discharges are routed through Outfall 018/019, however chemicals used for boiler feed waters have a very limited potential to be present in steam condensate streams. The characterization of condensate streams is a PMPP activity.
(E): Given the variabiltiy in the mercury characterization results, the average (instead of the max and min) of mercury characterization data is used to determine the est. mercury content total.
(F): Average of FO120 and FO180 concentration used for determining the mercury potential.
(G): Mercury is not added in the manufacture of these types of batteries. Trace mercury that may be present would only be associated with the electrolytic acid solution.

Attachment IV: Mercury and TSS Data

Table IV-1: Outfall 015 and Intake (No. 4 Pump Station) Data

Table IV-2: Outfall 501 and Outfall 607 Data

Table IV-1. Outfall 015 and Intake (No. 4 Pump Station) Data

Sample Date	No. 4 Pump Station Total Mercury (ng/L)				TSS	Outfall 015 Total Mercury (ng/L)					TSS
	Sample	Duplicate	Average	Mercury Data Flag	(mg/L)	Sample	Duplicate	Average	Mercury Data Flag	Mercury Analysis Indicator	(mg/L)
03/13/18	1.4	---	1.4		6.8	8.0	4.9	6.4		R	5.3
04/09/18	1.0	---	1.0		11.5	4.8	5.0	4.9		S, ALS	3.7
05/07/18	1.5	1.4	1.5		1.6	3.6	---	3.6		S	6.2
06/20/18	1.9	---	1.9		1.7	2.9	3.0	3.0		S, ALS	8.9
07/16/18	2.1	2.0	2.1		1.9	2.7	---	2.7		S	4.2
08/21/18	3.0	---	3.0		3.4	2.5	---	2.5		S	3.5
09/17/18	75	---	75		6.6	2.1	---	2.1		S	2.7
10/10/18	20	12	16		3.6	2.1	---	2.1		S	6.2
11/12/18	1.7	---	1.7		1.1	2.3	---	2.3		S	24.6
12/11/18	2.0	---	2.0		15.3	1.8	2.0	1.9		S, ALS	3.4
02/11/19	3.2	---	3.2		2.1	2.2	---	2.2		S	4.0
04/16/19	1.7	---	1.7		1.6	2.1	2.6	2.3		S, ALS	4.6
06/17/19	2.1	---	2.1		0.7	5.5	---	5.5		S	7.8
08/19/19	0.8	---	0.83		1.9	1.5	---	1.5		S	2.6
10/14/19	0.43	0.37	0.40	J	5.3	1.3	---	1.3		S	5.1
12/16/19	4.2	---	4.2		1.9	2.2	1.6	1.9		SR	7.8
12/22/19	---	---	---		---	0.46	---	0.46	J	A	1.9
12/23/19	---	---	---		---	1.5	---	1.5		A	1.4
12/24/19	---	---	---		---	1.5	---	1.5		A	1.3
12/25/19	---	---	---		---	1.1	---	1.1		A	1.2
12/26/19	---	---	---		---	2.1	---	2.1		A	1.8
12/27/19	---	---	---		---	1.2	---	1.2		A	1.6
12/28/19	---	---	---		---	0.66	---	0.66		A	3.7
12/29/19	---	---	---		---	1.1	---	1.1		A	4.6
12/30/19	---	---	---		---	1.7	---	1.7		A	2.3
12/31/19	---	---	---		---	14	---	14		A	9.8
01/01/20	---	---	---		---	2.2	---	2.2		A	39.0
01/02/20	---	---	---		---	1.6	---	1.6		A	6.8
01/03/20	---	---	---		---	2.1	---	2.1		A	1.6
01/04/20	---	---	---		---	1.9	---	1.9		A	4.4
01/05/20	---	---	---		---	1.9	---	1.9		A	1.8
01/06/20	---	---	---		---	2.4	---	2.4		A	18.0
01/07/20	---	---	---		---	1.8	---	1.8		A	2.2
01/08/20	---	---	---		---	7.1	---	7.1		A	1.6
01/09/20	---	---	---		---	1.8	---	1.8		A	1.6
01/10/20	---	---	---		---	1.2	---	1.2		A	4.3
01/11/20	---	---	---		---	11	---	11		A	11.5
01/12/20	---	---	---		---	4.8	---	4.8		A	3.8
01/13/20	---	---	---		---	2.4	---	2.4		A	2.3
01/14/20	---	---	---		---	2.2	---	2.2		A	2.6
01/15/20	---	---	---		---	1.6	---	1.6		A	2.5
01/16/20	---	---	---		---	1.3	---	1.3		A	2.9
01/17/20	---	---	---		---	1.5	---	1.5		A	2.1
01/18/20	---	---	---		---	1.3	---	1.3		A	3.1
01/19/20	---	---	---		---	1.3	---	1.3		A	3.6
01/20/20	---	---	---		---	1.6	---	1.6		A	2.7
01/21/20	---	---	---		---	1.5	---	1.5		A	3.2
01/22/20	---	---	---		---	1.0	---	1.0		A	2.4
01/23/20	---	---	---		---	0.94	---	0.94		A	8.9
01/24/20	---	---	---		---	1.1	---	1.1		A	5.1
01/25/20	---	---	---		---	3.4	---	3.4		A	2.7
01/26/20	---	---	---		---	1.5	---	1.5		A	4.9
01/27/20	---	---	---		---	1.7	---	1.7		A	1.6
01/28/20	---	---	---		---	0.80	---	0.80		A	2.4
01/29/20	---	---	---		---	2.2	---	2.2		A	4.6
01/30/20	---	---	---		---	1.4	---	1.4		A	2.8

Table IV-1. Outfall 015 and Intake (No. 4 Pump Station) Data

Sample Date	No. 4 Pump Station Total Mercury (ng/L)				TSS	Outfall 015 Total Mercury (ng/L)					TSS
	Sample	Duplicate	Average	Mercury Data Flag	(mg/L)	Sample	Duplicate	Average	Mercury Data Flag	Mercury Analysis Indicator	(mg/L)
01/31/20	---	---	---		---	1.2	---	1.2		A	2.4
02/01/20	---	---	---		---	1.0	---	1.0		A	4.6
02/02/20	---	---	---		---	1.1	---	1.1		A	2.9
02/03/20	---	---	---		---	1.8	---	1.8		A	2.0
02/04/20	---	---	---		---	1.4	---	1.4		A	2.8
02/05/20	---	---	---		---	1.3	---	1.3		A	4.2
02/06/20	---	---	---		---	4.4	---	4.4		A	2.4
02/07/20	---	---	---		---	2.2	---	2.2		A	5.5
02/08/20	---	---	---		---	0.86	---	0.86		A	5.3
02/09/20	---	---	---		---	0.52	---	0.52		A	4.3
02/10/20	---	---	---		---	2.6	---	2.6		A	9.8
02/11/20	---	---	---		---	1.2	---	1.2		A	7.3
02/12/20	0.38	---	0.38	J	5.3	0.93	---	0.93		A	5.0
02/13/20	---	---	---		---	2.0	---	2.0		A	8.8
02/14/20	---	---	---		---	1.5	---	1.5		A	4.3
02/15/20	---	---	---		---	1.2	---	1.2		A	2.8
02/16/20	---	---	---		---	1.8	---	1.8		A	4.0
02/17/20	---	---	---		---	1.2	---	1.2		A	3.8
02/18/20	---	---	---		---	1.6	---	1.6		A	2.1
02/19/20	---	---	---		---	0.58	---	0.58		A	2.7

Notes:

1. All mercury samples were grab samples. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. No. 4 Pump Station mercury samples and all TSS samples (single grabs) analyzed by ALS Laboratory Group.
3. Outfall 015 mercury samples include split analysis by Battelle Marine Sciences Laboratory (BMS) and ALS Laboratory Group (ALS) through December 2019. Unless noted, the "Sample" column values are the average of the split sample results from BMS and ALS. The "Duplicate" column values are the field duplicate (analyzed by either BMS or ALS).
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated mercury data flag(s).
6. Mercury Data Flags:
   "J" indicates at least one result used to determine the average is an estimated mercury value between the reporting limit (0.50 ng/L) and method detection limit (which ranges between 0.16 and 0.20 ng/L).
   "B1" indicates that associated field blank had a mercury detection outside of the criteria for blanks (whichever is greater: <0.5 ng/L or up to 1/5 the amount in associated samples). Sample considered invalid.
7. Mercury Analysis Indicators (not applicable to No. 4 Pump Station results).
   "S" indicates that the sample column result is the average of split sample analysis by Battelle Marine Sciences Laboratory and ALS Laboratory Group.
   "A" indicates that the sample column result is from ALS Laboratory Group analysis.
   "ALS" indicates that the field duplicate was analyzed by ALS Laboratory Group.
   "BMS" indicates that the field duplicate was analyzed by Battelle Marine Sciences Laboratory.
   "R" indicates that the sample column result is the average of the initial and re-analysis sample results by BMS and that the duplicate column result is the average of initial and re-analysis sample results by ALS.
   "SR" indicates that the sample column result is the average of the sample analysis by BMR and the initial and re-analysis results by ALS. The duplicate column result is the average of initial and re-analysis results on the field duplicate by ALS.

Table IV-2. Outfall 501 and Outfall 607 Data

Sample Date	Outfall 501 Total Mercury (ng/L) Sample	Duplicate	Average	Mercury Analysis Indicator	TSS (mg/L)	Outfall 607 Total Mercury (ng/L) Sample	Duplicate	Average	Mercury Analysis Indicator	TSS (mg/L)
03/13/18	9.4	---	9.4	S=ALS	4.2	171	166	168.5	S, SD	1.1
04/09/18	11.7	---	11.7	S	6.0	58.2	---	58.2	S	4.3
05/07/18	9.2	---	9.2	S	2.9	37.7	---	37.7	S	3.4
06/20/18	6.1	---	6.1	S	2.5	33.3	30.9	32.1	S, BMS	126
07/16/18	6.1	---	6.1	S	2.4	24.1	25.2	24.6	S, BMS	5.1
08/21/18	6.9	---	6.9	S	3.0	40.6	40.5	40.5	S, BMS	5.3
09/17/18	6.0	6.7	6.3	S, ALS	1.8	25.5	---	25.5	S	28.0
10/10/18	6.2	---	6.2	S	1.7	27.1	---	---	S	9.4
11/12/18	6.2	6.1	6.1	S, SD	4.0	19.6	---	19.6	S	10.0
12/11/18	7.7	---	7.7	S	3.4	16.0	---	16.0	S	1.4
02/11/19	6.0	---	6.0	S	4.0	18.9	20.1	19.5	S, BMS	1.2
02/13/19	---	---	---		---	17.0	---	17.0	S=ALS	---
02/14/19	9.7	---	9.7	S=ALS	---	---	---	---		---
02/21/19	9.8	---	9.8	S=ALS	---	16.0	---	16.0	S=ALS	---
02/28/19	8.4	---	8.4	S=ALS	---	17.0	---	17.0	S=ALS	---
04/16/19	11.0	---	11.0	S	11.6	18.1	---	18.1	S	2.8
06/17/19	5.5	5.5	5.5	S, SD	5.3	66.0	---	66.0	S	4.2
08/19/19	3.5	3.6	3.6	S, SD	2.5	13.8	---	13.8	S	13.4
10/14/19	3.1	---	3.1	S	1.2	12.8	13.1	13.0	S, BMS	6.2
12/16/19	2.8	---	2.8	S	1.3	20.2	---	20.2	S	9.0
02/12/20	4.4	4.6	4.5		1.0	10.0	---	10.0	S=ALS	1.9

Notes:

1. All mercury samples were grab samples. USEPA Method 1631E was used for all mercury analysis; unless noted otherwise the data presented met QA/QC requirements and are deemed valid.
2. All TSS samples (single grabs) analyzed by ALS Laboratory Group.
3. Outfall 501 and 607 mercury samples include split analysis by Battelle Marine Sciences Laboratory (BMS) and ALS Laboratory Group (ALS) through December 2019. Unless noted, the "Sample" column values are the average of the split sample results from BMS and ALS. The "Duplicate" column values are the field duplicate (analyzed by either BMS or ALS).
4. "---" indicates no sample was collected.
5. * indicates that the associated mercury data is invalid and is not included in the calculation of the summary statistics. Reasons are explained by the associated mercury data flag(s).
7. Mercury Analysis Indicators (not applicable to No. 4 Pump Station results).
   "S" indicates that the sample column result is the average of split sample analysis by Battelle Marine Sciences Laboratory and ALS Laboratory Group.
   "S=ALS" indicates that the sample column result is from analysis by ALS Laboratory Group.
   "SD" indicates that the field duplicate column result is the average of duplicate sample analysis by Battelle Marine Sciences Laboratory and ALS Laboratory Group.
   "ALS" indicates that the field duplicate was analyzed by ALS Laboratory Group.
   "BMS" indicates that the field duplicate was analyzed by Battelle Marine Sciences Laboratory.

Attachment V
PMPP Plan and Schedule of Activities

Attachment V. PMPP Plan and Schedule of Activities

Row ID	**Planned Activity**	***Activity Type***	***Goal***	***Measure of Performance***	***Schedule of Action***
1	Complete Inventory	Type 1: Source Characterization	Finalize the inventory of listed equipment/materials, and usage rates.	Submittal of completed inventory to IDEM.	In progress. Submit an updated inventory as part of the first Annual Progress Report following SMV approval and incorporation into the Permit.
2	Review of Purchasing Policies and Procedures	Type 3: Awareness and Containment Control	1. Review mercury content information from vendors/manufacturers. 2. Restrict or eliminate (as practicable) the purchase of mercury containing chemicals and equipment.	Implementation of Policies and Procedures that address the mercury content of materials.	Implemented/Ongoing.
3	Mercury Awareness Training	Type 3: Awareness and Containment Control	Education and increased awareness.	Expand the existing employee health and safety training program to include additional mercury information.	Implemented/Ongoing.
4	Good Housekeeping Practices: *Mercury Containing Chemicals and Materials*	Type 3: Awareness and Containment Control	Reduce possibility of accidental spills and releases.	Training of employees on good housekeeping practices that reduce the possibility of accidental spills and releases.	Implemented/Ongoing.
5	Maintenance and Cleaning Practices	Type 3: Awareness and Containment Control	Proper and safe-handling during maintenance activities.	Implement procedures to minimize release of mercury from mercury-containing materials during maintenance and cleaning activities.	Implemented/Ongoing.
6	Standard Operating Practices: Spill Prevention and Response: *Chemicals and Materials*	Type 3: Awareness and Containment Control	Safe and proper spill response for dealing with chemical spills. Reduce possibility of accidental spills and releases.	Training of employees on proper and safe spill response for dealing with chemical spills.	Implemented/Ongoing.
7	Disposal Practices of Mercury-Containing Materials	Type 3: Awareness and Containment Control	Estimate quantity of mercury from materials that are properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed pursuant to applicable disposal/recycling regulations.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.
8	Disposal Practices of Mercury-Containing Items: *Bulbs/Lamps*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from equipment that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from lamps/bulbs.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.
9	Disposal Practices of Mercury-Containing Items: *Batteries*	Type 3: Awareness and Containment Control	Estimate quantity of mercury from batteries that is properly disposed of and removed from the site.	Tracking/documentation of number of containers disposed as a universal waste from mercury-containing batteries.	Implemented/Ongoing. Estimated disposed of quantities will be provided as part of the Annual Progress Report.
10	*Outfall 015* Source Characterization: Water Treatment Additives [(A)]	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	For currently used materials, within 9 months of SMV approval and permit incorporation. For new water treatment additives, w/in 1 year of beginning use.

Attachment V. PMPP Plan and Schedule of Activities

Row ID	**Planned Activity**	***Activity Type***	***Goal***	***Measure of Performance***	***Schedule of Action***
11	*Outfall 015* Source Characterization and : Sodium Hypochlorite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium hypochlorite used for mussel control at the intake.	Documentation that mercury has been quantified.	Complete
12	*Outfall 015* Source Characterization: Sodium Bisulfite	Type 1: Source Characterization	Further characterize the specific vendor supplied sodium bisulfite used for dechlorination of the final Outfall 015 discharge.	Documentation that mercury has been quantified.	Complete
13	*Outfall 015* Source Characterization and : Sulfuric Acid	Type 1: Source Characterization	Perform additional mercury characterization of sulfuric acid used at the LTP in order to better assess the magnitude of the potential mercury contribution.	Documentation that mercury has been quantified.	Complete
14	Alternatives for Reduction Evaluation: *Mussel Control Chemicals*	Type 1: Source Characterization	Investigate the current usage practices of the Sodium Hypochlrorite used at the intakes for mussel control and Sodium Bisulfite used at Outfall 015 for dechlorination.	Documentation of evaluation.	Complete
15	*Outfall 015* Source Characterization: Condensate	Type 1: Source Characterization	Estimate the amount of mercury via direct sampling, literature review, and/or vendor information.	Documentation that mercury has been quantified.	Complete
16	*Outfall 607* Source Characterization: *Landfill sludges*	Type 1: Source Characterization	Evaluation of sludge inputs to landfill will be reviewed annually to confirm no significant changes in volume or sources. If a significant change occurs in current individual sludge disposal quantities or a new sludge accounting for more than 2% of total monthly mass disposed is added, it will be subjected to mercury characterization.	Documentation of evaluation.	Implemented/Ongoing as needed.
17	*Outfall 501* Source Characterization: *Landfill leachate*	Type 1: Source Characterization	Continued periodic mercury monitoring of the landfill leachate treated at the LTP for comparison to historical data.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).
18	*Outfall 501* Source Characterization: *Groundwater and misc. wastewaters*	Type 1: Source Characterization	Continued periodic mercury monitoring of the various influent streams (e.g. groundwater, misc. wastewaters) to the ETF for comparison to historical data.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).
19	*Outfall 501 & 607* Source Characterization: *Monitoring*	Type 1: Source Characterization	Continued periodic monitoring of Outfall 501 for mercury for comparison to historical data.	Documentation of evaluation.	Implemented/Ongoing.
20	*Outfall 501 & 607* Source Characterization: *Type of Mercury*	Type 1: Source Characterization	Continued periodic characterization of the types (filterable or dissolved) present in the Outfall 501 and Outfall 607 wastewaters.	Documentation of characterization.	Periodic evaluations (e.g., every other year).
21	*Outfall 501* Alternatives for Reduction Evaluation: *Current ETF Treatment System*	Type 2: Alternatives for Reduction Evaluation	Continued periodic evaluations of the current ETF sand filters with respect to mercury removal.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).

Attachment V. PMPP Plan and Schedule of Activities

Row ID	Planned Activity	*Activity Type*	*Goal*	*Measure of Performance*	*Schedule of Action*
22	*Outfall 607* Alternatives for Reduction Evaluation: *Current LTP Treatment System*	Type 2: Alternatives for Reduction Evaluation	Continued periodic evaluations of the current LTP treatment system with respect to mercury removal.	Documentation of evaluation.	Periodic evaluations (e.g., every other year).
23	*Source Characterization:* CL1370	Type 1: Source Characterization	Perform additional mercury characterization of CL1370 in order to better assess the magnitude of the potential mercury contribution.	Documentation of evaluation.	In progress. Complete within 1 year of approval and incorporation of the SMV into the Permit.
24	Alternatives for Reduction Evaluation: *Mercury-Containing Chemicals and Materials*	Type 2: Alternatives for Reduction Evaluation	Investigate replacement/reduction options for in-service mercury-containing materials.	Documentation of evaluation.	The scope and schedule of this type of activity will be determined based on the outcome of the various source characterization activities.
25	*Proposed Future Outfall 501* Alternatives for Reduction Evaluation: *ETF Treatment System w/proposed future wastewaters*	Type 2: Alternatives for Reduction Evaluation	Evaluate of the ETF system for mercury removal follo This may include periodic mercury monitoring at various locations in the ETF system (e.g., influents or combined influent to the system, just prior to and after the sand filters).	Documentation of evaluation.	If applicable, complete within 1 year of re-reouting the wastewaters currently treated by the LTP to the ETF for treatment.
26	*Proposed Future Outfall 501* Source Characterization: *Type of Mercury*	Type 2: Alternatives for Reduction Evaluation	Determine the predominate form of mercury present (e.g., filterable/particulate based or dissolved) for the new combined wastewaters treated by the ETF.	Documentation of evaluation.	If applicable, complete within 1 year of re-reouting the wastewaters currently treated by the LTP to the ETF for treatment.
27	*Future proposed Outfall 015* Source Characterization	Type 2: Alternatives for Reduction Evaluation	Evaluate the estimated mercury contribution of the proposed future Outfall 501 to Outfall 015 following the rerouting of all Outfall 607 wastewaters to the ETF for treatment.	Documentation of evaluation.	If applicable, complete within 1 year of re-reouting the wastewaters currently treated by the LTP to the ETF for treatment.

Notes:
(A): This includes the boiler treatment chemicals listed in Attachment III.

Attachment VI
Proof of Public Notice

USS Public Notice PMPP (1)

Details for USS Public Notice PMPP (1)

15 hrs ago

NOTICE OF AVAILABILITY POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP) U. S. Steel Gary Works One North Broadway Gary, Indiana 46402-3199 A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage area Outfall 015. The Outfall 015 drainage area encompasses the sinter plant, blast furnaces, SWD-1 Landfill, Leachate Treatment Facility, former coke plant and coke by-products area, and the Environmental Treatment Facility (which treats primarily remediation groundwater). The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Station No. 4. Pursuant to 327 Indiana Administrative Code 5-3.5, U. S. Steel is seeking to obtain variance limits from the Indiana Department of Environmental Management for the aforementioned individual outfall. As part of the approval process U. S. Steel is issuing this Notice on the PMPP and will receive public comments for 30 days. Interested parties should contact U. S. Steel for additional information or a copy of the PMPP: Meghan Cox 600 Grant Street, Suite 1881 Pittsburgh, PA 15219 (412) 433-6777 3/2 -37965 -hspaxlp

*** Proof of Publication ***

State of Indiana)
) ss:
Lake County)

Personally appeared before me, a notary public in and for said county and state, the undersigned Nicole Muscari who, being duly sworn, says that She/he is Legal Clerk of the Northwest Indiana Times newspaper of general circulation printed and published in the English language in the Town of Munster in state and county afore-said, and that the printed matter attached hereto is a true copy, which was duly published in said paper for 1 time(s), the date(s) of publication being as follows:
March 2, 2020

United States Steel - Environmental Affairs / Lega

Brian Lasko

1350 PENN AVENUE – SUITE 200

PITTSBURGH IN 15222-4211

ORDER NUMBER 37965

The undersigned further states that the Northwest Indiana Times newspaper maintains an Internet website, which is located at www.nwi.com website and that a copy of the above referenced printed matter was posted on such website on the date(s) of publication set forth above.

Nicole Muscari, Legal Clerk

By: Sallie Guerra

Subscribed and sworn to before me this 2 day of March 2020

Dawn Renee Heili
Notary Public

My commission expires:

DAWN RENEE HEILI
Notary Public, State of Indiana
Lake County
Commission #696125
My Commission Expires 01/31/25

Section: Legals

Category: 198 Legal - Lake County

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NOTICE OF AVAILABILITY
POLLUTANT MINIMIZATION
PROGRAM PLAN (PMPP)
U. S. Steel Gary Works
One North Broadway
Gary, Indiana 46402-3199

A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage area Outfall 015.

The Outfall 015 drainage area encompasses the sinter plant, blast furnaces, SWD-1 Landfill, Leachate Treatment Facility, former coke plant and coke by-products area, and the Environmental Treatment Facility (which treats primarily remediation groundwater). The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Station No. 4.

Pursuant to 327 Indiana Administrative Code 5-3.5, U. S. Steel is seeking to obtain variance limits from the Indiana Department of Environmental Management for the aforementioned individual outfall. As part of the approval process U. S. Steel is issuing this Notice on the PMPP and will receive public comments for 30 days.

Interested parties should contact U. S. Steel for additional information or a copy of the PMPP:
Meghan Cox
600 Grant Street, Suite 1881
Pittsburgh, PA 15219
(412) 433-6777
3/2 -37965 -hspaxlp

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General Form No. 99P (Rev. 2009A)

United States Steel - Environmental Affairs
(Governmental Unit)

To: The Times Media Company

Lake County, Indiana

601-45th Avenue, Munster, IN 46321

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37965

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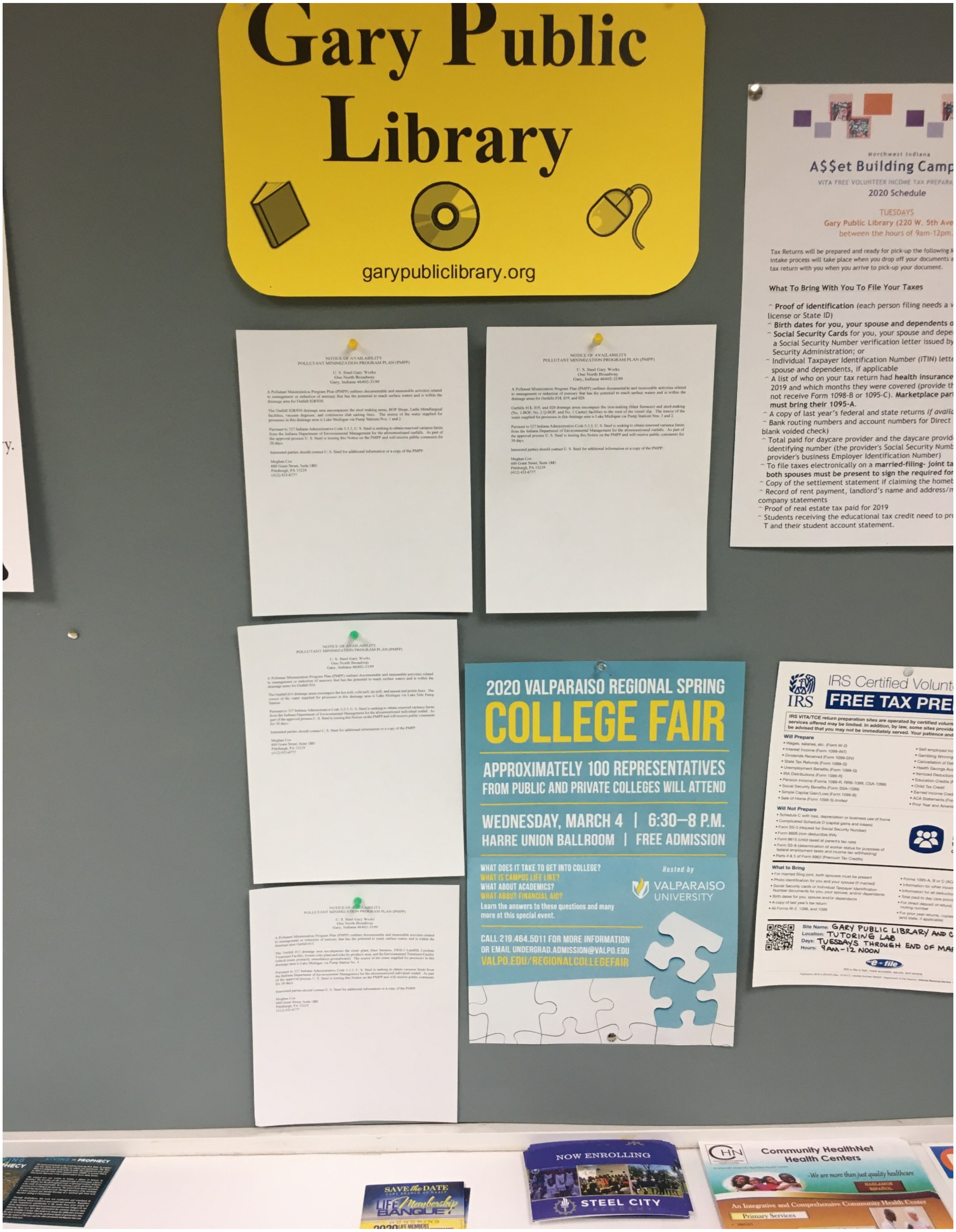
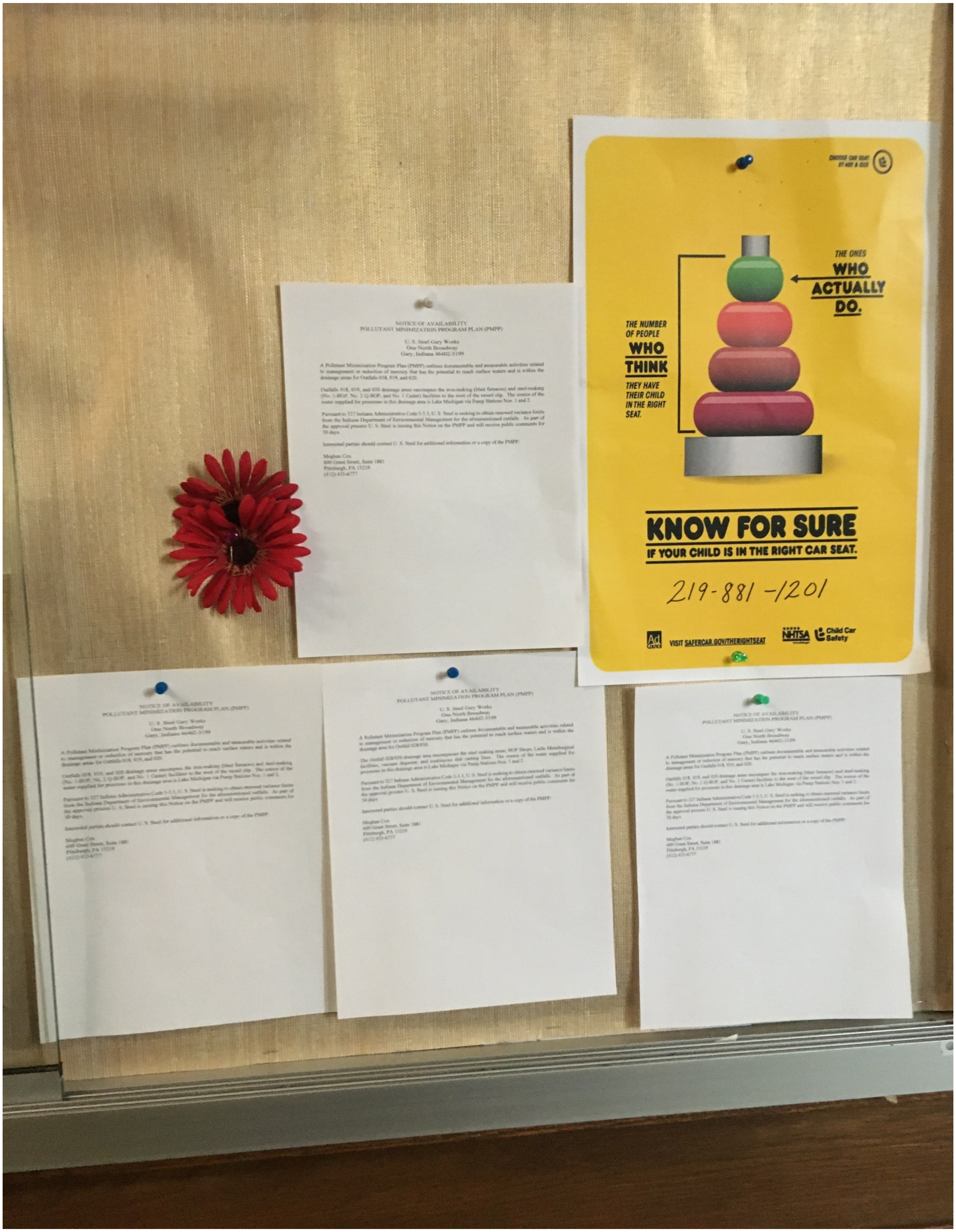
NOTICE AT THE GARY PUBLIC LIBRARY



NOTICE AT THE GARY TOWN HALL



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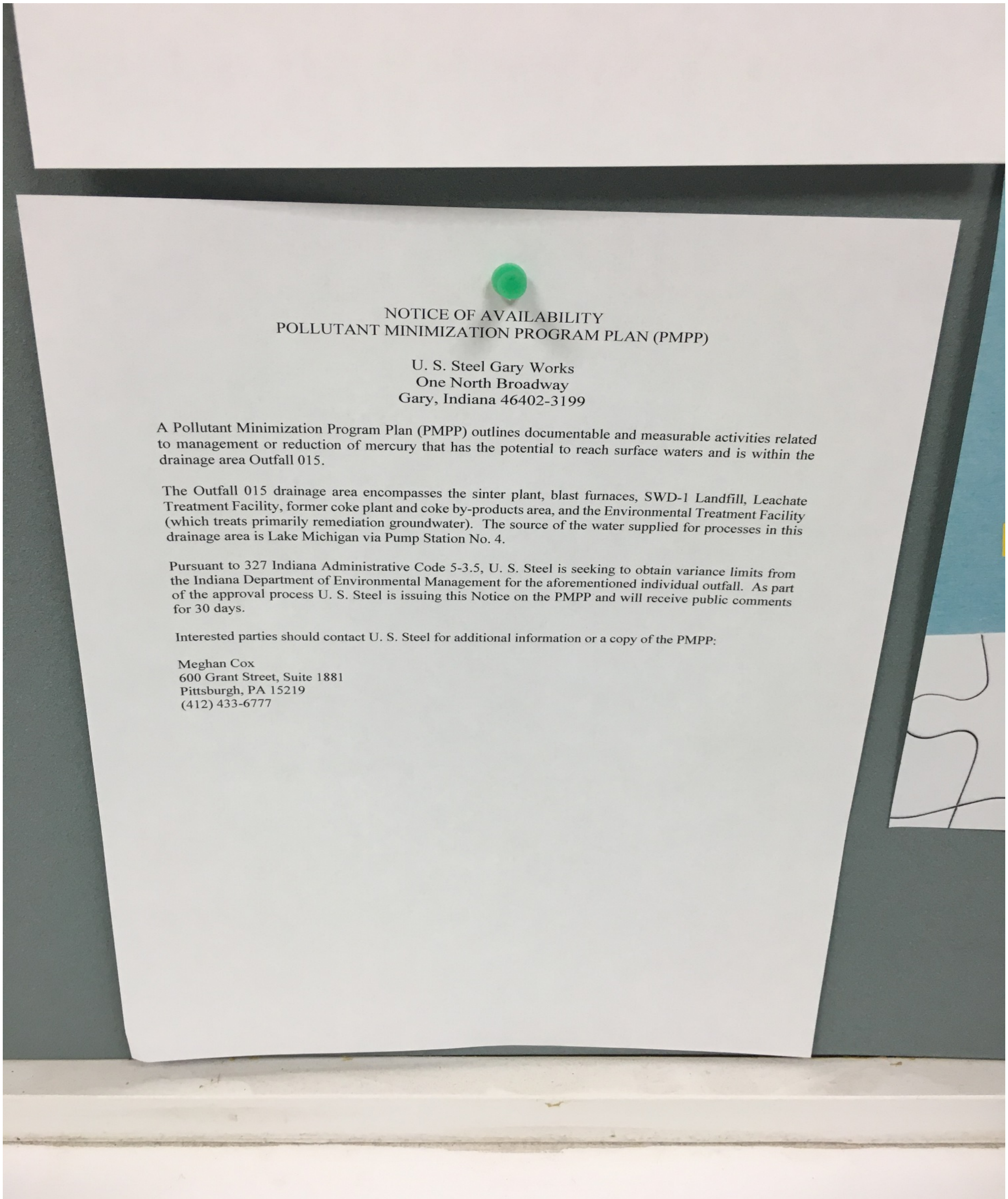

NOTICE OF AVAILABILITY
POLLUTANT MINIMIZATION PROGRAM PLAN (PMPP)

U. S. Steel Gary Works
One North Broadway
Gary, Indiana 46402-3199

A Pollutant Minimization Program Plan (PMPP) outlines documentable and measurable activities related to management or reduction of mercury that has the potential to reach surface waters and is within the drainage area Outfall 015.

The Outfall 015 drainage area encompasses the sinter plant, blast furnaces, SWD-1 Landfill, Leachate Treatment Facility, former coke plant and coke by-products area, and the Environmental Treatment Facility (which treats primarily remediation groundwater). The source of the water supplied for processes in this drainage area is Lake Michigan via Pump Station No. 4.

Pursuant to 327 Indiana Administrative Code 5-3.5, U. S. Steel is seeking to obtain variance limits from the Indiana Department of Environmental Management for the aforementioned individual outfall. As part of the approval process U. S. Steel is issuing this Notice on the PMPP and will receive public comments for 30 days.

Interested parties should contact U. S. Steel for additional information or a copy of the PMPP:

Meghan Cox
600 Grant Street, Suite 1881
Pittsburgh, PA 15219
(412) 433-6777

Attachment IV

316(b) Required Information

THIS INFORMATION IS PROVIDED IN PART 2 OF THE APPLICATION

Application for Renewal of NPDES Permit No. IN0000281

Part 2 of 2

Prepared for:

U. S. Steel Gary Works

Submitted to:
Industrial Permits Section
Office of Water Management
Indiana Department of Environmental Management

Prepared by:
Ramboll
Arlington, Virginia

Submission Date:
May 1, 2020

Attachment IV

316(b) Required Information

CWA 316(b) Requirements for CWIS

40 CFR 122.21(r)(2)-(8) Materials

Intended for
United States Steel Corporation Gary Works
One North Broadway
Gary, Indiana 46402
NPDES Permit No. IN0000281

Date
May 2020

Prepared By
Ramboll US Corporation

United States Steel Corporation
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Clean Water Act Section 316(b) Requirements for Cooling Water Intakes Structures Pursuant to 40 CFR part 122.21(r)(2) – (8)

CLEAN WATER ACT SECTION 316(B) REQUIREMENTS FOR COOLING WATER INTAKES STRUCTURES PURSUANT TO 40 CFR PART 122.21(R)(2)-(8)

CONTENTS

CHARTS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION AND BACKGROUND

United States Steel Corporation Gary Works (U. S. Steel), located at One North Broadway, Gary, Indiana, is an integrated steel mill facility that manufactures iron and steel products. U. S. Steel is authorized to withdraw water for their process and non-contact cooling water needs from five intakes consistent with their renewed National Pollutant Discharge Elimination System (NPDES) Permit IN0000281, which became effective on November 1, 2015 (the "NPDES Permit"). Three of the intakes are located within the ore loading slip of Gary Harbor (No. 1 Pump Station, No. 3 Pump Station, and No. 4 Pump Station), one is located at the mouth of the ore loading slip in Gary Harbor (No. 2 Pump Station), and one is located approximately 3,000 feet off-shore in Lake Michigan (Lakeside Pump Station). No. 1 Pump Station was determined to be representative of the other cooling water intake structures (CWIS) located in the ore loading slip of Gary Harbor (i.e. No. 3 & 4 Pump Station) due to its flow and location. Therefore, studies at the facility have focused on No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station. Total allowable withdrawal for the facility based on Indiana Department of Natural Resources (IDNR) water usage is approximately 1,263 MGD as shown in Table 1.

1.1 Background

As an existing facility with surface water intakes withdrawing greater than two million gallons per day (based on cumulative design intake flow) and more than 25% of the actual intake flow used exclusively for cooling purposes, the U. S. Steel CWIS is subject to the requirements published in 40 CFR Part 122.21(r)(2) through (r)(8). Corresponding federal regulation citations include:

- Physical Information for Source Water (§122.21(r)(2))
- Physical description of CWIS (§122.21(r)(3))
- Biological Information for Source Water (§122.21(r)(4))
- Cooling Water System Data (§122.21(r)(5))
- Impingement Mortality BTA Demonstration (§122.21(r)(6))
- Entrainment Performance Studies (§122.21(r)(7))
- Operational Status (§122.21(r)(8))

In addition, the owner or operator of an existing facility that withdraws greater than 125 MGD actual intake flow (AIF) of water for cooling purposes must also submit to the Director for review the information required under paragraphs (r)(9), (10), (11), (12), and (13) of this section.

- Entrainment Characterization Study (§122.21(r)(9))
- Comprehensive Technical Feasibility and Cost Evaluation Study (§122.21(r)(10))
- Benefits Valuation Study (§122.21(r)(11))
- Non-water Quality Environmental and Other Impacts Study (§122.21(r)(12))
- Peer Review (§122.21(r)(13))

The permit application requirements detailed in 40 CFR 122.21(r)(2 – 13) and summarized above are due to IDEM with the next permit renewal application on or before May 4, 2020 (180 days prior to the permit expiration date of October 31, 2020). Details contained herein address requirements per §122.21(r)(2) – (8). Reports addressing §122.21(r)(9) – (13) requirements are submitted under separate cover as part of this submittal package.

1.2 Executive Summary

The No. 1 Pump Station intake is located on the west side of the ore yard loading slip, about 2,500 feet from the slip mouth. Water is withdrawn through a concrete intake conduit via two intake openings, which are capped with bars. From the intake openings, water flows underground below an iron ore storage area for about 200 yards before it reaches the pump station. The pump station consists of an intake bay, a series of vertical traveling screens that protect the pumps from debris, and a wet well in which water is withdrawn via wet well pumps for facility use.

The No. 2 Pump Station intake is located on the west side of the vessel slip mouth of Gary Harbor. Water is withdrawn through a concrete intake conduit via two intake openings, which are capped with bars. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through the traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility use. No. 2 Pump Station is located immediately adjacent to the intake.

The No. 3 Pump Station intake is located on the southeastern corner of the vessel slip. Water is withdrawn through a concrete intake conduit via three intake openings, which are each capped with bars. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through the traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility use. No. 3 Pump Station is located immediately adjacent to the intake. No. 3 Pump Station is currently only used as an emergency spare and has not operated since September 2014.

The No. 4 Pump Station intake is located on the eastern side of the vessel slip. Water is withdrawn through a concrete intake conduit via two intake openings, which are capped with bars. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility use. No. 4 Pump Station is located about 165 feet from the ore yard slip bank.

The Lakeside intake is located approximately 3,000 feet off-shore at a depth of approximately 28 feet. Water is withdrawn through an intake crib via multiple intake openings. From the intake openings, water flows into an intake bay through a series of vertical traveling screens that protect the pumps from debris, and to a wet well in which it is withdrawn via wet well pumps for facility use.

Impingement studies were conducted at No. 1, No. 2, and Lakeside Pump Stations beginning in March 2011 through May 2015 totaling 72 events at both No. 1 & 2 Pump Station and 74 events at Lakeside Pump Station. The total number of fish impinged for all events at No.1 PS, No. 2 PS, and LS PS were 78,260; 9,399; and 8,267 respectively. No protected or endangered fish species were encountered during the studies.

Total species richness during impingement studies at No. 1 Pump Station was 41 with alewife, gizzard shad, round goby, spottail shiner, and yellow perch comprising greater than 98% of the total fish impinged. Total species richness during impingement studies at No. 2 Pump Station was 26 with alewife, gizzard shad, and yellow perch comprising greater than 89% of the total fish impinged. Total species richness during impingement studies at Lakeside Pump Station was 20 with alewife, round goby, spottail shiner, and yellow perch comprising greater than 98% of the total fish impinged.

Ranges for actual intake velocity at each operational pump station are as follows:

- No. 1 Pump Station ranges from 1.97 to 2.28 fps
- No. 2 Pump Station ranges from 1.65 to 2.48 fps

- No. 4 Pump Station ranges from 0.04 to 0.37 fps
- Lakeside Pump Station ranges from 0.04 to 0.07 fps

U. S. Steel asserts the existing cooling water intake structures associated with No. 3, No. 4, and Lakeside Pump Station represent Best Technology Available (BTA) to minimize adverse environmental impact related to impingement in accordance with Section 316(b) of the federal Clean Water Act. This assertion is based on the following information:

- No. 3 Pump Station is not in continuous operation, but services as an emergency spare. Both the definitions of actual intake flow (AIF) and design intake flow (DIF) specifically exclude flows associated with emergency capacity. Any impact from intermittent, emergency operation of this intake structure is negligible.
- No. 4 and Lakeside Pump Station both operate below an actual intake velocity of 0.5 fps at the submerged openings. Moreover, the design intake velocity based on current pump capacity is also below the 0.5 fps threshold.
- No. 4 Pump Station is located within the Gary Harbor Slip which is continually disturbed by vessel traffic and dredging activities not providing an optimal habitat for spawning or nursery purposes.
- Lakeside Pump Station is located at a submerged, offshore location that withdraws from a less biologically sensitive area than other shoreline intakes. Additionally, the location of the intake crib results in a change in the species profile observed with an increased prevalence of Round Goby, an identified nuisance species.

No. 1 and 2 Pump Station do not currently comply with one of the identified alternatives detailed in 40 CFR 125.94(c). As specified in Item (b) this same section, after entrainment requirements have been established, U. S. Steel will select and comply with the most feasible and effective impingement mortality standard in 125.94(c) as soon as practicable. Based on the results of the technology assessments, the initial screening of IM reducing technologies identified six (6) technologies with reasonable potential for effective application at No. 1 or 2 PS. These included the use of ultrasonic barrier, electrical barriers, multi-technology behavioral system, barrier nets, high velocity angled screens, and fish friendly traveling water screens with a fish return. Due to the uncertainty related to the behavioral deterrents and the space restrictions associated with the actual intake openings, modified traveling screens with a fish return are the preferred method of compliance. However, final determination on entrainment as well as formal engineering design of the fish return systems may prove that another alternative is better suited.

U. S. Steel will continue to research these various technologies as well as management practices and operational measures at No. 1 and No. 2 Pump Station to minimize impingement mortality of key species identified at No. 1 and 2 Pump Station. Due to the concern noted by IDEM and U. S. Fish and Wildlife Service with the high numbers of yellow perch impingement, the chosen impingement mortality compliance alternative will be focused on this species of special concern.

2. SOURCE WATER PHYSICAL DATA PURSUANT TO §122.21(R)(2)

This section describes source water physical data and provides the information requested in 40 CFR 122.21(r)(2).

2.1 Narrative Description of Source Waterbody including Hydrological and Geomorphological Features

No. 1 Pump Station, No. 2 Pump Station, No. 3 Pump Station and No. 4 Pump Station are located along the ore loading slip of Gary Harbor extending inland from the shore of Lake Michigan onto U. S. Steel property. The ore loading slip is approximately 5,800 feet long and ranges in depth from less than 25 feet near the walls to over 31 feet below low water datum[1] in the middle of the channel. Ship activity in the ore loading slip averages one to two ships at a time and an average in-port dock time of 10 hours. Dredging activity for navigational purposes occurs within the slip on an intermittent basis as needed. Therefore, the physical habitat of Gary Harbor, the ore loading slip, and the turning basin is maintained for navigational purposes and is not considered a critical/significant habitat for reproduction or growth of resident species present in the Southern Basin of Lake Michigan.

The Lakeside Pump Station is situated along the southern shore of Lake Michigan on U. S. Steel property with an intake structure positioned offshore a distance of 3,000 feet and at a lake depth of 28 feet. This area receives minimal commercial boat or ship traffic and is subject to occasional recreational boat activity. Bottom substrates for this portion of the southern shoreline of Lake Michigan consist of sand, the surface of which is unconsolidated and is constantly disrupted by surface wave energy. No critical or significant habitats have been identified in the area of the intake structure.

Source water from Lake Michigan was monitored at No. 1 Pump Station, No. 2 Pump Station and Lakeside Pump Station for select parameters such as conductivity, pH, dissolved oxygen, and temperature during 2011 through 2015 to monitor and trend incoming water quality during the permit required impingement and entrainment studies. A summary of water quality indicators from permit requirement impingement studies are included in Table 5. The observed trends are anticipated to reflect conditions at all U. S. Steel intakes. As anticipated, Lake Michigan turbidity is strongly influenced by surface wave energy from ship traffic and strong winds/gusts. Turbidity shows a trend of increasing turbidity during winter months (i.e. December – March) which reflects typical periods of high wind speed. Turbidity ranges from 0 to 120 NTU, with an average value of 8.0 NTU. A graphical depiction is shown in Chart 1. Other water quality measures are consistent with expectations for the southern portion of Lake Michigan with conductivity ranging from 250 – 350 uS/cm, pH ranging from 6.0 – 9.0 s.

u., and dissolved oxygen ranging from 8.5 mg/L – 12.8 mg/L (dependent mainly on water temperature).

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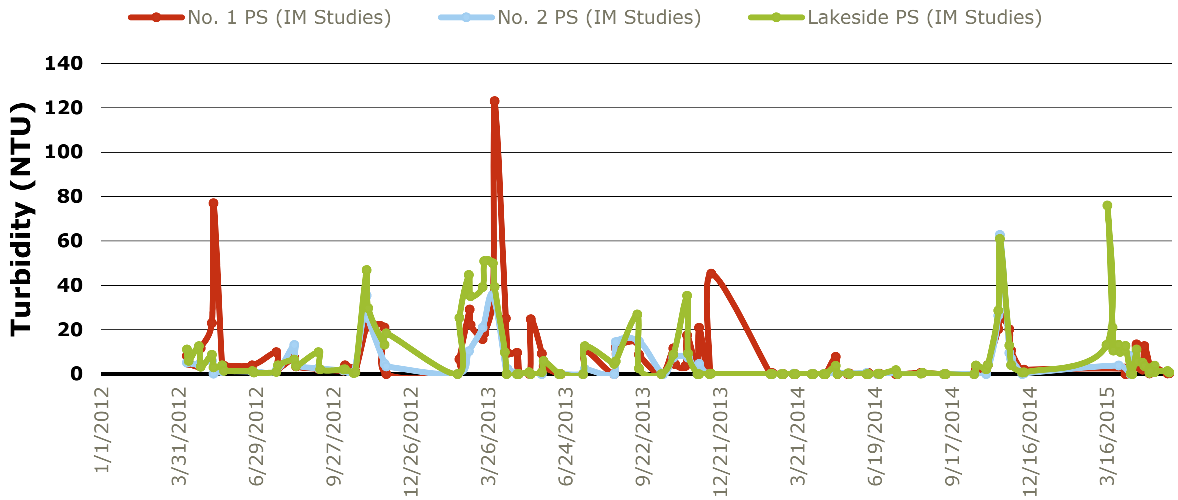
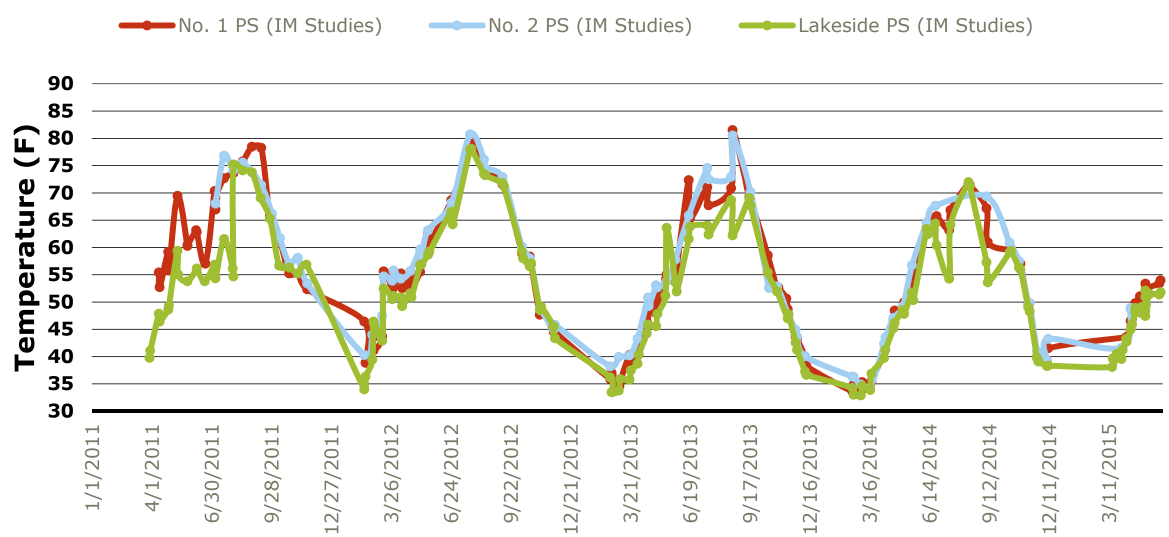
[1] Low Water Datum equivalent to 577.5 ft based on the IGLD1985

CHART 1. PUMP STATION TURBIDITY TRENDS



Temperature data are available No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station for the period in which impingement studies were conducted ranging from 2011 through early 2015. Based on the assumption that the Lakeside Pump Station best reflects the natural temperature for southern Lake Michigan nearshore waters, the general pattern observed indicates water in the ore loading slip of Gary Harbor follows natural temperature trends for southern Lake Michigan, except during the extreme summer and winter months when the Gary Harbor is several degrees warmer. This general trend is consistent with expectations given the depth of the Lakeside Pump Station intake is greater than the Gary Harbor intakes.

CHART 2. PUMP STATION TEMPERATURE TRENDS



2.2 Area of Influence (AOI)

The actual zone of influence from the pump stations would be described as the area extending from the mouth of the intake pipe structure out into the slip water where the velocity of the intake exceeds any current velocity within the slip. Specific distances from the intake mouth are unknown due to variations in Lake Michigan currents, seasonal differences, and meteorological conditions. Additional modeling would be required to develop a conservative estimate of the area of influence.

2.3 Location maps.

See Figures 1, 2, and 3.

3. COOLING WATER INTAKE STRUCTURE DATA PURSUANT TO §122.21(R)(3)

This section describes the cooling water intake structures and provides the information requested in 40 CFR 122.21(r)(3).

3.1 Narrative description of intake structure configuration and location

The No. 1 Pump Station (No. 1 PS) intake is located on the west side of the vessel slip about 2,500 feet south from the slip mouth supplying water to the iron and steel making operations. Water is withdrawn through an intake consisting of two openings of approximately 10 feet (ft) in diameter. Each intake opening is capped with trash bars that are spaced approximately 6 inches apart. No. 1 PS is located approximately 600 feet directly west of the vessel slip bank with the intake channel piping running under the ore yard and blast furnace operation areas. The pump station pumps are protected from debris by a series of fifteen vertical traveling screens, twelve of which are currently in operation. The traveling screens have debris trays that are vertically spaced approximately every 2 ft., span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. Eleven of the operating traveling screens and one of the out-of-operation screens are of 0.250-inch mesh and one remaining operating screen and two stand-by screens have 0.125-inch mesh. See Figure 4 for more detail. The debris trays for each screen are emptied into a common trough, which is located near the top of the screen, during the screen wash operating cycle. The appropriate distance from the screen bottom up to the water surface is 12.5-ft. The approximate distance from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough is about 15-ft. The trough gradually slopes to a discharge pipe, where it further slopes to two retaining baskets roughly 6-ft high by 5.5-ft wide by 3-ft deep. The remaining water from the No. 1 Pump Station trough is discharged back to the intake bays in front of the traveling screens. The existing infrastructure does not currently support discharge of return water back to the Gary Harbor Slip.

The No. 2 Pump Station (No. 2 PS) intake is located on the west side of the vessel slip mouth of Gary Harbor also supplying water to iron and steel making operations. Water is withdrawn through an intake consisting of two 10 ft. by 20 ft. openings. Each of the intake openings are capped with trash bars that are spaced approximately 6 inches apart. No. 2 PS is located approximately 60 feet from the pump station intake. The pump station has a total of seven traveling screen bays, six of which have vertical traveling screens installed. Four vertical traveling screens are currently in operation. The traveling screens have debris trays that are vertically spaced approximately every 2 ft., span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. Three of the 4 operating traveling screens and one of the out-of-operation screens are constructed of 0.250-inch mesh. The remaining operating screen and one out-of-operation screen are constructed of 0.152-inch mesh. See Figure 5 for more detail. The debris trays for each screen are emptied into a common return trough, which his located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 10-ft, and about 18-ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, where it further slopes back to the Gary Harbor Slip. The contents of the return trough are retained via plate screens before the remaining water is discharged.

The No. 3 Pump Station (No. 3 PS) intake is located on the southeastern corner of the ore yard loading slip and is currently not in operation. No. 3 PS previously supplied water to coke making operations which were decommissioned on March 30, 2015. This pump station now serves as an emergency spare to support No. 4 PS if issues occur. Water is withdrawn through a concrete intake conduit via three 10 ft diameter intake openings. Each of the intake openings are capped with bars that are spaced approximately six inches apart. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through the traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility uses. No. 3 Pump Station is located immediately adjacent to the intake. The pump station has a total of three traveling screens, all of which are currently not in operation. Similar to the No. 1 and No. 2 Pump Stations screens, the traveling screens have debris trays that are vertically spaced approximately every 2 ft, span across the width of the screen, and are each approximately 2 inches deep (D) by 3 inches wide (W). The 3 traveling screens are constructed of 0.138-inch mesh. See Figure 6 for more detail. The debris trays for each screen are emptied into a common return trough, which his located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 11-ft, and about 12-ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, where it further slopes back to the Gary Harbor Slip. The contents of the return trough are retained via plate screens before the remaining water is discharged.

The No. 4 Pump Station (No. 4 PS) intake is located on the eastern side of the ore yard loading slip and currently supplies water to sintering operations. No. 4 Pump Station previously supported coke making operations, and similar to No. 3 Pump Station, once coke making operations were decommissioned in March 2015 the water demand for this intake decreased. Water is withdrawn through a concrete intake conduit via two intake openings of approximately 10 feet in diameter. Each of the intake openings is capped with bars that are spaced approximately six inches apart. From the intake openings, water flows into an intake bay upstream of a series of vertical traveling screens that protect the pumps from debris, through the traveling screens, and to a wet well in which it is withdrawn via wet well pumps for facility uses. No. 4 Pump Station is located about 165 ft from the ore yard slip bank. The pump station has a total of five traveling screen bays, four of which have traveling screens installed. Of the four traveling screens, three are currently in operation. See Figure 7 for more detail. The debris trays for each screen are emptied into a common return trough, which is located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 10.5ft, and about 25-ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, which drops about 5-ft, to another pipe, where it further slopes back to the Gary Harbor Slip. The contents of the return trough are retained via plate screens before the remaining water is discharged.

The Lakeside Pump Station (LS PS) intake is located approximately 3,000 ft. off-shore at a depth of approximately 28 ft. Water is withdrawn through an intake crib and conduit located about 6 feet above the lake bed. The Lakeside pump station is located along the shore of Lake Michigan on the northwest side of the Plant. The LS PS pumps are protected from debris by four vertical traveling screens, all of which are currently in operation. The traveling screens have debris trays that are vertically spaced approximately every 2 ft., span across the width of the screen, and are each approximately 2 inches deep by 3 inches wide. Two of the 4 traveling screens are constructed of 0.4-inch mesh with the other 2 constructed of 0.188-inch mesh. See Figure 8 for more detail. The debris trays for each screen are emptied into a common return trough, which is located near the top of the screen, during the screen wash operating cycle. The approximate distance from the screen bottom up to the water surface is 12-ft, and about 20-ft from the water surface to the top of the traveling screens just before the contents of the debris tray empties into the return trough. The trough gradually slopes to a discharge pipe, where it further slopes back to Lake Michigan in the vicinity of the pump station intake bay. The contents of the return trough are retained via plate screens before the remaining water is discharged.

3.2 Latitude and longitude of intake locations

Corresponding global positioning station (GPS) coordinates for the intake structures are summarized in Table 1 and included below for reference:

No. 1 Pump Station	41° 36' 58" N	87° 19' 41" W
No. 2 Pump Station	41° 37' 27" N	87° 19' 31" W
No. 3 Pump Station	41° 36' 35" N	87° 19' 21" W
No. 4 Pump Station	41° 36' 55" N	87° 19' 14" W
Lakeside Pump Station	41° 37' 51" N	87° 22' 26" W

Location maps are also provided in Figures 1, 2, and 3.

3.3 Description of intake structure operations

Operations at the facility are continuous with intakes operated 24 hours per day, 7 days per week on a year round schedule. The only exception is No. 3 Pump Station, which is currently used only as an emergency spare as needed. No. 3 Pump Station has not operated since fall 2014.

The Gary Works facility is categorized as a "significant water withdrawal facility" by the IDNR Division of Water. As such, U. S. Steel is subject to registration and reporting of surface water withdrawals annually with a maximum allowed water withdrawal. The permitted maximum withdrawal rates for individual pump stations correspond to the design capacity of each intake and are shown in Table 1 with a total permitted capacity equal to approximately 1,263 MGD. Actual intake flows for the facility on a per pump station basis are shown in Table 2. As a facility, Gary Works typically operates at roughly 50% of the IDNR permitted withdrawal capacity. For pump station specific AIF to DIF comparisons, see Table 3.

3.4 Flow distribution and water balance

See Figures 9 and 10 for a depiction of the current East and West Side water balances. Water balance flows are also shown for the East and West Side in Tables 4.1 and 4.2 respectively. Based on the information available, approximately 86% and 65% of intake waters are used exclusively for cooling on the East and West Side respectively.

3.5 Engineering drawings

See Appendix 1.

4. BIOLOGICAL INFORMATION FOR SOURCE WATER PURSUANT TO §122.21(R)(4)

Pursuant to 40 CFR 122.21(r)(4), the following biological information for the source water is required.

4.1 Data in (r)(4)(ii) through (vi) that is not available

Not applicable; data addressing sections (r)(4)(ii) through (vi) are summarized below.

4.2 Species present in vicinity of the intake structure

Numerous studies have been performed to characterize fish assemblages in the nearshore area of Southern Lake Michigan in close proximity to U. S. Steel. A literature review that included these studies was completed and summarized in Table 6. Table 6 provides a list of these species and their status as endangered species or species of concern with the State of Indiana.

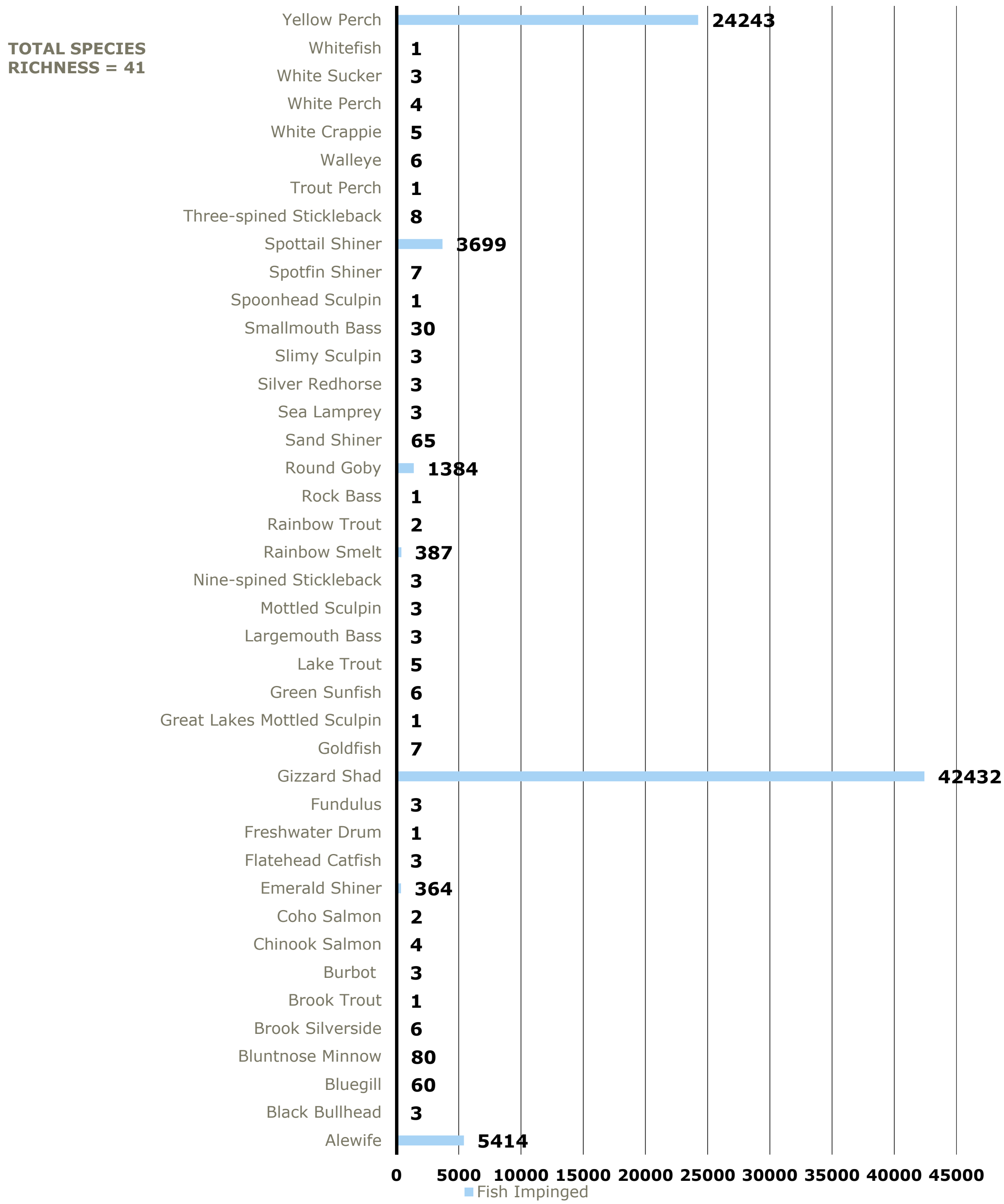
Pursuant to the previous NPDES Permit No. IN0000281 (effective March 1, 2010), U. S. Steel was required to conduct scientifically valid monitoring studies to further characterize the nature and extent of the environmental impacts from the cooling water intake structures. Permit conditions included submitting proposals for monitoring at least 90 days prior to initiation of the studies and subsequently monitoring for both impingement and entrainment during the 2nd (2011 - 2012), 3rd (2012 - 2013), 4th (2013 - 2014), and 5th (2014 – 2015) years of the Permit. Impingement monitoring was required at No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station, while entrainment monitoring was only required at No. 1 Pump Station and Lakeside Pump Station. Initial sampling periods were scheduled every other week during the peak spawning months of March through May and October through November, and once a month during June through September, and December. Please note, studies were abbreviated in 2015 due to the promulgation of the final rule and the following notification received from IDEM on March 24, 2015:

> *To: Facilities subject to CWA Section 316(b) requirements*
>
> *This email serves as notification that the CWA Section 316(b) requirements in Part IV of your NPDES permit issued prior to August 15, 2014, will no longer be applicable due to the promulgation of a Clean Water Act (CWA) section 316(b) regulation by the U.S. EPA on August 15, 2014, that establishes standards for cooling water intake structures. 79 Fed. Reg. 48300-439 (August 15, 2014). The regulation establishes best technology available standards to reduce impingement and entrainment of aquatic organisms at existing power generation and manufacturing facilities and became effective on October 14, 2014. IDEM is notifying all affected parties that NPDES permits containing the outdated language shall submit the information required by 40 CFR 122 and 40 CFR 125, including all of the associated supporting documentation and/or studies with the next permit renewal application (180 days prior to the expiration of the current permit), or an alternate schedule for the submission of the 316(b) requirements may be requested in accordance with 40 CFR 122.21*

A summary of species encountered and the relative abundance during this period (March 2011 – May 2015) is summarized in Tables 7, 8 and 9. Species encountered include organisms common to nearshore waters of the Southern Lake Michigan. Composition and abundance of the organisms will vary spatially depending upon meteorological conditions, life stage, reproduction, and feeding behavior; and vary temporally depending upon season.

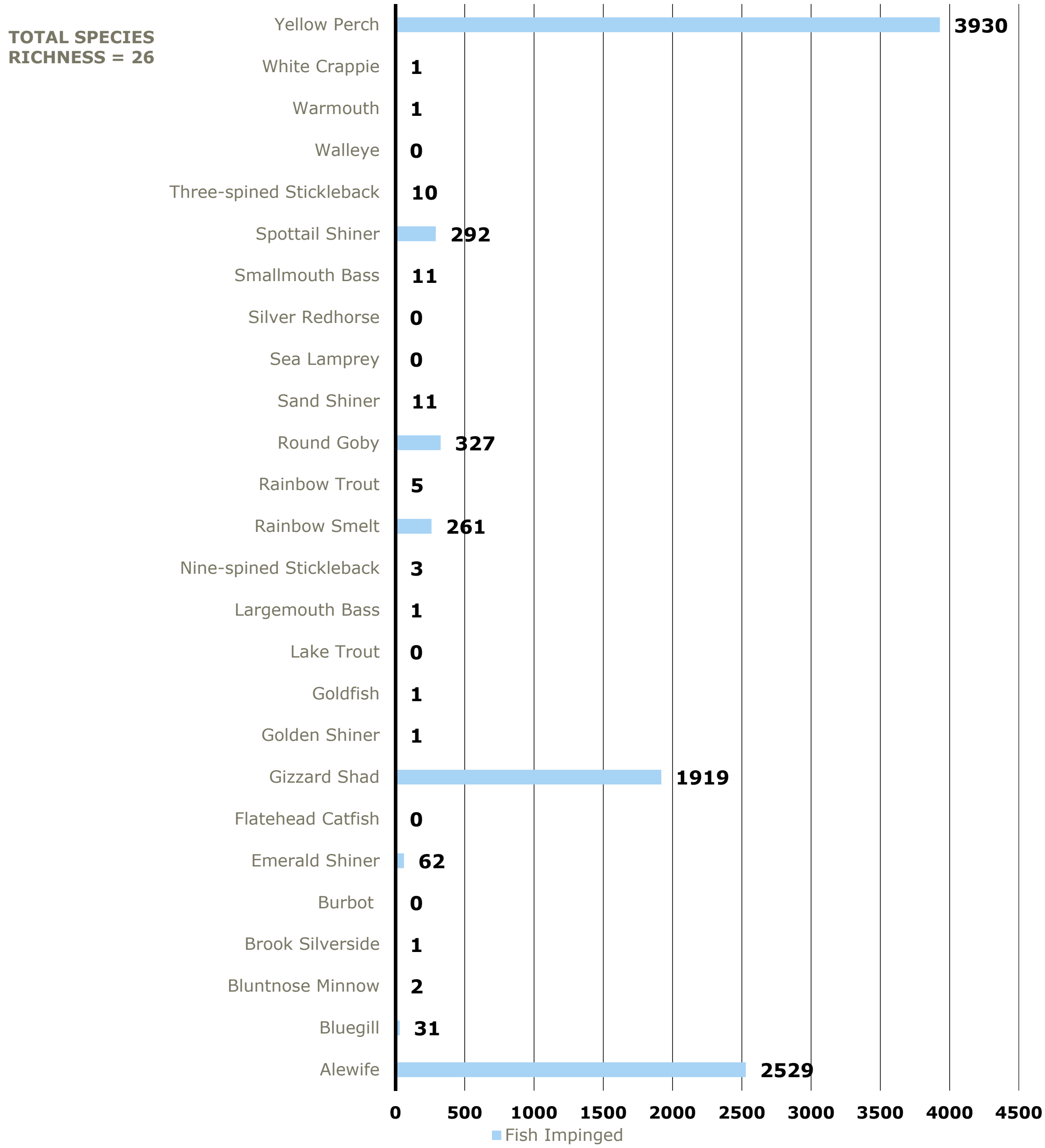
At No. 1 Pump Station the three most abundant species encountered were gizzard shad, yellow perch, and alewife respectively accounting for a combined 92.1% of the total abundance. Total richness observed at No. 1 Pump Station from 2011 through 2015 was 41 species with the peak spawning periods resulting in the greatest abundance in April and November. More detail available in Table 7.

CHART 3. FOUR-YEAR IMPINGEMENT STUDY TOTALS AT NO. 1 PUMP STATION



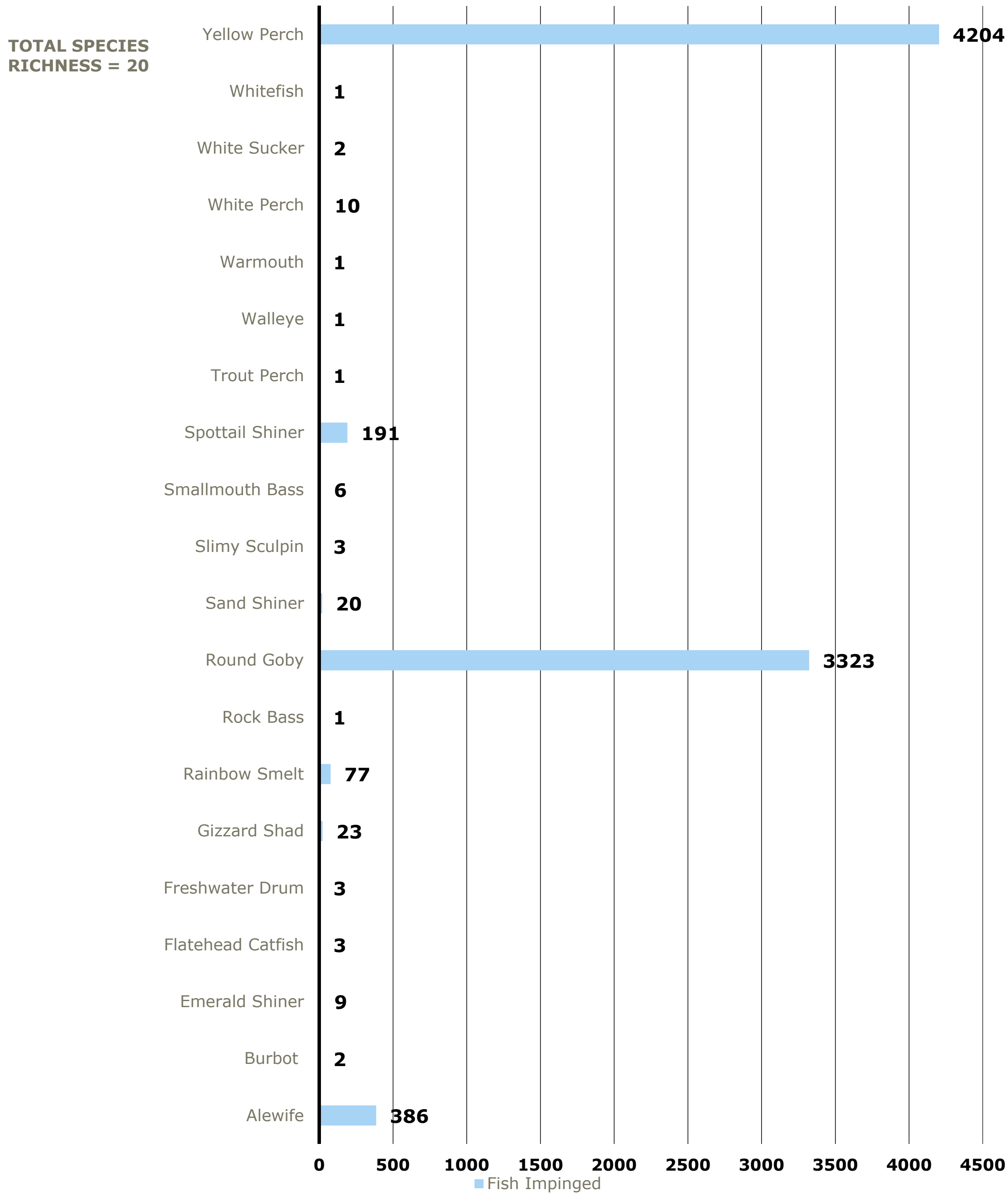
Likewise, observations at No. 2 Pump Station found the same three species to be the most abundant, but in a modified order: yellow perch, alewife, and gizzard shad respectively, making up a combined 89.1% of the total abundance. Total richness observed at No. 2 Pump Station over the four year monitoring period was 26 species with peak spawning periods resulting in the greatest abundance in May/June and October/November. More detail available in Table 8.

CHART 4. FOUR-YEAR IMPINGEMENT STUDY TOTALS AT NO. 2 PUMP STATION



At Lakeside Pump Station, the three most abundant species encountered were yellow perch, round goby, and alewife respectively. These three species accounted for 95.7% of the total abundance. Total richness observed at Lakeside Pump Station over the four year monitoring period was 20 species with peak spawning periods resulting in the greatest abundance in April, June, and November. More detail available in Table 9.

CHART 5. FOUR-YEAR IMPINGEMENT STUDY TOTALS AT LAKESIDE PUMP STATION



4.3 Species susceptible to impingement and entrainment

Species, typically juveniles, that reside in contiguous habitats, such as extensive rock outcrops, gravel beds, or submerged aquatic vegetation or "sea grass beds", for reproduction or feeding are likely most susceptible to impact by intake operations. Given that the intakes are not located within these types of areas, impacts from impingement and entrainment is anticipated to be low. Impacts are more likely to affect pelagic species or life stages, which are typically identified fragile species.

Based on the species encountered during the environmental field studies discussed in Section 4.2, the species anticipated to be most susceptible to impingement and entrainment include alewife, round goby, gizzard shad, and yellow perch. The only species of recreational significance is the yellow perch.

4.4 Primary reproduction and peak abundance periods

Only the species identified to be most susceptible to impingement and entrainment are addressed below. Overall total abundance as well as species abundance varied throughout the study years. Overall, No. 1 Pump Station encountered a greater number of fish impinged relative to No. 2 Pump Station and Lakeside Pump Station. A graphical depiction of the annualized impingement estimate as well as composition of species encountered is included below. Sample events from 2012 through 2015 were normalized from the 8-hr collection period to be representative of anticipated impingement over a 24-hr period. Results from 2015 do not represent a full year of sampling (i.e. sampling suspended in May 2015). Therefore, an annualized estimate of 2015 data is not included. See Table 10 for additional details.

CHART 6. NO 1 PUMP STATION ANNUAL IMPINGEMENT

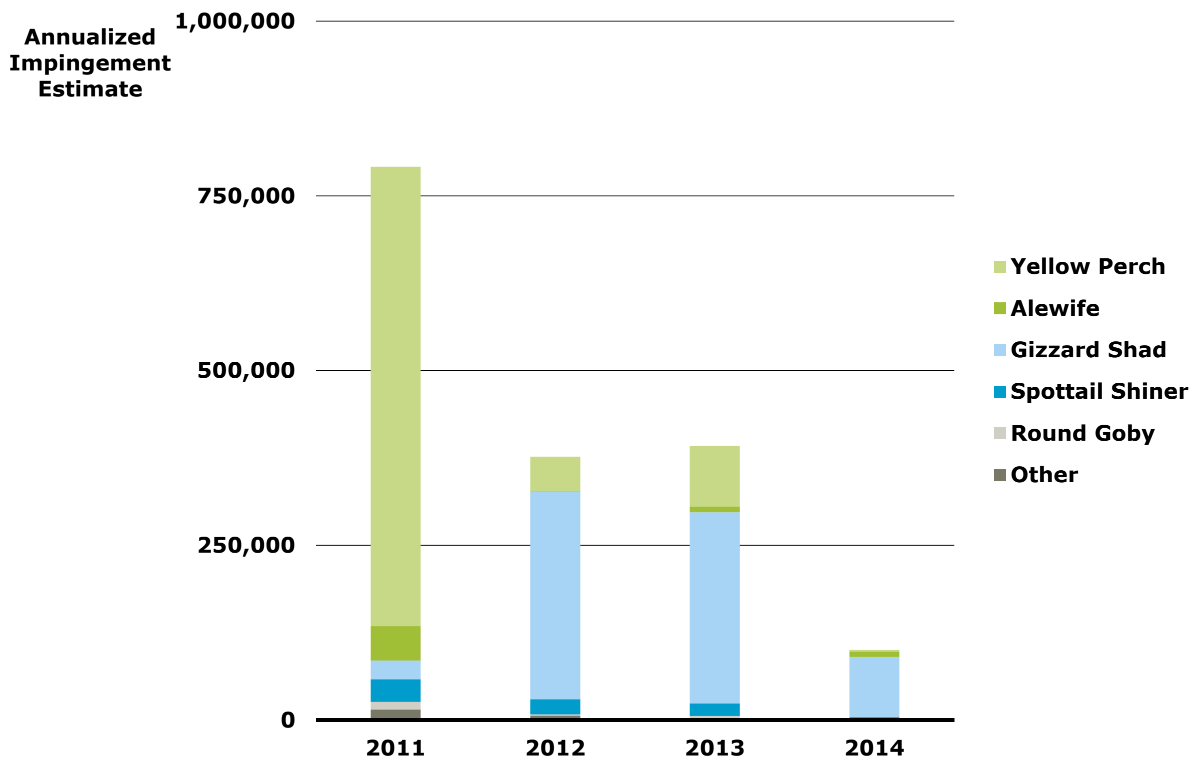


CHART 7. NO 2 PUMP STATION ANNUAL IMPINGEMENT

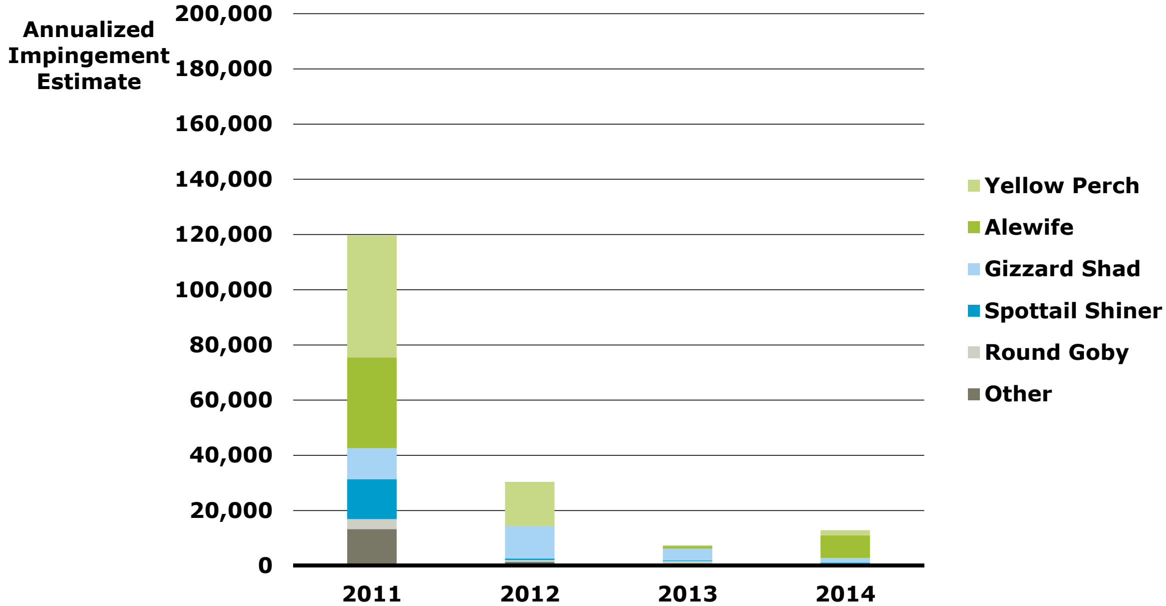
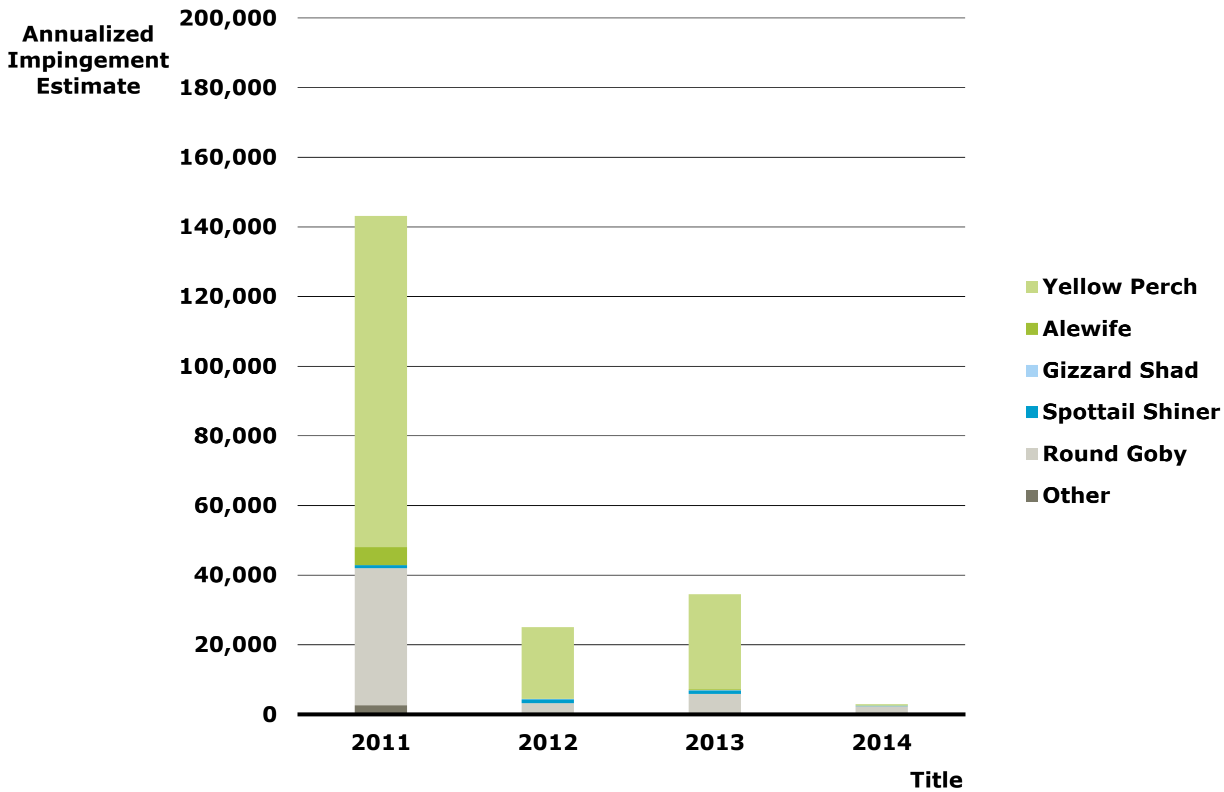


CHART 8. LAKESIDE PUMP STATION ANNUAL IMPINGEMENT



Yellow perch: Yellow perch normally spawn in April or early May, and have random spawning habitats that allow them to use almost all slow-moving or static waters within their geographical range (Becker, 1983). Eggs are laid in large accordion-like structures about 38 mm thick and attain lengths exceeding that of the parent fish, and these strands float until they become entangled in debris or fallen branches in shallow water (Mansueti, 1964).

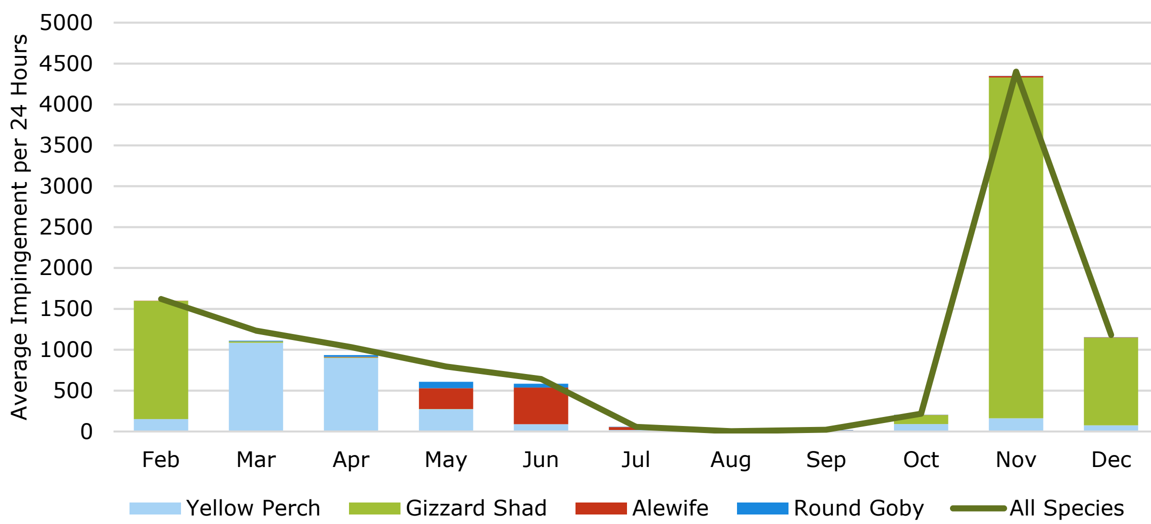
Gizzard shad: Gizzard shad spawning occurs in late April or early May, and continues into early August (Becker 1983).

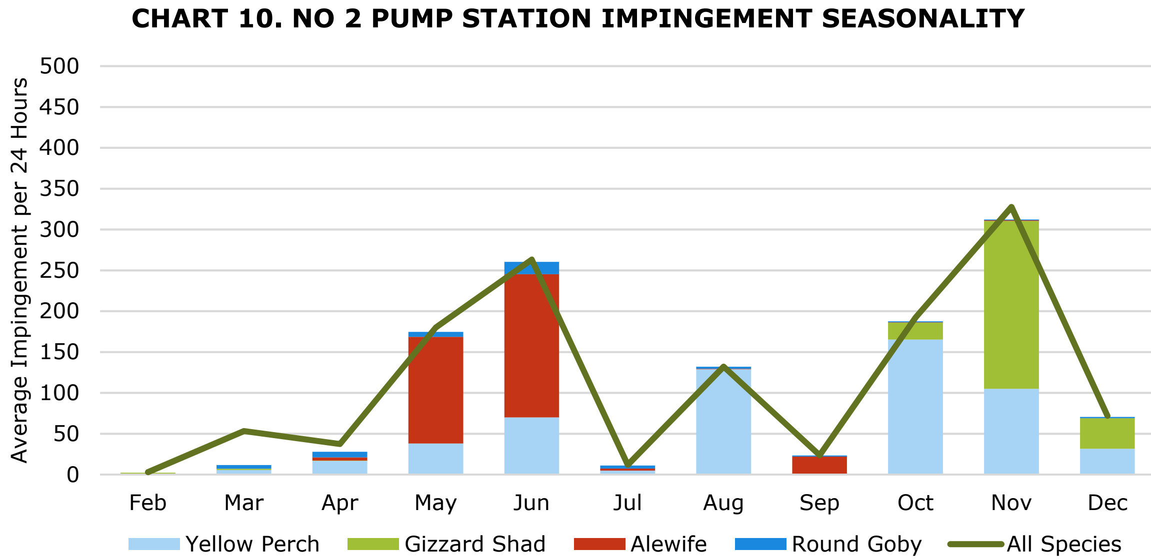
Alewife: The alewife have been a key forage species in Lake Michigan since the 1950s and, as a larval fish predator, can affect recruitment of native fishes, including lake trout and yellow perch. Adult alewife abundance in Lake Michigan has been declining since 2002 in part because of predation by stocked salmonids (i.e., salmon and trout) and likely in response to the decreasing abundance of Diporeia that has been attributed to the dreissenid mussel invasion of Lake Michigan (Nalepa, 2006). Most alewife consumed by salmonids in Lake Michigan are eaten by Chinook salmon (Madenjian, 2014). Offshore movements of alewife to deeper water during the fall where they remain through early spring limits their exposure to the intakes from about September through April. In the spring, alewife move inshore to spawn and remain nearshore through the summer.

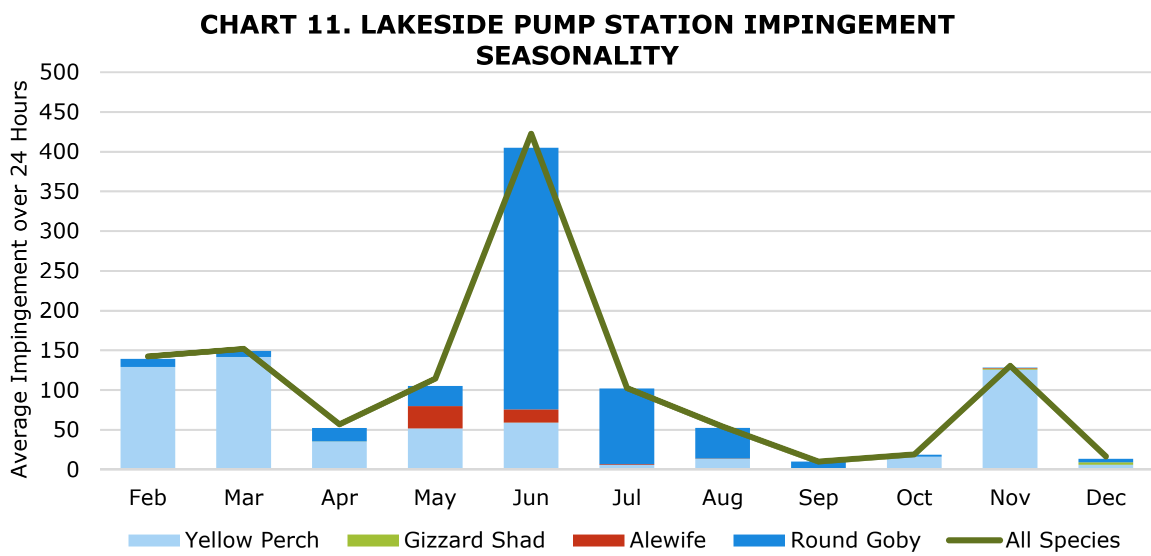
Round Goby: The round goby originated from the Black and Caspian Seas in Europe and was introduced to the Great Lakes by the release of ballast water from large trans-Atlantic cargo ships around 1990, and is therefore considered a nuisance species. They were first found in Lake Michigan around 1995. They are found in rocky areas and live in and around crevices in the rocks. Since they became established in Lake Michigan, they have eliminated nearly every small bottom dwelling fish, such as darters and sculpins, which were once found there. They also have been found to cause significant damage to the nests of smallmouth bass by consuming the eggs and young. Like all gobies, the round goby has its two pelvic fins fused into a single suction cup shaped fin. Full-grown adults are usually 4-8 inches, but they can reach 10 inches. Male round gobies aggressively defend their nesting sites protecting their eggs and young. Additionally, this species spawns multiple times during warmer months of the year, causing them to be very prolific.

Site-specific seasonality of key species encountered during the 2011 – 2015 studies is shown in Charts 9, 10, and 11 for No. 1 PS, No. 2 PS, and Lakeside PS respectively. Additional detail is available in Table 11.

CHART 9. NO 1 PUMP STATION IMPINGEMENT SEASONALITY







4.5 Seasonal and daily activities

See discussions in Section 4.4 regarding seasonal activities. There is little data on the most common species regarding diurnal activities.

4.6 Threatened and endangered species

No threatened or endangered species have been encountered; nor were there any species on the Indiana Department of Natural Resources list of species of concern collected during sampling.

4.7 Documentation of public participation or consultation with federal or state agencies

On multiple occasions, U. S. Steel has met and consulted with the Indiana Department of Environmental Management at their offices in Indianapolis, Indiana. General topics during these discussions included various permit renewal application requirements including cooling water intake structures. No public participation regarding the cooling water intake structures has occurred to date.

4.8 Field study documentation

The impingement and entrainment characterization study was performed at select Gary Works CWISs including No. 1 Pump Station, No 2 Pump Station, and Lakeside Pump Station.

4.9 Source water biological characterization data

Regulatory citation included for informational purposes only.

§122.21(r)(4)(ix) states "*In the case of the owner or operator of an existing facility or new unit at an existing facility, the Source Water Baseline Biological Characterization Data is the information in paragraphs (r)(4)(i) through (xii) of this section."*

4.10 Protective measures implemented

No protective measures or stabilization activities have been implemented in the vicinity of the CWIS.

4.11 List of fragile species

In the context of impingement and entrainment impacts, 40 CFR 125.92(b) defines the term *All life stages of fish and shellfish* as eggs, larvae, juveniles, and adults. These studies focus on the life stages of fish and shellfish most susceptible to impact by the cooling water intake structures with emphasis on threatened and endangered species. In the context of the final rule, EPA included two special definitions to qualify impingement data when fragile and non-indigenous invasive species (NIS) were encountered. See Table 12 for a summary of fragile and nuisance species encountered during the 2011 through 2015 studies.

Fragile Species

In the final rule, EPA adopted the term "fragile species" which were designated as those species of fish and shellfish that are least likely to survive any form of impingement with an impingement survival rate of less than 30 percent. This approach was used to ensure that biological data would reflect only the effects of a facility's improvements to the CWIS technology, and not be confounded by effects of data collection (i.e. fish handling) that are not caused by impingement. Based on the listing of known fragile species provided in §125.92(m), three fragile species were encountered at each of the pump stations: alewife, gizzard shad, and rainbow smelt. These fragile species account for 62%, 50% and 6% of the total fish impinged at No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station respectively.

Non-indigenous Invasive Species

The definition for all life stages of fish and shellfish does include standard exemptions such as members of the infraclass Cirripedia in the subphylum Crustacea (barnacles), green mussels (*Perna viridis*), or zebra mussels (*Dreissena polymorpha*). Additionally, the definition goes on to state the Director may determine that all life stages of fish and shellfish does not include other specified nuisance species. In the August 15, 2014 Federal Register (Vol. 79, No 158) EPA noted "NIS are a significant and increasingly prevalent stressor in both freshwater and marine environments. Approximately 300 NIS have become established in marine and estuarine habitats of the continental U.S., and the number of NIS continues to increase. Many NIS are nuisance species with undesirable effects on local communities."

U. S. Steel encountered one prevalent nuisance species (round goby) during biological monitoring which accounted for 2%, 3% and 40% of the total fish impinged at No. 1 PS, No. 2 PS and LS PS respectively. Given NOAA and IDNR listing that round goby are a high priority nuisance species in Lake Michigan and that IDNR has both a top priority to manage round goby as an aquatic nuisance species as well as enacting 312 IAC 9-6-7 that makes it illegal to "import, possess, propagate, buy, sell, barter, trade, transfer, loan, or release into public or private waters any of the following live fish or fry of live fish or their viable eggs or genetic material" related to round gobies, U.S. Steel is requesting that round goby continue to be defined as nuisance species for U.S. Steel presentation of impingement and entrainment performance of their intakes. Specifically, U.S. Steel will exclude round goby from discussions in presenting life stages of fish encountered at the intakes.

4.12 Incidental take authorization

This section is not applicable. U. S. Steel Gary Works has not obtained an incidental take exemption or authorization for its CWIS's from USFWS or NMFS.

5. COOLING WATER SYSTEM DATA PURSUANT TO §122.21(R)(5)

This section describes the cooling water system and covers the information requested in 40 CFR 122.21(r)(5).

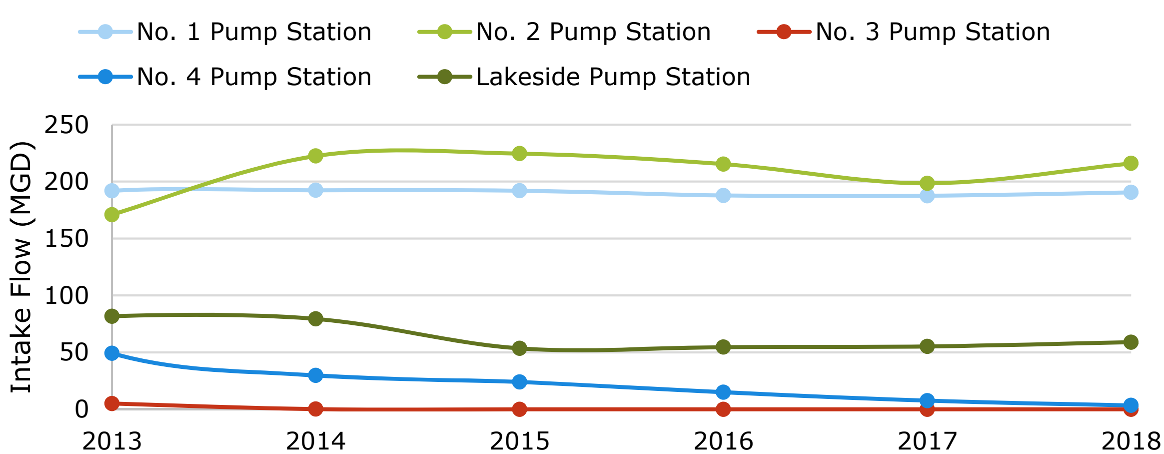
5.1 Cooling water system description

U. S. Steel is a fully integrated steel manufacturing plant with six (6) separate, but interdependent production areas. Coke and chemical by-products were produced on the east end of Gary Works prior to decommissioning in 2015; iron making and steel-making facilities are located toward the center of the facility to the west of the vessel slip while sintering operations are located to the east. Tin and other rolled products are finished and shipped from facilities located in the west end. The plant also includes ancillary facilities to support the production processes, such as boiler houses, maintenance facilities, environmental control systems such as scale pits, oil-water separators, and wastewater treatment (WWT) facilities, business administration operations, and shipping and receiving facilities, and outside material storage areas (raw, finished, and reclaimable materials). The facility operates continuously. The following is a high level overview of which pump station provides service water to the six (6) production areas:

- Sintering Operations supplied by No. 4 Pump Stations (No. 3 PS if needed)
- Iron Making supplied by No. 1 and 2 Pump Stations
- Steel-Making supplied by No. 1 and 2 Pump Stations
- Hot Rolling Operations supplied by Lakeside Pump Station
- Sheet Finishing Operations supplied by Lakeside Pump Station
- Tin Finishing Operations supplied by Lakeside Pump Station

The water balance diagrams accompanied by Table 4.1 and 4.2 show the proportion of flow used for process versus cooling. The actual intake flow (AIF) is defined as the average volume of water withdrawn on an annual basis by the cooling water intake structures over the past three years. AIFs are summarized for 2012 through 2018 in Table 2 and a comparison of AIF versus DIF is given in Table 3. Based on this data, Gary Works typically operates at roughly 50% of the DIF. In addition, a trend of relatively consistent wastewater withdrawal over the last three (3) years can be observed with minimal seasonal fluctuations. The most notable change is observed at No. 4 Pump Station in August 2014. Utilization of No. 4 Pump Station further decreased following the decommissioning of the coke batteries in March 2015 and subsequent shutdown of cooling water to the Coke and Chemicals By-Product operations in August 2015. To accommodate these changes, lower capacity pumps were installed at No. 4 Pump Station in summer of 2017.

CHART 12. GARY WORKS ANNUAL ACTUAL INTAKE FLOWS



5.2 Engineering calculations and supporting cooling system data

Based on the final rule, an intake water velocity exceeding 0.5 fps is believed to impair fish swimming ability, and at or below 0.5 fps is the velocity range believed to protect fish from mortality due to impingement. Velocity of the water through the screen/openings was calculated using the standard equation:

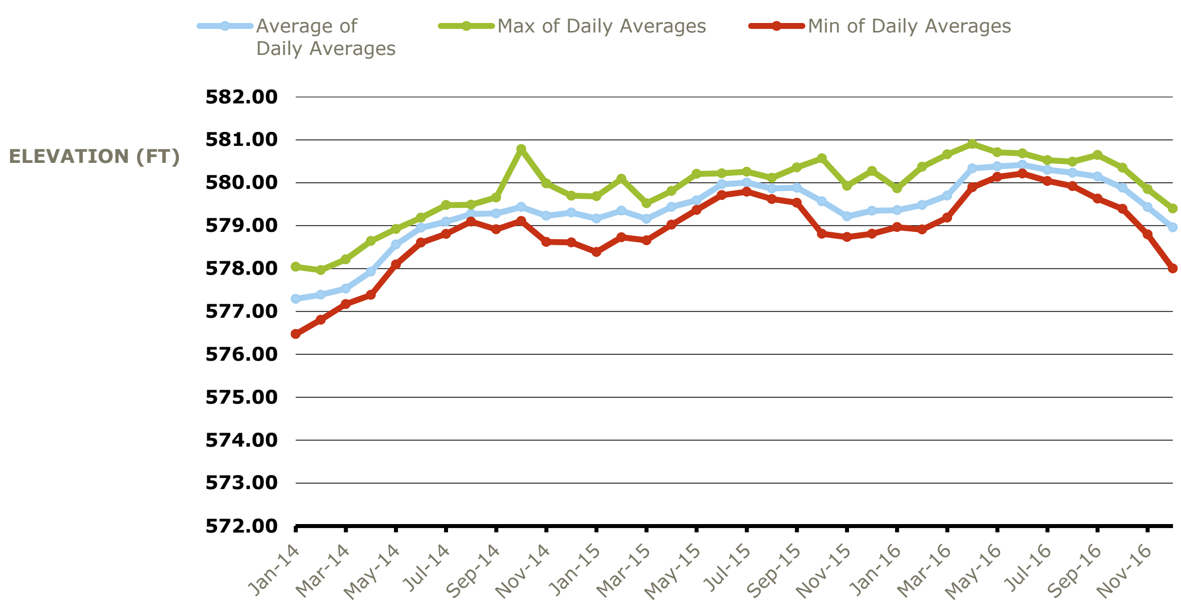
TSV = Q/A, where;

TSV = through-screen velocity
Q = volume of water pumped
A = net area of the submerged screen/openings
TSV = Q / A = (Flow in MGD*1,000,000)/(Area in sq. ft * 7.48 gal / cu. ft * 86400 sec / hr)

TSV has been calculated using two different methodologies for all U. S. Steel pump stations: at submerged intake openings and at the face of the traveling screen. The calculation at submerged openings determines the velocity at the submerged pipe withdrawing from the surface water assuming no screens are installed at this location (coarse bars only). The calculation at screens determines the velocity perpendicular to the traveling screens. Due to the differing configurations at each pump station, the submerged openings calculation method is more appropriate as a point of entry into the cooling water intake system at select pump stations.

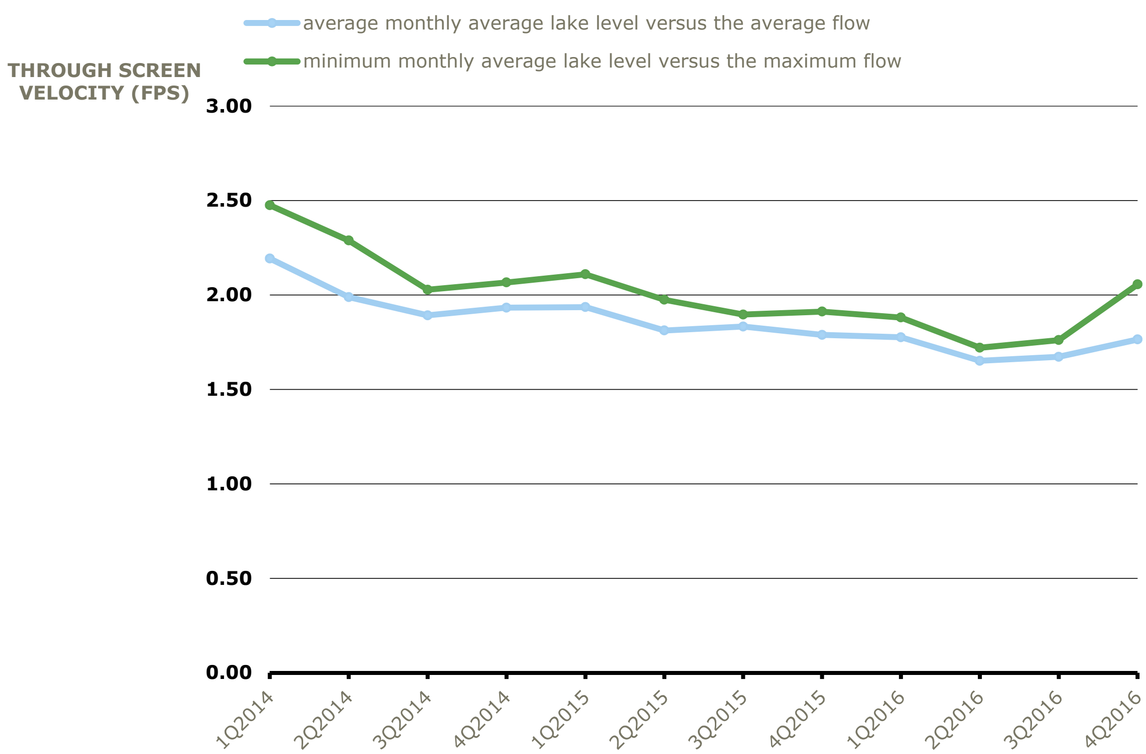
In order to estimate the portion of the screen submerged for the "at screens" methodology, lake levels are used from the NOAA site at Calumet Harbor Station No. 9087044 (see Table 13). Real time monitoring of water levels at each individual intake was established by U. S. Steel for a short time. However due to data quality and consistency concerns, the NOAA site was determined to be more appropriate for use. Lake levels have varied by roughly 3 ft over the last three years with annual low levels occurring during the winter (December – March) time period as shown in Chart 13.

CHART 13. LAKE MICHIGAN LEVELS AT CALUMET HARBOR



The TSV at screens was calculated for No. 2 PS based on monthly intake flow statistics (maximum, minimum, and average) and monthly lake level statistics (maximum, minimum, and average) as shown in Table 14. Chart 14 below shows the quarterly summaries using (1) the average monthly average lake level versus the average flow to be more representative of actual operations, and (2) the minimum monthly average lake level versus the maximum flow as a conservative worst case scenario. Chart 14 depicts these trends at No. 2 Pump Station over the last three years.

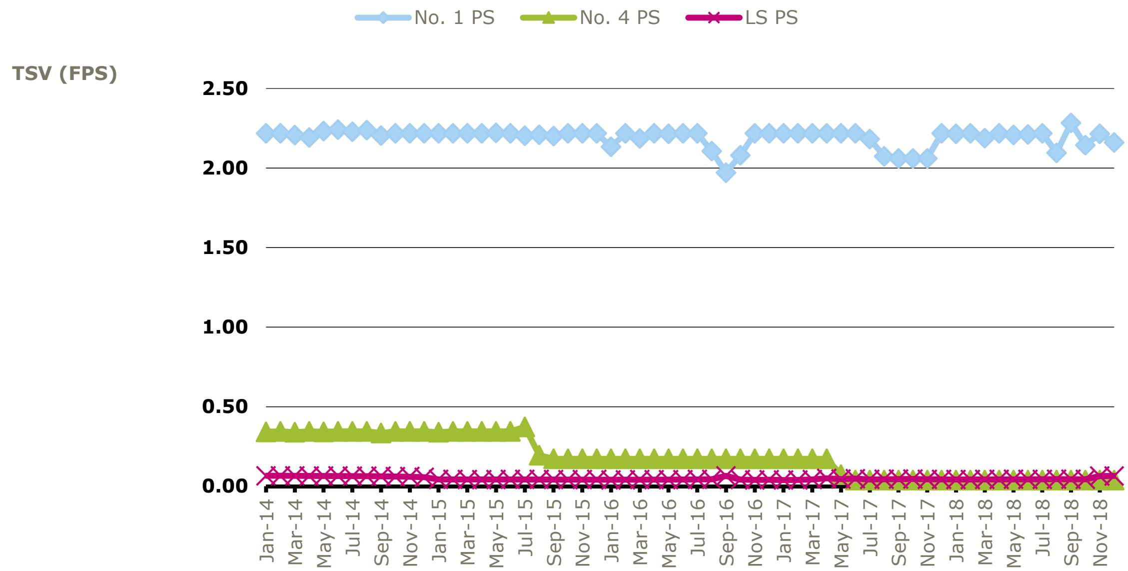
CHART 14. NO. 2 PUMP STATION TSV



The through-screen velocity is observed to be inversely related to Lake Michigan levels when using the at screens calculation method. As the lake levels rise, the submerged area of the screen increases and velocity perpendicular to the screens decreases if constant intake flow is maintained.

While the "at screens" approach is appropriate for intakes in close proximity of the surface water such as No. 2 Pump Station and No. 3 Pump Station, it is not indicative of the point of entry into systems with extended conveyance piping prior to reaching the screens (i.e. No. 1 Pump Station, No. 4 Pump Station, and Lakeside Pump Station). Therefore, a second calculation method was employed to best represent the velocity at the point of entrance/exit into the cooling water intake system. This methodology is referred to herein as the TSV at openings. Pump Station specific information used in the "at openings" calculation is summarized in Table 15. Bar dimensions are assumed to be the same as the U. S. Steel Midwest plant located in nearby Portage, Indiana except for Lakeside Pump Station which does not have bars. Since the TSV at openings calculation is not dependent upon lake levels (i.e. submerged intake), the calculated velocity remains relatively constant over the last three years. Moreover, the average, maximum, and minimum statistics do not significantly differ from one another. This is an expected trend given the stable intake flow data reviewed previously. Chart 15 depicts the average approach velocity at openings. For additional detail, see Table 16.

CHART 15. INTAKE VELOCITY AT SUBMERGED OPENINGS



5.3 Existing impingement and entrainment technologies or operational measures

Existing impingement and entrainment technologies or operational measures currently in place at the Gary Works facility include traveling screens at all pump stations, the submerged offshore location of Lakeside Pump Station, and completed water reduction/reuse efforts throughout the facility. The AIF comparison to the DIF demonstrates the continued efforts by the facility for water reuse/optimization both in primary operations (East Side) and finishing operations (West Side).

The East Side operates various cooling water systems for water recirculation/reuse at the facility. Both process wastewater and cooling water are treated for reuse on the East Side. The main process wastewater treatment and reuse systems include the Blast Furnace Gas Cleaning System, No. 1 BOP Gas Cleaning System, and No. 2 QBOP Gas Cleaning System. These systems treat process wastewater for solids removal prior to cycling through a cooling tower for reuse within the process. The cooling water reuse systems include the No. 2 QBOP Hood Cooling Water System (closed recirculation design equal to 40,000 gpm = 57.6 MGD), No. 2 Caster Mold Water Cooling Water System (closed recirculation design equal to 5,730 gpm = 8.3 MGD), and No. 2 Caster Internal Machine Cooling Water System (two cell cooling tower designed for 7,842 gpm per cell equal to 22.6 MGD). The recirculation systems for cooling water reuse total approximately 88.5 MGD. Operation of these water reuse and optimization systems is considered an existing impingement and entrainment control through reduction in intake volumes.

The West Side operates various cooling water systems for water recirculation/reuse at the facility. The most prominent water recycle facility on the West Side is the 84” Hot Strip Mill Recycle System. This system treats process wastewater for oil, grease, and solids removal prior to cycling through a cooling tower for reuse within the process. The cooling tower contains five cells (200A/B/C/D/E) each sized for 26,000 gpm, totaling a recirculation capacity of 187 MGD. Operation of this water reuse and optimization system is considered an existing impingement and entrainment control through reduction in intake volumes. Additionally, the Lakeside Pump Station intake is submerged and located off-shore away from spawning areas which would also be considered existing impingement and entrainment control measure.

The performance of the existing systems was evaluated during the 2011 – 2015 impingement studies. Percent mortality represents the proportion of fish in which death results due to impingement as well as inevitable morality (i.e. fish lacking the ability to escape the cooling water intake system). The Final Rule, which became effective in October 2014, addressed approved methods for quantification of percent mortality. As such, calculation of impingement mortality per the specified methodology is summarized below for the evaluations conducted from March 2011 through May 2015. Initial sampling periods were scheduled every other week during the peak spawning months of March through May and October through November, and once a month during June through September, and December. The initial schedule was accommodated when feasible, but select dates were modified due to facility operations. Impingement samples were collected over an 8-hour period except for those collected in 2011, which used a 24-hour sample period. Based on a review of the 2011 capture data, an 8-hour capture period was found to be adequate to provide the necessary data to determine impacts to the fishery.

During each monitoring period, all fish impinged and collected from the return trough were counted and retained, and all live fish were transferred to a holding tank for a period of 32 hours minimum (final rule recommends between 18 to 96 hour holding period). Following the holding period, the number of live and dead fish were recorded, identified, and weighed for determination of impingement mortality. The methodology presented in the final rule divides the total number of fish that died as a result of being impinged by the total number of fish impinged throughout the sampling period. In addition, "fragile species" are excluded from this calculation. The final rule requires biological monitoring to be conducted at a minimum frequency of monthly to demonstrate impingement mortality performance. The final rule presented the impingement mortality performance standard of 24% based on 12-months of total data. This standard is enforced as a rolling annual average recalculated monthly as described in §125.94(c)(7) requiring "each month, you must use all of the monitoring data collected during the previous 12 months to calculate the 12-month survival percentage".

To estimate percent mortality, the following information was recorded for each monitoring period:
1. the total number of fish impinged,
2. the number of impinged fish that were alive and transferred to a holding tank,
3. the number of fish determined to be "fragile species" (i.e. alewife, gizzard shad, and rainbow smelt; these species were impinged at Gary Works and are listed as "fragile" in the Final Federal Regulation), and
4. the number of dead fish in the holding tank after a 32-hour (minimum) holding time.

For example, if 100 fish were impinged and captured from the fish return over the sampling period and 25 were fragile and invasive species and thus excluded from the final count, 25 were "non-fragile species" dead on the screens, and 50 were found to be alive and immediately transferred to a flow-thru holding tank. After 32 hours in the holding tank, 25 of the 50 fish were still alive, this would result in a percent impingement mortality (% IM) rate of 67% for this sample, as the 25 fish are "fragile species" hence removed from the ratio.

The calculations for this example are summarized below:

100 {total fish impinged[2]} - 25 {fragile species dead when impinged} = 75 {total non-fragile/invasive fish species}

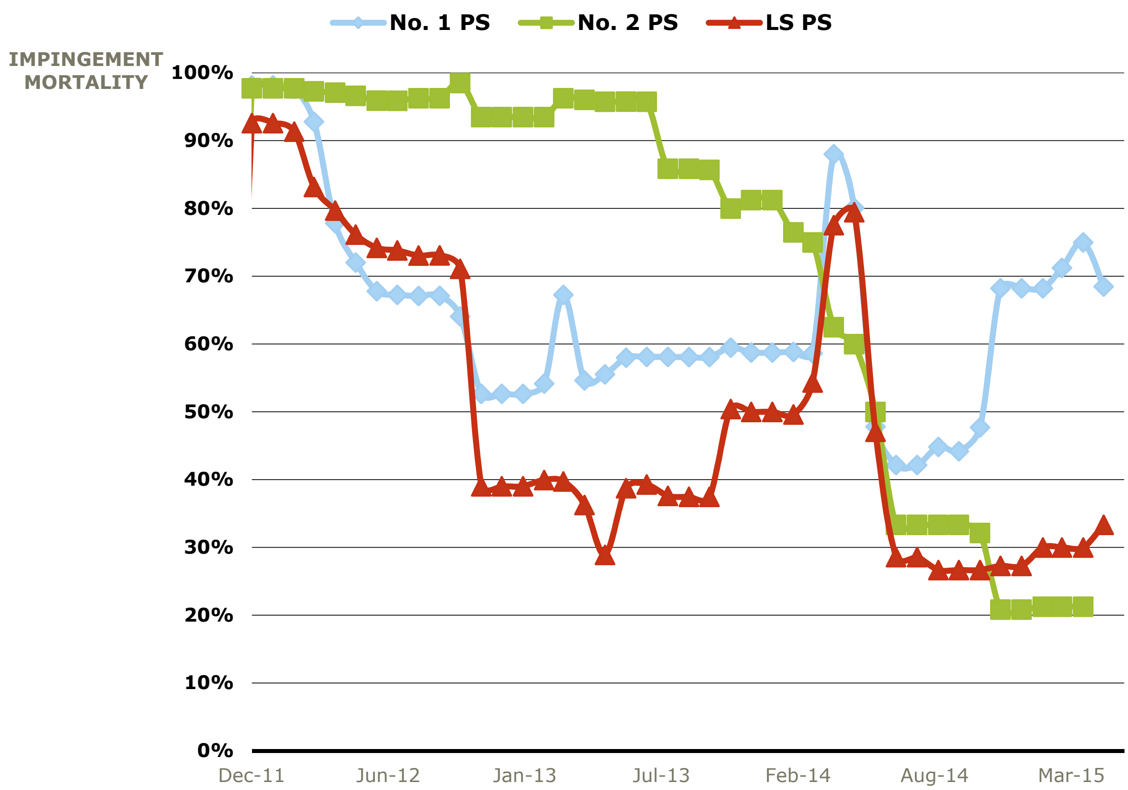
75 {total non-fragile fish species} – 25 {fish non-fragile fish species alive after the holding period} = 50 {total fish dead after the holding period}

= 50 {total fish dead after the holding period} / 75 {total non-fragile fish species} = 67 % IM

[2] As noted in Section 4, nuisance species (i.e. round goby) are not included as representing "all life stages of fish".

Based on this methodology, U. S. Steel calculated the impingement mortality for the period in which biological monitoring was conducted at the facility beginning in spring 2011 through spring 2015. Data from this calculation is summarized in Tables 17, 18, and 19. As stated previously, in lieu of the final rule, U. S. Steel conducted studies to capture the peak spawning periods and therefore not all 12 months are represented each year. When one looks into individual months, for all three pump stations the highest impingement mortality occurred during the summer and fall sampling with a noticeable decline in percent mortality during the early-spring sample events. The impingement mortality was calculated each month (although every month did not have impingement studies conducted) using the monitoring data collected during the previous 12 months to calculate the annual survival percentage. Percentages represent number of fish impinged over the most recent 12-month period less fragile and invasive species.

CHART 16. IMPINGEMENT PERFORMANCE



6. METHOD OF COMPLIANCE WITH IMPINGEMENT MORTALITY STANDARD PURSUANT TO §122.21(R)(6)

This section describes the intended method of compliance with the impingement mortality standard and covers the information requested in 40 CFR 122.21(r)(6). According to the 316(b) Rule, a facility like Gary Works must meet one of the following compliance alternatives for impingement under 40 CFR 125.94, including:

- Implementation of closed-cycle recirculating cooling system (i.e., cooling towers) (40 CFR 125.94(c)(1));
- Compliance with a 0.5 fps design through-screen velocity threshold (40 CFR 125.94(c)(2));
- Compliance with a 0.5 fps actual through-screen velocity threshold (40 CFR 125.94(c)(3));
- Existing CWIS with off-shore velocity caps (already existing) (40 CFR 125.94(c)(4));
- Modified "fish-friendly" traveling screen with fish return systems (40 CFR 125.94(c)(5));
- Combination of technologies that minimize impingement mortality impacts (40 CFR 125.94(c)(6)); or
- An impingement mortality performance standard of less than or equal to 24% annual average (40 CFR 125.94(c)(7)).

In addition to the seven streamlined IM compliance alternatives, EPA identified the following:

- Additional measures for shellfish (40 CFR 125.94(c)(8));
- Additional measures for other species, i.e. fragile species (40 CFR 125.94(c)(9));
- Reuse of other water for cooling purposes (40 CFR 125.94(c)(10));
- De minimis rate of impingement (40 CFR 125.94(c)(11)); or
- Low capacity utilization power generating units (40 CFR 125.94(c)(12)).

The 316(b) Rule includes an allowance to defer selection of the method of compliance for impingement mortality until after the entrainment BTA determination has been made. The Rule preamble states:

> *"Additionally, while EPA expects that many facilities will already comply with § 125.94(c), in some cases the facility will need to choose one of the compliance alternatives for IM in their subsequent permit cycle. In particular, EPA expects the facility would submit the information required in § 122.21(r), and the Director would make a determination of BTA for entrainment for that facility. Only after the Director has established site-specific BTA requirements for entrainment reduction will the facility have to select the compliance alternative on which it will rely to meet the IM requirements of today's rule. The Director may either amend the permit to include the IM requirements or include them in a subsequent permit if the Director determines the proposed controls are consistent with § 125.94(c). The Director would establish a schedule incorporating each of these sequential actions. In addition, the rule allows the Director the flexibility to grant a request for a waiver of permit application requirements in § 122.21(r)(6) in order to accommodate the circumstances described here."*

This timeline for making the entrainment BTA determination prior to selection of BTA for impingement mortality is further codified in the 316(b) Rule itself:

> *"Compliance with BTA standards. (1) Aligning compliance deadlines for impingement mortality and entrainment requirements. After issuance of a final permit that establishes the entrainment requirements under § 125.94(d), the owner or operator of an existing facility must comply with the impingement mortality standard in § 125.94(c) as soon as practicable. The Director may establish interim compliance milestones in the permit.*

Consistent with EPA expectations, U. S. Steel asserts that No. 3 Pump Station, No. 4 Pump Station, and Lakeside Pump Station already comply with § 125.94(c). Specific details on the currently achieved IM compliance alternative are discussed below. For No. 1 and 2 PS, additional evaluations, and potentially capital expenditures, will be required to achieve compliance with IM standards. Pending the entrainment BTA determination from IDEM, U. S. Steel shall implement IM requirements at No. 1 and 2 Pump Station per the identified and agreed upon schedule detailed in the renewed permit. At this time, modified traveling screens with fish returns are the preferred method of compliance at No. 1 and 2 PS. However, this could change depending on final entrainment determination as well as detailed engineering design and associated costs.

6.1 Design Intake Velocity at No. 4 PS and LS PS

The No. 4 PS intake is located on the eastern side of the ore yard loading slip roughly 165-ft inland from the slip bank. Water is withdrawn through two submerged, concrete intake openings of approximately 10-ft in diameter and transferred inland to the pump station. Each of the intake openings are capped with bars that are spaced approximately six inches apart. No. 4 PS is currently equipped with three (3) 1,200 gpm capacity pumps, equating to a design intake flow of roughly 5 MGD. The calculated intake velocity at the entrance to the cooling water intake structure is no more than 0.06 fps. U. S. Steel will continue to operate No. 4 Pump Station below a maximum design approach velocity of 0.5 fps consistent with the IM compliance alternative identified in §125.94(c)(2).

The LS PS intake is located approximately 3,000-ft off-shore at a depth of approximately 28-ft. The intake crib is equipped with twelve (12) submerged intake openings located about 6 feet above the lake bed. LS PS currently operates five (5) 37,000 gpm capacity pumps, equating to a design intake flow of roughly 266 MGD. The calculated intake velocity at the entrance to the cooling water intake structure is no more than 0.21 fps. U. S. Steel will continue to operate LS PS below a maximum design approach velocity of 0.5 fps consistent with the IM compliance alternative identified in §125.94(c)(2).

6.2 De Minimis Rate of Impingement at No. 3 PS

Due to the limited operation of No. 3 Pump Station (i.e. emergency spare), U. S. Steel asserts that rates of impingement are so low that additional impingement controls are not justified. U. S. Steel requests concurrence from the Director, based on review of site specific data submitted under 40 CFR 122.21(r), that no additional controls are warranted.

6.3 Compliance Alternatives for No. 1 and 2 PS

Alternatives that have potential to reduce IM and/or meet one of the seven IM compliance alternatives in the Rule were assessed for No. 1 and 2 PS. Each potential option was evaluated based on consideration of both the biological effectiveness and engineering feasibility. For a technology to be considered biologically effective, available data and information is needed to demonstrate that it has reasonable potential to reduce IM of organisms collected at Gary, with an emphasis on options that are effective with Yellow Perch (Perca flavescens). From an engineering standpoint, the design of an alternative technology needs to demonstrate that it could be installed, operated, and maintained under the environmental, navigational and operating conditions experienced in the vicinity pump station intakes and the slip. To assist with determinations of biological effectiveness and engineering feasibility, screening criteria were developed to guide the review and assessment of each IM reducing option.

A technology was considered practical for application at Gary and had potential for further evaluation if:

1. The technology has proven biological effectiveness;

- A technology is deemed to have proven biological effectiveness if test data (preferably from full-scale application) are available that documents its effectiveness with perch and other species present at that site.

2. The technology is available and does not require extensive engineering development;
    - The technology will be further evaluated, if it has been constructed and successfully operated at another site.
    - Technologies that have been tested in laboratory or pilot studies but do not have any full-scale applications will be considered if adequate data exists in sufficient detail to develop a conceptual design.

3. The technology has engineering and/or biological advantages over the other technologies evaluated;
    - An intake technology that has been proven effective at reducing losses for perch and other species and under a variety of intake conditions has a biological advantage over one that has demonstrated limited effectiveness with perch or under limited intake conditions.
    - From an engineering perspective, one technology may hold an advantage over another if the civil/structural requirements for its installation or operation and maintenance requirements are substantially less.

4. Adequate space is available to construct a technology and operate it as designed and intended;
    - The technology will be further evaluated if it can be installed and maintained without impacting shipping and loading/unloading activities within the slip.
    - The technology can be installed and maintained with limited disturbances to the molten iron rail lines, blast furnaces, highline railway, and roadway.

Based on the results of the technology assessments and the application of the criteria, the initial screening of IM reducing technologies identified six (6) technologies with reasonable potential for effective application at No. 1 or 2 PS. These included the use of ultrasonic barrier, electrical barriers, multi-technology behavioral system, barrier nets, high velocity angled screens, and fish friendly traveling water screens.

U. S. Steel will continue to research these various technologies as well as management practices and operational measures at No. 1 and No. 2 Pump Station to minimize impingement mortality of key species identified at each intake. Following the BTA determination for entrainment, U. S. Steel will identify the most feasible option for reduction in IM. At this time, modified traveling screens with fish returns are the preferred method of compliance at No. 1 and 2 PS. However, this could change depending on final entrainment determination as well as detailed engineering design and associated costs.

7. EXISTING ENTRAINMENT PERFORMANCE STUDIES PURSUANT TO §122.21(R)(7)

This section describes existing entrainment performance studies and covers the information requested in 40 CFR 122.21(r)(7).

U. S. Steel is not aware of any previously conducted studies from other facilities addressing technology efficacy, through-facility entrainment survival, and other entrainment studies. Entrainment characterization studies, relevant to U. S. Steel Gary Works due to location and timing, have been performed by other manufacturing industries in the Southern Basin of Lake Michigan. Summaries of these applicable studies are included below.

7.1 ArcelorMittal Burns Harbor

Pursuant to AM's NPDES Permit, entrainment characterization studies were performed over a two year period from 2012 to 2014. However, details of the study results are not publicly available.

7.2 ArcelorMittal Indiana Harbor

The Indiana Harbor East (IHE) has three intake structures including the Main Intake, 2E and 2F which withdraw water from Lake Michigan. Total DIFs for the three intake structures are 1152 MGD, 433.3 MGD, and 135.4 MGD for the Main Intake, 2E, and 2F respectively. During the IHE sampling, entrainment samples were collected monthly or twice monthly over the two year period per the sampling plan at the 7E and 2E intakes. Sample events spanned periods both with and without chlorination for mussel control. Water volume of entrained samples averaged 122 cubic meters. The results of 32 events found no fish/larvae or eggs in over 87% of sampling events at both pump stations. Only four fish, all of the same species (slimy sculpin), were entrained during the sampling period.

The Indiana Harbor West (IHW) CWIS is located at the intake canal in Lake Michigan roughly 5,500 ft offshore. Total DIF is approximately 296.6 MGD with an average AIF of 118 MGD. During the IHW sampling, entrainment samples were collected monthly or twice monthly over the two year period per the sampling plan. Sample events spanned periods both with and without chlorination for mussel control. Water volume of entrainment samples ranged from 84 to 190 cubic meters. The results of 26 sampling events found no fish/larvae or eggs in over 91% of sampling events. Only two fish were entrained during the sampling period which included one burbot and one bluntnose minnow.

7.3 U. S. Steel Midwest – Portage, Indiana

U. S. Steel Midwest Plant, located in Portage, Indiana, finishes coils received from other U. S. Steel plants into cold rolled, galvanized, chromium or tin-plated strip and sheet products. U. S. Steel Midwest is authorized to withdraw water for their process and non-contact cooling waters needs from one intake pursuant to NPDES Permit No. IN0000337. The intake is located approximately 2,800 ft off-shore of the Midwest Plant in the Southern Lake Michigan Basin at a depth of roughly 30 feet.

Entrainment samples were collected during 32 sample events over a 24 month period from June 2012 to May 2014. Samples were collected during periods representative of normal operational intake flows. Samples were taken every other week during the peak spawning months of March through May and October through November, and once a month during February, June through September, and December. A total of 32 sample events were executed, 28 of which did not indicate the presence of any ichthyoplankton. Even still, entrainment sampling provided sufficient data, for sample events when specimens were found, to develop estimations of ichthyoplankton entrained per 24 hours. Samples that were positive for the presence of ichthyoplankton were Sample Events #1, #2, #17, and #19. Projections of ichthyoplankton per 24-hours ranged from 58 to 1,121. For Sample Events

#1-#16, the annual projection of ichthyoplankton entrained is 15,667, and for Sample Events #17-#32 the projection is 26,900. These projections are a combination of fish eggs and larvae collected, which includes Actinopterygii (class for ray-finned fishes), Gobidae (family for goby) juveniles, Neogobius melanostomus (species and genus for round goby). Zooplankton (not identified to species) were present during every sample event except Sample Event #1, while the appearance of mussel veligers was more inconsistent. No threatened or endangered species were encountered; nor were there any species on the Indiana Department of Natural Resources list of species of concern collected during sampling.

7.4 U. S. Steel Gary Works – Gary, Indiana

Pursuant to the previous NPDES Permit (effective March 2010), U. S. Steel conducted Entrainment Characterization Studies which are detailed in the §122.21(r)(9) Report under separate cover.

8. OPERATIONAL STATUS PURSUANT TO §122.21(R)(8)

Pursuant to 40 CFR 122.21(r)(8), the following operational information is required.

8.1 Description of Individual Unit Operating status for power production or steam generation

U. S. Steel Gary Works operates utilities onsite which support the steel manufacturing process including power production and steam generation.

The site contains a cogeneration plant that provides process steam and electricity to the facility with supporting electric power stations (No. 1, 4, and 5). In 2018, U.S. Steel generated 133 MW and purchased 69 MW, for a total usage of 203 MW. Purchased power is provided from the Northern Indiana Public Service Company (NIPSCO). The fraction of onsite power production is dictated by manufacturing operations and market conditions. Steam is generated onsite at the Turboblower and No.4 Boiler House.

The Turboblower Boiler House includes the following units:

- Three (3) Boilers, No. 1, No. 2 and No. 3 constructed in 1948, equipped to combust blast furnace gas, coke oven gas, fuel oil and natural gas, with a maximum heat input of 410 MMBtu per hour each;
- One (1) Boiler No. 5 constructed in 1958, equipped to combust blast furnace gas, coke oven gas, fuel oil and natural gas, with a maximum heat input of 410 MMBtu per hour; and
- One (1) boiler, No. 6, constructed after August 17, 1971, equipped to combust blast furnace gas and natural gas, with a maximum heat input capacity of 710 MMBtu per hour.

No. 4 Boiler House includes the following units:

- Two (2) Boilers, No. 1 and No. 2, constructed in1967, equipped to combust natural gas, blast furnace gas and fuel oil, with a maximum heat input of 500 MMBtu per hour each; and
- One (1) Boiler, No. 3, constructed in 1967, equipped to combust blast furnace gas and natural gas, with a maximum heat input of 500 MMBtu per hour

Cooling water used in the context of power production or steam generation is negligible in comparison to the steel manufacturing processes.

8.2 Description of completed, approved, or scheduled uprates for nuclear facilities

Not applicable.

8.3 Description of production process if intend to use flow reduction to meet §125.94(c) Requirements

Not applicable.

8.4 Description of current and future production schedules

Production data submitted in the 2020 Permit Renewal Application Form 2C is representative of current and future production schedules.

8.5 Description of planned new units

At this time, there are no upgrades or new units planned within the next five (5) years that would affect current intake volumes.

TABLES

TABLE 1. DESIGN INTAKE FLOW (DIF)

Description	Latitude	Longitude	PUMP CAPACITY		IDNR Registration (IN-00467) Maximum	
			GPM	MGD	GPM	MGD
No. 1 Pump Station	41° 36' 58" N	87° 19' 41" W	294,500	424	295,500	426
No. 2 Pump Station	41° 37' 27" N	87° 19' 31" W	258,400	372	258,400	372
No. 3 Pump Station	41° 36' 35" N	87° 19' 21" W	41,600	60	42,000	60
No. 4 Pump Station (current design)	41° 36' 55" N	87° 19' 14" W	3,600	5	81,000	117
Lakeside Pump Station	41° 37' 51" N	87° 22' 26" W	185,000	266	200,000	288
			783,100.0	**1,128**	**876,900.0**	**1,263**
Great Lakes Compact Council Restrictions						
Maximum Diversions from the Great Lakes Basin					**0.0**	**0.0**
Maximum Consumptive Use					**87,690**	**126**

Notes: GPM = gallons per minute
MGD = million gallons per day
IDNR = Indiana Department of Natural Resources

TABLE 2. SUMMARY OF ACTUAL INTAKE FLOW (AIF)

Description	2012 (MGD)	2013 (MGD)	2014 (MGD)	2015 (MGD)	2016 (MGD)	2017 (MGD)	2018 (MGD)	AIF (2014)	AIF (2015)	AIF (2016)	AIF (2017)	AIF (2018)
No. 1 Pump Station	**173**	**192**	**192**	**192**	**188**	**188**	**190**	**186**	**192**	**191**	**189**	**189**
January	187	199	192	192	185	192	192	---	---	---	---	---
February	183	199	192	192	192	192	192	---	---	---	---	---
March	183	177	191	192	189	192	190	---	---	---	---	---
April	183	175	190	192	192	192	192	---	---	---	---	---
May	183	195	193	193	192	192	191	---	---	---	---	---
June	153	192	194	192	192	192	192	---	---	---	---	---
July	182	188	193	191	192	189	192	---	---	---	---	---
August	184	193	194	191	183	180	182	---	---	---	---	---
September	121	192	191	191	171	179	198	---	---	---	---	---
October	130	208	192	192	180	179	186	---	---	---	---	---
November	184	192	192	192	192	179	192	---	---	---	---	---
December	200	192	192	192	192	192	187	---	---	---	---	---
No. 2 Pump Station	**110**	**171**	**222**	**225**	**215**	**198**	**216**	**168**	**206**	**221**	**213**	**210**
January	111	111	216	231	216	216	216	---	---	---	---	---
February	111	100	215	227	216	216	216	---	---	---	---	---
March	111	109	215	231	215	202	222	---	---	---	---	---
April	111	111	216	224	216	216	216	---	---	---	---	---
May	110	111	225	217	216	216	216	---	---	---	---	---
June	111	216	217	230	216	216	216	---	---	---	---	---
July	111	215	216	231	216	216	216	---	---	---	---	---
August	107	214	225	231	216	216	209	---	---	---	---	---
September	110	216	231	231	216	217	223	---	---	---	---	---
October	113	216	231	216	214	216	208	---	---	---	---	---
November	111	216	231	216	208	16	215	---	---	---	---	---
December	111	216	231	212	216	216	216	---	---	---	---	---
No. 3 Pump Station	**11**	**5**	**0**	**0**	**0**	**0**	**0**	**6**	**2**	**0**	**0**	**0**
January	30	43	0	0	0	0	0	---	---	---	---	---
February	30	7	0	0	0	0	0	---	---	---	---	---
March	30	0	0	0	0	0	0	---	---	---	---	---
April	26	0	0	0	0	0	0	---	---	---	---	---
May	0	0	0	0	0	0	0	---	---	---	---	---
June	6	0	0	0	0	0	0	---	---	---	---	---
July	15	10	0	0	0	0	0	---	---	---	---	---
August	0	0	1	0	0	0	0	---	---	---	---	---
September	0	0	1	0	0	0	0	---	---	---	---	---
October	0	0	0	0	0	0	0	---	---	---	---	---
November	0	0	0	0	0	0	0	---	---	---	---	---
December	0	0	0	0	0	0	0	---	---	---	---	---
No. 4 Pump Station	**133**	**49**	**30**	**24**	**15**	**8**	**3**	**71**	**34**	**23**	**16**	**9**
January	104	84	30	29	15	15	3	---	---	---	---	---
February	102	103	30	30	15	15	3	---	---	---	---	---
March	91	103	29	30	15	15	3	---	---	---	---	---
April	83	59	30	30	15	15	3	---	---	---	---	---
May	183	37	30	30	15	6	3	---	---	---	---	---
June	181	30	30	30	15	3	3	---	---	---	---	---
July	180	26	30	32	15	3	3	---	---	---	---	---
August	102	29	30	17	15	3	3	---	---	---	---	---
September	182	30	29	15	15	3	3	---	---	---	---	---
October	180	30	30	15	15	3	3	---	---	---	---	---
November	110	30	30	15	15	3	3	---	---	---	---	---
December	100	30	30	15	15	3	3	---	---	---	---	---
Lakeside Pump Station	**69**	**82**	**79**	**53**	**55**	**55**	**59**	**77**	**72**	**62**	**54**	**56**
January	61	81	82	54	50	49	53	---	---	---	---	---
February	60	81	83	54	51	50	53	---	---	---	---	---
March	63	81	82	53	53	53	54	---	---	---	---	---
April	62	86	81	52	52	63	55	---	---	---	---	---
May	62	82	81	54	52	57	55	---	---	---	---	---
June	62	82	82	54	52	60	54	---	---	---	---	---
July	63	82	79	54	54	54	54	---	---	---	---	---
August	77	82	79	54	55	56	56	---	---	---	---	---
September	77	82	79	53	82	57	55	---	---	---	---	---
October	78	81	76	52	53	57	55	---	---	---	---	---
November	81	81	77	53	50	55	81	---	---	---	---	---
December	82	80	71	54	52	54	81	---	---	---	---	---
	497	**499**	**524**	**494**	**473**	**449**	**469**					

Notes: MGD = Millions of Gallons Per Day
MGM = Million Gallons per Month

Table 3. AIF versus DIF

Description		AIF (2014)	AIF (2015)	AIF (2016)	AIF (2017)	AIF (2018)
No. 1 Pump Station	AIF (MGD)	186	192	191	189	189
	DIF (MGD)	426	426	426	426	426
	AIF/DIF (%)	**44%**	**45%**	**45%**	**44%**	**44%**
No. 2 Pump Station	AIF (MGD)	168	206	221	213	210
	DIF (MGD)	372	372	372	372	372
	AIF/DIF (%)	**45%**	**55%**	**59%**	**57%**	**56%**
No. 3 Pump Station	AIF (MGD)	6	2	0	0	0
	DIF (MGD)	60	60	60	60	60
	AIF/DIF (%)	**9%**	**3%**	**0%**	**0%**	**0%**
No. 4 Pump Station	AIF (MGD)	71	34	23	16	9
	DIF (MGD)	117	117	117	117	117
	AIF/DIF (%)	**61%**	**29%**	**20%**	**13%**	**7%**
Lakeside Pump Station	AIF (MGD)	77	72	62	54	56
	DIF (MGD)	288	288	288	288	288
	AIF/DIF (%)	**27%**	**25%**	**22%**	**19%**	**20%**
Facility Total	AIF (MGD)	507	506	497	472	463
	DIF (MGD)	1263	1263	1263	1263	1263
	AIF/DIF (%)	**40%**	**40%**	**39%**	**37%**	**37%**

Notes: MGD = Millions of Gallons Per Day
MGM = Million Gallons per Month

TABLE 4.1 SUMMARY OF WATER BALANCE - EAST SIDE

Description	No. 1 PS (MGD)	No. 2 PS (MGD)	No. 4 PS (MGD)	% of Operating Withdrawal
Actual Intake Flow (AIF), 2018	189	210	1 (A)	
IDNR Permitted Maximum Withdrawal	426	372	117	
Other Sources (i.e. Groundwater - Outfall 501 & Leachate - Outfall 607)			1	NA
NCCW - Sinter Plant and Pulverized Coal Injection (Outfall 015 less groundwater, Outfall 501, & leachate, Outfall 607)			1	0%
NCCW - Sinter Plant Recirculation			2	1%
Process Wastewater - Steelmaking (Outfall 603)	9			2%
NCCW - South Iron Producing (Outfall 018)	57			14%
NCCW - North Steel and South Iron Producing (Outfall 019)	78			20%
NCCW - South Steel Producing (Outfall 020)	51			13%
NCCW - Steel Producing (Outfall 028/030 less Outfall 603)	16			4%
NCCW - North Iron Producing (Outfall 035)	140			35%
Consumption	48			12%

NOTES:

GPM = gallons per minute

MGD = million gallons per day

NCCW = noncontact cooling water

Due to the accuracy of flow monitoring methodologies, rates ve been rounded to the nearest whole number.

Outfalls 021, 032, 041A/B are not shown due to relatively low process/cooling water and high stormwater contributions

(A) Due to recent process changes, the AIF at No. 4 PS does not reflect current conditions. Therefore, No. 4 PS withdrawal is based on two (2) pumps operating at capacity of 1,200 gpm minus recirculation cooling water directed back to wet well

TABLE 4.2 SUMMARY OF WATER BALANCE - WEST SIDE

Description	West Side Flow (MGD)	% of Operating Withdrawal
Actual Intake Flow (AIF), 2018	56	
IDNR Permitted Maximum Withdrawal	288	
Process Wastewater - Hot Rolling, Sheet, and Tin (Outfall 604)	14	25%
Process Wastewater - Hot Strip Mill (Outfall 605)	1	2%
NCCW - South Sheet & Tin (Outfall 606)	4	8%
NCCW - North Sheet (Outfall 037)	3	5%
NCCW - Hot Strip Mill (Outfall 039)	29	52%
NCCW - Sheet/Tin (Outfall 033)	0	0%
HSM Recycle Consumption (2,500 gpm HSM cooling tower design)	4	7%
Miscellaneous other consumption & losses	1	1%

NOTES:

GPM = gallons per minute

MGD = million gallons per day

NCCW = noncontact cooling water

Due to the accuracy of flow monitoring methodologies, rates have been rounded to the nearest whole number.

TABLE 5. WATER QUALITY INDICATORS FROM PERMIT REQUIRED IMPINGEMENT STUDIES

NO. 1 PUMP STATION

Sample Date	pH (su)	Temperature (°C)	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (uS)	Turbidity (NTU)
4/12/2011	7.06	13	55.4	10.69	343	
4/13/2011	7.02	11.5	52.7	10.4	351	
4/26/2011	7.3	15.1	59.18	12.7	362	
4/27/2011	7.48	13.2	55.76	10.6	331	
5/10/2011	7.27	20.8	69.44	12.56	351	
5/25/2011	7.86	15.7	60.26	10.2	305	
5/25/2011	8.06	15.81	60.458	10.4	301	
6/7/2011	7.98	17.3	63.14	11.18	294	
6/8/2011	6.32	17.1	62.78	11.44	333	
6/21/2011	8.02	13.9	57.02	11.3	288	
7/5/2011	7.79	21.3	70.34	10.17	272	
7/6/2011	7.77	19.4	66.92	9.55	261	
7/6/2011	8.15	20.6	69.08	9.3	285	
7/19/2011	8.2	22.6	72.68	9.3	286	
8/2/2011	7.69	23.1	73.58	9.07	280	
8/16/2011	7.27	24.3	75.74	8.45	324	
8/30/2011	6.47	25.8	78.44	8.3	315	
9/13/2011	8.15	25.7	78.26	8.29	384	
9/26/2011	7.9	18.8	65.84	8.53	304	
10/10/2011	8.9	16.5	61.7	7.1	303	
10/25/2011	7.98	12.9	55.22	11.31	292	
11/7/2011	6.9	12.9	55.22	11.8	316	
11/21/2011	6.9	11.3	52.34	12.71	337	
2/15/2012	6.81	8	46.4	14.44	334	
2/17/2012	6.7	3.8	38.84	16.5	327	
2/27/2012	7.92	6.29	43.322	13.02	311	
2/29/2012	7.98	5.05	41.09	13.2	321	
3/13/2012	7.81	6.48	43.664	12.2	308	
3/15/2012	7.98	13.12	55.616	14.92	296	
3/28/2012	8.2	11.27	52.286	11.12	323	
3/30/2012	8.09	11.6	52.88	13.75	312	
4/10/2012	7.95	12.9	55.22	12.02	325	8.2
4/12/2012	7.95	11.4	52.52	12.54	309	5
4/24/2012	8.03	12.83	55.094	9.79	321	3.8
4/26/2012	8.24	11.42	52.556	10.64	312	11.7
5/9/2012	8.26	13.07	55.526	12.15	319	23
5/11/2012	8.33	13.9	57.02	11.8	326	77
5/21/2012	7.3	17.01	62.618	8.37	330	2.2
5/23/2012	8.23	16.09	60.962	11.03	339	3.8
6/25/2012	8.26	20.36	68.648	9.22	361	4
7/23/2012	8.18	25.57	78.026	5.79	365	9.9
7/25/2012	7.69	26.15	79.07	6.3	327	2.8
8/13/2012	8.46	23.51	74.318	7.64	351	7.4
8/15/2012	8.3	23.29	73.922	7.41	351	3.5
9/10/2012	8.19	21.98	71.564	7.8	326	2.4
10/9/2012	8.03	15.02	59.036	7.74	342	1.6
10/11/2012	8.39	14.66	58.388	9.38	318	4
10/21/2012	8	14.63	58.334	8.97	323	2.4
10/23/2012	8.2	13.9	57.02	9.43	330	1
11/5/2012	8.32	8.7	47.66	8.2	318	22
11/7/2012	7.1	9.31	48.758	12.64	332	21.4
11/26/2012	8.23	6.96	44.528	14.1	303	21
11/28/2012	6.99	6.9	44.42	10.28	319	0
2/19/2013	6.27	2.16	35.888	15.61	334	0
2/21/2013	7.38	2.75	36.95	10.55	340	6.7
3/5/2013	8.2	1.45	34.61	13.22	345	29.1
3/6/2013	8.12	1.93	35.474	13.62	350	22.2
3/20/2013	8.34	4.61	40.298	13.56	335	15.8
3/22/2013	7.61	3.27	37.886	11.34	375	18.3
4/1/2013	8.02	5.1	41.18	12.21	341	33.7
4/3/2013	7.2	5.54	41.972	11.1	338	123
4/16/2013	8.03	7.82	46.076	10.71	331	25.1
4/18/2013	8.36	9.11	48.398	9.14	330	9.6
4/29/2013	8.35	8.87	47.966	11.69	327	9.6
5/1/2013	8.1	10.44	50.792	9.15	302	0
4/29/2013	8.35	8.87	47.966	11.69	327	9.6
5/1/2013	8.1	10.44	50.792	9.15	302	0
5/14/2013	7.83	12.33	54.194	9.82	318	0
5/15/2013	8.61	12.81	55.058	12.02	314	24.7
5/28/2013	7.28	13.06	55.508	9.25	305	9.2
5/30/2013	8.31	13.54	56.372	8.42	301	3.6
6/17/2013	8.19	22.41	72.338	7.74	274	0
6/19/2013	7.77	18.51	65.318	9.53	299	0
7/15/2013	8.4	21.68	71.024	9.24	290	0
7/17/2013	8.03	19.84	67.712	9.71	330	10.7
8/20/2013	8.8	21.59	70.862	6.96	339	0
8/22/2013	7.32	27.5	81.5	5.63	350	11.8
9/16/2013	7.34	20.68	69.224	7.16	324	14.7
9/18/2013	8.31	20.42	68.756	7.84	321	8.8
10/14/2013	7.11	14.75	58.55	9.92	315	0
10/28/2013	7.22	11.24	52.232	10.3	331	11.6
10/30/2013	8.1	11.47	52.646	12.94	331	4.5
11/11/2013	7.88	10.34	50.612	10.82	338	3.7
11/13/2013	7.54	9.26	48.668	12.76	343	17.5
11/25/2013	7.97	6.47	43.646	11.95	325	2.1
11/27/2013	7.14	6.26	43.268	10.96	333	20.9
12/9/2013	8.26	4.41	39.938	13.85	314	0
12/11/2013	7.58	3.48	38.264	12.25	328	45.3
2/18/2014	8.14	0.92	33.656	15.12	366	0
2/20/2014	7.32	1.57	34.826	13.77	387	0.5
3/3/2014	7.76	0.89	33.602	13.94	372	0
3/5/2014	6.5	1.85	35.33	11.77	373	0
3/17/2014	7.14	1.53	34.754	11.25	364	0
3/19/2014	7.33	1.95	35.51	11.7	358	0
4/7/2014	7	4.92	40.856	11.62	345	0
4/9/2014	7.29	5.69	42.242	12.27	332	0
4/21/2014	7.56	8.29	46.922	12.22	332	0
4/23/2014	7.34	9.13	48.434	11.57	330	0
5/5/2014	7.75	9	48.2	12.62	324	7.8
5/7/2014	7.72	9.98	49.964	10.86	334	0
5/19/2014	7.77	11.41	52.538	10.74	327	0
5/21/2014	8.31	11.95	53.51	11.79	280	0.3
6/10/2014	7.51	17.59	63.662	10.04	341	0
6/12/2014	8.15	16.97	62.546	9.53	296	0.5
6/23/2014	7.34	18.41	65.138	8.89	266	0
6/25/2014	7.99	18.74	65.732	8.56	289	0.2
7/14/2014	7.81	17.3	63.14	10.16	327	0
7/16/2014	7.7	19.36	66.848	8.57	325	0
8/12/2014	7.48	22.1	71.78	7.87	230	0.6
8/14/2014	7.7	21.9	71.42	7.55	233	0.6
9/8/2014	8.35	19.54	67.172	6.82	307	0
9/10/2014	7.55	16.08	60.944	10.13	313	0
10/13/2014	7.83	15.3	59.54	9.22	323	0
10/15/2014	7.47	15.43	59.774	9.33	340	1.8
10/27/2014	8.18	13.95	57.11	8.57	335	0.3
10/29/2014	7.35	13.9	57.02	8.58	293	4.1
11/10/2014	7.79	9.71	49.478	8.93	329	20.3
11/12/2014	7.09	9.87	49.766	11.47	334	25.9
11/23/2014	7.72	4.37	39.866	11.98	336	20.2
11/25/2014	7.32	4.71	40.478	13.6	308	10.7
12/8/2014	7.42	3.96	39.128	13.18	296	0.8
12/10/2014	7.3	5.3	41.54	11.29	325	2
4/6/2015	8.65	6.41	43.538	11.34	122	2.5
4/7/2015	8.63	6.17	43.106	11	135	0
4/13/2015	6.98	8.06	46.508	11.46	328	0
4/15/2015	7.53	8.29	46.922	10.19	328	6.2
4/20/2015	7.36	9.89	49.802	10.03	304	13.4
4/20/2015	7.78	9.72	49.496	9.94	305	12.5
4/21/2015	7.88	9.54	49.172	9.93	342	3.7
4/27/2015	7.08	10.58	51.044	9.63	348	2
4/29/2015	7.61	9.49	49.082	10.73	331	12.6
5/5/2015	7.54	11.86	53.348	11.41	286	3.9
5/5/2015	8	11.1	51.98	11.95	322	0.3
5/6/2015	7.99	11.37	52.466	11.47	323	3.9
5/26/2015	8.03	11.9	53.42	12.1	282	0.3
5/28/2015	7.19	12.2	53.96	12.8	319	0.4

NO. 2 PUMP STATION

Sample Date	pH (su)	Temperature (°C)	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (uS)	Turbidity (NTU)
7/6/2011	6.17	20	68	9.81	284	
7/19/2011	7.13	24.9	76.82	8.9	280	
8/2/2011	8.16	23.4	74.12	9.4	265	
8/16/2011	6.31	24.2	75.56	8.38	352	
9/13/2011	8.91	21.9	71.42	8.86	293	
9/29/2011	7.97	19	66.2	8.14	295	
10/11/2011	8.82	16.5	61.7	7.02	288	
10/25/2011	8.25	13.9	57.02	11.1	285	
11/7/2011	7.02	14.5	58.1	10.94	298	
11/21/2011	6.79	11.9	53.42	12.42	280	
2/15/2012		4.6	40.28	14.5	312	
2/27/2012	7.99	6.67	44.006	12	305	
2/29/2012	7.99	6.8	44.24	14.9	284	
3/13/2012	8	8.6	47.48	11.44	304	
3/15/2012	8.07	12.59	54.662	14.83	283	
3/28/2012	7.97	12.15	53.87	8.13	315	
3/30/2012	7.41	13.2	55.76	13.25	302	
4/10/2012	7.29	12.36	54.248	14.4	293	5.2
4/24/2012	7.9	13.14	55.652	10.37	312	4.3
5/9/2012	7.87	15.33	59.594	12.17	311	6
5/11/2012	8.18	14.7	58.46	11.55	315	0.2
5/21/2012	6.89	17.29	63.122	9.32	316	1.3
6/25/2012	8.1	20.07	68.126	8.35	340	1.2
7/23/2012	8.13	27.06	80.708	6.21	346	1.5
8/13/2012	7.89	24.51	76.118	8.53	352	13.1
8/15/2012	8.28	23.62	74.516	7.09	331	4.5
9/10/2012	8.33	22.71	72.878	7.76	321	2.6
10/9/2012	8.48	15.64	60.152	8.66	317	1.7
10/21/2012	8.04	14.43	57.974	9.01	310	0.7
11/5/2012	8.26	9.38	48.884	9.7	305	35.4
11/7/2012	6.73	9.15	48.47	11.41	317	25.1
11/26/2012	8.28	7.21	44.978	13.91	297	4.7
11/28/2012	7.24	7.66	45.788	9.78	305	3.5
2/19/2013	7.11	3.44	38.192	17.47	336	0
3/4/2013	7.49	4.41	39.938	10.11	333	10.3
3/20/2013	7.94	4.57	40.226	13.63	330	21
4/1/2013	8.19	6.27	43.286	13.01	327	35.7
4/17/2013	8.13	10.46	50.828	11.56	317	0
4/18/2013	7.68	9.59	49.262	13.03	318	2.3
4/29/2013	8.28	11.7	53.06	11.42	309	0
5/1/2013	8.12	11.49	52.682	11.43	309	0
5/15/2013	8.19	12.12	53.816	11.98	298	0
5/28/2013	7.64	14.33	57.794	9.66	291	0
5/28/2013	8.06	14.33	57.794	10.31	291	
6/17/2013	8.32	18.81	65.858	9.36	280	0
7/15/2013	8.5	23.64	74.552	9.62	282	0
7/17/2013	8.47	22.5	72.5	9.07	321	2.3
8/20/2013	8.86	22.75	72.95	8.25	326	0
8/22/2013	7.24	26.94	80.492	5.8	342	14.4
9/18/2013	7.62	21.2	70.16	7.92	312	14.8
10/16/2013	7.07	11.42	52.556	10.92	311	0
10/28/2013	8.44	11.59	52.862	8.95	320	7.4
11/14/2013	8.36	8.66	47.588	10.02	317	7.4
11/25/2013	8.14	7.15	44.87	11.62	316	0
11/27/2013	7.84	6.46	43.628	10.82	320	4.6
12/9/2013	7.95	4.48	40.064	14.01	308	0
2/18/2014	8.06	2.41	36.338	16.81	353	0
2/20/2014	7.42	2.38	36.284	14.13	368	0
3/3/2014	7.51	1.58	34.844	14.41	353	0
3/17/2014	7.24	1.28	34.304	11.9	323	0.2
4/7/2014	7.03	5.74	42.332	12.09	322	0
4/9/2014	7.74	6.4	43.52	12.48	314	0
4/21/2014	7.59	8.37	47.066	12.76	323	0
5/5/2014	7.77	9.54	49.172	12.29	294	0.9
5/19/2014	7.67	13.74	56.732	10.38	304	0.3
6/10/2014	8.27	18.07	64.526	10.41	225	0.5
6/23/2014	6.72	19.79	67.622	7.35	379	0
9/8/2014	6.65	20.75	69.35	7.8	299	0
10/13/2014	6.52	16.02	60.836	9.6	313	0
10/27/2014	7.16	14.14	57.452	10	323	0
11/10/2014	8.29	9.75	49.55	9.89	321	26.3
11/12/2014	7.68	9.87	49.766	12.75	259	62.7
11/23/2014	7.79	5.01	41.018	13.12	319	9.5
11/25/2014	7.96	4.83	40.694	14.39	294	6.9
12/8/2014	6.42	4.04	39.272	13.97	336	0
12/10/2014	7.6	6.24	43.232	11.39	282	0.4
3/30/2015	7.55	5.35	41.63	12.15	303	3.9
4/13/2015	7.2	9.38	48.884	11.12	324	0
4/13/2015	7.32	9.24	48.632	10.64	301	8.2

LAKESIDE PUMP STATION

Sample Date	pH (su)	Temperature (°C)	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (uS)	Turbidity (NTU)
3/29/2011	7.49	4.3	39.74	12.9	307	
3/30/2011	8.1	5.03	41.054	15	296	
4/12/2011	7.48	8.8	47.84	11.65	322	
4/13/2011	6.82	8	46.4	11.81	313	
4/26/2011	7.95	9.2	48.56	16	296	
4/27/2011	7.78	9.6	49.28	11.3	313	
5/10/2011	7.34	15.2	59.36	16	359	
5/11/2011	6.31	12.8	55.04	14.3	359	
5/25/2011	7.46	12.1	53.78	11.09	297	
6/8/2011	6.9	13.4	56.12	15.5	327	
6/8/2011	7.91	13.4	56.12	15.22	280	
6/20/2011	7.9	12.1	53.78	11.48	270	
7/5/2011	6.8	13.8	56.84	11.62	278	
7/6/2011	8.05	12.4	54.32	11.55	258	
7/19/2011	8.04	16.4	61.52	12	264	
8/1/2011	6.58	13.4	56.12	10.87	260	
8/2/2011	6.7	12.6	54.68	10.77	256	
8/2/2011	9.03	24	75.2	13.4	255	
8/16/2011	7.45	23.4	74.12	9.07	309	
8/30/2011	8.08	23.2	73.76	6.58	297	
9/12/2011	7.14	20.6	69.08	10.59	318	
9/26/2011	7.43	18.5	65.3	9.15	296	
10/10/2011	7.82	13.7	56.66	10.26	287	
10/25/2011	7.29	13.5	56.3	11.16	343	
11/7/2011	7.16	12.9	55.22	12.25	357	
11/20/2011	7.9	13.8	56.84	13.39	245	
2/15/2012		1.1	33.98	14.6	369	
2/17/2012		2.4	36.32	16.5	301	
2/27/2012	8.03	4.13	39.434	11.65	303	
2/29/2012	7.17	8	46.4	12.6	281	
3/13/2012	7.86	6.04	42.872	12.5	295	
3/15/2012	7.1	11.35	52.43	12.98	286	
3/28/2012	8.05	10.29	50.522	7.98	295	
3/30/2012	8.15	10.61	51.098	11.7	299	
4/10/2012	8.16	10.46	50.828	12.68	294	11.1
4/12/2012	8.12	9.59	49.262	13.71	293	6
4/24/2012	7.87	10.89	51.602	11.23	307	12.6
4/26/2012	8.29	10.47	50.846	10.96	298	3.3
5/9/2012	7.87	13.77	56.786	13.24	321	8.7
5/11/2012	8.19	13.8	56.84	10.84	314	3
5/21/2012	7.14	14.81	58.658	11.36	314	4
5/23/2012	7.94	15.13	59.234	13.02	321	1.5
6/25/2012	7.83	19.18	66.524	7.67	315	1.4
6/27/2012	8.04	17.9	64.22	9.32	327	0.7
7/23/2012	7.78	25.54	77.972	7.65	342	1
7/25/2012	7.04	25.6	78.08	8.1	101	4
8/13/2012	7.99	23.05	73.49	9.3	334	6.6
8/15/2012	8.22	22.9	73.22	7.36	327	3.6
9/10/2012	7.71	22.11	71.798	7.31	326	9.9
9/12/2012	7.55	21.8	71.24	7.62	333	2.2
10/9/2012	7.77	15.16	59.288	9.7	317	2.1
10/11/2012	8.25	14.43	57.974	9.62	309	2.2
10/21/2012	8.25	13.62	56.516	8.5	301	0.5
10/23/2012	8.06	13.95	57.11	8.86	310	0.7
11/5/2012	7.31	9.21	48.578	10.86	322	46.9
11/7/2012	8.26	9.54	49.172	7.23	305	29.7
11/26/2012	7.89	7.5	45.5	13.04	299	13.3
11/28/2012	7.02	6.3	43.34	12.65	300	18.4
2/19/2013	6.56	2.31	36.158	15.18	361	0
2/21/2013	6.93	0.8	33.44	13.34	439	25.4
3/4/2013	8.1	0.98	33.764	18.69	316	44.7
3/6/2013	7.8	2.15	35.87	10.2	348	35.1
3/20/2013	7.65	2.08	35.744	15.04	334	39.2
3/22/2013	7.78	3.04	37.472	13.17	373	50.9
4/1/2013	7.52	3.72	38.696	14.77	340	50
4/3/2013	8.19	4.65	40.37	12.31	320	39.4
4/15/2013	7.87	6.81	44.258	13.98	302	9.9
4/17/2013	8.34	7.7	45.86	13.43	304	0
4/29/2013	7.92	7.53	45.554	11.34	305	0
5/1/2013	7.14	8.78	47.804	10.87	306	0
5/13/2013	7.8	10.64	51.152	9.91	303	0.9
5/15/2013	8.34	17.54	63.572	11.25	298	0
5/28/2013	7.89	11.99	53.582	8.62	283	0.9
5/30/2013	7.47	11.06	51.908	10.9	288	5.9
6/17/2013	7.63	16.4	61.52	9.71	276	0
6/19/2013	7.07	17.66	63.788	7.55	285	0
7/15/2013	7.77	17.8	64.04	9.54	272	0
7/17/2013	8.41	16.86	62.348	10.64	311	12.6
8/20/2013	8.08	20.39	68.702	7.67	321	4.6
8/22/2013	8.35	16.78	62.204	9.69	308	5.8
9/16/2013	7.84	20.6	69.08	7.88	311	26.9
9/18/2013	8.14	19.79	67.622	9.2	305	2.6
10/14/2013	6.9	13.01	55.418	8.76	311	0
10/28/2013	7.96	11.07	51.926	9.37	320	8.8
11/13/2013	8.13	8.32	46.976	12.47	322	35.3
11/14/2013	7.22	8.76	47.768	11.34	317	9.3
11/25/2013	6.86	5.86	42.548	11.53	305	0
11/27/2013	7.79	5.12	41.216	10.24	324	0
12/9/2013	7.52	2.91	37.238	15.37	304	0
12/11/2013	7.98	2.58	36.644	13.7	310	0.2
2/18/2014	7.42	1.26	34.268	15.69	355	0
2/20/2014	8	0.55	32.99	13.46	372	0
3/3/2014	7.44	0.49	32.882	14.26	371	0
3/5/2014	7.23	1.46	34.628	13.63	372	0
3/17/2014	7.04	1.03	33.854	12.44	323	0
3/19/2014	7.37	2.7	36.86	12.67	327	0
4/7/2014	6.55	4.31	39.758	12.25	319	0
4/9/2014	7.77	5.13	41.234	12.99	295	0
4/21/2014	7.22	7.31	45.158	12.46	309	0
4/23/2014	7.68	7.87	46.166	12.71	306	0
5/5/2014	7.38	9.17	48.506	12.47	287	3.78
5/7/2014	7.64	8.78	47.804	11.89	301	0
5/19/2014	8.48	10.97	51.746	11.93	280	0.4
5/21/2014	8.37	10.19	50.342	12.74	290	0
6/10/2014	7.58	17.44	63.392	9.7	336	0
6/12/2014	8.12	16.9	62.42	10.91	321	0
6/23/2014	7.56	17.98	64.364	8.92	240	0.2
6/25/2014	8	15.78	60.404	10.24	325	0
7/14/2014	7.6	12.36	54.248	11.67	247	1.8
7/16/2014	8.23	17.87	64.166	8.9	253	0
8/12/2014	8.1	22.2	71.96	9.08	226	0.2
8/14/2014	8.18	21.8	71.24	8.93	219	0.6
9/8/2014	8.23	14.04	57.272	10.6	292	0
9/10/2014	7.63	11.99	53.582	12.83	297	0
10/13/2014	8.03	15.06	59.108	10.47	306	0
10/15/2014	7.73	15.19	59.342	9.83	319	3.9
10/27/2014	8.01	13.5	56.3	10.32	324	2.2
10/29/2014	7.73	13.33	55.994	9.53	308	4.1
11/10/2014	7.53	9.47	49.046	10.64	319	28.6
11/12/2014	7.76	9.05	48.29	13.57	289	60.9
11/23/2014	7.7	4.3	39.74	13.26	321	12.9
11/25/2014	7.83	3.95	39.11	15.4	293	4.1
12/8/2014	6.77	3.47	38.246	13.57	324	0.7
12/10/2014	7.82	3.52	38.336	13.41	318	0.8
3/16/2015	7.36	3.38	38.084	11.58	330	13.1
3/17/2015	7.76	4.25	39.65	17.48	208	76
3/23/2015	7.29	4.72	40.496	1.87	164	21
3/24/2015	7.63	4.3	39.74	15.05	167	10.6
3/30/2015	8.11	4.19	39.542	13.18	279	13.18
4/1/2015	7.95	5.12	41.216	14.6	323	10
4/6/2015	8.63	6.24	43.232	12.08	141	10.8
4/7/2015	8.56	5.96	42.728	12.72	198	12.7
4/13/2015	7.46	7.2	44.96	11.88	291	0.3
4/15/2015	6.97	7.71	45.878	11.36	318	0
4/20/2015	7.44	9.01	48.218	10.83	292	11.1
4/20/2015	7.8	9.38	48.884	11.07	336	6.2
4/21/2015	7.83	9.33	48.794	11.13	339	5.7
4/27/2015	7.26	8.92	48.056	10.91	334	5.1
4/29/2015	7.61	9.49	49.082	10.73	331	3.6
5/5/2015	7.49	8.58	47.444	11.6	318	2.6
5/5/2015	7.89	9.11	48.398	12.79	318	0.8
5/6/2015	7.96	9.72	49.496	11.72	322	0.9
5/11/2015	7.9	10.81	51.458	11.63	317	3.8
5/11/2015	8.1	10.81	51.458	11.71	318	0.9
5/5/2015	7.62	10.51	50.918	11.58	312	1.6
5/5/2015	7.94	11.17	52.106	12.2	316	0.6
5/6/2015	7.98	11.02	51.836	11.79	318	1.4
5/26/2015	7.22	10.76	51.368	11.92	311	1.4
5/28/2015	7.73	11	51.8	12.42	309	0.7

TABLE 6. SOUTHERN LAKE MICHIGAN SPECIES LIST FROM LITERATURE REVIEW

	COMMON (*Scientific*) NAME	Indiana Endangered or Special Concern Species
LAMPREY FAMILY (*Petromyzontidae)*		
	Silver lamprey (*Ichthyomyzon unicuspis*)	
	Sea lamprey (*Petromyzon marinus*)	
STURGEON FAMILY (Acipenseridae)		
	Lake Sturgeon (*Acipenser fulvescens*)	Endangered
GAR FAMILY (Lepisosteidae)		
	Longnose gar (*Lepisosteus osseus*)	
BOWFIN FAMILY (Amiidae)		
	Bowfin (*Amia calva*)	
FRESHWATER EEL FAMILY (Anguillidae)		
	American eel (*Anguilla rostrata*)	
HERRING FAMILY (Clupeidae)		
	Alewife (*Alose pseudoharengus*)	
	Skipjack herring (Alosa chrysocloris)	
	Gizzard Shad (*Dorosome cepedianum*)	
SUCKER FAMILY (Catostomidae)		
	White sucker (*Catostomus commersonii*)	
	Longnose sucker (*Catostomus catostomus*)	Special Concern
	Spotted sucker (*Minytrema melanops*)	
MINNOW FAMILY (Cyrpinidae)		
	Common carp (*Cyprinus carpio*)	
	Goldfish (*Carassius auratus*)	
	Longnose dace (*Rhinichthys cataractae*)	Special Concern
	Golden shiner (*Notemigonus crysoleucas*)	
	Common shiner (*Luxilus cornutus*)	
	Emerald shiner (*Notropis atherinoides*)	
	Silver shiner (*Notropis photogenis*)	
	Spottail shiner (*Notropis hudsonius*)	
	Sand shiner (*Notrtopis stramineus*)	
	Mimic shiner (*Notropis volucellus*)	
	Bluntnose minnow (*Pimephales notatus*)	
	Fathead minnow (*Pimephales promelas*)	
CATFISH FAMILY (Ictaluridae)		
	Channel catfish (*Ictalurus puntatus*)	
	Black bullhead (*Ictalurus melas*)[4]	
	Brown bullhead (*Ameiurus nebulosus*)	
	Yellow bullhead (*Ameiurus natalis*)	
	Tadpole madtom (*Noturus gyrinus*)	
SMELT FAMILY (Osmeridae)		
	Rainbow Smelt (*Osmerus mordax*)	
SALMON FAMILY (Salmonidae)		
WHITEFISH SUBFAMILY (Coredoninae)		
	Round whitefish (*Prosopium cylindraceum*)	
	Lake whitefish (*Coregonus clupeaformis*)	Special Concern – commercial
	Lake cisco (*Coregonus artedi*)	Special Concern – commercial
	Kiyi (*Coregonus kiyi*)	
SALMON, TROUT, AND CHAR SUBFAMILY (Salmoninae)		
	Lake trout (*Salvelinus namaycush*)	
	Brown trout (*Salmo trutta*)	
	Rainbow trout (*Eoncorhynchus mykiss*)	

TABLE 6. SOUTHERN LAKE MICHIGAN SPECIES LIST FROM LITERATURE REVIEW

	COMMON (*Scientific*) NAME	Indiana Endangered or Special Concern Species
	Coho salmon (*Oncohynchus kisutch*)	
	Chinook salmon (*Oncorhynchus tshawytscha*)	
PIKE FAMILY (Esocidae)		
	Grass pickerel (*Esox americanus vermiculatus*)	
	Northern pike (*Esox lucius*)	
	Muskellunge (*Esox masquinongy*)	
MUDMINNOW FAMILY (Umbridae)		
	Central mudminnow (*Umbra limi*)	
TROUTPERCH FAMILY (Percopsidae)		
	Trout-perch (*Percopsis omiscomaycus*)	Special Concern
FRESHWATER COD FAMILY (Gadidae)		
	Burbot (*Lota lota*)	
KILLIFISH AND TOPMINNOW FAMILY (Fundulidae)		
	Banded killifish (*Fundulus diaphanus*)	
SILVERSIDE FAMILY (Atherinopsidae)		
	Brook silverside (*Labidesthes sicculus*)	
STRIPED BASS FAMILY (Moronidae)		
	Striped bass hybrid (*Morone saxatilis x chrysops*)	
	White perch (*Morone americana*)	
PERCH FAMILY (Percidae)		
	Yellow perch (Perca flavescens)	Special Concern – commercial
	Walleye *(Sander vitreus*)	
	Logperch (*Percina caprodes*)	
	Scaly darter (*Etheostoma eulepis*)	
SUNFISH and BASS FAMILY (Centrarchidae)		
	Smallmouth bass (*Micropterus dolomieu*)	
	Largemouth bass (*Micropterus salmoides*)	
	Warmouth (*Lepomis gulosus*)	
	Green sunfish (*Lepomis cyanellus*)	
	Pumpkindseed (*Lepomis gibbosus*)	
	Redbreast sunfish (*Lepomis auritus*)	Not usually found in Great Lakes
	Bluegill (*Lepomis macrochirus*)	
	Orangespotted sunfish (*Lepomis humilis*)	
	Northern rock bass (*Ambloplites rupestris*)	
	White crappie (*Pomoxis annularis*)	
	Black crappie (*Pomoxis nigromaculatus*)	
SCULPIN FAMILY (Cottidae)		
	Deepwater sculpin (*Myoxocephalus thompsonii*)	
	Slimy sculpin (*Cottus cognatus*)	Special Concern
	Mottled sculpin (*Cottus bairdii*)	
GOBY FAMILY (Gobiidae)		
	Round goby (*Neogobius melanostomus*)	
STICKLEBACK FAMILY (Gasterosteidae)		
	Brook stickleback (*Culaea inconstans*)	
	Threespine stickleback (*Gasterosteus aculeatus*)	
	Ninespine stickleback (*Pungitius pungitius*)	
DRUM FAMILY (Sciaenidae)		
	Freshwater drum *(Aplodinotus grunniens)*	

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	3/28/2011	4/11/2011	4/25/2011	5/9/2011	5/23/2011	6/6/2011	6/20/2011
			Month	3	4	4	5	5	6	6
			Year	2011	2011	2011	2011	2011	2011	2011
			Date Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	0	0	56	30	938	2188	205
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**							
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	80	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	3	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	1	0
Burbot	*Lota lota*	**3**	**0.0%**							
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	1	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	1	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	1
Fundulus		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	76	31	28	9	1	0	0
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	1	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	1	0	0	0	0	0
Green Sunfish		**6**	**0.0%**							
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	1	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**							
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**							
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	22	48	102	9	20	3	1
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	2	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	26	38	85	57	156	240	25
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	7	0	43	8	6
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**							
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	0	0	1	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	1	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	7	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	273	191	124	153	52	30	5
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	1	0	0	0	0	0	1
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	1	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**							
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	1	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	1
White Sucker	*Catostomus commersonii*	**3**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**	1	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	6097	4908	1964	700	138	143	231
	TOTAL	**78260**	**100.0%**	**6591**	**5218**	**2368**	**958**	**1348**	**2615**	**476**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	7/4/2011	7/18/2011	8/1/2011	8/15/2011	8/29/2011	9/12/2011	9/26/2011
			Month	7	7	8	8	8	9	9
			Year	2011	2011	2011	2011	2011	2011	2011
			Date Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	80	12	0	0	0	3	0
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**							
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**							
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	1	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	1	0	2	1	0	0
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**							
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	1	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	1	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**							
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**							
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	1	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	9	0	0	2	0	1	0
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	1	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**							
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	1	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	1	0	0	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	2	0	1	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**							
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	48	1	2	3	0	0	0
	TOTAL	**78260**	**100.0%**	**138**	**15**	**4**	**11**	**3**	**4**	**0**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	10/10/2011	10/24/2011	11/7/2011	11/21/2011	2/11/2012	2/25/2012	3/10/2012
			Month	10	10	11	11	2	2	3
			Year	2011	2011	2011	2011	2012	2012	2012
			Date Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	0	0	0	0	3	0	0
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**					0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	2	1	3	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**					0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	4	0	0	9	3	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**					0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**					0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	17	101	821	433	1698	4086	39
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**					0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	1	1	0	0	0	0
Mottled Sculpin		**3**	**0.0%**					0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**					0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	8	14	23	8	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	0	1	0	0	0	0	0
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**					0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**					0	0	0
Slimy Sculpin		**3**	**0.0%**					0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	1	0	0	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	0	74	7	8	12	18	24
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**					0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	1	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	3	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**					0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	27	702	395	247	162	216	282
	TOTAL	**78260**	**100.0%**	**54**	**899**	**1251**	**696**	**1887**	**4323**	**345**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	3/24/2012	4/7/2012	4/21/2012	5/5/2012	5/19/2012	6/23/2012	7/21/2012
			Month	3	4	4	5	5	6	7
			Year	2012	2012	2012	2012	2012	2012	2012
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	3	3	0	27	9	0	0
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	3	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	0	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	39	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	9	0	3	0	0	0
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	6	9	30	33	6	0	15
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	0	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	0	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	369	69	51	573	402	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	3	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	3	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	990	138	102	189	222	3	9
	TOTAL	**78260**	**100.0%**	**1374**	**228**	**183**	**864**	**642**	**3**	**24**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	8/11/2012	9/8/2012	10/6/2012	10/20/2012	11/3/2012	11/24/2012	2/19/2013
			Month	8	9	10	10	11	11	2
			Year	2012	2012	2012	2012	2012	2012	2013
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	0	0	0	9	0	15	3
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	3	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	54	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	0	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	3	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	3	279	6	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	0	0	126	5904	4020	3
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	0	0	0	12	0	0	0
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	0	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	0	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	0	0	0	0	6	3	33
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	3
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	0	3	0	0	18	588	228
	TOTAL	**78260**	**100.0%**	**0**	**6**	**0**	**150**	**6261**	**4635**	**270**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events

41 Total Richness

			Sample Date	3/4/2013	3/20/2013	4/1/2013	4/17/2013	4/29/2013	4/30/2013	5/15/2013
			Month	3	3	4	4	4	4	5
			Year	2013	2013	2013	2013	2013	2013	2013
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	6	0	0	0	0	0	135
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	3	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	3	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	3	9	3	6	3	3
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	3	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0	30	6	33	36	12
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	0	0	6	24	18	24	57
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	3	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	0	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	0	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	27	42	114	207	51	48	69
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	39	171	258	2487	552	360	936
	TOTAL	**78260**	**100.0%**	**72**	**216**	**423**	**2727**	**663**	**474**	**1212**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	5/28/2013	6/17/2013	7/15/2013	8/20/2013	9/18/2013	10/16/2013	10/28/2013
			Month	5	6	7	8	9	10	10
			Year	2013	2013	2013	2013	2013	2013	2013
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**43**	**44**	**45**	**46**	**47**	**48**	**49**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	270	123	3	0	3	0	0
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	0	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	0	0	0	51	30	399
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	3	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	9	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	177	3	0	0	0	0	0
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	3	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	9	0	0	0	3	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	255	282	0	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	3	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	219	135	30	0	0	0	0
	TOTAL	**78260**	**100.0%**	**945**	**543**	**33**	**0**	**57**	**33**	**399**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	11/14/2013	11/25/2013	12/9/2013	2/18/2014	3/3/2014	3/17/2014	4/7/2014
			Month	11	11	12	2	3	3	4
			Year	2013	2013	2013	2014	2014	2014	2014
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**50**	**51**	**52**	**53**	**54**	**55**	**56**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	0	3	0	0	0	0	0
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	0	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	0	0	3
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	9492	9381	81	0	0	0	3
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	0	0	0	0	0	15	3
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	0	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	0	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	3	0	9	0	0	0	3
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	3	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	0	0	129	0	3	9	0
	TOTAL	**78260**	**100.0%**	**9495**	**9384**	**219**	**0**	**6**	**24**	**12**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	4/21/2014	5/5/2014	6/10/2014	6/25/2014	7/16/2014	8/12/2014	9/8/2014
			Month	4	5	6	6	7	8	9
			Year	2014	2014	2014	2014	2014	2014	2014
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**57**	**58**	**59**	**60**	**61**	**62**	**63**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	0	0	48	129	78	6	12
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	0	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	0	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	3	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	3	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	3	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	15	6	3	3	0	0	21
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	0	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	0	0	0	0	12
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	6	24	3	6	0	0	3
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	6	6	15	6	3	0	0
	TOTAL	**78260**	**100.0%**	**33**	**39**	**69**	**144**	**81**	**6**	**48**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

72 Events
41 Total Richness

			Sample Date	10/13/2014	10/24/2014	11/10/2014	11/23/2014	12/10/2014	4/15/2015	4/27/2015
			Month	10	10	11	11	12	4	4
			Year	2014	2014	2014	2014	2014	2015	2015
			Date Type	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	0	6	96	27	9	0	0
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0	0	0	0	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0	0	0	0	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0	0	0	0	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0	0	0	18	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0	0	0	0	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0	0	0	0	0	0
Fundulus		**3**	**0.0%**	0	0	0	0	3	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	3	198	1455	1833	2064	0	6
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0	3	0	0	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0	0	0	0	0	0
Green Sunfish		**6**	**0.0%**	0	0	6	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0	0	0	0	0	0
Mottled Sculpin		**3**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0	0	0	0	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	3	6	6	0	3	3	12
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0	0	0	0	0	0
Slimy Sculpin		**3**	**0.0%**	0	0	0	0	0	0	3
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0	3	0	0	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0	0	0	0	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	0	0	15	3	24	9	9
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0	0	0	0	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0	0	0	0	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0	0	0	0	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0	0	0	0	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	0	0	27	15	21	12	3
	TOTAL	**78260**	**100.0%**	**6**	**210**	**1611**	**1878**	**2142**	**24**	**33**

TABLE 7. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 1 PUMP STATION

			Sample Date	5/11/2015	5/26/2015
			Month	5	5
	72 Events		**Year**	2015	2015
	41 Total Richness		**Date Type**	24-hr normalized	24-hr normalized
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**71**	**72**
Alewife	*Alosa pseudoharengus*	**5414**	**6.9%**	636	240
Black Bullhead	*Ameiurus melas*	**3**	**0.0%**	0	0
Bluegill	*Lepomis macrochirus*	**60**	**0.1%**	0	0
Bluntnose Minnow	*Pimephales notatus*	**80**	**0.1%**	0	0
Brook Silverside	*Labidesthes sicculus*	**6**	**0.0%**	0	0
Brook Trout	*Salvelinus fontinalis*	**1**	**0.0%**	0	0
Burbot	*Lota lota*	**3**	**0.0%**	0	0
Chinook Salmon	*Oncorhynchus tshawytscha*	**4**	**0.0%**	0	0
Coho Salmon	*Oncorhynchus kisutch*	**2**	**0.0%**	0	0
Emerald Shiner	*Notropis atherinoides*	**364**	**0.5%**	0	0
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**	0	0
Freshwater Drum	*Aplodinotus grunniens*	**1**	**0.0%**	0	0
Fundulus		**3**	**0.0%**	0	0
Gizzard Shad	*Dorosoma cepedianum*	**42432**	**54.2%**	0	0
Goldfish	*Carassius auratus auratus*	**7**	**0.0%**	0	0
Great Lakes Mottled Sculpin	*Cottus bairdii*	**1**	**0.0%**	0	0
Green Sunfish		**6**	**0.0%**	0	0
Lake Trout	*Salvelinus namaycush*	**5**	**0.0%**	0	0
Largemouth Bass	*Micropterus salmoides*	**3**	**0.0%**	0	0
Mottled Sculpin		**3**	**0.0%**	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0
Rainbow Smelt	*Osmerus mordax*	**387**	**0.5%**	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**2**	**0.0%**	0	0
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**	0	0
Round Goby	*Neogobius melanostomus*	**1384**	**1.8%**	96	129
Sand Shiner	*Notropis stramineus*	**65**	**0.1%**	0	0
Sea Lamprey	*Petromyzon marinus*	**3**	**0.0%**	0	0
Silver Redhorse	*Moxostoma anisurum*	**3**	**0.0%**	0	0
Slimy Sculpin		**3**	**0.0%**	0	0
Smallmouth Bass	*Micropterus dolomieu*	**30**	**0.0%**	0	0
Spoonhead Sculpin	*Cottus ricei*	**1**	**0.0%**	0	0
Spotfin Shiner	*Cyprinella spiloptera*	**7**	**0.0%**	0	0
Spottail Shiner	*Notropis hudsonius*	**3699**	**4.7%**	3	6
Three-spined Stickleback	*Gasterosteus aculeatus*	**8**	**0.0%**	0	0
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**	0	0
Walleye	*Sander vitreus*	**6**	**0.0%**	0	0
White Crappie	*Pomoxis*	**5**	**0.0%**	0	0
White Perch	*Morone americana*	**4**	**0.0%**	0	0
White Sucker	*Catostomus commersonii*	**3**	**0.0%**	0	0
Whitefish	*Coregonus*	**1**	**0.0%**	0	0
Yellow Perch	*Perca flavescens*	**24243**	**31.0%**	6	39
	TOTAL	**78260**	**100.0%**	**741**	**414**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

Common Name	Species Name	Total Fish Impinged	% of Total	1	2	3	4	5	6	7
			Sample Date	3/28/2011	4/11/2011	4/25/2011	5/9/2011	5/23/2011	6/6/2011	6/20/2011
			Month	3	4	4	5	5	6	6
			Year	2011	2011	2011	2011	2011	2011	2011
			Data Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	0	0	46	14	1234	815	230
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	2	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	1	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	7	1	4	1	0	0	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	1	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	1	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**							
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**							
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	122	1	41	3	5	6	1
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	5	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	12	13	31	30	19	73	9
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	11	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**							
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	1	0	0	0	1
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	158	0	2	6	1	8	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	7	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	1
White Crappie	*Pomoxis*	**1**	**0.0%**	1	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	35	3	188	160	220	222	195
	TOTAL	**9399**	**100.0%**	**351**	**18**	**314**	**214**	**1490**	**1124**	**437**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	7/4/2011	7/18/2011	8/1/2011	8/15/2011	8/29/2011	9/12/2011	9/26/2011
			Month	7	7	8	8	8	9	9
			Year	2011	2011	2011	2011	2011	2011	2011
			Data Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	9	1	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	2	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	0	0	0	0	0	2
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**							
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**							
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	4	2	0	0	1	1	0
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**							
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	1	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	1	0	0	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	12	1	1	1	0	0	0
	TOTAL	**9399**	**100.0%**	**26**	**4**	**1**	**2**	**1**	**3**	**2**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	10/10/2011	10/24/2011	11/7/2011	11/21/2011	2/11/2012	2/25/2012	3/10/2012
			Month	10	10	11	11	2	2	3
			Year	2011	2011	2011	2011	2012	2012	2012
			Data Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	1	6	1	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**					0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	2	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**					0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	2	129	567	48	0	9	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**					0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	1	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**					0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	1	3	0	0	0	3
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	1	2	0	0	0	0	3
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**					0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**					0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	1	1	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	1	23	21	2	0	0	6
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**					0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	19	1302	610	10	0	0	0
	TOTAL	**9399**	**100.0%**	**25**	**1467**	**1202**	**60**	**0**	**9**	**12**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	3/24/2012	4/7/2012	4/21/2012	5/5/2012	5/19/2012	6/23/2012	7/21/2012
			Month	3	4	4	5	5	6	7
			Year	2012	2012	2012	2012	2012	2012	2012
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	0	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	0	0	0	0	0	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	18	0	0	3	0	3	3
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	0	0	0	3
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	27	0	0	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	6	0	0	0	0	0	3
	TOTAL	**9399**	**100.0%**	**51**	**0**	**0**	**3**	**0**	**3**	**9**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	8/11/2012	9/8/2012	10/6/2012	10/20/2012	11/3/2012	11/24/2012	2/19/2013
			Month	8	9	10	10	11	11	2
			Year	2012	2012	2012	2012	2012	2012	2013
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	3	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	18	3	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	3	57	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	0	0	24	591	147	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	0	0	0	3	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	3	0	0	0	3	3	0
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	0	0	0	0	0	3	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	642	0	0	0	126	24	0
	TOTAL	**9399**	**100.0%**	**648**	**0**	**0**	**27**	**795**	**183**	**0**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	3/4/2013	3/20/2013	4/1/2013	4/17/2013	4/29/2013	4/30/2013	5/15/2013
			Month	3	3	4	4	4	4	5
			Year	2013	2013	2013	2013	2013	2013	2013
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	0	0	0	0	0	0	45
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	6	0	0	0	0	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	3	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	33	3	0	18	15
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	0	0	9	3	0	6	3
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	0	0	3	3	0	6	3
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	0	3	6	0	0	3	0
	TOTAL	**9399**	**100.0%**	**0**	**9**	**51**	**9**	**0**	**36**	**66**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	5/28/2013	6/17/2013	7/15/2013	8/20/2013	9/18/2013	10/16/2013	10/28/2013
			Month	5	6	7	8	9	10	10
			Year	2013	2013	2013	2013	2013	2013	2013
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**43**	**44**	**45**	**46**	**47**	**48**	**49**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	12	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	0	0	0	0	3	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	3	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	6	3	6	9	0	0	0
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	3	0	0	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	3	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	0	3	3	0	0	0	0
	TOTAL	**9399**	**100.0%**	**27**	**6**	**9**	**9**	**0**	**3**	**0**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	11/14/2013	11/25/2013	12/9/2013	2/18/2014	3/3/2014	3/17/2014	4/7/2014
			Month	11	11	12	2	3	3	4
			Year	2013	2013	2013	2014	2014	2014	2014
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**50**	**51**	**52**	**53**	**54**	**55**	**56**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	3	3	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	177	75	21	0	0	0	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	0	0	3	0	0	3	3
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	3	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	0	0	3	3	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	0	0	0	0	0	0	0
	TOTAL	**9399**	**100.0%**	**180**	**81**	**27**	**3**	**0**	**3**	**3**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	4/21/2014	5/5/2014	5/19/2014	6/10/2014	6/23/2014	9/8/2014	10/13/2014
			Month	4	5	5	6	6	9	10
			Year	2014	2014	2014	2014	2014	2014	2014
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**57**	**58**	**59**	**60**	**61**	**62**	**63**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	0	0	0	0	6	105	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	0	0	0	0	3	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	3	0	0	3	0	6	3
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	0	0	0	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	0	0	0	0	0	0	0
	TOTAL	**9399**	**100.0%**	**3**	**0**	**0**	**3**	**6**	**114**	**3**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	10/27/2014	11/10/2014	11/23/2014	12/8/2014	3/30/2015	4/13/2015	4/27/2015
			Month	10	11	11	12	3	4	4
			Year	2014	2014	2014	2014	2015	2015	2015
			Data Type	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	3	0	0	0	0	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0	0	0	0	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0	0	0	0	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0	0	0	0	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0	0	0	0	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0	0	0	0	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0	0	0	0	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	9	6	33	54	0	0	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0	0	0	0	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0	0	0	0	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0	0	0	0	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0	0	0	0	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0	0	0	0	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0	0	0	0	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0	0	0	0	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	3	0	3	0	0	15	0
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0	0	0	0	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0	0	0	0	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0	0	0	0	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0	0	0	0	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	0	3	6	0	0	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0	0	0	0	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0	0	0	0	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0	0	0	0	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0	0	0	0	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	0	3	66	63	0	0	0
	TOTAL	**9399**	**100.0%**	**15**	**12**	**108**	**117**	**0**	**15**	**0**

TABLE 8. IMPINGEMENT STUDIES 2011 - 2015 FROM NO. 2 PUMP STATION

72 Events
26 Total Richness

			Sample Date	5/11/2015	5/26/2015
			Month	5	5
			Year	2015	2015
			Data Type	24-hr normal	24-hr normal
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**71**	**72**
Alewife	*Alosa pseudoharengus*	**2529**	**26.9%**	0	0
Bluegill	*Lepomis macrochirus*	**31**	**0.3%**	0	0
Bluntnose Minnow	*Pimephales notatus*	**2**	**0.0%**	0	0
Brook Silverside	*Labidesthes sicculus*	**1**	**0.0%**	0	0
Burbot	*Lota lota*	**0**	**0.0%**	0	0
Emerald Shiner	*Notropis atherinoides*	**62**	**0.7%**	0	0
Flatehead Catfish	*Pylodictis olivaris*	**0**	**0.0%**	0	0
Gizzard Shad	*Dorosoma cepedianum*	**1919**	**20.4%**	0	0
Golden Shiner	*Notemigonus crysoleucas*	**1**	**0.0%**	0	0
Goldfish	*Carassius auratus auratus*	**1**	**0.0%**	0	0
Lake Trout	*Salvelinus namaycush*	**0**	**0.0%**	0	0
Largemouth Bass	*Micropterus salmoides*	**1**	**0.0%**	0	0
Nine-spined Stickleback	*Pungitius pungitius*	**3**	**0.0%**	0	0
Rainbow Smelt	*Osmerus mordax*	**261**	**2.8%**	0	0
Rainbow Trout	*Oncorhynchus mykiss*	**5**	**0.1%**	0	0
Round Goby	*Neogobius melanostomus*	**327**	**3.5%**	0	0
Sand Shiner	*Notropis stramineus*	**11**	**0.1%**	0	0
Sea Lamprey	*Petromyzon marinus*	**0**	**0.0%**	0	0
Silver Redhorse	*Moxostoma anisurum*	**0**	**0.0%**	0	0
Smallmouth Bass	*Micropterus dolomieu*	**11**	**0.1%**	0	0
Spottail Shiner	*Notropis hudsonius*	**292**	**3.1%**	0	0
Three-spined Stickleback	*Gasterosteus aculeatus*	**10**	**0.1%**	0	0
Walleye	*Sander vitreus*	**0**	**0.0%**	0	0
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	0	0
White Crappie	*Pomoxis*	**1**	**0.0%**	0	0
Yellow Perch	*Perca flavescens*	**3930**	**41.8%**	0	0
	TOTAL	**9399**	**100.0%**	**0**	**0**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	3/28/2011	4/11/2011	4/25/2011	5/9/2011	5/23/2011	6/6/2011	6/20/2011
			Month	3	4	4	5	5	6	6
			Year	2011	2011	2011	2011	2011	2011	2011
			Data Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**				2	267	89	7
Burbot	*Lota lota*	**2**	**0.0%**				1			1
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**	2			1			
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**							1
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**	13	6	10	4	6	32	
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**						1	
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	6	30	67	63	126	495	1394
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**					12		4
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**		5	1	2	1	37	
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**						1	
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**					1		
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	933	79	86	29	36	39	12
	TOTAL	**8267**	**100.0%**	**954**	**120**	**164**	**102**	**449**	**694**	**1419**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	7/4/2011	7/18/2011	8/1/2011	8/15/2011	8/29/2011	9/12/2011	9/26/2011
			Month	7	7	8	8	8	9	9
			Year	2011	2011	2011	2011	2011	2011	2011
			Data Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**	1	1	1	1			
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**				1			
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**				1			
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	201	180	128	83	5	2	
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**		2	1	1			
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**			3				
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**			1				
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**				1			
Whitefish	*Coregonus*	**1**	**0.0%**		1					
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	8	2	6	21	5		
	TOTAL	**8267**	**100.0%**	**210**	**186**	**140**	**109**	**10**	**2**	

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	10/10/2011	10/24/2011	11/7/2011	11/21/2011	2/11/2012	2/25/2012	3/10/2012
			Month	10	10	11	11	2	2	3
			Year	2011	2011	2011	2011	2012	2012	2012
			Data Type	24-hr collect	24-hr collect	24-hr collect	24-hr collect	24-hr normal	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**				2			
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**			1	2			
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**			1	1			
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	2		1		12	12	3
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**		1		9	6		
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**	1						
White Perch	*Morone americana*	**10**	**0.1%**					6		
White Sucker	*Catostomus commersonii*	**2**	**0.0%**	1						
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	3	127	133	471	48	138	48
	TOTAL	**8267**	**100.0%**	**7**	**128**	**136**	**485**	**72**	**150**	**51**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	3/24/2012	4/7/2012	4/21/2012	5/5/2012	5/19/2012	6/23/2012	7/21/2012
			Month	3	4	4	5	5	6	7
			Year	2012	2012	2012	2012	2012	2012	2012
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**							
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**			3				
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**				3			
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	15	12			3	39	
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**	3	3	3	3	33	6	
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**		3					
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	36	18	24	111	285	18	3
	TOTAL	**8267**	**100.0%**	**54**	**36**	**30**	**117**	**321**	**63**	**3**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	8/11/2012	9/8/2012	10/6/2012	10/20/2012	11/3/2012	11/24/2012	2/19/2013
			Month	8	9	10	10	11	11	2
			Year	2012	2012	2012	2012	2012	2012	2013
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**							
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**						6	
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**						6	
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**							
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	6	3					15
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**	3						
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**							
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	48	3			87	303	327
	TOTAL	**8267**	**100.0%**	**57**	**6**			**87**	**315**	**342**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	3/4/2013	3/20/2013	4/1/2013	4/17/2013	4/29/2013	4/30/2013	5/15/2013
			Month	3	3	4	4	4	4	5
			Year	2013	2013	2013	2013	2013	2013	2013
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**							
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**					3		
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**							
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**							
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	9	9	15	21	6	24	27
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**	3		9	9		6	3
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	45	69	168	24	15	9	18
	TOTAL	**8267**	**100.0%**	**57**	**78**	**192**	**54**	**24**	**39**	**48**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	5/28/2013	6/17/2013	7/15/2013	8/20/2013	9/18/2013	10/16/2013	10/28/2013
			Month	5	6	7	8	9	10	10
			Year	2013	2013	2013	2013	2013	2013	2013
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**43**	**44**	**45**	**46**	**47**	**48**	**49**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**	9	3	3				
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**							
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**							
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	9	30	57	9	21	12	
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**		3					
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**	21	15					
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	39	279	12				
	TOTAL	**8267**	**100.0%**	**78**	**330**	**72**	**9**	**21**	**12**	

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	11/14/2013	11/25/2013	12/9/2013	2/17/2014	3/3/2014	3/17/2014	4/7/2014
			Month	11	11	12	2	3	3	4
			Year	2013	2013	2013	2014	2014	2014	2014
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**50**	**51**	**52**	**53**	**54**	**55**	**56**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**							
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**		3	6				
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**							
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	3	3	9	3	3	9	
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**			3				
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	6		12	3			
	TOTAL	**8267**	**100.0%**	**9**	**6**	**30**	**6**	**3**	**9**	

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	4/21/2014	5/5/2014	5/19/2014	6/9/2014	6/23/2014	7/14/2014	8/11/2014
			Month	4	5	5	6	6	7	8
			Year	2014	2014	2014	2014	2014	2014	2014
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**57**	**58**	**59**	**60**	**61**	**62**	**63**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**							
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**				3			
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**							
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**							
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**		6	3	15	3	39	
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**							
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**		3		3			
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**					6	3	
	TOTAL	**8267**	**100.0%**		**9**	**3**	**21**	**9**	**42**	

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	9/8/2014	10/13/2014	10/27/2014	11/10/2014	11/23/2014	12/8/2014	3/30/2015
			Month	9	10	10	11	11	12	3
			Year	2014	2014	2014	2014	2014	2014	2015
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**							
Burbot	*Lota lota*	**2**	**0.0%**							
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**							
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**							
Freshwater Drum		**3**	**0.0%**							
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**							
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**							
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**							
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	18	3	3				9
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**							
Slimy Sculpin		**3**	**0.0%**						3	
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**							
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**							
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**							
Walleye	*Sander vitreus*	**1**	**0.0%**							
Warmouth	*Lepomis gulosus*	**1**	**0.0%**							
White Perch	*Morone americana*	**10**	**0.1%**							
White Sucker	*Catostomus commersonii*	**2**	**0.0%**							
Whitefish	*Coregonus*	**1**	**0.0%**							
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**	3				6		
	TOTAL	**8267**	**100.0%**	**21**	**3**	**3**		**6**	**3**	**9**

TABLE 9. IMPINGEMENT STUDIES 2011 - 2015 FROM LAKESIDE PUMP STATION

74 Events
20 Total Richness

			Sample Date	4/15/2015	4/27/2015	5/11/2015	5/26/2015
			Month	4	4	5	5
			Year	2015	2015	2015	2015
			Data Type	8-hr collect	8-hr collect	8-hr collect	8-hr collect
Common Name	**Species Name**	**Total Fish Impinged**	**% of Total**	**71**	**72**	**73**	**74**
Alewife	*Alosa pseudoharengus*	**386**	**4.7%**				
Burbot	*Lota lota*	**2**	**0.0%**				
Emerald Shiner	*Notropis atherinoides*	**9**	**0.1%**				
Flatehead Catfish	*Pylodictis olivaris*	**3**	**0.0%**				
Freshwater Drum		**3**	**0.0%**				
Gizzard Shad	*Dorosoma cepedianum*	**23**	**0.3%**				
Rainbow Smelt	*Osmerus mordax*	**77**	**0.9%**				
Rock Bass	*Ambloplites rupestris*	**1**	**0.0%**				
Round Goby	*Neogobius melanostomus*	**3323**	**40.2%**	9	15	6	12
Sand Shiner	*Notropis stramineus*	**20**	**0.2%**				
Slimy Sculpin		**3**	**0.0%**				
Smallmouth Bass	*Micropterus dolomieu*	**6**	**0.1%**				
Spottail Shiner	*Notropis hudsonius*	**191**	**2.3%**				
Trout Perch	*Percopsis omiscomaycus*	**1**	**0.0%**				
Walleye	*Sander vitreus*	**1**	**0.0%**				
Warmouth	*Lepomis gulosus*	**1**	**0.0%**				
White Perch	*Morone americana*	**10**	**0.1%**				
White Sucker	*Catostomus commersonii*	**2**	**0.0%**				
Whitefish	*Coregonus*	**1**	**0.0%**				
Yellow Perch	*Perca flavescens*	**4204**	**50.9%**				
	TOTAL	**8267**	**100.0%**	**9**	**15**	**6**	**12**

TABLE 10. ANNUAL IMPINGEMENT ESTIMATES

Year	Alewife	Gizzard Shad	Round Goby	Spottail Shiner	Yellow Perch	Other	All Species
No. 1 Pump Station							
2011	49,168	26,766	10,832	32,508	657,468	14,896	791,638
2012	1,152	296,376	1,764	21,723	49,629	6,183	376,827
2013	8,424	273,267	3,912	18,147	86,520	1,809	392,079
2014	7,989	85,998	1,611	1,464	2,037	1,113	100,212
No. 2 Pump Station							
2011	32,886	11,158	3,636	14,498	44,226	13,242	119,646
2012	63	11,823	693	525	15,918	1,344	30,366
2013	915	4,308	879	216	267	801	7,386
2014	8,205	1,680	861	264	1,845	0	12,855
Lakeside Pump Station							
2011	5,194	70	39,394	826	95,036	2,578	143,098
2012	0	168	2,697	1,086	20,595	519	25,065
2013	261	117	5,805	957	27,264	96	34,500
2014	0	0	2,262	105	450	108	2,925

TABLE 11. IMPINGEMENT SEASONALITY AS A FUNCTION OF AVERAGE MEASURED IMPINGEMENT PER 24 HOURS

Location	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NO. 1 Pump Station											
Yellow Perch	152	1084	899	273	89	18	1	1	91	161	75
Gizzard Shad	1447	17	8	2	0	0	1	10	109	4167	1073
Alewife	2	1	5	254	449	35	1	4	2	18	5
Round Goby	0	7	22	80	46	5	0	4	3	1	2
All Species	1620	1233	1032	796	642	58	4	23	219	4401	1181
No. 2 Pump Station											
Yellow Perch	0	6	17	38	70	5	129	0	165	105	32
Gizzard Shad	2	2	0	0	0	0	0	1	21	206	38
Alewife	0	0	4	131	175	3	1	21	0	1	0
Round Goby	0	5	7	6	15	4	3	1	1	1	2
All Species	3	53	37	180	263	12	132	24	193	328	72
Lakeside Pump Station											
Yellow Perch	129	141	35	52	59	6	13	1	16	126	6
Gizzard Shad	0	0	0	0	0	0	0	0	0	2	3
Alewife	0	0	0	28	17	1	0	0	0	0	0
Round Goby	11	8	17	26	329	95	39	9	3	1	5
All Species	143	152	57	115	423	103	54	10	19	131	17

TABLE 12. SUMMARY OF FRAGILE AND NUISANCE SPECIES ENCOUNTERED

Pursuant to §125.92(m), fragile species means those species of fish and shellfish that are least likely to survive any form of impingement.
For purposes of this subpart, fragile species are defined as those with an impingement survival rate of less than 30 percent, including but not limited to:

Species	No. of Fish Impinged			Percentage of Total Fish Impinged		
	No. 1 PS	No. 2 PS	LS PS	No. 1 PS	No. 2 PS	LS PS
Fragile						
alewife	5414	2529	386	7%	27%	5%
American shad	0	0	0	---	---	---
Atlantic herring	0	0	0	---	---	---
Atlantic longfinned squid	0	0	0	---	---	---
Atlantic menhaden	0	0	0	---	---	---
bay anchovy	0	0	0	---	---	---
blueback herring	0	0	0	---	---	---
bluefish	0	0	0	---	---	---
butterfish	0	0	0	---	---	---
gizzard shad	42432	1919	23	54%	20%	0%
grey snapper	0	0	0	---	---	---
hickory shad	0	0	0	---	---	---
menhaden	0	0	0	---	---	---
rainbow smelt	387	261	77	0%	3%	1%
round herring	0	0	0	---	---	---
silver anchovy	0	0	0	---	---	---
Total fragile species	**48233**	**4709**	**486**	**62%**	**50%**	**6%**
Nuisance						
round goby	1384	327	3323	2%	3%	40%
Total nuisance species	**1384**	**327**	**3323**	**2%**	**3%**	**40%**
Total Fish Impinged	78260	9399	8267			

TABLE 13. NOAA LAKE LEVEL AT CALUMET HARBOR (STATION NO. 9087044)

Month	Lake Level (inches from LWD = 577.5')			Lake Level (Datum IGLD1985)		
	Average of Daily Averages	Max of Daily Averages	Min of Daily Averages	Average of Daily Averages	Max of Daily Averages	Min of Daily Averages
MAX	**35.00**	**40.84**	**32.56**	**580.42**	**580.90**	**580.21**
MIN	**-18.22**	**-11.13**	**-22.92**	**575.98**	**576.57**	**575.59**
RANGE	**53.23**	**51.96**	**55.47**	**4.44**	**4.33**	**4.62**
Jan-13	-18.22	-11.13	-22.92	575.98	576.57	575.59
Feb-13	-13.29	-5.01	-18.79	576.39	577.08	575.93
Mar-13	-11.76	-4.55	-14.87	576.52	577.12	576.26
Apr-13	-7.95	-2.70	-16.09	576.84	577.27	576.16
May-13	0.77	6.85	-4.65	577.56	578.07	577.11
Jun-13	4.51	8.91	0.93	577.88	578.24	577.58
Jul-13	5.12	9.18	1.47	577.93	578.26	577.62
Aug-13	3.62	7.00	-0.47	577.80	578.08	577.46
Sep-13	3.34	8.25	0.81	577.78	578.19	577.57
Oct-13	0.47	5.24	-5.27	577.54	577.94	577.06
Nov-13	-1.11	4.34	-9.86	577.41	577.86	576.68
Dec-13	-0.36	6.48	-6.95	577.47	578.04	576.92
Jan-14	-2.47	6.48	-12.32	577.29	578.04	576.47
Feb-14	-1.34	5.56	-8.33	577.39	577.96	576.81
Mar-14	0.38	8.57	-3.95	577.53	578.21	577.17
Apr-14	5.12	13.69	-1.38	577.93	578.64	577.39
May-14	12.71	17.06	7.13	578.56	578.92	578.09
Jun-14	17.40	20.20	13.25	578.95	579.18	578.60
Jul-14	19.09	23.76	15.68	579.09	579.48	578.81
Aug-14	21.29	23.84	19.12	579.27	579.49	579.09
Sep-14	21.40	25.86	16.95	579.28	579.66	578.91
Oct-14	23.21	39.39	19.30	579.43	580.78	579.11
Nov-14	20.74	29.79	13.45	579.23	579.98	578.62
Dec-14	21.64	26.36	13.31	579.30	579.70	578.61
Jan-15	19.97	26.21	10.63	579.16	579.68	578.39
Feb-15	22.17	31.07	14.75	579.35	580.09	578.73
Mar-15	19.87	24.25	13.89	579.16	579.52	578.66
Apr-15	23.23	27.69	18.25	579.44	579.81	579.02
May-15	25.07	32.46	22.37	579.59	580.20	579.36
Jun-15	29.56	32.62	26.53	579.96	580.22	579.71
Jul-15	30.03	33.06	27.49	580.00	580.26	579.79
Aug-15	28.38	31.36	25.42	579.86	580.11	579.62
Sep-15	28.60	34.27	24.40	579.88	580.36	579.53
Oct-15	24.79	36.81	15.72	579.57	580.57	578.81
Nov-15	20.57	29.13	14.80	579.21	579.93	578.73
Dec-15	22.17	33.29	15.72	579.35	580.27	578.81
Jan-16	22.32	28.43	17.59	579.36	579.87	578.97
Feb-16	23.77	34.43	16.89	579.48	580.37	578.91
Mar-16	26.42	37.92	20.24	579.70	580.66	579.19
Apr-16	34.01	40.84	28.71	580.33	580.90	579.89
May-16	34.56	38.51	31.64	580.38	580.71	580.14
Jun-16	35.00	38.20	32.56	580.42	580.68	580.21
Jul-16	33.60	36.31	30.48	580.30	580.53	580.04
Aug-16	32.80	35.88	29.04	580.23	580.49	579.92
Sep-16	31.73	37.74	25.53	580.14	580.64	579.63
Oct-16	28.57	34.20	22.68	579.88	580.35	579.39
Nov-16	23.16	28.20	15.53	579.43	579.85	578.79
Dec-16	17.48	22.78	6.02	578.96	579.40	578.00

TABLE 14. THROUGH-SCREEN VELOCITY AS A FUNCTION OF LAKE LEVEL AND FLOW RATE

Lake Level Description	Flow Rate Description	Time Period	NO. 2 PS
Ave. of Monthly Averages	Average of Monthly Averages	1Q2014	2.19
Ave. of Monthly Averages	Average of Monthly Averages	2Q2014	1.99
Ave. of Monthly Averages	Average of Monthly Averages	3Q2014	1.89
Ave. of Monthly Averages	Average of Monthly Averages	4Q2014	1.93
Ave. of Monthly Averages	Average of Monthly Averages	1Q2015	1.94
Ave. of Monthly Averages	Average of Monthly Averages	2Q2015	1.81
Ave. of Monthly Averages	Average of Monthly Averages	3Q2015	1.83
Ave. of Monthly Averages	Average of Monthly Averages	4Q2015	1.79
Ave. of Monthly Averages	Average of Monthly Averages	1Q2016	1.78
Ave. of Monthly Averages	Average of Monthly Averages	2Q2016	1.65
Ave. of Monthly Averages	Average of Monthly Averages	3Q2016	1.67
Ave. of Monthly Averages	Average of Monthly Averages	4Q2016	1.76
Min of Monthly Mins	Max of Monthly Maxes	1Q2014	2.48
Min of Monthly Mins	Max of Monthly Maxes	2Q2014	2.29
Min of Monthly Mins	Max of Monthly Maxes	3Q2014	2.03
Min of Monthly Mins	Max of Monthly Maxes	4Q2014	2.07
Min of Monthly Mins	Max of Monthly Maxes	1Q2015	2.11
Min of Monthly Mins	Max of Monthly Maxes	2Q2015	1.97
Min of Monthly Mins	Max of Monthly Maxes	3Q2015	1.90
Min of Monthly Mins	Max of Monthly Maxes	4Q2015	1.91
Min of Monthly Mins	Max of Monthly Maxes	1Q2016	1.88
Min of Monthly Mins	Max of Monthly Maxes	2Q2016	1.72
Min of Monthly Mins	Max of Monthly Maxes	3Q2016	1.76
Min of Monthly Mins	Max of Monthly Maxes	4Q2016	2.06

TABLE 15. SUBMERGED INTAKE OPENINGS

PARAMETER	UNITS	NO. 1 PS	NO. 4 PS	LS PS
Number of Intake Openings	#	2.00	2.00	12.00
Intake Opening Diameter	feet	10.00	10.00	14.33
Intake Opening Height	feet	---	---	---
Intake Opening Width	feet	---	---	---
Intake Opening Area	sq feet	78.54	78.54	161.35
Number of Intake Opening Bars	#	36.00	36.00	0.00
Average Length	inches	92.00	92.00	0.00
Average Width	inches	0.50	0.50	0.00
Intake Opening Bar Area	sq feet	11.50	11.50	0.00
Net Area Per Intake Opening	sq feet	67	67	161
Total Area of the Intakes Openings	sq feet	134	134	1936
Design Intake Flow (DIF)	MGD	424	5	266
Design Intake Flow (DIF)	cfs	658	8	413
Design Intake Velocity at submerged openings	fps	4.9	0.06	0.21

TABLE 16. ACTUAL INTAKE VELOCITY AT SUBMERGED OPENINGS

Period of Time	No. 1 PS			No. 4 PS			LS PS		
	Flow Rate (MGD)	Flow Rate (cfs)	TSV (fps)	Flow Rate (MGD)	Flow Rate (cfs)	TSV (fps)	Flow Rate (MGD)	Flow Rate (cfs)	TSV (fps)
Jan-14	192.24	297.46	2.22	29.69	45.94	0.34	82.18	127.16	0.07
Feb-14	192.24	297.46	2.22	29.95	46.35	0.35	82.50	127.66	0.07
Mar-14	191.29	295.99	2.21	29.47	45.60	0.34	82.06	126.98	0.07
Apr-14	190.02	294.02	2.19	29.95	46.35	0.35	80.67	124.82	0.06
May-14	193.48	299.38	2.23	29.69	45.94	0.34	81.34	125.86	0.07
Jun-14	194.21	300.51	2.24	29.95	46.35	0.35	82.19	127.18	0.07
Jul-14	193.12	298.83	2.23	29.95	46.35	0.35	79.44	122.92	0.06
Aug-14	194.03	300.23	2.24	29.95	46.35	0.35	79.34	122.76	0.06
Sep-14	191.03	295.58	2.20	29.04	44.93	0.34	79.24	122.61	0.06
Oct-14	192.24	297.46	2.22	29.95	46.35	0.35	75.76	117.23	0.06
Nov-14	192.24	297.46	2.22	29.95	46.35	0.35	76.53	118.42	0.06
Dec-14	192.24	297.46	2.22	29.95	46.35	0.35	71.23	110.22	0.06
Jan-15	192.24	297.46	2.22	29.47	45.60	0.34	54.15	83.80	0.04
Feb-15	192.24	297.46	2.22	29.95	46.35	0.35	54.14	83.78	0.04
Mar-15	192.24	297.46	2.22	29.95	46.35	0.35	52.99	82.00	0.04
Apr-15	192.24	297.46	2.22	29.95	46.35	0.35	52.38	81.05	0.04
May-15	192.50	297.87	2.22	29.95	46.35	0.35	53.84	83.31	0.04
Jun-15	192.24	297.46	2.22	29.95	46.35	0.35	54.24	83.92	0.04
Jul-15	190.98	295.51	2.20	32.39	50.11	0.37	54.00	83.56	0.04
Aug-15	191.49	296.31	2.21	16.91	26.16	0.20	54.43	84.22	0.04
Sep-15	190.73	295.12	2.20	14.98	23.17	0.17	52.91	81.87	0.04
Oct-15	192.24	297.46	2.22	14.98	23.17	0.17	51.69	79.98	0.04
Nov-15	192.24	297.46	2.22	14.98	23.17	0.17	52.96	81.95	0.04
Dec-15	192.24	297.46	2.22	14.98	23.17	0.17	54.06	83.65	0.04
Jan-16	184.92	286.14	2.13	14.98	23.17	0.17	50.03	77.42	0.04
Feb-16	192.24	297.46	2.22	14.98	23.17	0.17	50.75	78.53	0.04
Mar-16	189.49	293.20	2.19	14.98	23.17	0.17	53.09	82.15	0.04
Apr-16	192.24	297.46	2.22	14.98	23.17	0.17	51.65	79.92	0.04
May-16	192.02	297.12	2.22	14.98	23.17	0.17	52.17	80.73	0.04
Jun-16	192.24	297.46	2.22	14.98	23.17	0.17	52.33	80.98	0.04
Jul-16	192.24	297.46	2.22	14.98	23.17	0.17	54.11	83.73	0.04
Aug-16	182.53	282.44	2.11	14.98	23.17	0.17	54.78	84.77	0.04
Sep-16	170.81	264.30	1.97	14.98	23.17	0.17	81.98	126.85	0.07
Oct-16	180.33	279.02	2.08	14.98	23.17	0.17	52.75	81.63	0.04
Nov-16	192.24	297.46	2.22	14.98	23.17	0.17	50.01	77.38	0.04
Dec-16	192.24	297.46	2.22	14.98	23.17	0.17	51.95	80.39	0.04
Jan-17	192.24	297.46	2.22	14.98	23.17	0.17	48.96	75.76	0.04
Feb-17	192.24	297.46	2.22	14.98	23.17	0.17	49.51	76.61	0.04
Mar-17	192.24	297.46	2.22	14.98	23.17	0.17	53.25	82.40	0.04
Apr-17	192.24	297.46	2.22	14.98	23.17	0.17	62.50	96.71	0.05
May-17	192.24	297.46	2.22	6.43	9.95	0.07	56.69	87.71	0.05
Jun-17	192.24	297.46	2.22	3.46	5.35	0.04	59.54	92.14	0.05
Jul-17	189.15	292.68	2.18	3.46	5.35	0.04	54.14	83.78	0.04
Aug-17	179.68	278.02	2.07	3.46	5.35	0.04	55.63	86.08	0.04
Sep-17	178.56	276.29	2.06	3.46	5.35	0.04	56.60	87.58	0.05
Oct-17	178.56	276.29	2.06	3.46	5.35	0.04	57.33	88.70	0.05
Nov-17	178.56	276.29	2.06	3.46	5.35	0.04	54.72	84.67	0.04
Dec-17	192.24	297.46	2.22	3.46	5.35	0.04	54.17	83.82	0.04
Jan-18	192.02	297.12	2.22	3.46	5.35	0.04	53.42	82.66	0.04
Feb-18	192.24	297.46	2.22	3.46	5.35	0.04	52.68	81.51	0.04
Mar-18	189.65	293.46	2.19	3.46	5.35	0.04	54.20	83.87	0.04
Apr-18	192.24	297.46	2.22	3.46	5.35	0.04	54.57	84.44	0.04
May-18	191.34	296.07	2.21	3.46	5.35	0.04	55.30	85.56	0.04
Jun-18	191.63	296.52	2.21	3.46	5.35	0.04	54.35	84.10	0.04
Jul-18	192.24	297.46	2.22	3.46	5.35	0.04	54.11	83.72	0.04
Aug-18	181.63	281.04	2.10	3.46	5.35	0.04	56.05	86.73	0.04
Sep-18	197.88	306.18	2.28	3.46	5.35	0.04	55.37	85.68	0.04
Oct-18	185.76	287.44	2.14	3.46	5.35	0.04	54.90	84.95	0.04
Nov-18	191.96	297.02	2.22	3.46	5.35	0.04	80.67	124.82	0.06
Dec-18	187.32	289.85	2.16	3.46	5.35	0.04	81.27	125.75	0.06

TABLE 17. IMPINGEMENT MORTALITY CALCULATION FOR NO. 1 PUMP STATION

Month	Year	Mo-Yr	Fish Impinged (less fragile & nuisance species)	Fish Alive (less fragile & nuisance species)	IM
1	2011	Jan-11	0	0	---
2	2011	Feb-11	0	0	---
3	2011	Mar-11	6467	0	---
4	2011	Apr-11	7198	0	---
5	2011	May-11	1086	0	---
6	2011	Jun-11	429	0	---
7	2011	Jul-11	51	0	---
8	2011	Aug-11	13	0	---
9	2011	Sep-11	0	0	---
10	2011	Oct-11	812	207	---
11	2011	Nov-11	662	102	---
12	2011	Dec-11	0	0	98%
1	2012	Jan-12	0	0	98%
2	2012	Feb-12	141	87	98%
3	2012	Mar-12	557	393	93%
4	2012	Apr-12	120	69	78%
5	2012	May-12	476	54	72%
6	2012	Jun-12	1	0	68%
7	2012	Jul-12	3	0	67%
8	2012	Aug-12	0	0	67%
9	2012	Sep-12	2	0	67%
10	2012	Oct-12	1	0	64%
11	2012	Nov-12	319	164	53%
12	2012	Dec-12	0	0	53%
1	2013	Jan-13	0	0	53%
2	2013	Feb-13	88	38	54%
3	2013	Mar-13	93	36	67%
4	2013	Apr-13	1363	772	55%
5	2013	May-13	498	43	56%
6	2013	Jun-13	139	0	58%
7	2013	Jul-13	10	0	58%
8	2013	Aug-13	0	0	58%
9	2013	Sep-13	1	0	58%
10	2013	Oct-13	1	0	58%
11	2013	Nov-13	1	0	59%
12	2013	Dec-13	46	35	59%
1	2014	Jan-14	0	0	59%
2	2014	Feb-14	0	0	59%
3	2014	Mar-14	5	4	59%
4	2014	Apr-14	8	3	88%
5	2014	May-14	10	2	80%
6	2014	Jun-14	10	4	48%
7	2014	Jul-14	1	0	42%
8	2014	Aug-14	0	0	42%
9	2014	Sep-14	5	0	45%
10	2014	Oct-14	0	0	44%
11	2014	Nov-14	24	9	48%
12	2014	Dec-14	22	5	68%
1	2015	Jan-15	0	0	68%
2	2015	Feb-15	0	0	68%
3	2015	Mar-15	0	0	71%
4	2015	Apr-15	12	1	75%
5	2015	May-15	18	10	68%

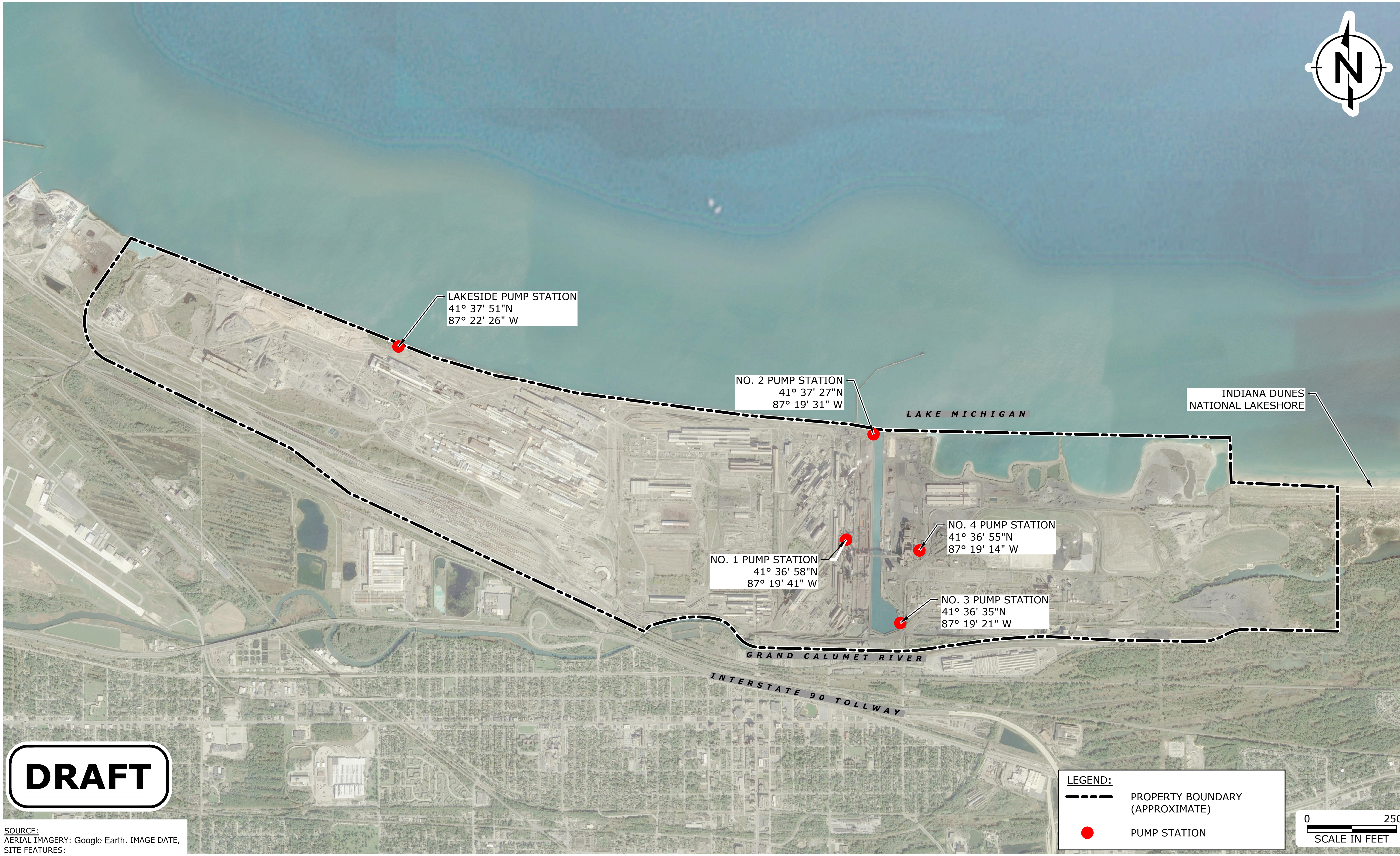
TABLE 18. IMPINGEMENT MORTALITY CALCULATION FOR NO. 2 PUMP STATION

Month	Year	Mo-Yr	Fish Impinged (less fragile & nuisance species)	Fish Alive (less fragile & nuisance species)	IM
1	2011	Jan-11	0	0	---
2	2011	Feb-11	0	0	---
3	2011	Mar-11	210	0	---
4	2011	Apr-11	195	0	---
5	2011	May-11	398	0	---
6	2011	Jun-11	427	0	---
7	2011	Jul-11	14	0	---
8	2011	Aug-11	3	0	---
9	2011	Sep-11	2	0	---
10	2011	Oct-11	1357	70	---
11	2011	Nov-11	644	4	---
12	2011	Dec-11	0	0	98%
1	2012	Jan-12	0	0	98%
2	2012	Feb-12	0	0	98%
3	2012	Mar-12	13	9	97%
4	2012	Apr-12	0	0	97%
5	2012	May-12	0	0	97%
6	2012	Jun-12	0	0	96%
7	2012	Jul-12	2	0	96%
8	2012	Aug-12	214	0	96%
9	2012	Sep-12	0	0	96%
10	2012	Oct-12	1	0	99%
11	2012	Nov-12	77	11	93%
12	2012	Dec-12	0	0	93%
1	2013	Jan-13	0	0	93%
2	2013	Feb-13	0	0	93%
3	2013	Mar-13	1	0	96%
4	2013	Apr-13	8	1	96%
5	2013	May-13	3	1	96%
6	2013	Jun-13	1	0	96%
7	2013	Jul-13	1	0	96%
8	2013	Aug-13	0	0	86%
9	2013	Sep-13	0	0	86%
10	2013	Oct-13	0	0	86%
11	2013	Nov-13	1	1	80%
12	2013	Dec-13	1	0	81%
1	2014	Jan-14	0	0	81%
2	2014	Feb-14	1	1	76%
3	2014	Mar-14	0	0	75%
4	2014	Apr-14	0	0	63%
5	2014	May-14	0	0	60%
6	2014	Jun-14	0	0	50%
7	2014	Jul-14	0	0	33%
8	2014	Aug-14	0	0	33%
9	2014	Sep-14	0	0	33%
10	2014	Oct-14	0	0	33%
11	2014	Nov-14	26	18	32%
12	2014	Dec-14	21	19	21%
1	2015	Jan-15	0	0	21%
2	2015	Feb-15	0	0	21%
3	2015	Mar-15	0	0	21%
4	2015	Apr-15	0	0	21%

TABLE 19. IMPINGEMENT MORTALITY CALCULATION FOR LAKESIDE PUMP STATION

Month	Year	Mo-Yr	Fish Impinged (less fragile & nuisance species)	Fish Alive (less fragile & nuisance species)	IM
1	2011	Jan-11	0	0	---
2	2011	Feb-11	0	0	---
3	2011	Mar-11	935	0	---
4	2011	Apr-11	171	0	---
5	2011	May-11	83	0	---
6	2011	Jun-11	95	0	---
7	2011	Jul-11	13	0	---
8	2011	Aug-11	39	0	---
9	2011	Sep-11	0	0	---
10	2011	Oct-11	133	18	---
11	2011	Nov-11	613	136	---
12	2011	Dec-11	0	0	93%
1	2012	Jan-12	0	0	93%
2	2012	Feb-12	66	32	91%
3	2012	Mar-12	29	23	83%
4	2012	Apr-12	17	12	80%
5	2012	May-12	144	53	76%
6	2012	Jun-12	8	0	74%
7	2012	Jul-12	1	1	74%
8	2012	Aug-12	17	2	73%
9	2012	Sep-12	1	0	73%
10	2012	Oct-12	0	0	71%
11	2012	Nov-12	132	130	39%
12	2012	Dec-12	0	0	39%
1	2013	Jan-13	0	0	39%
2	2013	Feb-13	109	54	40%
3	2013	Mar-13	39	30	40%
4	2013	Apr-13	81	69	36%
5	2013	May-13	27	9	29%
6	2013	Jun-13	99	15	39%
7	2013	Jul-13	4	0	39%
8	2013	Aug-13	0	0	38%
9	2013	Sep-13	0	0	37%
10	2013	Oct-13	0	0	37%
11	2013	Nov-13	2	2	50%
12	2013	Dec-13	5	4	50%
1	2014	Jan-14	0	0	50%
2	2014	Feb-14	1	1	50%
3	2014	Mar-14	0	0	54%
4	2014	Apr-14	0	0	78%
5	2014	May-14	1	1	79%
6	2014	Jun-14	4	1	47%
7	2014	Jul-14	1	1	29%
8	2014	Aug-14	0	0	29%
9	2014	Sep-14	1	1	27%
10	2014	Oct-14	0	0	27%
11	2014	Nov-14	2	2	27%
12	2014	Dec-14	1	1	27%
1	2015	Jan-15	0	0	27%
2	2015	Feb-15	0	0	30%
3	2015	Mar-15	0	0	30%
4	2015	Apr-15	0	0	30%
5	2015	May-15	0	0	33%

FIGURES



LENGLE 1/20/20 L:\ACTIVE PROJECTS\US STEEL\GARY\1690012298\CAD < FIG 1_CWIS LOCATION MAP_USS GARY_1690012298 >

RAMBOLL

DRAFTED BY: LTE | DATE: 20JAN2020

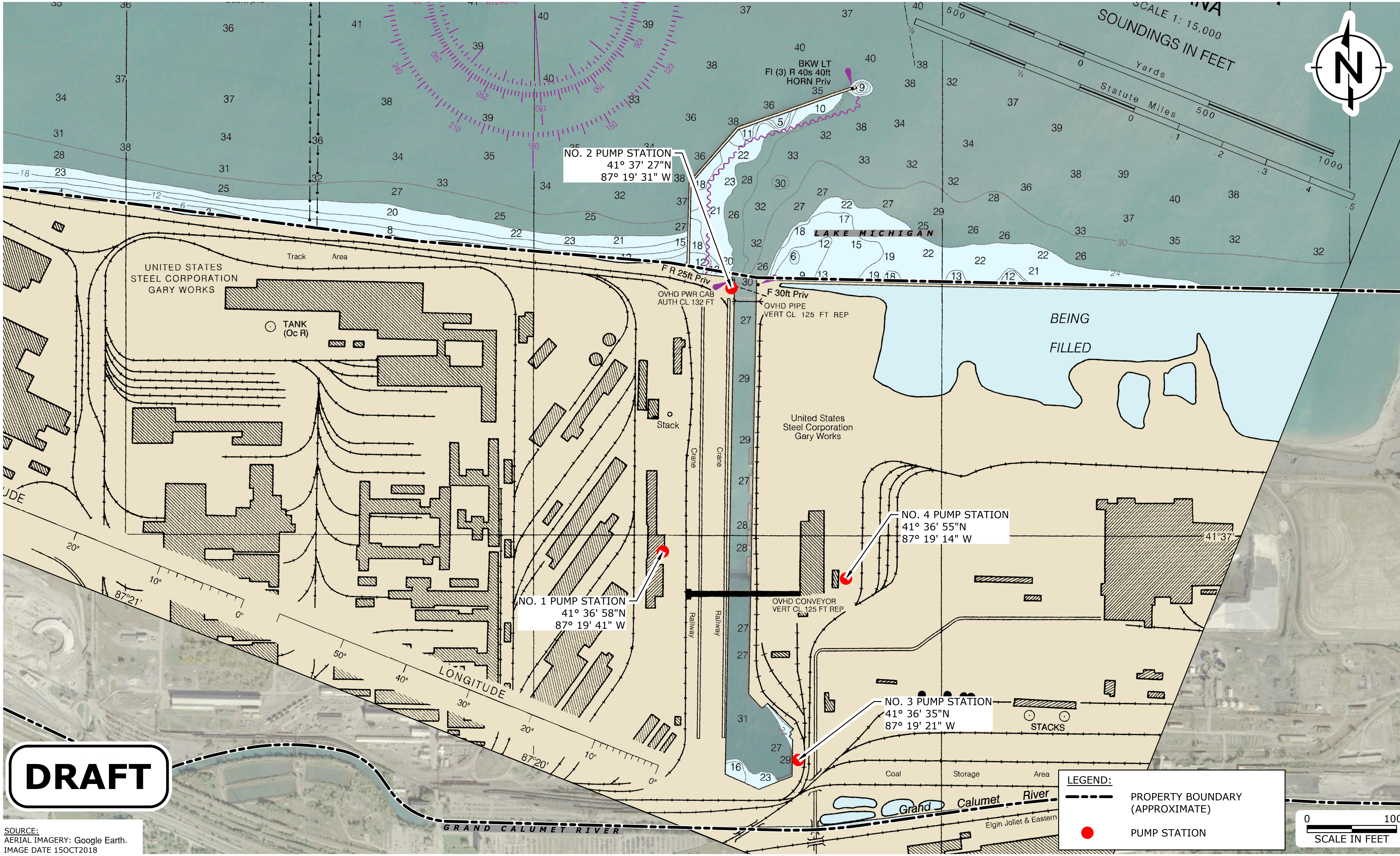
COOLING WATER INTAKE STRUCTURE (CWIS) LOCATION MAP

U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

INDIANA
QUADRANGLE LOCATION

FIGURE
1

PROJECT: 1690012298



RAMBOLL

EAST SIDE COOLING WATER INTAKE STRUCTURE (CWIS) LOCATION MAP

U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

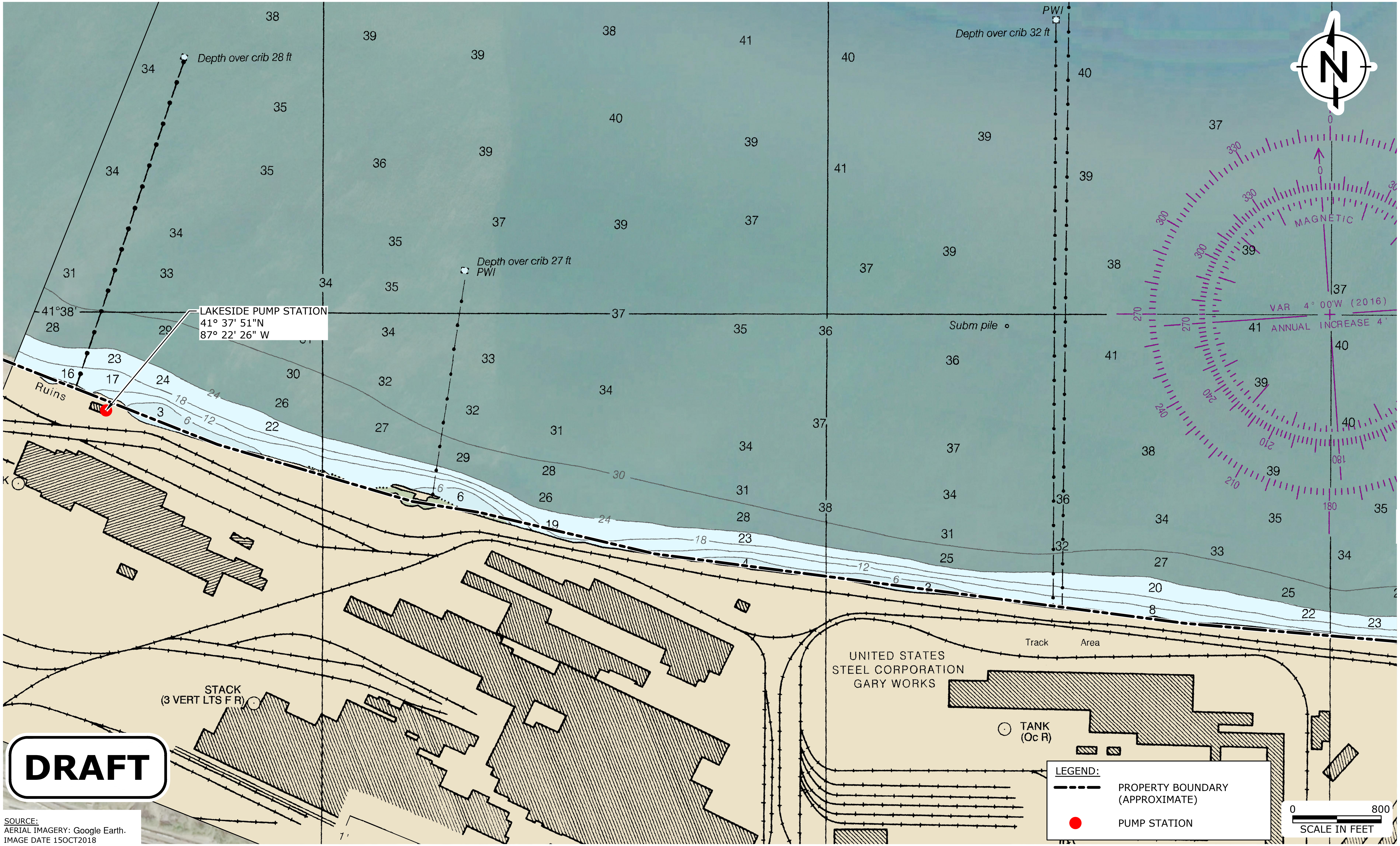
FIGURE
2

DRAFTED BY: LTE

DATE: 20JAN2020

PROJECT: 1690012298

LENGLE 1/20/20 L:\ACTIVE PROJECTS\US STEEL\GARY\1690012298\CAD < FIG 2-3_EAST-WEST CWIS LOCATION MAP_USS GARY_1690012298 >



RAMBOLL

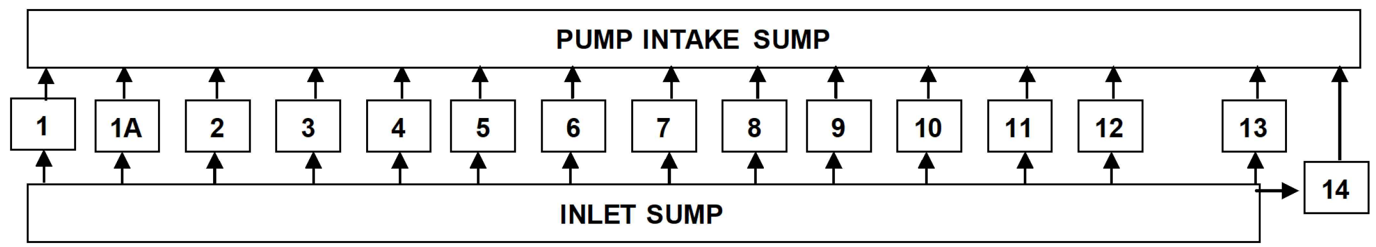
WEST SIDE COOLING WATER INTAKE STRUCTURE (CWIS) LOCATION MAP

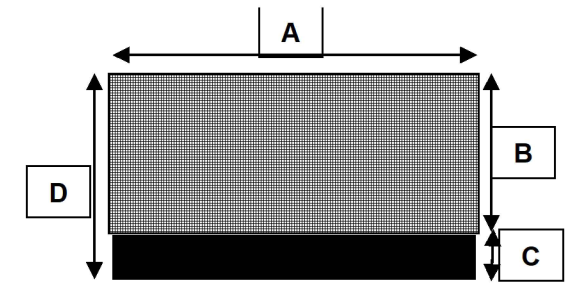
U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
3

DRAFTED BY: LTE | DATE: 20JAN2020 | PROJECT: 1690012298

LENGLE 1/20/20 L:\ACTIVE PROJECTS\US STEEL\GARY\1690012298\CAD < FIG 2-3_EAST-WEST CWIS LOCATION MAP_USS GARY_1690012298 >





PARAMETER	UNITS	SCREEN 1	SCREEN 1A	SCREEN 2	SCREEN 3	SCREEN 4	SCREEN 5	SCREEN 6	SCREEN 7	SCREEN 8	SCREEN 9	SCREEN 10	SCREEN 11	SCREEN 12	SCREEN 13	SCREEN 14
In Service (note 1)	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N
Opening Width (A)	inches	71.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	71.5	71.25
Opening Height (B)	inches	17	17.25	16.5	17.25	17.25	17.25	17.25	17.25	17.25	17.25	17.25	17.5	17.25	17.5	17.25
Screen Area (A x B)	sq inches	1,216	906	866	906	906	906	906	906	906	906	906	919	906	1,251	1,229
Scraper Height (C)	inches	4.00	5.25	4.50	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	3.75	5.25	3.75	4.00
Total Screen Section Height (D)	inches	21	22.50	21.00	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	21.25	22.50	21.25	21.25
Total Screen Section Area (A x D)	sq inches	1,502	1,181	1,103	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,181	1,116	1,181	1,519	1,514
Screen Wire Thickness	inches	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625
Mesh Holes Per Inch	#/inch	3.20	3.20	5.33	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	5.33	3.20	3.20	5.33
Mesh Hole Height	inches	0.250	0.250	0.125	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.125	0.250	0.250	0.125
Mesh Hole Length	inches	0.250	0.250	0.125	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.125	0.250	0.250	0.125
Area Per Hole	sq inches	0.063	0.063	0.016	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.016	0.063	0.063	0.016
Opening Count Horizontal	#	229	168	280	168	168	168	168	168	168	168	168	280	168	229	380
Opening Count Vertical	#	54	55	88	55	55	55	55	55	55	55	55	93	55	56	92
Total Opening Count	#	12,447	9,274	24,640	9,274	9,274	9,274	9,274	9,274	9,274	9,274	9,274	26,133	9,274	12,813	34,960
Total Area of Mesh Holes	sq inches	778	580	385	580	580	580	580	580	580	580	580	408	580	801	546
Mesh Opening per Total Screen	%	52	49	35	49	49	49	49	49	49	49	49	37	49	53	36

Observations for Model Setup (note 2)		
Lake Level (from low water datum)	7.4	inches
Corresponding Submerged Sump Depth	150	inches

Notes:

(1) For screen to be out of service, water cannot flow through screen (screen is clogged by debris/algae) or flow is diverted around screen.

(2) Observed Lake Michigan Water Level From Low Water Level Reported as 7.4 inches at Calumet Harbor, IL at 13:42 on 20 May 2010, which corresponds to submerged sump depth of 150 inches.

RAMBOLL

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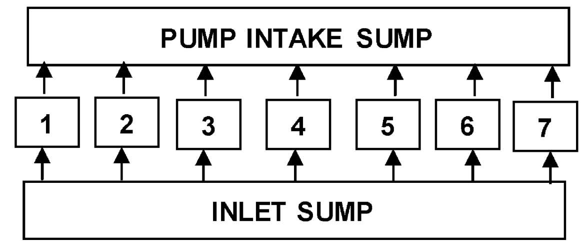
NO. 1 PUMP STATION SCREEN DETAIL

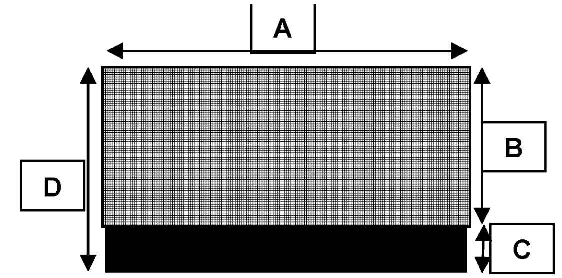
U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
4

PROJECT: 1690012298

LENGLE 1/15/20 L:\ACTIVE PROJECTS\US STEEL\GARY\1690012298\CAD < FIG 4_PUMP 1 DETAIL_1690012298 >





PARAMETER	UNITS	SCREEN 1	SCREEN 2	SCREEN 3	SCREEN 4	SCREEN 5	SCREEN 6	SCREEN 7
In Service (note 1)	Y/N	No Screen	Y	N	Y	Y	Y	N
Opening Width (A)	inches		101.5	101.5	101.5	101.5	101.5	101.5
Opening Height (B)	inches		17.5	17.5	17.5	16.5	17.5	16.5
Screen Area (A x B)	sq inches		1,776	1,776	1,776	1,675	1,776	1,675
Scraper Height (C)	inches		3.5	3.5	3.5	5.0	3.5	5.0
Total Screen Section Height (D)	inches		21.0	21.0	21.0	21.5	21.0	21.5
Total Screen Section Area (A x D)	sq inches		2,132	2,132	2,132	2,182	2,132	2,182
Screen Wire Thickness	inches		0.0625	0.0625	0.0625	0.0625	0.0625	0.0625
Mesh Holes Per Inch	#/inch		3.20	3.20	3.20	4.67	3.20	4.67
Mesh Hole Height	inches		0.250	0.250	0.250	0.152	0.250	0.152
Mesh Hole Length	inches		0.250	0.250	0.250	0.152	0.250	0.152
Area Per Hole	sq inches		0.063	0.063	0.063	0.023	0.063	0.023
Opening Count Horizontal	#		325	325	325	474	325	474
Opening Count Vertical	#		56	56	56	77	56	77
Total Opening Count	#		18,189	18,189	18,189	36,472	18,189	36,472
Total Area of Mesh Holes	sq inches		1,137	1,137	1,137	840	1,137	840
Mesh Opening per Total Screen	%		53	53	53	39	53	39
Observations for Model Setup (note 2)								
Lake Level (from low water datum)	7.7	inches						
Corresponding Submerged Sump Depth	118	inches						

Notes:

(1) For screen to be out of service, water cannot flow through screen (screen is clogged by debris/algae) or flow is diverted around screen.

(2) Observed Lake Michigan Water Level From Low Water Level Reported as 7.7 inches at Calumet Harbor, IL at 14:48 on 20 May 2010, which corresponds to submerged sump depth of 118 inches.

RAMBOLL

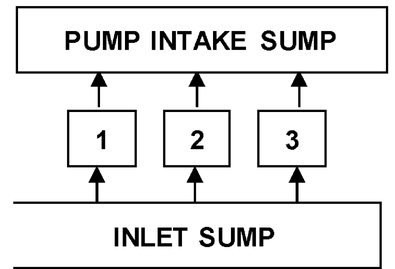
DRAFTED BY: LTE | DATE: 15JAN2020

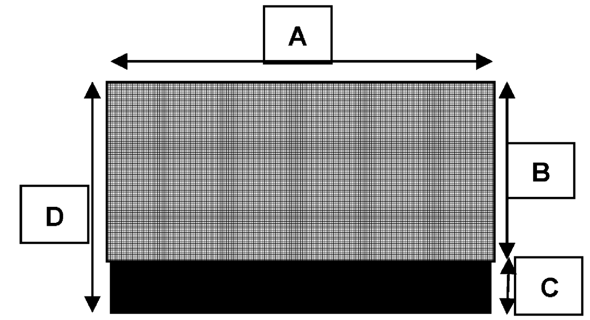
NO. 2 PUMP STATION SCREEN DETAIL

U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
5

PROJECT: 1690012298



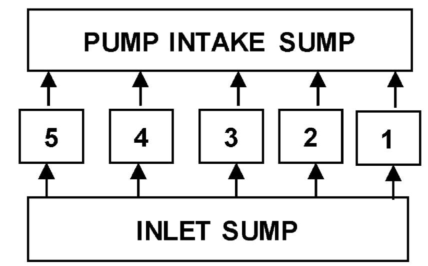


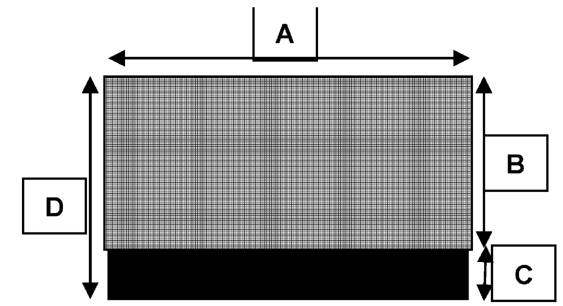
PARAMETER	UNITS	SCREEN 1	SCREEN 2	SCREEN 3
In Service (note 1)	Y/N	Y	Y	Y
Opening Width (A)	inches	101.5	101.5	101.5
Opening Height (B)	inches	20.5	20.5	20.5
Screen Area (A x B)	sq inches	2,081	2,081	2,081
Scraper Height (C)	inches	4.0	4.0	4.0
Total Screen Section Height (D)	inches	25	25	25
Total Screen Section Area (A x D)	sq inches	2,487	2,487	2,487
Screen Wire Thickness	inches	0.0625	0.0625	0.0625
Mesh Holes Per Inch	#/inch	5.0	5	5
Mesh Hole Height	inches	0.138	0.138	0.138
Mesh Hole Length	inches	0.138	0.138	0.138
Area Per Hole	sq inches	0.019	0.019	0.019
Opening Count Horizontal	#	508	508	508
Opening Count Vertical	#	103	103	103
Total Opening Count	#	52,019	52,019	52,019
Total Area of Mesh Holes	sq inches	983	983	983
Mesh Opening per Total Screen	%	40	40	40
Observations for Model Setup (note 2)				
Lake Level (from low water datum)	0.12	inches		
Corresponding Submerged Sump Depth	178.5	inches		

Notes:

(1) For screen to be out of service, water cannot flow through screen (screen is clogged by debris/algae) or flow is diverted around screen.

(2) Observed Lake Michigan Water Level From Low Water Level Reported as 0.12 inches at Calumet Harbor, IL at 14:00 on 10 Dec 2011, which corresponds to submerged sump measured depth of 178.5 inches.





PARAMETER	UNITS	SCREEN 1	SCREEN 2	SCREEN 3 (note 2)	SCREEN 4	SCREEN 5
In Service (note 1)	Y/N	Y	Y	Y	N	No Screen
Opening Width (A)	inches	69.375	69.375	69.375	69.25	
Opening Height (B)	inches	19.25	19.25	19.25	19	
Screen Area (A x B)	sq inches	1,335	1,335	1,335	1,316	
Scraper Height (C)	inches	5.0	5.0	5.0	2.0	
Total Screen Section Height (D)	inches	24.25	24.25	24.25	21	
Total Screen Section Area (A x D)	sq inches	1,682	1,682	1,682	1,454	
Screen Wire Thickness	inches	0.0625	0.0625	0.0625	0.0625	
Mesh Holes Per Inch	#/inch	5.75	5.75	5.75	5.75	
Mesh Hole Height	inches	0.111	0.111	0.111	0.111	
Mesh Hole Length	inches	0.111	0.111	0.111	0.111	
Area Per Hole	sq inches	0.012	0.012	0.012	0.012	
Opening Count Horizontal	#	399	399	399	398	
Opening Count Vertical	#	111	111	111	109	
Total Opening Count	#	44,154	44,154	44,154	43,502	
Total Area of Mesh Holes	sq inches	548	548	548	540	
Mesh Opening per Total Screen	%	33	33	33	37	

Observations for Model Setup (note 3)		
Lake Level (from low water datum)	8.5	inches
Corresponding Submerged Sump Depth (screens 1 & 3)	124	inches
Corresponding Submerged Sump Depth (screens 2 & 4)	148	inches
Corresponding Submerged Sump Depth (screen 5)	na	inches

Notes:

(1) For screen to be out of service, water cannot flow through screen (screen is clogged by debris/algae) or flow is diverted around screen.

(2) Could not measure submerged depth for Screen 3, so conservatively assumed to be same as Screen 1.

(3) Observed Lake Michigan Water Level From Low Water Level Reported as 8.5 inches at Calumet Harbor, IL at 11:42 on 20 May 2010, which corresponds to submerged sump measured depth of 124 or 148 inches.

RAMBOLL

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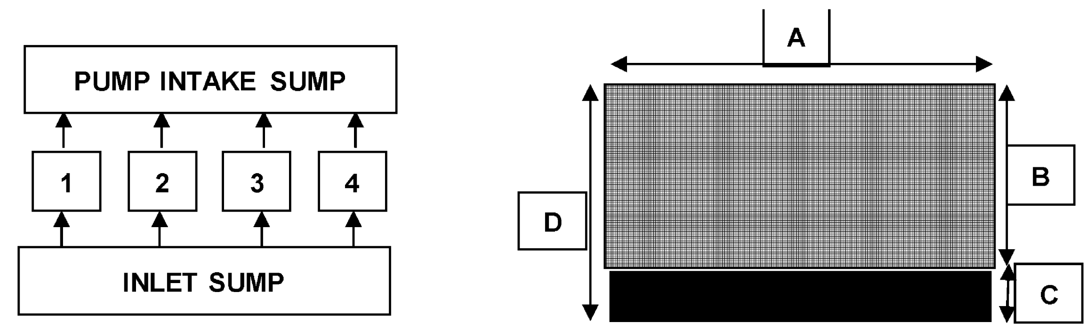
NO. 4 PUMP STATION SCREEN DETAIL

U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
7

PROJECT: 1690012298



PARAMETER	UNITS	SCREEN 1	SCREEN 2	SCREEN 3	SCREEN 4
In Service (note 1)	Y/N	Y	Y	Y	Y
Opening Width (A)	inches	119.375	119.375	119.375	119.375
Opening Height (B)	inches	18.375	18.375	18.375	18.375
Screen Area (A x B)	sq inches	2,194	2,194	2,194	2,194
Scraper Height (C)	inches	6.625	6.625	6.625	6.625
Total Screen Section Height (D)	inches	25	25	25	25
Total Screen Section Area (A x D)	sq inches	2,984	2,984	2,984	2,984
Screen Wire Thickness	inches	0.0625	0.0625	0.0625	0.0625
Mesh Holes Per Inch	#/inch	2.2	4	4	2.2
Mesh Hole Height	inches	0.399	0.188	0.188	0.399
Mesh Hole Length	inches	0.399	0.188	0.188	0.399
Area Per Hole	sq inches	0.159	0.035	0.035	0.159
Opening Count Horizontal	#	259	478	478	259
Opening Count Vertical	#	40	74	74	40
Total Opening Count	#	10,297	35,096	35,096	10,297
Total Area of Mesh Holes	sq inches	1,640	1,234	1,234	1,640
Mesh Opening per Total Screen	%	55	41	41	55

Observations for Model Setup (note 2)		
Lake Level (from low water datum)	7.68	inches
Corresponding Submerged Sump Depth	148	inches

Notes:

(1) For screen to be out of service, water cannot flow through screen (screen is clogged by debris/algae) or flow is diverted around screen.

(2) Observed Lake Michigan Water Level From Low Water Level Reported as 7.68 inches at Calumet Harbor, IL at 10:00 on 20 May 2010, which corresponds to submerged sump measured depth of 148 inches.

LENGLE 1/15/20 L:\ACTIVE PROJECTS\US STEEL\GARY\1690012298\CAD < FIG 8_LS PUMP DETAIL_1690012298 >

RAMBOLL

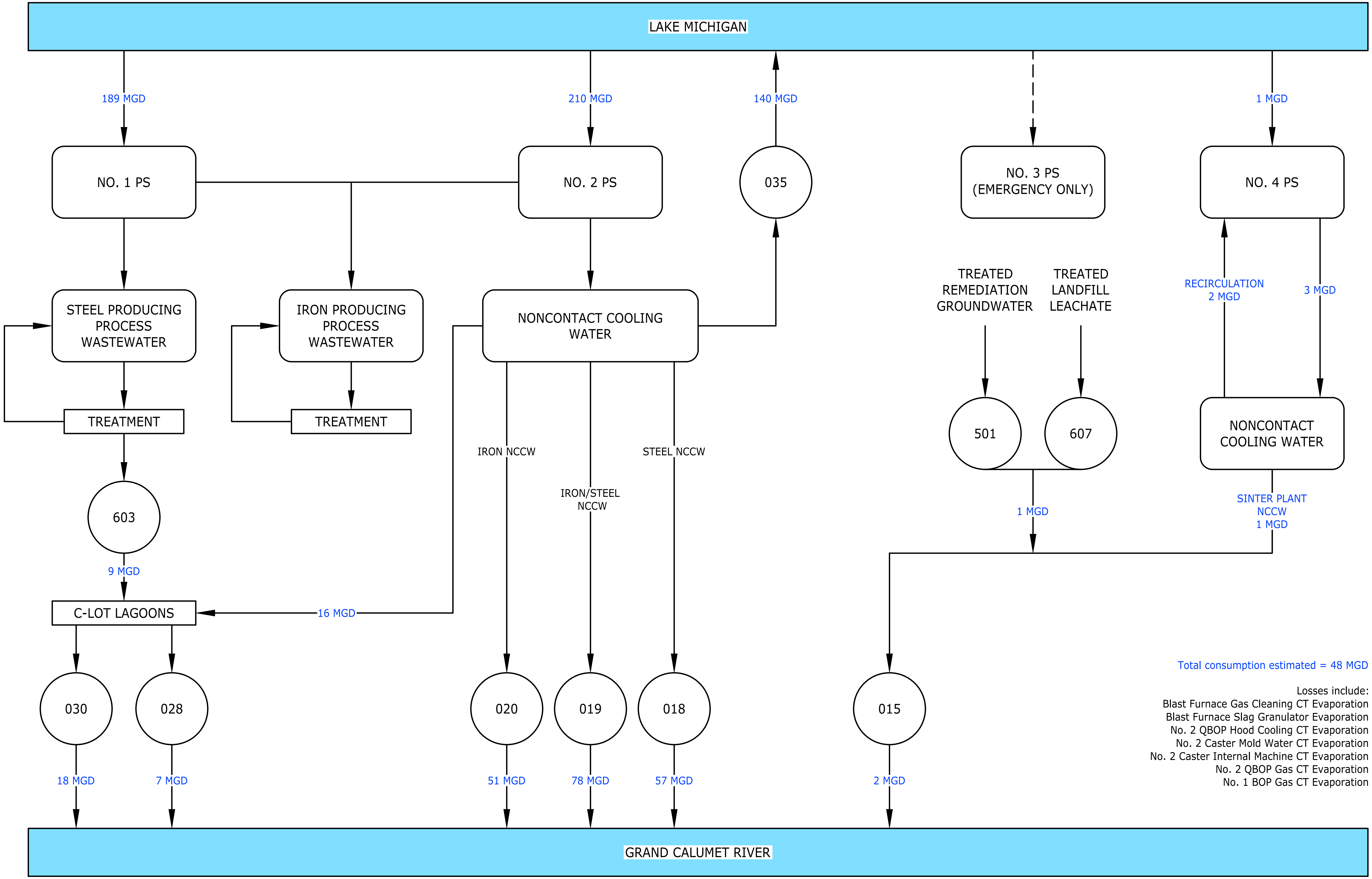
DRAFTED BY: LTE | DATE: 15JAN2020

LAKESIDE PUMP STATION SCREEN DETAIL

U.S. STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
8

PROJECT: 1690012298



*Flowrates based upon the long term average from Nov 2015 - Sep 2018. However due to accuracy intake flow monitoring methodologies, rates have been rounded to the nearest whole number.

RAMBOLL

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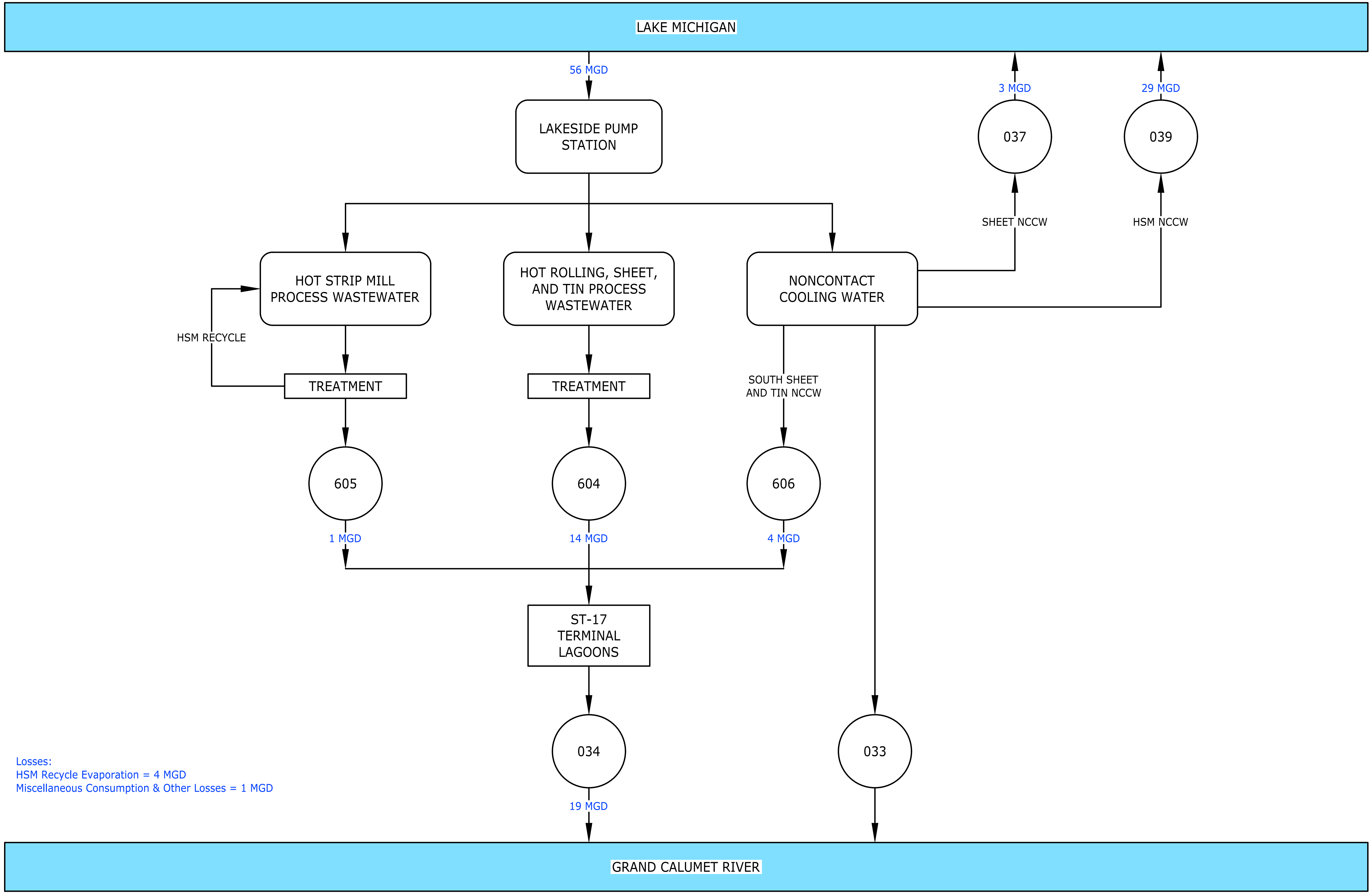
WATER BALANCE - EAST SIDE BASELINE

U.S.STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
9

PROJECT: 1690012298

LENGLE 1/15/20 L:\ACTIVE PROJECTS\US STEEL\GARY\1690012298\CAD < FIG 9_WATER BALANCE EAST_1690012298 >



*Flowrates based upon the long term average from Nov 2015 - Sep 2018. However due to accuracy intake flow monitoring methodologies, rates have been rounded to the nearest whole number.

RAMBOLL

DRAFTED BY: LTE | DATE: 15JAN2020

WATER BALANCE - WEST SIDE BASELINE

U.S.STEEL CORPORATION GARY WORKS
1 NORTH BROADWAY, GARY, INDIANA

FIGURE
10

PROJECT: 1690012298

APPENDIX 1

CONCEPTUAL DRAWINGS

NOTE 1: TWO 10' DIAMETER INTAKE OPENINGS CAPPED WITH BARS SPACED ABOUT 6" APART.

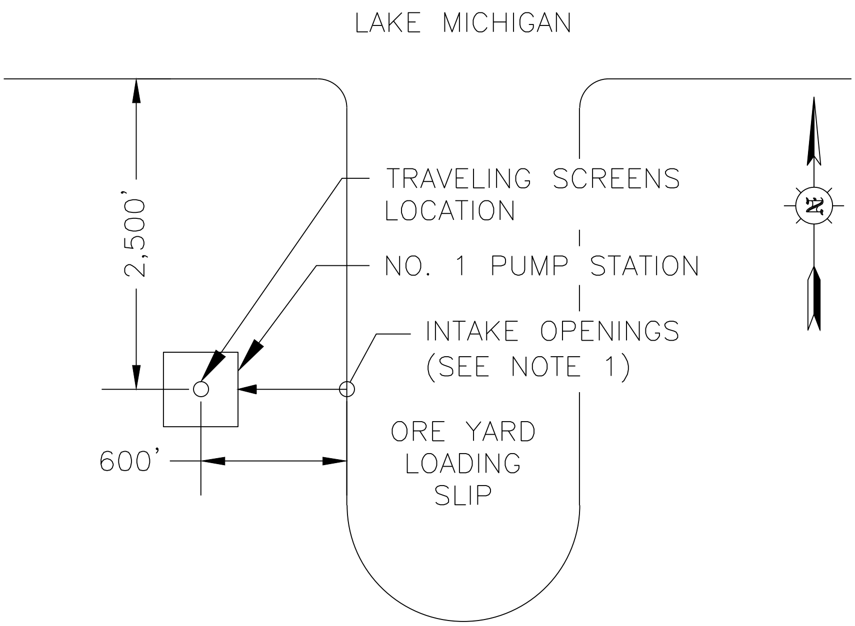
NOTE 2: 12 CURRENTLY IN OPERATION. 11 OF THE 12 CURRENTLY OPERATING TRAVELING SCREENS AND ONE OF THE OUT-OF-OPERATION SCREENS ARE CONSTRUCTED OF 0.250-INCH MESH. THE REMAINING CURRENTLY OPERATING SCREEN AND TWO OUT-OF-OPERATION SCREENS ARE CONSTRUCTED OF 0.125-INCH MESH.

NOTE 3: RATE OF DOWNWARD SPRAYING BACKWASH SPRAYS AND TRAVELING SCREEN ROTATION SPEED, WHICH IS APPROXIMATELY 10 FT PER MINUTE (FPM), CANNOT BE ADJUSTED (I.E., "ON" OR "OFF" MODE ONLY.) CURRENTLY, THE WASH OPERATING CYCLE IS MANUALLY INITIATED AT A MINIMUM FREQUENCY OF EVERY FOUR HOURS.

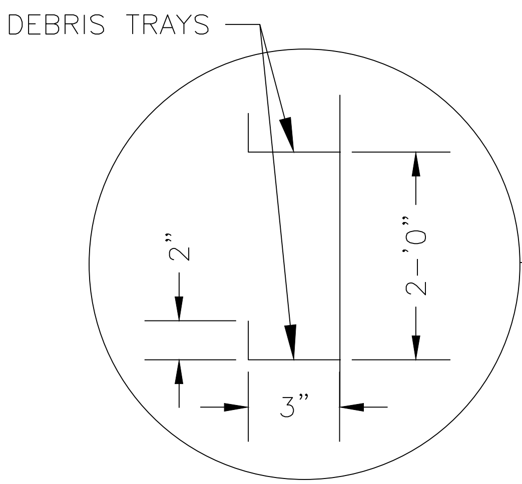
NOTE 4: RETURN TROUGH DISCHARGES TO INTAKE BAY (NOT TO ORE YARD LOADING SLIP).

NOTE 5: INTAKE VELOCITIES RANGE FROM 0.27-0.92 FT/S AND INTAKE FLOW RANGED FROM 62-172 MGD. QUARTERLY INTAKE VELOCITY CALCULATIONS BASED ON INTAKE FLOW AND LAKE LEVEL DATA COLLECTED MAR 2010-MAR 2011.

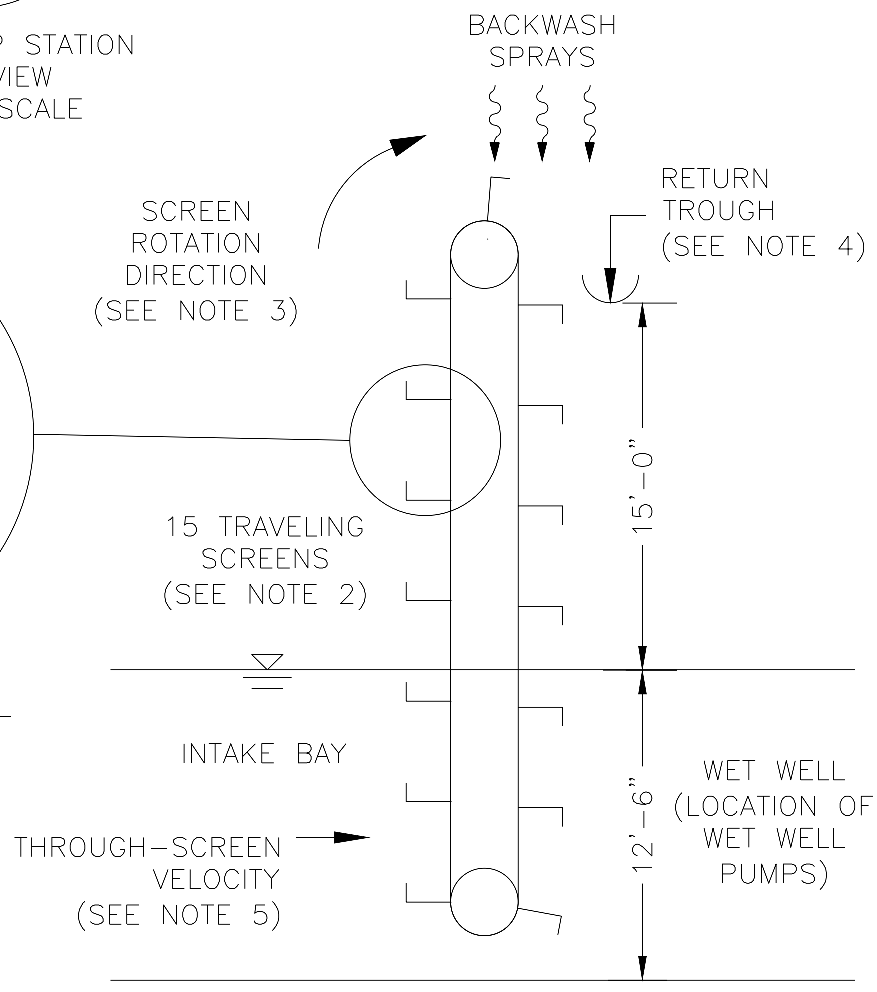
NOTE 6: ALL DISTANCES AND MEASUREMENTS ARE APPROXIMATE.



NO. 1 PUMP STATION
PLAN VIEW
NOT TO SCALE



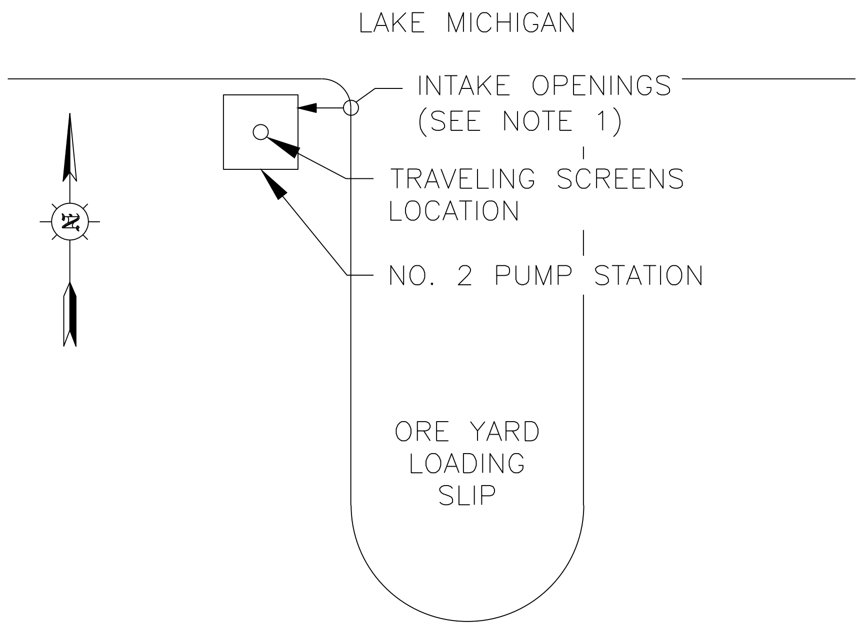
TRAVELING SCREEN DETAIL
NOT TO SCALE



TRAVELING SCREENS
ELEVATION VIEW
NOT TO SCALE

Prepared For:		
U. S. STEEL GARY, INDIANA		NO. 1 PUMP STATION CONCEPTUAL SCHEMATIC

SCALE:	N.T.S.	DRAWN BY:	MSH	APPR. BY:	.	DATE	06JULY11
CONTRACT NO.	2017798AB	SKETCH NO.	001			REV.:	A



NO. 2 PUMP STATION
PLAN VIEW
NOT TO SCALE

NOTE 1: TWO 10' X 20' CONCRETE INTAKE OPENINGS CAPPED WITH BARS SPACED ABOUT 6" APART.

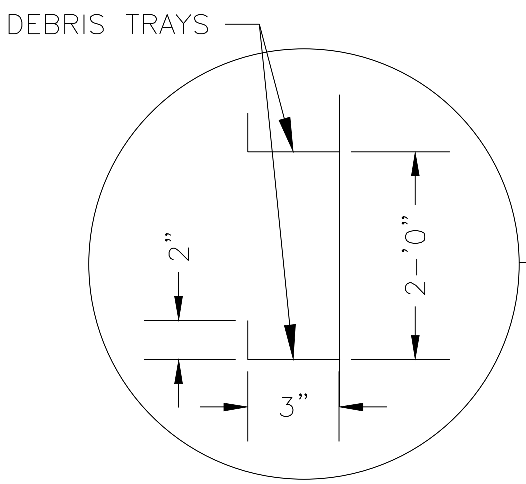
NOTE 2: 6 TRAVELING SCREENS INSTALLED IN THE 7 BAYS. 4 CURRENTLY IN OPERATION. 3 OF THE 4 CURRENTLY OPERATING TRAVELING SCREENS AND ONE OF THE OUT-OF-OPERATION SCREENS ARE CONSTRUCTED OF 0.250-INCH MESH. THE REMAINING CURRENTLY OPERATING SCREEN AND ONE OUT-OF-OPERATION SCREEN IS CONSTRUCTED OF 0.152-INCH MESH.

NOTE 3: RATE OF DOWNWARD SPRAYING BACKWASH SPRAYS AND TRAVELING SCREEN ROTATION SPEED, WHICH IS APPROXIMATELY 10 FT PER MINUTE (FPM), CANNOT BE ADJUSTED (I.E., "ON" OR "OFF" MODE ONLY.) CURRENTLY, THE WASH OPERATING CYCLE IS MANUALLY INITIATED AT A MINIMUM FREQUENCY OF EVERY FOUR HOURS.

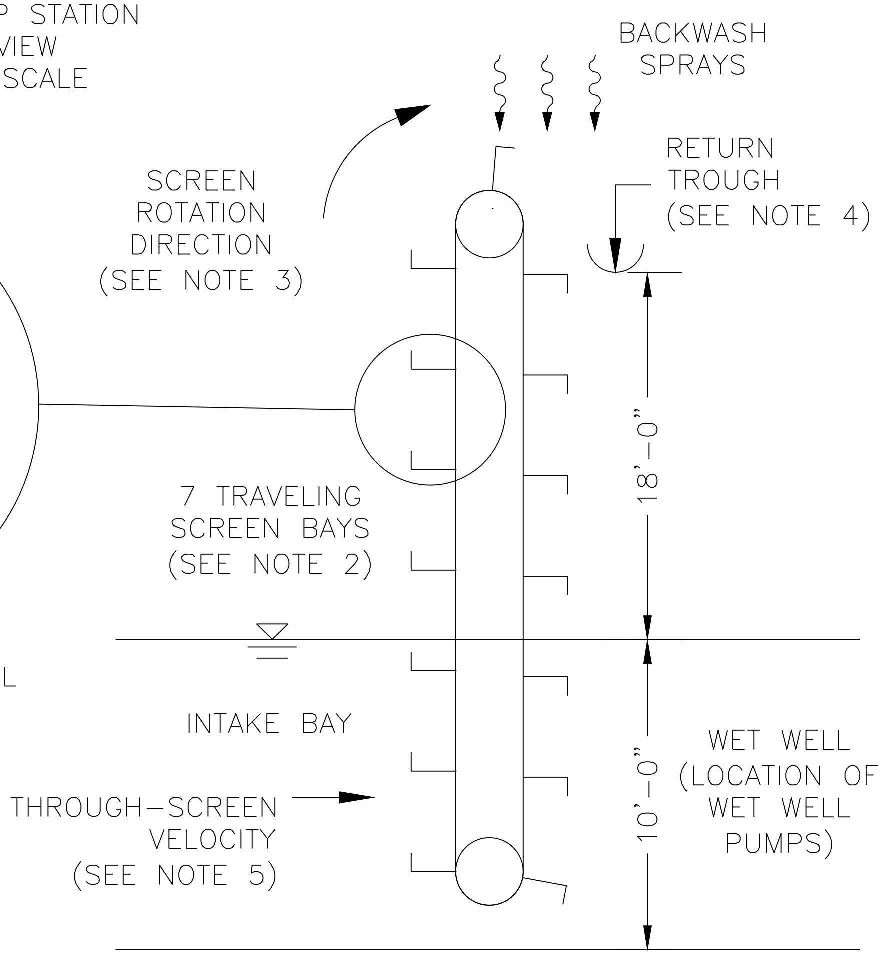
NOTE 4: RETURN TROUGH DISCHARGES TO ORE YARD LOADING SLIP.

NOTE 5: INTAKE VELOCITIES RANGE FROM 0.58-1.42 FT/S AND INTAKE FLOW RANGED FROM 64-122 MGD. QUARTERLY INTAKE VELOCITY CALCULATIONS BASED ON INTAKE FLOW AND LAKE LEVEL DATA COLLECTED MAR 2010-MAR 2011.

NOTE 6: ALL DISTANCES AND MEASUREMENTS ARE APPROXIMATE.



TRAVELING SCREEN DETAIL
NOT TO SCALE



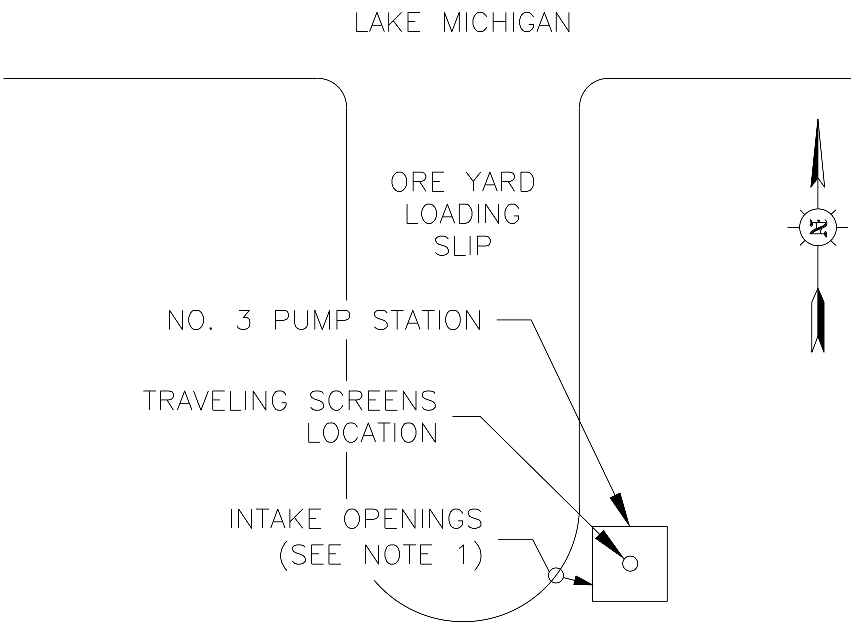
TRAVELING SCREENS
ELEVATION VIEW
NOT TO SCALE

Prepared For:

U. S. STEEL
GARY, INDIANA

NO. 2 PUMP STATION
CONCEPTUAL SCHEMATIC

SCALE:	N.T.S.	DRAWN BY:	MSH	APPR. BY:	.	DATE	06JULY11
CONTRACT NO.	2017798AB	SKETCH NO.		002		REV.:	A



NO. 3 PUMP STATION
PLAN VIEW
NOT TO SCALE

NOTE 1: THREE 10' DIAMETER INTAKE OPENINGS CAPPED WITH BARS SPACED ABOUT 6" APART.

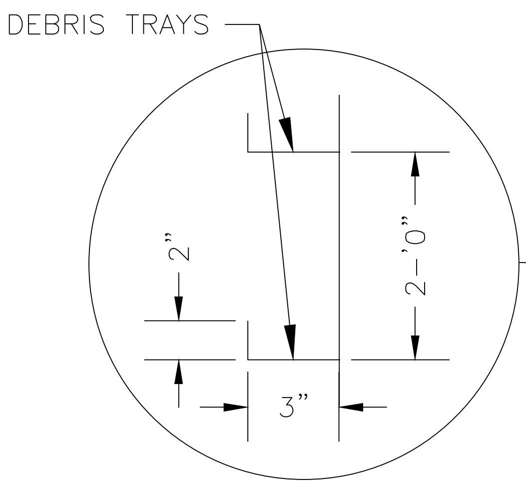
NOTE 2: 3 INTERMITTENTLY IN OPERATION. THE TRAVELING SCREENS ARE CONSTRUCTED OF 0.138-INCH MESH.

NOTE 3: RATE OF DOWNWARD SPRAYING BACKWASH SPRAYS AND TRAVELING SCREEN ROTATION SPEED, WHICH IS APPROXIMATELY 10 FT PER MINUTE (FPM), CANNOT BE ADJUSTED (I.E., "ON" OR "OFF" MODE ONLY.) CURRENTLY, THE WASH OPERATING CYCLE IS MANUALLY INITIATED AT A MINIMUM FREQUENCY OF EVERY FOUR HOURS.

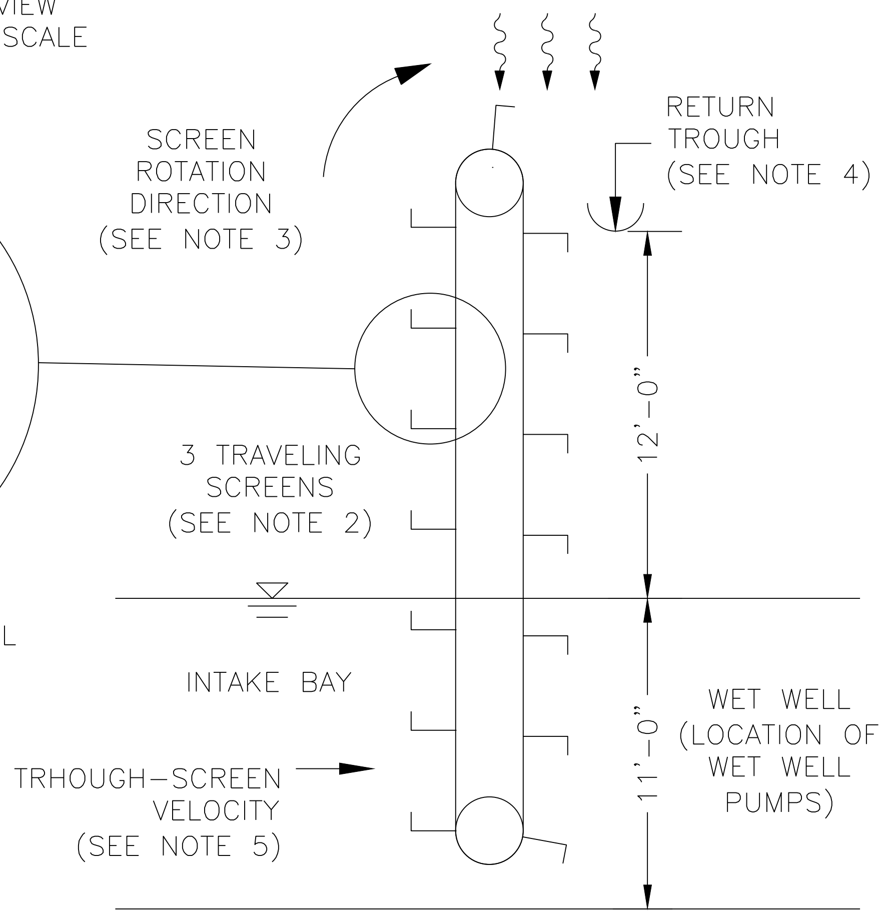
NOTE 4: RETURN TROUGH DISCHARGES TO ORE YARD LOADING SLIP.

NOTE 5: PUMP STATION OPERATION IS INERMITTENT. INSUFFICIENT DATA HAS BEEN COLLECTED TO DETERMINE INTAKE VELOCITY RANGE.

NOTE 6: ALL DISTANCES AND MEASUREMENTS ARE APPROXIMATE.



TRAVELING SCREEN DETAIL
NOT TO SCALE



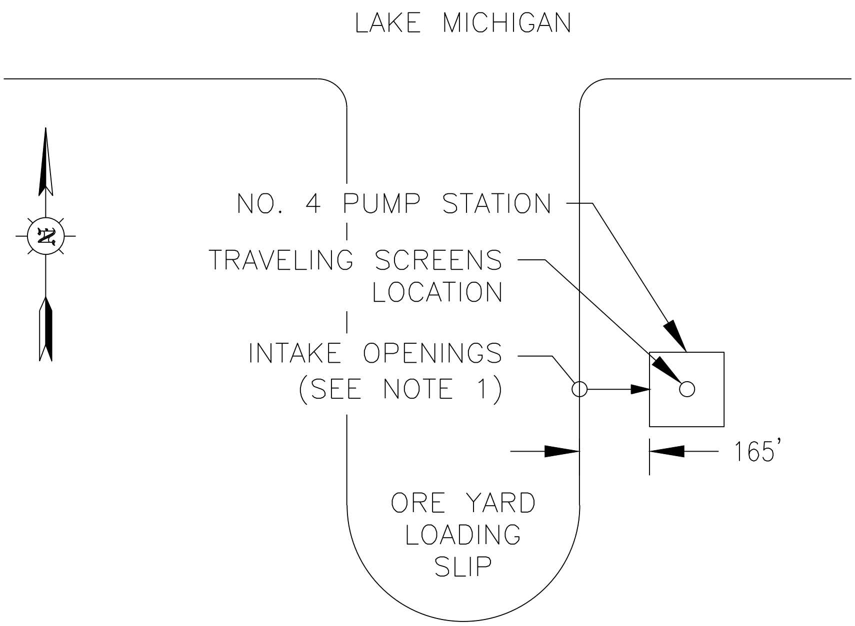
TRAVELING SCREENS
ELEVATION VIEW
NOT TO SCALE

Prepared For:

U. S. STEEL
GARY, INDIANA

NO. 3 PUMP STATION
CONCEPTUAL SCHEMATIC

SCALE:	N.T.S.	DRAWN BY:	MSH	APPR. BY:	.	DATE	06JULY11
CONTRACT NO.	2017798AB	SKETCH NO.	003			REV.:	A



NO. 4 PUMP STATION
PLAN VIEW
NOT TO SCALE

NOTE 1: TWO 10' DIAMETER INTAKE OPENINGS CAPPED WITH BARS SPACED ABOUT 6" APART.

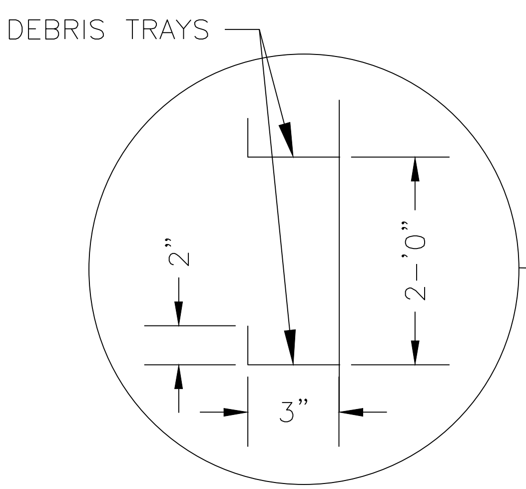
NOTE 2: 4 SCREENS CURRENTLY INSTALLED. 3 CURRENTLY IN OPERATION. THE 4 TRAVELING SCREENS ARE CONSTRUCTED OF 0.111-INCH MESH.

NOTE 3: RATE OF DOWNWARD SPRAYING BACKWASH SPRAYS AND TRAVELING SCREEN ROTATION SPEED, WHICH IS APPROXIMATELY 10 FT PER MINUTE (FPM), CANNOT BE ADJUSTED (I.E., "ON" OR "OFF" MODE ONLY.) CURRENTLY, THE WASH OPERATING CYCLE IS MANUALLY INITIATED AT A MINIMUM FREQUENCY OF EVERY FOUR HOURS.

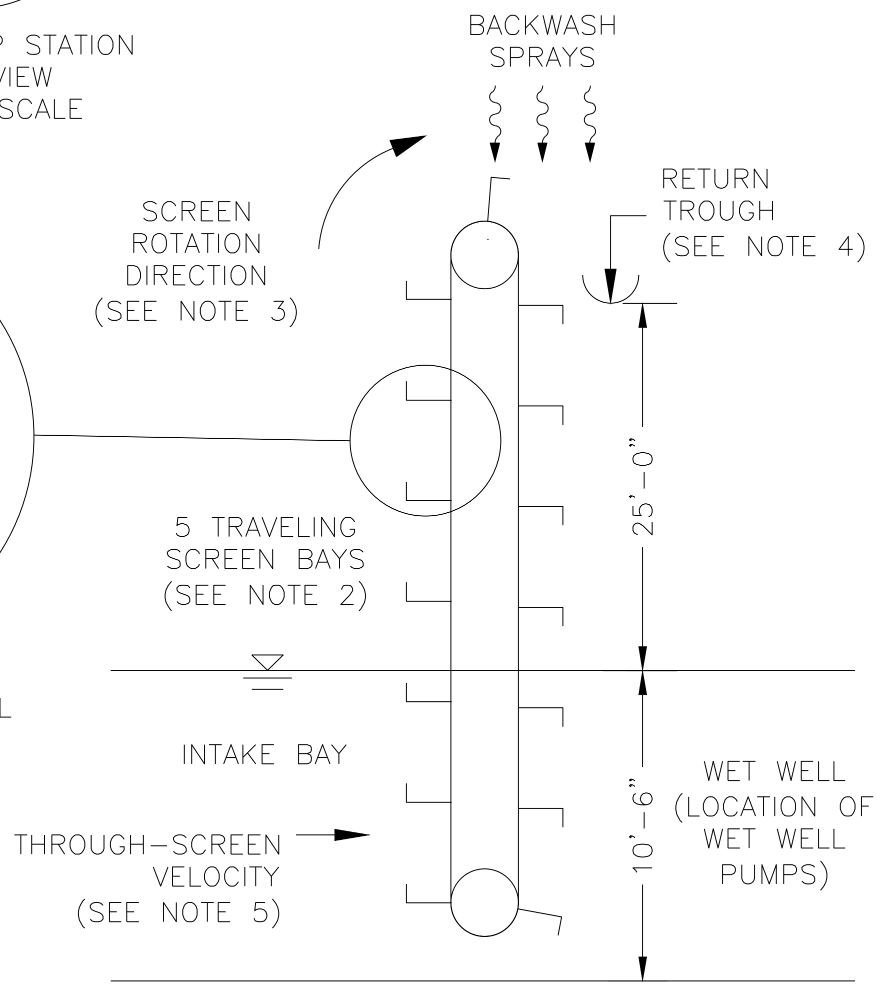
NOTE 4: RETURN TROUGH DISCHARGES TO ORE YARD LOADING SLIP.

NOTE 5: INTAKE VELOCITIES RANGE FROM 0.93-4.54 FT/S AND INTAKE FLOW RANGED FROM 39-156 MGD. QUARTERLY INTAKE VELOCITY CALCULATIONS BASED ON INTAKE FLOW AND LAKE LEVEL DATA COLLECTED MAR 2010-MAR 2011.

NOTE 6: ALL DISTANCES AND MEASUREMENTS ARE APPROXIMATE.



TRAVELING SCREEN DETAIL
NOT TO SCALE



TRAVELING SCREENS
ELEVATION VIEW
NOT TO SCALE

Prepared For:

U. S. STEEL
GARY, INDIANA

NO. 4 PUMP STATION
CONCEPTUAL SCHEMATIC

SCALE:	N.T.S.	DRAWN BY:	MSH	APPR. BY:	.	DATE	06JULY11
CONTRACT NO.	2017798AB	SKETCH NO.		004		REV.:	A

NOTE 1: MULTIPLE INTAKE OPENINGS LOCATED ABOUT 6 FEET ABOVE LAKE BOTTOM.

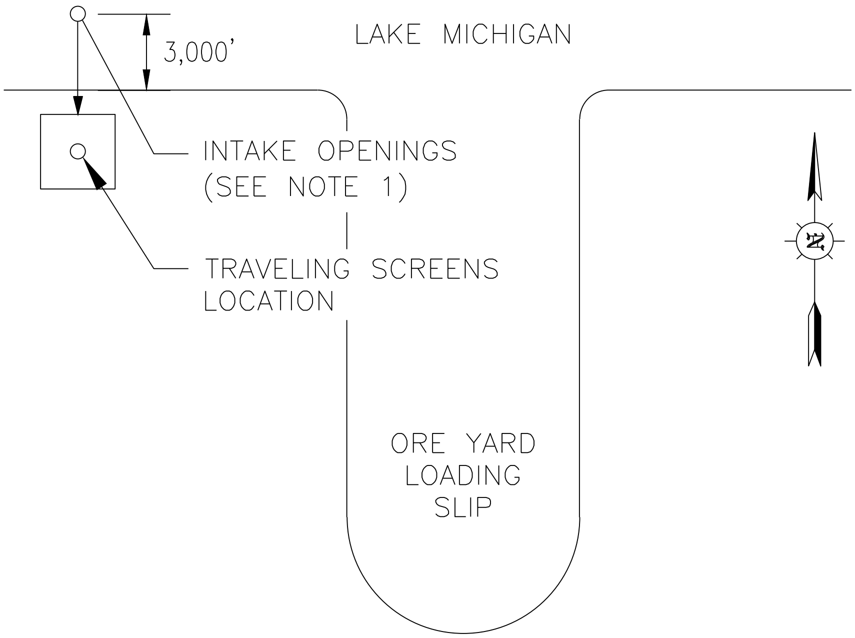
NOTE 2: 4 CURRENTLY IN OPERATION. 2 OF THE 4 TRAVELING SCREENS ARE CONSTRUCTED OF 0.400-INCH MESH. THE REMAINING TWO SCREENS ARE CONSTRUCTED OF 0.188-INCH MESH.

NOTE 3: RATE OF DOWNWARD SPRAYING BACKWASH SPRAYS AND TRAVELING SCREEN ROTATION SPEED, WHICH IS APPROXIMATELY 3.25 FT PER MINUTE (FPM), CANNOT BE ADJUSTED (I.E., "ON" OR "OFF" MODE ONLY.) CURRENTLY, THE WASH OPERATING CYCLE IS CONTINUOUS.

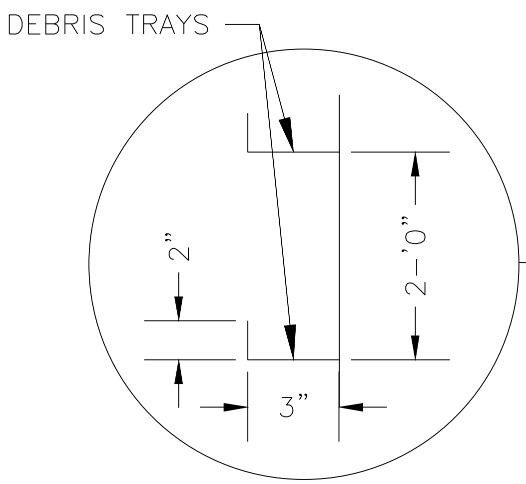
NOTE 4: RETURN TROUGH DISCHARGES TO LAKE MICHIGAN NEAR THE LAKE PUMP SOURCE.

NOTE 5: INTAKE VELOCITIES RANGE FROM 0.98-1.21 FT/S AND INTAKE FLOW REMAINED STEADY AT 156 MGD. QUARTERLY INTAKE VELOCITY CALCULATIONS BASED ON INTAKE FLOW AND LAKE LEVEL DATA COLLECTED MAR 2010-MAR 2011.

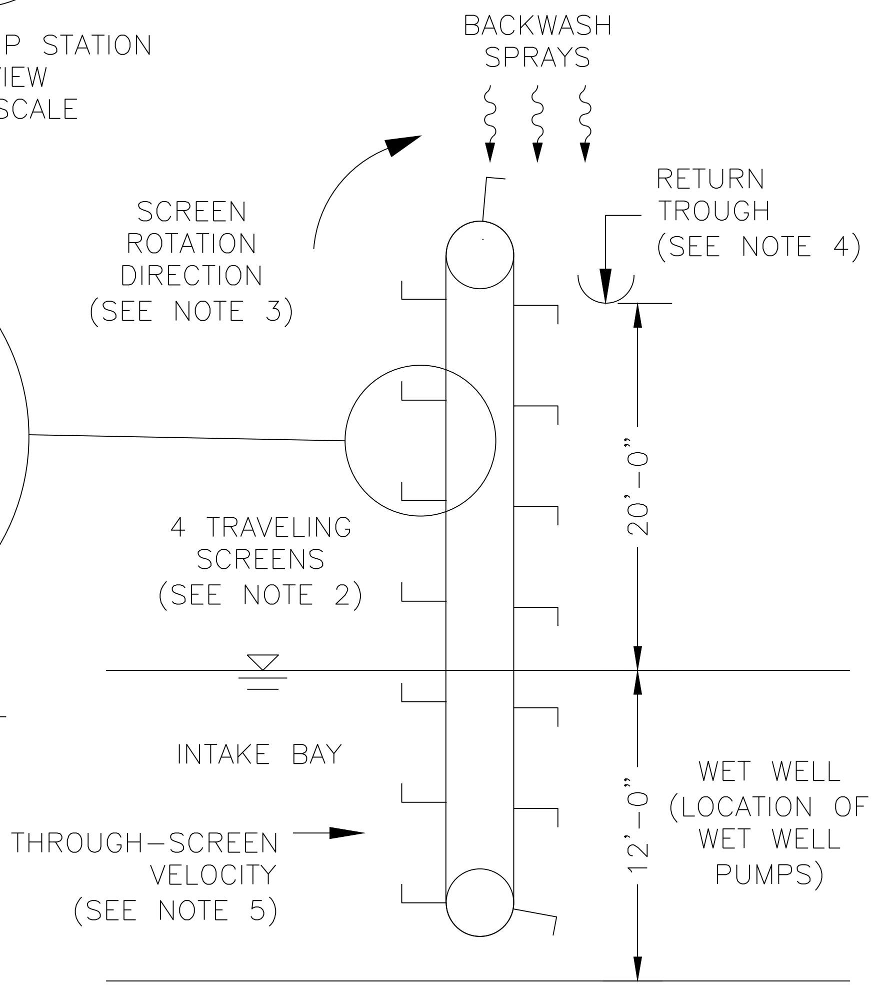
NOTE 6: ALL DISTANCES AND MEASUREMENTS ARE APPROXIMATE.



LAKESIDE PUMP STATION
PLAN VIEW
NOT TO SCALE



TRAVELING SCREEN DETAIL
NOT TO SCALE



TRAVELING SCREENS
ELEVATION VIEW
NOT TO SCALE

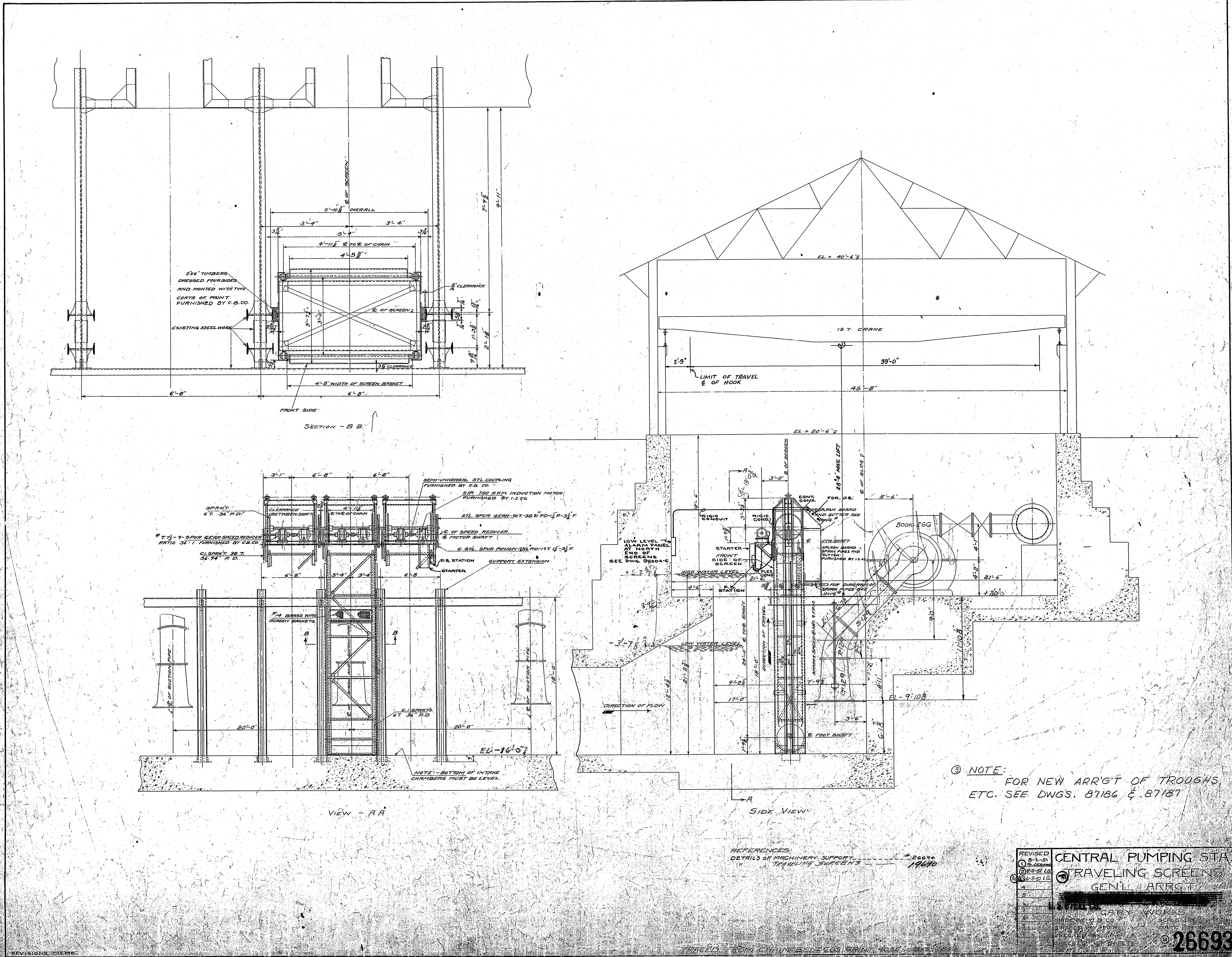
Prepared For:

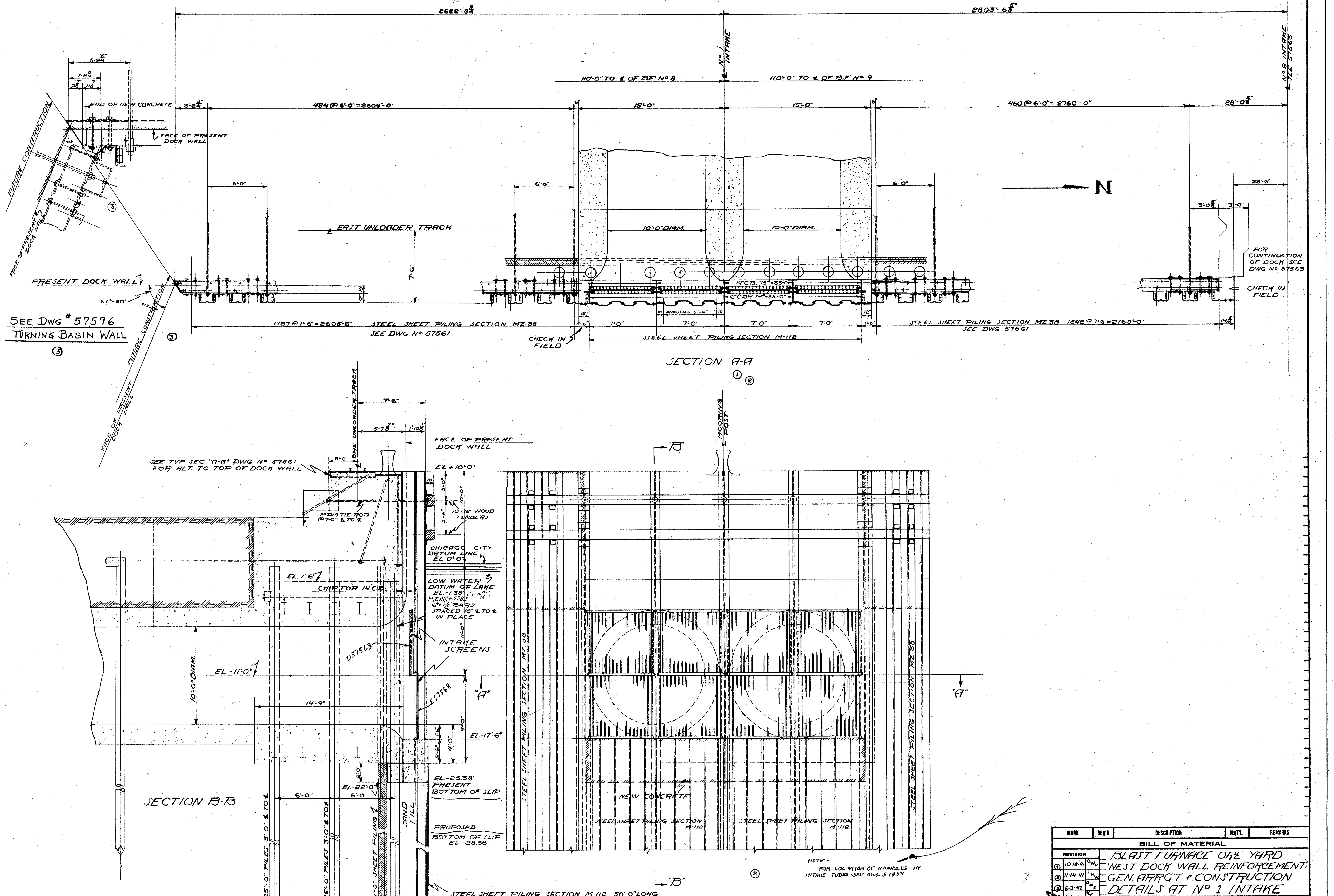
U. S. STEEL
GARY, INDIANA

LAKESIDE PUMP STATION
CONCEPTUAL SCHEMATIC

SCALE:	N.T.S.	DRAWN BY:	MSH	APPR. BY:	.	DATE	06JULY11
CONTRACT NO.	2017798AB	SKETCH NO.		005		REV.:	A

DETAILED DRAWINGS – NO. 1 PUMP STATION


SECTION - B B.
5'-10 3/8" OVERALL
3'-4"
5'-4"
4'-11 3/8" ℄ TO ℄ OF CHAIN
4'-5 3/8"
2"x6" TIMBERS DRESSED FOUR SIDES AND PAINTED WITH TWO COATS OF PAINT. FURNISHED BY C.B.CO.
EXISTING STEEL WORK
3/16" CLEARANCE
℄ OF SCREEN
3 1/2" CLEARANCE
4'-8" WIDTH OF SCREEN BASKET
FRONT SIDE
6'-8"
7'-9 1/2"
9'-11"
VIEW - A A
SEMI-UNIVERSAL STL. COUPLING FURNISHED BY C.B. CO.
5 H.P. 750 R.P.M. INDUCTION MOTOR FURNISHED BY I.S.CO.
STL. SPUR GEAR
SPRKT. 6T. 36" P.D.
CLEARANCE BETWEEN SHAFT
T-7 1/2-9-SPUR GEAR SPEED REDUCER RATIO 36:1 FURNISHED BY C.B.CO.
C.I. SPRKT. 38 T. 36.74" P.D.
℄ OF SPEED REDUCER & MOTOR SHAFT
C. STL. SPUR PINION
P.B. STATION
STARTER
SUPPORT EXTENSION
#14 BRASS WIRE SCREEN BASKETS
℄ OF SUCTION PIPE
C.I. SPRKTS. 6T. 36" P.D.
20'-0"
18'-0"
EL - 16'-0"
NOTE: - BOTTOM OF INTAKE CHAMBERS MUST BE LEVEL.
EL. + 40'-6"
15 T. CRANE
LIMIT OF TRAVEL ℄ OF HOOK
2'-9"
39'-0"
45'-8"
EL. + 20'-6"
20'-0" MAX. LIFT
RIGID CONDUIT
LOW LEVEL ALARM PANEL AT NORTH END OF SCREENS SEE DWG. 96604-C
STARTER
FRONT SIDE OF SCREEN
HIGH WATER LEVEL
P.B. STATION
LOW WATER LEVEL
DIRECTION OF FLOW
DIRECTION OF TRAVEL
℄ FOOT SHAFT
Book-266
EL - 9'-10 3/8"
SIDE VIEW
③ NOTE:
FOR NEW ARR'G'T OF TROUGHS, ETC. SEE DWGS. 87186 & 87187
REFERENCES:
DETAILS OF MACHINERY SUPPORT #26694
" TRAVELING SCREENS 19690
TRACED FROM CHAIN BELT CO'S PRINT 4095 - BK. 1785
REVISED 5-2-51
① G. JEROME
② 5-11-51 L.G.
③ 6-5-51 L.G.
CENTRAL PUMPING STA.
TRAVELING SCREENS
GEN'L. ARRG'T.
[redacted]
GARY WORKS
MADE BY C.B.CO.
TRACED BY H.J.R.
CHECKED BY
CHECKED FOR SAFETY
SCALE
DATE
26693
REVISIONS MEMO.
① ADDED & NOTED AUX. EQUIP. FOR TRAVELING SCREENS.
② ADDED CRANE TRAVEL LIMITS
③ ADDED NOTE



NOTE:- FOR LOCATION OF MANHOLES IN INTAKE TUBES SEE DWG. 57859

REFERENCES:

89 CENTRAL PUMPING STATION LOCATION OF PUMP HOUSE + DETAIL OF CONDUITS

57567 - B.F. ORE YARD - WEST DOCK WALL REINFORCEMENT ERECTION DIAGRAM

1817 - SLIP + DOCK - GENERAL PLAN + DETAILS

57560 - B.F. ORE YARD - W. DOCK WALL - UNLOADER TROUGH + ORE TROUGH - ALT + RENEWALS - PLAN + SECT.

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS

BILL OF MATERIAL

REVISION		
1	10-18-41	O.W.F.
2	11-14-41	J.H.W.
3	6-3-42	D.W.F.
4	1-16-62	M.H.C.
5		
6		
7		
8		
9		
10		
11		
12		

BLAST FURNACE ORE YARD
WEST DOCK WALL REINFORCEMENT
GEN. ARRG'T + CONSTRUCTION
DETAILS AT No 1 INTAKE

UNITED STATES STEEL CORPORATION
GARY STEEL WORKS

SAFETY USS FIRST

SCALE 1/4" = 1 FT.

MADE BY AAW

CHECKED BY S.G. 9-17-41

TRACED BY

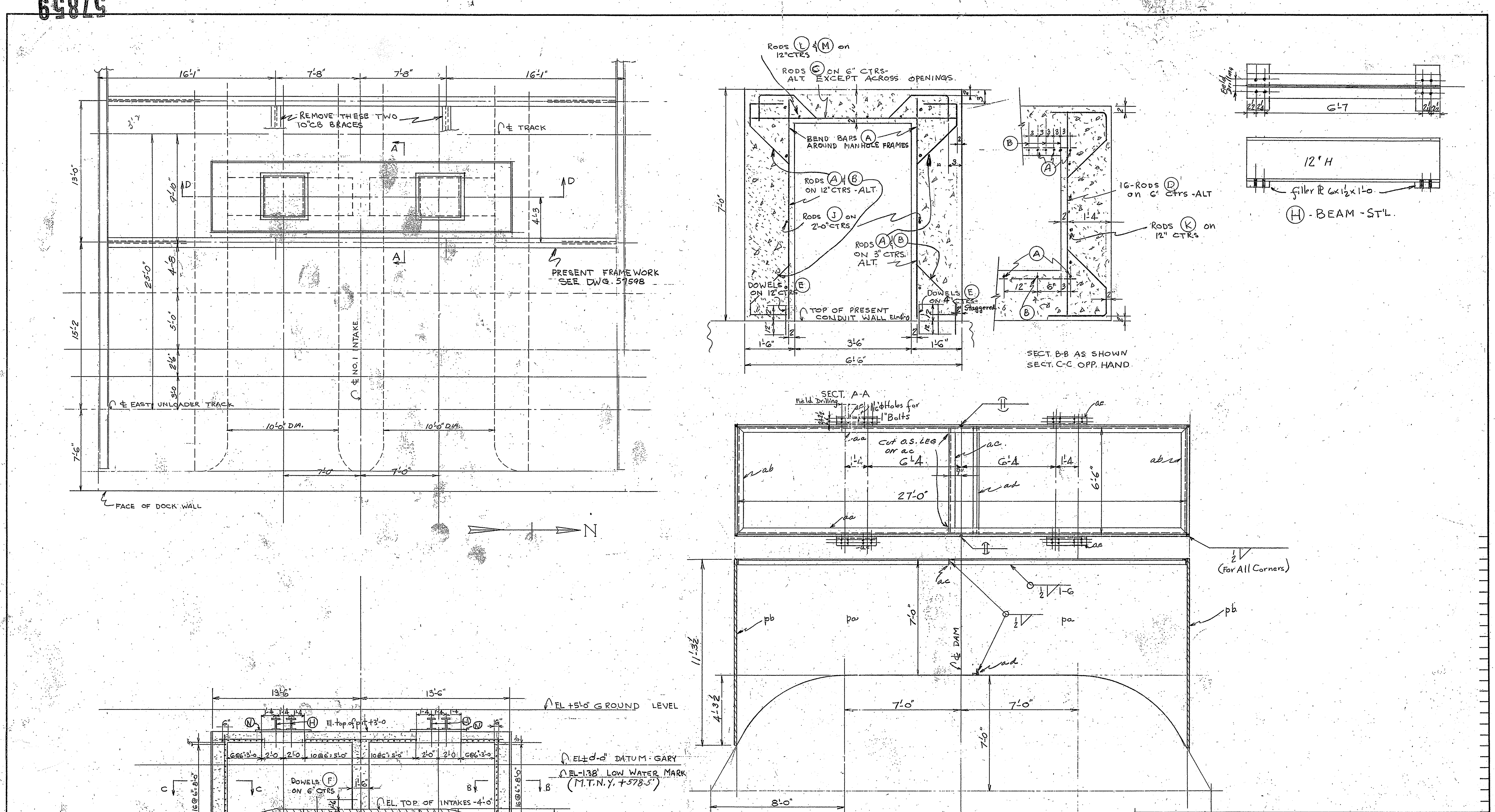
CHECKED FOR SAFETY AFFLECK

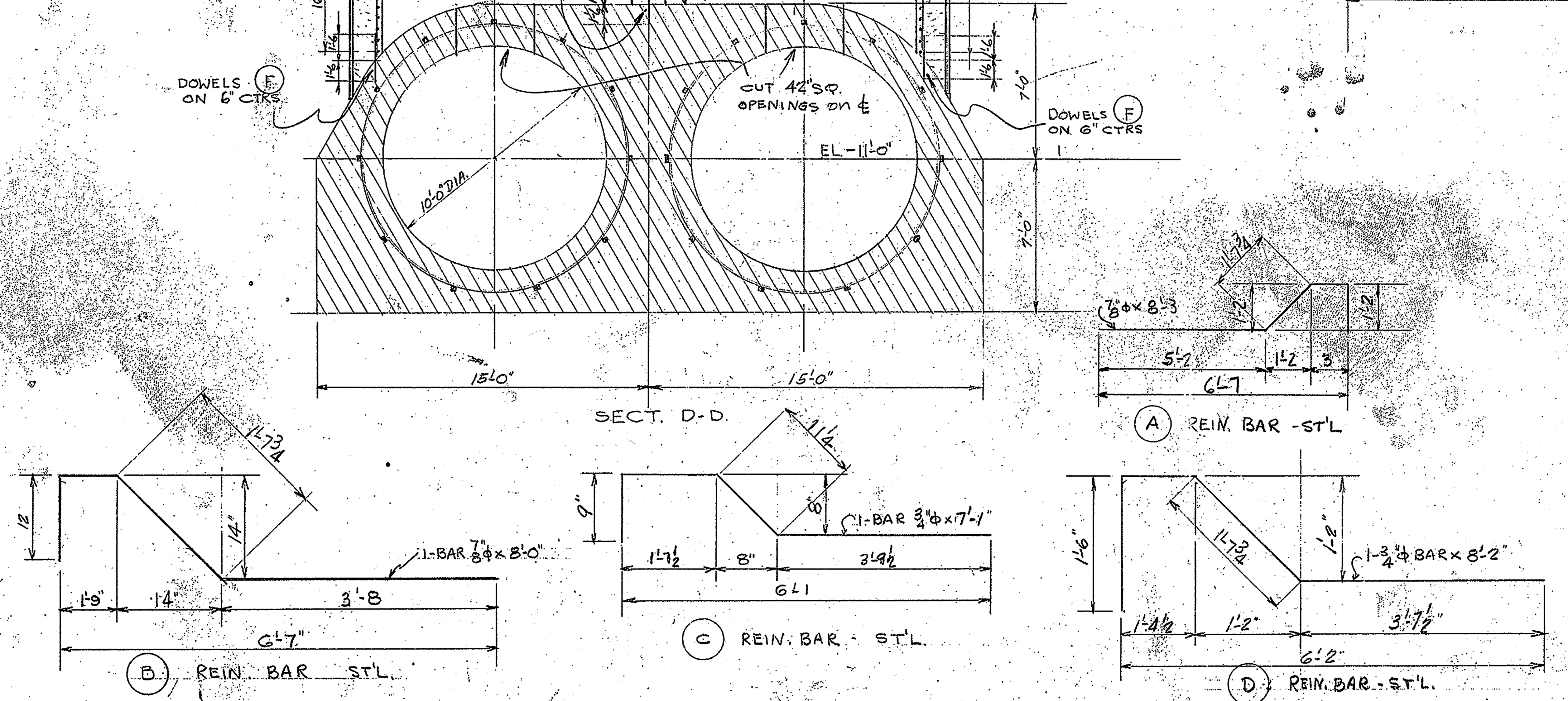
DATE 5-22-41

57562

4 ADDED NOTE ON MANHOLES

57859





Ⓖ COFFER DAM-ST'L.

MAT'L. FOR ONE

4-	℞ $135\frac{1}{2}\times\frac{1}{2}\times$ 13'-6	pa
2-	℞ $78\times\frac{1}{2}\times$ 11'-3½	pb
2-	Ls $4\times4\times\frac{1}{2}\times$ 26'-11	aa
2-	Ls $4\times4\times\frac{1}{2}\times$ 6'-5	ab
1-	L $4\times4\times\frac{1}{2}\times$ 6'-5"	ac
1-	L $4\times4\times\frac{1}{2}\times$ 6'-6	ad
4-	Ls $6\times6\times\frac{3}{4}\times$ 2'-4	ae

OLD. CONC. REMOVED	3	CU.YDS.
CONCRETE	30	CU.YDS
EXCAVATION	92	CU.YDS
FORMS	490	SQ. FT.
BACKFILL	40	CU.YDS
STEEL (REIN. RODS)	4100	lbs.

REFERENCES

89 CENT. PUMP. STAT. - DETAILS OF CONDUITS
57561 B.F. ORE YARD - WEST DOCK WALL - ARRGT. & DET.
57562 " " " - " " " -DET. AT #1 INTAKE
57598 " " " - " " " -ALT. AT #1 INTAKE

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE	PURCHASE NO.
N-57859	2	PLATES 54×1½×5'-0	ST'L.			
M-57859	8	REIN. BARS ¾"ϕ×10'-3	ST'L.			
L-57859	16	REIN. BARS ¾"ϕ×3'-3	ST'L.			
K-57859	8	REIN. BARS ¾"ϕ×8'-6	ST'L.			
J-57859	8	REIN. BARS ¾"ϕ×25'-0"	ST'L.			
H-57859	4	Beams	ST'L.			
G-57859	1	COFFER DAM	ST'L.			
F-57859	39	DOWELS 1"ϕ×3'-0"	ST'L.			
E-57859	110	DOWELS 1"ϕ×2'-0"	ST'L.			
D-57859	32	REIN. BARS	ST'L.			
C-57859	37	REIN. BARS	ST'L.			
B-57859	63	REIN. BARS	ST'L.			
A-57859	63	REIN. BARS	ST'L.			

BILL OF MATERIAL

REVISION		
1	1-21-48	TCW
2	3-29-48	TCW
3		
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BLAST FURNACE ORE YARD
10'-0" INTAKE TUBES FOR CENT. PUMP. STA. - ADDITION OF PIT & MANHOLES FOR INSPECTION OF TUBES - ARRGT. & DET.

CARNEGIE-ILLINOIS STEEL CORP
GARY STEEL WORKS

SAFETY USS STEEL FIRST

MADE BY Wozniak DATE 1-8-48
TRACED BY "
CHECKED BY OWF. " 1-15-48
CHECKED FOR SAFETY

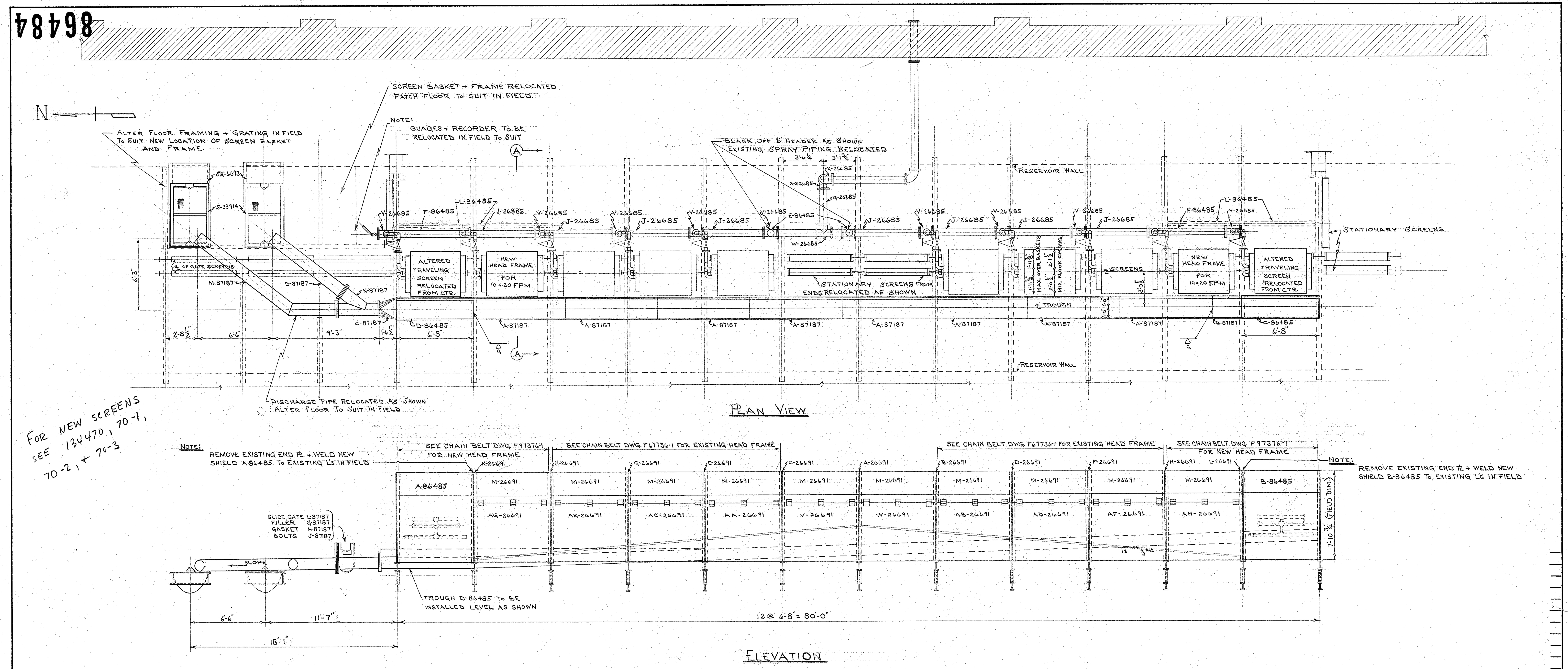
SCALE ¼-¾-1" =1 FT.

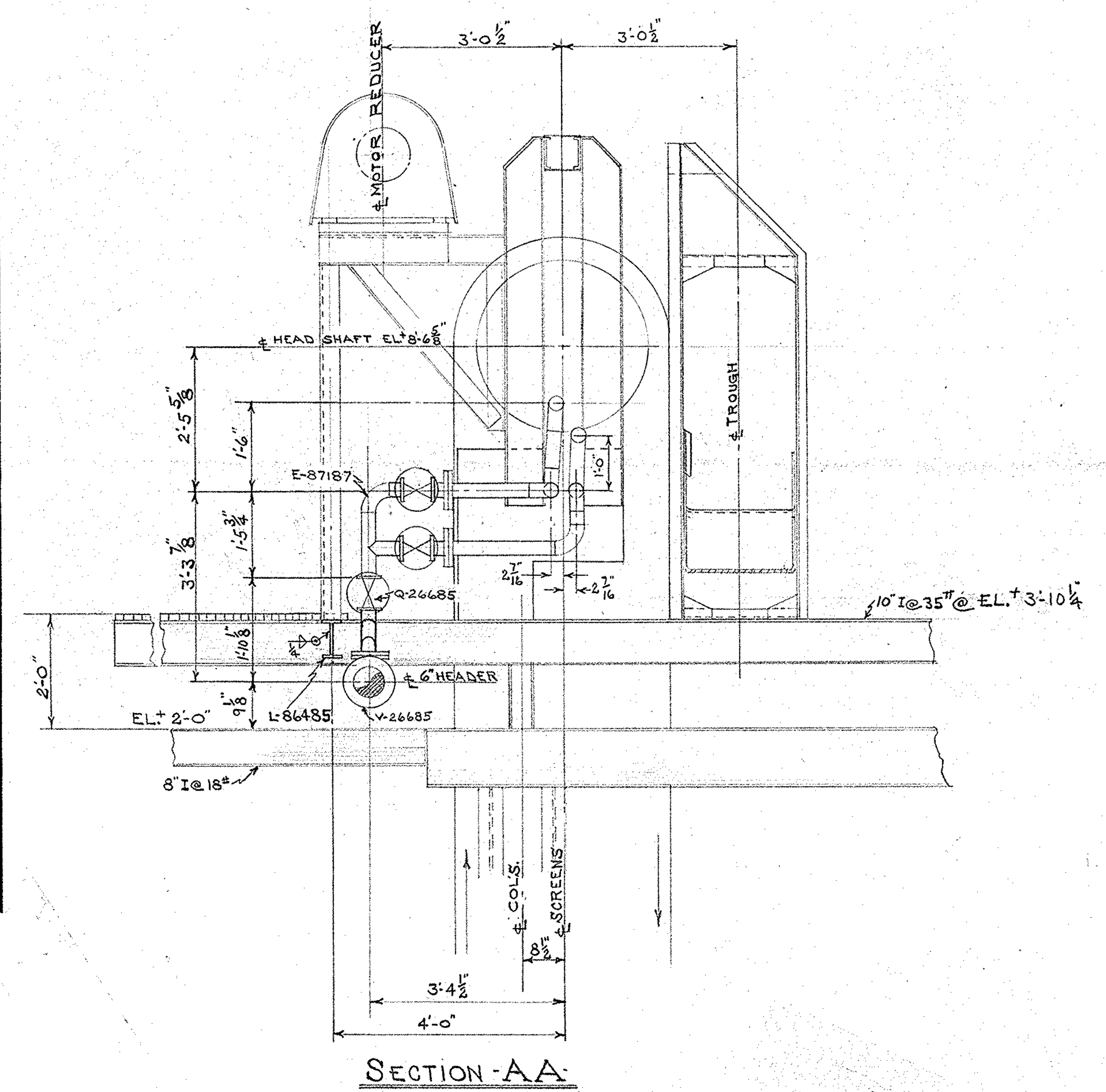
57859

IN CHARGE OF Kavanaugh

REVISIONS MEMO
1 Added lengths of Slopes on A-B-C-D.
② Cancelled Std. Manhole cover & frame, Added ℞ Ⓝ & H-Beams Ⓗ & Angles ⓐⓔ

86484





① TROUGH SLOPES TOWARD SOUTH & SCREENS ARE ON SOUTH END, CHECK IN FIELD

REFERENCES:

86485 - CENTRAL PUMPING STATION TRAVELING SCREENS - SHIELD-TROUGH + PIPING DETAILS
26672 - CENTRAL PUMPING STATION TRAVELING SCREENS - FLOOR BEAMS
26673 - CENTRAL PUMPING STATION TRAVELING SCREENS - FLOOR PLATES + BEAMS
26691 - CENTRAL PUMPING STATION TRAVELING SCREENS - TROUGH + SUPPORTS
26692 - CENTRAL PUMPING STATION TRAVELING SCREENS - TROUGH - HOUSING ARRG'T.
26693 - CENTRAL PUMPING STATION TRAVELING SCREENS - GEN. ARRG'T.
S-33914 - CENTRAL PUMPING STATION BASKET
SK.6693 - CENTRAL PUMPING STATION BASKET FRAME
BK.1785 - CENTRAL PUMPING STATION TRAVELING SCREENS - CHAIN BELT CO.
87187 - CENTRAL PUMPING STATION TRAVELING SCREENS SPRAY PIPING + TROUGH DETAILS
SK-6787 - CENTRAL PUMPING STATION PROPOSED RAISING OF SCREEN PLATFORM GEN. ARR'G'T.
SK-6788 - CENTRAL PUMPING STATION PROPOSED RAISING OF SCREEN PLATFORM SECTIONS

NOTE: THIS DWG. SUPERSEDES DWG. No. 87186 DATED 4-7-51

APPRO. #

WORKS AUTH. #

U.S.S. CORP. STD. FINISHES BASED ON GEN. ELECTRIC ROUGHNESS SPECIMENS		
SYMBOL	CLASS	DEGREE OF FIN. ROUGHNESS MICRO-INCHES BY PROFILOMETER
A	SUPER FINISH	4
B	POLISH	8
C	GROUND	16
D	SMOOTH	32
E	FINE	63
F	SEMI-FINE	125
G	MEDIUM	250
H	SEMI-ROUGH	500
J	ROUGH	1000
K	CLEAN UP	2000

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE

BILL OF MATERIAL

REVISION		
1	5-29-67	A.R. ← W
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CENTRAL PUMPING STATION
TRAVELING SCREENS
ALTERATIONS
GENERAL ARRANGEMENT

UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY GW 19086 Rev. 253 FIRST

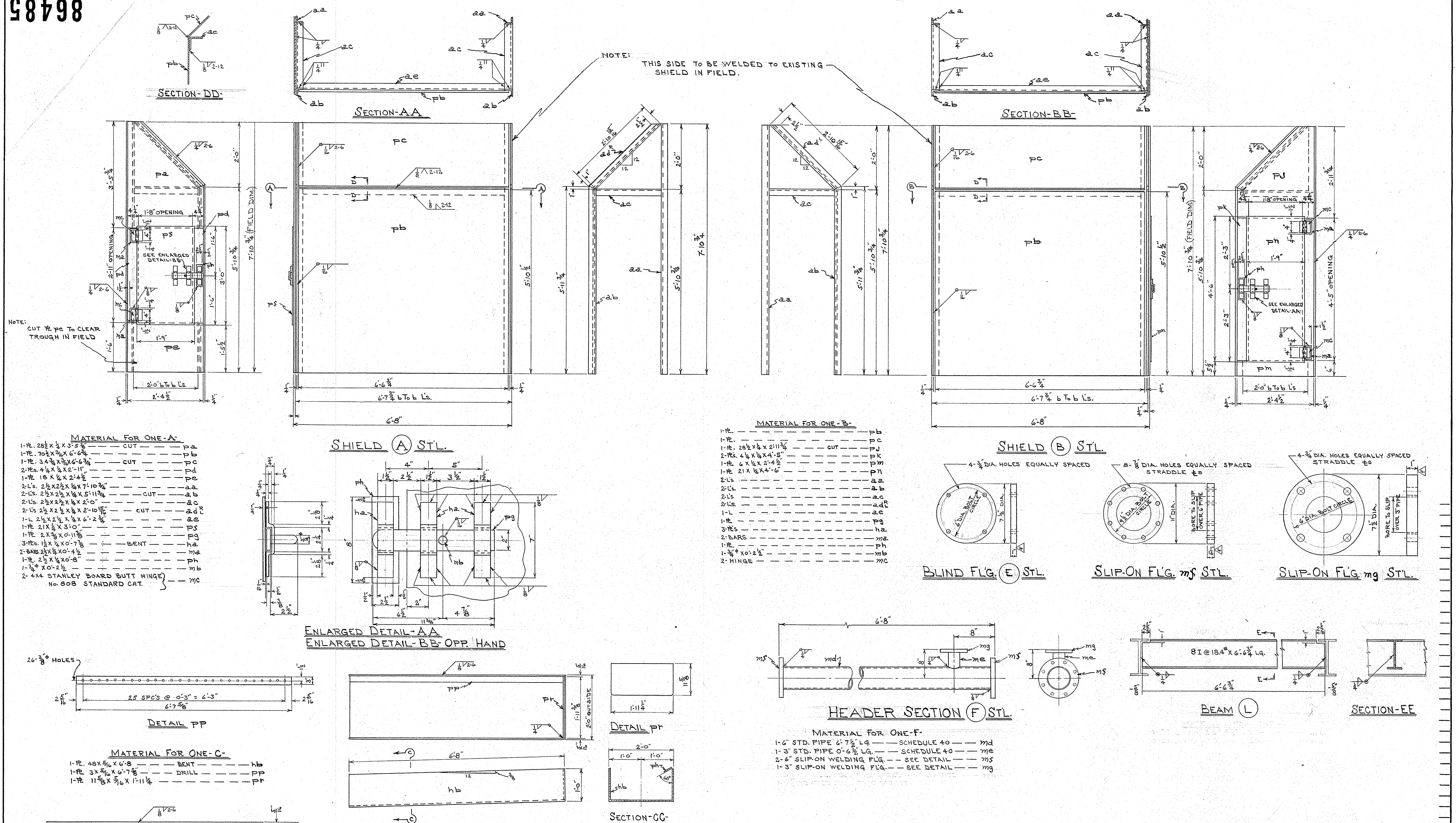
MADE BY C.O'NEILL DATE 11-7-55
TRACED BY "
CHECKED BY CWF " 12-2-55
CHECKED FOR SAFETY

SCALE 1/4 + 1/2 = 1 FT.

USS L M 86484

IN CHARGE OF O. ... ERSON

86485



MATERIAL FOR ONE-A-

1-℞. 28½ X ¼ X 3'-5¾" — CUT — pa
1-℞. 70½ X 3/16 X 6'-6¾ — pb
1-℞. 34¾ X 3/16 X 6'-6¾" — CUT — pc
2-℞s. 4¼ X ¼ X 2'-11" — pd
1-℞ 18 X ¼ X 2'-4½" — pe
2-L's. 2½ X 2½ X ¼ X 7'-10¾" — aa
2-L's. 2½ X 2½ X ¼ X 5'-11¾ — CUT — ab
2-L's. 2½ X 2½ X ¼ X 2'-0" — ac
2-L's 2½ X 2½ X ¼ X 2'-10 15/16" — CUT — ad R/L
1-L 2½ X 2½ X ¼ X 6'-2¾" — ae
1-℞ 21 X ¼ X 3'-0" — ps
1-℞ 2 X ⅜ X 0'-11⅜" — pg
3-℞s. 1½ X ¼ X 0'-7⅞ — BENT — ha
2-BARS 2½ X ¼ X 0'-4½ — ma
1-℞. 2½ X ¼ X 0'-8" — ph
1-¾"φ X 0'-2½ — mb
2- 4X4 STANLEY BOARD BUTT HINGE No. 808 STANDARD CAT. — mc

MATERIAL FOR ONE-B-

1-℞. — pb
1-℞. — pc
1-℞. 28½ X ¼ X 2'-11¾" — CUT — pJ
2-℞s. 4¼ X ¼ X 4'-5" — pK
1-℞ 6 X ¼ X 2'-4½" — pm
1-℞ 21 X ¼ X 4'-6" — pn
2-L's — aa
2-L's. — ab
2-L's — ac
2-L's. — ad R/L
1-L — ae
1-℞ — pg
3-℞'s — ha
2-BARS — ma
1-℞. — ph
1-¾"φ X 0'-2½" — mb
2- HINGE — mc

MATERIAL FOR ONE-C-

1-℞. 48 X 5/16 X 6'-8 — BENT — hb
1-℞ 3 X 5/16 X 6'-7⅝" — DRILL — pp
1-℞ 11⅝ X 5/16 X 1'-11¼ — pr

NOTE: BEVEL BOTH ENDS OF TROUGH SECTION C+D 37½° FOR FIELD WELDING.

MATERIAL FOR ONE-D-

1-℞. 57 X 5/16 X 6'-8" — BENT — hc
1-℞. — pp

MATERIAL FOR ONE-F-

1-6" STD. PIPE 6'-7½" LG. — SCHEDULE 40 — md
1-3" STD. PIPE 0'-6½" LG. — SCHEDULE 40 — me
2-6" SLIP-ON WELDING FL'G. — SEE DETAIL — ms
1-3" SLIP-ON WELDING FL'G. — SEE DETAIL — mg

PIPE + TROUGH

1ST COAT #769 DAMP PROOF RED PRIMER (SHORT OIL)
2ND COAT #634 RUST OLEUM-QUICK DRYING BLACK (S.O.)

PAINT NOTES (STRUCTURAL)

ALL FIELD WELD SURFACES No SHOP PAINT
SHOP
ONE COAT #2580 RED LEAD
FIELD
1ST COAT #2580 RED LEAD ON WELDS (TOUCH UP)
2ND COAT #540 DARK BROWN IRON OXIDE

REFERENCES:
86484—CENTRAL PUMPING STATION TRAVELING SCREENS ALTERATIONS GEN. ARRG'T.

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE
L-86485	4	BEAM	ST'L.		
K-86485	16	¾"φ SQ. HD. MACH. BOLT 3½" LG.	ST'L.	COMPLETE WITH HEX NUT	
J-86485	16	⅝"φ SQ. HD. MACH. BOLT 3" LG.	ST'L.	COMPLETE WITH HEX NUT	
H-86485	6	7½" O.D.-3" I.D. FULL FACE GASKET	ASBESTOS	CRANITE or EQUAL	
G-86485	4	11" O.D.-6" I.D. FULL FACE GASKET	ASBESTOS	CRANITE or EQUAL	
F-86485	2	HEADER SECTION	ST'L.		
E-86485	2	BLIND FLANGE	ST'L.		
D-86485	1	TROUGH SECTION	ST'L.		
C-86485	1	TROUGH SECTION	ST'L.		
B-86485	1	SHIELD	ST'L.		
A-86485	1	SHIELD	ST'L.		

BILL OF MATERIAL

U.S.S. CORP. STD. FINISHES BASED ON GEN. ELECTRIC ROUGHNESS SPECIMENS

SYMBOL	CLASS	DEGREE OF FIN. ROUGHNESS MICRO-INCHES BY PROFILOMETER
A	SUPER FINISH	4
B	POLISH	8
C	GROUND	16
D	SMOOTH	32
E	FINE	63
F	SEMI-FINE	125
G	MEDIUM	250
H	SEMI-ROUGH	500
J	ROUGH	1000
K	CLEAN UP	2000

REVISION
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APPRO. #
WORKS AUTH. #

CENTRAL PUMPING STATION
TRAVELING SCREENS
SHIELD - TROUGH + PIPING DETAILS

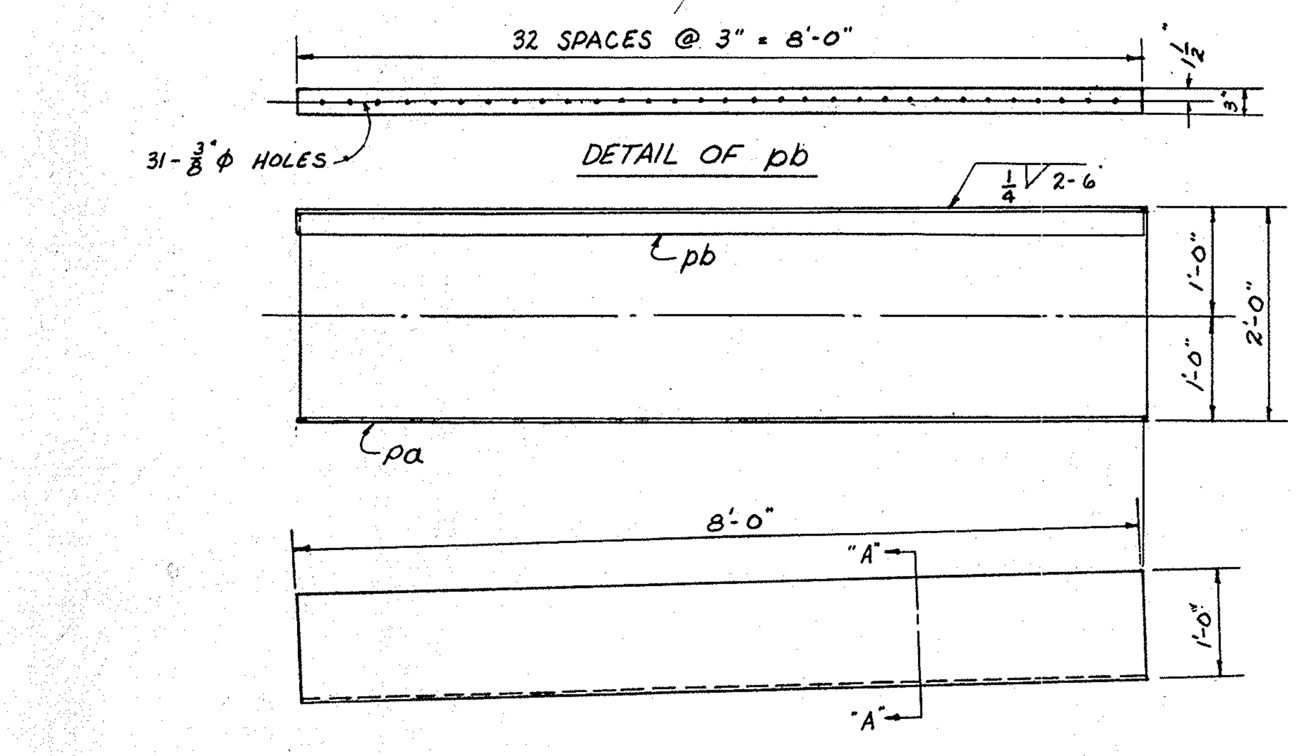
UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY GW 19086 Rev. 253 FIRST

MADE BY C. O'NEILL DATE 11-5-55
TRACED BY "
CHECKED BY OWF " 12-2-55
CHECKED FOR SAFETY
SCALE ¾"-3" = 1 FT.

86485

IN CHARGE OF

REVISIONS MEMO 1

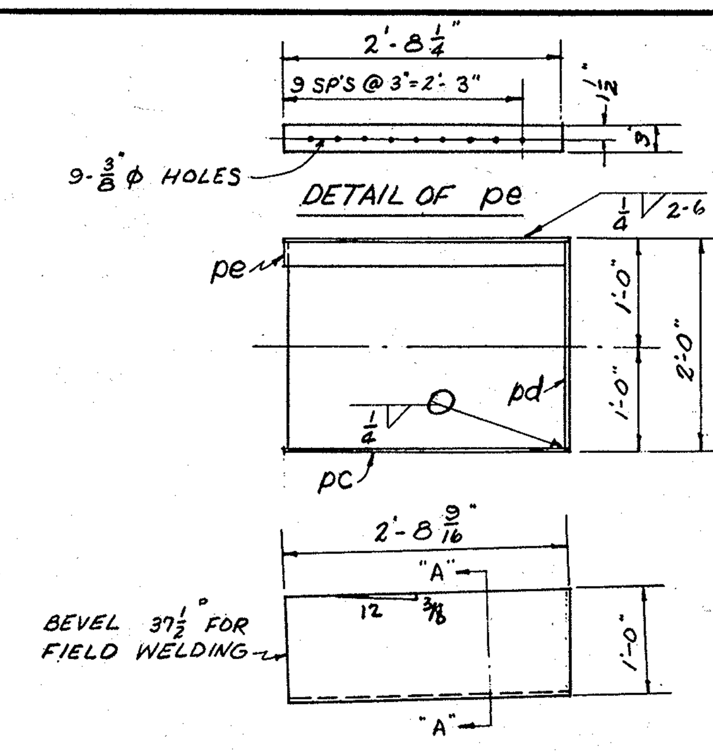


NOTE:
BEVEL BOTH ENDS OF TROUGH SECTION $37\frac{1}{2}°$ FOR FIELD WELDING.

TROUGH SECTION (A) ST'L

MAT'L FOR ONE (A)

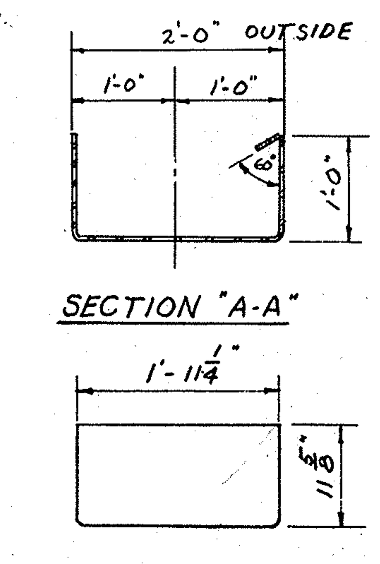
1-℗ 48" X $\frac{5}{16}$" X 8'-0" LG ——BEND—— pa
1-℗ 3" X $\frac{5}{16}$" X 8'-0" LG.———— pb



TROUGH SECTION (B) ST'L

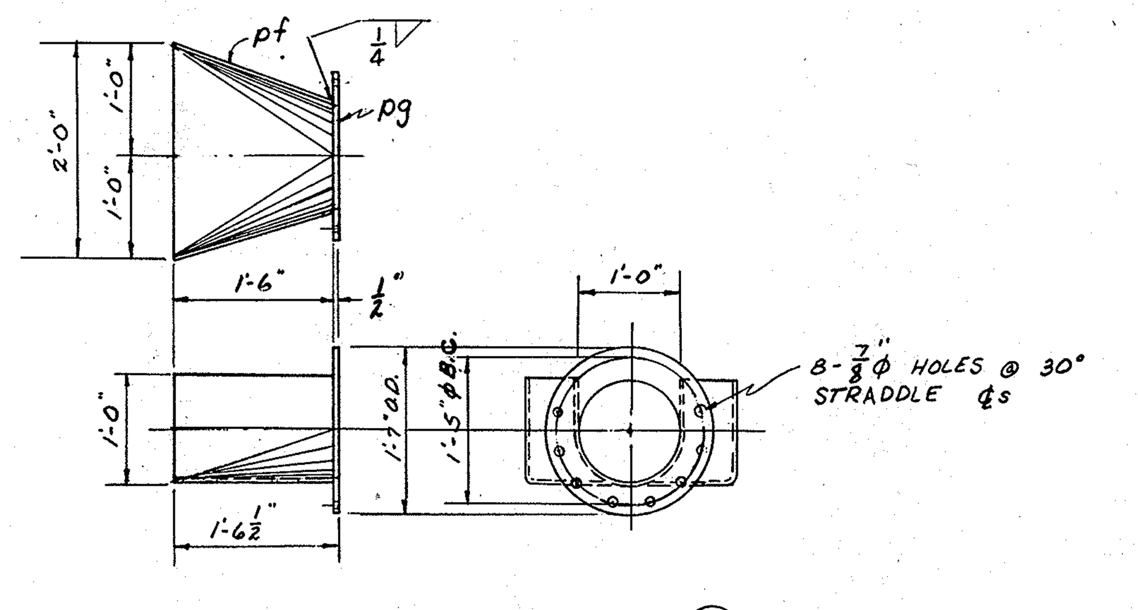
MAT'L FOR ONE (B)

1-℗ 48" X $\frac{5}{16}$" X 2'-8$\frac{9}{16}$" LG. —BEND— pc
1-℗ 11$\frac{5}{8}$" X $\frac{5}{16}$" X 1'-11$\frac{1}{4}$" LG. ——— pd
1-℗ 3" X $\frac{5}{16}$ X 2'-8$\frac{1}{4}$" ———— pe



SECTION "A-A"

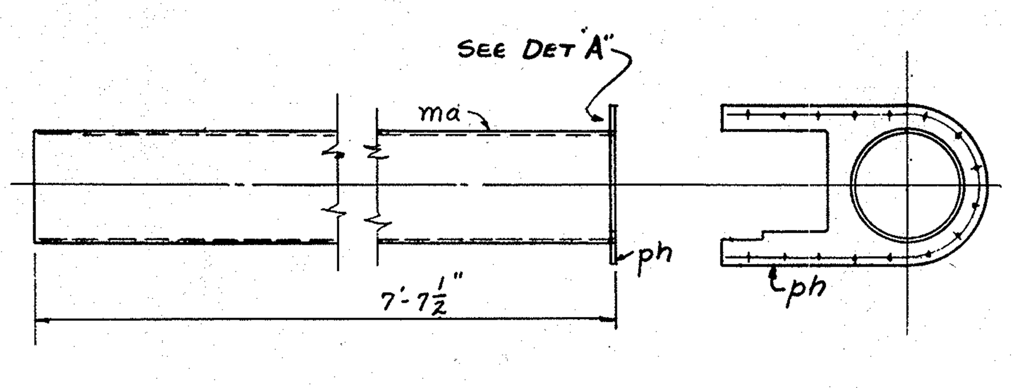
DETAIL OF pd



TROUGH CONNECTOR SECTION (C) ST'L

MAT'L FOR ONE (C)

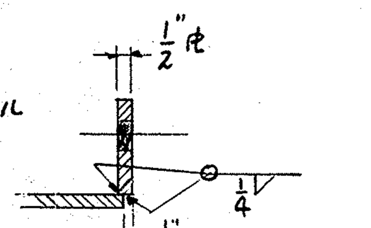
1-℗ 24" X $\frac{5}{16}$" X 4'-0" LG. —BEND— pf
1-℗ 19" X $\frac{1}{2}$" X 1'-7" LG. ——— pg



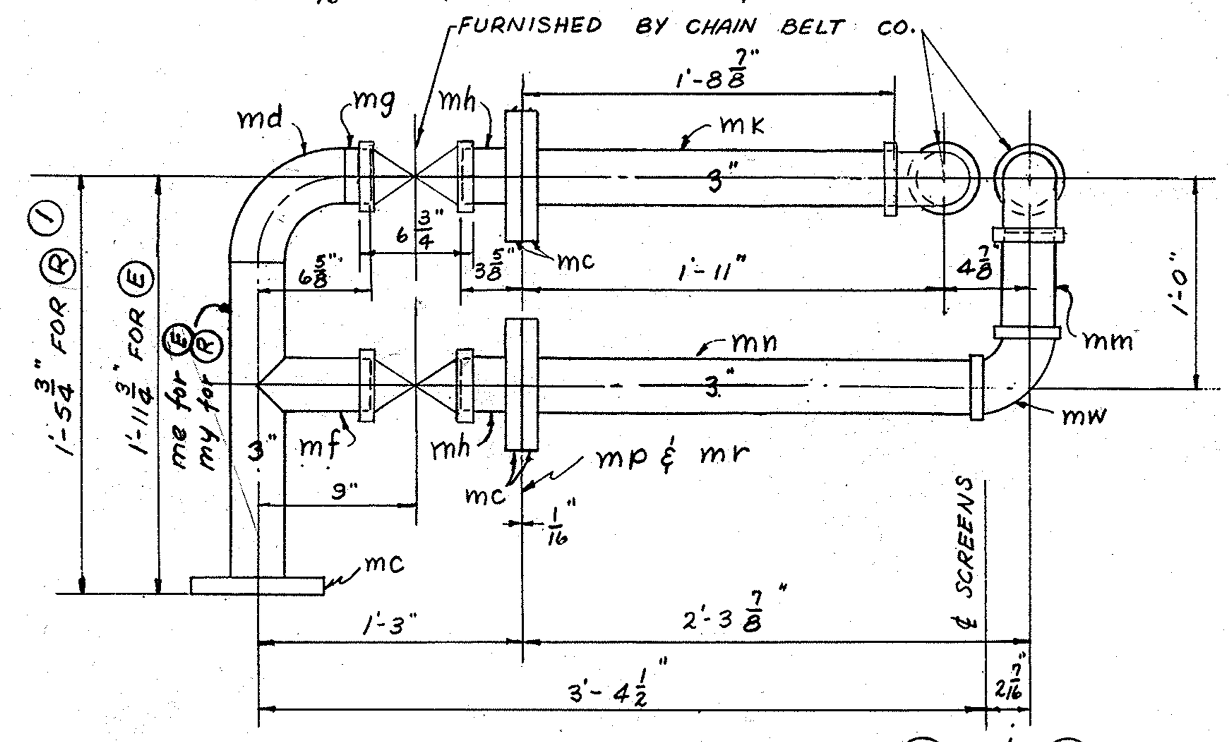
DISCHARGE PIPE (D) ST'L

MAT'L FOR ONE (D)

1-12" STD. PIPE X 7'-7$\frac{1}{4}$" LG. —— ma
1-℗ 18" X $\frac{1}{2}$" X 2'-3" LG. ——— ph (SEE ENLARGED DETAIL OF FLANGE)



DETAIL "A"
TYPICAL WELD OF FLG

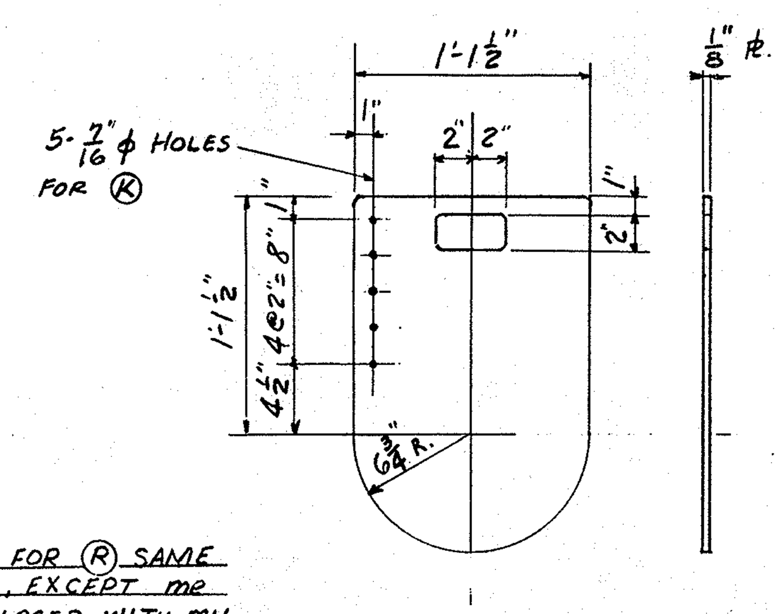


(1) SPRAY PIPE CONNECTION (E) & (R) ST'L

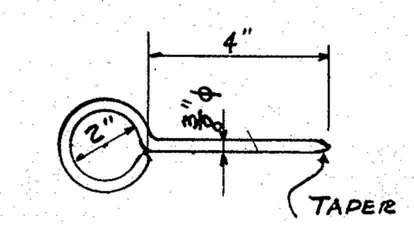
MAT'L FOR ONE (E)

5-3" SLIP-ON-WELDING FLANGES - 150#- CRANE * 554 ——— mc
1-3" 90° WELDING ELL CRANE * 352E ——— md
1-3" STD. PIPE X 1'-6$\frac{7}{8}$" LG. ——— me
1-3" STD. PIPE X 0'-6$\frac{5}{8}$" LG. ——— mf
1-3" STD. PIPE X 0'-2$\frac{1}{8}$" LG. - THD. ONE END ——— mg
2-3" STD. PIPE X 0'-3$\frac{1}{4}$" LG. - THD. ONE END ——— mh
1-3" STD. PIPE X 1'-8$\frac{1}{2}$" LG. - THD. ONE END ——— mk
1-3" STD. PIPE X 0'-7$\frac{3}{4}$" LG. - THD. TWO ENDS ——— mm
1-3" STD. PIPE X 2'-1$\frac{3}{8}$" LG. - THD. ONE END ——— mn
3- CRANITE GASKETS - 3" X 5$\frac{3}{8}$" X $\frac{1}{16}$" ——— mp
12-$\frac{5}{8}$"φ BOLTS X 3" LG. -1 HEX. NUT EA. ——— mr
1-3" STD. M.I. ELL SCREWED. ——— mw

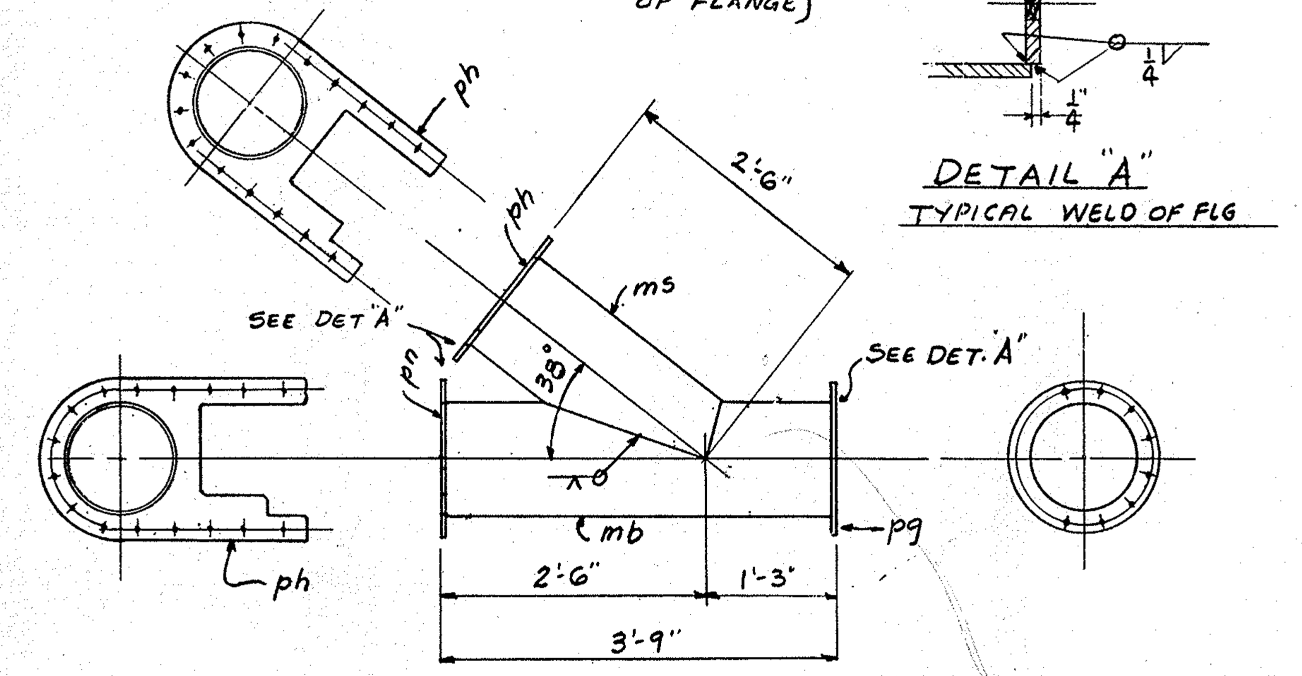
(1)
NOTE:
MAT'L FOR (R) SAME FOR (E), EXCEPT me IS REPLACED WITH my
1-3" STD. PIPE X 1'-0$\frac{7}{8}$" LG - my



SLIDE GATE (L) ST'L



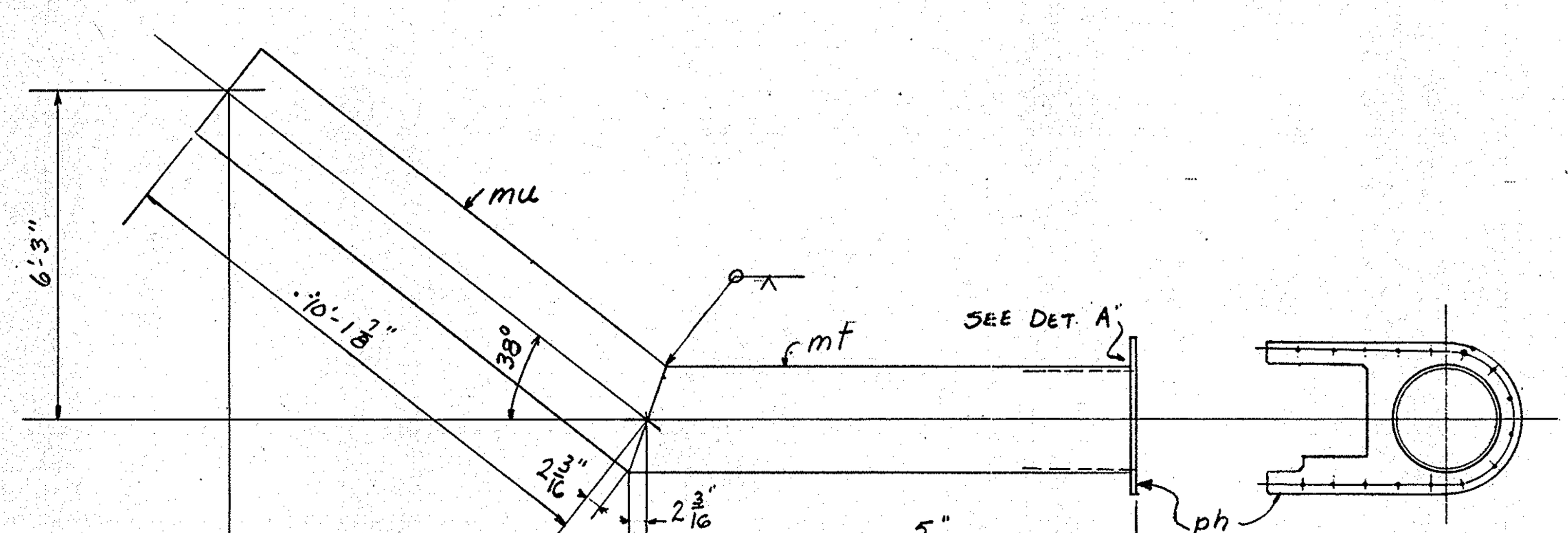
PIN- (K) ST'L



LATERAL (N) ST'L

MAT'L FOR ONE (N)

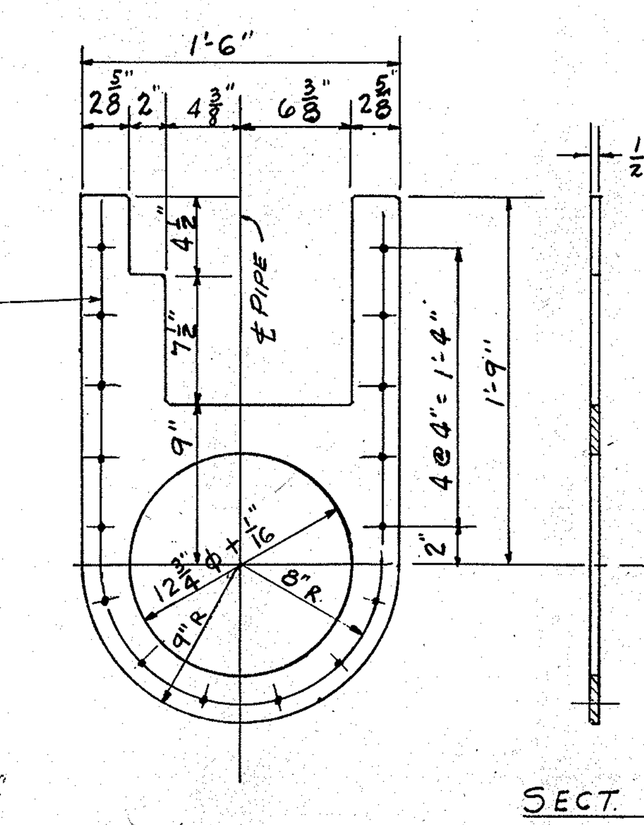
1-12 STD. PIPE X 3'-8$\frac{1}{2}$" LG - mb
1-12 STD. PIPE X 2'-5$\frac{3}{4}$" LG - ms
2 - Flanges ———— ph
1 - Flange ———— pg



DISCHARGE PIPE (M) ST'L

MAT'L FOR ONE (M)

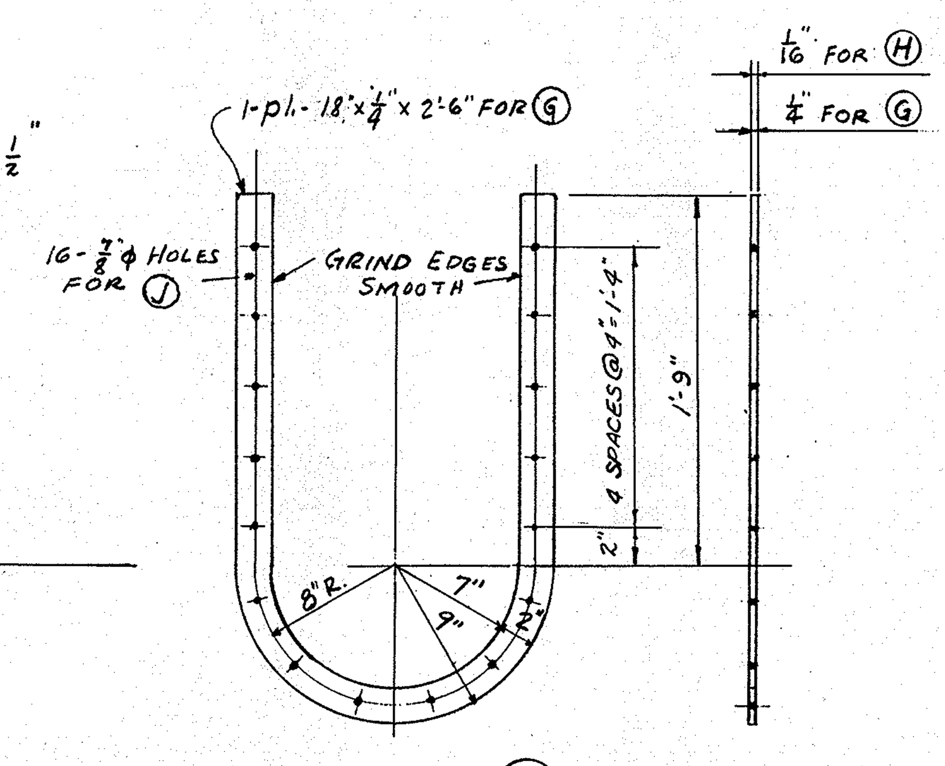
1-12" STD. PIPE X 4'-1$\frac{5}{8}$" - mt
1-12" STD. PIPE X 10'-4" - mu
1- FLANGE - ph



DRILL 16-$\frac{7}{8}$"φ HOLES FOR (J)

DETAIL OF FLANGE-ph

SECT. THRU ℄



FILLER (G) ST'L
GASKET (H) ASBESTOS

REFERENCES
87186- CENTRAL PUMPING STA. TRAVELING SCREENS SPRAY PIPING & TROUGH ARRG'T.
(2) 86484- CENTRAL PUMPING STA. TRAVELING SCREENS ALTERATIONS GEN. ARRG'T.

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE
(1) R-87187	2	SPRAY PIPE CONNECTION	ST'L	COMPLETE AS SHOWN	
P-87187	1	19" O.D. X 12" I.D. X $\frac{1}{16}$" GASKET	ASBESTOS		
N-87187	1	LATERAL	STEEL		
M-87187	1	DISCHARGE PIPE	STEEL		
L-87187	2	SLIDE GATE	STEEL		
K-87187	2	PIN	STEEL		
J-87187	40	3/4" X 2" BOLTS	STEEL	SQ HD - HEX NUT	
H-87187	4	GASKET	ASBESTOS		
G-87187	2	FILLER ℗.	STEEL		
F-87187	10	PATCH STRIP	ST'L	6" X $\frac{3}{16}$" X 6'-5" LG.	
(1) E-87187	8	SPRAY PIPE CONNECTION	ST'L	COMPLETE AS SHOWN	
D-87187	1	DISCHARGE PIPE	ST'L		
C-87187	1	TROUGH CONNECTOR SECT.	ST'L		
B-87187	1	TROUGH SECTION	ST'L		
A-87187	8	TROUGH SECTION	ST'L		

BILL OF MATERIAL

REVISION		
1	7-9-51	L.G
(2)	11-8-55	C.R.O.
3		
4		
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CENTRAL PUMPING STATION
TRAVELING SCREENS
SPRAY PIPING & TROUGH
DETAILS

UNITED STATES STEEL COMPANY
GARY STEEL WORKS

SAFETY FIRST

MADE BY L.G. DATE 5-10-51
TRACED BY "
CHECKED BY B.A. " 6-5-51
CHECKED FOR SAFETY

SCALE $\frac{3}{4}$ & $1\frac{1}{2}$" = 1 FT.

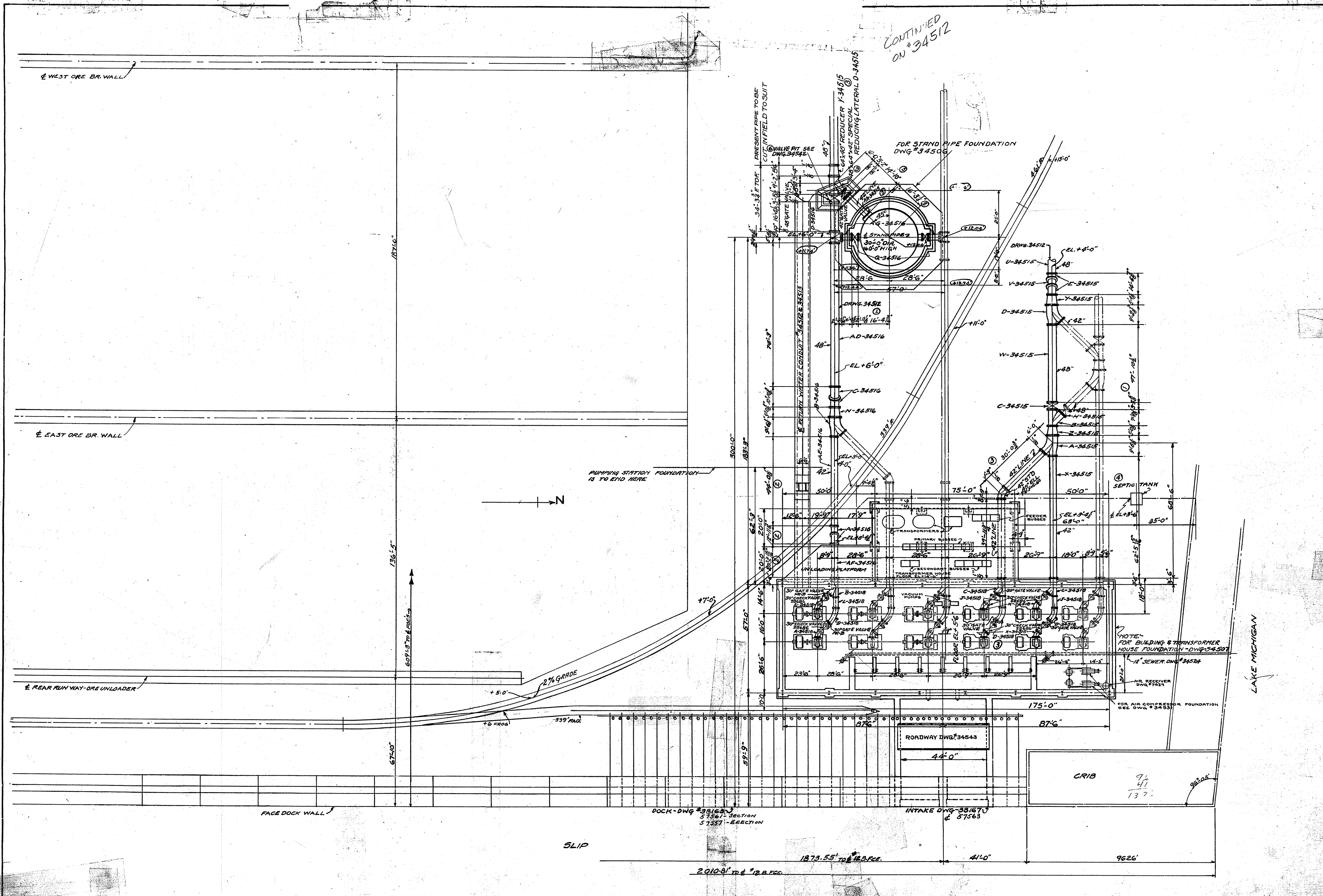
87187

APPRO. # A-6020
WORKS AUTH. #
OPERATION

IN CHARGE OF WOZNIAK

REVISIONS MEMO
1 ADDED ITEM (R)
(2) REFERENCE ADDED TO DWG.

DETAILED DRAWINGS – NO. 2 PUMP STATION



FOR GEN'L ARR'G'T OF EQUIP'T
SEE DWG. # 34500-A.

REFERENCES:-

34501-PUMPING STATION #2-PLAN OF FLOOR BEAMS & PUMPS
34502-PUMPING STATION #2-BUILDING SECTION OF BRICKWORK
34504-PUMPING STATION #2-BUILDING & TRANSFORMER HOUSE-BRICKWORK ARR'G'T & DETAILS
34505-PUMPING STATION #2-30'x160' STANDPIPE-ELEVATION & DETAILS
34506-PUMPING STATION #2-30'x160' STAND PIPE-FOUNDATION
34507-PUMPING STATION #2-BUILDING & TRANSFORMER HOUSE-FOUNDATION
34508-PUMPING STATION #2-BUILDING FOUNDATION SECTION & REINFORCING MATT.
34511-PUMPING STATION #2-PLAN OF PRESENT GROUND ELEV. AT RETURN WATER CONDUIT & WATER LINE
34512-PUMPING STATION #2-GEN. ARR'G'T OF WATER LINE & RETURN WATER CONDUIT TO [illegible] B. H. #4
39167-SLIP & DOCK-NEW CONSTRUCTION-INTAKE TUBES FOR PUMPING STATION #2
④ 34529-PUMPING STATION #2-WASH HOUSE-SEPTIC TANK & DRAINAGE SYSTEM

REVISIONS		
1	[illegible]-25	E.R.K.
2	8-19-25	S.L.
3	5-4-27	B.V.K.
4	6-2-47	F.E.D.
5	8-7-57	D.C.A.
6	10-17-27	G.R.H.
7	11-6-33	G.N.
8		
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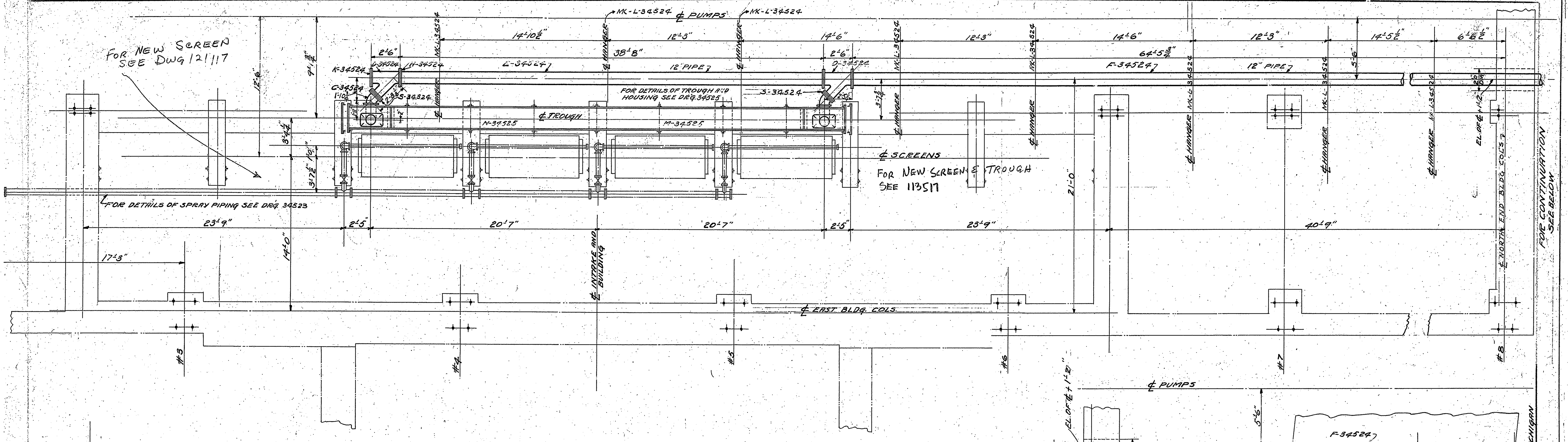
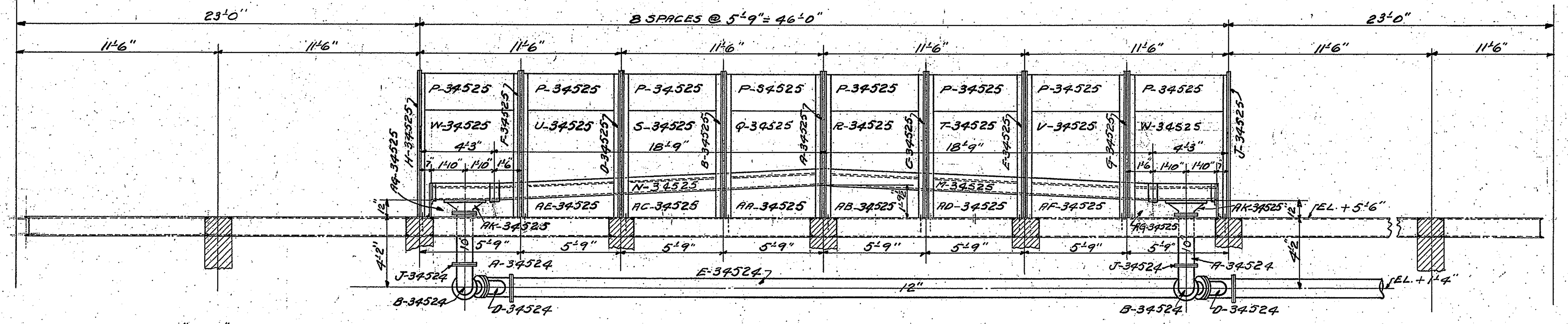
PUMPING STATION #2
LOCATION

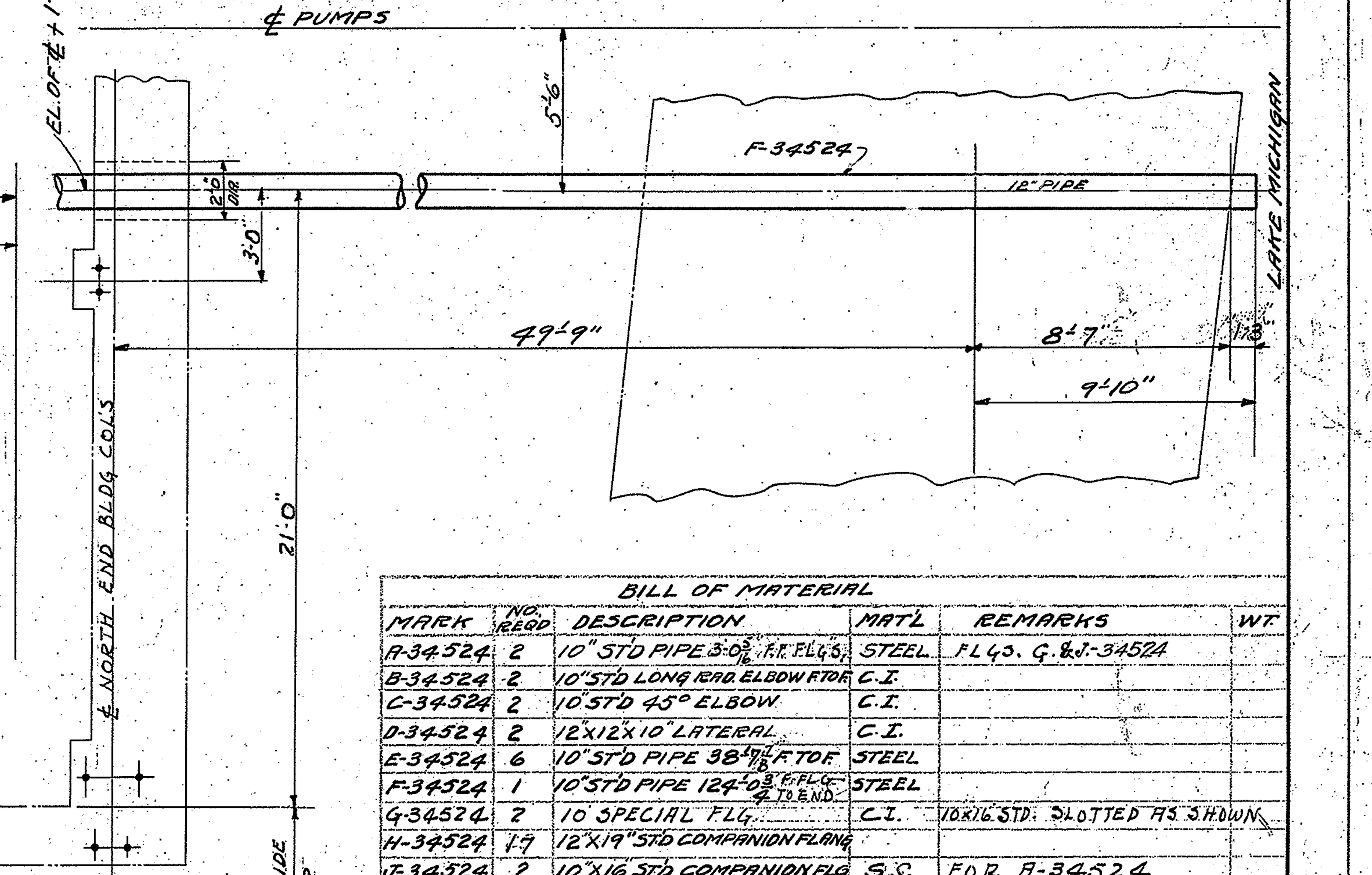
GARY STEEL WORKS
U.S. STEEL CO.
SAFETY USS FIRST

SCALE 1" = 20'-0"
MADE BY C. WARREN
DATE 7-22-24
TRACED BY J. A.
CHECKED BY E.R.K. 2-26-25
CHECKED FOR SAFETY

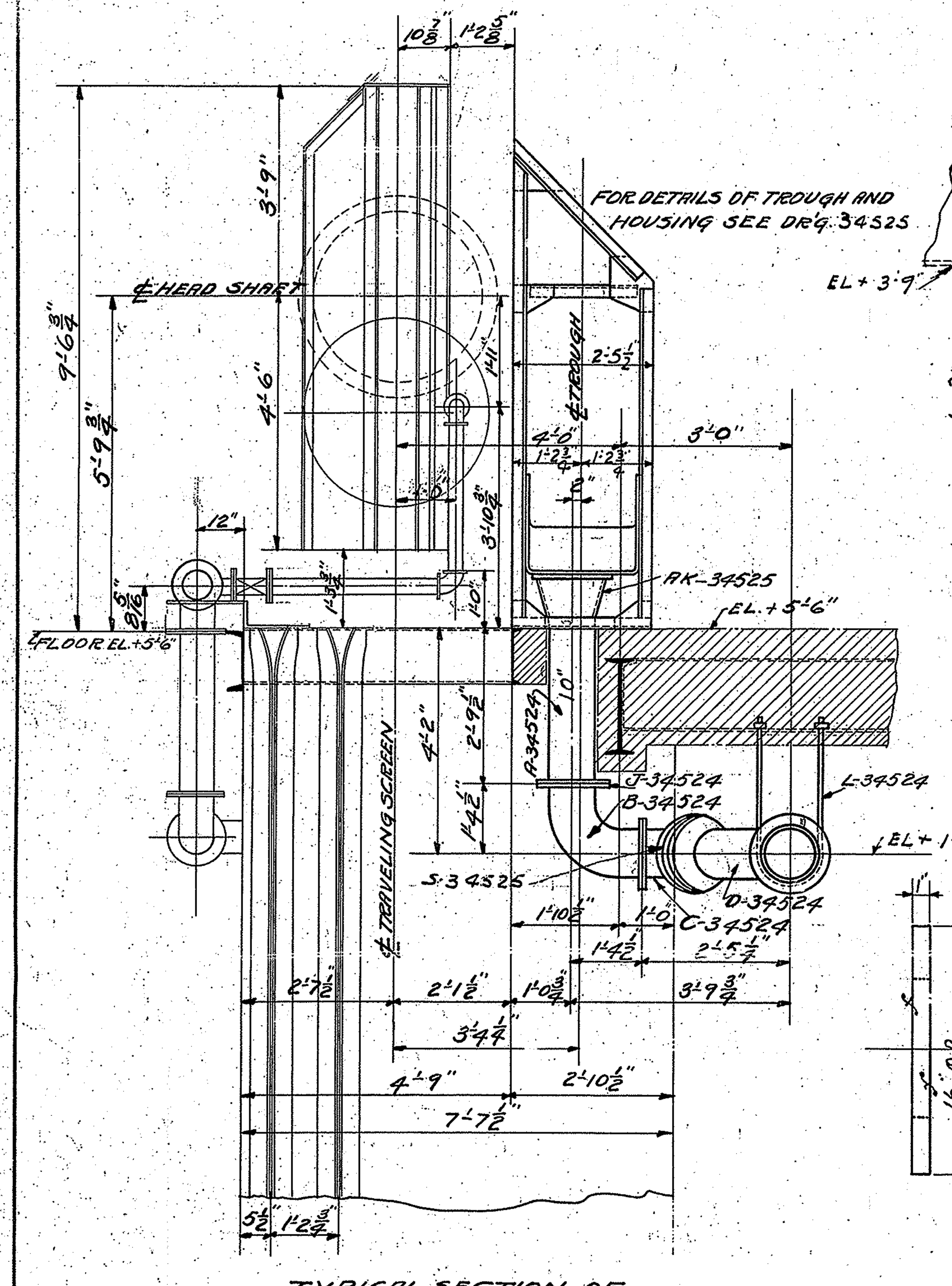
34500



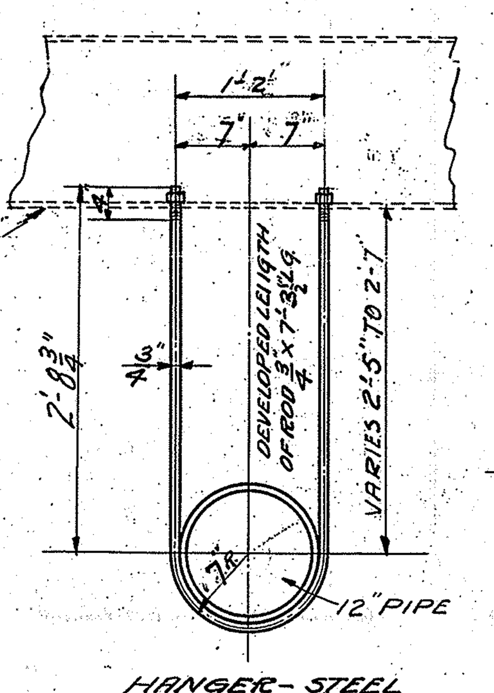




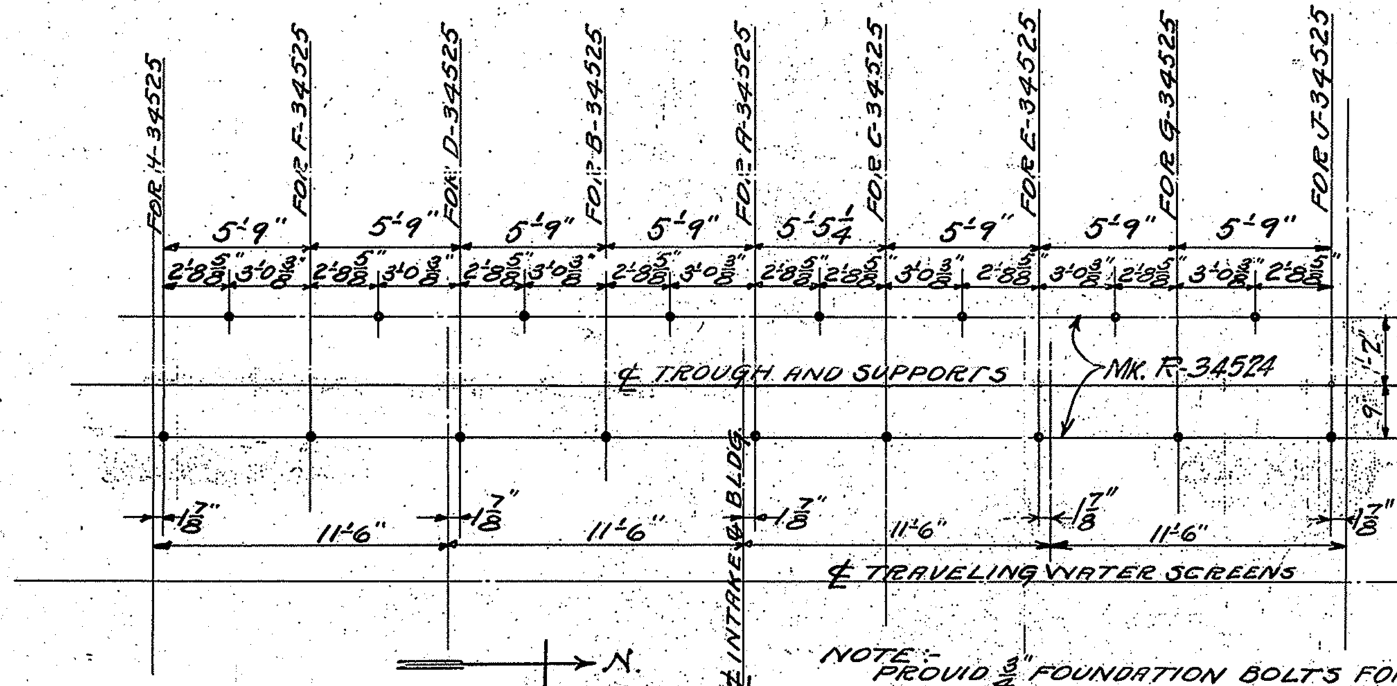
BILL OF MATERIAL					
MARK	NO. REQD	DESCRIPTION	MAT'L	REMARKS	WT.
A-34524	2	10" STD PIPE 3'-0 5/16" F.F. FLGS.	STEEL	FLGS. G & J-34524	
B-34524	2	10" STD LONG RAD. ELBOW F. TO F.	C.I.		
C-34524	2	10" STD 45° ELBOW	C.I.		
D-34524	2	12"X12"X10" LATERAL	C.I.		
E-34524	6	10" STD PIPE 38'-7 7/8" F. TO F.	STEEL		
F-34524	1	10" STD PIPE 124'-0 3/4" F. FLG. TO END	STEEL		
G-34524	2	10" SPECIAL FLG.	C.I.	10X16 STD. SLOTTED AS SHOWN	
H-34524	17	12"X19" STD COMPANION FLANG			
J-34524	2	10"X16" STD COMPANION FLG	S.C.	FOR A-34524	
K-34524	1	12"X19 STD BLIND FLG.	C.I.		
L-34524	8	HANGER	STEEL	COMP. AS SHOWN	
M-34524	288	BOLTS 7/8"x 3 1/2" S.H.-S.N.	STEEL	FOR 10x12 PIPE & FITTINGS	
N-34524	24	BOLTS 7/8"x 4 3/4" S.H.-S.N.	STEEL	FOR G-34524	
P-34524	10	10"X13 3/8" STD RING GASKET	CLOTH		
Q-34524	10	12"X16 7/8" STD RING GASKET	CLOTH		
R-34524	17	RAG BOLT 3/4"x 1'-0" LG.	STEEL	WITH NUTS	
S-34524	2	DUTCHMEN - 1" THICK	STEEL		



TYPICAL SECTION OF TROUGH AND HOUSING

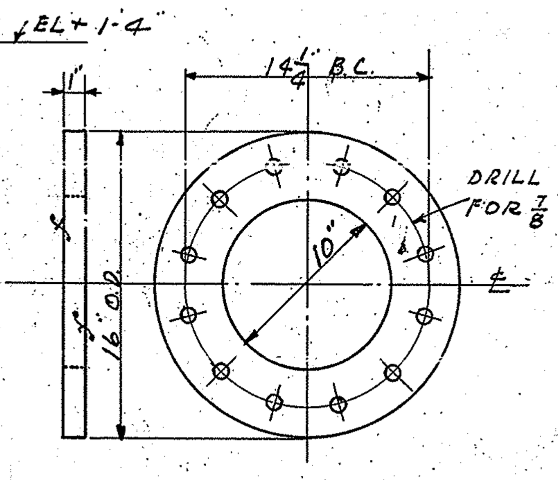


HANGER - STEEL
MK. L-34524

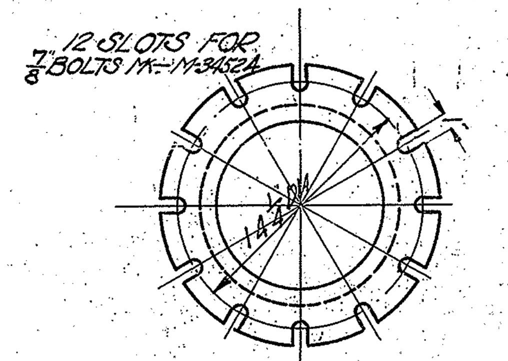


NOTE:-
PROVIDE 3/4" FOUNDATION BOLTS FOR TROUGH & HOUSING
ELEV. OF TOP FOUNDATION BOLTS + 5'-7 1/2" MK-R-34525

LOCATION OF FOUNDATION BOLTS FOR TROUGH AND HOUSING



DUTCHMEN - STEEL
MK- S-34524



10"x16" SPECIAL FLANGE-C.I.
MK-G-34524

REFERENCES:-
34523 - PUMPING STATION #2 - DETAILS OF SPRAY FEED PIPING FOR TRAVELING SCREENS
34525 - PUMPING STATION #2 - DETAILS OF TROUGH & HOUSING FOR TRAVELING SCREENS
34502 - CROSS SECTION THRU BUILDING AND FOUNDATION

REVISIONS		
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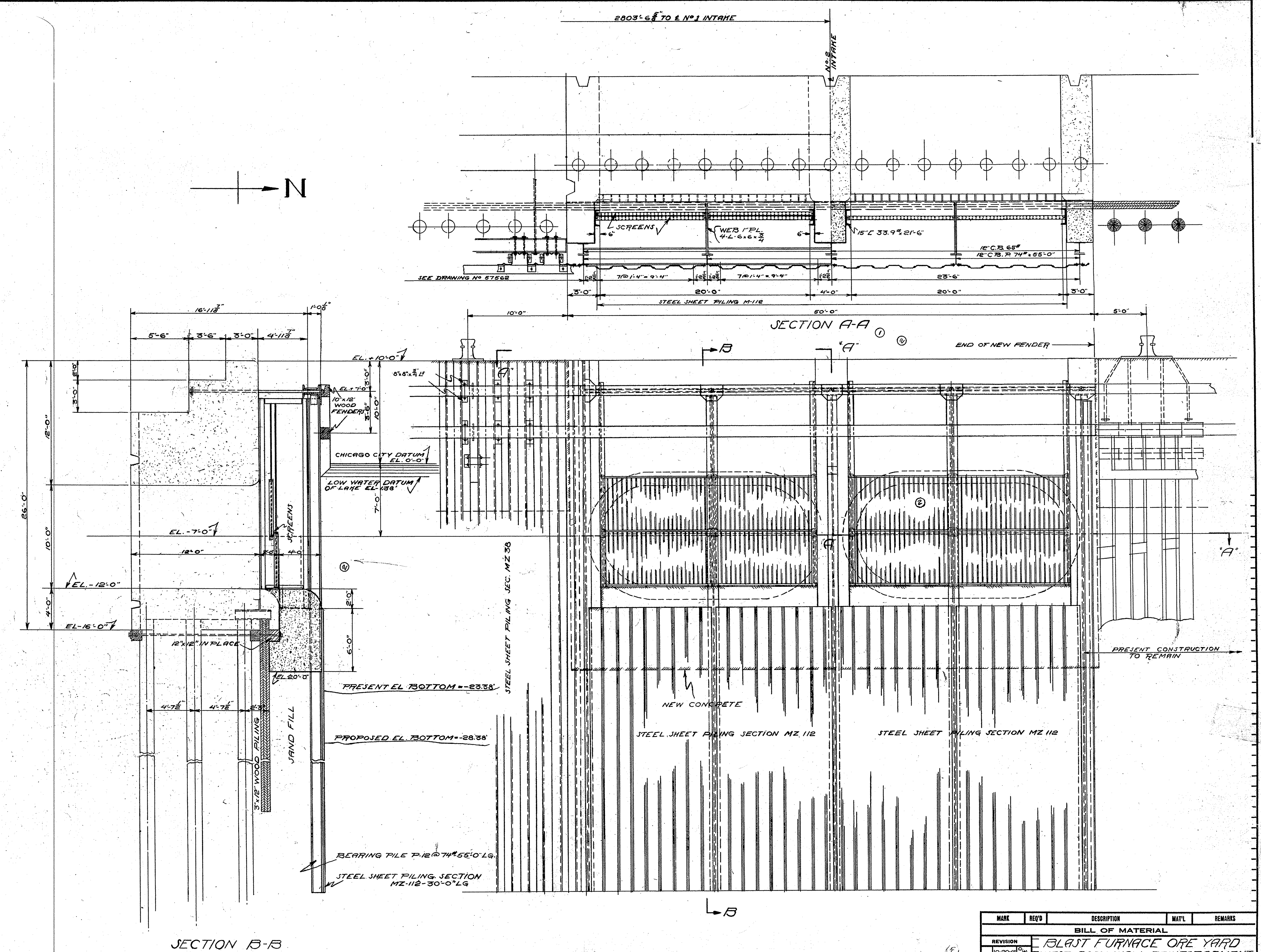
PUMPING STATION #2
TRAVELING SCREENS
GEN'L ARR'G'T OF TROUGH, HOUSING, 10" & 12" SUCTION PIPE
[redacted]
U.S. STEEL CO. GARY WORKS

MADE BY T.R. SCALE 1/4" & 1 1/2" = 1 FT.
TRACED BY M.P. DATE 8-26-25
CHECKED BY E.R.K.
CHECKED FOR SAFETY

34524

TRACED FROM:-



REFERENCES:

57557 - ERECTION DIAGRAM
57560 - B.F. ORE YARD WEST DOCK WALL UNLOADER TRACK + ORE TROUGH ALTERATION + RENEWALS - PLAN + SECTION

38192 old [illegible]
57570 + A new

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS

BILL OF MATERIAL

REVISION		
1	10-20-41	O.W.F.
2	11-25-41	J.H.W.
3		
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BLAST FURNACE ORE YARD WEST DOCK WALL REINFORCEMENT GEN. ARRG'T + CONSTRUCTION DETAILS AT Nº 2 INTAKE

CARNEGIE-ILLINOIS STEEL CORP.
GARY STEEL WORKS

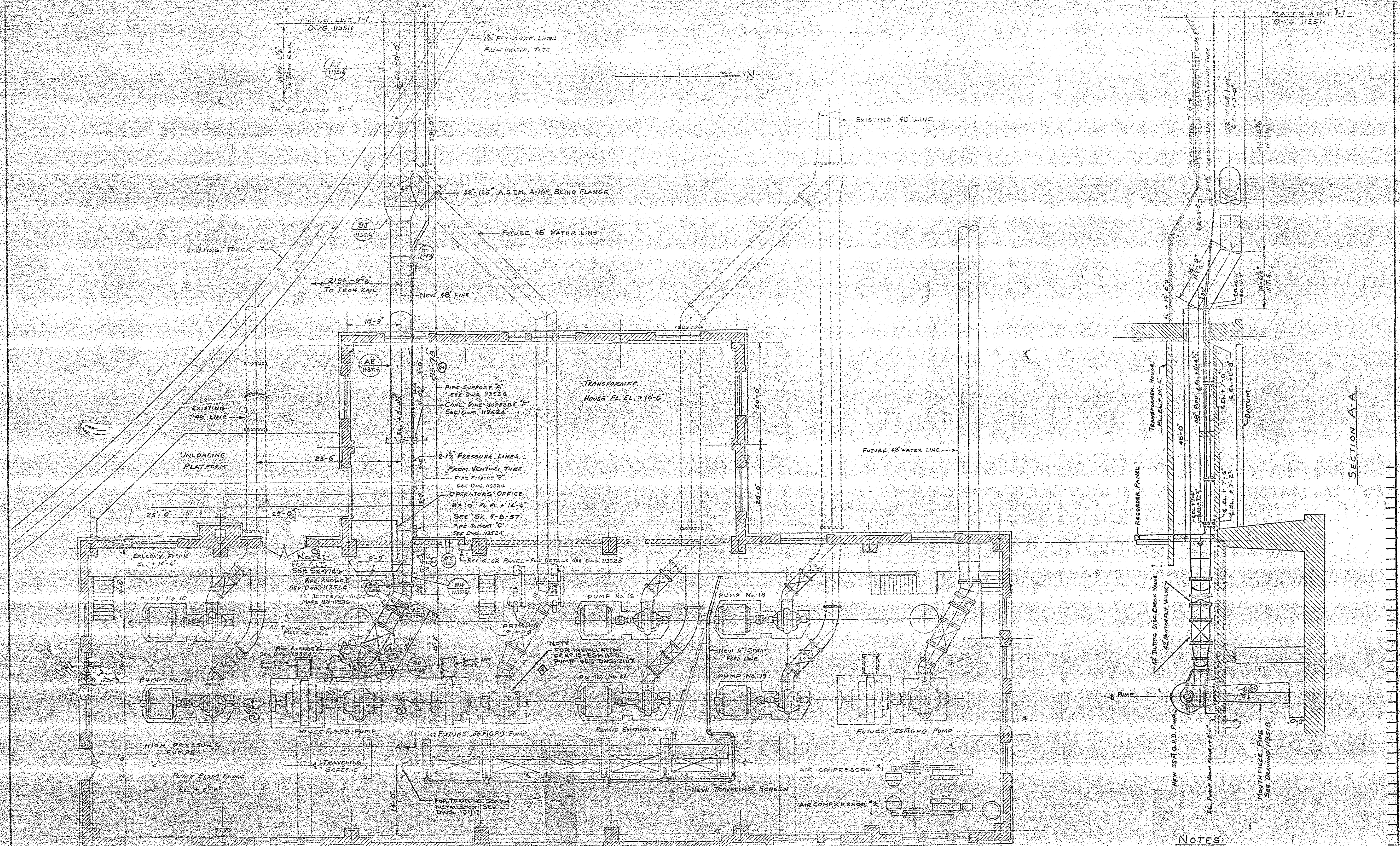
SAFETY USS FIRST

SCALE ¼" = 1 FT.

MADE BY A.A.W.
DATE 7-12-41
CHECKED BY J.G. 9-17-41
TRACED BY ANW B.C.O.W.F. 11-26-41.
CHECKED FOR SAFETY AEFLECK

57563

9/12/42



NOTES:

1. FOR BILL OF MATERIAL SEE DRAWING 113516.
2. THE LOCATIONS OF ALL UNDERGROUND FACILITIES SHOWN ARE APPROXIMATE ONLY AND MUST BE CHECKED IN FIELD BEFORE EXCAVATION.

REFERENCES:

113509 - SERVICE WATER MAIN FROM PUMPING STATION No. 2 TO 45" SLABBING MILL - GENERAL PLAN
113511 - SERVICE WATER MAIN FROM PUMPING STATION No. 2 TO 46" SLABBING MILL - PLAN & ELEVATION
113517 - PUMPING STATION No. 2 - INSTALLATION OF TRAVELING SCREEN - ARRANGEMENT & DETAILS
113518 - PUMPING STATION No. 2 - INSTALLATION OF 55 M.G.D. SERVICE WATER PUMP
113524 - SERVICE WATER MAIN FROM PUMPING STATION No. 2 TO 45" SLABBING MILL - AIR RELEASE VALVE PITS, PIPE SUPPORTS & PIPE ANCHORS - PLAN, SECTION & DETAILS
113525 - PUMPING STATION No. 2 - DISTRIBUTION PANEL - ARRANGEMENT & DETAILS

UNITED STATES STEEL CORPORATION
GENERAL OFFICE - CONSTRUCTION ENGINEERING

APPD. -
WORKS AUTH. -

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE

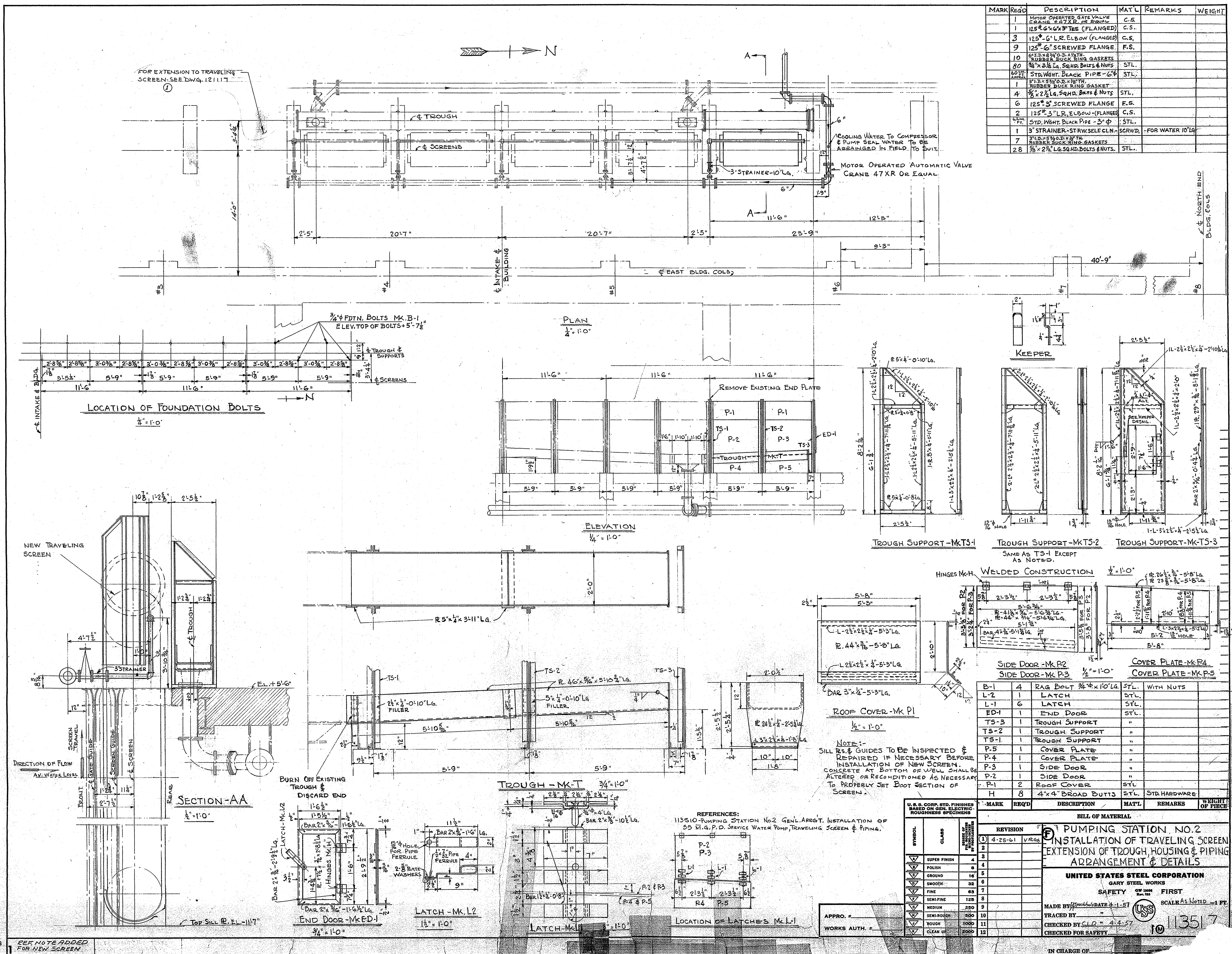
BILL OF MATERIAL

REVISION
1 C.L. DAY
2 J. KERR

PUMPING STATION No. 2
GENERAL ARRANGEMENT
INSTALLATION OF 55 MGPD SERVICE
WATER PUMP TRAVELING SCREEN & PIPING

UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY FIRST
SCALE ⅛" = 1 FT.

113510



MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT
	1	MOTOR OPERATED GATE VALVE CRANE #47XR. OR EQUAL	C.S.		
	1	125# 6"x6"x3" TEE (FLANGED)	C.S.		
	3	125# - 6" L.R. ELBOW (FLANGED)	C.S.		
	9	125# - 6" SCREWED FLANGE	F.S.		
	10	6" I.D. x 8 3/4" O.D. x 1/8 TH. RUBBER DUCK RING GASKETS			
	80	3/4" x 3 1/4" LG. SQ. HD. BOLTS & NUTS	STL.		
	60 LIN. FT. APPROX.	STD. WGHT. BLACK PIPE - 6" φ	STL.		
	1	3" I.D. x 5 3/8" O.D. x 1/8" TH. RUBBER DUCK RING GASKET			
	4	5/8" x 2 1/2" LG. SQ. HD. BOLTS & NUTS	STL.		
	6	125# - 3" SCREWED FLANGE	F.S.		
	2	125# - 3" L.R. ELBOW - (FLANGED)	C.S.		
	6 LIN. FT.	STD. WGHT. BLACK PIPE - 3" φ	STL.		
	1	3" STRAINER - ST. RW. SELF CLN. -	SCRWD.	- FOR WATER 10" LG	
	7	3" I.D. x 5 3/8 O.D. x 1/8" TH. RUBBER DUCK RING GASKETS			
	28	5/8" x 2 1/2" LG. SQ. HD. BOLTS & NUTS.	STL.		

NOTE:-
SILL PLS. & GUIDES TO BE INSPECTED & REPAIRED IF NECESSARY BEFORE INSTALLATION OF NEW SCREEN.
CONCRETE AT BOTTOM OF WELL SHALL BE ALTERED OR RECONDITIONED AS NECESSARY TO PROPERLY SET BOOT SECTION OF SCREEN.

REFERENCES:
113510 - PUMPING STATION No.2 GENL. ARRGT. INSTALLATION OF 55 M.G.P.D. SERVICE WATER PUMP, TRAVELING SCREEN & PIPING.

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE
B-1	4	RAG BOLT 3/4" φ x 1'-0" LG.	ST'L.	WITH NUTS	
L-2	1	LATCH	ST'L.		
L-1	6	LATCH	ST'L.		
ED-1	1	END DOOR	ST'L.		
TS-3	1	TROUGH SUPPORT	"		
TS-2	1	TROUGH SUPPORT	"		
TS-1	1	TROUGH SUPPORT	"		
P-5	1	COVER PLATE	"		
P-4	1	COVER PLATE	"		
P-3	1	SIDE DOOR	"		
P-2	1	SIDE DOOR	"		
P-1	2	ROOF COVER	ST'L		
H	8	4"x4" BROAD BUTTS	ST'L.	STD. HARDWARE	

BILL OF MATERIAL

U.S.S. CORP. STD. FINISHES BASED ON GEN. ELECTRIC ROUGHNESS SPECIMENS

SYMBOL	CLASS	DEGREE OF FIN. ROUGHNESS MICRO-INCHES BY PROFILOMETER
A	SUPER FINISH	4
B	POLISH	8
C	GROUND	16
D	SMOOTH	32
E	FINE	63
F	SEMI-FINE	125
G	MEDIUM	250
H	SEMI-ROUGH	500
J	ROUGH	1000
K	CLEAN UP	2000

REVISION		
1	4-25-61	VRG
2		
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REVISIONS MEMO
1 REF. NOTE ADDED FOR NEW SCREEN

APPRO. #
WORKS AUTH. #

F

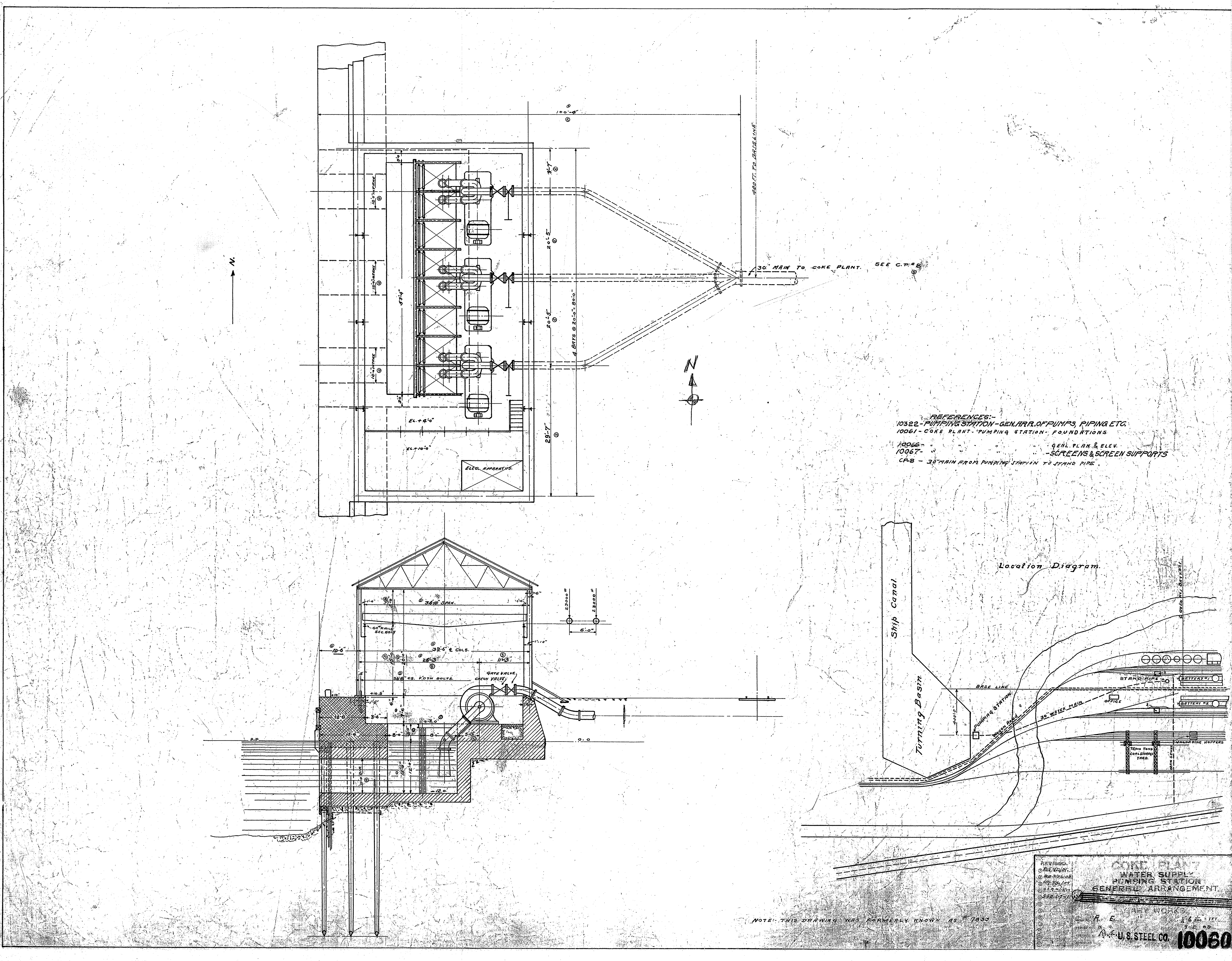
PUMPING STATION NO.2
INSTALLATION OF TRAVELING SCREEN
EXTENSION OF TROUGH, HOUSING & PIPING ARRANGEMENT & DETAILS

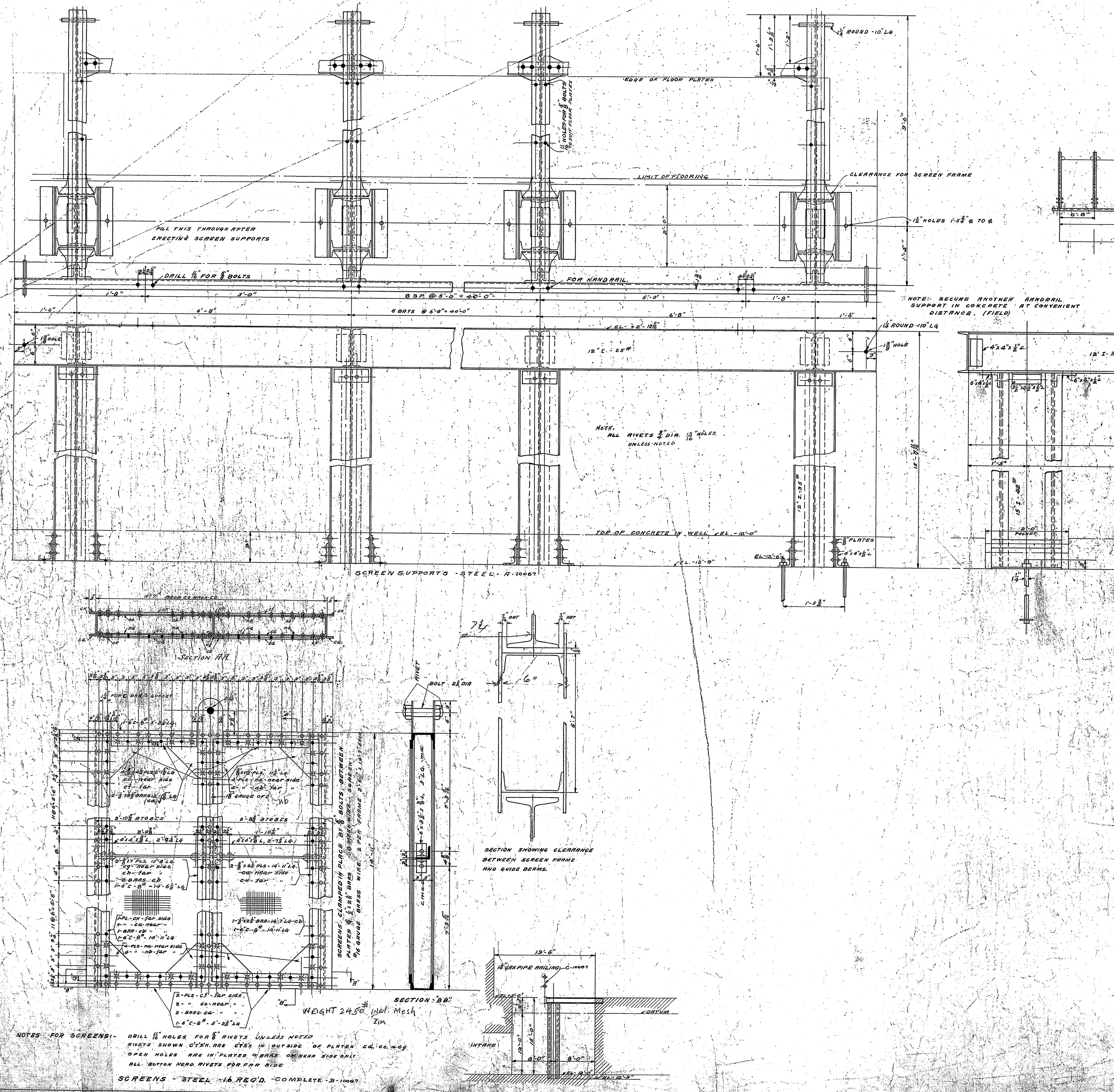
UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY GW 19086 Rev. 253 FIRST

MADE BY HASpeckhals DATE 4-1-57
TRACED BY "
CHECKED BY C.L.D. " 4-4-57
CHECKED FOR SAFETY
SCALE As Noted = 1 FT.
USS
M 113517
IN CHARGE OF

RAMBOLL

DETAILED DRAWINGS – NO. 3 PUMP STATION

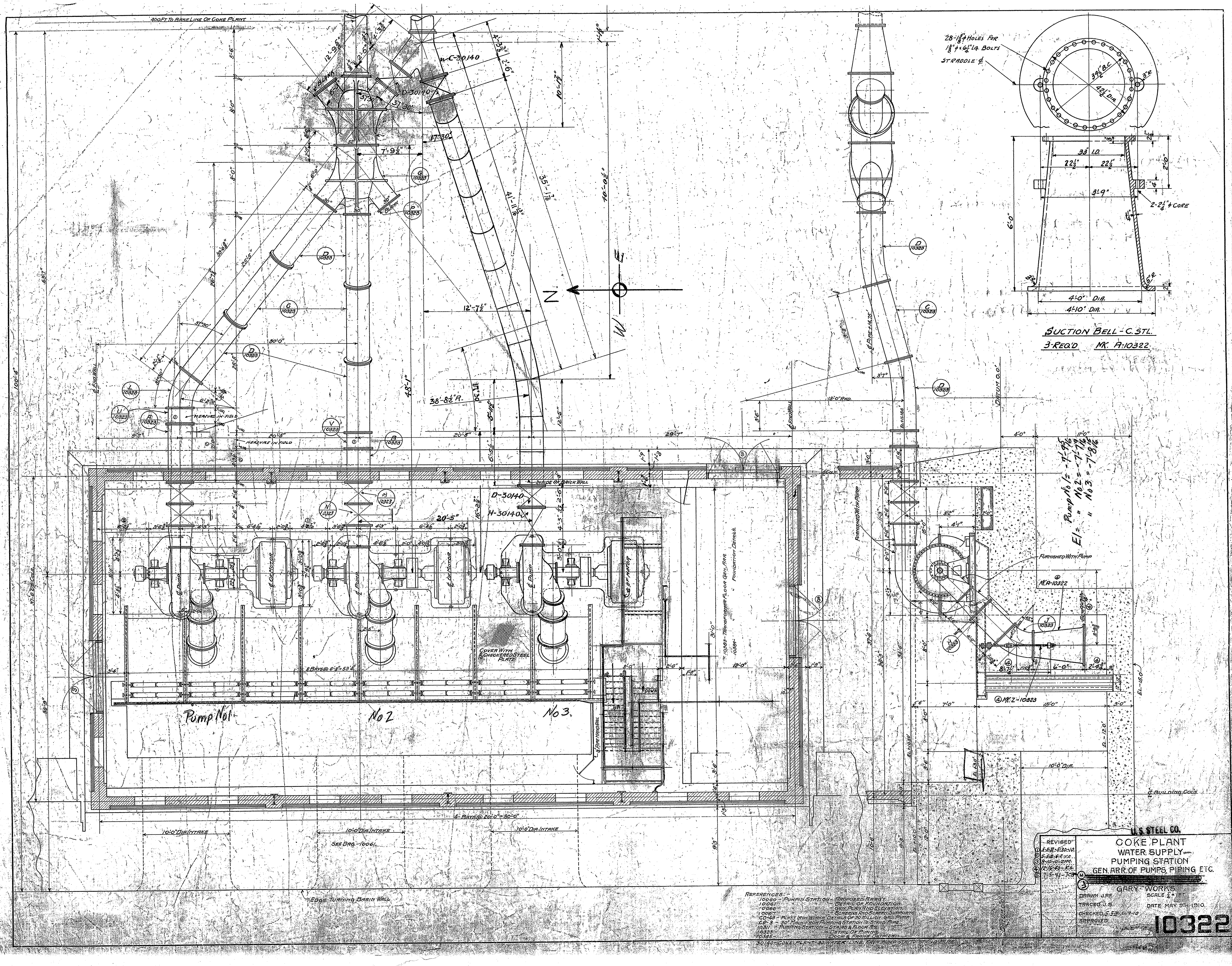

N.
100'-0"
400 FT. TO BASE LINE
30" MAIN TO COKE PLANT. SEE C.P. #8
4 BAYS @ 20'-0" = 80'-0"
EL. +4'-0"
EL. +10'-0"
ELEC. APPARATUS.
N
REFERENCES:-
10322-PUMPING STATION-GEN.ARR.OF PUMPS, PIPING ETC.
10061-COKE PLANT-PUMPING STATION-FOUNDATIONS
10066- " " " " -GENL. PLAN & ELEV.
10067- " " " " -SCREENS & SCREEN SUPPORTS
CP-8 - 30" MAIN FROM PUMPING STATION TO STAND PIPE.
36'-0" SPAN.
60" RAILS
32'-6" ℄ COLS.
GATE VALVE.
CHECK VALVE.
Location Diagram.
Ship Canal
Turning Basin
PUMPING STATION
30" WATER MAIN
BASE LINE
STAND PIPE
OFFICE
BATTERY #1
BATTERY #2
UNLOADING HOPPERS
NOTE: THIS DRAWING WAS FORMERLY KNOWN AS #7833
REVISED.
RWE 4/22/09.
HEG 9/26/09
HEG 9/30/09
HEG 10/18/09
SSB 6-2-10
COKE PLANT
WATER SUPPLY
PUMPING STATION
GENERAL ARRANGEMENT.
GARY WORKS
A. E.
H. G.
1/8" & 1/300" = 1 FT.
9-2-09
U.S. STEEL CO.
10060



BILL OF MATERIAL.

MARK	No. RQD.	DESCRIPTION	MATL.	REMARKS.	WGT.
A-10067	1	SET OF SCREEN SUPPORTS	STEEL	COMPLETE.	
B-10067	16	SCREENS	"	"	

COKE PLANT
PUMPING STATION
SCREENS AND SCREEN SUPPORTS
[redacted]
GARY WORKS
GREGG
H.L.B.
W.P.J.
1/8", 1" & 3" = 1'-0"
10/21/09
U.S. STEEL CO. 10067


400 FT. TO BASE LINE OF COKE PLANT
28-1 3/8" ϕ HOLES FOR 1 1/8" ϕ × 6 1/4" LG. BOLTS STRADDLE ℄
SUCTION BELL - C. STL.
3-REQ'D MK. A-10322
33" I.D.
4'-0" DIA.
4'-10" DIA.
2-2 1/4" ϕ CORE
C-30140
D-30140
H-30140
MEASURE IN FIELD
INSIDE OF BRICK WALL
FURNISHED WITH PUMP
MK. A-10322
MK. Z-10323
COVER WITH CHECKERED STEEL PLATE
8 BAYS @ 6'-6" = 53'-6"
4-BAYS @ 20'-0" = 80'-0"
10'-0" DIA. INTAKE
SEE DRG. - 10061
EDGE TURNING BASIN WALL
℄ BUILDING COLS.
DATUM 0.0'
Pump No 1
No 2
No 3.
Pump No 1 = 7'-9 5/16"
El = " No 2 = 7'-7 1/16"
" No 3 = 7'-8 1/16"
REFERENCES: -
10060 - PUMPIN STATION - PROPOSED ARRG'T.
10061 - " " - DETAIL OF FOUNDATION.
10066 - " " - GEN. PLAN AND ELEVATION.
10067 - " " - SCREENS AND SCREEN SUPPORTS.
CD-49 - PLATT IRON WORKS DETAILS OF 30 MILLION GAL. PUMP
CP-8 - 30" MAIN FROM PUMPING STATION TO STAND PIPE.
10311 - PUMPING STATION - STAIRS & FLOOR P'LS.
10323 - " " - DETAIL OF PIPING.
10385 - " " - DOOR & FRAME DETAILS.
30140 - COKE PLANT - 30" WATER LINE FROM PUMP STA. TO STAND PIPE.
U.S. STEEL CO.
REVISED
1 5-5-B-5-30-10.
2 5-5-B-6-2-10.
3 8-10-10-ZIM.
4 12-16-40-K.S.
5 7-5-41-JCB
COKE PLANT
WATER SUPPLY
PUMPING STATION
GEN. ARR. OF PUMPS, PIPING ETC.
[redacted]
GARY WORKS
DRAWN J.P.F.
SCALE 1/4" = 1 FT.
TRACED J.S.
DATE MAY 9TH 1910.
CHECKED 5-5-B-5-19-10
APPROVED
10322

DETAILED DRAWINGS – NO. 4 PUMP STATION

	Hatchway Cover
558	Specifications
40	Dock Intake
9	Location of Intake In Dock
BM-368	Bill of Material
References	

Table of Quantities

Mat'l	Quantity	Remarks
	Per lin. ft. 1"	
Concrete	5.6 Cu. yds	Quantities refer
Steel	135 #	To Sec. B-B

Revisions

Rev	No.	Date	By
1	2	5-3-24	G.M.
2	2	3-30-25	[illegible]
3			
4			
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7			
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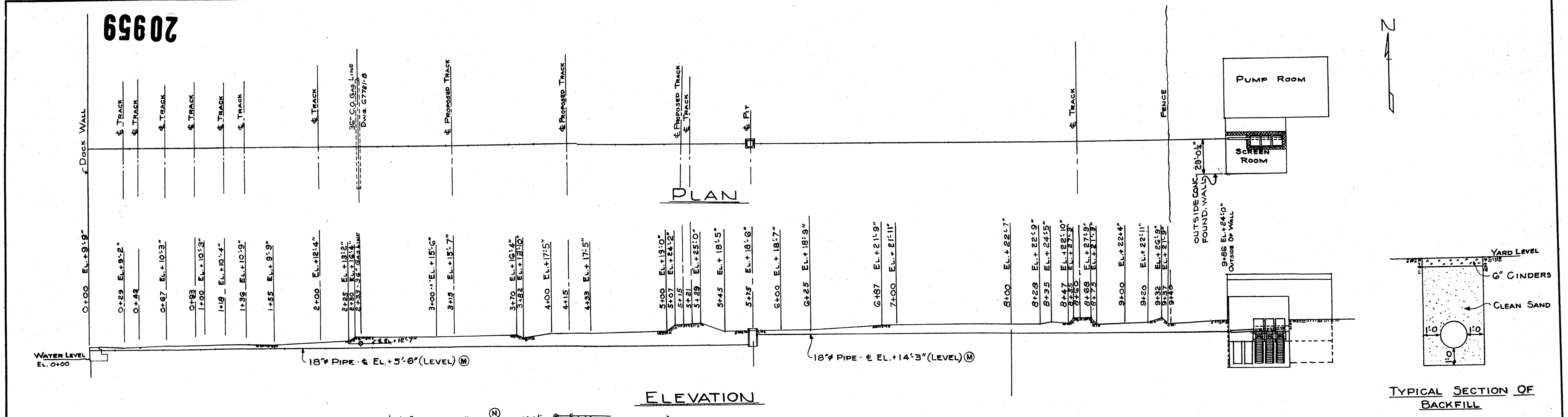
10			
11			

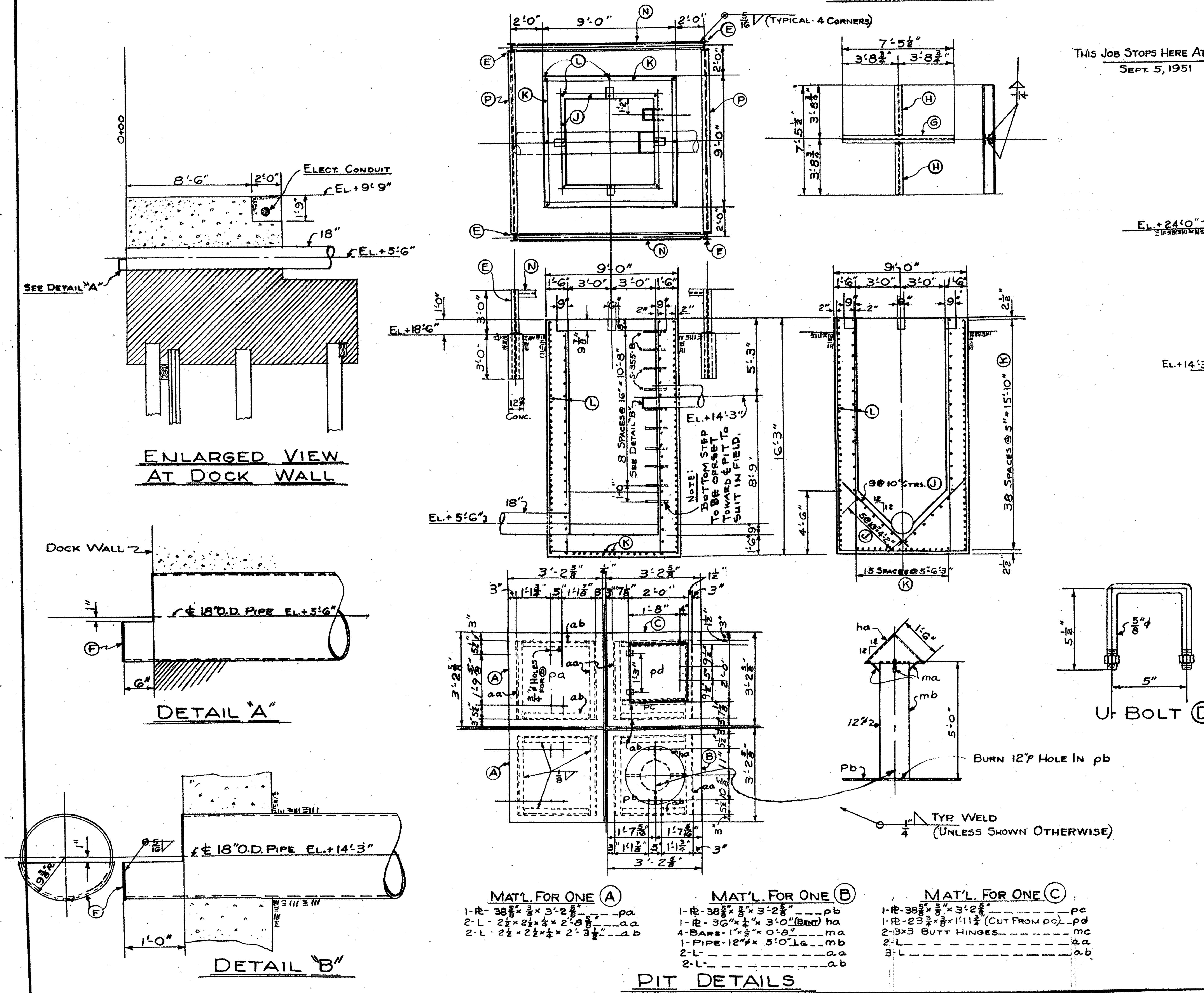
700

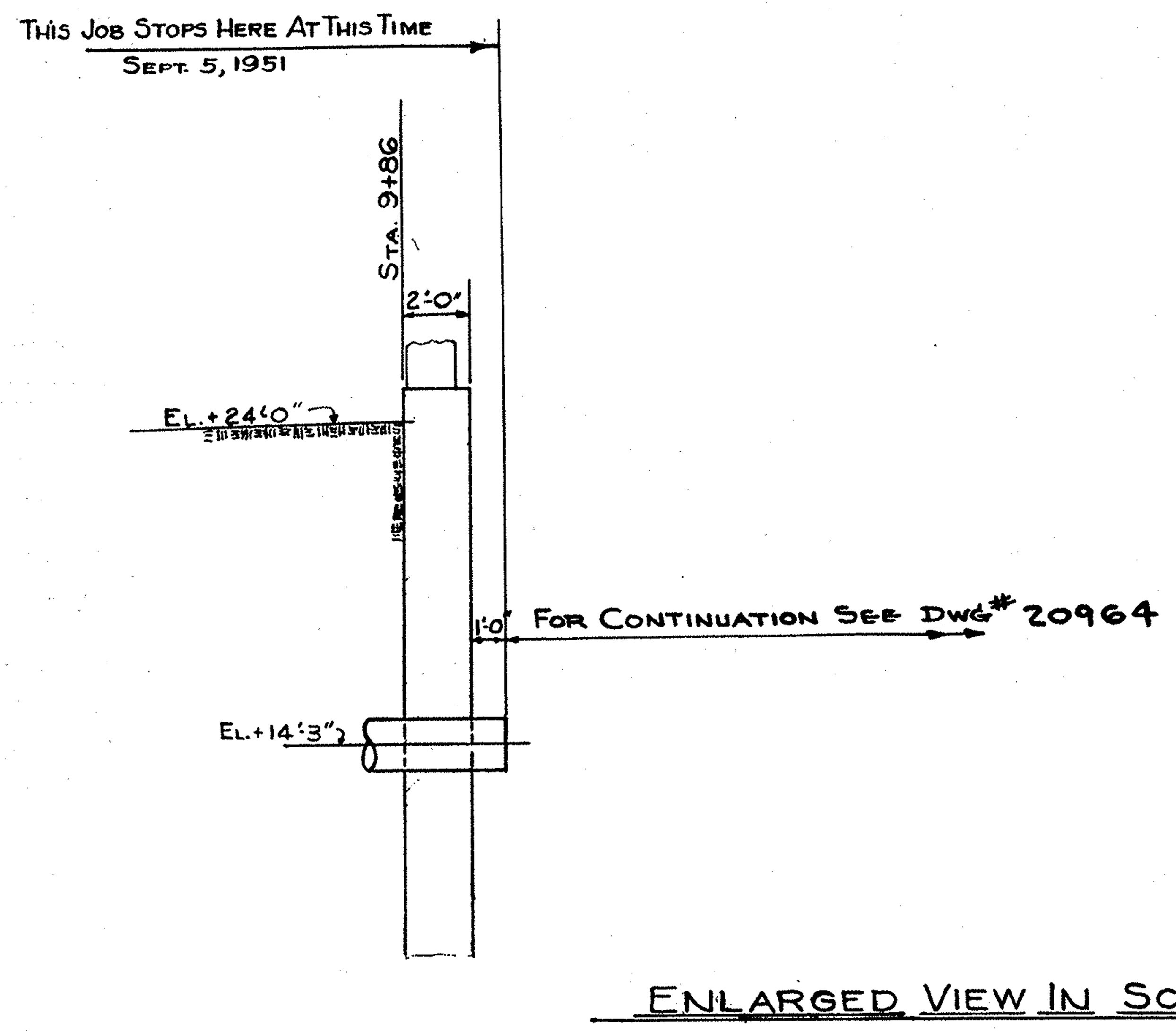
GARY TUBE COMPANY

General -
Low Pressure Water System
Dock Intake & Conduits (A-23)
Arrg't & Details

DRAWN 4-19-23 A.S.L. CHECKED [illegible]
CHECKED FOR SAFETY
CHIEF ENG.
DEPT. SUPT.
SCALE 1" = 10'-0" & 1" = 100'-0"







Note:
Check For Underground Conduits & Pipes.

Paint Note:
Shop - One Coat #2580 Red Lead Paint.
Field - One Coat #518 Red Iron Oxide.
One Coat #540 Dark Brown Iron Oxide
Guard Rail To Recieve One Coat #2630 Yellow Paint.

Total Quantities	
Excavation	5,686 Cu. Yd.
Backfill	5,560 Cu. Yd.
Old Conc. To Be Removed	4 Cu. Yd.
New Conc.	35 Cu. Yd.
Forms	1,885 Sq Ft.
Reinf. Rod	1.8 Tons

References
Bk-2142-A-Gary Tube Co. Misc. Prints
20960-C.P.-Add. Serv. Water Facilities - Steelwork - Arr'g't.
20961-C.P. " " " " " - Details
20962-C.P. " " " " - Tank - Details
20963-C.P. " " " " - Piping - Arr'g't & Details
20964-C.P. " " " " - " Details

Rev.	Mark	Req'd	Description	Mat'l	Remarks	Weight of Piece
1	P-20959	2	Rails 13'-0" Lg.	St'l	Use Scrap Rails	
1	N-20959	2	Rails 13'-0" Lg.	St'l	Use Scrap Rails Cope To Suit In Field	
*1	S-355-B	10	St'd. Pit Steps	C.I		
	M-20959	985	Lin.Ft. 18"∅ Pipe - ⅜" Thk.	St'l.	Bevel For Welding	
	L-20959	16	½" Spacing Rods × 16'-0" Lg.	St'l.		
1	K-20959	188	¾" Reinf. Rods × 8'-8" Lg	St'l.		
1	J-20959	98	¾"∅ Reinf. Rods × 6'-6" Lg.	St'l.		
	H-20959	2	10"WF21# × 3'-8½"	St'l	One End Coped To Fit 10WF21	
	G-20959	1	10"WF21# × 7'-5½"	St'l		
1	F-20959	2	℞-8⅜" × ⅜" × 1'-6¾"	St'l	See Details "A" & "B"	
1	E-20959	4	Rails × 6'-0" Lg.	St'l.	Use Scrap Rails	
	D-20959	7	U-Bolts	St'l	See Detail	
1	C-20959	1	Pit Cover	St'l		
1	B-20959	1	Pit Cover	St'l.		
1	A-20959	2	Pit Cover	St'l.		

Bill of Material

Revision		
1	9-7-51	K.E.W.
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

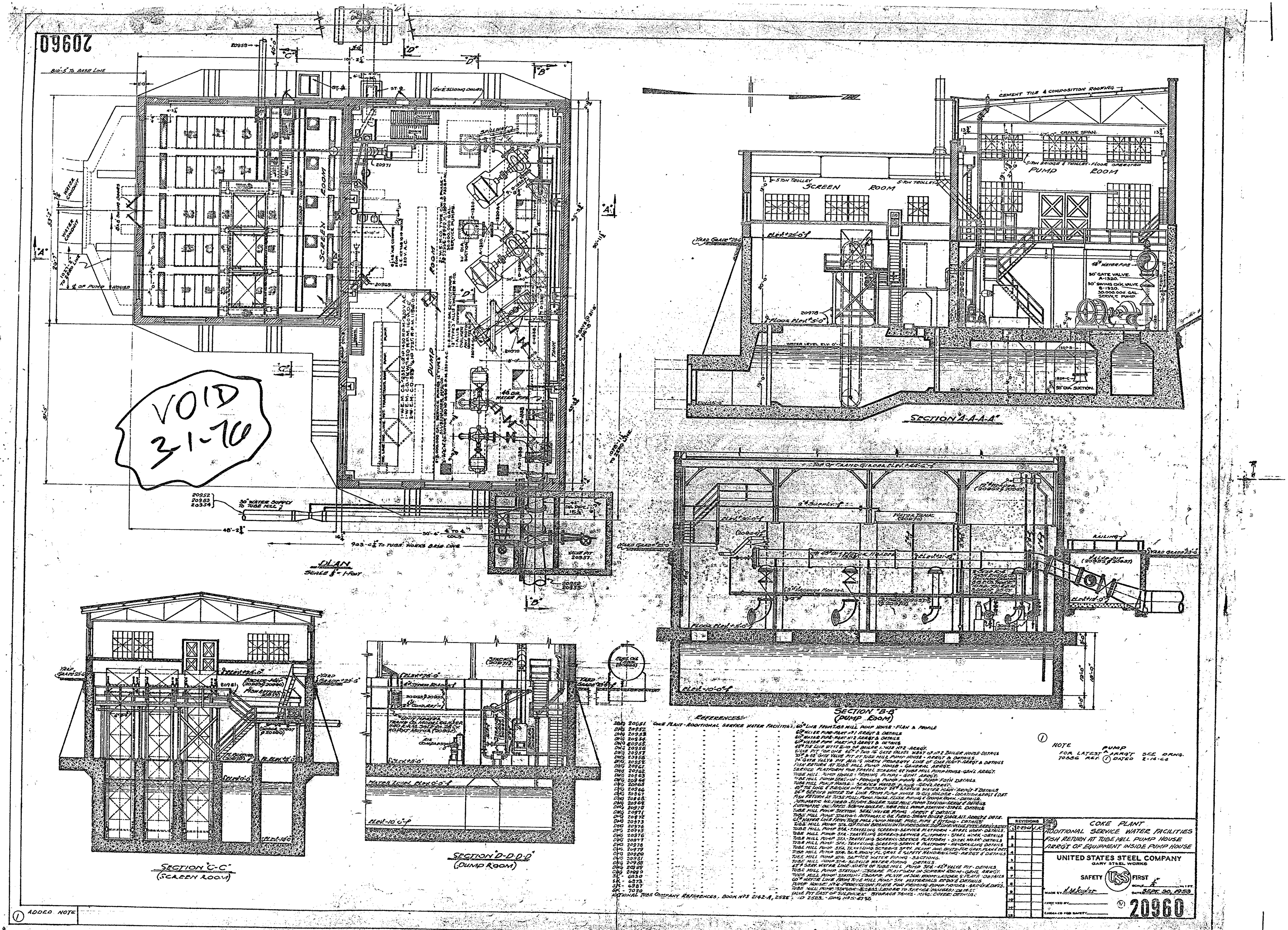
Coke Plant
Additional Service Water Facilities
Fish Return At Tube Mill. Pump House
General Arr'g't.

United States Steel Corporation
Gary Steel Works
GW 19006
Safety First
Made by KEW Date 8-29-51
Traced by "
Checked by [illegible] 9-7-51
Checked for safety CHR
Scale 1/40", 1/4", 1" = 1 Ft.

20959

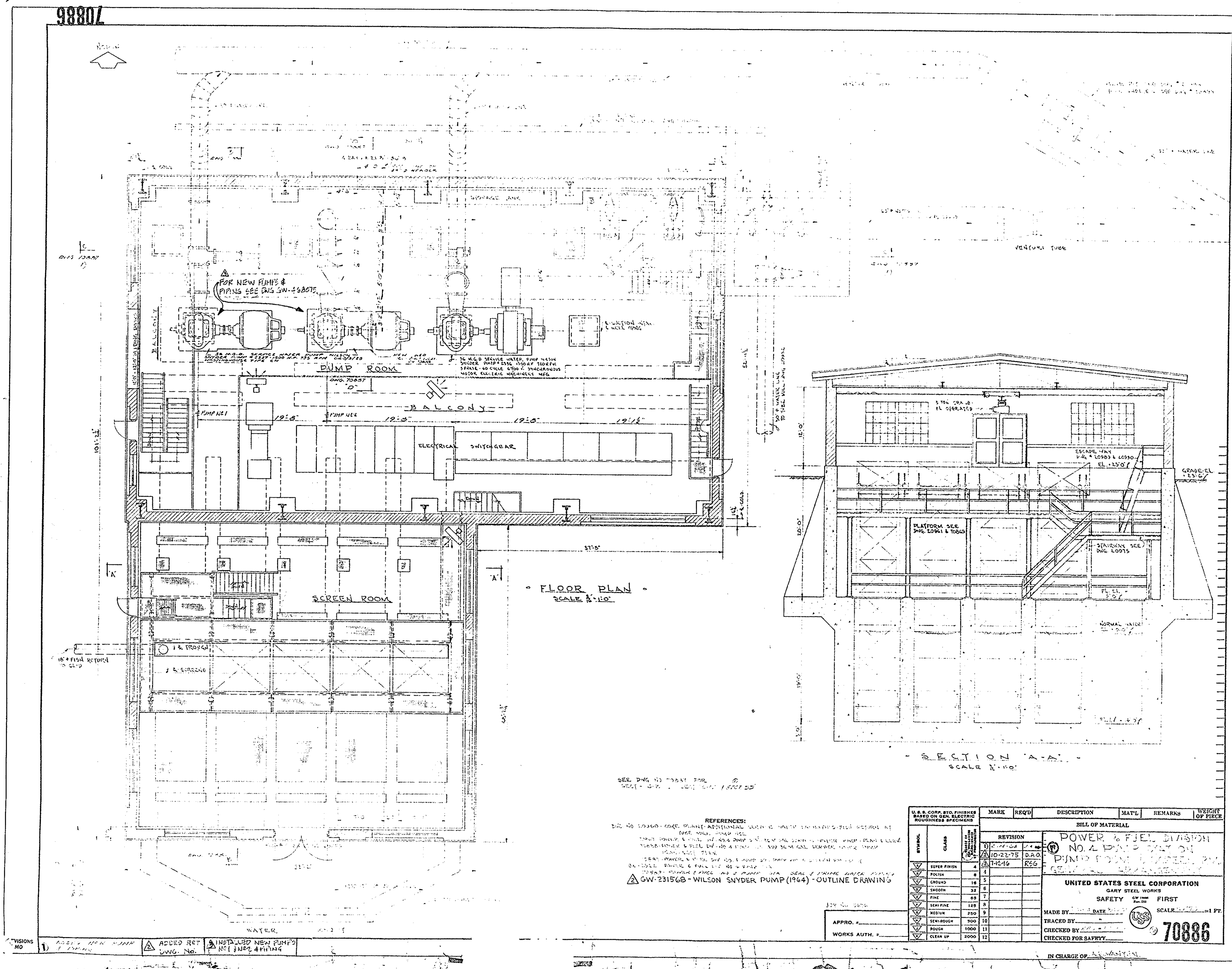
In charge of Rittenhouse

Revisions Memo 1



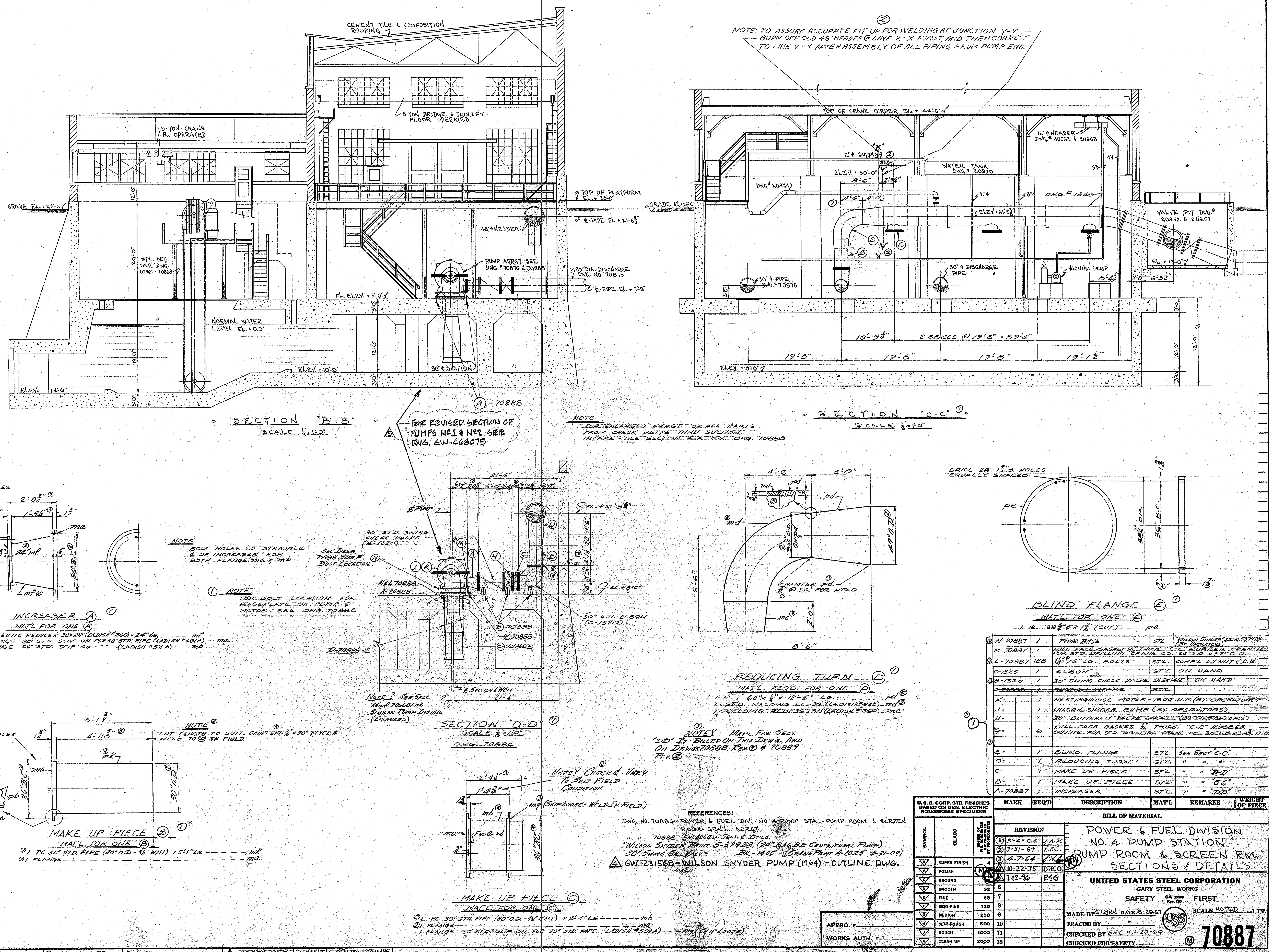
20960
VOID 3-1-76
SCREEN ROOM
PUMP ROOM
PLAN
SCALE 1/8" = 1-FOOT
SECTION "A-A-A-A"
SECTION "B-B" (PUMP ROOM)
SECTION "C-C" (SCREEN ROOM)
SECTION "D-D-D-D" (PUMP ROOM)
CEMENT TILE & COMPOSITION ROOFING
CRANE SPAN
PUMP ROOM
SCREEN ROOM
YARD GRADE 25'-6"
48" WATER PIPE
30" GATE VALVE. A-1320.
30" SWING CHK. VALVE B-1320.
30,000,000 GAL. SERVICE PUMP
55" DIA. SUCTION.
30" WATER SUPPLY TO TUBE MILL
VALVE PIT 20957
FUEL OIL TANK
ELEV.-10'-0"
REFERENCES:
DWG 20951 COKE PLANT - ADDITIONAL SERVICE WATER FACILITIES: 60" LINE FROM TUBE MILL PUMP HOUSE - PLAN & PROFILE
DWG 20952 60" WATER PIPE - PART Nº1 ARRGT & DETAILS
DWG 20953 60" WATER PIPE - PART Nº2 ARRGT & DETAILS
DWG 20954 60" WATER PIPE PART Nº3 ARRGT & DETAILS
DWG 20955 48" TIE LINE WEST END OF BOILER HOUSE Nº2 - ARRGT.
DWG 20956 VALVE PIT FOR ONE 48" & TWO 16" GATE VALVES WEST OF Nº2 BOILER HOUSE - DETAILS
DWG 20957 30" & 42" GATE VALVE PIT AT TUBE MILL PUMP HOUSE - ARRGT & DETAILS
DWG 20958 24" GATE VALVE PIT ALONG NORTH PROPERTY LINE OF COKE PLANT - ARRGT & DETAILS
DWG 20959 FISH RETURN AT TUBE MILL PUMP HOUSE - GENERAL ARRGT.
DWG 20961 SERVICE PLATFORM FOR TRAVEL SCREEN AT TUBE MILL PUMP HOUSE - GEN'L ARRGT.
DWG 20962 TUBE MILL PUMP HOUSE - PRIMING PUMPS - GEN'L ARRGT.
DWG 20963 TUBE MILL PUMP STATION - PRIMING PUMP PIPING & PUMP FDTN DETAILS
DWG 20964 TUBE MILL PUMP HOUSE - SERVICE WATER PIPING - GEN'L ARRGT.
DWG 20965 40" TIE LINE & BRANCH INTO PRESENT 24" SERVICE WATER MAIN - ARRGT & DETAILS
DWG 20966 24" SERVICE WATER TIE LINE FROM PUMP HOUSE TO GAS HOLDER - LOCATION ARRGT & DET.
DWG 20967 FISH RETURN AT TUBE MILL PUMP HOUSE, FLUSH. PIPING & TROUGH CONN. - DETAILS.
DWG 20968 AUTOMATIC OIL FIRED STEAM BOILER TUBE MILL PUMP STATION - ARRGT & DETAILS
DWG 20969 AUTOMATIC OIL FIRED STEAM BOILER TUBE MILL PUMP STATION - STEEL DETAILS
DWG 20970 TUBE MILL PUMP STATION SEAL WATER PIPING - ARRGT & DETAILS
DWG 20971 TUBE MILL PUMP STATION - AUTOMATIC OIL FIRED STEAM BOILER STACK ALT. ARRGT & DETS.
DWG 20972 60" WATER LINE FROM TUBE MILL PUMP HOUSE MISC. PIPE & FITTING - DETAILS
DWG 20973 TUBE MILL PUMP STA. 60" TIE-IN BRANCH INTO PRESENT 24" LINE VALVE PIT ARRGT & DET.
DWG 20974 TUBE MILL PUMP STA. - TRAVELING SCREENS - SERVICE PLATFORM - STEEL WORK - DETAILS.
DWG 20975 TUBE MILL PUMP STA. - TRAVELING SCREENS - SERVICE PLATFORM - STEEL WORK - DETAILS
DWG 20976 TUBE MILL PUMP STA. - TRAVELING SCREENS - SERVICE PLATFORM - STEEL WORK - DETAILS
DWG 20977 TUBE MILL PUMP STA. - TRAVELING SCREENS - SERVICE PLATFORM - HANDRAILING DETAILS
DWG 20978 TUBE MILL PUMP STA. TRAVELING SCREENS SERV. PLATF. ANC. BOLTS - FLR GRAT. PLAN & DET.
DWG 20979 TUBE MILL PUMP STA. SCR. ROOM FL. GRAT. & SAFETY HANDRAILING - ARRGT & DETAILS
DWG 20980 TUBE MILL PUMP STA. SERVICE WATER PIPING - SECTIONS.
DWG 20981 TUBE MILL PUMP STA. SERVICE WATER PIPING - DETAILS
DWG 20988 42" SERV. WATER LINE - NORTH OF TUBE MILL PUMP STA. - 42" VALVE PIT - DETAILS.
DWG 20989 TUBE MILL PUMP STATION - ESCAPE PLATFORM IN SCREEN ROOM - GEN'L ARRGT.
DWG 20990 TUBE MILL PUMP STATION - ESCAPE PLATE IN SCR. ROOM LADDER & PLATE DETAILS
SK - 6830 60" WATER LINE FROM TUBE MILL PUMP STA. MATERIALS REQ'D & DETAILS.
SK - 6873 PUMP HOUSE Nº4 - PROTECTION PLATE FOR PRIMING PUMP MOTORS - ARRGT & DETS.
SK - 6987 TUBE MILL PUMP STATION - ACCESS LADDER TO SERVICE AUXILIARY DETAILS
SK - 7020 VALVE PIT EAST OF SULPHURIC STORAGE TANKS - MISC. COVER DETAILS
NATIONAL TUBE COMPANY REFERENCES. BOOK NºS 2142-A, 2588, 2523 - DWG NºS 4736
① NOTE FOR LATEST PUMP ARRG'T SEE DRWG. 70686 REV. ① DATED 2-14-64
① ADDED NOTE
REVISIONS
① 2-25-64 J.K.
COKE PLANT
ADDITIONAL SERVICE WATER FACILITIES
FISH RETURN AT TUBE MILL PUMP HOUSE
ARRG'T OF EQUIPMENT INSIDE PUMP HOUSE
UNITED STATES STEEL COMPANY
GARY STEEL WORKS
SAFETY USS FIRST
SCALE 1/8" = 1 FT.
MADE BY H.M. Kunze
DATE SEPT. 30, 1953
CHECKED BY
CHECKED FOR SAFETY
20960


70868
NORTH
PUMP ROOM
SEE DRWG. #P-11223-A
12" I TO BE REMOVED
12" I @ 40.8#
SCREEN ROOM
PRES. L6-3"×2½"×¼" TO BE REMOVED & BEAM (A) TO BE INSTALLED
℄ TRUSS
℄ TROUGH
℄ SCREENS
FUTURE SCREEN
ADDITIONAL SCREEN
PRESENT SCREENS
FLOOR GRATING
FLOOR PLAN
SCALE ¼" = 1 FT.
SECTION A-A
EL. + 25'-0
TOP OF PLATFORM EL. + 18'-0
℄ 18" DIA. PIPE EL. + 14'-3 FISH RETURN
SCREEN ROOM
FLOOR EL. + 5'-0
3-TON CRANE FLOOR OPERATED
GRADE EL. + 23'-6
℄ SPROCKET
ALTERATIONS TO STAIRS & PLATFORMS
℄ TROUGH & FISH RETURN
FLOOR LINE EL. + 5'-0
NORMAL WATER LEVEL EL. 0'-0
FRONT OF SCREEN
REAR
DIRECTION OF TRAVEL
DIRECTION OF FLOW
TO PUMPS
EL. - 10'-0
EL. - 14'-0
SECTION B-B
SCALE ¼" = 1 FT.
12" I @ 40.8# × 15'-10½" LG.
CUT & CHIP
BEAM (A)
REFERENCES:
P-11223 A - No. 4 PUMP STA. - 3GM GPD SERVICE WATER PUMP.
20961 - No 4 PUMP STA. - SCREEN ROOM - PRES. ARRGT.
A-70868 | 2 | BEAMS | STEEL | SEE DETAIL
MARK | REQ'D | DESCRIPTION | MAT'L | REMARKS | WEIGHT OF PIECE
BILL OF MATERIAL
U.S.S. CORP. STD. FINISHES BASED ON GEN. ELECTRIC ROUGHNESS SPECIMENS
SUPER FINISH 4; POLISH 8; GROUND 16; SMOOTH 32; FINE 63; SEMI-FINE 125; MEDIUM 250; SEMI-ROUGH 500; ROUGH 1000; CLEAN UP 2000
REVISION
1 9-27-56 FJK
2 3-26-57 FJK
3 5-23-57 S.L.
POWER & FUEL DIV.
No. 4 PUMP STATION
ADD'NAL TRAVELING SCREENS
PLAN & SECTIONS
UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY FIRST
MADE BY FJKRANE DATE 4-23-56
SCALE ¼" = 1 FT.
TRACED BY
CHECKED BY
CHECKED FOR SAFETY
IN CHARGE OF LEVANTHAL
APPRO. #
WORKS AUTH. #
70868
REVISIONS MEMO
1 DIMENSIONS AT ROOF TRUSSES AND CRANE BEAMS ADDED.
3 CRANE RUNWAY DIM. ADDED



70886
FOR NEW PUMPS & PIPING SEE DWG GW-168075
PUMP ROOM
BALCONY
ELECTRICAL SWITCHGEAR
PUMP No.1
PUMP No.2
19'-8"
19'-8"
19'-8"
19'-1½"
101'-2¾"
37'-5"
SCREEN ROOM
FLOOR PLAN
SCALE ⅛"=1'-0"
"A"
"A"
WATER
VENTURI TUBE
PLATFORM SEE DWG. 70963 & 70963
STAIRWAY SEE DWG. 70975
GRADE EL
SECTION 'A-A'
SCALE ⅛"=1'-0"
SEE DWG NO 70837 FOR
REFERENCES:
GW-231568 - WILSON SNYDER PUMP (1964) - OUTLINE DRAWING
U.S.S. CORP. STD. FINISHES BASED ON GEN. ELECTRIC ROUGHNESS SPECIMENS
SYMBOL
CLASS
SUPER FINISH 4
POLISH 8
GROUND 16
SMOOTH 32
FINE 63
SEMI FINE 125
MEDIUM 250
SEMI-ROUGH 500
ROUGH 1000
CLEAN UP 2000
MARK
REQ'D
DESCRIPTION
MAT'L
REMARKS
WEIGHT OF PIECE
BILL OF MATERIAL
REVISION
10-22-75 D.A.O.
7-12-76 RSG
POWER & FUEL DIVISION
NO. 4 PUMP STATION
UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY FIRST
MADE BY
DATE
SCALE
=1 FT.
TRACED BY
CHECKED BY
CHECKED FOR SAFETY
70886
APPRO. #
WORKS AUTH. #
IN CHARGE OF
REVISIONS NO
ADDED DWG. No.
INSTALLED NEW PUMPS No1 & No2 & PIPING

70887



NOTE: FOR ENLARGED ARRG'T. OF ALL PARTS FROM CHECK VALVE THRU SUCTION INTAKE - SEE SECTION "A-A" ON DWG. 70888

NOTE: BOLT HOLES TO STRADDLE ℄ OF INCREASER FOR BOTH FLANGES ma & mb

① NOTE: FOR BOLT LOCATION FOR BASEPLATE OF PUMP & MOTOR SEE DWG. 70888

NOTE ②: CUT LENGTH TO SUIT, GRIND END 3/8" x 30° BEVEL & WELD TO ⑥ IN FIELD.

NOTE ③: CHECK & VARY TO SUIT FIELD CONDITION

NOTE ③: MAT'L FOR SECT. "DD" IS BILLED ON THIS DWG. AND ON DWGS. 70888 REV. ② & 70889 REV. ②

INCREASER Ⓐ: ③ 1 CONCENTRIC REDUCER 30"x24" (LADISH #260) x 24" LG. - - - mf; ③ 1 FLANGE 30" STD. SLIP ON FOR 30" STD. PIPE (LADISH #501A) - - ma; 1 FLANGE 24" STD. SLIP ON - - - - (LADISH #501A) - - mb

MAKE UP PIECE Ⓑ: ③ 1 PC. 30" STD. PIPE (30" O.D. - 3/8" WALL) x 5'-1" LG. - - - mk; ③ 1 FLANGE - - - ma

MAKE UP PIECE Ⓒ: ③ 1 PC. 30" STD. PIPE (30" O.D. - 3/8" WALL) x 2'-4" LG. - - - mh; ③ 1 FLANGE - - - ma; 1 FLANGE 30" STD. SLIP ON FOR 30" STD. PIPE (LADISH #501A) - - - mg (SHIP LOOSE)

REDUCING TURN Ⓓ: 1 PL. 60" x 1/2" x 12'-5" LG. - - - pd; 1 STD. WELDING EL. 30" (LADISH #940) - md; 1 WELDING RED. 36"x30" (LADISH #260) - mc

REFERENCES:

DWG. NO. 70886 - POWER & FUEL DIV. - NO. 4 PUMP STA. - PUMP ROOM & SCREEN ROOM - GEN'L. ARRGT.
" " 70888 ENLARGED SECT. & DT'LS.
"WILSON SNYDER" PRINT S-37928 (24" BAGBB CENTRIFUGAL PUMP)
30" SWING CK. VALVE BK.-1405 (CRANE PRINT A-1025 3-31-09)
④ GW-231568 - WILSON SNYDER PUMP (1964) - OUTLINE DWG.

MARK	REQ'D	DESCRIPTION	MAT'L	REMARKS	WEIGHT OF PIECE
③ N-70887	1	PUMP BASE	STL.	"WILSON SNYDER" DRWG. 537928 (BY OPERATORS)	
M-70887	1	FULL FACE GASKET 1/16" THICK "C-C" RUBBER CRANITE FOR STD. DRILLING CRANE CO. 24" I.D. x 32" O.D.			
③ L-70887	188	1 1/4"⌀ x 6" LG. BOLTS	ST'L.	COMP'L W/NUT & L.W.	
C-1320	1	ELBOW	ST'L.	ON HAND	
③ B-1320	1	30" SWING CHECK VALVE	IN BK1405	ON HAND	
~~C-70888~~	~~1~~	~~SUCTION INTAKE~~	~~ST'L.~~		
K-	1	WESTINGHOUSE MOTOR - 1500 H.P. (BY OPERATORS)			
J-	1	WILSON-SNYDER PUMP (BY OPERATORS)			
H-	1	30" BUTTERFLY VALVE - PRATT (BY OPERATORS)			
G-	6	FULL FACE GASKET 1/16" THICK "C-C" RUBBER CRANITE FOR STD. DRILLING CRANE CO. 30" I.D. x 38 3/4" O.D.			
③					
E-	1	BLIND FLANGE	ST'L.	SEE SECT "C-C"	
D-	1	REDUCING TURN	ST'L.	" " "	
C-	1	MAKE UP PIECE	ST'L.	" " "D-D"	
B-	1	MAKE UP PIECE	ST'L.	" " "CC"	
A-70887	1	INCREASER	ST'L.	" " "DD"	

BILL OF MATERIAL

U.S.S. CORP. STD. FINISHES BASED ON GEN. ELECTRIC ROUGHNESS SPECIMENS

SYMBOL	CLASS	DEGREE OF FIN. ROUGHNESS MICRO-INCHES BY PROFILOMETER
A	SUPER FINISH	4
B	POLISH	
C	GROUND	
D	SMOOTH	32
E	FINE	63
F	SEMI-FINE	125
G	MEDIUM	250
H	SEMI-ROUGH	500
J	ROUGH	1000
K	CLEAN UP	2000

REVISION		
①	3-4-64	J.A.K.
②	3-31-64	E.F.C.
③	4-7-64	J.W.A.
④	10-22-75	D.A.O.
⑤	7-12-96	RSG
6		
7		
8		
9		
10		
11		
12		

POWER & FUEL DIVISION
NO. 4 PUMP STATION
PUMP ROOM & SCREEN RM.
SECTIONS & DETAILS

UNITED STATES STEEL CORPORATION
GARY STEEL WORKS
SAFETY GW 19088 Rev. 253 FIRST

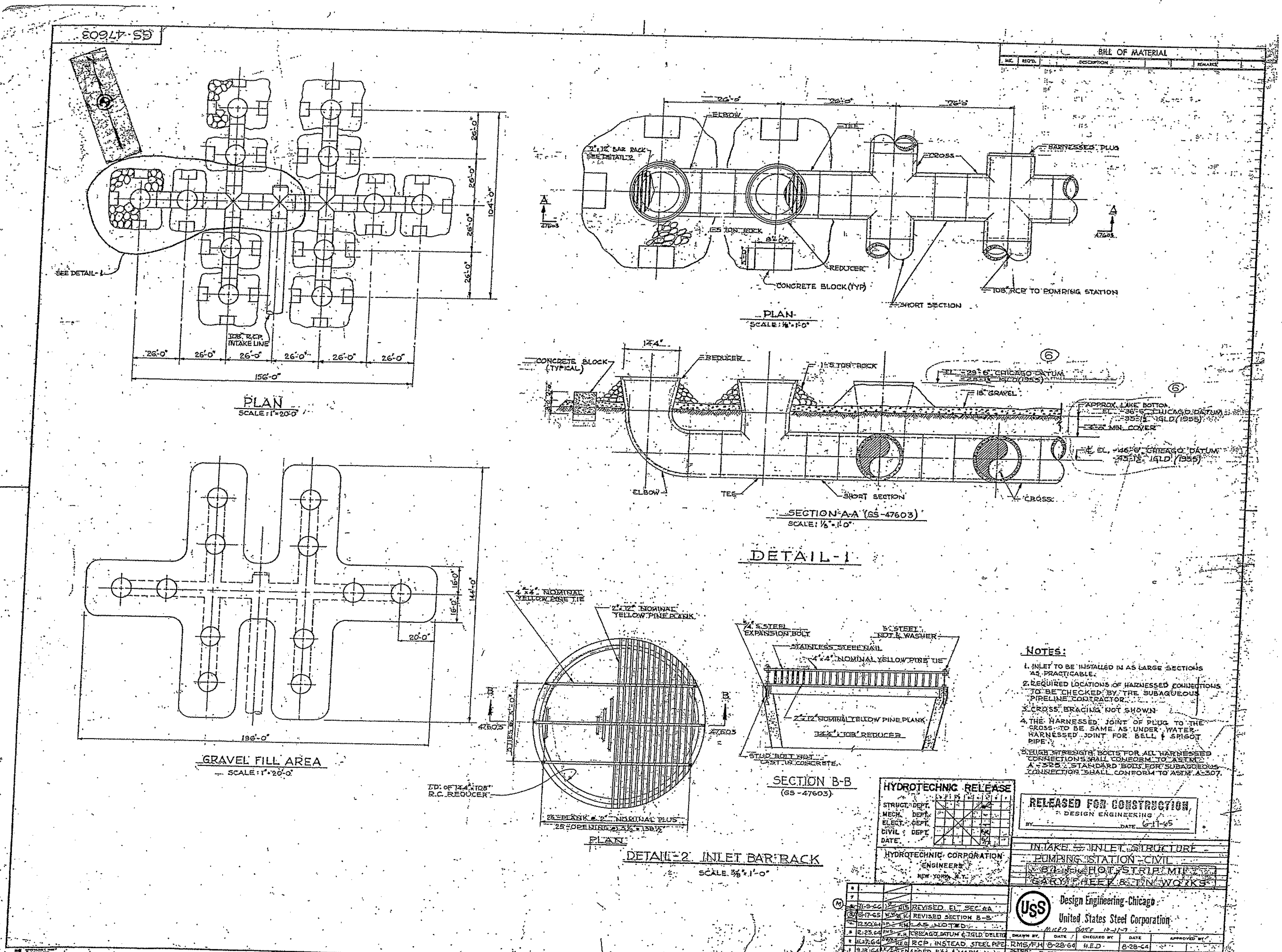
MADE BY S. LYNN DATE 8-29-57
SCALE NOTED = 1 FT.
TRACED BY "
CHECKED BY E.F.C. " 3-20-64
CHECKED FOR SAFETY
Ⓜ 70887

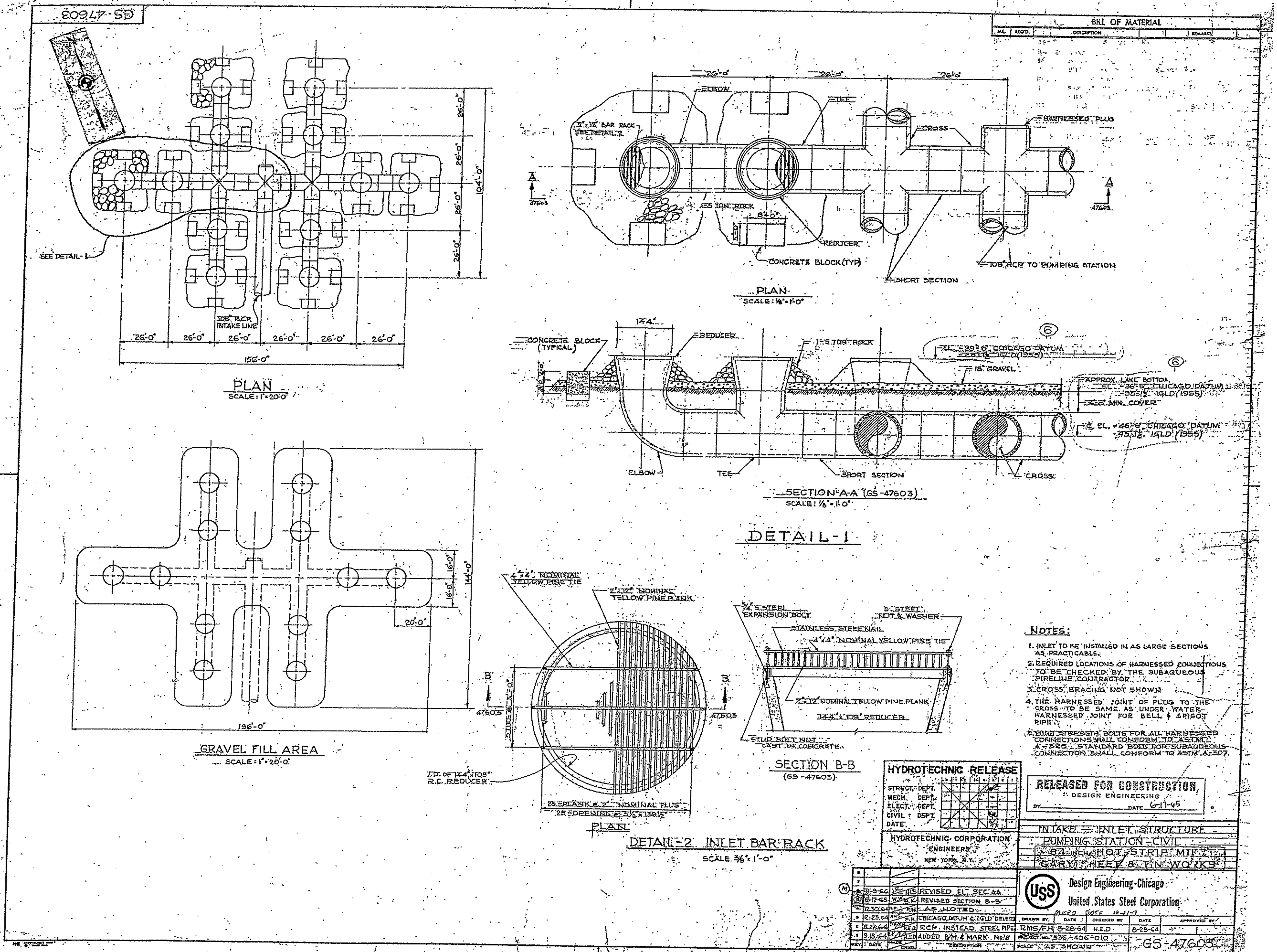
APPRO. #
WORKS AUTH. #

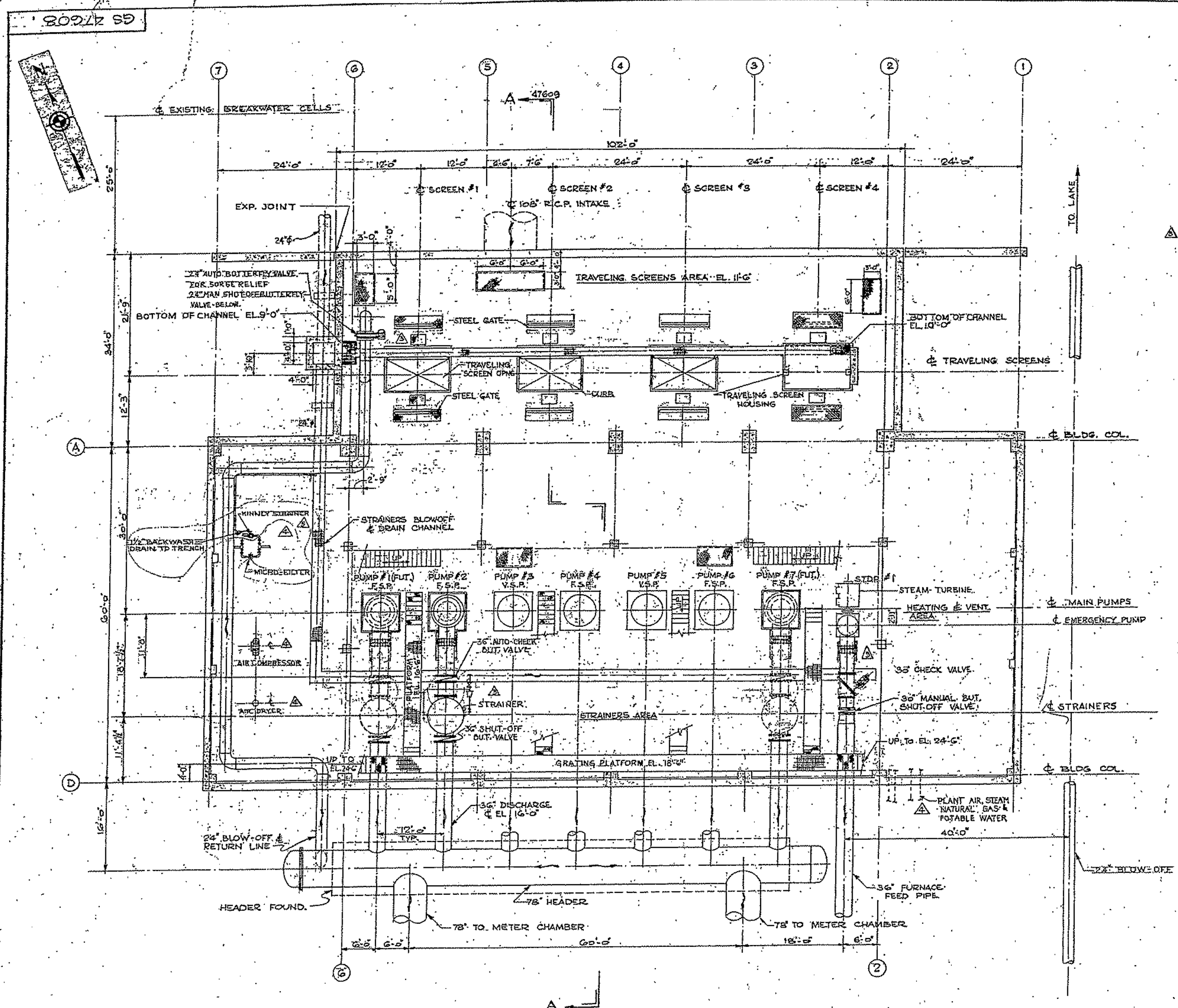
IN CHARGE OF A.E. WANTHAL

REVISIONS MEMO: ① ADDED SECT. "D-D", BILL / MAT'L & DETAILS; ② ADDED NOTE TO SECTION C-C & Rev. Mk. to Bill MH.; ③ GENERAL REVISION; ④ ADDED REF. DWG. No.; ⑤ INSTALLED NEW PUMPS No1 & No2 & PIPING

DETAILED DRAWINGS – LAKESIDE PUMP STATION


GS-47603
BILL OF MATERIAL
PLAN
SCALE: 1"=20'-0"
SEE DETAIL-1
108" R.C.P. INTAKE LINE
26'-0"
156'-0"
104'-0"
GRAVEL FILL AREA
SCALE: 1"=20'-0"
196'-0"
144'-0"
16'-0"
20'-0"
ELBOW
TEE
2"x12" BAR RACK SEE DETAIL-2
CROSS
HARNESSED PLUG
2.5 TON ROCK
REDUCER
CONCRETE BLOCK (TYP)
SHORT SECTION
108" RCP TO PUMPING STATION
PLAN
SCALE: 1/8"=1'-0"
CONCRETE BLOCK (TYPICAL)
1.5 TON ROCK
EL. 529'-6" CHICAGO DATUM
18" GRAVEL
APPROX. LAKE BOTTOM
MIN. COVER
SECTION A-A (GS-47603)
SCALE: 1/8"=1'-0"
DETAIL-1
4"x4" NOMINAL YELLOW PINE TIE
2"x12" NOMINAL YELLOW PINE PLANK
I.D. OF 144"x108" R.C. REDUCER
PLAN
DETAIL-2 INLET BAR RACK
SCALE: 3/8"=1'-0"
3/4" S. STEEL EXPANSION BOLT
S. STEEL NUT & WASHER
STAINLESS STEEL NAIL
4"x4" NOMINAL YELLOW PINE TIE
2"x12" NOMINAL YELLOW PINE PLANK
144" JOB REDUCER
STUD BOLT NOT CAST IN CONCRETE
SECTION B-B
(GS-47603)
NOTES:
1. INLET TO BE INSTALLED IN AS LARGE SECTIONS AS PRACTICABLE.
2. REQUIRED LOCATIONS OF HARNESSED CONNECTIONS TO BE CHECKED BY THE SUBAQUEOUS PIPELINE CONTRACTOR.
3. CROSS BRACING NOT SHOWN.
4. THE HARNESSED JOINT OF PLUG TO THE CROSS TO BE SAME AS UNDER WATER HARNESSED JOINT FOR BELL & SPIGOT PIPE.
5. HIGH STRENGTH BOLTS FOR ALL HARNESSED CONNECTIONS SHALL CONFORM TO ASTM A-325. STANDARD BOLTS FOR SUBAQUEOUS CONNECTION SHALL CONFORM TO ASTM A-307.
HYDROTECHNIC RELEASE
STRUCT. DEPT.
MECH. DEPT.
ELECT. DEPT.
CIVIL DEPT.
DATE
HYDROTECHNIC CORPORATION
ENGINEERS
NEW YORK, N.Y.
RELEASED FOR CONSTRUCTION
DESIGN ENGINEERING
BY
DATE 6-11-65
INTAKE - INLET STRUCTURE
PUMPING STATION - CIVIL
84 INCH HOT STRIP MILL
GARY SHEET & TIN WORKS
Design Engineering-Chicago
United States Steel Corporation
11-9-66 REVISED EL. SEC. AA
6-17-65 REVISED SECTION B-B
12-30-64 AS NOTED
12-23-64 CHICAGO DATUM & IGLD DELETED
11-27-64 RCP INSTEAD STEEL PIPE
9-18-64 ADDED B/M & MARK No.8
DRAWN BY RMS/F.H.
DATE 8-28-64
CHECKED BY H.E.D.
DATE 8-28-64
APPROVED BY
PROJECT NO. 536-406-010


GS-47603
BILL OF MATERIAL
PLAN
SCALE: 1"=20-0"
SEE DETAIL-1
108" R.C.P. INTAKE LINE
26'-0"
156'-0"
104'-0"
GRAVEL FILL AREA
SCALE: 1"=20-0"
196'-0"
144'-0"
20'-0"
16'-0"
ELBOW
TEE
2"x12" BAR RACK SEE DETAIL 2
CROSS
HARNESSED PLUG
REDUCER
CONCRETE BLOCK (TYP)
SHORT SECTION
108" RCP TO PUMPING STATION
PLAN
SCALE: 1/8"=1'-0"
CONCRETE BLOCK (TYPICAL)
REDUCER
1-5 TON ROCK
18" GRAVEL
APPROX. LAKE BOTTOM
5'-0" MIN. COVER
CHICAGO DATUM
IGLD (1955)
SECTION A-A (GS-47603)
SCALE: 1/8"=1'-0"
DETAIL-1
4"x4" NOMINAL YELLOW PINE TIE
2"x12" NOMINAL YELLOW PINE PLANK
I.D. OF 144"x108" R.C. REDUCER
PLAN
DETAIL-2 INLET BAR RACK
SCALE 3/8"=1'-0"
3/4" S. STEEL EXPANSION BOLT
S. STEEL NUT & WASHER
STAINLESS STEEL NAIL
4"x4" NOMINAL YELLOW PINE TIE
2"x12" NOMINAL YELLOW PINE PLANK
144"x108" REDUCER
STUD BOLT NOT CAST IN CONCRETE
SECTION B-B
(GS-47603)
NOTES:
1. INLET TO BE INSTALLED IN AS LARGE SECTIONS AS PRACTICABLE.
2. REQUIRED LOCATIONS OF HARNESSED CONNECTIONS TO BE CHECKED BY THE SUBAQUEOUS PIPELINE CONTRACTOR.
3. CROSS BRACING NOT SHOWN
4. THE HARNESSED JOINT OF PLUG TO THE CROSS TO BE SAME AS UNDER WATER HARNESSED JOINT FOR BELL & SPIGOT PIPE.
5. HIGH STRENGTH BOLTS FOR ALL HARNESSED CONNECTIONS SHALL CONFORM TO ASTM A-325. STANDARD BOLTS FOR SUBAQUEOUS CONNECTION SHALL CONFORM TO ASTM A-307.
HYDROTECHNIC RELEASE
STRUCT. DEPT.
MECH. DEPT.
ELECT. DEPT.
CIVIL DEPT.
DATE
HYDROTECHNIC CORPORATION
ENGINEERS
NEW YORK, N.Y.
RELEASED FOR CONSTRUCTION
DESIGN ENGINEERING
BY. DATE 6-17-65
INTAKE - INLET STRUCTURE
PUMPING STATION - CIVIL
84 INCH HOT STRIP MILL
GARY SHEET & TIN WORKS
Design Engineering-Chicago
United States Steel Corporation
REVISED EL. SEC. AA
6-17-65 REVISED SECTION B-B
12-30-64 AS NOTED
2-25-64 CHICAGO DATUM & IGLD DELETED
11-27-64 RCP INSTEAD STEEL PIPE
9-18-64 ADDED B/M & MARK No.'s
REV. DATE DESCRIPTION
DRAWN BY RMS/F.H. DATE 8-28-64 CHECKED BY H.E.D. DATE 8-28-64 APPROVED BY
PROJECT NO. 536-406-010
SCALE AS SHOWN
GS-47603



PLAN ABOVE EL. 11'-6"

LIST OF MAJOR MECH. EQUIPMENT

- FSP - 37,000 GPM @ 165 FT. TDH PUMP WITH 2250 HP MOTOR (BYRON JACKSON & ELECTRIC PRODUCTS)
- VSP - 37,000 GPM @ 165 FT. TDH PUMP WITH 2250 HP MOTOR AND MAGNETIC (INTEGRAL) COUPLING (BYRON JACKSON & IDEAL ELECTRIC)
- STDP - 20,000 GPM @ 150 FT. TDH PUMP WITH RIGHT ANGLE GEAR AND 1000 HP STEAM TURBINE DRIVE (BYRON JACKSON, WESTERN & ELLIOT)
- 36" AUTOMATIC STRAINERS (S. P. KINNEY)
- 10'-0" TRAVELING SCREENS (REX CHAINBELT)
- 36" BUTTERFLY VALVES (B.I.F.)
- 30" CHECK VALVE (CHAPMAN DIVISION-CRANE CO.)
- AIR COMPRESSOR (GARDNER DENVER CO.)
- AIR DRYER (VAN PRODUCTS)
- MICRO-FILTER (CUNO CO.)
- DALL FLOW TUBES (SOUTH OF STATION) (PENN METER CO.)
- HEATING & VENTILATING EQUIP. (AMERICAN STANDARD CO.)
- 4.16 KV. MOTOR CONTROL CENTERS (ALLIS - CHALMERS)
- 480 V. MOTOR CONTROL CENTERS (ALLIS - CHALMERS)
- OVERHEAD CRANE (P. & H.)

NOTE:
1. FOR LIST OF DRAWINGS SEE DWG. GS-47600
2. SERVICE PIPING NOT SHOWN.

HYDROTECHNIC RELEASE
STRUCT. DEPT.
MECH. DEPT.
ELECT. DEPT.
CIVIL DEPT.
DATE

HYDROTECHNIC CORPORATION
ENGINEERS
NEW YORK, N.Y.

RELEASED FOR
DESIGN EN

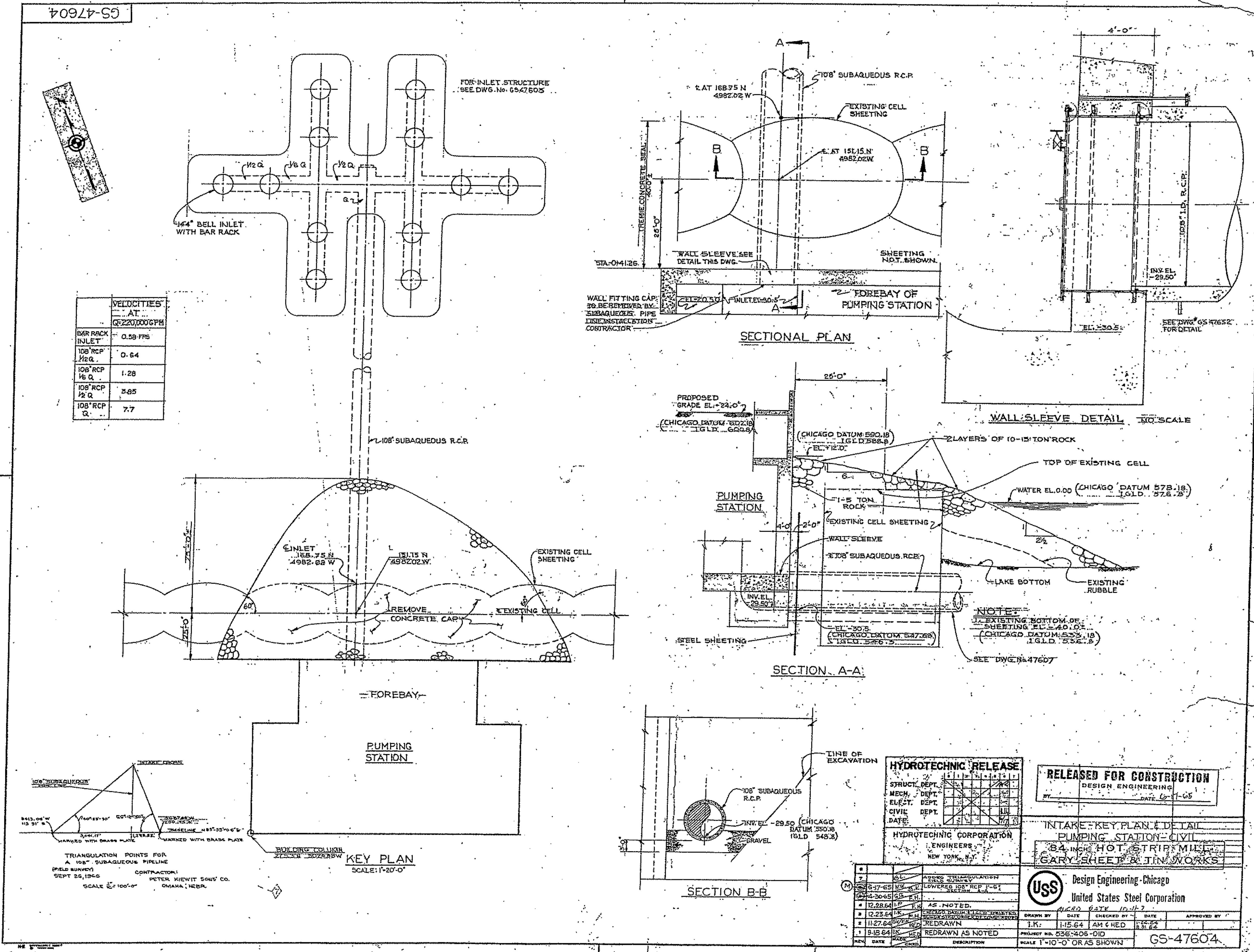
REV.	DATE	MADE	CHKD	DESCRIPTION
	12/6/67			REMOVED ONE MICRO-STRAINER & ADDED KINNEY STRAINER
	11/9/65			
	8/4/65			GENERAL REVISION
	6/25/65			GENERAL REVISION
	10.23.64			GENERAL REVISION

GENERAL ARRANGEMENT - PLAN
PUMPING STATION - MECHANICAL
84 IN. HOT STRIP MILL
GARY SHEET & TIN WORKS

USS
Design Engineering - Chicago
United States Steel Corporation

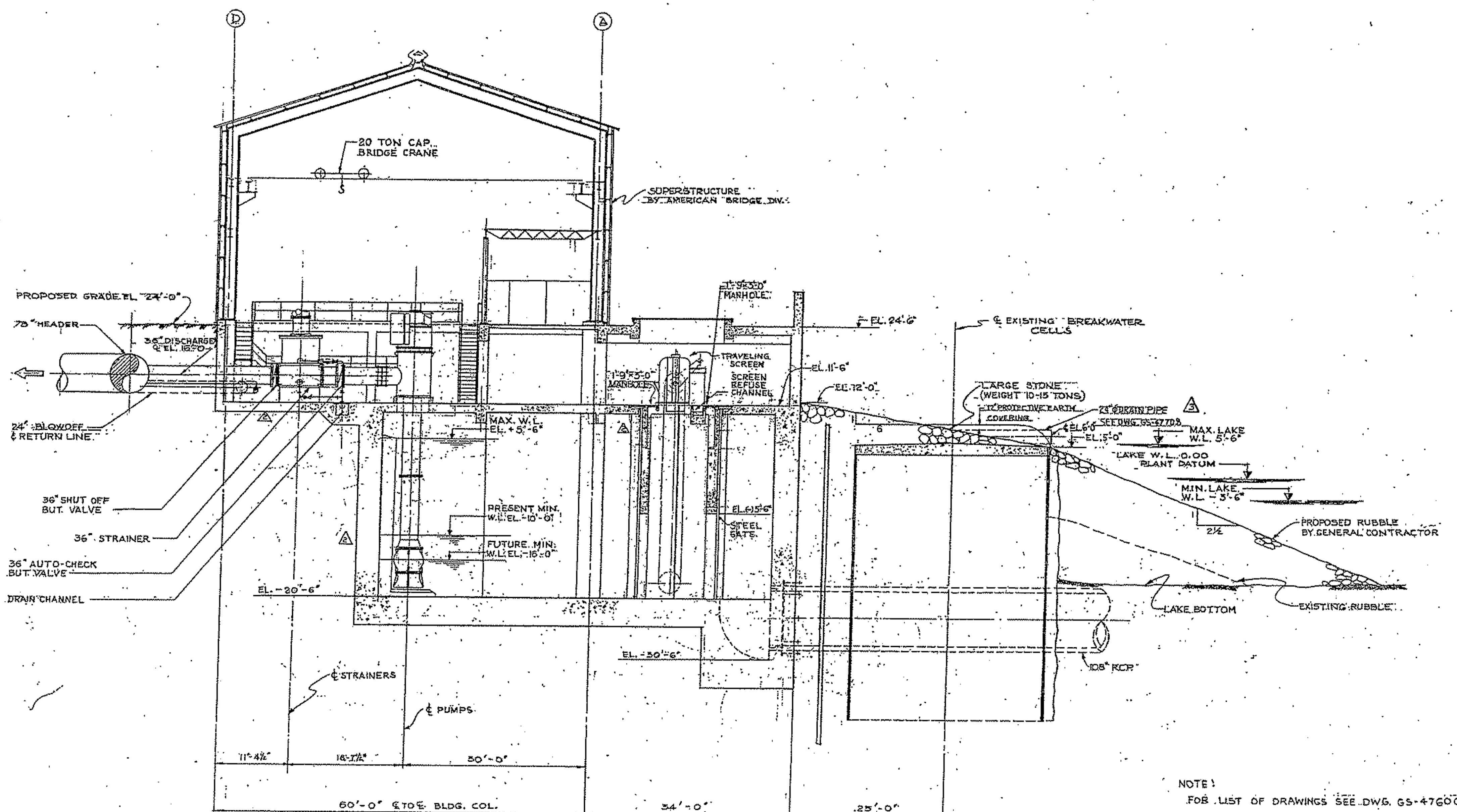
DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY
D.G.	9.21.64	H.E.D.	10.26.64	CHI. DES. MRV NOV. 2.64

PROJECT NO. 536-406-10
SCALE 1/8" = 1'-0"
GS-47608



	VELOCITIES AT Q=220,000 GPM
BAR RACK INLET	0.58 FPS
108" RCP 1/12 Q	0.64
108" RCP 1/6 Q	1.28
108" RCP 1/2 Q	3.85
108" RCP Q	7.7

GS-47609



NOTE:
FOR LIST OF DRAWINGS SEE DWG. GS-47600

SECTION A-A (47608) & (47610)

RELEASED FOR CONSTRUCTION
DESIGN ENGINEERING
BY J. E. McDERMOTT DATE 11-13-65

HYDROTECHNIC RELEASE
STRUCT. DEPT.
MECH. DEPT.
ELECT. DEPT.
CIVIL DEPT.
DATE

HYDROTECHNIC CORPORATION
ENGINEERS
NEW YORK, N.Y.

DATE	MADE	CHKD.	DESCRIPTION
11/9/65	H.B.	J.A.	24" DRAIN PIPE ADDED
3/4/65	J.D.	J.F.	GENERAL REVISION
1/23/65		E.H.	GENERAL REVISION

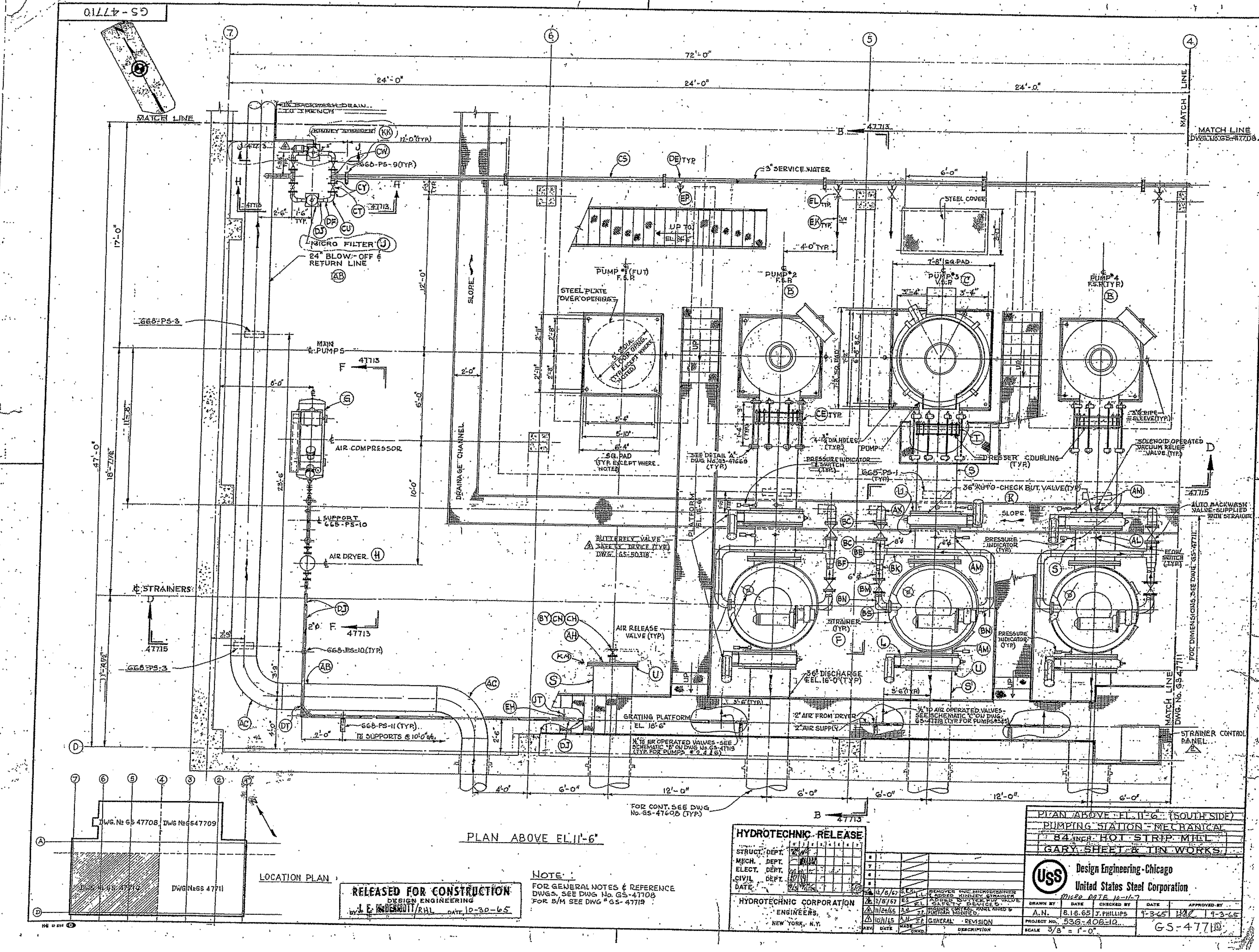
GENERAL ARRANGEMENT - SECTION
PUMPING STATION - MECHANICAL
84 INCH HOT STRIP MILL
GARY SHEET & TIN WORKS

Design Engineering - Chicago
United States Steel Corporation

MICRO DATE 10-11-7

DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY
I. P. - D.G.	10.23.64	H.S.D.	10.26.64	CHI. DES. HRV NOV 2 64

PROJECT NO. 556-406-10
SCALE: ⅛" = 1 FT.
GS-47609



GS-47710
72'-0"
24'-0"
24'-0"
24'-0"
MATCH LINE
MATCH LINE DWG. NO. GS-47708
KINNEY STRAINER (KK)
12'-0" (TYP.)
3" SERVICE WATER
6'-0"
STEEL COVER
MICRO FILTER (J)
24" BLOW-OFF & RETURN LINE (AB)
PUMP #1 (FUT) F.S.P.
PUMP #2 F.S.P. (B)
PUMP #3 V.S.P. (C)
PUMP #4 F.S.P. (TYP) (B)
STEEL PLATE OVER OPENINGS
7'-8" SQ. PAD
SLOPE
668-PS-3
MAIN PUMPS
F 47713
AIR COMPRESSOR
DRAINAGE CHANNEL
SQ. PAD (TYP. EXCEPT WHERE NOTED)
SEE DETAIL "A" DWG No. GS-47669 (TYP)
PRESSURE INDICATOR & SWITCH (TYP.)
665-PS-1 (TYP)
DRESSER COUPLING (TYP)
SOLENOID OPERATED VACUUM RELIEF VALVE (TYP)
36" AUTO-CHECK BUT. VALVE (TYP)
AUTO BACKWASH VALVE-SUPPLIED WITH STRAINER
D 47715
SUPPORT 665-PS-10
AIR DRYER (H)
BUTTERFLY VALVE SAFETY DEVICE (TYP) DWG. GS-50318
PLATFORM EL. 18'-6"
PRESSURE INDICATOR (TYP)
FLOW SWITCH (TYP)
FOR DIMENSIONS SEE DWG. GS-47711
℄ STRAINERS
47715
668-PS-10 (TYP)
668-PS-3
AIR RELEASE VALVE (TYP.)
STRAINER (TYP.) (F)
36" DISCHARGE EL. 16'-0" (TYP)
GRATING PLATFORM EL. 18'-6"
2" AIR FROM DRYER
2" AIR SUPPLY
1/4" TO AIR OPERATED VALVES-SEE SCHEMATIC "C" ON DWG. GS-47719 (TYP. FOR PUMPS #3 & 5)
1/4" TO AIR OPERATED VALVES-SEE SCHEMATIC "B" ON DWG. No. GS-47719 (TYP. FOR PUMPS #2, 4 & 6)
MATCH LINE DWG. No. GS-47711
STRAINER CONTROL PANEL
668-PS-11 (TYP)
12 SUPPORTS @ 10'-0" ea.
FOR CONT. SEE DWG. No. GS-47608 (TYP.)
B 47713
DWG. No. GS 47708
DWG No. GS 47709
DWG No. GS 47710
DWG No. GS 47711
LOCATION PLAN
PLAN ABOVE EL. 11'-6"
RELEASED FOR CONSTRUCTION
DESIGN ENGINEERING
BY J. E. McDERMOTT/RHL DATE 10-30-65
NOTE:
FOR GENERAL NOTES & REFERENCE DWGS. SEE DWG No. GS-47708
FOR B/M SEE DWG # GS-47719
HYDROTECHNIC RELEASE
STRUCT. DEPT.
MECH. DEPT.
ELECT. DEPT.
CIVIL DEPT.
DATE
HYDROTECHNIC CORPORATION ENGINEERS, NEW YORK, N.Y.
GENERAL REVISION
DESCRIPTION
PLAN ABOVE EL. 11'-6" (SOUTH SIDE)
PUMPING STATION - MECHANICAL
84 INCH HOT STRIP MILL
GARY SHEET & TIN WORKS
USS
Design Engineering - Chicago
United States Steel Corporation
DRAWN BY A.N. DATE 8.16.65 CHECKED BY J. PHILLIPS DATE 9-3-65
PROJECT NO. 536-406-10
SCALE 3/8" = 1'-0"
GS-47710

CWA 316(b) Requirements for CWIS

40 CFR 122.21(r)(9)-(12) Materials

Intended for

United States Steel Corporation Gary Works
One North Broadway
Gary, Indiana 46402
NPDES Permit No. IN0000281

Date

May 2020

Prepared By

Ramboll US Corporation

Clean Water Act Section 316(b) Requirements for Cooling Water Intakes Structures Pursuant to 40 CFR part 122.21(r)(9) – (12)

CLEAN WATER ACT SECTION 316(B) REQUIREMENTS FOR COOLING WATER INTAKES STRUCTURES PURSUANT TO 40 CFR PART 122.21(R)(9)-(12)

CONTENTS

TABLES

APPENDICES

Appendix 1. *Comprehensive Technical Feasibility and Cost Evaluation Study,* ENERCON (March 31, 2020)

Appendix 2. *Social Costs of Purchasing and Installing Entrainment Reduction Technologies*, Veritas Economic Consulting (March 2020)

Appendix 3. *Entrainment Reduction Benefits Study*, Veritas Economic Consulting (March 2020)

Appendix 4. *Non-Water Quality Environmental and Other Impacts Study*, ENERCON (March 31, 2020)

1. EXECUTIVE SUMMARY

United States Steel Corporation Gary Works (U. S. Steel), located at One North Broadway, Gary, Indiana, is an integrated steel mill facility that manufactures iron and steel products. U. S. Steel is authorized to withdraw water for their process and non-contact cooling waters needs from five intakes consistent with their renewed National Pollutant Discharge Elimination System (NPDES) Permit IN0000281, which became effective on November 1, 2015 and was modified on February 1, 2017 (the "NPDES Permit"). Three of the intakes are located within the ore loading slip of Gary Harbor (No. 1 Pump Station, No. 3 Pump Station, and No. 4 Pump Station), one is located at the mouth of the ore loading slip in Gary Harbor (No. 2 Pump Station), and one is located approximately 3,000 feet off-shore in Lake Michigan (Lakeside Pump Station). No. 1 Pump Station was determined to be representative of the other cooling water intake structures (CWIS) located in the ore loading slip of Gary Harbor (i.e. No. 3 & 4 Pump Station) due to its flow and location. Therefore, studies at the facility have focused on No. 1 Pump Station, No. 2 Pump Station, and Lakeside Pump Station. Total allowable withdrawal for the facility based on Indiana Department of Natural Resources (IDNR) water usage is approximately 1,263 MGD.

As an existing facility with surface water intakes withdrawing greater than two million gallons per day (based on cumulative design intake flow) and more than 25% of the actual intake flow used exclusively for cooling purposes, the U. S. Steel CWIS is subject to the requirements published in 40 CFR Part 122.21(r). As the owner/operator of an existing facility that withdraws greater than 125 MGD actual intake flow (AIF) of water for cooling purposes, U. S. Steel is required to submit to the Director for review the information required under paragraphs (r)(9), (10), (11), (12), and (13) of 40 CFR 122.21(r). This includes the following:

- Entrainment Characterization Study (§122.21(r)(9))
- Comprehensive Technical Feasibility and Cost Evaluation Study (§122.21(r)(10))
- Benefits Valuation Study (§122.21(r)(11))
- Non-water Quality Environmental and Other Impacts Study (§122.21(r)(12))
- Peer Review (§122.21(r)(13))

Per these requirements, U. S. Steel evaluated the technical feasibility and engineering costs for the implementation of ichthyoplankton entrainment reduction technologies, including conversion to a closed-cycle recirculation system and installation of fine mesh screens. The reuse of existing or nearby wastewater, grey water or municipal water or the use of alternative fresh water sources was determined to be infeasible given the temperature, quality, and flow rate requirements at Gary Works. Technical feasibility defined for the purposes of this evaluation is not a determination of practicality or effectiveness, but rather the ability to design, construct, and operate the technology. The peer review report will be submitted under separate cover.

Conversion to Closed Cycle Recirculation System

Conversion of U.S. Steel's Gary Works integrated steel mill facility to closed-cycle cooling with hybrid cooling capacity is technically feasible but would involve a significant construction project, would impact the operation of the facility, and introduce mechanical and thermal risks to critical infrastructure which is essential to the safety of U.S. Steel employees and the surrounding community. The conceptual design involves two predominantly independent cooling and process water systems (referred to herein as East and West) that would be cooled with the mechanical draft cooling tower systems. During particularly warm periods, each cooling tower system would return cooling and process water at temperatures higher than the historic intake temperature operability limit if operated in a closed-cycle mode. Therefore, a hybrid cooling capacity was integrated into the design, which would result in periods of operation as a partial and once-through cooling system.

Identified risks at this level of conceptual design include:

- A greater quantity of large diameter piping, new booster pumps or a greater quantity of cooling tower cells could be required if a detailed design were to determine that reliability of the facility would be insufficient under reasonable combinations of system requirements and environmental conditions. This would result in an increase in construction costs relative to those quantified during the conceptual design.
- Installation of long runs of buried, large diameter piping from the existing outfalls to the proposed cooling towers would require extensive excavation through areas of the facility which include complex buried utilities, relatively old underground infrastructure, and areas of legacy industrial operations. A detailed review of the piping route has not been completed and would be required.
- Tie-in of the proposed piping would require specialized planning, analysis and coordination to complete without requiring a major facility outage. Unplanned loss of cooling and process water discharge could result in significant risks to the safety of Gary Works personnel and the local community.
- Ground fogging at and nearby the Gary Works site would be compounded due to the evaporative plumes from the cooling tower stacks and traffic safety risks could be increased due to these effects.

The estimated construction cost for closed-cycle cooling is approximately $148,180,000, and the recommended engineering budget would be $29,640,000. Estimated permitting costs are $3,820,000. Closed-cycle cooling would require new and modified permits for the construction and final configuration. Additionally, closed-cycle cooling would create new particulate air emissions via cooling tower drift and would result in increased energy consumption. The total capital investment excluding operation and maintenance costs would be $181,640,000.

Installation of Fine Mesh Screens

Retrofit of the traveling water screens (TWS) in operation at U.S. Steel's Gary Works integrated steel mill facility with fine mesh (2.0 mm) and modified fish protection systems is technically feasible but would involve a significant and technically challenging construction project in order to complete the fish handling and return system. Due to the higher intake velocity, construction of buried fish handling and return systems (FHRS) would be required at No. 1 Pump Station and No. 2 Pump Station.[1]

Identified risks at this level of conceptual design include:

- In order to complete the retrofitting activities without causing a major facility outage, the TWS would be taken out of service one at a time while the facility cooling and process water withdrawal would continue at current rates. Debris loading of the existing TWS would be anticipated to increase during the retrofitting activities due to the redistribution of water withdrawal through a decreased quantity of TWS.
- Fine mesh TWS are at higher risk for increased debris loading, differential pressures in excess of operable limits and, in extreme cases, catastrophic failure. Due to the high heat load nature of the steelmaking process, resultant partial or total loss of cooling and process water could result in serious risk to the health and safety of Gary Works personnel and the local community.
- Due to the age of the facility and complex heavy manufacturing infrastructure in the path of the FHRS pipe, the installation would require extensive and potentially intrusive excavation through areas of the facility which include complex buried utilities, relatively old underground infrastructure, and areas of legacy industrial operations. A detailed review of the piping route has not been completed and would be required. Should an impediment or serious risk

[1] Due to low intake velocities at the entrances to the No. 4 Pump Station and Lakeside Pump Station, no fish handling and return system would be required. Both No. 4 Pump Station and Lakeside Pump Station intend to demonstrate BTA standards for impingement mortality by operating the CWIS at a design intake velocity less than 0.5 foot per second.

associated with the installation of the FHRS piping be identified, an alternative FHRS piping route, installation method or fish handling method would be required.

- Chlorination agents would continue to be required for invasive mussel control at the fine mesh screens. Therefore, it is expected low levels of residual chlorine would contribute to chemical stresses and likely mortality of entrainable organisms excluded by the fine mesh screens. This chlorination for control of invasive mussels effectively negates any perceived benefits of the exclusion technology.
- Additionally, to maintain compliance with water quality based effluent limitations, screen backwash water must be dechlorinated prior to discharge. Due to the long, complex routing of the FHRS piping and dechlorination of the sluice water, the control of biogrowth or blockages in the FHRS pipe would likely be a significant challenge. Mechanical and hydrostatic cleaning may be required on a frequent basis in order to maintain an unobstructed path for the return of organisms to Lake Michigan. Excessive biogrowth or blockages would result in loss of operation of the FHRS.

The estimated construction cost for a retrofit of the existing TWS with fine mesh would be approximately $23,810,000, and the recommended engineering budget would be $4,760,000. Estimated permitting costs are $880,000. Fine mesh TWS would require new and modified permits for the construction and final configuration. The total capital investment excluding operation and maintenance expenses would be $29,450,000.

In addition to the capital investments (which are a portion of the compliance costs), social costs of installing entrainment reduction technologies were also developed and evaluated. Social costs represent "the total burden imposed on the economy; it is the sum of all opportunity costs incurred associated with taking actions. These opportunity costs consist of the value lost to society of all the goods and services that will not be produced and consumed as a facility complies with permit requirements, and society reallocates resources away from other production activities and towards minimizing adverse environmental impacts." (79 Fed. Reg. 158, 48432).

Social costs from entrainment reductions for this evaluation resulted from:

- Compliance costs defined as the owner's cost for purchasing, permitting, installing, operating, and maintaining entrainment reduction technologies;
- Government Regulatory Costs defined as permitting, monitoring, administering, and enforcing regulatory compliance;
- Power System Costs defined as increased fuel costs from running more expensive units when the facility is subject to outage, capacity reductions, or closure due to the implementation of entrainment reducing technologies; and
- Impacts to Safety as an environmental externality.

These costs are summarized in the Social Costs of Purchasing and Installing Entrainment Reduction Technologies report (Appendix 2) completed by Veritas Economic Consulting on behalf of U. S. Steel and excerpted below for reference:

Discount Rate	Technology Type	Compliance Costs [a]: Total Design, Construction, and Installation Costs	Compliance Costs [a]: Annual O&M Costs	Compliance Costs [a]: Tower Fill Replacement [b]	Social Costs (Present Value): Compliance Costs	Social Costs (Present Value): Power System Costs	Social Costs (Present Value): Externality Costs [c]	Social Costs (Present Value): Government Regulatory Costs	Social Costs (Present Value): Total Social Costs	Social Costs (Present Value): Annual Social Costs
3%	CCRS	$181.64M	$0.24M	$5.32M	$108.20M	$41.07M	$0.07M	$0.03M	$149.38M	$4.98M
	FMS	$29.45M	$0.20M	NA	$21.05M	$1.38M	NA	$0.01M	$22.44M	$0.75M
7%	CCRS	$181.64M	$0.24M	$5.32M	$52.19M	$19.83M	$0.04M	$0.02M	$72.08M	$2.40M
	FMS	$29.45M	$0.20M	NA	$11.44M	$0.74M	NA	$0.01M	$12.19M	$0.41M

[a] Compliance costs presented in Table 1 are undiscounted and in 2018 dollars. The social costs associated with each technology are in 2019 dollars and discounted at 3 and 7 percent using the specifications outlined in Table 2.
[b] Low fouling counterflow cooling tower fill replaced once every 10 years of operation beginning at start-up. This cost is incurred in 2037 and 2047.
[c] Externality costs include expenditures to maintain baseline safety conditions and avoid increased mortality and morbidity effects of potential accidents from cooling tower induced fogging and icing.

Benefits of Entrainment Reduction Technologies

Differences between With Entrainment (baseline) and Reduced-Entrainment conditions are used to quantify the benefits of entrainment reduction technologies by modeling fishery stocks. Facility entrainment data from the site-specific characterization studies in 2012 and 2013 were used for the with entrainment (baseline) scenario. These years represent the low and high end of the observed annual entrainment. Benefits evaluated include reactional, commercial, and nonuse benefits. For the purposes of this evaluation, only recreational and commercial benefits were quantified.

Reduced entrainment conditions were evaluated for both the conversion to closed cycle recirculating system (CCRS) and retrofit with 2.0 mm fine mesh screens (FMS). Additionally, the results are also depicted for the complete elimination of entrainment (100% reduction). This is done for reference purposes and for clarity in presenting the figures within the Benefits Valuation Study. This does not represent an attainable metric based on the technologies evaluated. These benefits are summarized in the Benefits Valuation Study (Appendix 3) completed by Veritas Economic Consulting on behalf of U. S. Steel and excerpted below for reference:

Discount Rate	Technology	2012 Entrainment Data: Present Value: Rec	Com	Total	2012 Entrainment Data: Annual Value: Rec	Com	Total	2013 Entrainment Data: Present Value: Rec	Com	Total	2013 Entrainment Data: Annual Value: Rec	Com	Total
3%	100% Reduction	$64	$0	$64	$2	$0	$2	$74,005	$22	$74,027	$2,467	$1	$2,468
	CCRS[a]	$50	$0	$50	$2	$0	$2	$57,954	$18	$57,972	$1,932	$1	$1,933
	FMS[b]	$64	$0	$64	$2	$0	$2	$0	$0	$0	$0	$0	$0
7%	100% Reduction	$30	$0	$30	$1	$0	$1	$36,677	$11	$36,688	$1,223	$1	$1,224
	CCRS[a]	$21	$0	$21	$1	$0	$1	$25,620	$8	$25,628	$854	$1	$855
	FMS[b]	$30	$0	$30	$1	$0	$1	$0	$0	$0	$0	$0	$0

Notes: Totals may not sum due to rounding
[a] The percent reduction for mechanical draft cooling towers is estimated using the cooling tower system average annual configuration frequency presented in the Comprehensive Technical Feasibility and Cost Evaluation Study (122.21(r)(10)). Baseline flow is calculated by multiplying the once through cooling flow rate by the total number of annual hours. The cooling tower flow is calculated by multiplying the flow rate by the number of annual hours under each cooling tower configuration and summing across configurations. The percent reduction is then estimated as the difference between Baseline and cooling tower flow.

[b] The percent reduction for 2.0mm fine mesh screens is based on Ramboll (2019). No eggs are excluded with 2.0mm fine mesh screens, and all larvae and juveniles are excluded with 2.0mm fine mesh screens (Ramboll 2019). The large difference in benefits across years and technologies results from differences in egg entrainment in 2012 and 2013 (0 in 2012 vs more than 16 million in 2013).

Please note, assumptions on the effectiveness of each technology are built into the quantified benefits:

- Conversion to CCRS assumes an entrainment reduction proportional to the reduction in withdrawal volume. Considerations were included for periods in which the system must operate as a hybrid or complete once-through cooling system.
- Retrofit with 2.0 mm FMS assumes 100% survival of excluded organisms. Organisms generally expected to be excluded include all juveniles and most larvae, while many species have eggs that are not anticipated to be excluded at this mesh size. The 100% off-screen survival assumption does not account for physical trauma or chemical stresses encountered during exclusion, such as the presence of residual chlorine levels for control of invasive mussels. U. S. Steel currently is authorized to feed chlorine bleach year-round at the intake for control of invasive mussel species and to maintain reliability of the cooling water systems. For this reason, actual survival for exclusion technologies and the quantified benefits are exaggerated.

Best Technology Available for Minimizing Adverse Environmental Impact

Pursuant to 40 CFR 125.98(f), the Director must establish site-specific requirements for entrainment after reviewing the information submitted under 40 CFR 122.21(r). These entrainment requirements must reflect the Director's determination of the maximum reduction in entrainment warranted after consideration of factors relevant for determining the best technology available for minimizing adverse environmental impact at each facility. In this determination, the Director must consider factors outlined in § 125.98(f)(2), and may consider additional factors outlined in § 125.98(f)(3). Applicable "must" and "may" factors are discussed below:

Must Factors

i. Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species, and designated critical habitat (e.g., prey base);

Entrainment characterization studies at U. S. Steel Gary Works demonstrated that entrainment of fish juveniles, larvae, and eggs was rare. Low levels of entrainment were observed at both pump stations throughout the studies:

- No. 1 Pump Station documented no ichthyoplankton entrainment in 85% of sample events (66 events total)
- Lakeside Pump Station documented no ichthyoplankton entrainment in 82% of sample events (66 events total).

Additionally, when ichthyoplankton were present at Lakeside Pump Station a majority of taxonomic classification indicated *Neogobius melanostomus* (Round Goby), which is a common benthic nuisance species present in Lake Michigan. Even given the rare entrainment rates, entrainment at Lakeside Pump Station was measurably lower than No. 1 Pump Station. This is likely due to the configuration of the submerged, offshore intake crib at Lakeside Pump Station versus the shoreline withdrawal at No. 1 Pump Station. Additionally, a prominent shift was observed in the ratio of species identified at Lakeside versus No. 1 Pump Station. Round goby, an identified nuisance species, accounted for a large portion of the species at Lakeside Pump Station, and are likely colonizing the intake structure for feeding and spawning purposes.

Species encountered at each pump station remained relatively consistent (even if the ratio of species occurrence was different) both in impingement and entrainment sampling. Species encountered in greatest abundance include gizzard shad, alewife, yellow perch, spottail shiner, rainbow smelt, emerald shiner, and round goby. There were no known Federally-listed threatened or endangered (T&E) aquatic species identified during the site-specific impingement and entrainment studies. In addition, there is no Federally-listed designated critical habitat in the vicinity of the intakes.

ii. *Impact of changes in particulate emissions or other pollutants associated with entrainment technologies;*

The installation of additional cooling towers would be expected to result in:

- Significant increases in particulate emissions (e.g., PM, PM-10, and PM-2.5) from the cooling towers drift;
- Significant increases in carbon dioxide (CO_2) and other criteria air pollutants from the increase in energy required to operate the cooling towers;
- A potential increase of mists, fog, and icing from the cooling towers evaporation plumes impacting facility safety;
- Impacts to nearby vegetation/structures from drift corrosion; and
- An increase in the total dissolved solids (TDS) loading to Lake Michigan due to concentrating pollutants in cooling tower cycles and use of water treatment additives to control corrosion.

iii. *Land availability insofar as it relates to the feasibility of entrainment technology;*

Area limitations on the Gary Works site include existing buildings, railroad equipment, access roads, slab storage, piles, and waterways. The continuous operation of the facility relies on optimal ground and marine transportation of raw and processed materials, personnel, and equipment throughout the site.

Selection of siting from unused areas for the proposed new cooling towers, particularly for the larger east cooling tower system, required consideration of the operations and management of the facility. Detailed design would need to be completed to confirm the proposed siting in the conceptual design.

Installation of fine mesh screens can be accomplished through a retrofit at the existing pump stations and does not expand the existing footprint. However, installation of a fish handling and return system at No. 1 and No. 2 Pump Station would impact land availability during excavation/construction by requiring road closures and rerouting.

iv. *Remaining useful plant life; and,*

U. S. Steel Gary Works has operated at this location since the early 1900s and plans to continue operations for the foreseeable future.

v. *Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.*

The 40 CFR 122.21(r)(10) and (r)(12) reports quantified social benefits and costs based on a conceptual level design, but with sufficient rigor to support a site-specific entrainment determination. The total social costs (which included compliance costs, government regulatory costs, power system costs, and applicable environmental externalities) based on present value ranged from $2.40M - $149.38M for CCRS and from $0.41M to $22.44M for FMS. The associated total benefits based on present value ranged from $10 to $26,918 for CCRS and $0 to $30 for FMS. When comparing the social costs and benefits, the evaluation demonstrates differences between the two metrics of several orders of magnitude. Social costs range in the millions of dollars, while the benefits are merely tens to thousands of dollars.

The current evaluation supports that the total burden imposed on the economy would significantly offset any small benefits realized from installing entrainment reduction technologies. Therefore, U. S. Steel asserts the location, design, construction, and capacity of the cooling water intake structures reflect the best technology available for minimizing adverse environmental impact for entrainment and no additional engineered or operational changes are required.

2. ENTRAINMENT CHARACTERIZATION STUDY PURSUANT TO §122.21(R)(9)

2.1 Entrainment Data Collection Method

In general, entrainment samples were collected by passing intake water through a plankton net fitted with a removable sample container at the bottom of the net. The source of the water for entrainment samples was the wet well at a point between the traveling screens after intake water has passed through the screens and prior to entering the intake pumps. The setup at Lakeside Pump Station is shown in the photos below for reference.

Photo 1. Entrainment setup following Traveling Screens at Lakeside Pump Station

Photo 2. Holding Tank and Plankton Net at Lakeside Pump Station

The following conditions applied to all entrainment samples:

- Entrainment sample water was obtained using a deck-mounted and metered pneumatic diaphragm pump to minimize physical/mechanical damage to fish larvae and fish eggs. An intake hose attached to the pneumatic pump system was lowered into the wet well to mid-depth to collect sample water. An outflow hose from the pneumatic pump delivered water to the plankton net sample collection apparatus.

- Entrainment samples were collected over a 32 to 60-hour period. Pump run time and total sample volume pumped were recorded for each event.
- Entrainment sample water pumped from the pneumatic pump was passed through a 200-micron mesh plankton net with a 0.5-meter diameter opening fitted with a removable sample bucket. The plankton net was partially submerged in a vertical position within a large holding tank containing water so that damage to fish larvae and eggs constrained within the netting was minimal.
- The plankton net was fitted with a removable collection bucket at the bottom of the net. For sample retrieval the net was removed from the holding tank and washed down to concentrate any collected material in to the collection bucket. The contents of the bucket were transferred to one-liter wide mouth plastic bottles for shipment.
- The pneumatic pump was fitted with a meter to record volume and the pump was set to pump approximately 13-15 gallons per minute. The meter value at the start and end of all sample collection periods was recorded in a log book and was used to determine the total amount of water sampled for each entrainment collection period and sample.
- All entrainment samples were properly labeled according to sample location, start and end times of sample collection, date, total volume of sample water collected, and depth of sample collection. All entrainment samples were preserved with Lugol's solution, stored/shipped on ice, and retained for analysis by EcoAnalysts.

Pursuant to the NPDES Permit No. IN0000281 (effective March 1, 2010) Part III.C.2(a), U. S. Steel was required to conduct scientifically valid entrainment studies at the Lakeside and #2 Pump Stations in two-year periods following Year 1 of the Permit. U. S. Steel submitted specific, detailed work plans describing the proposed entrainment sampling to IDEM at least ninety (90) days prior to the start of the studies. Due to logistical constraints, entrainment sampling was conducted at No. 1 Pump Station, rather than No. 2 Pump Station. This change in sampling location was reflected in the study plan submitted to IDEM.

Entrainment characterization studies were conducted in the second half of 2011, 2012, 2013, and 2014 at the U. S. Steel Gary Works site, but were suspended in 2015 following a March 24, 2015 email from the Indiana Department of Environmental Management, stating:

> *To: Facilities subject to CWA Section 316(b) requirements*
>
> *This email serves as notification that the CWA Section 316(b) requirements in Part IV of your NPDES permit issued prior to August 15, 2014, will no longer be applicable due to the promulgation of a Clean Water Act (CWA) section 316(b) regulation by the U.S. EPA on August 15, 2014, that establishes standards for cooling water intake structures. 79 Fed. Reg. 48300-439 (August 15, 2014). The regulation establishes best technology available standards to reduce impingement and entrainment of aquatic organisms at existing power generation and manufacturing facilities and became effective on October 14, 2014.*
>
> *IDEM is notifying all affected parties that NPDES permits containing the outdated language shall submit the information required by 40 CFR 122 and 40 CFR 125, including all of the associated supporting documentation and/or studies with the next permit renewal application (180 days prior to the expiration of the current permit), or an alternate schedule for the submission of the 316(b) requirements may be requested in accordance with 40 CFR 122.21.*

2.2 Biological Entrainment Characterization

Entrainment sample analysis focused on identification to the lowest practical taxonomic classification and enumeration of fish larvae/juveniles, fish eggs, mussel veligers, and immature mussels. Invertebrate forms of plankton that were noted included bivalve veligers and copepods as either present or absent. All preserved samples were analyzed within the proper holding time.

As previously mentioned, ichthyoplankton were fairly rare (although invertebrate forms were observed in most samples). A certain degree of seasonality was observed during entrainment sampling. Ichthyoplankton, when encountered, were typically identified as present during the spring and summer months. Entrainment typically occurred in June, July, and August at both No. 1 Pump Station and Lakeside Pump Station.

Studies showed that entrainment of fish larvae and eggs was sporadic and relatively rare at Gary Works during the permit required monitoring beginning in mid-2011 through 2014.

- No. 1 Pump Station documented no entrainment in 85% of sample events (66 events total)
- Lakeside Pump Station documented no entrainment in 82% of sample events (66 events total). Additionally, when ichthyoplankton were present taxonomic classification indicated *Neogobius melanostomus* (Round Goby), a common invasive nuisance species present in Lake Michigan.

Overall, entrainment at Lakeside Pump Station was measurably lower than No. 1 Pump Station. This is likely due to the configuration of the submerged, offshore intake crib at Lakeside Pump Station versus the shoreline withdrawal at No. 1 Pump Station. The Round goby accounted for a large portion of the species fraction at Lakeside Pump Station versus the other shoreline intake. The round goby is a benthic foraging and spawning species, and is likely colonizing the offshore crib at the Lakeside intake.

The definition for all life stages of fish and shellfish does include standard exemptions for specified nuisance, or non-indigenous, species (NIS). In the August 15, 2014 Federal Register (Vol. 79, No 158) EPA noted "NIS[2] are a significant and increasingly prevalent stressor in both freshwater and marine environments. Approximately 300 NIS have become established in marine and estuarine habitats of the continental U.S., and the number of NIS continues to increase. Many NIS are nuisance species with undesirable effects on local communities." NOAA and IDNR have listed round goby as a high priority nuisance species in Lake Michigan. IDNR has both a top priority to manage round goby as an aquatic nuisance species as well as enacting 312 IAC 9-6-7 that makes it illegal to "import, possess, propagate, buy, sell, barter, trade, transfer, loan, or release into public or private waters any of the following live fish or fry of live fish or their viable eggs or genetic material" related to round gobies. For these reasons, USS has excluded Round Goby when quantifying social benefits of proposed entrainment reduction technologies. However, round goby have been included in the supporting tables for reference with the understanding they have be excluded for quantifying benefits in the Benefits Valuation Study.

2.3 Analysis and Supporting Documentation

In order to estimate an annualized entrainment based on the data collected, the following methodology was utilized. During entrainment sampling, gallons of water pumps by sampler and time interval of the sample event were record. These values were used to qualify and scale up the subsample to be representative of the entire intake flow. Ichthyoplankton abundance was normalized for a 24-hr collection period and multiplied by a ratio of subsample flow to average annual intake flow at the given pump station for each calendar year. Based on current operations at the facility, it was determined that entrainment impacts due to operation of No. 3 PS (currently out of service and only available as an emergency spare) and No. 4 PS (actual intake flow has decreased to approximately 1

[2] non-indigenous species

MGD) were negligible. Therefore No. 3 and No. 4 PS are excluded from the annualized entrainment estimate. Since entrainment sampling was only conducted at No. 1 Pump Station and Lakeside Pump Station, sampling conducted at No. 1 Pump Station was used as a surrogate for No. 2 Pump Station given the location within the Gary Harbor Slip and shoreline orientation of the intake. For the estimate of No. 2 Pump Station entrainment impacts, the No. 1 Pump Station entrainment data was used, but scaled up based upon the average intake flow for No. 2 Pump Station for the given calendar year.

Entrainment estimates were normalized to a 24-hr collection period and a representative number of days was identified to extrapolate the daily entrainment estimate. The calculation ensured the representative number of days reflected the entire calendar year (i.e. 366 days in 2012, 365 days in 2013, and 365 days in 2014). The summation of the estimated eggs, larvae, and juveniles accounted for the annual ichthyoplankton entrainment for the three full sampling years (2012, 2013, and 2014).

Organisms unable to be identified to the species level (i.e. specimens listed as Actinopterygii, ray finned fishes) were estimated based upon the species and abundance encountered during impingement sampling from 2011 through 2015 shown in Table 1. The number of ichthyoplankton were weighted based on fraction of species observed during impingement studies at the corresponding pump station. Only species accounting for greater than 1% of the total abundance were included in the species fraction. This included gizzard shad, alewife, yellow perch, spottail shiner, rainbow smelt, emerald shiner, and round goby.

Raw data, daily entrainment estimates, and annualized totals are shown for each pump station in Tables 2 through 10. The annualized entrainment estimate for the facility by species and life stage is shown in Table 11. Table 12 reflects the same information as shown in Table 11, but has been adjusted to remove the identified nuisance species (i.e. Round Goby).

3. COMPREHENSIVE TECHNICAL FEASIBILITY AND COST EVALUATION STUDY PURSUANT TO §122.21(R)(10)

Pursuant to 40 CFR 122.21(r)(10), the following technical feasibility and cost evaluations are required.

3.1 Technical Feasibility

This evaluation is included in the Comprehensive Technical Feasibility and Cost Evaluation by ENERCON on behalf of U. S. Steel and is included in Appendix 1.

3.2 Other Entrainment Control Technologies

This evaluation is included in the Comprehensive Technical Feasibility and Cost Evaluation by ENERCON on behalf of U. S. Steel and is included in Appendix 1.

3.3 Cost Evaluations

This evaluation is included in the Social Costs of Purchasing and Installing Entrainment Reduction Technologies completed by Veritas Economic Consulting on behalf of U. S. Steel and is included in Appendix 2.

4. BENEFITS VALUATION STUDY PURSUANT TO §122.21(R)(11)

Pursuant to 40 CFR 122.21(r)(11), the following benefits valuation information is required. The benefits valuation study must include, but is not limited to, the following elements:

4.1 Incremental Changes in Individual Fish/Shellfish Lost due to Impingement and Entrainment

This evaluation is included in the Benefits Valuation Study completed by Veritas Economic Consulting on behalf of U. S. Steel and is included in Appendix 3.

4.2 Basis for Estimates of Changes in the Stock Sizes or Harvest Levels

This evaluation is included in the Benefits Valuation Study completed by Veritas Economic Consulting on behalf of U. S. Steel and is included in Appendix 3.

4.3 Basis for Monetized Values Assigned to Changes in Stock Size or Harvest Levels

This evaluation is included in the Benefits Valuation Study completed by Veritas Economic Consulting on behalf of U. S. Steel and is included in Appendix 3.

4.4 Mitigation Efforts Completed Prior to October 14, 2014

This section must include a discussion of recent mitigation efforts completed in the ten years preceding October 14, 2014 and how these have affected fish abundance and ecosystem viability in the intake structure's area of influence. Mitigation efforts may include entrainment reduction technologies or operational measures such as flow reduction. Flow reduction means any modification to a cooling water intake structure or its operation that serves to reduce the volume of cooling water withdrawn. Examples include, but are not limited to, variable speed pumps, seasonal flow reductions, wet cooling towers, dry cooling towers, hybrid cooling towers, unit closures, or substitution for withdrawals by reuse of effluent from a nearby facility.

Prior to October 14, 2014, unit closure of the coke making facilities at U. S. Steel Gary Works occurred. Decommissioning began with No. 3 Coke Battery in 2012. In October and November 2013, the #5 and #7 Battery Operations were idled. On March 30, 2015, all coke production at the facility ceased with the cold idling of #2 Battery. No. 3 Pump Station previously supplied water to coke making operations. The average annual intake flow at No. 3 Pump Station was 11 MGD, 5 MGD, 0 MGD in 2012, 2013, and 2014 respectively. This pump station now serves as an emergency spare to support No. 4 Pump Station if issues occur. No. 4 Pump Station supports sinter plant operations and previously supported coke making operations as well. Similar to No. 3 Pump Station, once coke making operations were decommissioned the water demand for this intake decreased. The average annual intake flow at No. 4 Pump Station was 133 MGD, 49 MGD, and 30 MGD in 2012, 2013, and 2014 respectively. With the closure of Outfall 005 in 2017, the current intake rate at No. 4 Pump Station is roughly 1 MGD. Quantifying differences in water withdrawals at No. 3 and 4 Pump Station between 2012 and 2014 resulted in a flow reduction of roughly 114 MGD.

4.5 Other Benefits Expected to Accrue to the Environment or Local Communities

Entrainment reductions at U. S. Steel Gary Works have the potential to affect the number of fish species in Lake Michigan as quantified in the Benefits Valuation Study completed by Veritas Economic Consulting on behalf of U. S. Steel and is included in Appendix 3. Additional quantification of benefits to the environment or local communities would require extensive modeling and evaluations that have not been included herein. Generally, no additional quantifiable benefits are expected to accrue to the local environment or communities as a result of installing additional entrainment controls.

4.6 Benefits Expected to Result from Reductions in Thermal Discharges

U. S. Steel Gary Works discharges thermal effluent to Lake Michigan and the Grand Calumet River. With the proposed conversion to a closed cycle cooling system, the thermal discharges would no longer occur. However, no additional benefits are expected to result from reductions in these thermal discharges as U. S. Steel is currently in compliance with thermal discharge standards.

Water quality based effluent limitations are included in the Permit for direct discharges from Outfall 035 to Lake Michigan based on 327 IAC 2-1.5-6(c)(4)(D). The Outfall 035 effluent limitation is expressed as 1.211 billion BTU/hour as a maximum daily average. As demonstrated in a November 1997 study, compliance with the BTU/hour limitation results in compliance with the 1,000 ft. arc requirements set forth in 327 IAC 2-1.8-5. Based on this information, IDEM determined U. S. Steel is in compliance with water quality standards for thermal discharges to Lake Michigan.

U. S. Steel is also currently in compliance with § 316(a) requirements for the Grand Calumet River which indicate that the thermal discharge does not have dramatic negative ecological effects under baseline conditions. Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the IDEM that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. U. S. steel has demonstrated that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will ensure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made. In 2012, U. S. Steel demonstrated the that alternate thermal effluent limitations were appropriate under Section 316(a) of the Clean Water Act for monitoring points 205, 220, and 230. The alternative thermal effluent limitations were approved and incorporated into the permit, effective January 1, 2013.

5. NON-WATER QUALITY ENVIRONMENTAL AND OTHER IMPACTS STUDY PURSUANT TO §122.21(R)(12)

Pursuant to 40 CFR 122.21(r)(12), the following non-water quality environmental and other impacts evaluations are required. The study must include the following:

- Estimates of Changes to Energy Consumption
- Estimates of Air Pollutant Emissions and Human Health/Environmental Impacts
- Estimates of Changes in Noise
- Impacts to Safety
- Impacts to Facility Reliability
- Significant Changes in Consumption of Water
- Discussion of Attempts to Mitigate These Impacts

These evaluations are included in the Non-Water Quality Environmental and Other Impacts Study completed by ENERCON on behalf of U. S. Steel and are included in Appendix 4.

CWA Section 316(b) Requirements for CWIS Pursuant to 40 CFR 122.21(r)(9)-(12)

TABLES

TABLE 1. DOMINANT SPECIES FRACTION BASED ON SITE SPECIFIC FISH IMPINGEMENT STUDIES DURING 2011 - 2015

Identification	Species Name	No. 1 PS		No. 2 PS		LS PS	
		No. of Fish Impinged	Species Fraction	Total Fish Impinged	Species Fraction	Total Fish Impinged	Species Fraction
Clupeidae	**Assumed Gizzard Shad or Alewife**						
Gizzard Shad	*Dorosoma cepedianum*	42432	89%	1919	43%	-	-
Alewife	*Alosa pseudoharengus*	5414	11%	2529	57%	386	100%
Actinopterygii	**Unidentified**						
Gizzard Shad	*Dorosoma cepedianum*	42432	55%	1919	21%	-	-
Alewife	*Alosa pseudoharengus*	5414	7%	2529	27%	386	5%
Yellow Perch	*Perca flavescens*	24243	31%	3930	42%	4204	51%
Spottail Shiner	*Notropis hudsonius*	3699	5%	292	3%	191	2%
Rainbow Smelt	*Osmerus mordax*	-	-	261	3%	77	1%
Emerald Shiner	*Notropis atherinoides*	-	-	62	1%	-	-
Round Goby	*Neogobius melanostomus*	1384	2%	327	4%	3323	41%

TABLE 2. NO. 1 PUMP STATION ENTRAINMENT RAW DATA

Sample Event	Collection Date (end of sample event)	No. 1 PS Average Annual Intake Rate (MGD)	Gallons Pump By Sampler for 32- 60 hours	Time of Interval of Sample Event (in minutes)	Gallons Pumped by Sampler in an 24 hours	Eggs per subsample	Larvae per subsample	Juvenile per subsample	Total Abundance per Subsample	Estimated Eggs per 24 hours	Estimated larvae per 24 hours	Estimated Juvenile per 24 hours	Estimated Ichthyoplankton per 24 hours	Species
1	02-17-2012	173.00	39410	2,890	19,637	0	0	0	0	0	0	0	0	
2	02-29-2012	173.00	23660	2,250	15,142	0	0	0	0	0	0	0	0	
3	03-15-2012	173.00	21670	2,875	10,854	0	0	0	0	0	0	0	0	
4	03-30-2012	173.00	19030	2,245	12,206	0	0	0	0	0	0	0	0	
5	04-12-2012	173.00	23990	2,875	12,016	0	0	0	0	0	0	0	0	
6	04-24-2012	173.00	27320	2,195	17,923	0	0	0	0	0	0	0	0	
7	05-11-2012	173.00	37670	2,990	18,142	0	0	0	0	0	0	0	0	
8	05-23-2012	173.00	29050	2,235	18,717	0	0	0	0	0	0	0	0	
9	06-27-2012	173.00	47470	3,435	19,900	0	0	0	0	0	0	0	0	
10	07-25-2012	173.00	31250	2,305	19,523	0	1	0	1	0	5,536	0	5,536	Clupeidae
11	08-15-2012	173.00	42800	3,065	20,108	0	0	0	0	0	0	0	0	
12	09-12-2012	173.00	25670	1,930	19,153	0	0	0	0	0	0	0	0	
13	10-11-2012	173.00	34540	2,325	21,393	0	0	0	0	0	0	0	0	
14	10-23-2012	173.00	38900	2,860	19,586	0	0	0	0	0	0	0	0	
15	11-05-2012	173.00	32860	2,730	17,333	0	0	0	0	0	0	0	0	
16	11-28-2012	173.00	27080	2,550	15,292	0	0	0	0	0	0	0	0	
1	02-21-2013	192.00	44080	3,145	20,183	0	0	0	0	0	0	0	0	
2	03-06-2013	192.00	35350	2,705	18,818	0	0	0	0	0	0	0	0	
3	03-22-2013	192.00	39190	2,825	19,976	0	0	0	0	0	0	0	0	
4	04-03-2013	192.00	41090	2,530	23,387	0	0	0	0	0	0	0	0	
5	04-17-2013	192.00	49910	3,250	22,114	6	0	0	6	23,082	0	0	23,082	Actinopterygii (unidentified egg)
6	05-01-2013	192.00	32160	2,580	17,950	0	0	0	0	0	0	0	0	
7	05-15-2013	192.00	55670	3,525	22,742	0	0	1	1	0	0	3,449	3,449	Neogobius melanostomus
7	05-15-2013	192.00	55670	3,525	22,742	6	0	0	6	20,693	0	0	20,693	Actinopterygii (unidentified egg)
8	05-30-2013	192.00	49270	2,876	24,669	0	0	0	0	0	0	0	0	
9	06-19-2013	192.00	52940	2,890	26,378	76	0	0	76	275,633	0	0	275,633	Actinopterygii (unidentified egg)
10	07-17-2013	192.00	44290	2,520	25,309	3	0	0	3	13,005	0	0	13,005	Actinopterygii (unidentified egg)
10	07-17-2013	192.00	44290	2,520	25,309	0	1	0	1	0	4,335	0	4,335	Neogobius melanostomus
11	08-22-2013	192.00	25350	2,840	12,854	0	0	0	0	0	0	0	0	
12	09-18-2013	192.00	44310	2,850	22,388	0	0	0	0	0	0	0	0	
13	10-16-2013	192.00	39000	2,775	20,238	0	0	0	0	0	0	0	0	
14	10-30-2013	192.00	38620	3,210	17,325	0	0	0	0	0	0	0	0	
15	11-13-2013	192.00	25330	2,730	13,361	0	0	0	0	0	0	0	0	
16	11-27-2013	192.00	19870	2,655	10,777	0	0	0	0	0	0	0	0	
17	12-11-2013	192.00	41400	2,760	21,600	0	0	0	0	0	0	0	0	
1	02-20-2014	192.00	39,150	2,397	23,519	0	0	0	0	0	0	0	0	
2	03-05-2014	192.00	45,540	2,855	22,969	0	0	0	0	0	0	0	0	
3	03-19-2014	192.00	44,010	2,747	23,070	0	0	0	0	0	0	0	0	
4	04-09-2014	192.00	45,221	2,855	22,808	0	0	0	0	0	0	0	0	
5	04-23-2014	192.00	41,980	2,880	20,990	0	0	0	0	0	0	0	0	
6	05-07-2014	192.00	43,660	2,892	21,739	0	0	0	0	0	0	0	0	
7	05-21-2014	192.00	54,360	2,830	27,660	0	0	0	0	0	0	0	0	
8	06-12-2014	192.00	49,001	2,850	24,758	0	0	0	0	0	0	0	0	
9	06-25-2014	192.00	48,250	2,840	24,465	12	0	0	12	47,751	0	0	47,751	Actinopterygii (unidentified egg)
9	06-25-2014	192.00	48,250	2,840	24,465	0	2	0	2	0	7,959	0	7,959	Neogobius melanostomus
10	07-16-2014	192.00	39,050	2,780	20,227	0	0	0	0	0	0	0	0	
11	08-14-2014	192.00	41,730	2,878	20,879	0	2	0	2	0	9,202	0	9,202	Neogobius melanostomus
12	09-10-2014	192.00	56,850	2,940	27,845	0	1	0	1	0	3,377	0	3,377	Clupeidae
13	10-15-2014	192.00	57,100	2,775	29,630	0	0	0	0	0	0	0	0	
14	10-29-2014	192.00	61,650	2,865	30,986	0	0	0	0	0	0	0	0	
15	11-22-2014	192.00	60,790	2,885	30,342	0	0	0	0	0	0	0	0	
16	11-25-2014	192.00	54,890	2,805	28,179	0	0	0	0	0	0	0	0	
17	12-10-2014	192.00	40,760	2,850	20,595	0	0	0	0	0	0	0	0	

TABLE 3. NO. 1 PUMP STATION ENTRAINMENT ESTIMATES

Collection Date (end of sample event)	Representative No. of Days	Estimated Eggs per 24 hours	Estimated larvae per 24 hours	Estimated Juvenile per 24 hours	Estimated Ichthyoplankton per 24 hours	Estimated Eggs per Representative No. of Days	Estimated larvae per Representative No. of Days	Estimated Juvenile per Representative No. of Days	Estimated Ichthyoplankton per Representative No. of Days
01-01-2012									
02-17-2012	59	0	0	0	0	0	0	0	0
02-29-2012	15	0	0	0	0	0	0	0	0
03-15-2012	15	0	0	0	0	0	0	0	0
03-30-2012	13	0	0	0	0	0	0	0	0
04-12-2012	12	0	0	0	0	0	0	0	0
04-24-2012	17	0	0	0	0	0	0	0	0
05-11-2012	12	0	0	0	0	0	0	0	0
05-23-2012	35	0	0	0	0	0	0	0	0
06-27-2012	28	0	0	0	0	0	0	0	0
07-25-2012	21	0	5,536	0	5,536	0	116,256	0	116,256
08-15-2012	28	0	0	0	0	0	0	0	0
09-12-2012	29	0	0	0	0	0	0	0	0
10-11-2012	12	0	0	0	0	0	0	0	0
10-23-2012	13	0	0	0	0	0	0	0	0
11-05-2012	23	0	0	0	0	0	0	0	0
11-28-2012	34	0	0	0	0	0	0	0	0
01-01-2013									
02-21-2013	64	0	0	0	0	0	0	0	0
03-06-2013	16	0	0	0	0	0	0	0	0
03-22-2013	12	0	0	0	0	0	0	0	0
04-03-2013	14	0	0	0	0	0	0	0	0
04-17-2013	14	23,082	0	0	23,082	323,142	0	0	323,142
05-01-2013	14	0	0	0	0	0	0	0	0
05-15-2013	15	10,347	0	1,724	12,071	155,200	0	25,867	181,067
05-30-2013	20	0	0	0	0	0	0	0	0
06-19-2013	28	275,633	0	0	275,633	7,717,718	0	0	7,717,718
07-17-2013	36	6,503	2,168	0	8,670	234,093	78,031	0	312,125
08-22-2013	27	0	0	0	0	0	0	0	0
09-18-2013	28	0	0	0	0	0	0	0	0
10-16-2013	14	0	0	0	0	0	0	0	0
10-30-2013	14	0	0	0	0	0	0	0	0
11-13-2013	14	0	0	0	0	0	0	0	0
11-27-2013	14	0	0	0	0	0	0	0	0
12-11-2013	21	0	0	0	0	0	0	0	0
01-01-2014									
02-20-2014	63	0	0	0	0	0	0	0	0
03-05-2014	14	0	0	0	0	0	0	0	0
03-19-2014	21	0	0	0	0	0	0	0	0
04-09-2014	14	0	0	0	0	0	0	0	0
04-23-2014	14	0	0	0	0	0	0	0	0
05-07-2014	14	0	0	0	0	0	0	0	0
05-21-2014	22	0	0	0	0	0	0	0	0
06-12-2014	13	0	0	0	0	0	0	0	0
06-25-2014	21	23,876	3,979	0	27,855	501,389	83,565	0	584,953
07-16-2014	29	0	0	0	0	0	0	0	0
08-14-2014	27	0	9,202	0	9,202	0	248,454	0	248,454
09-10-2014	35	0	3,377	0	3,377	0	118,206	0	118,206
10-15-2014	14	0	0	0	0	0	0	0	0
10-29-2014	24	0	0	0	0	0	0	0	0
11-22-2014	3	0	0	0	0	0	0	0	0
11-25-2014	15	0	0	0	0	0	0	0	0
12-10-2014	22	0	0	0	0	0	0	0	0
01-01-2015									

TABLE 4. NO. 1 PUMP STATION ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE

Year	Identification	Common Name	Species Fraction	Eggs	Larvae	Juvenile	Total Ichthyoplankton
2012	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**0**	**0**	**0**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**116,256**	**0**	**116,256**
	Dorosoma cepedianum	Gizzard Shad	89%	0	103,101	0	103,101
	Alosa pseudoharengus	Alewife	11%	0	13,155	0	13,155
	Actinopterygii	**Unidentified**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	55%	0	0	0	0
	Alosa pseudoharengus	Alewife	7%	0	0	0	0
	Perca flavescens	Yellow Perch	31%	0	0	0	0
	Notropis hudsonius	Spottail Shiner	5%	0	0	0	0
	Osmerus mordax	Rainbow Smelt	-	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	2%	0	0	0	0
2013	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**78,031**	**25,867**	**103,898**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	89%	0	0	0	0
	Alosa pseudoharengus	Alewife	11%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**8,430,154**	**0**	**0**	**8,430,154**
	Dorosoma cepedianum	Gizzard Shad	55%	4,635,208	0	0	4,635,208
	Alosa pseudoharengus	Alewife	7%	591,417	0	0	591,417
	Perca flavescens	Yellow Perch	31%	2,648,269	0	0	2,648,269
	Notropis hudsonius	Spottail Shiner	5%	404,073	0	0	404,073
	Osmerus mordax	Rainbow Smelt	-	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	2%	151,186	0	0	151,186
2014	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**332,019**	**0**	**332,019**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**118,206**	**0**	**118,206**
	Dorosoma cepedianum	Gizzard Shad	89%	0	104,830	0	104,830
	Alosa pseudoharengus	Alewife	11%	0	13,376	0	13,376
	Actinopterygii	**Unidentified**	**100%**	**501,389**	**0**	**0**	**501,389**
	Dorosoma cepedianum	Gizzard Shad	55%	275,682	0	0	275,682
	Alosa pseudoharengus	Alewife	7%	35,175	0	0	35,175
	Perca flavescens	Yellow Perch	31%	157,507	0	0	157,507
	Notropis hudsonius	Spottail Shiner	5%	24,033	0	0	24,033
	Osmerus mordax	Rainbow Smelt	-	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	2%	8,992	0	0	8,992

TABLE 5. NO. 2 PUMP STATION ENTRAINMENT ESTIMATE (BASED ON NO. 1 PS RAW DATA)

Sample Event	Collection Date (end of sample event)	No. 2 PS Average Annual Intake Rate (MGD)	Gallons Pump By Sampler for 32- 60 hours	Time of Interval of Sample Event (in minutes)	Gallons Pumped by Sampler in an 24 hours	Eggs per subsample	Larvae per subsample	Juvenile per subsample	Total Abundance per Subsample	Estimated Eggs per 24 hours	Estimated larvae per 24 hours	Estimated Juvenile per 24 hours	Estimated Ichthyoplankton per 24 hours	Species
1	02-17-2012	110.00	39410	2,890	19,637	0	0	0	0	0	0	0	0	
2	02-29-2012	110.00	23660	2,250	15,142	0	0	0	0	0	0	0	0	
3	03-15-2012	110.00	21670	2,875	10,854	0	0	0	0	0	0	0	0	
4	03-30-2012	110.00	19030	2,245	12,206	0	0	0	0	0	0	0	0	
5	04-12-2012	110.00	23990	2,875	12,016	0	0	0	0	0	0	0	0	
6	04-24-2012	110.00	27320	2,195	17,923	0	0	0	0	0	0	0	0	
7	05-11-2012	110.00	37670	2,990	18,142	0	0	0	0	0	0	0	0	
8	05-23-2012	110.00	29050	2,235	18,717	0	0	0	0	0	0	0	0	
9	06-27-2012	110.00	47470	3,435	19,900	0	0	0	0	0	0	0	0	
10	07-25-2012	110.00	31250	2,305	19,523	0	1	0	1	0	3,520	0	3,520	Clupeidae
11	08-15-2012	110.00	42800	3,065	20,108	0	0	0	0	0	0	0	0	
12	09-12-2012	110.00	25670	1,930	19,153	0	0	0	0	0	0	0	0	
13	10-11-2012	110.00	34540	2,325	21,393	0	0	0	0	0	0	0	0	
14	10-23-2012	110.00	38900	2,860	19,586	0	0	0	0	0	0	0	0	
15	11-05-2012	110.00	32860	2,730	17,333	0	0	0	0	0	0	0	0	
16	11-28-2012	110.00	27080	2,550	15,292	0	0	0	0	0	0	0	0	
1	02-21-2013	171.00	44080	3,145	20,183	0	0	0	0	0	0	0	0	
2	03-06-2013	171.00	35350	2,705	18,818	0	0	0	0	0	0	0	0	
3	03-22-2013	171.00	39190	2,825	19,976	0	0	0	0	0	0	0	0	
4	04-03-2013	171.00	41090	2,530	23,387	0	0	0	0	0	0	0	0	
5	04-17-2013	171.00	49910	3,250	22,114	6	0	0	6	20,557	0	0	20,557	Actinopterygii (unidentified egg)
6	05-01-2013	171.00	32160	2,580	17,950	0	0	0	0	0	0	0	0	
7	05-15-2013	171.00	55670	3,525	22,742	0	0	1	1	0	0	3,072	3,072	Neogobius melanostomus
7	05-15-2013	171.00	55670	3,525	22,742	6	0	0	6	18,430	0	0	18,430	Actinopterygii (unidentified egg)
8	05-30-2013	171.00	49270	2,876	24,669	0	0	0	0	0	0	0	0	
9	06-19-2013	171.00	52940	2,890	26,378	76	0	0	76	245,485	0	0	245,485	Actinopterygii (unidentified egg)
10	07-17-2013	171.00	44290	2,520	25,309	3	0	0	3	11,583	0	0	11,583	Actinopterygii (unidentified egg)
10	07-17-2013	171.00	44290	2,520	25,309	0	1	0	1	0	3,861	0	3,861	Neogobius melanostomus
11	08-22-2013	171.00	25350	2,840	12,854	0	0	0	0	0	0	0	0	
12	09-18-2013	171.00	44310	2,850	22,388	0	0	0	0	0	0	0	0	
13	10-16-2013	171.00	39000	2,775	20,238	0	0	0	0	0	0	0	0	
14	10-30-2013	171.00	38620	3,210	17,325	0	0	0	0	0	0	0	0	
15	11-13-2013	171.00	25330	2,730	13,361	0	0	0	0	0	0	0	0	
16	11-27-2013	171.00	19870	2,655	10,777	0	0	0	0	0	0	0	0	
17	12-11-2013	171.00	41400	2,760	21,600	0	0	0	0	0	0	0	0	
1	02-20-2014	222.00	39,150	2,397	23,519	0	0	0	0	0	0	0	0	
2	03-05-2014	222.00	45,540	2,855	22,969	0	0	0	0	0	0	0	0	
3	03-19-2014	222.00	44,010	2,747	23,070	0	0	0	0	0	0	0	0	
4	04-09-2014	222.00	45,221	2,855	22,808	0	0	0	0	0	0	0	0	
5	04-23-2014	222.00	41,980	2,880	20,990	0	0	0	0	0	0	0	0	
6	05-07-2014	222.00	43,660	2,892	21,739	0	0	0	0	0	0	0	0	
7	05-21-2014	222.00	54,360	2,830	27,660	0	0	0	0	0	0	0	0	
8	06-12-2014	222.00	49,001	2,850	24,758	0	0	0	0	0	0	0	0	
9	06-25-2014	222.00	48,250	2,840	24,465	12	0	0	12	55,212	0	0	55,212	Actinopterygii (unidentified egg)
9	06-25-2014	222.00	48,250	2,840	24,465	0	2	0	2	0	9,202	0	9,202	Neogobius melanostomus
10	07-16-2014	222.00	39,050	2,780	20,227	0	0	0	0	0	0	0	0	
11	08-14-2014	222.00	41,730	2,878	20,879	0	2	0	2	0	10,640	0	10,640	Neogobius melanostomus
12	09-10-2014	222.00	56,850	2,940	27,845	0	1	0	1	0	3,905	0	3,905	Clupeidae
13	10-15-2014	222.00	57,100	2,775	29,630	0	0	0	0	0	0	0	0	
14	10-29-2014	222.00	61,650	2,865	30,986	0	0	0	0	0	0	0	0	
15	11-22-2014	222.00	60,790	2,885	30,342	0	0	0	0	0	0	0	0	
16	11-25-2014	222.00	54,890	2,805	28,179	0	0	0	0	0	0	0	0	
17	12-10-2014	222.00	40,760	2,850	20,595	0	0	0	0	0	0	0	0	

TABLE 6. NO. 2 PUMP STATION ENTRAINMENT ESTIMATES (BASED ON NO. 1 PS RAW DATA)

Collection Date (end of sample event)	Representative No. of Days	Estimated Eggs per 24 hours	Estimated larvae per 24 hours	Estimated Juvenile per 24 hours	Estimated Ichthyoplankton per 24 hours	Estimated Eggs per Representative No. of Days	Estimated larvae per Representative No. of Days	Estimated Juvenile per Representative No. of Days	Estimated Ichthyoplankton per Representative No. of Days
01-01-2012									
02-17-2012	59	0	0	0	0	0	0	0	0
02-29-2012	15	0	0	0	0	0	0	0	0
03-15-2012	15	0	0	0	0	0	0	0	0
03-30-2012	13	0	0	0	0	0	0	0	0
04-12-2012	12	0	0	0	0	0	0	0	0
04-24-2012	17	0	0	0	0	0	0	0	0
05-11-2012	12	0	0	0	0	0	0	0	0
05-23-2012	35	0	0	0	0	0	0	0	0
06-27-2012	28	0	0	0	0	0	0	0	0
07-25-2012	21	0	3,520	0	3,520	0	73,920	0	73,920
08-15-2012	28	0	0	0	0	0	0	0	0
09-12-2012	29	0	0	0	0	0	0	0	0
10-11-2012	12	0	0	0	0	0	0	0	0
10-23-2012	13	0	0	0	0	0	0	0	0
11-05-2012	23	0	0	0	0	0	0	0	0
11-28-2012	34	0	0	0	0	0	0	0	0
01-01-2013									
02-21-2013	64	0	0	0	0	0	0	0	0
03-06-2013	16	0	0	0	0	0	0	0	0
03-22-2013	12	0	0	0	0	0	0	0	0
04-03-2013	14	0	0	0	0	0	0	0	0
04-17-2013	14	20,557	0	0	20,557	287,798	0	0	287,798
05-01-2013	14	0	0	0	0	0	0	0	0
05-15-2013	15	9,215	0	1,536	10,751	138,225	0	23,038	161,263
05-30-2013	20	0	0	0	0	0	0	0	0
06-19-2013	28	245,485	0	0	245,485	6,873,593	0	0	6,873,593
07-17-2013	36	5,791	1,930	0	7,722	208,490	69,497	0	277,986
08-22-2013	27	0	0	0	0	0	0	0	0
09-18-2013	28	0	0	0	0	0	0	0	0
10-16-2013	14	0	0	0	0	0	0	0	0
10-30-2013	14	0	0	0	0	0	0	0	0
11-13-2013	14	0	0	0	0	0	0	0	0
11-27-2013	14	0	0	0	0	0	0	0	0
12-11-2013	21	0	0	0	0	0	0	0	0
01-01-2014									
02-20-2014	63	0	0	0	0	0	0	0	0
03-05-2014	14	0	0	0	0	0	0	0	0
03-19-2014	21	0	0	0	0	0	0	0	0
04-09-2014	14	0	0	0	0	0	0	0	0
04-23-2014	14	0	0	0	0	0	0	0	0
05-07-2014	14	0	0	0	0	0	0	0	0
05-21-2014	22	0	0	0	0	0	0	0	0
06-12-2014	13	0	0	0	0	0	0	0	0
06-25-2014	21	27,606	4,601	0	32,207	579,731	96,622	0	676,352
07-16-2014	29	0	0	0	0	0	0	0	0
08-14-2014	27	0	10,640	0	10,640	0	287,275	0	287,275
09-10-2014	35	0	3,905	0	3,905	0	136,675	0	136,675
10-15-2014	14	0	0	0	0	0	0	0	0
10-29-2014	24	0	0	0	0	0	0	0	0
11-22-2014	3	0	0	0	0	0	0	0	0
11-25-2014	15	0	0	0	0	0	0	0	0
12-10-2014	22	0	0	0	0	0	0	0	0
01-01-2015									

TABLE 7. NO. 2 PUMP STATION ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE (BASED ON NO. 1 PS RAW DATA)

Year	Identification	Common Name	Species Fraction	Eggs	Larvae	Juvenile	Total Ichthyoplankton
2012	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**0**	**0**	**0**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**73,920**	**0**	**73,920**
	Dorosoma cepedianum	Gizzard Shad	43%	0	31,891	0	31,891
	Alosa pseudoharengus	Alewife	57%	0	42,029	0	42,029
	Actinopterygii	**Unidentified**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	21%	0	0	0	0
	Alosa pseudoharengus	Alewife	27%	0	0	0	0
	Perca flavescens	Yellow Perch	42%	0	0	0	0
	Notropis hudsonius	Spottail Shiner	3%	0	0	0	0
	Osmerus mordax	Rainbow Smelt	3%	0	0	0	0
	Notropis atherinoides	Emerald Shiner	1%	0	0	0	0
	Neogobius melanostomus	Round Goby	4%	0	0	0	0
2013	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**69,497**	**23,038**	**92,534**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	43%	0	0	0	0
	Alosa pseudoharengus	Alewife	57%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**7,508,106**	**0**	**0**	**7,508,106**
	Dorosoma cepedianum	Gizzard Shad	21%	1,545,929	0	0	1,545,929
	Alosa pseudoharengus	Alewife	27%	2,037,339	0	0	2,037,339
	Perca flavescens	Yellow Perch	42%	3,165,972	0	0	3,165,972
	Notropis hudsonius	Spottail Shiner	3%	235,232	0	0	235,232
	Osmerus mordax	Rainbow Smelt	3%	210,259	0	0	210,259
	Notropis atherinoides	Emerald Shiner	1%	49,947	0	0	49,947
	Neogobius melanostomus	Round Goby	4%	263,428	0	0	263,428
2014	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**383,897**	**0**	**383,897**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**136,675**	**0**	**136,675**
	Dorosoma cepedianum	Gizzard Shad	43%	0	58,966	0	58,966
	Alosa pseudoharengus	Alewife	57%	0	77,710	0	77,710
	Actinopterygii	**Unidentified**	**100%**	**579,731**	**0**	**0**	**579,731**
	Dorosoma cepedianum	Gizzard Shad	21%	119,367	0	0	119,367
	Alosa pseudoharengus	Alewife	27%	157,311	0	0	157,311
	Perca flavescens	Yellow Perch	42%	244,457	0	0	244,457
	Notropis hudsonius	Spottail Shiner	3%	18,163	0	0	18,163
	Osmerus mordax	Rainbow Smelt	3%	16,235	0	0	16,235
	Notropis atherinoides	Emerald Shiner	1%	3,857	0	0	3,857
	Neogobius melanostomus	Round Goby	4%	20,340	0	0	20,340

TABLE 8. LAKESIDE PUMP STATION ENTRAINMENT RAW DATA

Sample Event	Collection Date (end of sample event)	Intake Rate (MGD)	Gallons Pump By Sampler for 32- 60 hours	Time of Interval of Sample Event (in minutes)	Gallons Pumped by Sampler in an 24 hours	Eggs per subsample	Larvae per subsample	Juvenile per subsample	Total Abundance per Subsample	Estimated Eggs per 24 hours	Estimated larvae per 24 hours	Estimated Juvenile per 24 hours	Estimated Ichthyoplankton per 24 hours	Species
1	02-17-2012	69.00	45300	2905	22,455	0	0	0	0	0	0	0	0	
2	02-29-2012	69.00	32200	2190	21,173	0	0	0	0	0	0	0	0	
3	03-15-2012	69.00	31200	2860	15,709	0	0	0	0	0	0	0	0	
4	03-30-2012	69.00	29100	2310	18,140	0	0	0	0	0	0	0	0	
5	04-12-2012	69.00	49400	2858	24,890	0	0	0	0	0	0	0	0	
6	04-26-2012	69.00	25700	2230	16,596	0	0	0	0	0	0	0	0	
7	05-11-2012	69.00	48500	2860	24,420	0	0	0	0	0	0	0	0	
8	05-23-2012	69.00	32100	2190	21,107	0	0	0	0	0	0	0	0	
9	06-27-2012	69.00	36900	3240	16,400	0	5	0	5	0	9,350	0	9,350	Neogobius melanostomus
10	07-25-2012	69.00	38600	2250	24,704	0	0	9	9	0	0	16,088	16,088	Neogobius melanostomus
11	08-15-2012	69.00	54700	3100	25,409	0	4	0	4	0	5,046	0	5,046	Neogobius melanostomus
12	09-12-2012	69.00	54000	2885	26,953	0	0	0	0	0	0	0	0	
13	10-11-2012	69.00	41200	2345	25,300	0	0	0	0	0	0	0	0	
14	10-23-2012	69.00	55400	2950	27,043	0	0	0	0	0	0	0	0	
15	11-07-2012	69.00	34600	2820	17,668	0	0	0	0	0	0	0	0	
16	11-28-2012	69.00	37000	2620	20,336	0	0	0	0	0	0	0	0	
1	02-21-2013	82.00	45900	3015	21,922	0	0	0	0	0	0	0	0	
2	03-06-2013	82.00	45400	2875	22,739	0	0	0	0	0	0	0	0	
3	03-22-2013	82.00	37900	2,825	19,319	0	0	0	0	0	0	0	0	
4	04-03-2013	82.00	35700	2,895	17,758	0	0	0	0	0	0	0	0	
5	04-17-2013	82.00	39400	3,065	18,511	7	0	0	7	14,569	0	0	14,569	Actinopterygii (unidentified egg)
5	04-17-2013	82.00	39400	3,065	18,511	0	1	0	1	0	2,081	0	2,081	Neogobius melanostomus
6	05-01-2013	82.00	37800	2,605	20,895	0	0	0	0	0	0	0	0	
7	05-15-2013	82.00	44100	3,050	20,821	0	0	0	0	0	0	0	0	
8	05-30-2013	82.00	61100	2,810	31,311	0	0	0	0	0	0	0	0	
9	06-19-2013	82.00	68300	2,860	34,389	0	0	0	0	0	0	0	0	
10	07-17-2013	82.00	88850	2,925	43,742	0	2	0	2	0	1,846	0	1,846	Neogobius melanostomus
11	08-22-2013	82.00	56400	2,920	27,814	0	1	0	1	0	1,454	0	1,454	Neogobius melanostomus
12	09-18-2013	82.00	52700	2,895	26,213	0	0	0	0	0	0	0	0	
13	10-16-2013	82.00	64400	2,970	31,224	0	0	0	0	0	0	0	0	
14	10-30-2013	82.00	95200	3,130	43,798	0	1	0	1	0	861	0	861	Neogobius melanostomus
15	11-13-2013	82.00	68700	2,910	33,996	0	0	0	0	0	0	0	0	
16	11-27-2013	82.00	86600	3,150	39,589	0	0	0	0	0	0	0	0	
17	12-11-2013	82.00	42000	2,460	24,585	0	0	0	0	0	0	0	0	
1	02-20-2014	79.00	69300	2,970	33,600	0	0	0	0	0	0	0	0	
2	03-05-2014	79.00	72500	3,080	33,896	0	0	0	0	0	0	0	0	
3	03-19-2014	79.00	50200	2,930	24,672	0	0	0	0	0	0	0	0	
4	04-09-2014	79.00	91200	2,975	44,144	0	0	0	0	0	0	0	0	
5	04-23-2014	79.00	77900	2,895	38,748	0	0	0	0	0	0	0	0	
6	05-07-2014	79.00	58700	2,955	28,605	0	0	0	0	0	0	0	0	
7	05-21-2014	79.00	58300	2,853	29,426	0	0	0	0	0	0	0	0	
8	06-12-2014	79.00	61100	2,842	30,958	0	0	0	0	0	0	0	0	
9	06-25-2014	79.00	61900	2,880	30,950	0	0	0	0	0	0	0	0	
10	07-16-2014	79.00	55500	2,850	28,042	0	1	0	1	0	1,423	0	1,423	Neogobius melanostomus
11	08-14-2014	79.00	67000	2,887	33,419	0	2	0	2	0	2,358	0	2,358	Neogobius melanostomus
12	09-10-2014	79.00	62,300	2,860	31,368	0	0	0	0	0	0	0	0	
13	10-15-2014	79.00	77,300	2,805	39,683	0	0	0	0	0	0	0	0	
14	10-29-2014	79.00	37,900	2,895	18,852	0	0	0	0	0	0	0	0	
15	11-12-2014	79.00	51,850	2,900	25,746	0	0	0	0	0	0	0	0	
16	11-25-2014	79.00	61,400	2,820	31,353	0	0	0	0	0	0	0	0	
17	12-10-2014	79.00	37,100	2,870	18,615	0	0	0	0	0	0	0	0	

TABLE 9. LAKESIDE PUMP STATION ENTRAINMENT ESTIMATES

Collection Date (end of sample event)	Representative No. of Days	Estimated Eggs per 24 hours	Estimated larvae per 24 hours	Estimated Juvenile per 24 hours	Estimated Ichthyoplankton per 24 hours	Estimated Eggs per Representative No. of Days	Estimated larvae per Representative No. of Days	Estimated Juvenile per Representative No. of Days	Estimated Ichthyoplankton per Representative No. of Days
02-17-2012	12	0	0	0	0	0	0	0	0
02-29-2012	15	0	0	0	0	0	0	0	0
03-15-2012	15	0	0	0	0	0	0	0	0
03-30-2012	13	0	0	0	0	0	0	0	0
04-12-2012	14	0	0	0	0	0	0	0	0
04-26-2012	15	0	0	0	0	0	0	0	0
05-11-2012	12	0	0	0	0	0	0	0	0
05-23-2012	35	0	0	0	0	0	0	0	0
06-27-2012	28	0	9,350	0	9,350	0	261,789	0	261,789
07-25-2012	21	0	0	16,088	16,088	0	0	337,850	337,850
08-15-2012	28	0	5,046	0	5,046	0	141,280	0	141,280
09-12-2012	29	0	0	0	0	0	0	0	0
10-11-2012	12	0	0	0	0	0	0	0	0
10-23-2012	15	0	0	0	0	0	0	0	0
11-07-2012	21	0	0	0	0	0	0	0	0
11-28-2012	85	0	0	0	0	0	0	0	0
02-21-2013	13	0	0	0	0	0	0	0	0
03-06-2013	16	0	0	0	0	0	0	0	0
03-22-2013	12	0	0	0	0	0	0	0	0
04-03-2013	14	0	0	0	0	0	0	0	0
04-17-2013	14	7,284	1,041	0	8,325	101,980	14,569	0	116,548
05-01-2013	14	0	0	0	0	0	0	0	0
05-15-2013	15	0	0	0	0	0	0	0	0
05-30-2013	20	0	0	0	0	0	0	0	0
06-19-2013	28	0	0	0	0	0	0	0	0
07-17-2013	36	0	1,846	0	1,846	0	66,449	0	66,449
08-22-2013	27	0	1,454	0	1,454	0	39,255	0	39,255
09-18-2013	28	0	0	0	0	0	0	0	0
10-16-2013	14	0	0	0	0	0	0	0	0
10-30-2013	14	0	861	0	861	0	12,059	0	12,059
11-13-2013	14	0	0	0	0	0	0	0	0
11-27-2013	14	0	0	0	0	0	0	0	0
12-11-2013	71	0	0	0	0	0	0	0	0
02-20-2014	13	0	0	0	0	0	0	0	0
03-05-2014	14	0	0	0	0	0	0	0	0
03-19-2014	21	0	0	0	0	0	0	0	0
04-09-2014	14	0	0	0	0	0	0	0	0
04-23-2014	14	0	0	0	0	0	0	0	0
05-07-2014	14	0	0	0	0	0	0	0	0
05-21-2014	22	0	0	0	0	0	0	0	0
06-12-2014	13	0	0	0	0	0	0	0	0
06-25-2014	21	0	0	0	0	0	0	0	0
07-16-2014	29	0	1,423	0	1,423	0	41,279	0	41,279
08-14-2014	27	0	2,358	0	2,358	0	63,672	0	63,672
09-10-2014	35	0	0	0	0	0	0	0	0
10-15-2014	14	0	0	0	0	0	0	0	0
10-29-2014	14	0	0	0	0	0	0	0	0
11-12-2014	13	0	0	0	0	0	0	0	0
11-25-2014	15	0	0	0	0	0	0	0	0
12-10-2014	21	0	0	0	0	0	0	0	0

TABLE 10. LAKESIDE PUMP STATION ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE

Year	Identification	Common Name	Species Fraction	Eggs	Larvae	Juvenile	Total Ichthyoplankton
2012	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**403,068**	**337,850**	**740,918**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	100%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	5%	0	0	0	0
	Perca flavescens	Yellow Perch	51%	0	0	0	0
	Notropis hudsonius	Spottail Shiner	2%	0	0	0	0
	Osmerus mordax	Rainbow Smelt	1%	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	41%	0	0	0	0
2013	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**132,332**	**0**	**132,332**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	100%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**101,980**	**0**	**0**	**101,980**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	5%	4,812	0	0	4,812
	Perca flavescens	Yellow Perch	51%	52,405	0	0	52,405
	Notropis hudsonius	Spottail Shiner	2%	2,381	0	0	2,381
	Osmerus mordax	Rainbow Smelt	1%	960	0	0	960
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	41%	41,423	0	0	41,423
2014	**Neogobius melanostomus**	**Round Goby**	**100%**	**0**	**104,951**	**0**	**104,951**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	100%	0	0	0	0
	Actinopterygii	**Unidentified**	**100%**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	-	0	0	0	0
	Alosa pseudoharengus	Alewife	5%	0	0	0	0
	Perca flavescens	Yellow Perch	51%	0	0	0	0
	Notropis hudsonius	Spottail Shiner	2%	0	0	0	0
	Osmerus mordax	Rainbow Smelt	1%	0	0	0	0
	Notropis atherinoides	Emerald Shiner	-	0	0	0	0
	Neogobius melanostomus	Round Goby	41%	0	0	0	0

TABLE 11. FACILITY ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE

Year	Identification	Common Name	Eggs	Larvae	Juvenile	Total Ichthyoplankton
2012	**Neogobius melanostomus**	**Round Goby**	**0**	**403,068**	**337,850**	**740,918**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**190,176**	**0**	**190,176**
	Dorosoma cepedianum	Gizzard Shad	0	134,992	0	134,992
	Alosa pseudoharengus	Alewife	0	55,184	0	55,184
	Actinopterygii	**Unidentified**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0
	Alosa pseudoharengus	Alewife	0	0	0	0
	Perca flavescens	Yellow Perch	0	0	0	0
	Notropis hudsonius	Spottail Shiner	0	0	0	0
	Osmerus mordax	Rainbow Smelt	0	0	0	0
	Notropis atherinoides	Emerald Shiner	0	0	0	0
	Neogobius melanostomus	Round Goby	0	0	0	0
				Annualized Entrainment Estimate =		**931,094**
2013	**Neogobius melanostomus**	**Round Goby**	**0**	**279,859**	**48,904**	**328,764**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**0**	**0**	**0**
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0
	Alosa pseudoharengus	Alewife	0	0	0	0
	Actinopterygii	**Unidentified**	**16,040,239**	**0**	**0**	**16,040,239**
	Dorosoma cepedianum	Gizzard Shad	6,181,137	0	0	6,181,137
	Alosa pseudoharengus	Alewife	2,633,568	0	0	2,633,568
	Perca flavescens	Yellow Perch	5,866,645	0	0	5,866,645
	Notropis hudsonius	Spottail Shiner	641,687	0	0	641,687
	Osmerus mordax	Rainbow Smelt	211,219	0	0	211,219
	Notropis atherinoides	Emerald Shiner	49,947	0	0	49,947
	Neogobius melanostomus	Round Goby	456,037	0	0	456,037
				Annualized Entrainment Estimate =		**16,369,002**
2014	**Neogobius melanostomus**	**Round Goby**	**0**	**820,867**	**0**	**820,867**
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**254,881**	**0**	**254,881**
	Dorosoma cepedianum	Gizzard Shad	0	163,796	0	163,796
	Alosa pseudoharengus	Alewife	0	91,085	0	91,085
	Actinopterygii	**Unidentified**	**1,081,119**	**0**	**0**	**1,081,119**
	Dorosoma cepedianum	Gizzard Shad	395,049	0	0	395,049
	Alosa pseudoharengus	Alewife	192,486	0	0	192,486
	Perca flavescens	Yellow Perch	401,965	0	0	401,965
	Notropis hudsonius	Spottail Shiner	42,196	0	0	42,196
	Osmerus mordax	Rainbow Smelt	16,235	0	0	16,235
	Notropis atherinoides	Emerald Shiner	3,857	0	0	3,857
	Neogobius melanostomus	Round Goby	29,332	0	0	29,332
				Annualized Entrainment Estimate =		**2,156,868**

TABLE 12. FACILITY ANNUALIZED ENTRAINMENT ESTIMATES BY SPECIES AND LIFESTAGE ADJUSTED FOR REMOVAL OF EXOTIC/NUISANCE SPECIES

Year	Identification	Common Name	Eggs	Larvae	Juvenile	Total Ichthyoplankton	Organism Removal with Fine Mesh (2 mm) Screens (A)
2012	**Neogobius melanostomus**	**Round Goby**					
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**190,176**	**0**	**190,176**	100%
	Dorosoma cepedianum	Gizzard Shad	0	134,992	0	134,992	100%
	Alosa pseudoharengus	Alewife	0	55,184	0	55,184	100%
	Actinopterygii	**Unidentified**	**0**	**0**	**0**	**0**	N/A
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0	N/A
	Alosa pseudoharengus	Alewife	0	0	0	0	N/A
	Perca flavescens	Yellow Perch	0	0	0	0	N/A
	Notropis hudsonius	Spottail Shiner	0	0	0	0	N/A
	Osmerus mordax	Rainbow Smelt	0	0	0	0	N/A
	Notropis atherinoides	Emerald Shiner	0	0	0	0	N/A
	Neogobius melanostomus	Round Goby					
				Annualized Entrainment Estimate =		**190,176**	100%
2013	**Neogobius melanostomus**	**Round Goby**					
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**0**	**0**	**0**	N/A
	Dorosoma cepedianum	Gizzard Shad	0	0	0	0	N/A
	Alosa pseudoharengus	Alewife	0	0	0	0	N/A
	Actinopterygii	**Unidentified**	**16,040,239**	**0**	**0**	**16,040,239**	0%
	Dorosoma cepedianum	Gizzard Shad	6,181,137	0	0	6,181,137	0%
	Alosa pseudoharengus	Alewife	2,633,568	0	0	2,633,568	0%
	Perca flavescens	Yellow Perch	5,866,645	0	0	5,866,645	0%
	Notropis hudsonius	Spottail Shiner	641,687	0	0	641,687	0%
	Osmerus mordax	Rainbow Smelt	211,219	0	0	211,219	0%
	Notropis atherinoides	Emerald Shiner	49,947	0	0	49,947	0%
	Neogobius melanostomus	Round Goby					
				Annualized Entrainment Estimate =		**15,584,202**	0%
2014	**Neogobius melanostomus**	**Round Goby**					
	Clupeidae	**Assumed Gizzard Shad or Alewife**	**0**	**254,881**	**0**	**254,881**	100%
	Dorosoma cepedianum	Gizzard Shad	0	163,796	0	163,796	100%
	Alosa pseudoharengus	Alewife	0	91,085	0	91,085	100%
	Actinopterygii	**Unidentified**	**1,081,119**	**0**	**0**	**1,081,119**	0%
	Dorosoma cepedianum	Gizzard Shad	395,049	0	0	395,049	0%
	Alosa pseudoharengus	Alewife	192,486	0	0	192,486	0%
	Perca flavescens	Yellow Perch	401,965	0	0	401,965	0%
	Notropis hudsonius	Spottail Shiner	42,196	0	0	42,196	0%
	Osmerus mordax	Rainbow Smelt	16,235	0	0	16,235	0%
	Notropis atherinoides	Emerald Shiner	3,857	0	0	3,857	0%
	Neogobius melanostomus	Round Goby					
				Annualized Entrainment Estimate =		**1,306,668**	20%

(A) Assumes eggs to be removed by 0.5 mm mesh; juveniles and larvae to be removed by 2 mm mesh

APPENDICES

CWA Section 316(b) Requirements for CWIS
Pursuant to 40 CFR 122.21(r)(9)-(12)

APPENDIX 1

Comprehensive Technical Feasibility and Cost Evaluation Study
ENERCON (March 31, 2020)

MARCH 31, 2020

DRAFT FOR
FINAL REIVEW

COMPREHENSIVE TECHNICAL FEASIBILITY AND COST EVALUATION STUDY

U.S. STEEL – GARY WORKS

ENERCON

Excellence—Every project. Every day.

Comprehensive Technical Feasibility and Cost Evaluation Study

U.S. Steel – Gary Works

Lake County, Indiana

Submitted to:

U.S. Steel

Submitted by:

Enercon Services, Inc.

DRAFT FOR FINAL REVIEW
3/31/20

TABLE OF CONTENTS

LIST OF ATTACHMENTS

1 INTRODUCTION

This report documents and summarizes the comprehensive technical feasibility and cost evaluation studies performed in support of the permit renewal application of the National Pollutant Discharge Elimination System (NPDES) Permit IN0000281 held by United States Steel Corporation (U.S. Steel). To support the operations which generate the discharges authorized by the NPDES Permit, U.S. Steel withdraws water from Lake Michigan for use in cooling and process system uses. Included in this report are studies on: 1) fine mesh traveling water screens (TWS), 2) mechanical draft cooling towers, and 3) water reuse or alternative water sources.

1.1 Final Rule Requirements

The Final Rule requires that a comprehensive technical feasibility and cost evaluation study be prepared as one of four entrainment-related studies required of facilities with an average annual actual intake flow (AIF) greater than 125 million gallons per day (MGD). A facility-specific discussion and determination of technical feasibility and engineering cost estimate of the implementation of closed-cycle recirculation systems, fine mesh screens, and water reuse or alternate sources of cooling water is required. The following are the requirements of the technical feasibility sections of the study in §122.21(r)(10)(i):

An evaluation of the technical feasibility of closed-cycle recirculating systems as defined at 40 CFR 125.92(c), fine mesh screens with a mesh size of 2 millimeters or smaller, and water reuse or alternate sources of cooling water. In addition, this study must include:

(A) A description of all technologies and operational measures considered (including alternative designs of closed-cycle recirculating systems such as natural draft cooling towers, mechanical draft cooling towers, hybrid designs, and compact or multi-cell arrangements);

(B) A discussion of land availability, including an evaluation of adjacent land and acres potentially available due to generating unit retirements, production unit retirements, other buildings and equipment retirements, and potential for repurposing of areas devoted to ponds, coal piles, rail yards, transmission yards, and parking lots;

(C) A discussion of available sources of process water, grey water, waste water, reclaimed water, or other waters of appropriate quantity and quality for use as some or all of the cooling water needs of the facility; and

(D) Documentation of factors other than cost that may make a candidate technology impractical

or infeasible for further evaluation.

The following are the requirements of the cost evaluation sections of the study in §122.21(r)(10)(iii):

The study must include engineering cost estimates of all technologies considered in paragraphs (r)(10)(i) and (ii) of this section. Facility costs must also be adjusted to estimate social costs. All costs must be presented as the net present value (NPV) and the corresponding annual value. Costs must be clearly labeled as compliance costs or social costs. The applicant must separately discuss facility level compliance costs and social costs, and provide documentation as follows:

(A) Compliance costs are calculated as after-tax, while social costs are calculated as pre-tax. Compliance costs include the facility's administrative costs, including costs of permit application, while the social cost adjustment includes the Director's administrative costs. Any outages, downtime, or other impacts to facility net revenue, are included in compliance costs, while only that portion of lost net revenue that does not accrue to other producers can be included in social costs. Social costs must also be discounted using social discount rates of 3 percent and 7 percent. Assumptions regarding depreciation schedules, tax rates, interest rates, discount rates and related assumptions must be identified;

(B) Costs and explanation of any additional facility modifications necessary to support construction and operation of technologies considered in paragraphs (r)(10)(i) and (ii) of this section, including but not limited to relocation of existing buildings or equipment, reinforcement or upgrading of existing equipment, and additional construction and operating permits. Assumptions regarding depreciation schedules, interest rates, discount rates, useful life of the technology considered, and any related assumptions must be identified; and

(C) Costs and explanation for addressing any non-water quality environmental and other impacts identified in paragraph (r)(12) of this section. The cost evaluation must include a discussion of all reasonable attempts to mitigate each of these impacts.

For the sake of the evaluation studies presented in this report, technical feasibility is defined as the ability to design, construct, and operate a technology with no or minor impacts to the reliability, safety and/or operability of a facility. Technical feasibility includes the consideration of impediments to implementation and whether there are available, reasonable mitigation methods which could be utilized to resolve the identified impediments. Technical feasibility is not a determination of practicality or effectiveness. The technical feasibility and cost evaluations presented in this report are completed in compliance with the regulations promulgated in §122.21(r)(10). The engineering evaluations are based on high level conceptual designs intended for use in screening/feasibility determinations and should not be considered final designs for construction. A number of assumptions have been made which would require a detailed engineering design to validate the designs and conclusions presented in this document.

1.2 Fine Mesh Traveling Water Screens Executive Summary

Retrofit of the TWS in operation at U.S. Steel's Gary Works integrated steel mill facility with fine mesh and modified fish protection systems is technically feasible but would involve a significant and technically challenging construction project in order to complete the fish handling and return system. The cooling water intake structures (CWIS) would be modified as follows:

<u>Pump Station #1</u>

- Modified fine mesh screens with Ristroph-type baskets would be installed on the existing 12 TWS.
- A low-pressure spray wash system would be installed to gently remove organisms from the screen.
- A buried fish handling and return system (FHRS) pipe would be installed to return organisms to Lake Michigan through a 5,405 ft long gravity driven run. Due to the age of the facility and complex heavy manufacturing infrastructure in the path of the FHRS pipe, the installation would require extensive and potentially intrusive excavation.

<u>Pump Station #2</u>

- Modified fine mesh screens with Ristroph-type baskets would be installed on the existing 6 TWS, 2 of which would be returned to operation from an out of service status.
- A low-pressure spray wash system would be installed to gently remove organisms from the screen.
- A buried FHRS pipe would be installed to return organisms to Lake Michigan through a 1,380 ft long gravity driven run.

<u>Pump Station #4</u>

- Fine mesh screens would be installed on the existing 3 TWS.
- The relatively low withdrawal rates at Pump Station #4 produce through-screen velocities low enough to operate below 0.5 feet per second (fps) under all projected conditions.

- No FHRS would be installed at Pump Station #4 due to the low withdrawal rates and low through-screen velocities allowing for evacuation of motile organisms from the CWIS by their own motive.

Lakeside Pump Station

- Fine mesh screens would be installed on the existing 4 TWS.
- The design of the intake crib produces withdrawal velocities low enough to operate below 0.5 fps under all projected conditions.
- No FHRS pipe would be installed at Lakeside Pump Station due to the design of the intake crib and low through-screen velocities allowing for evacuation of motile organisms from the CWIS by their own motive.

Fine Mesh Screen Identified Risks

There are a number of risks associated with the construction, operation and maintenance of fine mesh TWS at Gary Works. While the identified risks have not impacted the determination of technical feasibility, the conceptual design of this technology should be considered alongside the potential risks for completeness.

In order to complete the retrofitting activities without causing a major facility outage, the TWS would be taken out of service one at a time while the facility cooling and process water withdrawal would continue at current rates. Debris loading of the existing TWS would be anticipated to increase during the retrofitting activities due to the redistribution of water withdrawal through a decreased quantity of TWS.

Fine mesh TWS are at higher risk for increased debris loading, differential pressures in excess of operable limits and, in extreme cases, catastrophic failure. Due to the high heat load nature of the steelmaking process, resultant partial or total loss of cooling and process water could result in serious risk to the safety and wellbeing of Gary Works personnel and the local community.

Installation of the FHRS piping would require extensive excavation through areas of the facility which include complex buried utilities and relatively old underground infrastructure. While it is assumed that any buried interferences which may be identified during the detailed design or implementation phases would be mitigated through typical best practices, a detailed review of the piping route has not been completed and would be required to confirm this assumption. Should an impediment or serious risk associated with the installation of the FHRS piping be identified, an alternative FHRS piping route, installation method or fish handling method would be required.

Due to the long, complex routing of the FHRS piping and inability to use chlorination agents or biocide in the sluice water, the control of biogrowth or blockages in the pipe would likely be a significant challenge. Mechanical and hydrostatic cleaning may be required on a frequent basis in order to maintain an unobstructed path for the return of organisms to Lake Michigan. Excessive biogrowth or blockages would result in loss of operation of the FHRS.

Fine Mesh Screen Capital Cost Summary

The estimated construction cost for a retrofit of the existing TWS with fine mesh would be approximately $23,810,000, and the recommended engineering budget would be $4,760,000. Estimated permitting costs are $880,000. Fine mesh TWS would require new and modified permits for the construction and final configuration. The total capital investment excluding operation and maintenance expenses would be $29,440,000.

1.3 Mechanical Draft Cooling Tower Executive Summary

Conversion of U.S. Steel's Gary Works integrated steel mill facility to closed-cycle cooling with hybrid (i.e., recirculation of 50%, 60% or 80% of the cooling and process water) cooling capacity is technically feasible but would involve a significant construction project, would impact the operation of the facility, and introduce mechanical and thermal risks to critical infrastructure which is essential to the safety of U.S. Steel employees and the surrounding community. The two predominantly independent cooling and process water systems would be cooled with the following mechanical draft cooling tower systems:

West Cooling and Process Water System

- A non-plume-abated, mechanical draft cooling tower would be installed southeast of the existing hot strip mill cooling tower and would consist of 2 cooling tower cells.
- New buried piping would redirect water from Outfall 034 to a new south booster pump station and from Outfall 037 and Outfall 039 to a new north booster pump station. The new pump stations would deliver water to the cooling tower through new buried piping.
- New buried piping would deliver the cooled water from the cooling tower basin to the offshore tie-in point.
- Tie-in for the returning water would occur at the offshore intake pipe which feeds Lakeside Pump Station. Makeup water for water lost to drift, evaporation, onsite consumption and hybrid operation blowdown would be drawn through the existing offshore intake conduit by the circulating water pumps.
- The existing outfalls would be permanently closed, and a new outfall would be opened for

seasonally variable, non-continuous blowdown to Lake Michigan. This flowrate and quality at the new outfall would be monitored and reported.

- Intake flows for Lakeside Pump Station would be reduced from 56 MGD to approximately 5.8 MGD 81.9% of the time.

East Cooling and Process Water System

- A non-plume-abated, mechanical draft cooling tower would be installed east of the ore loading slip turning basin and would consist of 15 cooling tower cells.

- New buried piping would redirect water from Outfall 032 and Outfall 033 to existing Pump Station GW-11 and from Outfall 015, Outfall 018, Outfall 019, Outfall 020, Outfall 021, Outfall 023, Outfall 026, Outfall 028, Outfall 030 and Outfall 035 to a new booster pump station located adjacent to the cooling tower. The new pump station would deliver water directly to the cooling tower.

- New buried piping would deliver the cooled water from the cooling tower basin to a holding lagoon located north of the abandoned Pump Station #3. New pipes buried below the ore loading slip dredge line would run from the holding lagoon to Pump Station #1, Pump Station #2, and Pump Station #4.

- Tie-in for the returning water would occur at the buried intake pipes which feeds Pump Station #1 and Pump Station #4. Returning water for Pump Station #2 would be delivered directly to the Pump Station #2 forebay. The existing intake points would be permanently closed. Makeup water for water lost to drift, evaporation, onsite consumption and hybrid operation blowdown would be drawn through a new holding lagoon by the circulating water pumps.

- The existing outfalls would be permanently closed, and a new outfall would be opened for seasonally variable, non-continuous blowdown to the Grand Calumet River. This flowrate and quality at the new outfall would be monitored and reported.

- Combined intake flows for Pump Station #1, Pump Station #2, and Pump Station #4 would be reduced from 400 MGD to approximately 53.6 MGD 96.1% of the time.

Mechanical Draft Cooling Tower Identified Risks

There are a number of risks associated with the construction, operation and maintenance of closed-cycle cooling using cooling towers at Gary Works. While the identified risks have not impacted the determination of technical feasibility, the conceptual design of this technology should be considered alongside the potential risks for completeness.

Detailed hydrodynamic and thermal studies of the CWIS and cooling and process water systems at Gary Works have not been completed to validate the designs of the cooling towers and recirculation piping. A greater quantity of large diameter piping, new booster pumps or a greater quantity of cooling tower cells could be required if a detailed design were to determine that reliability of the facility would be insufficient under reasonable combinations of system requirements and environmental conditions.

Installation of long runs of large diameter piping from the existing outfalls to the proposed cooling towers would require extensive excavation through areas of the facility which include complex buried utilities and relatively old underground infrastructure. While it is assumed that any buried interferences which may be identified during the detailed design or implementation phases would be mitigated through typical best practices, a detailed review of the piping route has not been completed and would be required to confirm this assumption.

Tie-in of the proposed piping would require specialized planning, analysis and coordination to complete without requiring a major facility outage. Unplanned loss of cooling and process water discharge could result in significant risks to the safety of Gary Works personnel and the local community. If a detailed design were to determine that tie-in of the proposed piping would require a major facility outage, the associated costs of loss of production would be included in the capital costs of the close-cycle cooling retrofit.

Ground fogging at and nearby the Gary Works site would be compounded due to the evaporative plumes from the cooling tower stacks. Ground fogging at Gary Works is an existing safety risk which currently requires seasonal mitigation efforts. Fogging effects would be particularly notable during cold weather months. Fogging could result in decreased visibility, ground or surface icing and salt deposition. Traffic safety risks could be increased due to these effects. Implementation of plume abated cooling towers could be completed at considerable costs if a detailed design determined that the identified risks would be critical to the feasibility of the technology. The conceptual design presented in this report does not include the use of plume abated cooling towers.

Mechanical Draft Cooling Tower Capital Cost Summary

The estimated construction cost for closed-cycle cooling is approximately $148,180,000, and the recommended engineering budget would be $29,640,000. Estimated permitting costs are $3,820,000. Closed-cycle cooling would require new and modified permits for the construction and final configuration. Additionally, closed-cycle cooling would create new particulate air emissions via cooling tower drift and would result in increased energy consumption. The total capital investment excluding operation and maintenance costs would be $181,640,000.

1.4 Water Reuse / Alternative Water Sources

It was determined that reuse of existing or nearby wastewater, grey water or municipal water or the use of alternative fresh water sources would not be feasible given the temperature, quality and flow rate requirements at Gary Works. No cost evaluation was completed due to the limitations to feasibility.

2 FINE MESH THROUGH-FLOW TRAVELING WATER SCREEN RETROFIT

2.1 Introduction

TWS are intake protection equipment which filter debris from incoming raw water to protect the equipment that uses that water from damage or fouling. TWS filter out debris and biological species from cooling water by passing the water through a screen mesh. As the mesh is loaded with debris, the screen rotates over a head sprocket to expose clean mesh while the debris is removed, usually through a screen wash system. The screen wash system washes off the debris into a trash trough for removal from the screen system. Conventional through-flow TWS are oriented such that the flow travels through both the ascending and descending sides of the screen.

Conventional through-flow TWS can be altered to incorporate modifications that improve survival of impinged fish and other organisms, thus reducing the impingement mortality rate. These modifications are meant to minimize fish mortality associated with screen impingement and screen wash removal. There are four features of TWS systems that improve the survivability of fish and other organisms:

- Continuous operation of TWS to minimize impingement time;
- Modified Ristroph-type bucket configurations that include provisions to minimize damage to the fish upon entering the fish bucket, while they are in the bucket, and during transport to the FHRS;
- Low pressure fish screen wash systems to gently remove the impinged fish before the high-pressure debris spray is used to clean debris off the screens; and
- A FHRS that ensures that the fish can be returned to the water body with a minimum of stress.

Fine mesh screens utilize very small mesh opening sizes (less than or equal to 2 mm per 40 CFR §122.21(r)(10)(i)) to reduce entrainment as well as impingement mortality. Because the mesh opening size is smaller, a greater proportion of the total area is covered by the screening material and not available for flow. As a result, the percent open area (POA), or percentage of the total screen area that can pass flow, is low for these screens. Through-screen velocity (TSV) and total screening area are inversely related given a fixed withdrawal rate. Therefore, installation of fine mesh would result in an increased TSV, which is already higher than the United States Environmental Protection Agency (EPA) recommended 0.5 fps at the low water level at Pump Station #1 and Pump Station #2.

An illustration of a through-flow TWS is shown in Figure 2.1.

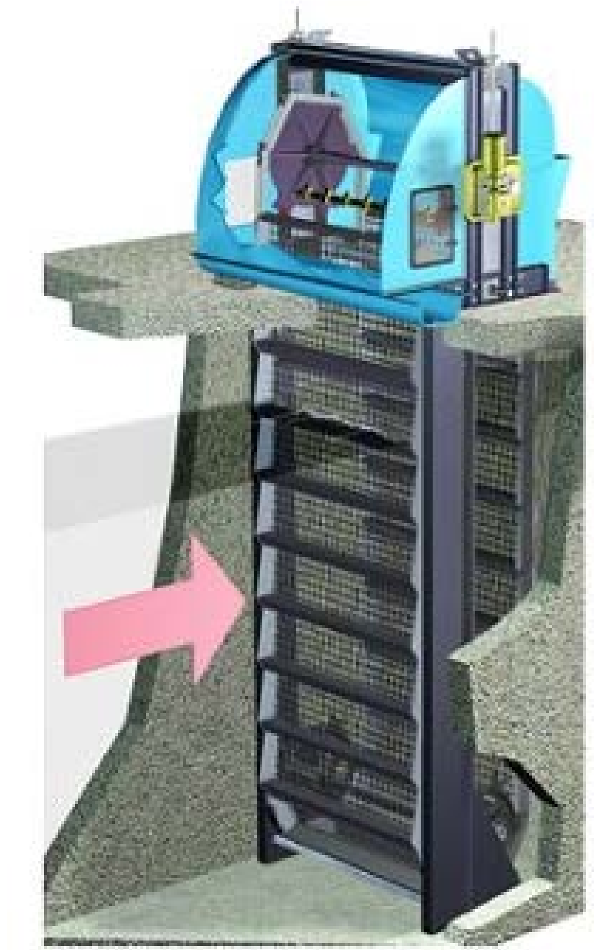


Figure 2.1: Through-Flow Traveling Water Screen (image courtesy of Evoqua Water Technologies LLC)

2.2 Existing Traveling Water Screens

U.S. Steel Corporation's Gary Works integrated steel mill facility has four independent CWIS which provide cooling water and process water to the intermediate stages of steel manufacturing: Pump Station #1, Pump Station #2, Pump Station #4 and Lakeside Pump Station. The location of these CWIS are shown in Figure 2.2. At the present time, each of the CWIS are equipped with conventional coarse mesh TWS of various sizes. With the exception of Lakeside Pump Station, the existing TWS are not rotated continuously. None of the intakes are equipped with fish collection buckets or FHRS.

Figure 2.2: Gary Works CWIS Locations

Pump Station #1 draws water through submerged intake tubes to an inlet sump. Fifteen TWS are installed between the inlet sump and the common pump intake sump. Three of the fifteen TWS are not in service. The in service TWS operate on an as-needed basis to maintain appropriate cleanliness. Approximately 15 minutes of runtime per day is required under typical debris loading.

Pump Station #2 draws water through an intake consisting of two 10 ft by 20 ft openings to an inlet sump. Six TWS are installed between the inlet sump and the common pump intake sump. Two of the six TWS are not in service. The in service TWS operate on an as-needed basis to maintain appropriate cleanliness. Approximately 15 minutes of runtime per day is required under typical debris loading.

Pump Station #4 draws water through a buried pipe to a screen room. Four TWS are installed between the screen room and the pump room. One of the four TWS is not in service. The in service TWS are cleaned manually once per month.

Lakeside Pump Station draws water through an offshore submerged intake crib to a forebay. Four TWS are installed between the forebay and the common pump intake sump. The TWS operate continuously year-round.

2.3 Overview of Design

Per 40 CFR §122.21(r)(10)(i), any facility that withdraws greater than 125 million gallons per day (MGD) AIF of water by CWIS must present a study of fine mesh screens (mesh opening sizes less than or equal to 2 millimeters [mm]) as a portion of entrainment control technology compliance to Section 316(b) of the Clean Water Act (CWA).

The best technology available (BTA) alternatives which a facility must operate to comply with impingement mortality standards for Section 316(b) of the CWA are defined in 40 CFR §125.94(c). Seven distinct and predefined options are provided, any one of which may be utilized to ensure compliance.

One alternative, as listed in 40 CFR §125.94(c)(5), is the use of “modified traveling screens”. The modified traveling screen is defined in 40 CFR §125.92(s) as a TWS with special fish and shellfish collection buckets and a return system which minimizes damage to the aquatic life. The design presented for Pump Station #1 and Pump Station #2 would meet the standards required to be defined as a modified traveling screen and therefore would be a candidate technology for compliance with the impingement mortality standards. Due to the location of Pump Station #1, the installation of a FHRS at that CWIS would present a significant technical challenge due to surrounding infrastructure and distance to Lake Michigan.

Other alternatives include the operation of a CWIS with a “0.5 Feet Per Second Through-Screen Design Velocity” and “0.5 Feet Per Second Through-Screen Actual Velocity”, as listed in 40 CFR §125.94(c)(2) and (c)(3), respectively. The definition for such an alternative requires submittal of information which demonstrates that the maximum intake velocity measured perpendicular to the screen mesh or opening of the intake does not exceed 0.5 fps under all normal operation of the CWIS, including during minimum water surface elevations and maximum head loss across the TWS and other devices. The design presented for Pump Station #4 and Lakeside Pump Station would meet the standards required to be defined as meeting a maximum through-screen velocity of less than or equal to 0.5 fps and, therefore, would be a candidate technology for compliance with the impingement mortality standards.

Evoqua Water Technologies LLC, a prominent TWS vendor, was contacted to provide design input and a budgetary quotation for the retrofit of the existing through-flow TWS with fine mesh baskets (Attachment 5). A mesh size of 2 mm square was selected to satisfy the fine mesh criteria defined in 40 CFR §122.21(r)(10)(i). The retrofits of Pump Station #1 and Pump Station #2 were designed with modified Ristroph fish baskets which satisfy the definition of modified traveling screens found in 40 CFR §125.92(s).

Given the mesh size and CWIS parameters, it was determined through preliminary estimates and vendor information that a direct retrofit of the existing TWS would meet the design requirements without requiring major modifications to the intake structure or TWS; however, installation of a FHRS at Pump Station #1 and Pump Station #2 would require major modifications at significant cost and may require the evaluation and resolution of technical challenges which are assumed to be within the definition of feasible used in this conceptual design. The proposed retrofit of the existing through-flow TWS would be completed by removal of the existing TWS from the respective screen bay to an onsite work area, direct replacement of relevant components by vendor authorized personnel, and installation of the TWS to the screen bay. Components to be replaced, modified, installed or retrofitted include the mesh baskets, splash housing, the debris and fish troughs, low-pressure fish spray system, and main drive chain. An inspection of each TWS will determine any additional components that may require modification to support the installation of fine mesh and, where applicable, modified Ristroph baskets. Per vendor recommendation, all other structural, mechanical and electrical TWS components are assumed to be retained or unsubstantially modified. If any additional components are identified during the retrofitting activities as requiring repair or replacement due to routine wear, the appropriate maintenance will be evaluated and, if necessary, performed to restore the TWS to like-new conditions. This cost is not captured in the budgetary estimate and would be incurred regardless of the installation of fine mesh. The existing high-pressure debris spray systems and debris troughs would be retained for full use.

2.4 Through-Flow Traveling Water Screens Retrofit

As described in Section 2.3, Evoqua Water Technologies LLC was consulted on the project for the retrofit of the existing through-flow TWS. The vendor provided validation of the feasibility of fine mesh baskets installed on the existing through-flow TWS. It was assumed that a 2 mm square mesh with a wire diameter of 0.021 inches would be installed on the existing through-flow TWS. To provide adequate structural stability, a 1 inch square backing mesh with a wire diameter of 14 gauge (0.080 inch) was selected to be installed behind the fine mesh. The backing mesh is coarse enough relative to the primary fine mesh to not significantly affect head loss or TSV while providing rigidity against constant through screen flow and debris loading.

Each TWS would be removed sequentially by removing roofing panels from the respective CWIS, securing the TWS, installing stop logs in the screen bay, lifting the TWS from the screen bay via hydraulic crane through the access panels in the roof and delivering the TWS to the onsite workspace via flatbed truck. A two person crew of vendor authorized personnel would replace each existing coarse mesh screen with a new fine mesh screen with Ristroph-type basket by removing the existing fasteners, removing the existing basket from the track frame and main chain, inspecting the frame and threading for adequate support, installing the new fine mesh basket, new fasteners and hardware, and manually rotating the screen to replace the next basket. The new baskets would be constructed of a non-metallic frame with 304 stainless steel smooth top mesh to reduce injury to the aquatic specimens. No increased galvanic corrosion would be expected due to the metal selection by the vendor and design of the TWS baskets. New seals would be installed to obtain the 2 mm threshold and ensure optimal operation of the TWS.

For TWS which would be designed to modified traveling screen specification, additional work would be completed to incorporate the heighted fish protection technologies. The splash housing would be removed to access the drivetrain and spray systems. The head section frame would be raised to create the necessary space to install the modifications. The main chain would be extended by an appropriate amount to account for the raised head section. New high-pressure debris spray and low-pressure fish spray systems would be installed and calibrated to follow fish protection best practices. An upper fish trough and a lower debris chute would be installed integral to the frame of the TWS. The low-pressure fish spray system would sluice organisms from the Ristroph-type baskets to the upper fish trough. The upper fish trough would connect to a common external trough which would gently transport specimens to Lake Michigan to avoid reimpingement. After the low-pressure fish spray, the TWS would be cleaned using the high-pressure debris spray. The high-pressure debris spray system would wash loaded debris from the fine mesh screens to the lower debris chute. The lower debris chute would connect to an external trough which would route the new flow to the existing debris trough system. New splash housing would be installed to fit the raised head section and new troughs.

The existing TWS controls at Pump Station #1 and Pump Station #2 would be modified to allow for continuous operation year-round. This would maintain the fine mesh screens at an acceptable cleanliness. Continuous or near-continuous screen rotation is a recommended measure included in the definition of a modified traveling screen per 40 CFR §125.92(s). It is anticipated that continuous operation of the TWS would result in more frequent maintenance due to mechanical stress, vibrational loading and component fatigue. The existing TWS controls at Pump Station #4 and Lakeside Pump Station would be retained as-is.

The existing high-pressure spray wash nozzles and debris transport systems would be retained as-is. When the associated TWS would be in operation, the high-pressure spray wash system would also be in operation. New low-pressure spray pumps, piping and nozzles would be installed in Pump Station #1 and Pump Station #2 to gently remove impinged organisms from the fine mesh screens. Two independent FHRS would be installed for use with Pump Station #1 and Pump Station #2 to transport the returned organisms and low-pressure spray wash water to Lake Michigan. The FHRS trough would be made of a fiberglass reinforced polymer (FRP) while inside the CWIS and would transition to a high-density polyethylene (HDPE) plastic pipe when exiting the CWIS.

A small amount of equipment weight would be added to each CWIS. The additional weight is not significant enough to affect the structure or foundation.

The installation of the fine mesh TWS and, where applicable, the FHRS would require personnel and equipment to maintain the new equipment; this would be done in accordance with the facility's maintenance processes. The implementation of fine mesh TWS would also introduce new risks to the operations at Gary Works, as discussed in Section 1.2.

The fine mesh retrofit of the existing TWS is based on existing conditions at each CWIS. The flow rates which each CWIS is projected to operate at are estimated by the long-term average from January 2016 to December 2019, i.e. 2018 AIF, except for Pump Station #4. Due to recent process changes, the AIF at Pump Station #4 does not reflect current conditions. Therefore, the withdrawal flow rate at Pump Station #4 is based on the flow rate for two pumps operating at a capacity of 1,200 gallons per minute (gpm) minus an estimated flow rate of cooling water recirculation directed back to the wet well (Reference 1, Tables 4.1 and 4.2). It is assumed that these values represent accurate projections of future conditions at each CWIS and that flow rates would be relatively constant through the lifespan of the fine mesh TWS.

Pump Station #1 low water level and invert elevation are defined per the CWIS general arrangement drawing as El. -3'–7 ⅛" and El. -16'–0", respectively (Reference 2). Pump Station #2 low water level is defined as the low water datum of Lake Michigan per the dock wall general arrangement drawing as El. -1.38' (Reference 3). This assumes minimal losses upstream of the

TWS. Pump Station #2 invert elevation is defined per the TWS installation drawing as El. -11’–7” (Reference 4). Pump Station #4 low water level was assumed to be the same as the Pump Station #2 low water level. This similarly assumes minimal losses upstream of the TWS. Pump Station #4 invert elevation is defined per the CWIS details drawing as El. -14’–0” (Reference 5). Lakeside Pump Station low water level is defined per the CWIS section drawing as El. -10’–0” (Reference 6). Lakeside Pump Station invert elevation is defined per the CWIS section drawing as El. -20–6” (Reference 7). Minimum screen submergence at each CWIS is calculated as the difference between the low water level and the invert elevation. The POA of a square mesh TWS can be estimated by the following formula:

$$POA = \frac{w * w}{(w + d) * (w + d)}$$

Where:

POA: percent open area [unitless]

w: mesh opening width [inch]

d: mesh wire diameter [inch]

The primary design parameters for the fine mesh retrofit of the existing through-flow TWS for each of the CWIS are summarized in Tables 2-1 through 2-4.

Table 2-1: Pump Station #1 TWS Design Parameters

Parameter	Value
Number of screens	12
Screen width	52.5-71.5 in
Modified traveling screen	Yes
Fine mesh opening size	2 mm
Fine mesh wire diameter	0.021 in
Fine mesh percent open area	62.9%
Backing mesh opening size	1 in
Backing mesh wire diameter	0.080 in
Backing mesh percent open area	85.7%
Minimum immersion	12.4 ft
2018 AIF	189 MGD

Table 2-2: Pump Station #2 TWS Design Parameters

Parameter	Value
Number of screens	6
Screen width	101.5 in
Modified traveling screen	Yes
Fine mesh opening size	2 mm
Fine mesh wire diameter	0.021 in
Fine mesh percent open area	62.9%
Backing mesh opening size	1 in
Backing mesh wire diameter	0.080 in
Backing mesh percent open area	85.7%
Minimum immersion	10.2 ft
2018 AIF	210 MGD

Table 2-3: Pump Station #4 TWS Design Parameters

Parameter	Value
Number of screens	3
Screen width	69.375 in
Modified traveling screen	No
Fine mesh opening size	2 mm
Fine mesh wire diameter	0.021 in
Fine mesh percent open area	62.9%
Backing mesh opening size	1 in
Backing mesh wire diameter	0.080 in
Backing mesh percent open area	85.7%
Minimum immersion	12.6 ft
2018 AIF	1 MGD

Table 2-4: Lakeside Pump Station TWS Design Parameters

Parameter	Value
Number of screens	4
Screen width	119.375 in
Modified traveling screen	No
Fine mesh opening size	2 mm
Fine mesh wire diameter	0.021 in
Fine mesh percent open area	62.9%
Backing mesh opening size	1 in
Backing mesh wire diameter	0.080 in
Backing mesh percent open area	85.7%
Minimum immersion	10.5 ft
2018 AIF	56 MGD

2.5 Hydraulic Analysis

The existing pump intake sumps at each of the CWIS house a variety of pumps, which draw water for use as noncontact cooling water and process water. Several criteria define general limitations to the operation of the retrofitted TWS. To avoid damage to the pumps, hydraulic analysis is needed to ensure the additional head loss due to the new fine mesh panels are within acceptable margins. To avoid pump cavitation, margins to Net Positive Suction Head (NPSH) should be considered. If NPSH is marginally insufficient, more effective screen cleaning technology could be installed on the TWS. To avoid vortexing effects, margins to minimum water level should be considered. Because each of these are measured as pump intake sump water level, the bounding value will determine the operability. If submergence is marginally insufficient, vortex suppression technologies could be installed on the suction bells of the pumps or in the pump sump. To avoid damage to the TWS, differential pressure across the screens should be considered.

Where available, the NPSH required above the impeller eye centerline is provided by the vendor pump curves at the design flow rate. Pump Station #1 houses Allis-Chalmers 36 x 30 WSG pumps with 46 ⅜" diameter impellers. The pump curve provides an NPSH required of 15.5 ft at the operating point. Pump Station #2 houses Goulds 36 GHC pumps with 26" diameter impellers. The pump curve provides an NPSH required of 30 ft at the operating point. Pump Station #4 houses FH Ayer 10x14RJLC pumps. The pump specification provides an NPSH required of 14.4 ft at the operating point. Lakeside Pump Station houses Flowserve 56 KXL pumps. The pump curve provides an NPSH required of 27 ft at the operating point. HI provides standards for NPSH margins as published in ANSI/HI 9.6.1. High suction energy water pumps should maintain a minimum NPSH available to NPSH required margin ratio of 1.3. Acceptable head loss to avoid pump cavitation was calculated as the difference between the NPSH available and the NPSH required plus the appropriate ratio margin.

Where available, minimum submergence above the pump suction bell is provided by the vendor pump curves at the design flow rate. Pump Station #1 houses Bryon Jackson 56 KXL pumps. The pump curve provides a minimum submergence of 4.5 ft. Pump Station #4 houses FH Ayer 10x14RJLC pumps. The pump specification provides a minimum submergence of 2.6 ft. Acceptable head loss to avoid vortex formation was calculated as the difference between the low water level and the minimum submergence elevation.

Vendor recommendation standards suggest that a TSV limit of 2.5 fps should be maintained to avoid excessive differential pressure and ensure reliable continuous operation of the fine mesh.

TSV are calculated and presented in this report as a validation of the technical feasibility of the proposed design. The TSV at the TWS may not be representative of the velocity at the point of entry to the cooling water system due to the configurations of the various CWIS. See Section 5.2 of Reference 1 for more details regarding cooling water system entry velocity at Gary Works. The TSV of a TWS can be estimated by the following formula:

$$TSV = \frac{Q}{(1-k) * POA * BW * S}$$

Where:

TSV: through screen velocity [fps]

Q: flow rate through screen [cubic feet per second]

k: percent of area blocked by hardware [unitless]

POA: percent open area [unitless]

BW: basket width [ft]

S: screen submergence [ft]

The head loss of a TWS at a given TSV can be estimated as the kinetic energy the water must carry through the TWS times a safety factor. Typical safety factors range from 1.8 to 2.2, depending on the manufacturer and design of the TWS. TSV and respective head loss at low water level and mean ambient lake water level for the fine mesh retrofit of the existing TWS at each CWIS is provided in Table 2-5.

Table 2-5: Through Screen Velocities and Head Losses at Low Water Level and Mean Ambient Lake Water Level, 100% Cleanliness

Pump Station	Low Water Level		Mean Water Level	
	TSV	Head loss	TSV	Head loss
#1	1.08 fps	0.04 ft	0.84 fps	0.02 ft
#2	1.60 fps	0.08 ft	1.41 fps	0.06 ft
#4	0.02 fps	0 ft	0.01 fps	0 ft
Lakeside	0.53 fps	0.01 ft	0.27 fps	0 ft

The key operability parameters for each of the CWIS are summarized in Tables 2-6 through 2-9 below. Figures 2.3 through 2.6 depict the head loss across the screens at varying cleanliness and the limit of operation. Figures 2.7 through 2.10 depict the TSV at varying cleanliness and the limit of operation. Note that the TSV limitation imposed on TWS in Pump Station #4 is at a design maximum TSV of 0.5 fps to measure feasibility of compliance with the impingement mortality alternative listed in 40 CFR §125.94(c)(2). The TSV limitation for all other CWIS was according to the operability of the TWS as informed by the vendor. The analysis performed concluded that the installation of fine mesh TWS is hydraulically feasible. Computational fluid dynamic analysis would be performed in the detailed design to validate the operability of the fine mesh TWS design.

Table 2-6: Pump Station #1 TWS Operability Parameters

Parameter	Value
Acceptable NPSH head loss	4.23 ft
Acceptable submergence head loss	1.75 ft
Maximum Operable TSV	2.5 fps
Head loss at 100% cleanliness and low water level	0.04 ft
TSV at 100% cleanliness and low water level	1.08 fps
Minimum cleanliness for acceptable NPSH head loss	9.3%
Minimum cleanliness for acceptable submergence head loss	14.5%
Minimum cleanliness for acceptable TSV	43.1%

Table 2-7: Pump Station #2 TWS Operability Parameters

Parameter	Value
Acceptable NPSH head loss	5.40 ft
Maximum Operable TSV	2.5 fps
Head loss at 100% cleanliness and low water level	0.08 ft
TSV at 100% cleanliness and low water level	1.60 fps
Minimum cleanliness for acceptable NPSH head loss	12.2%
Minimum cleanliness for acceptable TSV	63.9%

Table 2-8: Pump Station #4 TWS Operability Parameters

Parameter	Value
Acceptable NPSH head loss	2.87 ft
Acceptable submergence head loss	5.86 ft
Design maximum TSV	0.5 fps
Head loss at 100% cleanliness and low water level	0 ft
TSV at 100% cleanliness and low water level	0.02 fps
Minimum cleanliness for acceptable NPSH head loss	0.2%
Minimum cleanliness for acceptable submergence head loss	0.1%
Minimum cleanliness for design maximum TSV	3.3%

Table 2-9: Lakeside Pump Station TWS Operability Parameters

Parameter	Value
Acceptable NPSH head loss	4.93 ft
Maximum Operable TSV	2.5 fps
Head loss at 100% cleanliness and low water level	0.01 ft
TSV at 100% cleanliness and low water level	0.53 fps
Minimum cleanliness for acceptable NPSH head loss	4.2%
Minimum cleanliness for acceptable TSV	21.1%

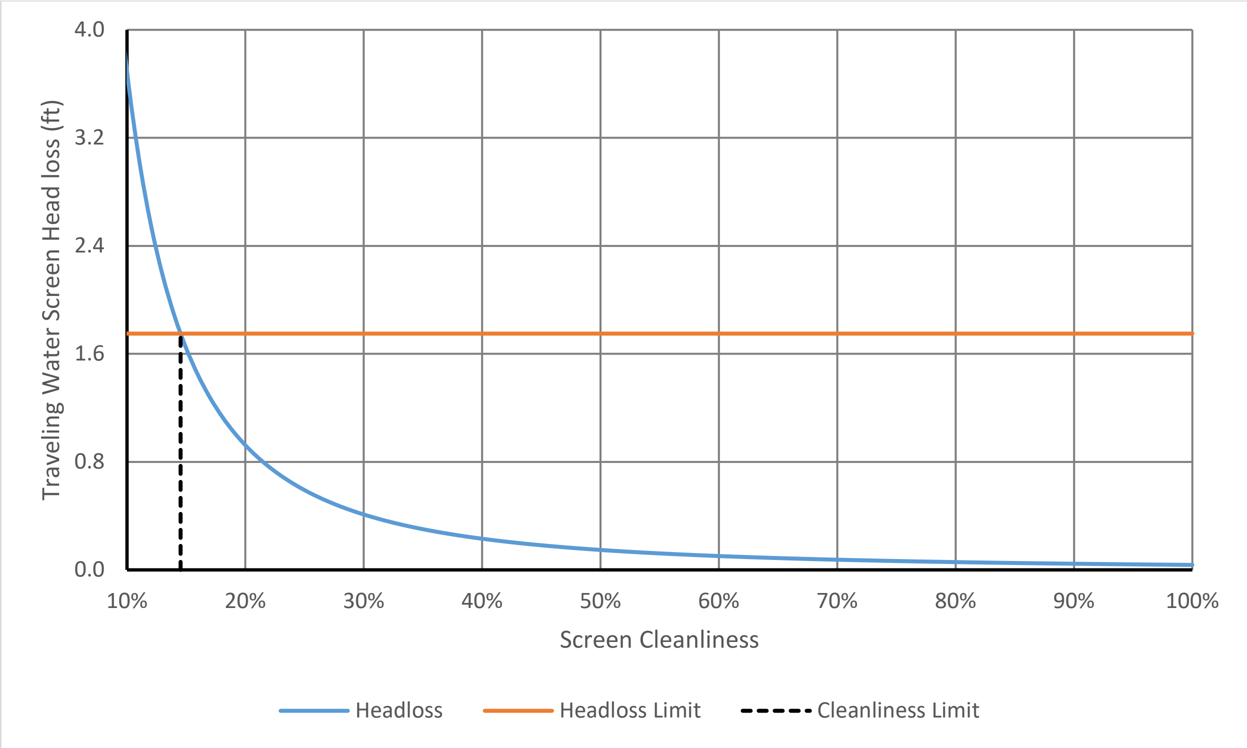


Figure 2.3: Pump Station #1 Fine Mesh TWS Head loss Curve

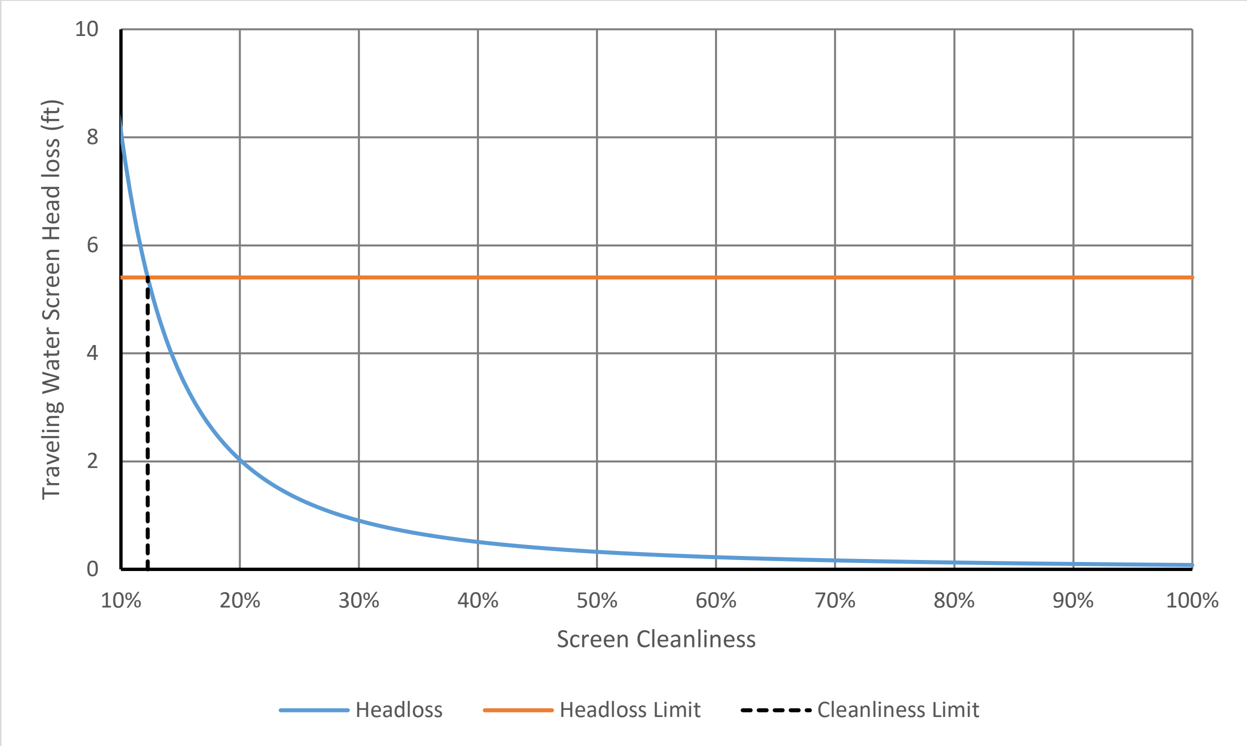


Figure 2.4: Pump Station #2 Fine Mesh TWS Head loss Curve

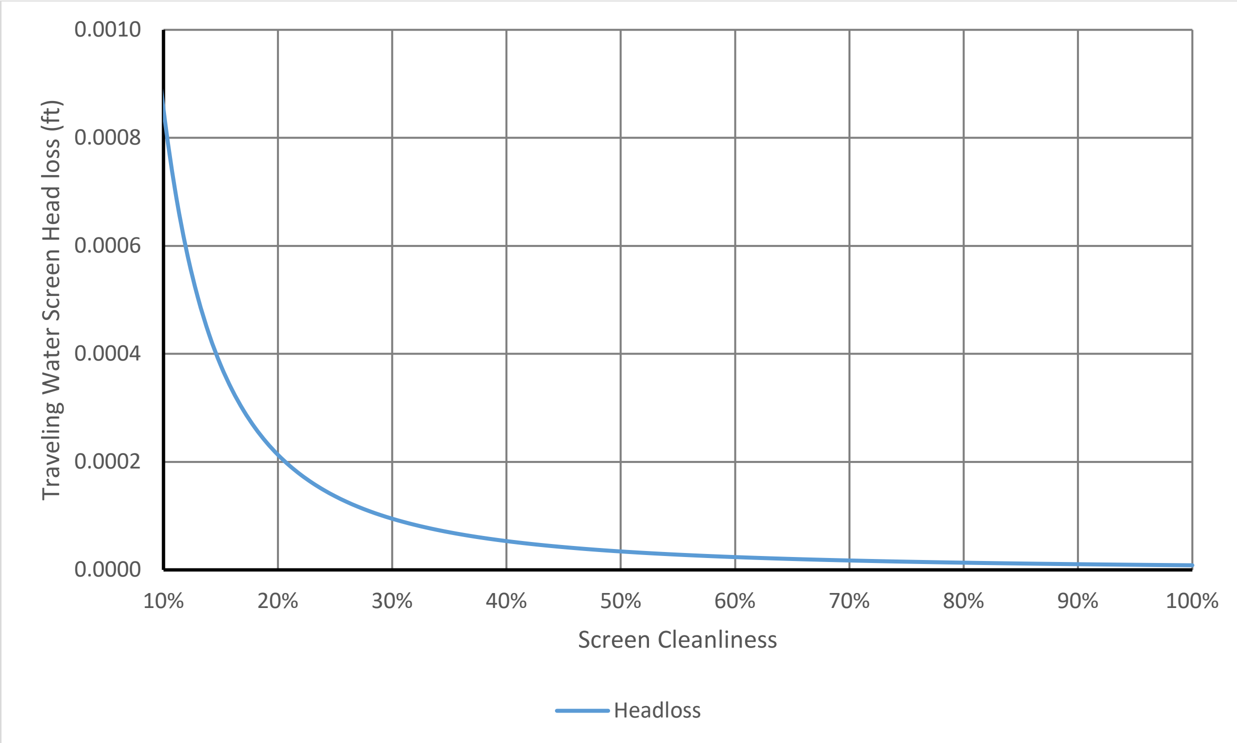


Figure 2.5: Pump Station #4 Fine Mesh TWS Head loss Curve

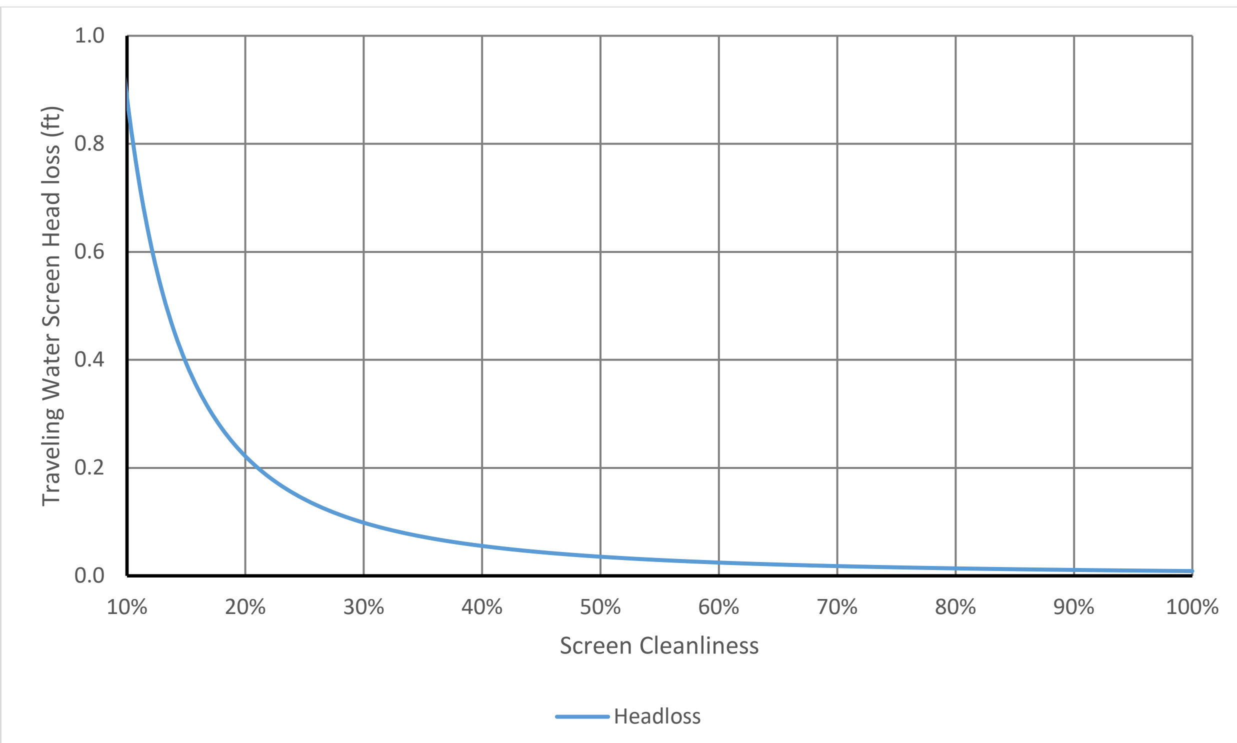


Figure 2.6: Lakeside Pump Station Fine Mesh TWS Head loss Curve

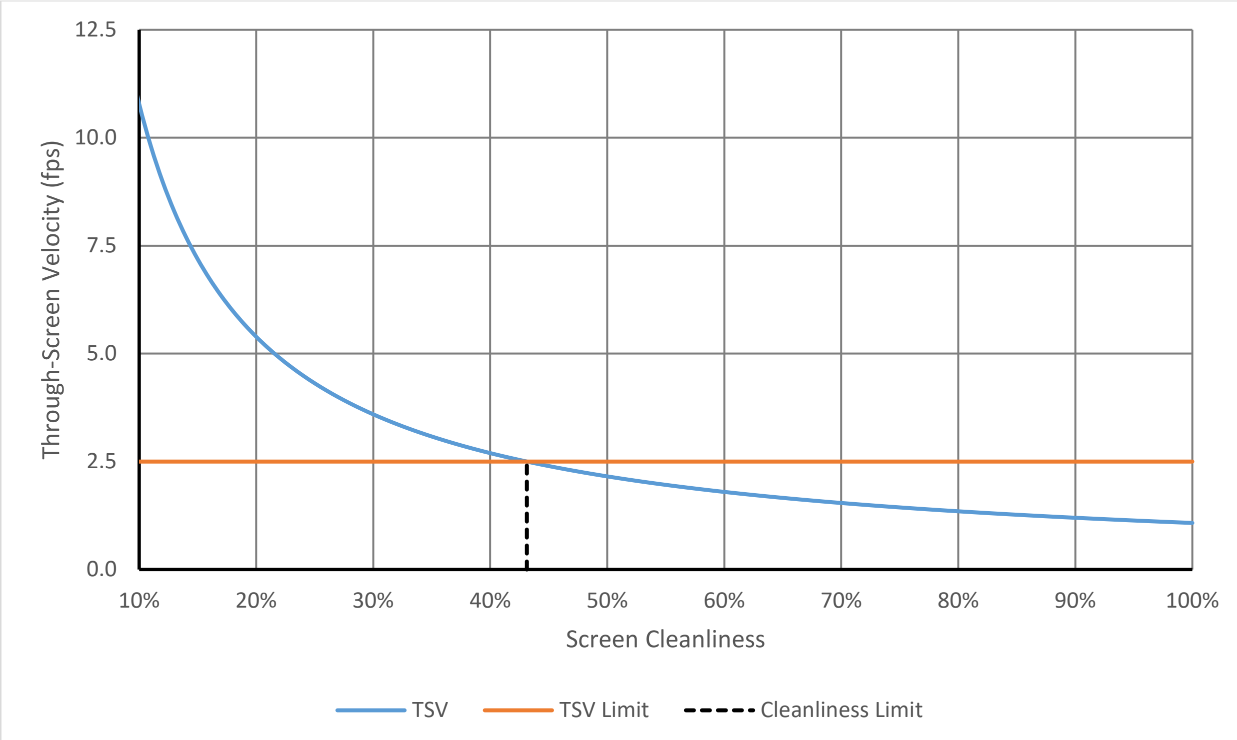


Figure 2.7: Pump Station #1 Fine Mesh TWS Through-Screen Velocity Curve

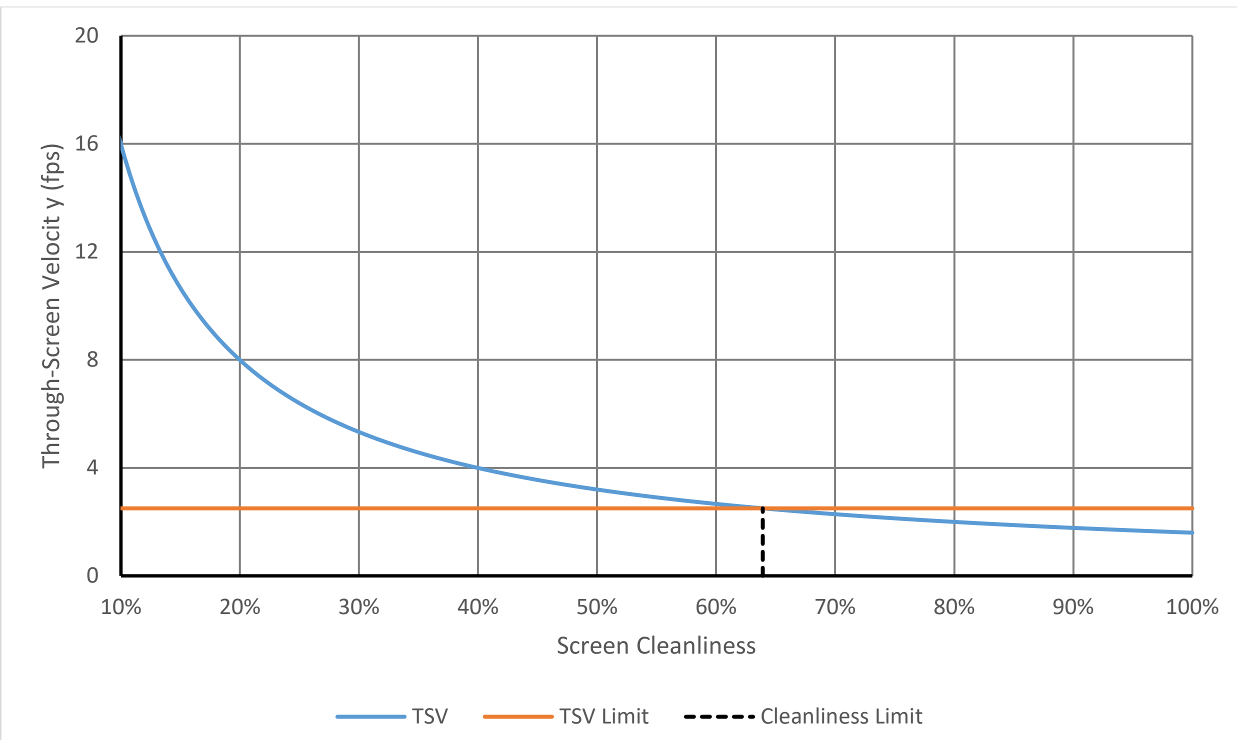


Figure 2.8: Pump Station #2 Fine Mesh TWS Through-Screen Velocity Curve

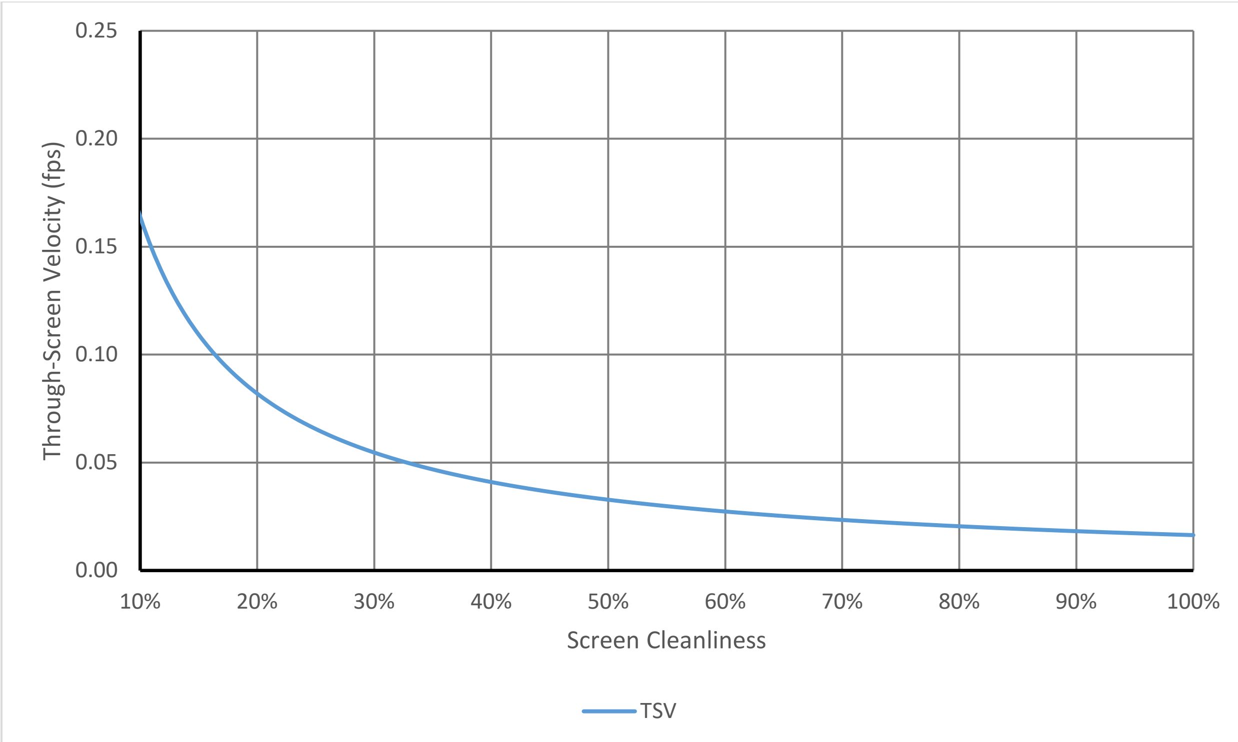


Figure 2.9: Pump Station #4 Fine Mesh TWS Through-Screen Velocity Curve

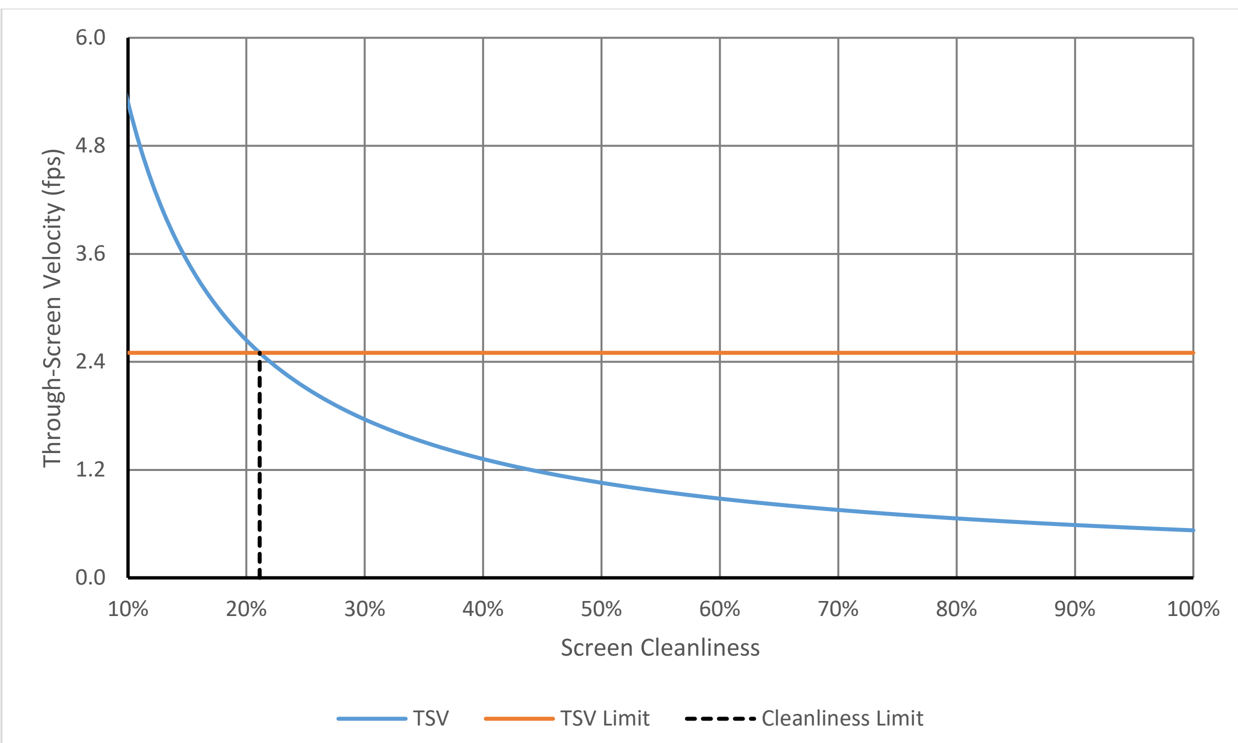


Figure 2.10: Lakeside Pump Station Fine Mesh TWS Through-Screen Velocity Curve

2.6 Screen Wash System

To maintain the TWS mesh at an operable cleanliness, the existing high-pressure screen wash systems would be retained, upgraded and calibrated to effectively remove debris from the fine mesh TWS baskets. The existing screen wash water supply systems will be retained in the existing condition for full use. A new 3 inch carbon steel debris spray pipe would be installed with brass high-pressure spray nozzles, as detailed by the budgetary quote supplied by Evoqua Water Technologies LLC. The existing water delivery was assumed to be adequate for use with the retrofitted fine mesh TWS. The existing screen wash piping would be modified to deliver wash water to the new high-pressure spray nozzles.

The installation of fine mesh screens would increase the total debris load retained as compared to the existing coarse mesh screens due to the smaller mesh opening. Because the operation of Pump Station #1 and Pump Station #2 TWS would be extended from infrequent to continuous, the existing debris removal systems were assumed to be adequate to support the debris loading from the fine mesh screens. Because the flow rates and through screen velocities of Pump Station #4 and Lakeside Pump Station would be relatively low, the existing debris removal systems were assumed to be adequate to support the debris loading from the fine mesh screens. These assumptions would be validated during a detailed design prior to installation of the fine mesh retrofit. The increased operation frequency of the TWS at Pump Station #1 and Pump Station #2 would reduce the risk of impacts to the pumps and downstream systems or failure of the TWS by reducing the debris build-up that would occur with a stationary screen; however, it is anticipated that the increase operation would result in more frequent maintenance.

Operational experience, vendor information, and demonstrated performance suggest that the screen wash system would be capable of consistently maintaining screen cleanliness above the cleanliness limits discussed in Section 2.5.

To gently remove aquatic specimens from the fish buckets and mesh, a new fish spray system would have to be installed within the modified TWS. Two parallel interior fish spray pipes, one 2.5 inch carbon steel pipe and one 2 inch carbon steel pipe, would be installed with brass spray nozzles to provide adequately covering sluice water at 15 pounds per square inch (psi) to assist the transfer of aquatic specimens to the fish trough. One auxiliary 1.5 inch carbon steel pipe would be installed with brass spray nozzles to provide additional water at 7 psi to the hydraulically stabilized fish baskets in order to keep a sufficient amount of water to keep the aquatic specimens submerged and sliding freely. Isolation valves would be installed on each nozzle header to allow for simplified maintenance on each nozzle header. Pressure reducing regulators would lower the pressure for gentle removal of specimens. Figure 2.11 depicts a typical screen wash system retrofit.

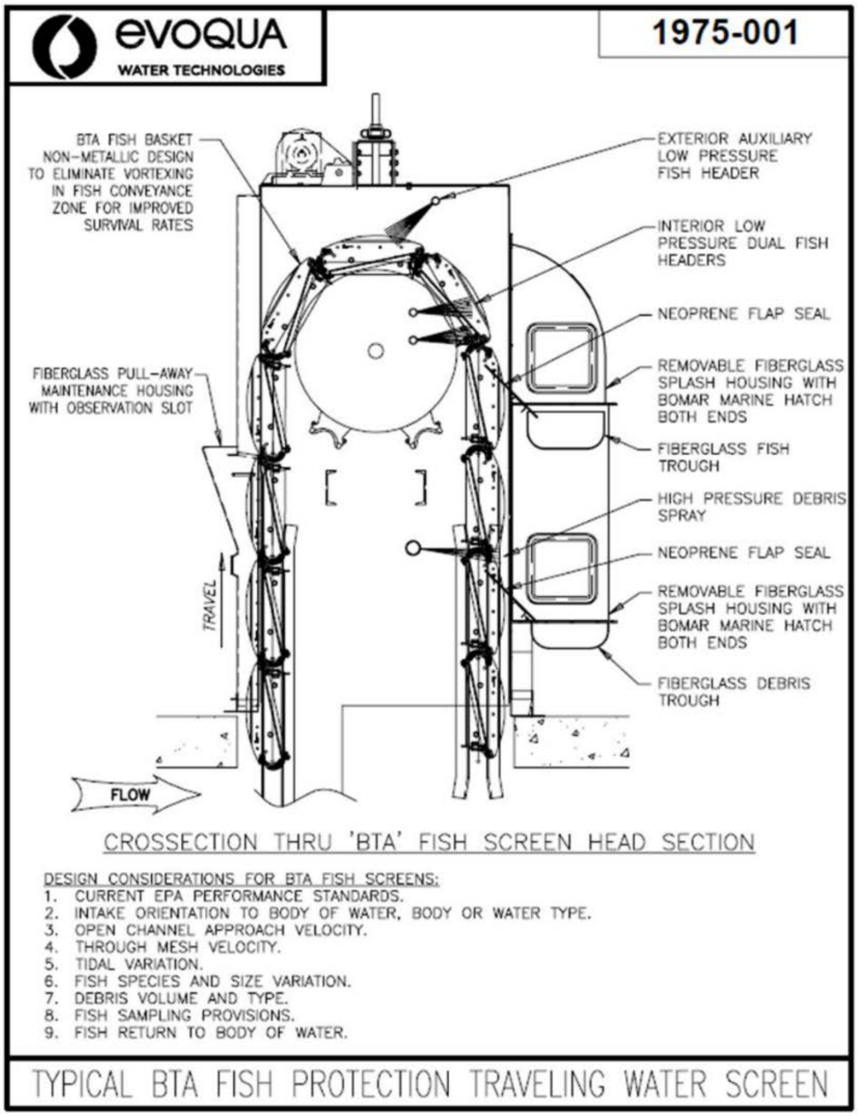


Figure 2.11: Typical Modified Traveling Water Screen Wash System Retrofit (Courtesy of Evoqua Water Technologies LLC)

An estimated 250 gpm of spray wash water per modified TWS would be required to operate the new low-pressure spray wash systems. Each modified TWS spray wash system was estimated to operate with a 50% rate of pass through from the spray wash nozzles to the FHRS. Approximately 125 gpm of spray wash water would return to the wet pit after washing the screens. This would constitute a new higher volume point source discharge at Pump Station #1 and Pump Station #2. Sluice water in excess of the pass through spray wash water would be required to ensure the FHRS has adequate operating parameters, as discussed in Section 2.7. Estimated flow rates of 2,000 gpm and 3,500 gpm of FHRS sluice water would be required at Pump Station #1 and Pump Station #2, respectively.

New screen wash pumps would be installed in Pump Station #1 and Pump Station #2 to provide water to the new low-pressure fish spray systems and FHRS. Each CWIS would have two new screen wash pumps installed in currently unoccupied pump sump openings. Each pair of pumps would deliver water to a new low-pressure spray wash header. Each TWS would be supplied water by a pipe which tees from the header. The total dynamic head (TDH) required by the screen wash system is estimated as follows:

$$TDH = Static\ Head + Elevation\ Head + Friction\ Loss + Minor\ Loss$$

A breakdown of the TDH required by the new low-pressure spray wash system at each CWIS is shown in Table 2-10.

Table 2-10: Low-Pressure Spray Wash System Total Dynamic Head Estimations

Pump Station	Static Head	Elevation Head	Friction Loss	Minor Loss	TDH
#1	35.2 ft	12.6 ft	6.8 ft	29.5 ft	84.1 ft
#2	35.2 ft	10.7 ft	4.9 ft	28.1 ft	78.9 ft

An estimated TDH between 78.9 ft and 84.1 ft of water would be required by the screen wash system. National Pump Company LLC was contacted to supply a budgetary quotation for six new screen wash pumps for use with the low-pressure spray wash system (Attachment 6). A pump providing 86.8 ft TDH at 2,500 gpm was selected to allow margin for transients and potential heightened pipe relative roughness.

2.7 Fish Handling and Return Systems

The modified TWS in Pump Station #1 and Pump Station #2 would operate with FHRS in order to meet the definition of a modified traveling screen. The FHRS would return any impinged aquatic organisms from the pump station to Lake Michigan. This would discourage reimpingement in Pump Station #1 and Pump Station #2 by returning the organisms to a location outside of the ore loading slip and, therefore, outside and away from direct access to of the hydraulic zone of influence. Each FHRS would consist of four primary sections: 1) an internal trough installed in each modified TWS, 2) a common trough collecting the flows from each modified TWS, 3) a free flow buried pipe, and 4) a forced flow buried pipe.

The internal trough would be constructed of fiberglass and would run the width of each modified TWS. It would collect the low-pressure wash water and aquatic specimens. The internal trough would transition to an external common trough constructed of FRP. The common trough would run between each modified TWS, collecting the flows from each screen. The common trough would continue toward the CWIS wall. Upon reaching the wall, the trough would transition to a pipe constructed of HDPE.

The HDPE pipe would be installed through a new wall penetration directly into the ground. This pipe would take a gentle downward slope and the pipe would fill to between one third and one half full of water. The water would flow under open channel conditions, forced only by gravity. This would continue until the water meets the ambient source body water level where the pipe would be full. The transition from partially filled free flow to full forced flow would be gradual and at a safe speed. To drive the flow under these conditions, an amount of head above the source body water level would build to overcome the friction losses through the pipe. The full pipe would be forced by this head to continue transporting the water and aquatic organisms. This pipe would be routed to the source water body.

The buried piping would be installed primarily using hydro excavation techniques. This allows for excavation near existing buried utilities and covered areas with decreased risk of damage. Exact routing and discharge locations would be finalized in the detailed design. Preliminary estimates have been used for the cost estimates and support analysis in this assessment. If hydro excavation techniques are determined to be impractical in part or all of the route due to the large amount of buried utilities and infrastructure, availability of equipment with sufficient capacity or inaccessibility, other installation techniques, potentially including conventional excavation, horizontal directional drilling or auger boring, would be required. This would result in a higher cost of installation for each FHRS.

The FHRS would have sufficient water flow to return the fish directly to the source water in a manner that does not promote predation or reimpingement of the fish and would not require a large vertical drop in accordance with the definition of a modified traveling screen in 40 CFR §125.92(s). Additionally, the design also considered the good practices and guidelines listed below (Reference 8, Section VI):

1. All conveyance structures shall be smooth to prevent abrasion to the fish.
2. Water shall have a minimum depth of 6 inches and shall have a minimum width of 18 inches.

3. Transport velocities should be greater than the sustained cruising speed of fish. The cruising speed is assumed to be between 2 and 4 fps. Transport velocities should also be below velocities at which injury would be sustained. To achieve a theoretical mortality rate of 0% for non-fragile species, velocities should remain well below 17 fps (Reference 9, Chapter 25).
4. Materials used should minimize bio-fouling.
5. Long radius bends (bend radius to nominal pipe diameter ratio greater than or equal to 2.5) shall be used to prevent abrasion at bends.
6. Pipe joints shall be constructed such that there is a smooth transition between pipe sections.
7. All transitions shall be gradual and avoid flow separation.
8. Buried piping shall be below the frost depth.
9. The outlet shall be located well away from the intake to avoid re-impingement.
10. Sluices shall be routed to prevent assault by predatory species and discharge to a location with adequate water quality.

The following considerations were taken to satisfy the above good practices and guidelines:

Response to criterion:

1. The fish trough integral to the TWS would be constructed of fiberglass, the common fish trough would be constructed of FRP and the buried fish return pipe would be constructed of HDPE. These materials would provide a smooth conveyance surface.
2. A 24 inch wide trough and 24.2 inch internal diameter pipe (30 inch nominal diameter) would be used for the conveyance of marine life of all life stages from Pump Station #1. A 24 inch wide trough and 19.4 inch internal diameter pipe (24 inch nominal diameter) would be used for the conveyance of marine life of all life stages from Pump Station #2. The flow was modeled using the Manning formula for uniform open-channel flow in a partially full circular channel to validate that the dimensions meet the criteria.
3. An appropriate nominal trough diameter and slope would be selected to provide a transport velocity which would meet the criteria. Flow modeling using the Manning formula, the Darcy-Weisbach equation and Bernoulli's equation validated the selected parameters were appropriate.
4. Fiberglass, FRP and HDPE material would be used for the FHRS troughs and pipe. These materials would provide resistance to bio-fouling.
5. Any bends used in the routing of the FHRS are long radius bends (bend radius at least 1.5 times larger than the nominal diameter).
6. FRP troughs and HDPE pipes would be match tapered to provide a smooth conveyance surface.
7. Sharp bends are avoided in the design to reduce abrasion of fish around turns. The slope selected is adequately gentle as to prevent flow separation.
8. The buried return piping would be installed below the local frost line (60 inches below the grade elevation [Reference 10, Figure 3]). Additionally, the outlet to the source water body

would be installed below the maximum ice buildup elevation (75 cm or 2.5 ft below the water level [Reference 11, Pg 11]).

9. The new source water body return outlets would be located at an adequate distance from the hydraulic zone of influence of all CWIS.
10. All open air troughs would be located within closed buildings. Additionally, the location for return to Lake Michigan would be selected to minimize predation and water quality.

Flow modeling of the FHRS was approximated using the Manning formula for uniform open-channel flow in a partially full circular channel. Using regressive calculation, multiple unknown factors were solved for uniquely. The equation used has the general form:

$$Q = V * A = \frac{k}{n} * A * R^{\frac{2}{3}} * \sqrt{S}$$

Where:

Q: flow rate [ft^3/s]

V: velocity [fps]

A: flow area [ft^2]

k: unit conversion factor of 1.486 [$ft^{1/3}/s$]

n: Manning roughness factor [unitless]

R: hydraulic radius [ft]

S: slope [ft/ft]

Based on a low-pressure screen wash flow rate of 250 gpm per screen, low-pressure screen wash water pass through rate of 50%, and a Manning roughness factor for HDPE of 0.012 (Reference 12, Section 3-2), the primary parameters of FHRS flow were determined. Tables 2-11 and 2-12 summarize the design of the FHRS. Figures 2.12 and 2.13 depict the general routes to be taken by the FHRS. Figures 2.14 and 2.15 depict the cross elevations of these routes. The new FHRS associated with Pump Station #1 and Pump Station #2 would constitute new volume point source discharges to Lake Michigan.

Table 2-11: Pump Station #1 Fish Handling and Return System Design Parameters

Parameter	Value
Flow rate	3,500 gpm
Buried pipe inner diameter	24.218 in
Buried pipe slope (1st section)	0.017 ft/ft
Buried pipe slope (2nd section)	0.002 ft/ft
Buried pipe length	4,770 ft
Free flow water depth	8.05 in
Free flow water width	22.8 in
Free flow velocity	8.39 fps
Forced flow velocity	2.44 fps
Common trough elevation	588.4 ft*
Free flow to forced flow high water transition elevation	584.5 ft*
Low water datum elevation	577.5 ft*
Exit elevation	569.2 ft*

Table 2-12: Pump Station #2 Fish Handling and Return System Design Parameters

Parameter	Value
Flow rate	4,200 gpm
Buried pipe inner diameter	19.375 in
Buried pipe slope	0.020 ft/ft
Buried pipe length	1,010 ft
Free flow water depth	9.43 in
Free flow water width	19.37 in
Free flow velocity	9.46 fps
Forced flow velocity	4.57 fps
Common trough elevation	587.2 ft*
Free flow to forced flow high water transition elevation	584.0 ft*
Low water datum elevation	577.5 ft*
Exit elevation	569.2 ft*

* Elevations in reference to International Great Lakes Datum 1985 (IGLD 1985)

Figure 2.12: Pump Station #1 Fish Handling and Return System Layout (Satellite Imagery Courtesy of Google)

Figure 2.13: Pump Station #2 Fish Handling and Return System Layout (Satellite Imagery Courtesy of Google)

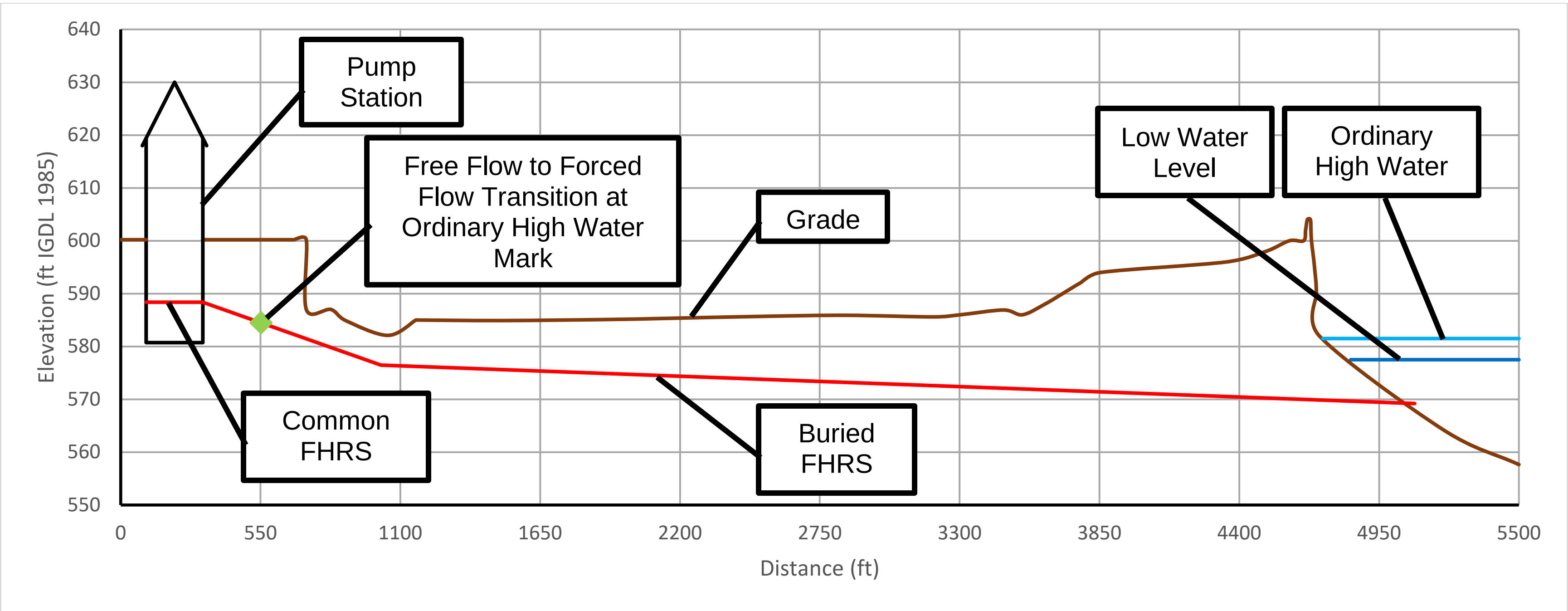


Figure 2.14: Pump Station #1 Fish Handling and Return System Cross Elevation

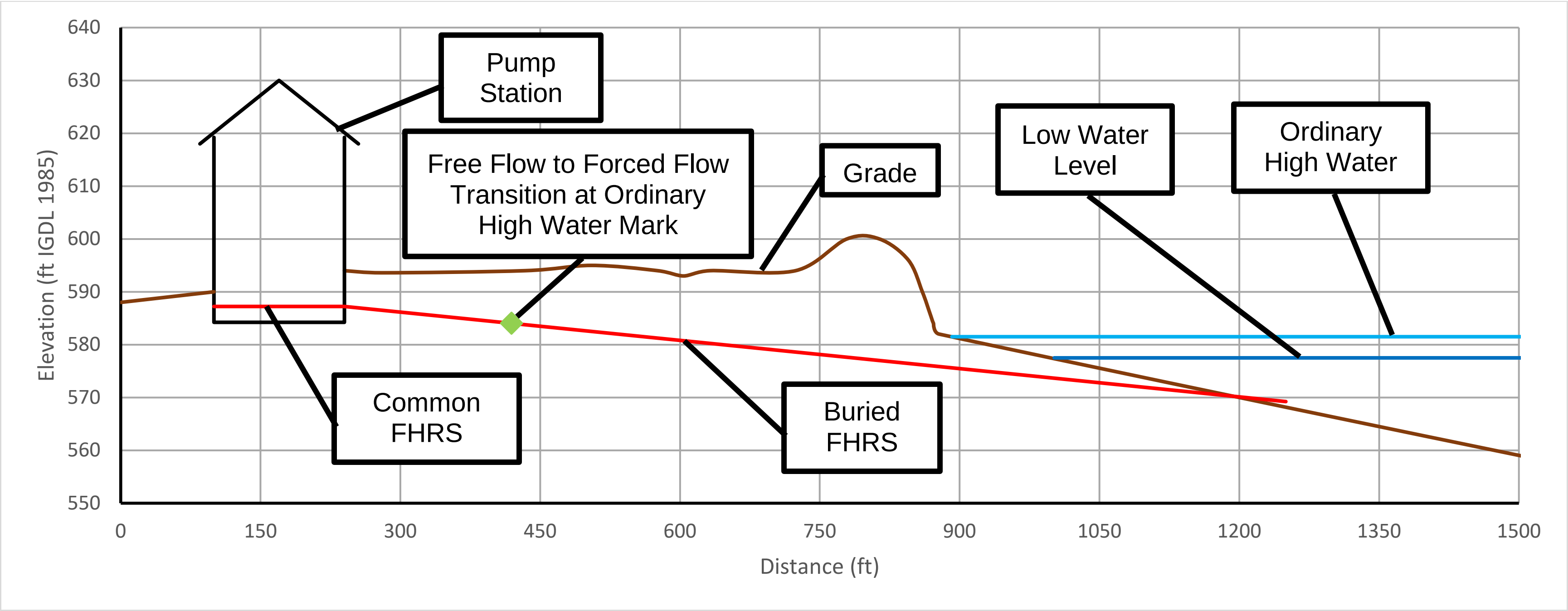


Figure 2.15: Pump Station #2 Fish Handling and Return System Cross Elevation

2.8 Electrical Design

The extent of the new electrical loads imposed on the CWIS substations and electrical distribution system would be the new low-pressure screen wash pumps. The Pump Station #1 and Pump Station #2 electrical systems would each gain an additional load of 131 kilowatts (kW) due to the new screen wash pumps. It is assumed that the electrical systems would not require any significant modifications or upgrades due to historically higher loads at each CWIS. The existing TWS motors and auxiliary equipment would be retained for use with the new fine mesh baskets. The extended runtime of each TWS would increase the annual energy draw from the existing substations; however, this would not affect the design of the electrical systems.

Motor controls for the existing TWS would be retained and modified slightly based on setpoints determined in a detailed system design.

2.9 Supports for FHRS Common Troughs

The design and budget of the structural supports for the common FHRS troughs at Pump Station #1 and Pump Station #2 were estimated based on prior project experience with similar FHRS troughs. The troughs would span across the floor of the respective CWIS on a beam frame structure. Frames would be installed as required for maximum spans of 14 ft as per vendor suggested trough span distances. One frame would consist of one W8x31 columns with ½ inch x 12 inch x 12 inch baseplates welded on to them for mounting into the CWIS floor with Hilti HIT HY-100 adhesive anchors or similar. Each baseplate would require four ½ inch diameter by 9 inch length treaded rods. The height of each frame would be matched to the height of the common trough to allow for continuous flow of wash water from each TWS and the additional sluice wash water.

2.10 Major Components

Table 2-13 presents a listing of major new equipment that would be required for retrofit of new fine mesh screens on the existing TWS at the Gary Works CWIS.

Table 2-13: Listing of Major Equipment and Components Required for Installation

Component	Quantity	Notes
Fine mesh modified Ristroph retrofit of existing through-flow traveling water screens	18	retrofit with non-metallic fish protection baskets, 2 mm fine mesh with 1 inch backing mesh, spray wash system and substructure modifications
Fine mesh retrofit of existing through-flow traveling water screens	7	retrofit with 2 mm fine mesh with 1 inch backing mesh and substructure modifications
Screen wash valves	18	4 inch low-pressure spray wash TWS isolation valves
	18	4 inch low-pressure spray wash TWS check valves
	1	10 inch low-pressure spray wash pump isolation valves
	4	10 inch low-pressure spray wash pump check valves
	1	12 inch low-pressure spray wash pump isolation valves
Screen wash piping	312 ft	4 inch diameter, Schedule 40, A-53 steel
	240 ft	10 inch diameter, Schedule 40, A-53 steel
	214 ft	12 inch diameter, Schedule 40, A-53 steel
Screen wash nozzle	162	low-pressure flat spray nozzles
FHRS trough	330 ft	24 inch width FRP trough
FHRS piping	1,380 ft	24 inch diameter HDPE pipe
	5,405 ft	30 inch diameter HDPE pipe

The conceptual design contained in this report considers material compatibility for each component. Appropriate materials were selected to provide an economical design which provides reasonable lifespan, reliable operability and minimal impacts to existing systems, structures and components. The water source is unchanged, and flow rates through each CWIS would remain approximately the same. Thus, there is no potential for increased corrosion of existing facility components. Additionally, there is no increase in corrosion potential due to joining of dissimilar metals, and none of the water chemistry would be affected by the changes. Therefore, there are no significant material compatibility effects anticipated. Final material selection and verification of compatibility would be addressed in detailed design.

2.11 Potential Risks

In the following analysis of potential risks, the modified pump stations are assumed to function as designed. Any uncertainties in hydraulic, structural, or electrical analyses would be addressed in the detailed design process and are not considered here. Additionally, what follows is a system-level analysis and is not intended to be an exhaustive evaluation of component-level failures. Further analysis of failure modes and unassessed risks would be performed during the detailed design process.

The implementation of fine mesh TWS would create the potential for new failures within the pump stations and possible effects on the probability of failure for some existing facility equipment.

The greatest risk imposed from installing fine mesh TWS is the increased likelihood of screen blockage. Large-scale screen blockage would result in a partial loss of flow to the associated circulating pump. Large-scale screen blockage is mitigated through redundancy in the design of the pump stations. Each pump station draws water through the TWS to a common pump sump. If one or more TWS develop large-scale screen blockage, flow would be diverted through the other TWS. Should large-scale screen blockage or pump failure occur, pumps which are in standby can draw in supplemental water to mitigate the emergent issue.

Potential causes of localized screen blockage include any failure in the screen wash nozzles, valves, or piping. While any form of blockage would result in a partial loss of flow, the severity is lessened through redundancy in the pump stations, as previously discussed, and redundancy in the screen wash system.

Other mechanisms may cause a partial loss of flow. Examples include any form of circulating pump or discharge piping failure. If a circulating pump electrically or mechanically fails, total facility flow would be reduced by a percentage of the total flow while the pump or a standby backup pump is offline. Since a complete break of any discharge pipe is highly unlikely, a leak or small break would result in a smaller reduction in system flow.

2.12 Construction Schedule

A detailed schedule for procurement and installation of the fine mesh retrofit of the existing through-flow TWS preliminary design is presented in Attachment 1. Pre-construction detailed engineering design would begin approximately 1½ years prior to all construction activities and would require approximately 1 year for completion of final designs, supporting analysis, and equipment specifications. Procurement of materials and equipment would begin following the completion of the detailed engineering design. The procurement and construction of the fine mesh screens for through-flow TWS option is estimated to require a total of 20 weeks after receipt of order (ARO). This estimate is comprised of 3 weeks of lead time for vendor engineering, preparation and drafting, 2 weeks for U.S. Steel review and approval, 14 weeks for production, and 1 week for shipment and receipt. After construction begins, procurement of construction materials and equipment would be performed in parallel with construction activities. Construction permits and wastewater permits preparation and submittal activities would begin following the completion of an interim (50%) engineering design and would require approximately 1 year for receipt of permits. It should be noted that scheduling can be highly variable, dependent on agency approvals and permitting. Construction activities would begin following the receipt of permits. It is estimated that the fine mesh retrofitting activity would take 2 weeks per TWS. The retrofitting would be completed sequentially with one TWS being completed at a time. In this manner, the construction would be completed while the facility is online and each CWIS is withdrawing cooling and process water at typical flow rates. Forced outage time would not be required during construction, installation, testing and tie-in of the fine mesh through-flow TWS design. It is estimated that operation of the retrofitted fine mesh TWS would commence over 3½ years after the project begins.

Note that severe weather conditions could result in schedule delays. The schedule includes the following construction activities:

- Mobilization
  - Construction site set up to include delivery of onsite trailers, construction equipment, and labor
  - Delivery and inspection of fine mesh baskets and ancillary equipment
- General Site Modifications
  - Marking and protecting construction area
  - Preparing laydown area
  - Rerouting vehicle and pedestrian traffic around construction area
- Construction Activities
  - Installation of common troughs in CWIS
  - Excavation of access pits and sluice channels
  - Installation of buried trough piping
  - Modifications to TWS controls
  - Sequential retrofitting of TWS consisting of:
    - Removal of existing TWS
    - Transportation of TWS to workspace

        - Installation of fine mesh baskets
        - Modifications of head section and installation of new seals, hardware and splash housing
        - Installation of retrofitted TWS to CWIS
    - Installation of low-pressure spray wash piping
    - Installation of new spray wash pumps
    - Tie-in of new components and testing
- Demobilization
    - Clean up of construction site
    - Restoration of construction site

Some activities would be completed in parallel to ensure timely operation of the retrofitted fine mesh TWS. Key activities include:

- Detailed engineering design, which would occur from project month 1 to project month 12,
- Permitting, which would occur from project month 7 to project month 18,
- Advanced procurement, which would occur from project month 13 to project month 21,
- Construction, which would occur from project month 19 to project month 40,
- Tie-in and testing, which would occur from project month 41 to project month 43, and,
- Demobilization, which would occur during project month 44.

It is not anticipated that the construction schedule would be impacted by limitations imposed on construction activities in or around Lake Michigan. Construction in Lake Michigan would be limited to the final installation of the section of FHRS buried pipe which discharges into Lake Michigan. The facility would not be required to operate at reduced capacity during any construction activities.

2.13 Construction Cost

The total recommended construction budget to install the fine mesh retrofit of the existing through-flow TWS is estimated as $23,810,000 based upon 2018 U.S. Dollars. Construction estimate tools, vendor quotations, and previous project experience are utilized for this estimate. Based on industry standards and experience, the recommended consulting engineering budget for installation of fine mesh TWS is $4,760,000 based upon 2018 U.S. Dollars. The estimated permitting cost is $880,000 based upon 2018 U.S. Dollars. The cost estimate is a Class 5 estimate per ASTM E2516-11, which is a high-level estimate intended for use in screening and feasibility determinations. Table 2-14 summarizes the construction budget.

Table 2-14: Breakdown of Construction Budget by Major Category in 2018 U.S. Dollars

Category	Cost
Pump Station #1 Screen Wash	$ 280,000
Pump Station #2 Screen Wash	$ 220,000
Pump Station #1 Fish Return Trough	$ 5,010,000
Pump Station #2 Fish Return Trough	$ 1,220,000
Pump Station #1 TWS Conversion	$ 4,320,000
Pump Station #2 TWS Conversion	$ 2,150,000
Pump Station #4 TWS Conversion	$ 530,000
Lakeside Pump Station TWS Conversion	$ 700,000
Contingency / Adjustment	$ 9,380,000
TOTAL:	$ 23,810,000

Attachment 3 shows an itemized cost estimate which includes tabulated subtotals for contingencies, permitting, and construction management costs. Sources for each cost estimate are also included within the table. The items that affect the total cost most significantly for this option are:

- Fine Mesh Retrofit of Existing TWS
- Pump Station #1 buried fish return pipe

Some information associated with the cost of retrofitting existing TWS with fine mesh and, where applicable, a FHRS, such as field conditions, structural design requirements, material selection, and construction schedule demands, have only been preliminarily determined. Certain costs are subject to unmodeled change based on external factors. These costs would require reassessment during the detailed design phase. These costs include but are not limited to:

- Mobilization and equipment transportation costs
- Specialized equipment and materials required
- Unidentified work required to retrofit existing TWS
- Subgrade interferences with the FHRS buried pipe
- Excavated material and spoil quality, handling and disposal

Finally, given the preliminary nature of this assessment, there are several items remaining to be investigated during detailed design that may affect the cost. These considerations include the following:

- An assessment of required spares would need to be evaluated during detailed design. Critical spares are not included in the cost estimate but in certain cases may be essential to maintaining reliable facility operation.
- A detailed routing plan for the screen wash piping and FHRS piping/troughs would be required.
- A detailed assessment of changes to the TWS control system

2.14 Operation Costs

U.S. Steel Corporation would incur additional operational costs if the fine mesh retrofit of the existing through-flow TWS were to be installed and operated at Gary Works. This section focuses on new operation costs relative to the existing configuration. Costs associated with operation of the new equipment would be incurred due to additional electrical power consumption.

The additional electrical power consumption that would be incurred with the implementation of the design described in this evaluation include power required to operate the motors associated with the retrofitted through-flow TWS and screen wash pumps. Although the exact power consumption would be based on detailed design, final equipment selection, and the manner in which the equipment is operated, the values presented are estimated based on assumptions and estimates considered to be reasonable. All motors are assumed to have an 85% efficiency.

The drive motors associated with the existing through-flow TWS were assumed to have an operating power output of approximately 2 horsepower (HP) each. The drive motors would be retained for use with the retrofitted design. The retrofitted TWS installed in Pump Station #1, Pump Station #2, and Lakeside Pump Station would operate continuously year-round. The existing TWS installed in Pump Station #1 and Pump Station #2 currently operate infrequently and are assumed to currently incur a negligible associated parasitic loss. The existing TWS installed in Lakeside Pump Station operate continuously and therefore would not incur additional parasitic loads due to the fine mesh retrofit. The retrofitted TWS installed in Pump Station #4 would be operated infrequently. This is the existing condition of the TWS installed in Pump Station #4 and, therefore, would not incur additional parasitic loads due to the fine mesh retrofit. An annual average increase in parasitic losses of 32 kilowatts kW on a year-round basis would be incurred due to the retrofit of the existing TWS.

The motors associated with the new screen wash pumps would have a rated HP of approximately 75 HP each. The modified TWS would feature continuously operating FHRS. This would require the continuous operation of the new and existing screen wash pumps. Pump Station #1 and Pump Station #2 would each have two new screen wash pumps installed. An annual average increase in parasitic losses of 263 kW would be incurred due to the installation of new screen wash pumps.

The additional electrical power would be purchased from a local electric distribution company. The loads should be assumed to be constant year-round. This cost is captured as a long-term recurring cost, which must be considered along with the construction costs of the conversion to fine mesh TWS. Table 2-15 summarizes the operational loads due to parasitic loads.

Table 2-15: Estimate of Average Operational Loads by Major Components

Component	Average Parasitic Load
Through-Flow Traveling Water Screen	32 kW
Screen Wash Pumps	263 kW
Total:	295 kW

2.15 Maintenance Costs

U.S. Steel Corporation would incur additional maintenance costs if the fine mesh retrofit of the existing through-flow TWS were to be installed and operated at Gary Works. This section focuses on new maintenance costs relative to the existing configuration. Costs associated with maintenance of the new equipment would be incurred due to additional labor required to operate and maintain the equipment.

The estimated number of labor-hours to operate and maintain each piece of equipment is based on previous experience and inspection schedules provided by equipment vendors. The fine mesh TWS maintenance activities would include inspections of the drivetrain mechanisms, inspections of the baskets for biofouling, screen greasing and removal and repair of various subcomponents. The screen wash system maintenance activities would include inspection of the valves and nozzles and routine plumbing. The screen wash pumps maintenance activities would include verification that the pump is operating within design conditions, checks for leaks, as well as weekly inspection of pump lubricant and semi-annual inspections of the pump foundations and coupling alignment.

The United States Bureau of Labor Statistics provides periodic news releases on the average employer costs for employee compensation in the United States. The costs are composited from wages and salaries, and benefit costs which are incurred by the employer. The most recent such news release at the time of this assessment was released on March 19, 2019 and presents the costs as observed in December 2018. The labor associated with the additional required maintenance was assumed to be provided by unionized workforce. The news release reported a national average hourly cost to employer of $43.94 for unionized employees working in the manufacturing industry (Reference 13, Supplementary Table 2). Based on the 2018 weighted average city cost index for labor in Gary, IN from RSMeans, a construction costs estimator tool, this rate would be subject to a correction factor of 1.104 to account for geographic differences in local labor rates. An adjusted hourly cost of $48.51 was used to estimate the annualized operation cost for the installation of fine mesh TWS. This cost is presented in 2018 U.S. Dollars.

The additional labor cost is captured as a long-term recurring cost, which must be considered along with the construction costs of the conversion to fine mesh TWS.

The estimated number of man-hours to operate and inspect each piece of equipment is multiplied by the average hourly cost to employer to determine the annualized cost to operate each piece of equipment in Table 2-16 below:

Table 2-16: Estimate of Annualized Maintenance Costs by Major Components in 2018 U.S. Dollars

Component	Labor-Hours	Cost
Through-Flow Traveling Water Screens	3,125	$ 151,600
Screen Wash Pumps	1,000	$ 48,500
Total:	4,125	$ 200,100

2.16 Construction Support Costs

Other costs which would be incurred prior to or during construction include the engineering costs and construction permitting costs. An engineering firm would perform analysis, design, drafting or revision of drawings, final equipment specification, construction support and verification through the detailed design, implementation and testing phases. Starting when the engineering design reaches a 30%-60% milestone and prior to certain key construction activities, construction and environmental permit applications would be drafted and submitted in compliance with federal, state, and local rules and regulations. Permits which may be required include but are not limited to:

United States Army Corps of Engineers Nationwide Permit

The design change option presented in this evaluation requires the installation of new minor outfalls where the FHRS would discharge into Lake Michigan, returning previously impinged organisms to the source waterbody. Alterations and additions to the intake and fish collection system may be authorized under Nationwide Permit (NWP) 7: *Outfall Structures and Associated Intake Structures*, granted by the United States Army Corps of Engineers (USACE). NWP 7 covers activities related to the construction or modifications of outfall structures and associated intake structures, where the effluent from the outfall is authorized, conditionally authorized, or specifically exempted by, or that are otherwise in compliance with regulations issued under the NPDES or an equivalent state ground and surface water discharge program. This NWP requires a preconstruction notification (PCN) to the USACE.

If the proposed project requires an USACE permit, it would require a joint permit application, which is issued through the USACE Chicago District and Indiana Department of Environmental Management (IDEM). IDEM is authorized to satisfy sections 401 and 404 of the CWA through use of the Water Quality Certification program. As part of the permit application process, a project description and project plans would be placed on public notice and open to public comment.

To satisfy Section 7 of the Endangered Species Act (ESA) for any species under the jurisdiction of the United States Fish and Wildlife Service (USFWS), the filing of this NWP, requiring a PCN, would require consultation with the USFWS Northern Indiana Suboffice and documentation of adherence to consultation guidance.

National Environmental Protection Act

If a project triggers a federal permit, compliance with the National Environmental Protection Act (NEPA) is required; including a review of impacts to, or loss of, marine habitat.

Application for an USACE permit would trigger the following State and Federal consultations:

- USFWS
- National Marine Fisheries Service (NMFS)
- Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA or MSA)
- IDEM
- Indiana Department of Natural Resources (IDNR)

These consultations are to ensure that the proposed project would not result in adverse impacts to state and federally listed species, federally listed marine species, essential fish habitat, and is consistent with the Nongame and Endangered Species Conservation Act.

While NWPs are generally not released to the public for comment, it is up to the discretion of the lead agency to determine if the proposed project has the potential to be controversial, and therefore; may open the project up to public comment.

National Pollutant Discharge Elimination System

Alterations to the facility intake structures and outfalls would likely require a modification to the current NPDES Permit number IN0000281. Submittal of updated conditions to the intake structure must be submitted upon application for reissuance of the permit and must address conditions to Phase II of the Final Rules of Section 316(b) of the CWA. The new FHRS piping would constitute a new outfall with associated reporting and monitoring requirements.

Indiana Department of Homeland Security

All modifications must be in compliance with the Indiana Department of Homeland Security (DHS), which enforces codes and regulations regarding public concern and quality of life, including building codes, fire safety codes, plumbing codes and local land use services.

Local Agencies

All planned modifications must comply with and submit to the following local agencies for formal review and approval:

- Lake County Plan Commission
- Indiana Volunteer Firefighters District 1
- Lake County Soil and Water Conservation District
- Lake County Board of Commissioners

The estimates of construction support costs are based on standard percentage rates of construction budget subtotal. Table 2-17 summarizes the estimated construction support costs.

Table 2-17: Estimate of Construction Support Costs by Percentage of Construction Budget Subtotal and Capital Cost in 2018 U.S. Dollars

Fee	Percentage Rate	Cost
Engineering	20%	$ 4,760,000
Construction Permitting	2%	$ 480,000
Environmental Permitting	Estimate	$ 400,000

2.17 Water Consumption

The installation of fine mesh TWS would not require the withdrawal of any additional cooling water. Additional water would be withdrawn by the new screen wash pumps to supply low-pressure spray wash water to assist in gently removing impinged aquatic organisms from the TWS. Table 2-18 summarizes the new water withdrawal rates by pump station.

Table 2-18: New Water Withdrawal by Pump Station

Pump Station	Withdrawal Rate	Use
#1	5,000 gpm	Low-pressure screen wash
#2	5,000 gpm	Low-pressure screen wash

3 CONVERSION TO CLOSED-CYCLE RECIRCULATION SYSTEM

3.1 Introduction

The purpose of this report is to evaluate the technical feasibility and cost of implementing a closed-cycle recirculating system (CCRS) at United States Steel Corporation's Gary Works integrated steel mill facility (Gary Works) utilizing mechanical draft cooling towers. This report develops a conceptual design for modifications to the affected systems and considers capital costs (e.g., construction), operational costs (e.g., power consumption), and maintenance costs (e.g., cooling tower upkeep).

3.2 Site Description

Gary Works is an integrated steel mill facility owned and operated by United States Steel Corporation. It is located on approximately 4,000 acres on the southern shore of Lake Michigan in Lake County, Indiana, approximately 10 miles east of Chicago, IL. The facility produces steel and iron products and has an annual raw steelmaking capability of 7.5 million net tons. Gary Works operates as a production facility year-round.

3.3 Regulatory Background

Gary Works withdraws water from Lake Michigan for cooling and process purposes and discharges the water back to Lake Michigan and the Grand Calumet River under NPDES Permit No. IN0000281. The CWA Section 316(b) requires that NPDES permits for facilities with CWIS that withdraw cooling water from waters of the United States ensure that the location, design, construction, and capacity of the structures reflect the best technology available (BTA) to minimize harmful impacts to the environment. The EPA promulgated a new Section 316(b) rule (Rule) governing existing facilities, such as Gary Works, which was published in the Federal Register on August 15, 2014 and went into effect on October 14, 2014.

Existing industrial facilities that are designed to withdraw greater than 2 MGD of water from waters of the United States, and that use at least 25 percent of this water exclusively for cooling purposes, are subject to the BTA standard for impingement (aquatic species trapped on CWIS) mortality. Compliance with the BTA standard for impingement mortality may be achieved using any one of seven options delineated in the Rule.

For entrainment (aquatic species drawn through the circulating water system) compliance for existing facilities, the Rule does not prescribe a single nationally applicable entrainment performance standard, but instead requires that the NPDES Permit Director establish the BTA entrainment requirement on a site-specific basis. Facilities that have an AIF of 125 MGD or greater must submit information addressing the requirements of §122.21(r)(9) through (r)(13) to the Director as described below to aid in determination of BTA for entrainment. As a part of §122.21(r)(10), facilities must submit an engineering study of the technical feasibility and incremental costs of candidate entrainment control technologies. The study must include an evaluation of the technical feasibility of closed-cycle cooling, fine-mesh screens with a mesh size of 2 millimeters (mm) or smaller, reuse of water or alternate sources of cooling water, and any other entrainment reduction technologies identified by the applicant or requested by the Director. This report assesses the technical feasibility of closed-cycle cooling at Gary Works.

3.4 Cooling and Process Water Systems

Gary Works currently draws water for cooling and process uses through four separate but interdependent CWIS. Pump Station #1, Pump Station #2, and Pump Station #4 are located on the eastern region of the facility and draw water from Lake Michigan through the ore loading slip. Water drawn through these pump stations is used for steel production, iron production, and noncontact cooling. The associated outfalls discharge to Lake Michigan and the Grand Calumet River. Throughout this assessment, the intake and discharge flows from these three pump stations will be combined and referred to as the east cooling and process water system. Lakeside Pump Station is located on the western region of the facility and draws water directly from Lake Michigan. Water drawn through this pump station is used for the hot strip mill, hot rolling, sheet production, tin production, and noncontact cooling. The associated outfalls discharge to Lake Michigan and the Grand Calumet River. Throughout this assessment, the intake and discharge flows from this pump station will be combined and referred to as the west cooling and process water system. While a small diameter crosstie between the east and west cooling and process water systems exists, it was assumed that the transfer of water between the systems is negligible such that the two systems could be designed and modeled independently.

Where appropriate, each section will delineate between the information pertinent to the west and east cooling and process water systems. Figure 3.1 depicts the locations of the active outfalls and CWIS at Gary Works.

Figure 3.1: Locations of Active Outfalls and CWIS at Gary Works (Satellite Imagery Courtesy of Google)

The key operating parameters for the west and east cooling and process water systems in the current configuration was determined through analysis of water temperature data collected at Pump Station #1, Pump Station #2, Lakeside Pump Station, Outfall 015, Outfall 018, Outfall 019, Outfall 020, Outfall 028, Outfall 030, Outfall 034, Outfall 035, Outfall 037, and Outfall 039 between March 2011 and September 2018. It is assumed that water temperatures at Pump Station #1, Pump Station #2, and Pump Station #4 are equivalent and interchangeable. The maximum recorded intake water temperatures at the west and east cooling and process water systems are 78.1°F and 81.5°F, respectively. The mass weighted difference in intake and discharge temperatures (i.e. range) of the west and east cooling and process water systems vary depending on the time of year and facility operation. The design range was selected conservatively such that 95% of the recorded data would be at or below the specified temperature. The west and east cooling and process water system design range was determined to be 18.0°F and 17.5°F, respectively. Figures 3.2 and 3.3 show relative histograms of the calculated system ranges.

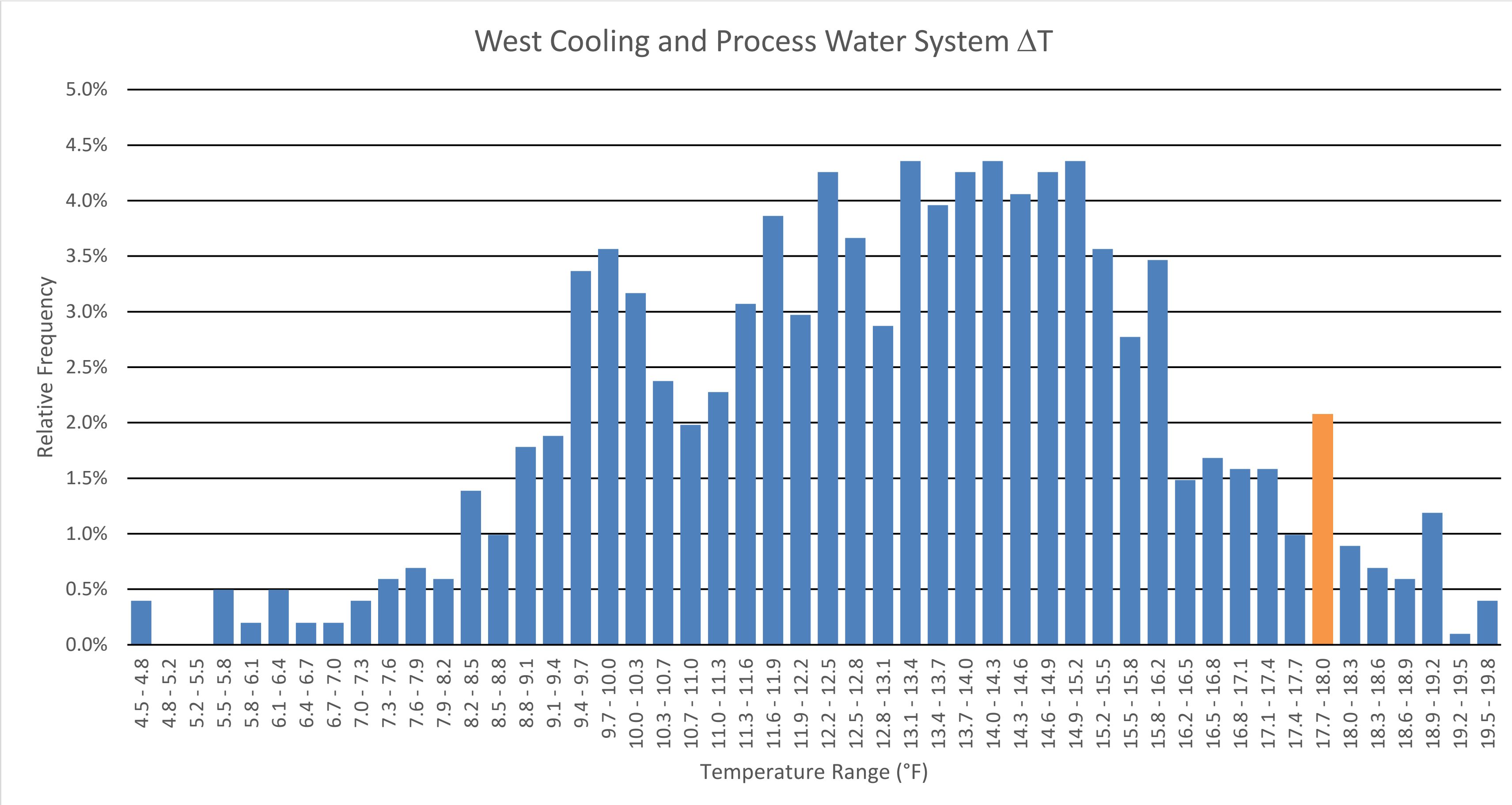


Figure 3.2: West Cooling and Process Water System Calculated Range Histogram, Orange Bar Represents 95th Percentile, Note: Lower Limits Are Inclusive and Upper Limits Are Exclusive

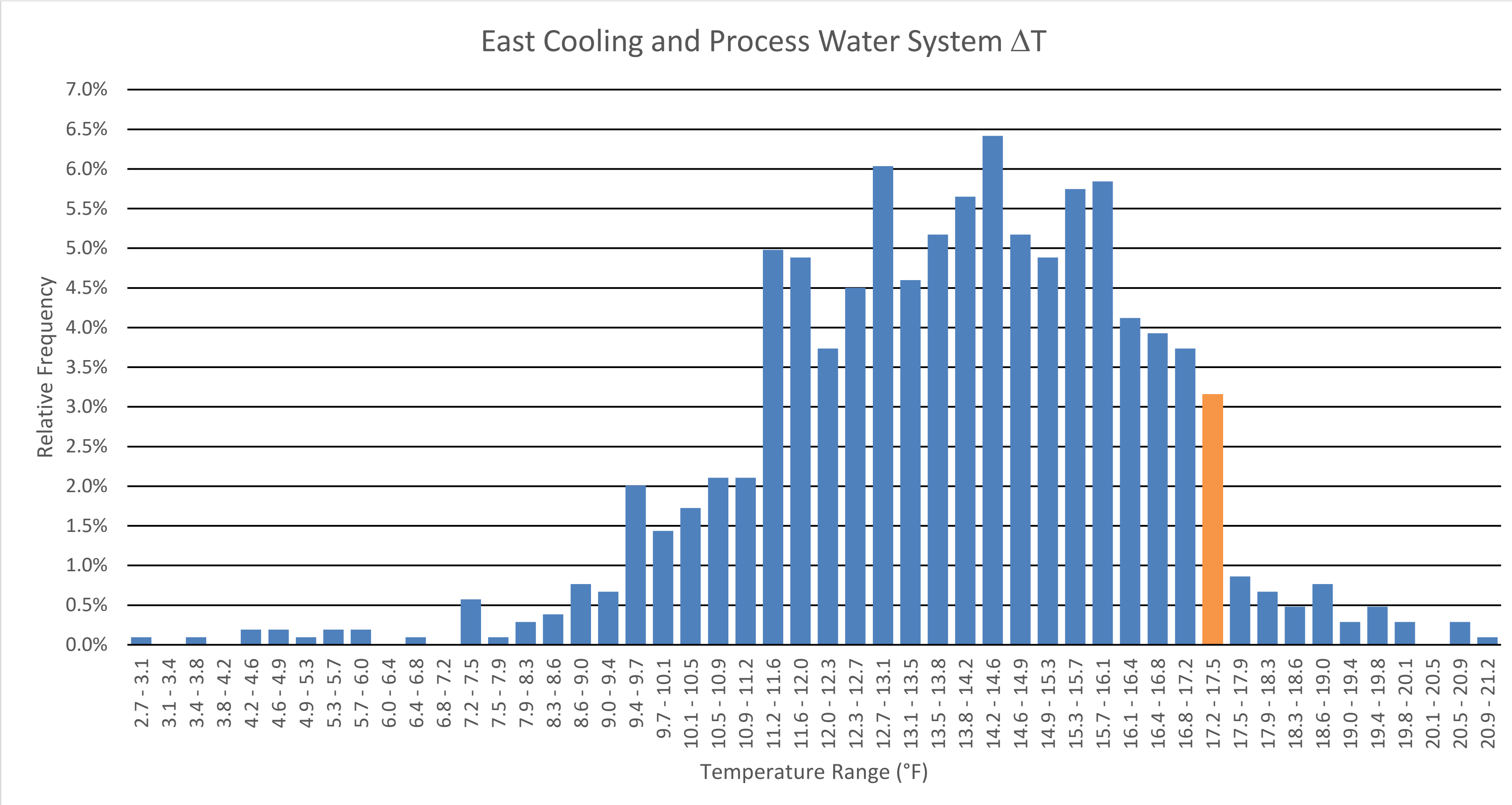


Figure 3.3: East Cooling and Process Water System Calculated Range Histogram, Orange Bar Represents 95th Percentile, Note: Lower Limits Are Inclusive and Upper Limits Are Exclusive

3.5 Closed-cycle Recirculation System Overview

In a closed-cycle recirculation system (CCRS), waste heat is discharged to the atmosphere rather than a cooling water body. The CWA Section 316(b) rule gives the following definition for a CCRS per 40 CFR §125.92(c)(1):

> "Closed-cycle recirculating system: includes a facility with wet, dry, or hybrid cooling towers, a system of impoundments that are not waters of the United States, or any combination thereof. A properly operated and maintained closed-cycle recirculating system withdraws new source water (make-up water) only to replenish losses that have occurred due to blowdown, drift, and evaporation. If waters of the United States are withdrawn for purposes of replenishing losses to a closed-cycle recirculating system other than those due to blowdown, drift, and evaporation from the cooling system, the Director may determine a cooling system is a closed-cycle recirculating system if the facility demonstrates to the satisfaction of the Director that make-up water withdrawals attributed specifically to the cooling portion of the cooling system have been minimized."

This section first provides an overview of the various types of closed-cycle cooling systems that are potentially available for use at Gary Works that would meet the above definition in the CWA 316(b) rule.

<u>Dry Cooling Towers</u>

Dry cooling towers are large heat exchangers that use air to cool heated water traveling through numerous tubes. Dry cooling towers rely on sensible heat transfer only (similar to an automobile radiator) and do not utilize evaporative cooling. As a result, they lack the efficiency of wet or hybrid towers and thus require a much larger footprint than a similar wet or hybrid tower that can reject the same amount of heat. For example, the Vogtle Electric Generating Plant considered the use of dry cooling towers to provide secondary-side cooling for two AP-1000 nuclear reactors. It was determined that dry cooling towers would require approximately three times the amount of land as natural draft (i.e., evaporative) towers (Reference 14).

As stated in the Technical Development Document for the Final Section 316(b) Existing Facilities Rule (Reference 15), the EPA does not believe that dry cooling is a viable alternative for reducing impingement and entrainment on a national scale. Dry cooling could provide substantial reductions in impingement and entrainment, but with a significantly higher cost and penalty to performance. There is no area of free space at Gary Works large enough to site a dry cooling tower. The lower efficiency would also lower feasibility of the technology.

Wet Evaporative Cooling Towers

There are several different types of wet evaporative cooling towers that will be considered in lieu of dry cooling towers. All wet cooling towers use an evaporative cooling process to remove heat from the water. This is because latent heat removal provides a much larger temperature drop in the remaining water than sensible heat removal alone. By definition, one British Thermal Unit (BTU) is the amount of energy required to change the temperature of one pound of water by 1°F. The amount of energy required to evaporate water; however, is much larger. For every pound of water that evaporates, approximately 1,045 BTU of energy is removed from the surrounding environment, which provides a substantial amount of cooling (Reference 18, Pg 19). For this reason, cooling towers are designed to evaporate as much water as possible. As a result of the evaporation process that occurs within cooling towers, a small fraction of the process water is lost to the atmosphere.

Natural Draft Cooling Towers

Of the types of evaporative cooling towers, natural draft wet towers are comparatively efficient, quiet, moderate to high in initial cost, moderate in footprint (i.e., up to 450 ft in diameter), and under appropriate circumstances (discussed below), can be less costly to operate than comparably sized mechanical draft cooling towers. Thus, given suitable conditions, the natural draft tower can be a sound engineering choice. A cross-sectional view of a counterflow natural draft cooling tower is provided in Figure 3.4.

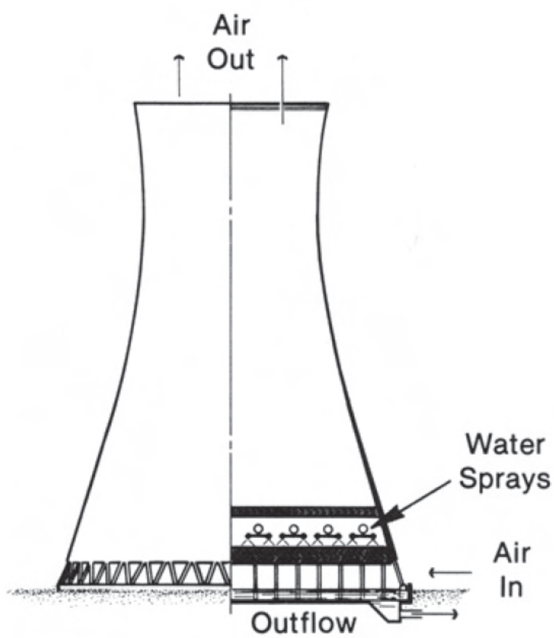


Figure 3.4: Cross-sectional View of a Typical Natural Draft Cooling Tower (Image Courtesy of Marley/SPX)

Natural draft towers rely on the “chimney effect” of the tower to create the required draft; hence, the tower must be very tall, approximately 450 – 550 ft in height. Natural draft towers require a large cooling water system heat load to introduce the thermal differential required to create and sustain the “chimney effect.” At minimum, a cooling tower flow rate of at least 250,000 gpm is required to operate a natural draft cooling tower (Reference 18, Pg 8). Due to their higher initial cost and lower operating cost, natural draft towers must operate for a long time to offset the higher initial cost. Thus, natural draft towers are a more economical choice for new facilities that will operate continuously. In addition, local zoning restrictions can sometimes preclude the use of natural draft towers due to the large aesthetic impact. There is no area of free space at Gary Works large enough to site a natural draft cooling tower.

Mechanical Draft Cooling Towers

Mechanical draft wet evaporative cooling towers can be efficient, typically lowest in initial cost, moderate in footprint, and with moderate operating costs. Due to the need for forced draft fans, this type of tower has higher noise levels and operating costs than a natural draft tower, although sound attenuation is typically possible at an added cost. Mechanical draft cooling towers (MDCT) use fans to force or induce (depending upon the location of the fans) air through the tower to encourage heat transfer and evaporation. A typical method is to place fans on the top deck of the cooling tower, inducing air flow through the louvered inlets on the sides of the tower. As air is drawn into the tower, it interacts with the water droplets falling through the fill, and heat transfer from water-to-air occurs, in addition to evaporation. The air is heated and laden with moisture and exits from the top of the tower. A cross-sectional view of a counter flow MDCT is provided in Figure 3.5.

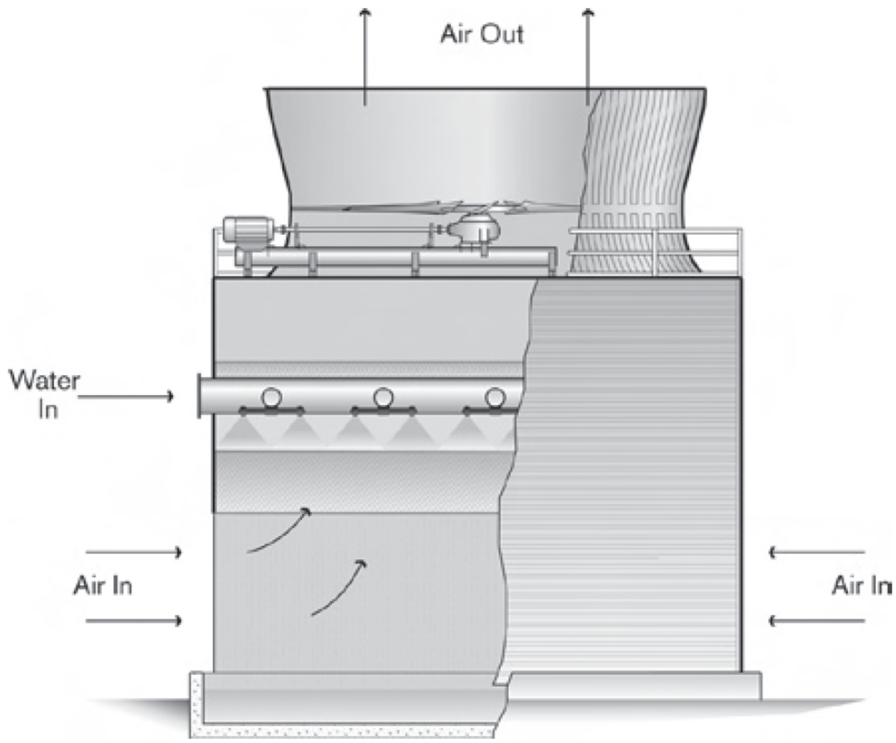


Figure 3.5: Typical Mechanical Draft, Counterflow Cooling Tower (Image Courtesy of Marley/SPX)

During certain meteorological conditions, operation of wet cooling towers may result in discharge of a large visible plume. Cooling tower plumes are the result of the much higher heat and moisture content of the exiting air relative to the ambient around it. Visible plumes are most prominent in cold weather conditions. When the saturated air leaves the top of the tower, it is immediately cooled by the surrounding ambient air. Depending on the characteristics of the ambient air, this can cause the air exiting the tower to become super-saturated for a brief time until diffusion allows the extra moisture to mix in with the surrounding ambient air. This causes a plume to appear at the top of the tower. Plumes can descend to ground level, causing fogging and moisture deposition. During freezing weather, plumes can result in deposition of small ice crystals. If visible plumes present serious hazard or damage to the surrounding area, plume-abated cooling towers may be considered. Plume-abated towers utilize a combination of dry and wet cooling to produce air that typically does not become super-saturated as it exits the top of the tower. These towers, sometimes called hybrid towers, are similar to MDCT but use a portion of the hot water in heat exchangers to provide dry cooling. A cross-sectional of a plume-abated MDCT is provided in Figure 3.6.

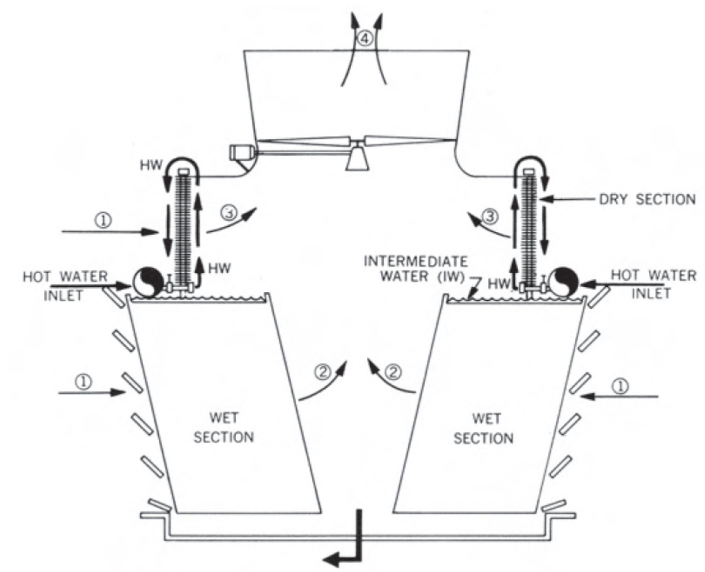


Figure 3.6: Typical Plume-Abated Mechanical Draft Cooling Tower (Image Courtesy of Marley/SPX)

The wet cooling portion of the tower produces similarly warm and moisture-laden exhaust, but the dry portion creates warm air with the same moisture content of the incoming air. This warm, but relatively dry air, mixes with the saturated air near the top of the tower to produce warm air that is below saturation. If the air is sufficiently below saturation as it exits the top of the tower, it will not become super-saturated. Therefore, it will not produce a plume when it is cooled by the surrounding ambient air. Due to the large number of existing plumes and stacks onsite and nearby, it was assumed that the addition of plumes would not substantially affect the safety of the local community or viewshed. For this reason, plume-abated cooling towers were not evaluated further. The additional ground fogging during winter months would result in precautionary traffic control modifications to alleviate safety risks due to limited visibility.

Non-plume-abated MDCTs were selected as the most feasible option to convert Gary Works to a CCRS. Conversion of Gary Works to CCRS would significantly change the way that the facility is cooled, which would result in significant reductions in intake flow from Lake Michigan. The cooling and process water system currently relies on the cold water temperatures of Lake Michigan to provide cooling water. The CCRS would instead rely on the water in the cooling tower basin cooled by the new MDCT.

3.6 Design Approach

Due to the large area spanned by the facility and the complexity of the CWIS and discharge system, the assessment of CCRS at Gary Works was segmented into two systems based on location within the facility: one system servicing the west cooling and process water system and one system servicing the east cooling and process water system. Each system is functionally alike and was designed using a similar approach.

Due to the relatively low intake temperature which the facility is designed to operate at, each cooling tower system would allow for operation in closed-cycle, hybrid, and once through configurations. Details of the configuration can be found in Section 3.10. This would allow for uninterrupted operation of the facility during periods when the high ambient wet bulb temperature would limit the performance of the cooling towers, which would return the cooling and process water at a temperature higher than the inlet temperature at which the facility has demonstrated capability to operate at.

3.7 Overview of Proposed Design for Gary Works

<u>West Cooling and Process Water System</u>

Closed-cycle cooling would be implemented at the west cooling and process water system by detouring water from Outfall 034, Outfall 037, and Outfall 039 through a new mechanical draft cooling tower and then back to Lakeside Pump Station. A new piping tie-in at each outfall would redirect this flow to one of two new booster pump stations, which would pump the water into the cooling tower. The water would then be cooled by the cooling tower and collect in the basin at the bottom of the tower. A portion of the water would be lost due to evaporation and drift. Additionally, a portion of the water would be lost to onsite consumption. The remainder would be gravity fed back to the buried offshore intake pipe which feeds Lakeside Pump Station. Makeup water would be naturally drawn in through the offshore intake conduit according to the difference in the flowrates being drawn through the circulating pumps and the flowrates being returned by the CCRS. The makeup flow rate would account for the water volume lost to drift, evaporation, and onsite consumption. From Lakeside Pump Station, water would be pumped through the circulating water pumps to the various noncontact cooling and process equipment, and the process would repeat. To maintain a stable concentration of salts and impurities in the cooling and process water system, dilution with fresh water from Lake Michigan would be required. Typically, this would be offset by a blowdown of water from the cooling tower. The losses to onsite consumption are larger than the blowdown flowrate that would be required to maintain an appropriate cycle of concentration. Therefore, the system would not typically require any blowdown. During periods of the year when a dilution of fresh water from Lake Michigan would be required to cool the water, a portion of the water from the cooling tower basin would be returned to Lake Michigan as blowdown through a new outfall. The discharge at the new outfall would be monitored and reported. A schematic diagram of this system is shown below in Figure 3.7.

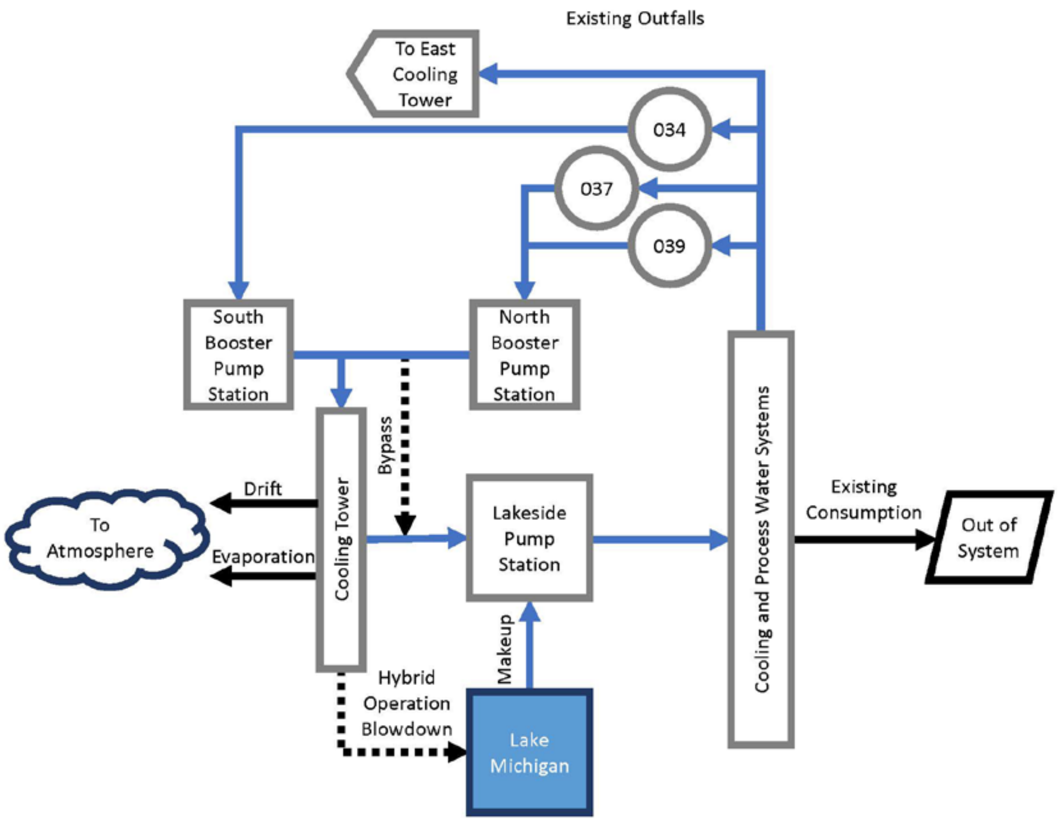


Figure 3.7: Simplified Schematic of West Cooling and Process Water System CCRS

East Cooling and Process Water System

Closed-cycle cooling would be implemented at the east cooling and process water system by detouring water from Outfall 015, Outfall 018, Outfall 019, Outfall 020, Outfall 028, Outfall 030, Outfall 033, and Outfall 035 through a new mechanical draft cooling tower and then back to Pump Station #1, Pump Station #2, and Pump Station #4. A new piping tie-in at each outfall would redirect this flow to a new booster pump station, which would pump the water into the cooling tower. The water would then be cooled by the cooling tower and collect in the basin at the bottom of the tower. A portion of the water would be lost due to evaporation and drift. Additionally, a portion of the water would be lost to onsite consumption. The remainder would be gravity fed to a holding lagoon. The holding lagoon would allow for a period of delay when transitioning from a closed-cycle operation mode to a hybrid or once through operation mode. Makeup water would be naturally drawn in through the holding lagoon according to the difference in the flowrates being drawn through the circulating pumps and the flowrates being returned by the CCRS. Weir gates would control the flow from the ore loading slip turning basin to the holding lagoon. The makeup flow rate would account for the water volume lost to drift, evaporation, and onsite consumption. New piping would deliver water from the holding lagoon to Pump Station #1, Pump Station #2, and Pump Station #4. New tie-ins to the Pump Station #1 and Pump Station #4 intake piping would be installed below the dredge line. The existing intake piping would be permanently sealed. The new return piping would discharge directly to the Pump Station #2 forebay. The Pump Station #2 intake forebay would be closed to the ore loading slip. From Pump Station #1, Pump Station #2, and Pump Station #4, water would be pumped through the circulating water pumps to the various noncontact cooling and process equipment, and the process would repeat. Similar to the proposed west cooling and process water loop cooling tower system, the east cooling and process water loop cooling tower system would not typically require any blowdown. During periods of the year when a dilution of fresh water from Lake Michigan would be required to cool the water, a portion of the water from the cooling tower basin would be returned to the Grand Calumet River as blowdown through a new outfall. The discharge at the new outfall would be monitored and reported. A schematic diagram of this system is shown below in Figure 3.8.

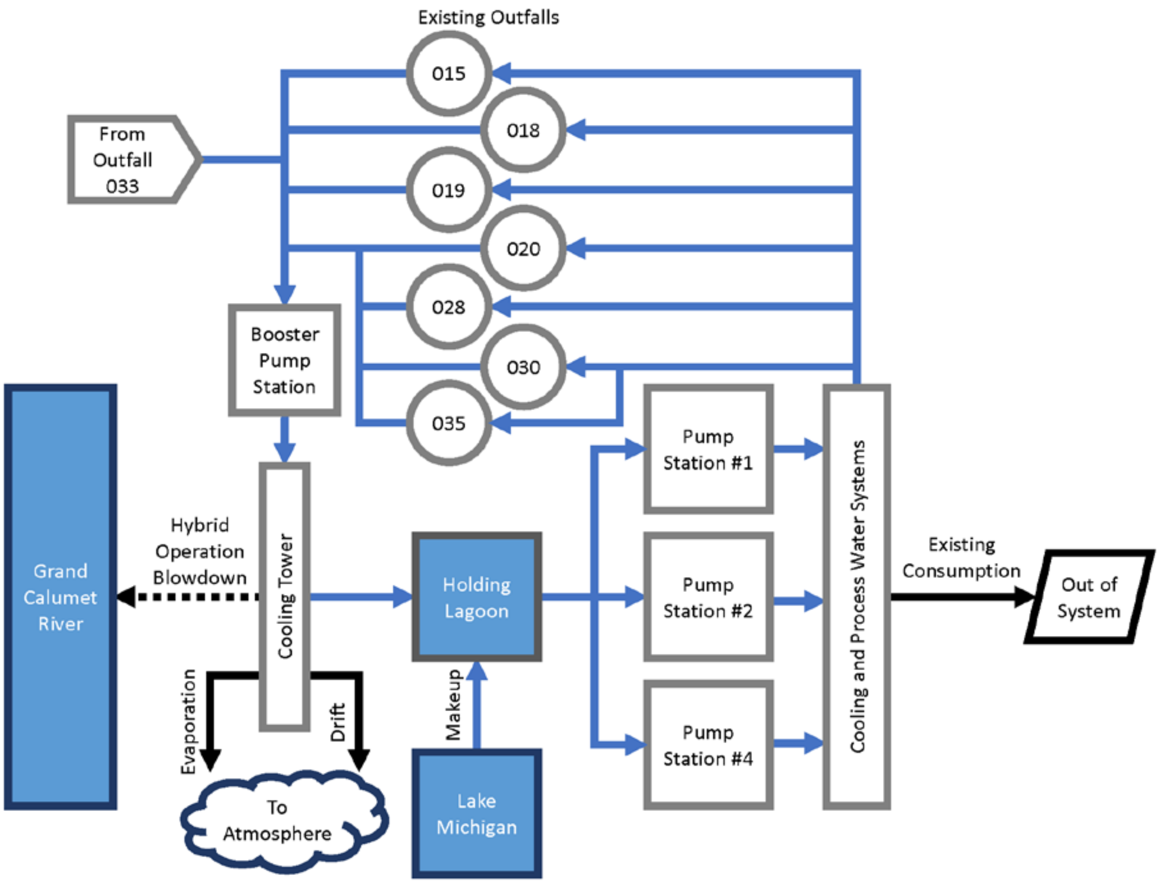


Figure 3.8: Simplified Schematic of East Cooling and Process Water System CCRS

The implementation of the proposed CCRS at Gary Works would require the installation and modification of several large pieces of equipment. Most significantly, large, non-plume-abated, mechanical-draft cooling towers would be required to maintain the cooling and process water at an operable temperature range. Significant piping runs across the Gary Works site would be required to supply flow to and return flow from the cooling towers. New booster pump stations would be required to supply hot water to the towers. A holding lagoon would be required to supplement the east cooling and process water system supply when transitioning between operation modes. New outfalls would be required for occasional blowdown when the system is in hybrid and once-through operation modes. The west cooling tower system would blowdown to Lake Michigan through a new outfall located east of Lakeside Pump Station. The east cooling tower system would blowdown to the Grand Calumet River through a new outfall located east of Outfall 015. Auxiliary systems such as water treatment and electrical distribution would also be required. The design of these components is described in subsequent sections of this report.

3.8 Cooling Tower

In-line, non-plume-abated, mechanical draft wet cooling towers would be used to reject heat from the Gary Works cooling and process water systems. EvapTech, Inc. (EvapTech) provided a cooling tower design and budgetary estimate for the proposed cooling towers.

The cooling tower used for the west and east cooling and process water system preliminary designs are model ECE1554-554R and ECE254-654T, respectively. Each model is an in-line, non-plume-abated, mechanical draft counterflow cooling tower. In-line towers are cooling towers in which all the cooling tower cells are arranged in a single line. Counterflow towers have a fill configuration through which air flows vertically counter to the downward direction of the falling water. The hot water is delivered to the top of the fill and is sprayed downward. As the water falls through the fill, it is cooled by the air because of convection heat transfer and evaporation. The air, carrying a higher temperature and moisture content, reaches the middle of the tower, where it is drawn upward by the fans. Figure 3.9 shows an illustration of a typical counterflow cooling tower.

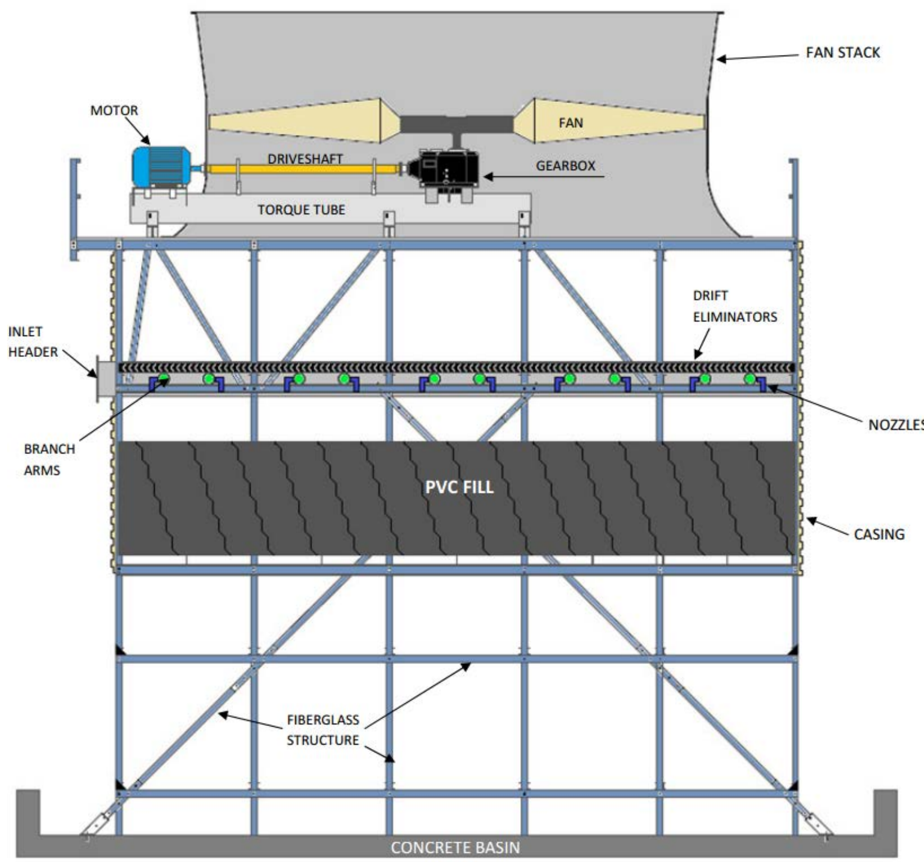


Figure 3.9: Cross-section View of a Typical Counterflow Mechanical Draft Cooling Tower, Image Courtesy of EvapTech

The proposed cooling towers would have the following dimensions:

Table 3-1: Proposed Cooling Tower Dimensions

Parameter	West Cooling Tower	East Cooling Tower
Number of Cells	2	15
Cell Width	54 ft	54 ft
Cell Length	54 ft	54 ft
Cell Height	28.55 ft	35.55 ft
Overall Length	108 ft	810 ft
Overall Width	54 ft	54 ft
Overall Height	34.6 ft	49.6 ft
Basin Length	116 ft	812 ft
Basin Width	62 ft	65 ft

The orientation of the new cooling towers would match the existing mechanical draft cooling towers and the spacing between towers would be specified in order to avoid consistent recirculation issues (i.e., heated air from the top of the tower re-entering the air inlets at the bottom or entering the air inlets at nearby cooling towers). During heavy, unfavorable wind conditions, some recirculation may occur that could degrade the performance of the cooling towers. For this reason, the fans would be slightly oversized and provide a high air discharge velocity at the top of the tower. This would aid in reducing the potential for recirculation.

The cooling tower structure and support members would be made of fiberglass reinforced plastic (FRP), and the fan deck water distribution system would be made of gritted FRP. The top deck of each cooling tower would be accessible by built in stairs and ladders. The connectors and hardware (e.g. driveshafts, fan guards, tie rods, bolts, nuts) would be made of Type 304 stainless steel. The cooling tower casing would be made of corrugated fiber reinforced polymer (FRP). The tower would also be designed with TechClean 312 low fouling film fill. Film-type fill causes the water to spread into a thin film, flowing over large vertical areas, to promote maximum exposure to the air flow. It has the capability to provide more effective cooling capacity within the same amount of space relative to splash-type fill but can be sensitive to uneven water or air distribution. A new mechanical draft cooling tower would be expected to have a design life of 30 years (Reference 16, Pg 3-10). Several components such as fill, bearings, fasteners, etc. may require replacement over the life of the tower.

The tower would contain cellular pack polyvinyl chloride (PVC) drift eliminators to reduce drift of liquid water entrained in the exhausting water vapor. Drift eliminators operate by causing the liquid water to lose velocity and fall to the cold water basin. This would allow for lower water consumption and minimal ice buildup on and around the cooling tower. The use of drift eliminators would reduce particulate emissions, wear on the tower's mechanical components, and would reduce the impact of water, ice, and water treatment chemicals on the region immediately surrounding the cooling tower. Elimination of drift would be important because of the undesirable consequences of water accumulation near the tower and would be especially important during winter time. Because of the quality of the cooling and process water, drift from the new Gary Works cooling towers may result in additional air emissions. The method and quality of installation of drift eliminators is as important as the quality of the eliminators themselves. The manufacturer states that the drift eliminators that would be installed with this tower could reduce drift to 0.001% of the cooling tower flow rate (Attachments 7 and 8). This equates to drift rates at the west and east cooling towers of approximately 0.4 gpm and 2.5 gpm, respectively.

Each cell has a 30 inch flange pipe connection, drilled to match a 125/150 lb ANSI flange, for the water distribution systems (Attachments 7 and 8). The water distribution systems are internal to the cooling towers. Each water distribution system is comprised of piping, fittings, nozzles, and a basin to distribute the flow over the fill. Downstream from the booster pump stations and parallel to the cooling towers, a buried header pipe would deliver hot water to each cooling tower cell via individual riser pipes. The west and east cooling tower buried header pipes would be 6.5 ft and 8 ft in diameter, respectively. The riser pipes would be 30 inch to match the water distribution system flange size. The water distribution systems would be adjusted to evenly divide the hot water between each cooling tower cell.

Each cooling tower cell would use a 32 ft diameter, high-efficiency fan to induce the draft of air through the tower. The west cooling tower fans would each be constructed with 7 FRP blades and a double epoxy hub. Each of the east cooling tower fans would be constructed with 8 FRP blades and a double epoxy hub. Each cooling tower fan would be powered by an 1800 RPM, 460V, three-phase motor that is variable frequency drive (VFD) capable.

The motor would be coupled to the fan by a full floating composite driveshaft with stainless steel couplings and a right-angle double-reduction gear drive. The right-angle gear boxes would have splash lubrication and could operate in forward or reverse. The ability for reverse fan operation would be especially important for this tower, which would need to be able to operate effectively in freezing weather conditions. The west and east cooling tower fan motors would have rated capacities of 250 HP and 200 HP, respectively.

3.9 Thermal Design Considerations

The most important feature of a cooling tower is its ability to reject heat to maintain the performance of the condensers, heat exchangers, and internal processes. Conversion of Gary Works to closed-cycle cooling would increase the cooling and process water temperature entering the pump stations. The higher temperature water would reduce the temperature differential across the noncontact cooling components and may have impacts to the internal steel and iron production processes. Whereas Lake Michigan provides relatively cool water much of the year, the temperature returning from the cooling towers would be constrained by the mechanism of evaporative cooling. Design of a cooling tower involves a trade-off between achievable cold water temperature and the size and cost of the tower. In turn, the achievable cold water temperature is limited by the "approach" to design wet-bulb temperature (see Figure 3.10 below), which is a function of air temperature and humidity content. As a result, the cooling tower would not typically provide water as cool as once-through cooling from Lake Michigan.

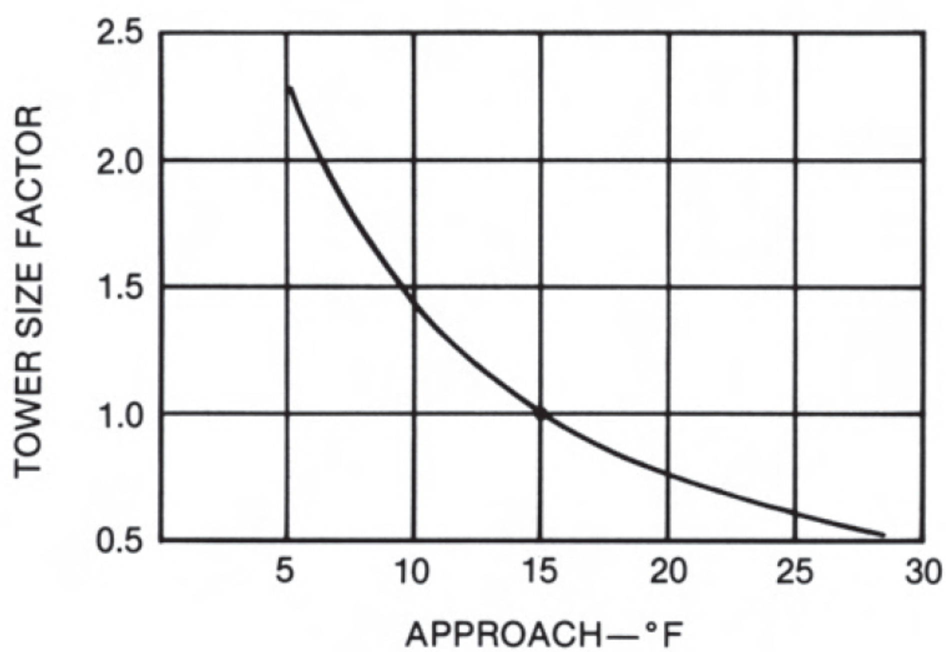


Figure 3.10: Relationship Between Tower Size and Approach, Image Courtesy of Marley/SPX

The approach is fixed by the size and efficiency of the cooling tower. The graph in Figure 3.10 indicates how, for two towers of equal efficiency with proportionate fill configurations and air rates, the larger tower would produce colder water; i.e., have a closer approach. Because evaporative cooling is limited by the wet-bulb temperature, the water will asymptotically "approach" the wet-bulb temperature as it falls through the cooling tower but does not reach it. Cooling tower performance is typically not guaranteed at an approach below 5°F.

In order to economically maximize the amount of time the cooling and process water systems would operate in a closed-cycle configuration, cooling towers with an 8°F approach were considered appropriate. Approach defines the final temperature difference between the cool water exiting the tower and the wet-bulb temperature. An approach of 8°F means that the water temperature exiting the tower will be 8°F above the wet-bulb temperature at design conditions.

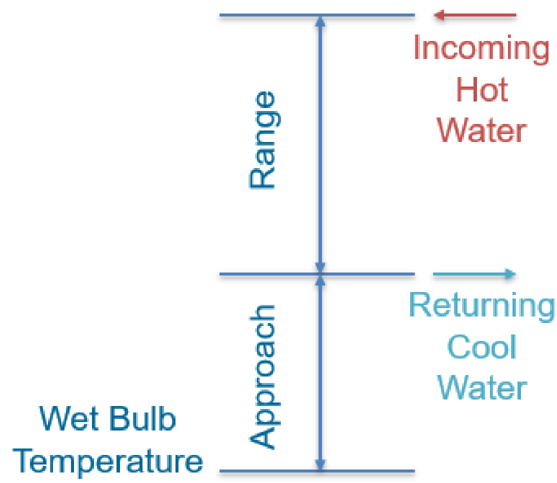


Figure 3.11: Definition of Range and Approach

The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook provides design wet-bulb temperatures for various regions across the United States for use in heating, ventilation, and air conditioning (HVAC) and evaporative cooling applications. The nearest station that includes monthly design wet-bulb temperatures was found to be Chicago Midway Airport, which is located approximately 25 miles west-northwest of Gary Works. For this application, an annual wet-bulb exceedance value of 0.4% was chosen. This means that the design wet-bulb temperature will be exceeded approximately 0.4% of the year. The 0.4% annual exceedance wet-bulb temperature for this region is 78.0°F (Reference 17, WMO#: 725340). Given the 8°F approach temperature, the cold water exiting the cooling tower and returning to the pump station intakes would be expected to be 86°F when the wet bulb temperature is at the design condition of 78°F.

The historic intake temperature operability limits, as discussed in Section 3.4, are lower than the expected cold water temperature at the wet bulb design condition. For this reason, each cooling tower system would be supplemented by cooler fresh water from Lake Michigan during particularly warm periods. When supplemental cooling water is required to maintain the intake temperature below the historic operability limits, a portion or all of the water from the cooling tower cold water basin would be discharged from the CCRS. During these periods, the west cooling tower would discharge the additional water to Lake Michigan through a new outfall and the east cooling tower would discharge the additional water to the Grand Calumet River through a new outfall. Details of the hybrid operation of the cooling tower systems can be found in Section 3.10.

Cooling tower range is defined by the temperature difference between the hot water entering the tower and the cooler water leaving it. As discussed in Section 3.4, the 95th percentile west and east cooling and process water system temperature rise is 18.0°F and 17.5°F, respectively. At the design wet bulb condition, water being discharged at the combined outfalls and redirected to the west and east cooling towers would be designed to have a temperature at or below 104.0°F and 103.5°F, respectively. To maintain the operability of the facility, cooling towers must be designed to maintain the west and east cooling and process water system temperature ranges of 18.0°F and 17.5°F, respectively. Given the west and east outfall flow rates of 51 MGD and 353 MGD, respectively, the heat rejection rate of each cooling tower was estimated as $3.18*10^8$ BTU/hr and $2.14*10^9$ BTU/hr, respectively, as detailed below (Reference 18, Pg 22).

$$Heat\ Load = \frac{Q}{24} * R * 8.333 * 10^6 * 1$$

Where:

Q: cooling tower flow rate [MGD]

R: cooling tower range [°F]

24: days to hours conversion [hr/day]

$8.333*10^6$: density of water at a typical temperature [lbs/million gallon]

1: specific heat capacity of water [BTU/(lb*°F)]

The thermal design of the cooling tower is based on facility parameters which significantly affect the size of the tower. Several conservative simplifications are made in determination of the cooling tower thermal design parameters for this preliminary study. These simplifications have a small impact to the overall cost; however, these effects would need to be evaluated more thoroughly during detailed design.

- The facility water temperature range fluctuates depending on the interaction of many variables. In this preliminary design, it was assumed that the cooling and process water system ranges would be constant at the selected ranges. More detailed analysis would be required to model the system ranges.

- The facility intake flowrates have historically changed based on the modified requirements and operational status of internal processes. In this preliminary design, it was assumed that the calculated long-term average flowrates are constant and reflective of future conditions.

- Water temperature and wet bulb temperature transients were assumed to be gradual and damped. Transient analysis would be required in a detailed design to determine the impacts of sudden system changes.

- Water quality may have a small impact on the specific heat capacity, which would create small changes in the temperature differentials. For the purposes of the thermal design of the tower, pure water was assumed in this preliminary design.

- Fill degradation over time is not considered in the thermal performance calculations. It is assumed that a change out of the fill will be required once every ten years.

A summary of the west cooling tower thermal design parameters is provided in Table 3-2 below:

Table 3-2: West Cooling Tower Thermal Design Parameters

Parameter	Value
Type of Tower	Counterflow
Number of Cells	2
Design Inlet Temp.	104.0°F
Design Outlet Temp.	86.0°F
Flow Rate	51 MGD
Design Wet Bulb Temp.	78.0°F
Range	18.0°F
Approach	8.0°F
Heat Load	$3.18*10^8$ BTU/hr

A summary of the east cooling tower thermal design parameters is provided in Table 3-3 below:

Table 3-3: East Cooling Tower Thermal Design Parameters

Parameter	Value
Type of Tower	Counterflow
Number of Cells	15
Design Inlet Temp.	103.5°F
Design Outlet Temp.	86.0°F
Flow Rate	353 MGD
Design Wet Bulb Temp.	78.0°F
Range	17.5°F
Approach	8.0°F
Heat Load	$2.14*10^9$ BTU/hr

Note that the thermal design parameters listed in Tables 3-2 and 3-3 are valid at the design wet bulb temperature of 78.0°F. As noted previously, this represents a value that would be expected to be exceeded approximately 0.4% of the year. Therefore, cooling tower discharge temperatures near 86.0°F would be expected during the warmest days of the year.

As the wet bulb temperature drops, the cold water temperatures from the cooling towers would also drop. However, the cold water temperatures would not decrease nearly as much as the wet bulb temperature. This would result in an increased approach temperature differential when conditions are lower than the design condition. EvapTech provided a performance curve for each cooling tower. The west and east cooling tower performance curves are provided in Attachments 7 and 8, respectively. The performance curve for each cooling tower at full flow conditions provides a cold water temperature of 86.0°F at the design wet bulb of 78.0°F. With a wet bulb temperature of 65°F, the cold water temperature drops to about 77.8°F for each cooling tower. At a wet bulb temperature of 50°F, the cold water temperature is about 69.5°F for each cooling tower. Therefore, even during cold weather conditions, the cooling water provided to the Gary Works pump stations would still be relatively warm. The largest cooling and process water temperature difference between once-through and closed-cycle cooling would occur in the winter time due to this effect.

3.10 Hybrid Operation

During particularly warm periods, each cooling tower system would return cooling and process water at temperatures higher than the historic intake temperature operability limit if operated in a closed-cycle mode. To maintain the operability of the facility, each system would mix cool water from Lake Michigan with the water returning from the cooling towers to lower the mass intake temperature. The west cooling tower system would accomplish this by drawing water through the offshore intake conduit where it would mix with the returning water at the intake pipe tie in point. The east cooling tower system would draw the supplemental cool water into the new holding lagoon through weir gates where it would mix with the returning water before being distributed to the pump stations.

Historic wet bulb temperature data from a nearby monitoring station (Reference 19) was analyzed to project the operation of the cooling tower systems across several previous years. Using the cooling tower performance curves provided in the vendor documentation, the temperatures of the water returning from the cooling towers were estimated. These values were then compared to the historic intake temperature operability limits to determine if the facility would be impacted due to increased intake temperatures. If the temperature was above the determined limit, the amount of cool water from Lake Michigan which would be required to lower the intake temperature an appropriate value is calculated. This amount is then compared to discrete flowrates to determine what flowrate would be used in a realistic scenario.

The lowest of these discrete options is the flowrate required to replace the water lost to evaporation, drift and existing onsite consumption. This is the base flowrate expected to be maintained under typical closed-cycle operation. Under this configuration all of the residual heat load from the cooling and process water systems would be transferred to the atmosphere through the cooling towers. The next discrete options are fractional values of the intake flowrates. Flowrates of 20%, 40% and 50% of the intake flowrates were selected to provide a gradient coverage of flowrate options. Under these conditions, the cooling system would be in a hybrid configuration. When in this configuration, a portion of the heat load would be transferred to the atmosphere through the cooling towers while the remainder of the west system heat load would be discharged to Lake Michigan and the remainder of the east system heat load would be discharged to the Grand Calumet River. The final discrete option is a transition of the system to a once-through configuration. Under this configuration, all of the heat load would be discharged to Lake Michigan or the Grand Calumet River, similar to the existing configuration. When in a once-through configuration, the cooling towers would continue to operate to lower the thermal impact of the large discharge and allow for a return to a hybrid or closed-cycle configuration as soon as possible.

Based on the historic wet bulb temperature and intake temperature data and thermal simulations generated, an average year of operation was compiled. Tables 3-4 and 3-5 provide the number of annual average hours each cooling tower system would operate at the five discrete configuration options.

Table 3-4: West Cooling Tower System Average Annual Configuration Frequency

	Closed-cycle Consumption Makeup	20% Hybrid Makeup	40% Hybrid Makeup	50% Hybrid Makeup	Once Through Cooling
Flow Rate (MGD)	5.8	11.2	22.4	28.0	56.0
Annual Hours	7,179	301	737	190	358
% of Year	81.9%	3.4%	8.4%	2.2%	4.0%

Table 3-5: East Cooling Tower System Average Annual Configuration Frequency

	Closed-cycle Consumption Makeup	20% Hybrid Makeup	40% Hybrid Makeup	50% Hybrid Makeup	Once Through Cooling
Flow Rate (MGD)	53.6	80.0	160.0	200.0	400.0
Annual Hours	8,423	80	216	36	11
% of Year	96.1%	0.9%	2.5%	0.4%	0.1%

Figures 3.12 and 3.13 illustrate the projection of cooling tower operation based on historic wet bulb temperature data. Each point above the intake temperature operability limit would require mixing of cool water from Lake Michigan. This mixing may be bounded by the typical makeup flowrate due to losses to evaporation, drift and existing onsite consumption. Figures 3.14 and 3.15 illustrate the calculated minimum amount of mixing required on an hourly basis. Each point would default to the next highest discrete flowrate option. Any point above a 50% hybrid makeup flowrate would default to a once through cooling configuration.

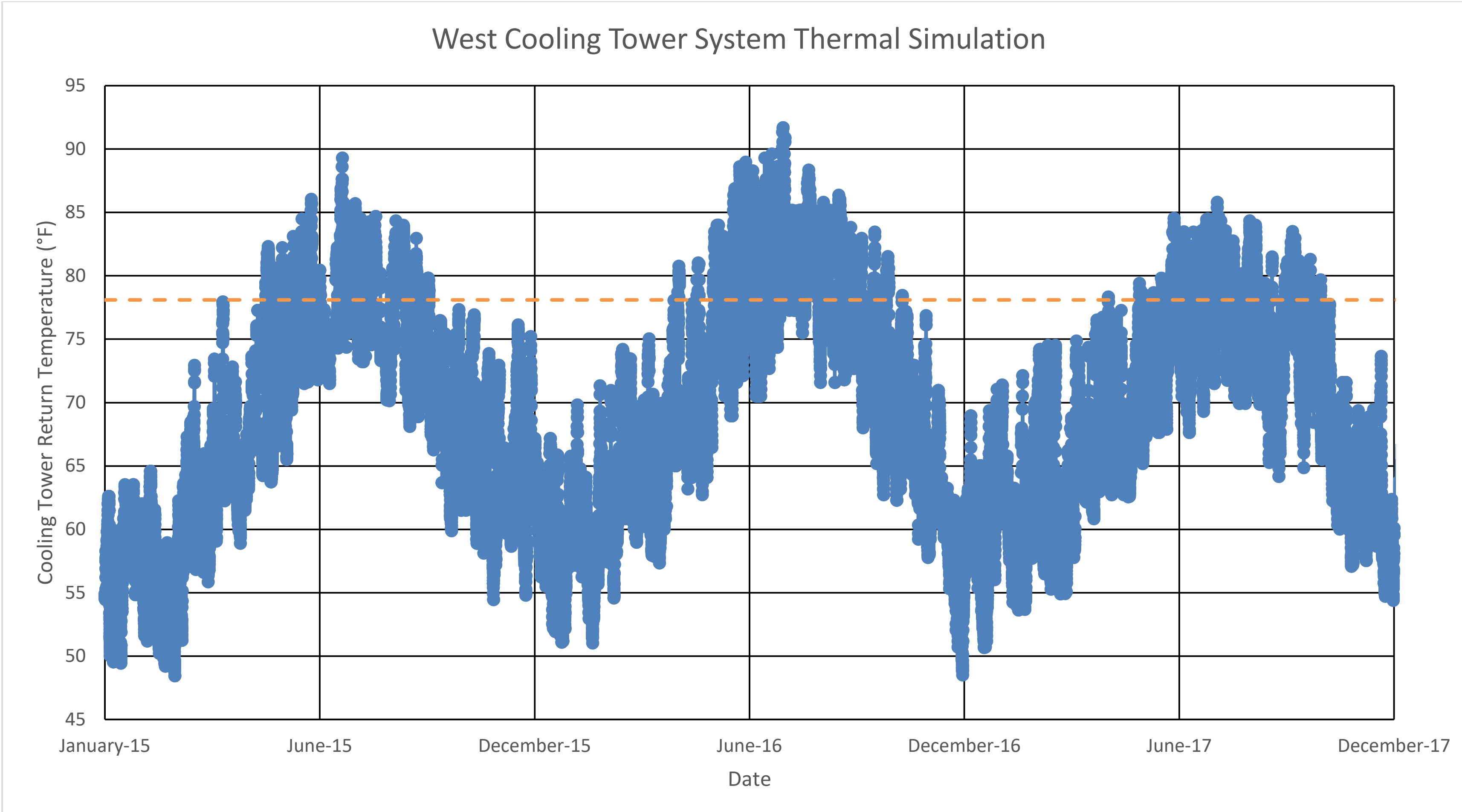


Figure 3.12: West Cooling Tower Return Temperature, Orange Dashed Line Represents Historic Intake Temperature Operability Limit

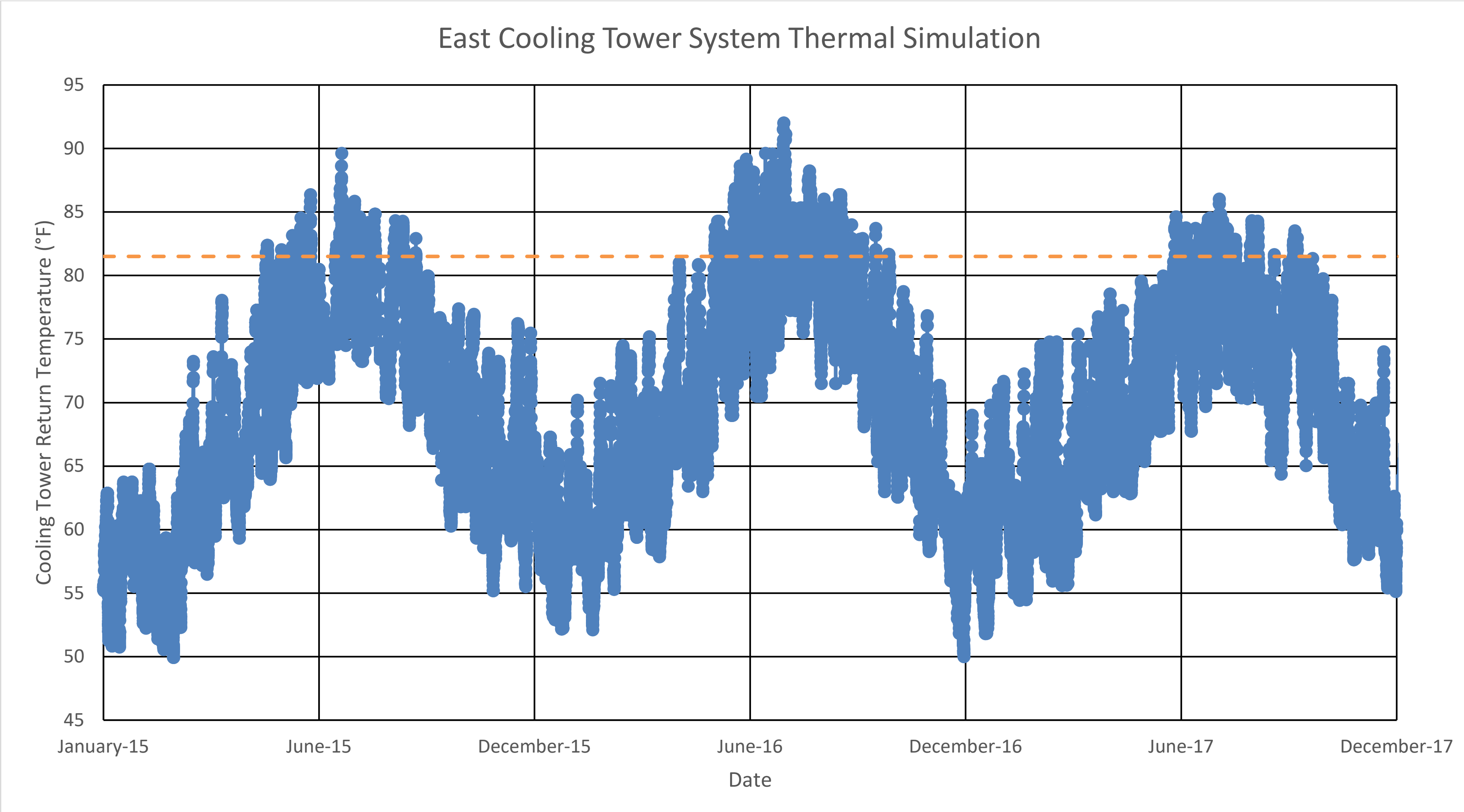


Figure 3.13: East Cooling Tower Return Temperature, Orange Dashed Line Represents Historic Intake Temperature Operability Limit

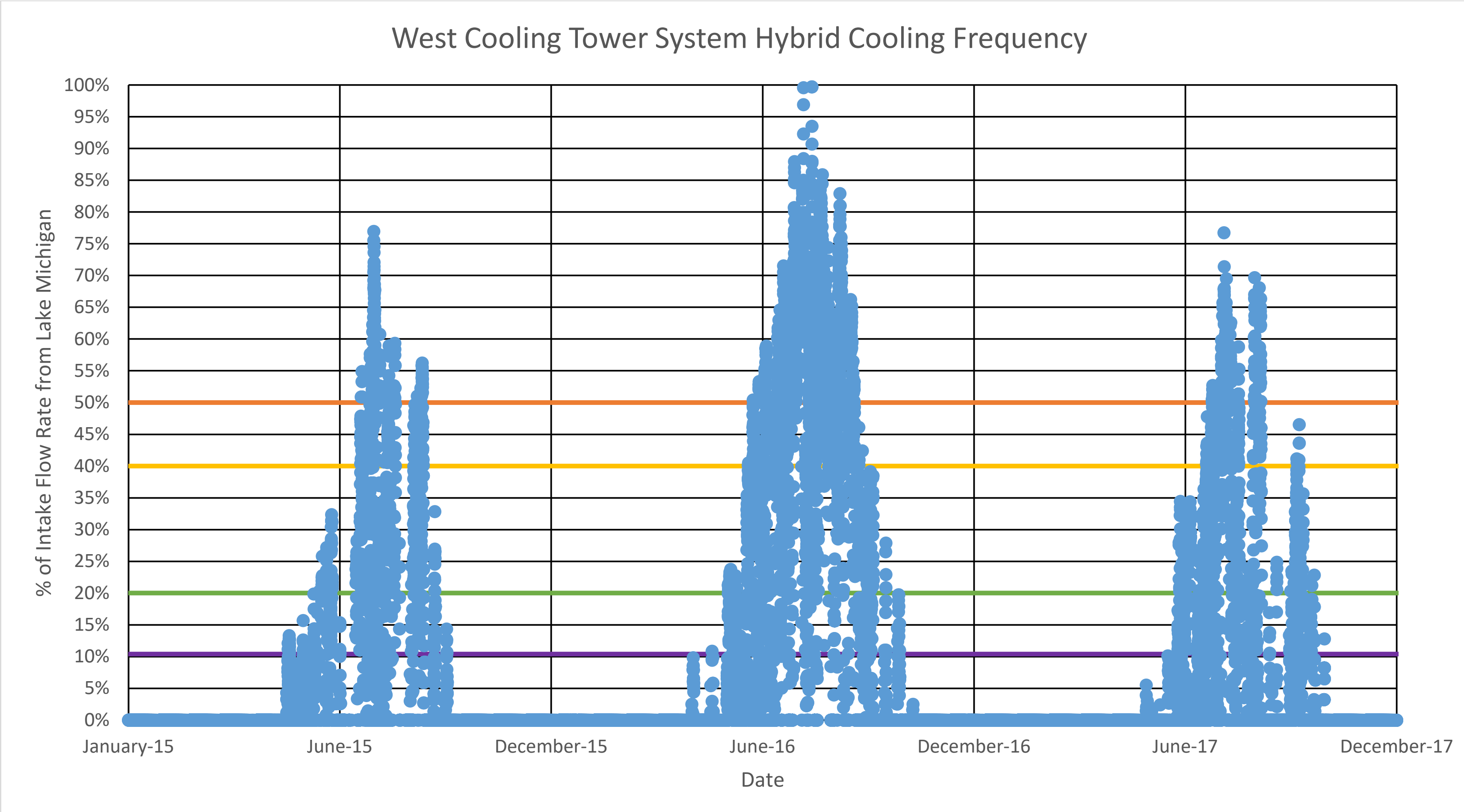


Figure 3.14: West Cooling Tower Minimum Required Cool Water Mixing, Purple Line Represents Closed-cycle Consumption Makeup, Green Line Represents 20% Hybrid Makeup, Yellow Line Represents 40% Hybrid Makeup, Orange Line Represents 50% Hybrid Makeup

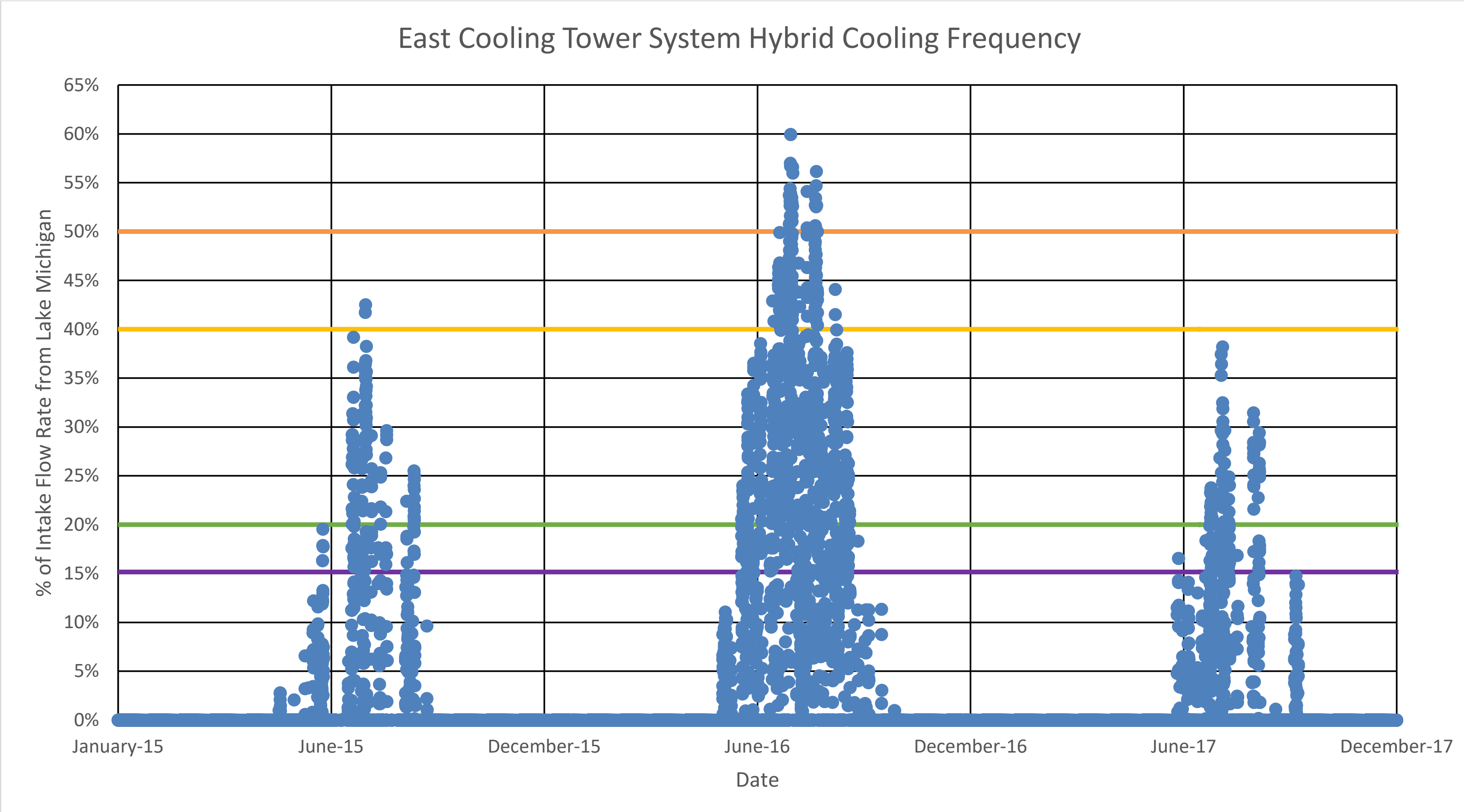


Figure 3.15: East Cooling Tower Minimum Required Cool Water Mixing, Purple Line Represents Closed-cycle Consumption Makeup, Green Line Represents 20% Hybrid Makeup, Yellow Line Represents 40% Hybrid Makeup, Orange Line Represents 50% Hybrid Makeup

3.11 Cooling Tower Siting

The proposed west cooling tower site is southeast of the existing hot strip mill cooling tower. This location is undeveloped, centrally located from Outfall 034, Outfall 037, and Outfall 039 and far enough from nearby buildings to cause recirculation effects. The proposed east cooling tower site is east of the ore loading slip turning basin. This location is the closest large available plot of space to the east cooling and process water system outfalls. It was previously used for coal storage but since the shutdown of the coke plant has become unused. The topsoil at this location will likely require hazardous waste handling and disposal. Figures 3.16 and 3.17 show the locations of the proposed cooling towers within the Gary Works site.

Figure 3.16: Proposed West Cooling Tower and Pump House Site

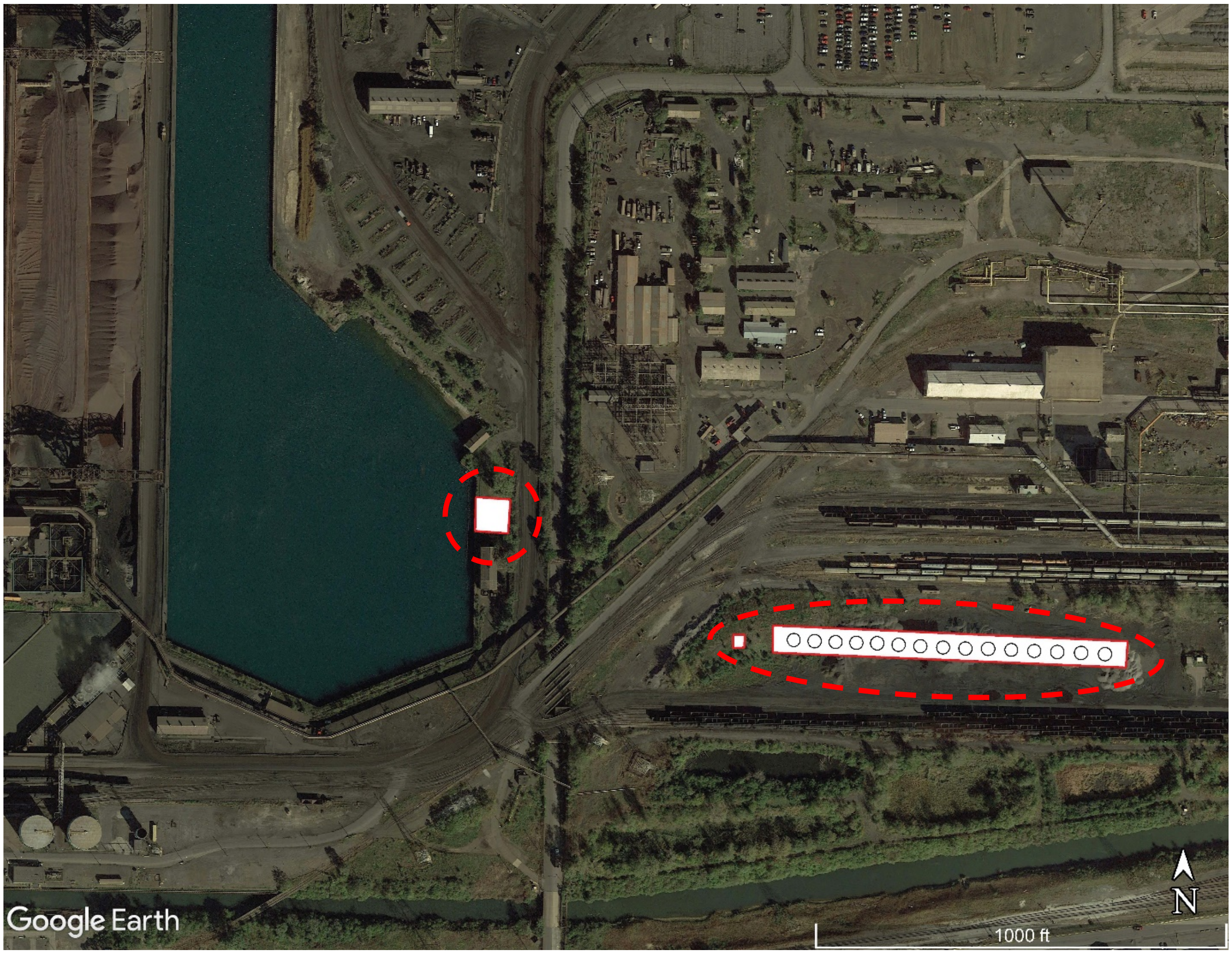


Figure 3.17: Proposed East Cooling Tower, Pump House and Holding Lagoon Site

Primary considerations for siting the towers include the available and required space, hydraulic requirements, required site preparation, regulatory impacts, and impacts to surroundings. These considerations are discussed in the following sections.

3.12 Area Requirements

West Cooling Tower

As noted in Section 3.8, a 2 cell cooling tower would be required to remove the maximum heat load at the design conditions. The overall cooling tower dimensions would be 54 ft wide by 108 ft long. To prevent performance degradation from recirculation and interference effects, the new cooling tower would be oriented with the major axis parallel to the major axis of the existing nearby hot strip mill cooling tower. The new and existing cooling towers would be offset by greater than one half of the longer existing cooling tower length.

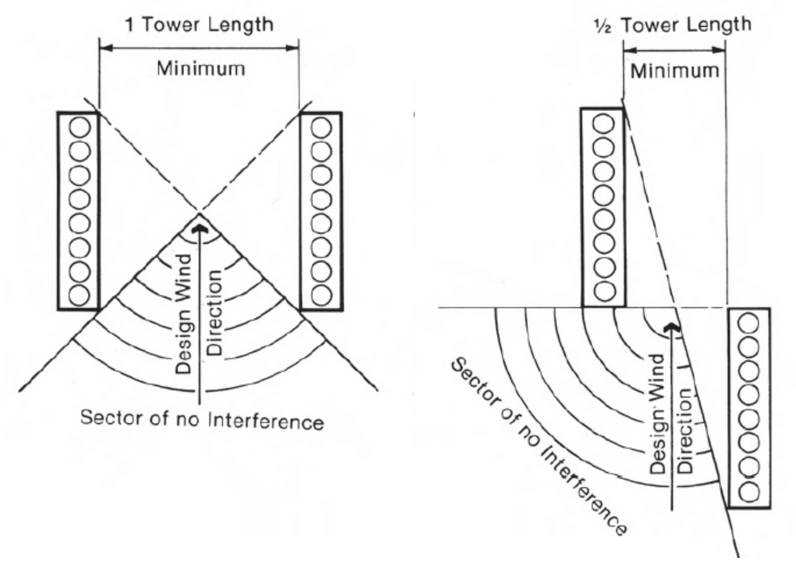


Figure 3.18: Cooling Tower Spacing Requirements (Reference 18, p. 27)

East Cooling Tower

As noted in Section 3.8, a 15 cell cooling tower would be required to remove the maximum heat load at the design conditions. Additional adjacent area would be required for the booster pump station.

3.13 Available Area

Area limitations on the Gary Works site include existing buildings, railroad equipment, access roads, slab storage, piles, and waterways. The continuous operation of the facility relies on optimal transportation of raw and processed materials, personnel, and equipment throughout the site. Selection of siting from unused areas for the proposed new cooling towers, particularly for the larger west cooling tower, requires consideration of the operations and management of the facility.

3.14 Hydraulic Requirements

Addition of CCRS requires additional pumps, piping, and other piping components. Hydraulic requirements are lowered by selecting a site as close as possible to the tie-in locations and with small elevation difference. This minimizes the amount of additional piping and the size of pumps and motors. Due to the complex layout of the facility and significant amount of buried interferences, it was assumed that the only accessible tie-in location was at or near each outfall.

The proposed site of the west cooling tower is centralized in reference to Outfall 034, Outfall 037, and Outfall 039 and has a mostly unobstructed path from the outfalls to the proposed cooling tower, running parallel to the railroad tracks, where buried interferences are assumed to be negligible. The proposed site of the east cooling tower is a short distance from Outfall 015, the most easterly active outfall and has a mostly unobstructed path from the outfalls to the proposed cooling tower, running parallel to the railroad tracks and below an access road, where buried interferences are assumed to be negligible. Therefore, the selected cooling tower sites are feasible from a hydraulic perspective.

3.15 Site Preparation

Preparation of the tower site would include leveling the ground for development. Inspection of the topography shows that the proposed cooling tower sites are relatively flat with only minor piles requiring removal, as shown in Figures 3.19 and 3.20. This would limit the amount of earthwork required for site preparation.

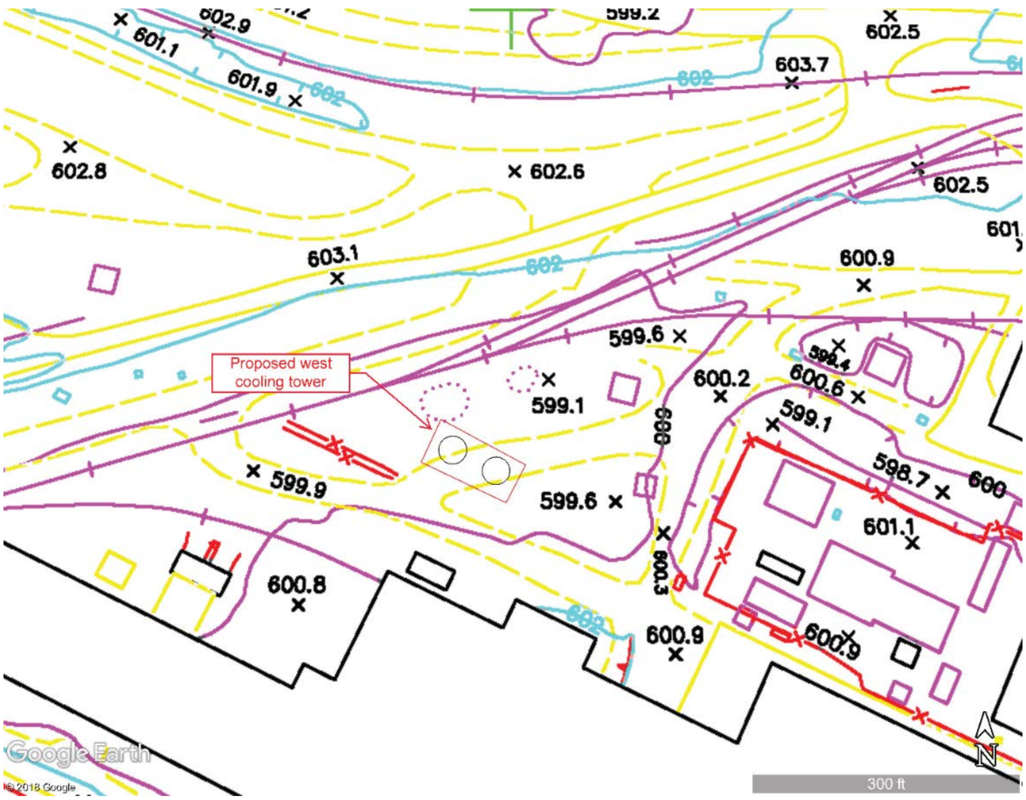


Figure 3.19: West Cooling Tower Site Topography (Reference 20)

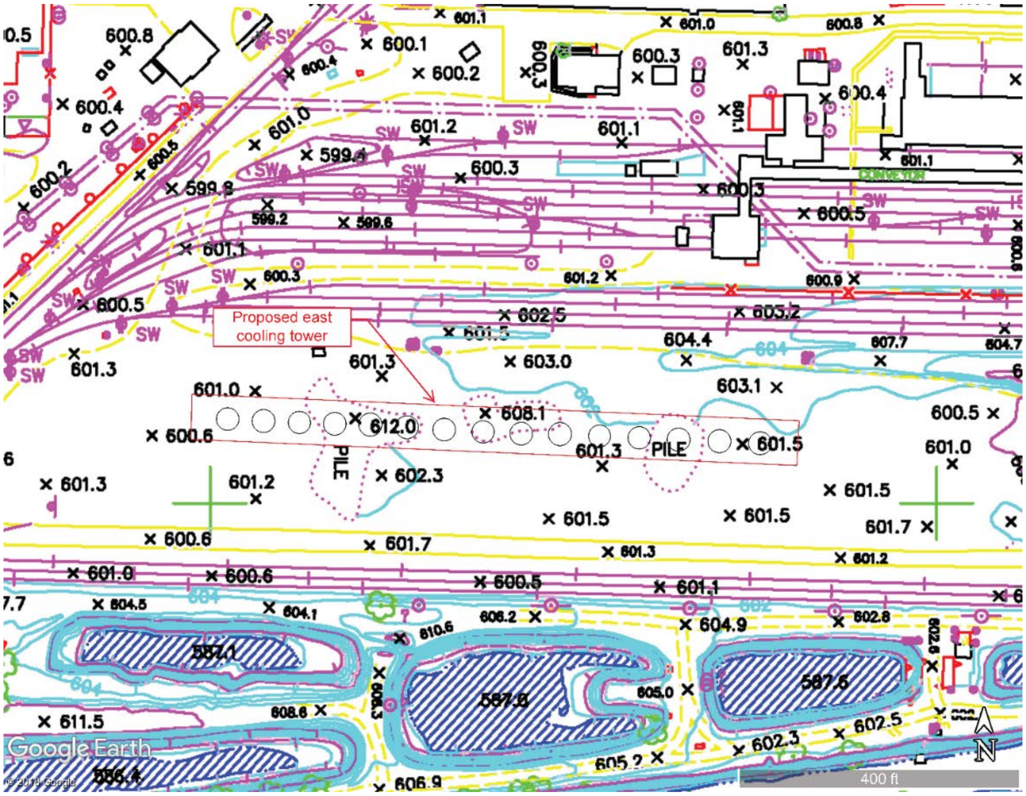


Figure 3.20: East Cooling Tower Site Topography (Reference 20)

3.16 Flood Elevation Requirements

The selected locations for tower location are located in an area of minimal flood hazard (References 21 and 22). Therefore, flooding is not a consideration in site selection or tower design.

3.17 Impacts to Surroundings

Cooling tower emissions can have negative impacts on surrounding vegetation and structures. As wind will direct the tower emissions and therefore determine the location of heaviest impact, it is desirable to locate the towers such that the downwind area is free of sensitive or costly components.

The structures surrounding the proposed cooling tower sites are not anticipated to require enhanced protection from the cooling tower emissions. Further, nearby cooling towers and stacks suggest that additional cooling tower plumes would not have an impact on surrounding structures. Drift impact on vegetation cannot be avoided by selecting a certain tower site and does not affect the siting selection. A detailed analysis of plume drift and impacts would be required during a detailed design.

3.18 Hydraulic Design Considerations

Makeup and Blowdown

Conversion of Gary Works to CCRS would require a complete hydraulic redesign and analysis of Gary Work's cooling and process water system. The existing once-through west and east cooling and process water systems at Gary Works withdraw 56 MGD and 400 MGD, respectively. In a CCRS, intake flow rate is required for makeup only. The makeup flow is required to offset water losses that occur by three primary mechanisms: evaporation, drift, and existing onsite consumption.

Evaporation is a necessary part of wet cooling tower operation as discussed in Section 3.5. The evaporation of water creates substantial cooling for the water that is left behind; however, it does result in a decrease in the volume of water in the CCRS. The evaporation rates of the west and east cooling towers are estimated as 1.63% and 1.59% of the cooling tower flow rates at design conditions, respectively. This translates to west and east cooling tower evaporation rates of 0.8 MGD and 5.6 MGD, respectively.

Cooling towers are designed to promote close contact between air and water within the fill to improve heat transfer, and ultimately, performance of the cooling tower. As a byproduct of this facet of cooling tower design, small water droplets become entrained in the air stream leaving the tower. Cooling tower drift is defined as the circulating water that is lost from a cooling tower as liquid droplets become entrained in the exhaust air stream. As discussed in Section 3.8, each cooling tower would contain drift eliminators to reduce drift to an assumed rate of 0.001% of the cooling tower flow rate. This translates to west and east cooling tower drift rates of 0.4 gpm and 2.5 gpm, respectively. More information on the impact of drift is provided in Section 3.23.

Finally, existing onsite consumption includes evaporative losses, production losses, disposal losses, and replacement losses, among other sources. The west and east cooling and process water system consumption flowrates are 5 MGD and 48 MGD, respectively.

Typical cooling tower systems also require makeup to replace losses to the blowdown system. Blowdown is water that is intentionally purged from the CCRS to control concentrations of salts and other impurities in the circulating water. Evaporation of water from the tower leaves behind impurities, which would become more and more concentrated over time unless a portion of the cooling tower system is purged and replaced with clean water. Selection of an appropriate blowdown rate is dependent upon the system's cycles of concentration. The cycles of concentration is a fundamental design parameter of a CCRS because it affects the intake (makeup) and discharge (blowdown) flow rates. Higher cycles of concentration lead to lower makeup rates and blowdown rates. For this reason, the CWA 316(b) rule states that makeup and blowdown rates should be minimized. However, the impurities contained within the CCRS become greater with increasing cycles of concentration. For a cycles of concentration of X, the concentration of an impurity would be X times greater than that of the makeup water source. This can have detrimental effects on facility equipment, including corrosion due to increased conductivity and scaling potential of the water.

Typical freshwater cooling tower systems feature cycles of concentrations equal to or greater than 2. This allows for relatively low makeup flowrates while maintaining an operable water quality. Equation 5 from Reference 18 is used to calculate the cycles of concentration:

$$C = \frac{E + D + B}{D + B}$$

Where:

B = Blowdown Rate [MGD]

C = Cycles of Concentration [unitless]

D = Drift Rate [MGD]

E = Evaporation Rate [MGD]

Based on the evaporation and drift rates discussed above and substituting the existing onsite consumption discussed above as a surrogate blowdown, the west and east cooling tower systems would operate with cycles of concentration of 1.17 and 1.12, respectively, at design conditions. Any additional blowdown would lower the cycles of concentration further. For this reason, no blowdown is required to control water quality.

To maintain inventory in the cooling tower systems (i.e., maintain level in the cooling tower basins), the makeup flow rate must be equal to the sum of all flows leaving the system. Therefore, the makeup water flow rate of the west and east cooling tower systems would be 5.8 MGD and 53.6 MGD, respectively, under typical operating conditions. This is approximately 10.4% and 13.4% of the current west and east intake flow rates, respectively.

The makeup flow rate of the west cooling tower system would occur naturally through the offshore intake conduit as a result of the flow balance on the volume of water drawn through the circulating pumps and the volume of water being returned to the intake pipe from the west cooling tower. The makeup flow rate of the east cooling tower system would be controlled via weir gates. The cooling tower would return water to the new holding lagoon where it would mix with the makeup flow from the ore loading slip. The weir gates connecting the holding lagoon to the ore loading slip would be configured to withdraw the appropriate makeup flow rate into the holding lagoon according to the level difference across the gates.

Blowdown of water from the CCRS would be required in periods of high wet bulb temperature to allow for higher withdrawal of cool water from Lake Michigan. To achieve this, each cooling tower basin would have auxiliary drains which would return water to either Lake Michigan or the Grand Calumet River. Four pipes, each sized to return the equivalent blowdown required to maintain inventory under one of the four discrete makeup options discussed in Section 3.10, would be installed with each CCRS. Flow to each pipe would be gravity fed and controlled via a motor operated gate valve.

Cooling and Process Water System Hydraulics

Head loss for the cooling and process water systems is estimated in the preliminary design and would be evaluated using advanced methods during the detailed design. The heated water leaving the systems would utilize the existing discharge piping. New piping would tie into the discharge piping at or near the existing outfalls and would deliver the water to the new booster pumping stations. The existing outfalls would be permanently closed following the tie-in.

Sizing of the new cooling tower supply piping and cooling tower booster pumps considered best practices to minimize the capital and operational costs, impacts on the existing systems, interferences with nearby equipment, and restrictions to constructability. Two booster pumps would be installed to service the west cooling tower system: one located in a new pump station north of the new cooling tower to provide head to the water returning from Outfall 037 and Outfall 039 and one located in a new booster pump station south of the new cooling tower to provide head to the water returning from Outfall 034. The north booster pump would have a design capacity of 32 MGD to handle the combined outfall flows. The south booster pump would have a design capacity of 19 MGD to handle the single outfall flow. The west cooling tower system flow would be pumped by four new booster pumps. All four pumps would be located in a new pump station adjacent to the new cooling tower. Each east cooling tower system booster pump would have a design capacity of 88.3 MGD to handle the combined outfall flows. Each booster pump would provide head to overcome the new losses and demands from the CCRS. The total dynamic head (TDH) required by the booster pumps is estimated as follows:

$$TDH = Static\ Head + Elevation\ Head + Friction\ Loss + Minor\ Loss$$

Based on the vendor information provided for each cooling tower, the west and east cooling tower water distribution systems would require 27.1 ft and 27.9 ft of static head, respectively, as measured from the top of the basin curb. The north and south booster pumps which would supply water to the west cooling tower would be required to overcome estimated elevation heads of 6 ft and 3 ft, respectively. Each of the east cooling tower booster pumps which would supply water to the east cooling tower would be required to overcome an estimated elevation head of 20 ft. Frictional losses through each piping run was estimated using the empirical Hazen-Williams Equation as follows:

$$Friction\ Loss = 0.2083 * \left(\frac{100 * Q}{C}\right)^{1.852} * \frac{1}{D_H^{4.8655}} * \frac{L}{100\ ft}$$

Where:

Q: Volumetric flow [gpm]

C: Material specific coefficient [unitless]

D_H: Inside hydraulic diameter [inch]

L: Length of piping run [ft]

Table 3-6 lists the west cooling tower system supply piping and the estimated friction losses through each length of pipe. Figure 3.21 shows the proposed new buried piping runs of the west cooling tower system.

Table 3-6: West Cooling Tower System Supply Piping

From	To	Inside Diameter	Length	Friction Loss
Outfall 034	South Booster Pump	54 inch	500 ft	0.2 ft
Outfall 037	North Booster Pump	18 inch	1,000 ft	2.3 ft
Outfall 039	North Booster Pump	66 inch	1,000 ft	0.3 ft

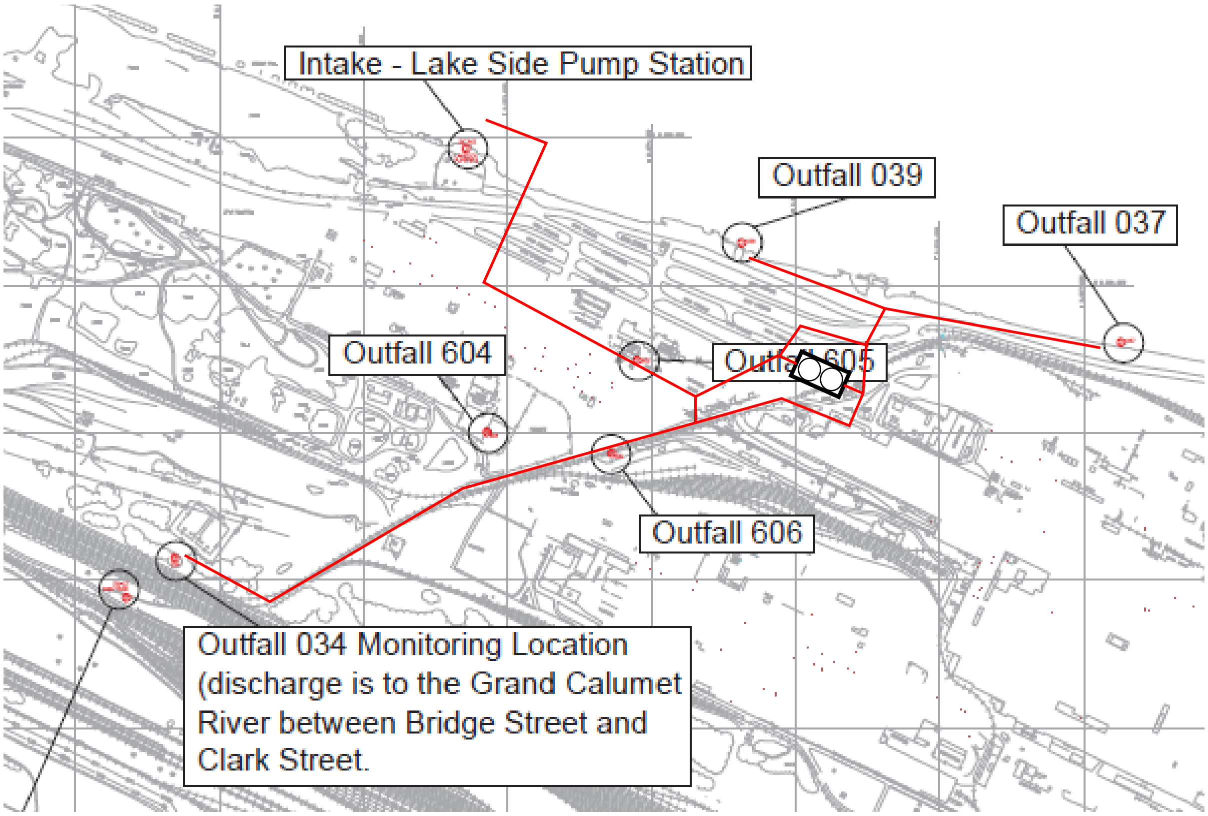


Figure 3.21: West Cooling Tower System Buried Piping General Arrangement

The east cooling tower system supply piping would deliver water to the new booster pump station through an increasing diameter pipe. The piping would follow the north shoreline of the Grand Calumet River with tie-ins at each outfall, where additional flow would be added to the piping. An additional run of large diameter pipe would redirect water from Outfall 035 along the west side of the ore loading slip to a tie-in point with the main piping run. Table 3-7 lists the west cooling tower system supply piping and the estimated friction losses through each length of pipe. Figure 3.22 shows the new buried piping runs of the west cooling tower system.

Table 3-7: East Cooling Tower System Supply Piping

From	To	Inside Diameter	Length	Friction Loss
Outfall 033	Outfall 032	10 inch	1,600 ft	0.7 ft
Outfall 032	Pump Station GW-11	10 inch	1,700 ft	0.8 ft
Outfall 030	Outfall 028	36 inch	1,500 ft	2.8 ft
Outfall 028	Outfall 026	36 inch	1,200 ft	4.1 ft
Outfall 026	Outfall 023	36 inch	700 ft	2.4 ft
Outfall 023	Outfall 021	36 inch	300 ft	1.0 ft
Outfall 021	Outfall 020	36 inch	200 ft	0.7 ft
Outfall 020	Outfall 019	60 inch	600 ft	1.3 ft
Outfall 019	Outfall 018	72 inch	700 ft	2.3 ft
Outfall 018	Outfall 015	84 inch	1,600 ft	4.5 ft
Outfall 035	Outfall 015	72 inch	6,600 ft	18.3 ft
Outfall 015	Booster Pump Station	96 inch	1,000 ft	3.8 ft

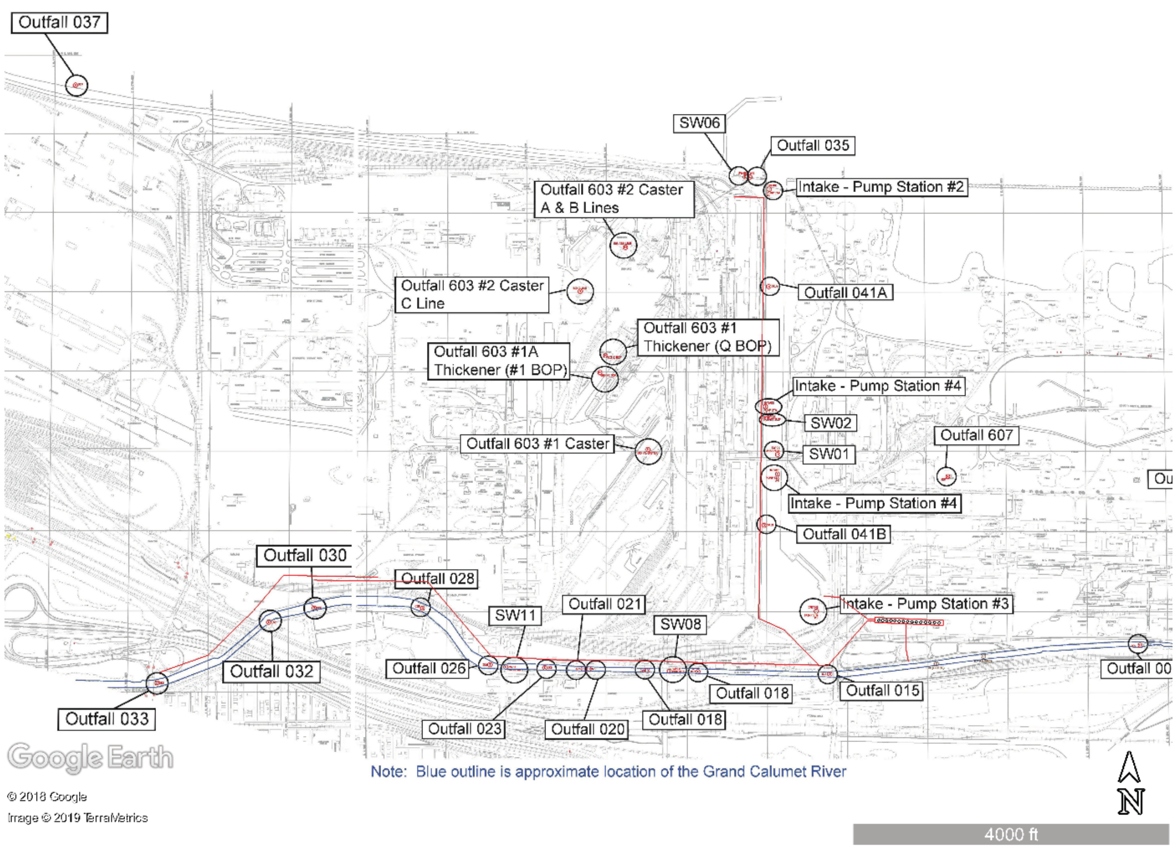


Figure 3.22: East Cooling Tower System Buried Piping General Arrangement

Minor head losses due to piping elbows, diameter changes, piping tees, and pipe seams were estimated at 2.0 ft for each west cooling booster pump and 3.5 ft for each east cooling tower booster. A summary breakdown of TDH is provided in Table 3-8.

Table 3-8: Cooling Tower Booster Pump Total Dynamic Head Requirements

Cooling Tower System Booster Pump	Static Head	Elevation Head	Friction Losses	Minor Losses	TDH
West Cooling Tower North Booster Pump	27.1 ft	6.0 ft	2.3 ft	2.0 ft	37.4 ft
West Cooling Tower South Booster Pump	27.1 ft	3.0 ft	0.2 ft	2.0 ft	32.3 ft
East Cooling Tower Booster Pump Cluster	27.9 ft	20.0 ft	22.9 ft	3.5 ft	74.3 ft

The TDH and respective estimated nameplate motor power rating are provided in Table 3-9. These values were estimated by subjecting the hydraulic horsepower of each pump to an assumed 85% efficiency and a 90% power factor.

Table 3-9: Cooling Tower Booster Pump Sizing

Cooling Tower System Booster Pump	Quantity	Flow Rate	TDH	Nameplate Power
West Cooling Tower North Booster Pump	1	32.0 MGD	37.4 ft	300 HP
West Cooling Tower South Booster Pump	1	19.0 MGD	32.3 ft	150 HP
East Cooling Tower Booster Pump Cluster	4	88.3 MGD	74.3 ft	1,500 HP

The water would be under suction throughout the cooling tower supply piping and would be pumped through the cooling tower booster pumps, into the cooling towers. Each cooling tower booster pump would discharge into a large diameter header pipe. The west cooling tower header pipe would have an inside diameter of 78 inches while the east cooling tower header pipe would have an inside diameter of 96 inches. The buried header pipe would travel along the side of the cooling tower with individual 30 inch riser pipes to deliver water to each cooling tower cell. The west cooling tower header pipe would be installed with cooling tower bypass lines with valves, which would be sized to allow the flow to bypass one or both of the cooling tower cells and discharge to the new blowdown outfall. This would allow for maintenance or emergency shutdown of the cooling tower cells. The large number of cells within the east cooling tower would allow for individual cells to be taken out of service while the flow rate attributed to that cell is redistributed through the remaining cells. For this reason, no bypass was designed for the east cooling tower.

After falling through the cooling tower fill and releasing heat through evaporation, the cooled water would collect in the cooling tower basin and drain through the return pipe or blowdown pipe, depending on the mode that the system is operating. Due to the location of the cooling towers, the return water can be gravity fed. This allows for a passive delivery of water to the pumping stations, lower the risk to the cooling and process water systems under a cooling tower system failure.

The west cooling tower basin would discharge into a 78 inch return header pipe with a discharge flow control valve to regulate flow. The header would contain a tie-in with the bypass lines. The 78 inch return header pipe would be routed across the site to the existing intake pipe, where a new tie-in would complete the closed-cycle. The returning cooled water would be delivered to Lakeside Pump Station, enter the circulating pumps and reused in the onsite cooling and process water systems. Given an estimated 3,500 ft of 78 inch return piping, the estimated head loss is approximately 12.8 ft when accounting for bends, elbows, and other various turns the piping may make to avoid interferences. Assuming a conservatively low cooling tower basin water level at an empty basin, the elevation difference between the ordinary high water level and cooling tower basin level would provide 17 ft of head. This would overcome the pipe losses with an amount of margin to allow for transients and losses due to pipe fouling. A similarly sized blowdown pipe would tee off of the return header pipe and discharge water to Lake Michigan through a new outfall when the cooling tower system is in a hybrid or once-through configuration.

The east cooling tower basin would discharge into four cooling tower discharge pipes, each with a discharge flow control valve to regulate flow. The discharge pipes would deliver water from the cooling tower basin to the new holding lagoon. Each discharge pipe would be sized to be gravity fed at the discrete flow rate configurations, as discussed in Section 3.10. The bounding of the four discharge pipes allows for an estimated 1.1 ft of margin to allow for transients and losses due to pipe fouling. Four similarly sized blowdown pipes would discharge from the east cooling tower basin to the Grand Calumet River through a new outfall when the cooling tower system is in a hybrid or once-through configuration.

From the holding lagoon, two drain pipes would deliver water to Pump Station #1, Pump Station #2, and Pump Station #4. The drain pipes are sized so that the delivery of water to each pump station would be gravity fed by the level difference between the holding lagoon and the circulating pump sumps. Six weir gates would be installed on the water facing wall of the holding lagoon. The weir gates would lower to allow withdrawal of makeup from the ore loading slip. Each weir gate would be constructed to be 6 ft wide and 6.5 ft tall, allowing for control of flowrates between the closed-cycle makeup and once-through withdrawal at all anticipated water levels. The capacity of the system of weir gates was calculated using the following empirical equation:

$$Q = C_d * W * \sqrt{g} * H^{3/2}$$

Where:

C_d: Sharp crested weir coefficient [unitless]

W: Width of weir gate [ft]

g: Acceleration due to gravity [ft^2/s]

H: Weir head [ft]

When all six weir gates would be fully open and the ore loading slip water level is at the low water datum, the holding lagoon would be able to passively draw approximately 449 MGD through the weir openings. This would exceed the system withdrawal when in the once-through configuration. The holding lagoon was designed to absorb a period of system lag when transitioning between configurations. When flow through the cooling tower discharge pipes would be decreased to allow for cool water from Lake Michigan to be withdrawn and mix with the warmer cooling tower discharge water, the holding lagoon would be drawn down while the weir gate is positioned to a level where water would be withdrawn at a steady rate. The size of the holding lagoon was selected based on other similar holding lagoons with flow rates of the same order of magnitude. The holding lagoon was sited north of the retired Pump Station #3. This site is unused, close to the east cooling tower, adjacent to the ore loading slip turning basin and accessible to site personnel.

Two large diameter return pipes would penetrate the floor of the holding lagoon. Water would drain from the holding lagoon to Pump Station #1, Pump Station #2, and Pump Station #4 through these pipes. The return pipes would extend above the floor of the holding lagoon to provide margin for siltation buildup within the holding lagoon. One return pipe would run from the holding lagoon to a tie-in point with the existing Pump Station #1 intake pipe. A smaller diameter pipe would tee off this return pipe which would tie-in to the existing Pump Station #4 intake pipe. The second return pipe would run from the holding lagoon to the intake forebay of Pump Station #2. The return pipes would follow the ore loading slip and would be buried below the dredge line. The details of the east cooling and process water system return pipes are provided in Table 3-10.

Table 3-10: East Cooling and Process Water System Return Pipes Details

From	To	Inside Diameter	Length	Friction Loss
Holding Lagoon	Junction Point	12 ft	2,100 ft	0.2 ft
Junction Point	Pump Station #1 Intake Pipe	11 ft	1,400 ft	0.2 ft
Junction Point	Pump Station #4 Intake Pipe	1.5 ft	500 ft	0.1 ft
Holding Lagoon	Pump Station #2 Intake Forebay	12 ft	5,400 ft	0.7 ft

The losses from the new return piping would not significantly affect margins to circulating pump net positive suction head or submergence requirements. For this reason, no additional booster pumps would be required for transportation of the water to the pump stations for to complete the closed-cycle.

The existing TWS installed in each pump station would be retained and operated as-is to filter and dispose of any entrained organisms or debris. Trash racks would be installed in the holding lagoon openings to preclude any large debris from entering the system and potentially causing significant damage.

<u>Piping</u>

The large diameter piping in the preliminary design would be constructed of prestressed concrete or high-density polyethylene. These materials are commonly available in large diameters and able to be installed using a variety of construction methods. In locations where buried interference would make trenched installation infeasible, alternative installation techniques, potentially including horizontal directional drilling, auger boring or cut/cover tunneling, would be used. This would allow for less intrusive installation of the large diameter pipe. The installation of the east cooling and process water loop return pipes would require extensive and deep trenching along the entire length of the ore loading slip and underwater pipelaying techniques. This may interfere with shipping schedules through the ore loading slip. Concrete thrust blocks would be implemented at all bends in the piping, and at all tie-in points with preexisting piping in order to resist thrust loads developed when the flow of water changes direction.

This preliminary design assumed that underground interferences would be avoided and would not impact the schedule or budget of the design. A complete ground penetrating radar (GPR) study of the proposed piping route would be required during detailed design to finalize the below ground piping routes. Furthermore, there is potential to find underground interferences during the construction that were not captured by a GPR investigation. The impact of finding unknown interferences during construction is not included in the construction cost estimate or schedule.

3.19 Civil Design Considerations

Cooling Tower Foundation

Cooling tower foundation is designed based on the assumption that soil has a minimum bearing capacity of 3,000 pounds per square foot and has frost depth of 55 inch maximum. Based on cooling tower vendor recommendation, the total catchment depth of basin is 4 ft. The base of the foundation will be 5 ft below grade to accommodate frost depth. The foundation will support columns which in turn elevate and support the cooling tower. The footprint of the foundation is provided in the cooling tower budgetary quotation. The foundation will be double reinforced (top and bottom) with No. 11 rebars spaced at 6 inches in both directions. Depth of the excavation required is estimated to be 5 ft.

Cooling Tower Columns

Based on vendor recommendation, columns shall be reinforced concrete with spacing of 6 ft along the length and 9 ft along the width. Each column will have 16 No. 11 rebars that serve as primary reinforcement and ties/stirrups consisting of No. 4 rebar spaced at 12 inches along the height of the column. These columns are designed as long-slender columns. The estimated height of each column is 20 feet.

Lagoon Retaining Wall

The catchment area requirement is estimated to be 82 ft by 82 ft. As the depth of the water body bed fluctuates based on dredging conditions, it is assumed to be 36 ft. The free board is calculated to be 4 ft considering the facility to be low risk. Therefore, total depth of the retaining structure is 40 ft (excluding depth of foundation).

Three sides of the holding lagoon would be supported by retaining walls and the fourth side would consist of partial walls and weir gates supported by columns. The retaining wall on each side of the holding lagoon is designed as a counterfort retaining wall with counterforts attached to stem and heel side of the retaining wall. Counterforts are two feet thick and are spaced every 10 ft. The horizontal reinforcement in the stem is No. 11 rebars spaced at 12 inches along the height and vertical reinforcement in the stem is No. 4 rebars spaced at 12 inches along the width. The main reinforcement in counterforts connecting stem and heel is 3 No. 11 rebar spaced at 8.5 inches and the temperature reinforcement in the counterfort is No. 4 rebar spaced at 12 inches.

Lagoon Foundation

The holding lagoon foundation would consist of a 6 foot deep mat with a foot print of 110 ft by 110 ft. The foundation would be double reinforced (top and bottom) with No. 11 rebars spaced at 6 inches in both directions. Depth of the excavation required is estimated to be 46 feet to accommodate the retaining wall and mat foundation.

The foundation will rest on drilled piers. Diameter of drilled piers is 3 ft, spaced 9 ft along center. The total number of drilled piers is expected to be 144. The drilled piers would have a bell at bottom with a diameter of 6 ft and a height of 3.5 ft. Each drilled pier is reinforced up to a depth of 50 ft with 6 No. 11 rebars and encased with ties/stirrups consisting of No.4 rebar. Stirrups would be spaced at 18 inches.

Lagoon Walls

The non-earth holding lagoon retaining walls are estimated to be 16 ft long and 40 ft tall with a thickness of 2 ft. These walls are reinforced with No. 11 rebars spaced at 12 inches in both directions and on both faces.

Lagoon Columns

The holding lagoon columns are estimated to be 2 square ft columns that are 40 feet tall. The total number of columns required to support sliding gates is estimated to be 7. Each column will have 16 No. 11 rebars that serve as primary reinforcement and ties/stirrups consisting of No. 4 rebar spaced at 12 inches along the height of the column. These columns are designed as long-slender columns. The estimated height of each column is 40 feet.

3.20 Electrical Design Considerations

A new electrical distribution system would be needed to service the new cooling towers and new pumping systems for the facility.

West Cooling Tower System

The west cooling tower system electrical distribution would be supported by two subsystems: the north side electrical distribution system and the south side electrical distribution system.

The north side electrical distribution system would consist of a prefabricated electrical substation building that would be powered from a utility supplied step down transformer. This transformer is estimated to be 1,500 kVA and step down from the utility voltage to 4,160 volts. The secondary connections from this transformer would be routed underground into a prefabricated building where it would be connected to a 4,160 volt switchgear with main vacuum breaker coupled to a medium voltage vacuum starter lineup with starters for a 300 HP supply pump and two 250 HP cooling tower fans.

Another utility supplied transformer, estimated to be 45 kVA would be provided to step the utility voltage down to 240/120 volts to be used to power a distribution panel located in the substation building for miscellaneous prefabricated building 120 volt loads as well as provide the power source for lighting and electrical heat tracing freeze protection circuits.

The prefabricated building would be supplied with smoke detection, lighting, heating and air conditioning. The estimated size of the building would be 50 ft by 25 ft by 10 ft. The building would be installed on concrete piers. Direct buried conduits would be installed to route the power and control feeders from this building to power the water supply pump and two cell cooling towers. In addition, lighting feeders would be routed in direct buried conduits for cooling tower lighting. A local programmable logic controller (PLC) would be located in the substation building in a separate area for controlling the pump and cooling tower fans.

Local lighting would be provided for the cooling towers as well as the water pump for servicing and maintenance. Lighting would be photocell controlled.

A new electrical grounding grid would be installed for the prefabricated switchgear building and cooling towers. All electrical equipment would be grounded via the newly installed grounding system. In addition, lightning protection would be provided for the prefabricated substation building as well as the cooling towers and water pump.

The water pump and cooling tower fans would be locally controlled.

1,000 feet of electric heat tracing cable is included to account for freeze protection of 20 lines of small-bore piping.

The 150 HP water supply pump on the south side would be powered from a separate utility supplied stepdown transformer 750 kVA that would step down the utility supply to 4,160 volts which would be used to power the new water supply pump. The secondary connections from this transformer would be routed underground into a prefabricated building where it would be connected to a 4,160 volt switchgear with main vacuum breaker coupled to a medium voltage vacuum starter for the 500 hp supply pump.

An additional utility supplied transformer, estimated to be 25 kVA would be provided to step the utility voltage down to 240/120 volts to be used to power a distribution panel in the prefabricated building for powering miscellaneous prefabricated building 120 volt loads as well as provide the power source for lighting and electrical heat tracing freeze protection circuits.

The south prefabricated building would be supplied with smoke detection, lighting, heating and air conditioning. The estimated size of the building would be 30 ft by 25 ft by 10 ft. The building would be installed on concrete piers. Direct buried conduits would be installed to route the power and control feeders from this building to power the water supply pump. A local PLC would be located in the substation building in a separate area for controlling the pump.

Local lighting would be provided for the water pump for servicing and maintenance. Lighting would be photocell controlled.

A new electrical grounding grid would be installed for the prefabricated switchgear building with grounding conductors run to ground the south water supply pump. All electrical equipment would be grounded via the newly installed grounding system. In addition, lightning protection would be provided for the water pump area. The water pump would be locally controlled.

East Cooling Tower System

A new main 13.8 kV electrical substation would be required. The main electrical substation would power each unit’s four 1,500 HP cooling tower water pumps and supply power to two 480 volt unit substations that would power the fifteen, 200 HP cooling tower fans.

The main electrical substation would include an oil filled, 20MVA 69kV/13.8 kV transformer connected to a 13.8 kV switchgear via a 2,000 amp bus duct.

The 13.8 kV switchgear and two 480 volt unit substations would be installed in a prefabricated substation building. The building would be heated and cooled and supplied with lighting and smoke detection systems. The 13.8 kV switchgear would power the two-cooling tower 480-volt unit substations and provide power to serve four new 1,500 HP cooling water pumps. The 480 volt feeder breakers from the 480 volt distribution panels would be used to feed building heating, ventilation and air condition (HVAC), lighting, and miscellaneous loads. The new substation would also have an area allocated for the cooling tower control system consisting of PLCs.

Each of the two cooling tower unit substations would consist of a 13.8 kV/480 volt, dry type 2,500 kVA unit substation transformer directly connected to a 480 volt motor control center equipped with starters and feeder breakers. The starters would serve the 200 HP cooling tower fans and the miscellaneous loads. Each motor control center would accommodate 7 or 8 fans, totaling 15 fans.

Each 1,500 HP motor would be provided with RTDs wired to motor protective relays to monitor winding and bearing temperatures. Protective relays would alarm on high temperature and would trip the pump on high-high temperatures.

The 1,500 HP motors and pumps would be monitored for vibrations as well. Alarms would be annunciating on high vibration and tripping of the motor would occur on high-high vibrations. Vibration monitoring would also be provided for the mechanical draft cooling tower fans. Should vibrations exceed a specific value the offending fan would be tripped, and an alarm would be annunciated.

An integrated redundant PLC based system would be used to control the cooling towers with PLC inputs and outputs I/O located in the substation. Individual inputs and outputs would be wired to control the fans and pumps (i.e. start-stop) and accept running status inputs, basin levels, water flow, alarms and fan and pump vibration signal inputs. The main substation building would also include a Human Machine Interface (HMI) unit to provide easy access to parameters and alarms for the cooling tower.

Lighting would be provided around each substation building. In addition, roadway lighting and cooling tower lighting would also be provided. All lighting would be LED type.

A new grounding system would be provided for the main and unit substations and cooling tower. The system would consist of buried conductors and ground rods to form grounding loops, which would be tied together to form an equal potential grid. This grid would also be tied into the main plant's grounding grid. Lightning protection of the substation and cooling towers would also be provided, which would consist of air terminals, down conductors, and ground rods.

The local utility supplier is responsible for providing and connecting the onsite feed to the new electrical substation described. No costs for onsite feed connection have been provided in the project estimates.

3.21 Water Treatment

In most cases where a cooling tower is installed in a closed-cycle arrangement, chemical treatment is required to prevent biological growth, scale formation, and corrosion. Water quality treatment needs in a closed-cycle cooling tower system depend on the incoming water quality, the cycles of concentration, and equipment limitations. Based on the stage of design, this section focuses on general expectations for water treatment needs in a potential closed-cycle cooling system and lays the foundation for work that would be completed during the detailed design phase.

Slime, a gelatinous organic growth, and algae, a green moss, may grow in the cooling tower or heat exchangers. This is commonly referred to as biological fouling or “bio-fouling.” The presence of bio-fouling can interfere with cooling efficiencies of heat exchangers and cooling towers. Chlorine and chlorine containing compounds are effective algaecides and slimicides, but excess chlorine can damage wood and other organic materials of construction and has limited application potential due to anticipated discharge limits. If used, chlorine should be added as intermittent (or shock) treatment only as frequently as needed to control the slime and algae, and free residual levels should be monitored. All existing treatment of bio-fouling would continue if Gary Works were retrofitted with closed-cycle cooling. It is possible that the frequency and quantity of treatments would need to be increased with the installation of the cooling towers.

Scale formation is the creation of a precipitated solid, which coats the surfaces in contact with the water. Scale formation is harmful in that it reduces heat transfer effectiveness of heat exchangers and cooling towers. In general, closed-cycle cooling tower precipitates are calcium carbonate crystals. Scaling occurs because specific dissolved solids have exceeded their solubility limits. To prevent the buildup of mineral scale, the dissolved solids and conductivity of the cooling and process water must be monitored so that appropriate water treatment can occur. The conductivity set point is the most critical factor in operating an evaporative cooling loop. The first step is determining the bulk water chemistry at the design cycles of concentration in the system. The concentration of solids and other contaminants would generally increase by a factor equal to the cycles of concentration each cooling tower system is operated at. Once the type of solids and their concentrations are known, an effective inhibitor selection can be made to ensure that deposition does not occur on vital heat exchanger surfaces in the process equipment. Scale formation is most commonly inhibited by using sequestering agents like hydroxyethylidene-1, 1-diphosphonic acid (HEDP), or other polymers such as polyacrylate (Reference 23). Sulfuric acid or a polyphosphate can also be used to control calcium carbonate scale and pH.

Corrosion is the process of metal dissolution, usually by oxidation, resulting in substantial material breakdown and premature degradation of system equipment. The oxidation process, in a very simplified form, is the movement of electrons from metal components into the water medium and subsequently to a corrosion product of substantially different form than the original base material. This process degrades the metal, reduces its strength, thickness, and in some cases creates pits or holes in the material. Corrosion must be guarded against to ensure the long-term integrity of the cooling system. The first step is determining the bulk water chemistry at the design cycles of concentration in the system. Once the system chemistry is known, the materials used to inhibit corrosion would be carefully chosen for compatibility with the environment and with other chemicals used in the water treatment system. Commonly used corrosion inhibitors or retardation products are tolytriazole or orthophosphates. Maintaining the system clear of biological growth and fouling is also critical in limiting corrosion (Reference 23).

The cooling tower vendor recommends maintaining the following water quality parameters in the cooling and process water system during cooling tower operation (Attachment 12):

Table 3-11: Recommended Cooling and Process Water Chemistry Operating Parameters

Parameter	Recommended Range
pH	6.5 – 9.0
TDS	0 – 5,000 ppm
TSS	0 – 50 ppm
Iron	0 – 3 ppm
Sulfides	0 – 1.5 ppm

Monitoring equipment would be required to measure the various water quality parameters above. Once the bulk water chemistry and the water treatment products are defined, the water quality parameters would be measured continuously. Automatic control systems are available that would respond to changes in water chemistry by automatically discharging the required treatment chemical into the cooling tower system. The automatic control system has remote monitoring capability via the installation of a fiber optic backbone link. Where fiber optic cables cross heavy haul paths/roadways they would be installed in rigid galvanized conduit.

3.22 Major Components

The following is a listing of major new equipment required for retrofitting Gary Works with CCRS:

Table 3-12: Listing of major equipment required for closed-cycle cooling

Component	Quantity	Notes
West cooling tower	2 cells	Counterflow non-plume-abated cooling tower
East cooling tower	15 cells	Counterflow non-plume-abated cooling tower
West fan and motor	2	7-blade, 250 hp, 480V, Fans and motors are included in the cost for the cooling tower
East fan and motor	15	8-blade, 200 hp, 480V, Fans and motors are included in the cost for the cooling tower
West cooling tower north booster pump	1	Flow: 32.0 MGD TDH: 37.4 ft-H_2O Nameplate power: 300 HP
West cooling tower south booster pump	1	Flow: 19.0 MGD TDH: 32.3 ft-H_2O Nameplate power: 150 HP
East cooling tower booster pump	4	Flow: 88.3 MGD TDH: 74.3 ft-H_2O Power: 1,500 HP
Water Quality Monitoring Station	2	Details regarding water treatment to be determined during detailed design
Cooling tower blowdown discharge control valve	1	Cast iron gate valve, 24 in
Cooling tower blowdown discharge control valve	1	Cast iron gate valve, 30 in
Cooling tower blowdown discharge control valve	3	Cast iron gate valve, 36 in
Cooling tower basin discharge control valve	1	Cast iron gate valve, 24 in
Cooling tower basin discharge control valve	1	Cast iron gate valve, 30 in
Cooling tower basin discharge control valve	3	Cast iron gate valve, 36 in

The following is a listing of major new structures required for retrofitting Gary Works with CCRS:

Table 3-13: Listing of major structures required for closed-cycle cooling

Component	Approximate Size	Notes
West cooling tower basin	Length: 16 ft Width: 62 ft Depth: 4 ft	Reinforced Concrete, 6000 psi
East cooling tower basin	Length: 812 ft Width: 65 ft Depth: 4 ft	Reinforced Concrete, 6000 psi
East cooling tower holding lagoon	Length: 82 ft Width: 82 ft Depth: 36 ft	Reinforced Concrete, 6000 psi
West cooling tower supply piping	Diameter: 1.5 ft Length: 1,000 ft	Welded high density polyethylene
West cooling tower supply piping	Diameter: 4.5 ft Length: 4,600 ft	Welded high density polyethylene
West cooling tower supply piping	Diameter: 5.5 ft Length: 2,600 ft	Welded high density polyethylene
East cooling tower supply piping	Diameter: 10 in Length: 3,300 ft	Prestressed concrete pipe
East cooling tower supply piping	Diameter: 3 ft Length: 3,900 ft	Prestressed concrete pipe
East cooling tower supply piping	Diameter: 5 ft Length: 600 ft	Prestressed concrete pipe
East cooling tower supply piping	Diameter: 6 ft Length: 8,000 ft	Prestressed concrete pipe
East cooling tower supply piping	Diameter: 7 ft Length: 1,600 ft	Prestressed concrete pipe
East cooling tower supply piping	Diameter: 8 in Length: 1,000 ft	Prestressed concrete pipe
West cooling tower drain piping	Diameter: 6.5 ft Length: 4,500 ft	Welded high density polyethylene
East cooling tower drain piping	Diameter: 2 ft Length: 1,210 ft	Prestressed concrete pipe
East cooling tower drain piping	Diameter: 3 ft Length: 1,210 ft	Prestressed concrete pipe
East cooling tower drain piping	Diameter: 2.5 ft Length: 1,210 ft	Prestressed concrete pipe
East cooling tower drain piping	Diameter: 4.5 ft Length: 1,210 ft	Prestressed concrete pipe
East cooling tower return piping	Diameter: 1.5 ft Length: 500 ft	Prestressed concrete pipe
East cooling tower return piping	Diameter: 11 ft Length: 1,400 ft	Prestressed concrete pipe
East cooling tower return piping	Diameter: 12 ft Length: 6,500 ft	Prestressed concrete pipe

3.23 Other Operational Impacts

The conversion of Gary Works to CCRS would impact the operation of Gary Works. The operation of two new cooling towers would impact the site in several ways, including how the facility starts up, and how it operates during freezing weather conditions. This section focuses on large operational impacts of converting Gary Works to CCRS.

Plume

Evaporative cooling towers produce large plumes of condensed water vapor due to the large amount of warm and saturated air leaving the top of the tower. This is especially prominent during cold or humid conditions, where the air cannot accept any more moisture. Due to the large number of plumes onsite and nearby, it was decided that plume abatement was not required to install, permit, and operate new cooling towers.

Potential risks and impacts due to the new cooling tower plumes include ground level fogging, icing, and local viewshed changes. If the plume is not significantly buoyant and descends to ground level, it could present a hazard to key transportation, including railway, barge, and motor vehicle. Ground level fogging due to cooling tower plume is an existing hazard at Gary Works. Construction of additional cooling towers may decrease visibility on the Gary Works site, onsite or nearby construction sites, and/or the local community to a hazardous level. Icing may occur on nearby surfaces, including the ground, buildings, equipment, roads, vehicles, and the cooling towers. This would occur due to the water within the moist air freezing upon contact with cold ambient conditions. The visuals of the surrounding area would be impacted by a large plume. This may be unfavorable to the local community.

Drift

Cooling towers are designed to promote close contact between air and water within the fill to improve heat transfer, and ultimately, performance of the cooling tower. As a byproduct of this facet of cooling tower design, small water droplets become entrained in the air stream leaving the tower. Cooling tower drift is defined as the circulating water that is lost from a cooling tower as liquid droplets become entrained in the exhaust air stream. Despite recent drift eliminator advancements, some drift would always occur. As noted before, the vendor has stated that a drift rate of 0.001% of the cooling tower flow rate should be expected.

Drift should not be confused with the very small water droplets that form when saturated water vapor leaves the top of the tower and condense out of the air due to a drop in temperature (i.e., the plume). The composition of the water that comprises drift is the same as that of the circulating water passing through the tower. This can become problematic based on the water quality characteristics.

Impacts associated with cooling tower drift contacting nearby equipment and the environment are typically limited to the region immediately surrounding the cooling tower. Large drift droplets settle out of the tower exhaust air stream and deposit near the tower. This process can lead to wetting, icing, salt deposition, and other related problems such as damage to equipment or to vegetation.

When siting a tower, the vulnerability of existing facilities in the vicinity of the cooling tower to corrosion from drift must be considered. Not only are the amount, direction, and distance of the drift from the cooling system important, but the concentration of entrained chemicals above the natural background level at the site is also important in assessing drift effects. An analysis of the potential environmental and system impacts that could occur due to drift deposition would be completed in detailed design.

Drift that leaves the top of the tower will reflect the same water chemistry as that of the cooling and process water system. Due to the processes which utilize the cooling and process water onsite, the drift would contain moderate to high levels of dissolved solids. When these small droplets are released into the air, evaporation occurs, leaving behind the solids that were once dissolved. This has the effect of introducing fine particulate matter into the atmosphere. Particles with a mean aerodynamic diameter of less than or equal to 10 microns or 2.5 microns are classified within the National Ambient Air Quality Standards (NAAQS) as PM10 or PM2.5, respectively.

Drift rates are a function of the quality of installation and state of repair of the drift eliminators and can be higher or lower depending upon installation-specific and site-specific circumstances. The drop size spectrum can change with different drift eliminator designs, as well as with the age and condition of the drift eliminators. Some fraction of the drift will fall to the ground or surrounding structures, and the dissolved material in those drops will not be released into the atmosphere. This would be expected to vary based on local geography, proximity of other structures, height of the tower, as well as typical wind velocities and directions.

In summary, operating a cooling tower using cooling and process water with a water chemistry which includes dissolved solids can lead to substantial air emissions in the form of fine particulate matter. There is an amount of uncertainty in the rate of expected air emissions that would result from the proposed cooling towers. The design, installation, and state of repair of the tower all play a significant role in the emissions rate, as well as the local environment immediately surrounding the tower.

3.24 Freezing Weather Operation

Due to the location of Gary Works in the Midwest United States, freezing weather operation was a design consideration for this preliminary design. The very nature of cooling tower design promotes maximum possible contact between air and water. While this provides high effectiveness in heat transfer, during freezing weather conditions it can create too much heat transfer, resulting in conditions that are conducive to ice formation within and outside of the tower. Therefore, a means for reducing the efficiency of the cooling tower during freezing conditions is required in the design of the tower systems and is required to be used when necessary or automatically controlled.

There are acceptable and unacceptable degrees of ice formation on an operating cooling tower. Some ice formation is inevitable in very low temperatures; however, bulk ice formation that imposes upon and restricts air flow into the tower is deemed unacceptable. Additionally, large blocks of ice accumulating on a cooling tower can present a safety hazard.

There are three primary effects that must be considered with regard to ice formation within and on a cooling tower during freezing weather conditions (Reference 18, Section 1.H):

- The potential for ice formation varies directly with the quantity of air flowing through the tower. Reducing air flow retards the formation of ice.
- Where air flow is uncontrolled, the potential for ice formation varies inversely with the heat load imposed on the tower. A reduced heat load decreases the incoming water temperature and increases the probability that unacceptable quantities of ice will form.
- The potential for ice varies inversely with the amount of water flowing over the fill. A reduced pumping rate increases the likelihood of unacceptable ice formation.

For mechanical draft towers in general, manipulation of air flow is a useful tool for elimination of ice formulation and accumulation, since ice formation generally increases with higher air flows. Reduction of air flow reduces the amount of cold air that comes into contact with the water, which reduces the potential for ice formation. Additionally, reduction in air flow velocity alters the path of the falling water, allowing it to impinge upon and melt ice that may have formed.

Fans can be individually cycled back and forth between speeds as necessary to achieve the required cooling but to also periodically alter the path of the warm water to prevent significant ice formation in any one place. VFDs are recommended to operate the fan motors at differing speeds to minimize the amount of ice formation on the cooling tower structure and eliminate temperature gradients between cells. Reductions in fan speeds would have the effect of altering the amount of ice formation but would also reduce the heat transfer that occurs, resulting in warmer basin water temperature. In extreme conditions, or during startup, fans could even be reversed. Fan reversal would allow the warm water to heat the air, which would then be blown outwards from the bottom of the tower to melt ice that has accumulated on the cooling tower structure. Fan reversal should be limited to a time period of no more than 1 – 2 minutes at half speed to preclude excessive icing of the fan.

Finally, there should be measures to prevent the basin from freezing, including flowrate control, heat tracing and temperature monitoring. As stated previously, reduced water flow rate over the fill can result in the increased potential for ice formation if air flow remains constant. In addition, the constant motion of the water, combined with the energy imparted to the fluid by passing through several very large pumps, would create a situation in which it would be very unlikely for the concentrated water to freeze. Heat tracing cable would be installed on equipment and components identified as being at risk for freezing. Finally, the cooling tower basin could be drained if the cooling tower were to be offline for an extended period of time.

In the event that the cooling and process water system would need to be shut down during freezing weather conditions, the potential exists for the basin to begin to freeze over time. For this reason, a drain line would be provided that discharges the contents of the cooling tower basin out through the new outfalls. Based on the total volume of the cooling and process water system, if the entire system were drained, a lengthier recharge time would be required due to the increased piping runs and CCRS. If it were essential to have the basin remain full during freezing weather operation while the cooling and process water system was not operating, immersion heaters could be installed. However, this is not included in the preliminary design.

3.25 Water Consumption

The current once-through cooling and process water system draws water in from Lake Michigan, uses it directly for cooling and process applications, and discharges it back to Lake Michigan or the Grand Calumet River at an elevated temperature. An amount of water is withdrawn and consumed on site. In a closed-cycle cooling system that uses cooling towers with wet cooling, some evaporation must occur for the cooling tower to provide the required cooling. Because the cooling and process water system uses high flow rates, this evaporation rate leads to "consumption" of water by the cooling system. The estimated evaporation rates for the west and east cooling towers are 577 gpm and 3,901 gpm, respectively. The estimated drift rates for the west and east cooling towers are 0.4 gpm and 2.5 gpm, respectively. Note that these rates are based on rule-of-thumb estimates and are not precise figures. Based on these flow rates, the CCRS would be expected to consume 2.4 billion gallons of water per year based on continuous operation.

3.26 Construction Schedule

A detailed schedule for procurement and installation of the CCRS retrofit preliminary design is presented in Attachment 2. Pre-construction detailed engineering design would begin over 2 years prior to all construction activities and would require approximately 1½ years for completion of final designs, supporting analysis, and equipment specification. Procurement of materials and equipment would begin following the completion of the detailed engineering design. The procurement and construction of the west cooling tower is estimated to require a total of 30 weeks after receipt of order (ARO). This estimate is comprised of 22 weeks of lead time for vendor engineering, preparation, production, and shipping and 8 weeks for receipt and construction. The procurement and construction of the east cooling tower is estimated to require a total of 41 weeks ARO. This estimate is comprised of 22 weeks of lead time for vendor engineering, preparation, production, and shipping and 19 weeks for receipt and construction. After construction begins, procurement of construction materials and equipment would be performed in parallel with construction activities. Construction permits and wastewater permits preparation and submittal activities would begin following the completion of an interim (50%) engineering design and would require approximately 1½ year for receipt of permits. It should be noted that scheduling can be highly variable, dependent on agency approvals and permitting. Construction activities would begin following the receipt of permits. It is estimated that operation of the CCRS would commence over 7 years after the project begins.

Most construction activities would be able to be completed without impact to the onsite systems. The most significant activity that would require specialized coordination is the tie-in of the cooling tower supply piping with the existing outfalls. Water would be diverted through the upstream outfalls while each tie-in is completed successively. In this manner, the construction would be completed while the facility is online and withdrawing cooling and process water at typical flow rates. This would be a significant technical challenge beyond typical operating procedures which would require extensive planning, coordination and safety precautions to be established in advance of the tie-in activities. A major outage of Gary Works would be required if continued discharge of cooling and process water would be disrupted. Further, loss of flow to internal processes may result in risk to onsite and local safety. It is assumed that diversion of the discharge using existing infrastructure would be available and forced outage time may not be required during construction, installation, testing, and tie-in of the CCRS design.

Note that severe weather conditions could result in schedule delays. The schedule includes the following construction activities:

- Mobilization
  - Construction site set up to include delivery of onsite trailers, construction equipment, and labor
  - Delivery and inspection of mechanical draft cooling tower and ancillary equipment
- General Site Modifications
  - Marking and protecting construction area
  - Preparing and clearing laydown area
  - Rerouting vehicle and pedestrian traffic around construction area
- Construction Activities
  - Installation of cooling tower basin and foundation
  - Installation of booster pump stations
  - Installation of substation
  - Excavation of access pits and sluice channels
  - Installation of piping
  - Excavation and installation of holding lagoon
  - Installation of mechanical draft cooling towers
  - Tie-in of new components and testing
- Demobilization
  - Clean up of construction site
  - Restoration of construction site

Some activities would be completed in parallel to ensure timely operation of the CCRS. Key activities include:

- Detailed engineering design, which would occur from project month 1 to project month 18,
- Permitting, which would occur from project month 10 to project month 27,
- Advanced procurement, which would occur from project month 19 to project month 30,

- Construction, which would occur from project month 28 to project month 78,
- Tie-in and testing, which would occur from project month 78 to project month 84, and,
- Demobilization, which would occur from project month 85 to project month 86.

It is not anticipated that the construction schedule would be impacted by limitations imposed on construction activities in or around Lake Michigan. The facility would not be required to operate at reduced capacity during any construction activities.

3.27 Construction Cost

The capital costs estimated for the CCRS evaluated for Gary Works include costs related to design, procurement, implementation, and startup activities. Estimates for significant and unique components or construction activities included in the design were derived from vendor quotations or past project experience. Estimates for construction labor, materials, and basic equipment for construction were derived from RSMeans for Gary, Indiana in the 2018 release. The cost estimates are located in Appendix 2 for detailed reference.

The total recommended construction budget to retrofit to CCRS is estimated to be $148,180,000 based upon 2018 U.S. Dollars. Based on industry standards and experience, the recommended consulting engineering budget for retrofit to CCRS is $29,640,000 based upon 2018 U.S. Dollars. Estimated permitting costs are $3,820,000 based upon 2018 U.S. Dollars. Table 3-14 lists the major cost categories for the retrofit to CCRS along with the respective costs for each category. The consulting engineering budget includes geotechnical studies/data collection, but does not include engineering field support during construction, or the cost of U.S. Steel's staff support of the project. This cost estimate is a Class 5 estimate per ASTM E2516-11, which is a high-level estimate meant to be used for feasibility and screening purposes.

Table 3-14: Breakdown of Cost by Major Category

Category	Cost
West Cooling Tower System	
Mobilization and Demobilization	$ 60,000
Earthwork	$ 1,260,000
Civil / Structural	$ 860,000
Rental Equipment	$ 90,000
Water Monitoring	$ 40,000
Mechanical Items	$ 1,720,000
Piping	$ 5,680,000
Pump Houses	$ 200,000
Electrical Items	$ 2,770,000
East Cooling Tower System	
Holding Lagoon	$ 3,950,000
Cooling Tower Basin	$ 4,130,000
MDCT Pump Station	$ 730,000
Substation Foundation	$ 10,000
Water Monitoring	$ 40,000
Mechanical Items	$ 12,960,000
Outfall Piping	$ 11,590,000
Cooling Tower Discharge Piping	$ 1,150,000
Cooling Tower Blowdown Piping	$ 750,000
Pump Station Return Piping	$ 28,400,000
Electrical Items	$ 4,800,000
Contingency / Adjustments	
Conceptual Design, Uncertainties, Etc.	$ 66,990,000
TOTAL:	$148,180,000

Appendix 2 shows an itemized cost estimate which includes tabulated subtotals for contingencies, permitting, and construction management costs. Sources for each cost estimate are also included within the table. Note that the cost for monitoring and testing the excavated soil has been included. The cost of remediating contaminated soils has been included. The items that affect the total cost the most for this option are:

- Mechanical Draft Cooling Towers
- Large Diameter Piping
- Underwater Pipelaying

Some information associated with the cost of implementation of the CCRS retrofit, such as field conditions, structural design requirements, material selection, and construction schedule demands have only been preliminarily determined. Certain costs are subject to unmodeled change based on external factors. These costs would require reassessment during the detailed design phase. These costs include but are not limited to:

- Drilling labor/equipment, which is dependent on location and depth of bedrock and subsurface conditions
- Mobilization and equipment transportation costs
- Specialized equipment and materials required

Finally, given the preliminary nature of this assessment, there are several items remaining to be investigated during detailed design that may affect the cost. These considerations include the following:

- A detailed water treatment study would be required to determine additives required to maintain acceptable water chemistry in the system while maintaining compliance with discharge permits.
- A Seasonal/Annual Cooling Tower Impacts (SACTI) model or similar analysis is recommended to predict impacts of plume/drift on nearby structures and equipment.
- A detailed sound/noise study is recommended to determine whether the noise from the cooling tower will meet local ordinances, or if further mitigation is required.
- The simplifying assumptions made in the thermal design of the tower, such as refinements of equipment cooling heat load, water quality, and fill degradation would need to be considered.
- A more detailed estimate of the evaporation rate would be required. A rule-of-thumb was used in this calculation. Changes to this rate affect the operating cycles of concentration.
- Final sizing of the booster pumps would require a more detailed hydraulic evaluation of the cooling and process water system.
- Local and remote control schemes for maintaining level, temperature, etc. in the cooling tower basin and pump pits would require more detailed evaluation.
- A detailed water chemistry analysis would be required, and a water treatment vendor would need to provide a recommended water treatment plan.

3.28 Operation Costs

U.S. Steel Corporation would incur additional operation costs if the CCRS retrofit of the existing were to be installed and operated at Gary Works. This section focuses on new operation costs relative to the existing configuration. Costs associated with operation of the new equipment would be incurred due to additional electrical power consumption.

The additional electrical power consumption that would be incurred with the implementation of the design described in this evaluation include power required to operate the cooling tower fan motors and the booster pump motors. Although the exact power consumption would be based on detailed design, final equipment selection, and the manner in which the equipment is operated, the values presented are estimated based on assumptions and estimates considered to be reasonable. All motors are assumed to have an 85% efficiency.

The two west cooling tower fan motors would have a nameplate power requirement of 250 HP, each. The fifteen east cooling tower fan motors would have a nameplate power requirement of 200 HP, each. The west cooling tower north and south booster pumps would have a nameplate power requirement of 300 HP and 150 HP, respectively. The four east cooling tower booster pumps would have a nameplate power requirement of 1,500 HP, each.

The additional electrical power would be purchased from a local electric distribution company. The loads should be assumed to be constant year-round. This cost is captured as a long-term recurring cost, which must be considered along with the construction costs of the conversion to CCRS. Table 3-15 summarizes the operational loads due to parasitic loads.

Table 3-15: Estimate of Average Operational Loads by Major Components

Component	Average Parasitic Load
West MDCT Fans	439 kW
East MDCT Fans	2,632 kW
West MDCT North Booster Pump	263 kW
West MDCT South Booster Pump	132 kW
East MDCT Booster Pump	5,264 kW
Total:	8,334 kW

3.29 Maintenance Costs

U.S. Steel Corporation would incur additional maintenance costs if the CCRS retrofit were to be installed and operated at Gary Works. This section focuses on new maintenance costs relative to the existing configuration. Costs associated with maintenance of the new equipment would be incurred due to additional labor required to operate and maintain the equipment.

The estimated number of labor-hours to operate and maintain each piece of equipment is based on previous experience and inspection schedules provided by equipment vendors. The cooling tower maintenance activities would include inspections of the fans, inspections of the cooling tower fill, lubrication of the gearbox and removal and repair of various subcomponents. The cooling tower water supply system maintenance activities would include inspection of the valves and nozzles and routine plumbing. The booster pumps maintenance activities would include verification that the pump is operating within design conditions, checks for leaks, as well as weekly inspection of pump lubricant and semi-annual inspections of the pump foundations and coupling alignment.

The United States Bureau of Labor Statistics provides periodic news releases on the average employer costs for employee compensation in the United States. The costs are composited from wages and salaries, and benefit costs which are incurred by the employer. The most recent such news release at the time of this assessment was released on March 19, 2019 and presents the costs as observed in December 2018. The labor associated with the additional required maintenance was assumed to be provided by unionized workforce. The news release reported a national average hourly cost to employer of $43.94 for unionized employees working in the manufacturing industry (Reference 13, Supplementary Table 2). Based on the 2018 weighted average city cost index for labor in Gary, IN from RSMeans, a construction costs estimator tool, this rate would be subject to a correction factor of 1.104 to account for geographic differences in local labor rates. An adjusted hourly cost of $48.51 was used to estimate the annualized operation cost for the installation of CCRS at Gary Works. This cost is presented in 2018 U.S. Dollars.

The additional labor cost is captured as a long-term recurring cost, which must be considered along with the construction costs of the conversion to CCRS.

The estimated number of labor-hours to operate and inspect each piece of equipment is multiplied by the average hourly cost to employer to determine the annualized cost to operate each piece of equipment in Table 3-16 below:

Table 3-16: Estimate of Annualized Maintenance Costs by Major Components in 2018 U.S. Dollars

Component	Labor-Hours	Cost
Mechanical Draft Cooling Towers	1,250	$ 60,600
Booster Pumps	2,750	$ 133,400
Valves	600	$ 29,100
Weir Gates	350	$ 17,000
Total:	4,950	$ 240,100

3.30 Recurring Capital Costs

In excess of the capital costs that would be spent during the design and construction activities, certain costs would be required at regular intervals. Due to fouling and corrosion, the fill in a cooling tower should be replaced once every 10 years for the lifespan of the cooling tower, starting at the tie-in date. Based on prior project experience and vendor information, it is estimated that replacement of fill in all 17 cooling tower cells with similar grade of film fill would cost approximately $5,320,000 based upon 2018 U.S. Dollars.

3.31 Construction Support Costs

Other costs which would be incurred prior to or during construction include the engineering costs and construction permitting costs. An engineering firm would perform analysis, design, drafting or revision of drawings, final equipment specification, construction support and verification through the detailed design, implementation and testing phases. Starting when the engineering design reaches a 30%-60% milestone and prior to certain key construction activities, construction and environmental permit applications would be drafted and submitted in compliance with federal, state and local rules and regulations. Permits which may be required include but are not limited to:

<u>National Environmental Protection Act</u>

If a project triggers a federal permit, compliance with the National Environmental Protection Act (NEPA) is required; including a review of impacts to, or loss of, marine habitat.

Application for an USACE permit would trigger the following State and Federal consultations:

- USFWS
- National Marine Fisheries Service (NMFS)
- Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA or MSA)
- IDEM
- Indiana Department of Natural Resources (IDNR)

These consultations are to ensure that the proposed project would not result in adverse impacts to state and federally listed species, federally listed marine species, essential fish habitat, and is consistent with the Nongame and Endangered Species Conservation Act.

While NWPs are generally not released to the public for comment, it is up to the discretion of the lead agency to determine if the proposed project has the potential to be controversial, and therefore; may open the project up to public comment.

National Pollutant Discharge Elimination System

Alterations to the facility intake structures and outfalls would likely require a modification to the current NPDES Permit number IN0000281. Submittal of updated conditions to the cooling and process water systems must be submitted upon application for reissuance of the permit and must address conditions to Phase II of the Final Rules of Section 316(b) of the CWA. The new outfalls would have associated reporting and monitoring requirements.

Indiana Department of Homeland Security

All modifications must be in compliance with the Indiana Department of Homeland Security (DHS), which enforces codes and regulations regarding public concern and quality of life, including building codes, fire safety codes, plumbing codes and local land use services.

Local Agencies

All planned modifications must comply with and submit to the following local agencies for formal review and approval:

- Lake County Plan Commission
- Indiana Volunteer Firefighters District 1
- Lake County Soil and Water Conservation District
- Lake County Board of Commissioners
- City of Gary

The estimates of construction support costs are based on standard percentage rates of construction budget subtotal. Table 3-17 summarizes the estimated construction support costs.

Table 3-17: Estimate of Construction Support Costs by Percentage of Construction Budget Subtotal and Capital Cost in 2018 U.S. Dollars

Fee	Percentage Rate	Cost
Engineering	20%	$ 29,640,000
Construction Permitting	2%	$ 2,960,000
Environmental Permitting	Estimate	$ 860,000

4 WATER REUSE / ALTERNATIVE SOURCES OF WATER

4.1 Introduction

This study of water reuse and alternative sources of cooling water has been completed in support of the permit renewal application of NPDES Permit No. IN0000281 which authorizes discharges to designated outfalls at U.S. Steel's Gary Works integrated steel mill facility. Per 40 CFR 122.21(r)(10)(i), submittal of applications for existing facilities with CWIS structures which cumulatively withdraw greater than 125 MGD must include an evaluation of the technical feasibility of certain entrainment control technologies, including water reuse or alternative sources of cooling water. The evaluation is required to include a description of potential sources of water which could be used for some or all of the cooling water needs at the facility. These sources may include, but are not limited to, process water, grey water and reclaimed water. Determination of feasibility includes the judgement of whether a source would provide an appropriate quantity and quality of water.

4.2 Option 1: Alternative Fresh Water Source

One proposed alternative is to find and use an alternative fresh water source. Gary Works has water needs that substantially exceed the volume of water available from alternate surface water sources. There is no alternative surface water source within a 10-mile radius that would be large enough to meet the necessary water requirements for Gary Works.

Other than Lake Michigan, the surface water hydrology in the region includes the Little Calumet, Grand Calumet, and Galena Rivers; Trail Creek; an extensive network of smaller tributary streams and ditches; several natural and man-made lakes; ponds and man-made excavations; and scattered remnants of marshes, swamps, and other wetlands (Reference 24). Of the region's rivers, Grand Calumet River is not suitable for providing a source of water for Gary Works facility due to water quality concerns. In addition, most of the flow in the river is the outfall flow from U.S. Steel and the neighboring industries (Reference 24). The water-supply potential of the Little Calumet River and its tributaries varies considerably across the Lake Michigan Region because of the geographic variation in flows. The water-supply potential from the Little Calumet River and its major tributaries is greater along the reaches in Porter County than in Lake County (Reference 24). In Porter County (about 15 mi. distance from Gary Works), the daily mean river flow recorded at the Porter gaging station is less than 325 MGD for 99% of the time (Reference 24, Fig. 5), which is not enough to meet the continuous daily water needs of Gary Works facility, currently provided by Lake Michigan at 456 MGD (Reference 1). Similarly, Trail Creek flow recorded at the

Porter gaging station is less than 325 MGD for 99% of the time (Reference 24, Fig. 5). Galena Rivers is about 35 miles from Gary Works facility. It would be impractical to run piping from this potential water source. Additionally, it is expected that the required water capacity will not be available from Galena River.

No lakes, reservoirs, or marshlands within a 10-mile radius are present that could provide the water capacity needed for Gary Works (See Figure 4.1). Wolf Lake (approx. 11 mi. from Gary Works facility), which is the largest lake other than Lake Michigan in the vicinity of Gary Works facility, has a total volume of less than one million gallons (MG) (385 acres surface area x maximum depth of 8') (Reference 25, Surface Hydrology Part 1, Table 10), which is not sufficient to meet the continuous daily water needs of 456 MGD for Gary Works.

4.3 Option 2: Groundwater, Municipal Water or Reclaimed Water

The use of either groundwater, municipal water, or reclaimed water as alternative water sources was evaluated. Gary Works has water needs that would substantially exceed the volume of water available from any of the alternate sources.

Unconsolidated and bedrock aquifer systems are present in the Lake County region, where Gary Works is located, to provide ground water. The unconsolidated aquifer systems include "Calumet" and "Lacustrine" aquifer systems. Domestic wells on these aquifer systems yield 0.0072 to 0.029 MGD and larger industrial facilities can yield 0.01 to 1.63 MGD (Reference 30). The bedrock aquifer systems include "Coldwater, Ellsworth and Antrim shale" and "Silurian and Devonian Carbonates" aquifer systems. Domestic wells on these aquifer systems yield 0.014 to 0.043 MGD and larger wells for industrial facilities can yield 0.13 to 2.45 MGD (Reference 30). Although higher yields may be available at some locations, there is low confidence that higher yields would be produced on a consistent daily basis for the needs of Gary Works. Based on the expected yields of the wells from the available aquifer systems ranging between 0.0072 to 2.45 MGD, an estimated 32,000 wells would be required to meet the 456 MGD water needed for Gary Works. The impact on the watershed and the land space required makes this option infeasible as the significant draw on the watershed would be detrimental to the water supply and surrounding ecosystem. The infrastructure required, constructing multiple wells and running associated piping and other equipment, along with a more involved permitting process with an uncertain outcome, makes this option impractical.

Municipal groundwater suppliers outside the 10-mile range are not considered. It would not be practical to run piping from potential sources outside the 10-mile range due to extensive construction and permitting requirements.

Potential sources of reclaimed water or industrial discharge water in the Lake County area (shown in Figure 4.2) include Gary Sanitary District Wastewater Treatment Plant (Approx. 2.7 mi. from Pump Station 2) with a 60 MGD rated capacity (Reference 26, pg. 59), City of Hobart Wastewater Treatment Plant (Approx. 7 mi. from Gary Works) with a 4.8 MGD capacity (pending approval of draft NPDES Permit (Reference 27, pg. 57), City of Hammond Wastewater Plant (Approx. 8.5 mi. from Pump Station #2) with a 4.1 MGD average capacity (Reference 28, pg. 4.4), and Schererville Wastewater Treatment Plant (Approx. 11.5 mi. from Pump Station #2) with a 8.75 MGD average design capacity (Reference 29, pg. 1). Expected permitted withdrawal would be a fractional amount of the design capacities of any site. An additional consideration is the potential that the reclaimed wastewater would have to undergo additional treatment prior to being used at Gary Works. Reclaimed wastewater would also need to be collected in a separate pond before being used at the Station. This would require additional space and piping.

Assuming all the above sources could provide their full permitted flows, the total flow would be about 78 MGD. However, it is unlikely the sites would consistently produce their full permitted discharge or design capacity on a daily basis and the actual amount of wastewater that could be used would be less than 78 MGD. The required flow at Gary Works facility is about 456 MGD, therefore approximately 83% (or more) of the flow would continue to be withdrawn from Lake Michigan. The 17% reduction in flow could also be achieved via a more cost effective method, such as variable speed pumps. Overall, to use groundwater, municipal water, or reclaimed water is infeasible due to the distance to the sources of water and permits required from multiple federal, state, and local governmental entities. There would also be a substantial potential that the wastewater would have to undergo treatment, and most importantly, the total capacity would not be enough to meet the water needs of Gary Works.

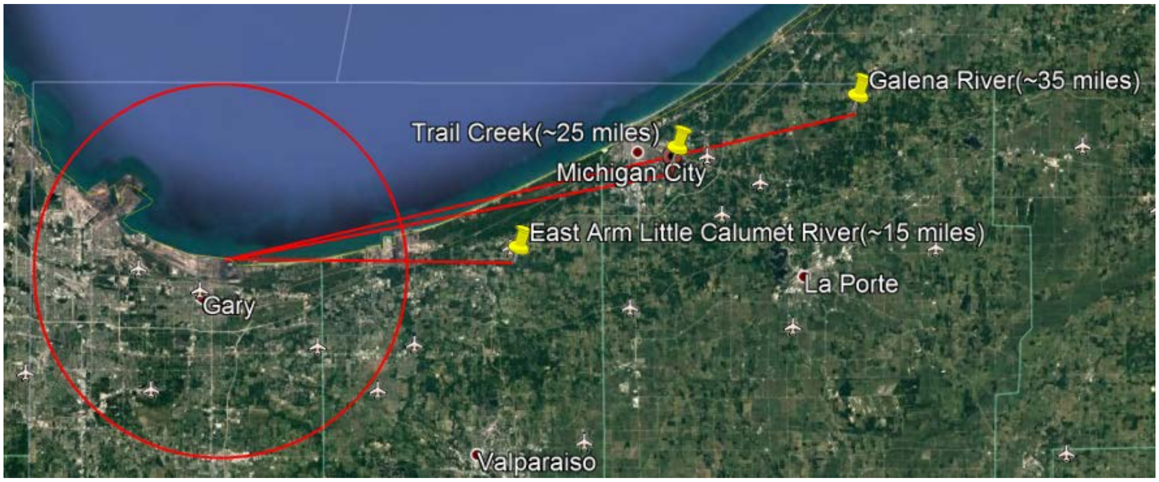


Figure 4.1: Distances to the Little Calumet River, Trail Creek and Galena River from Gary Works Facility

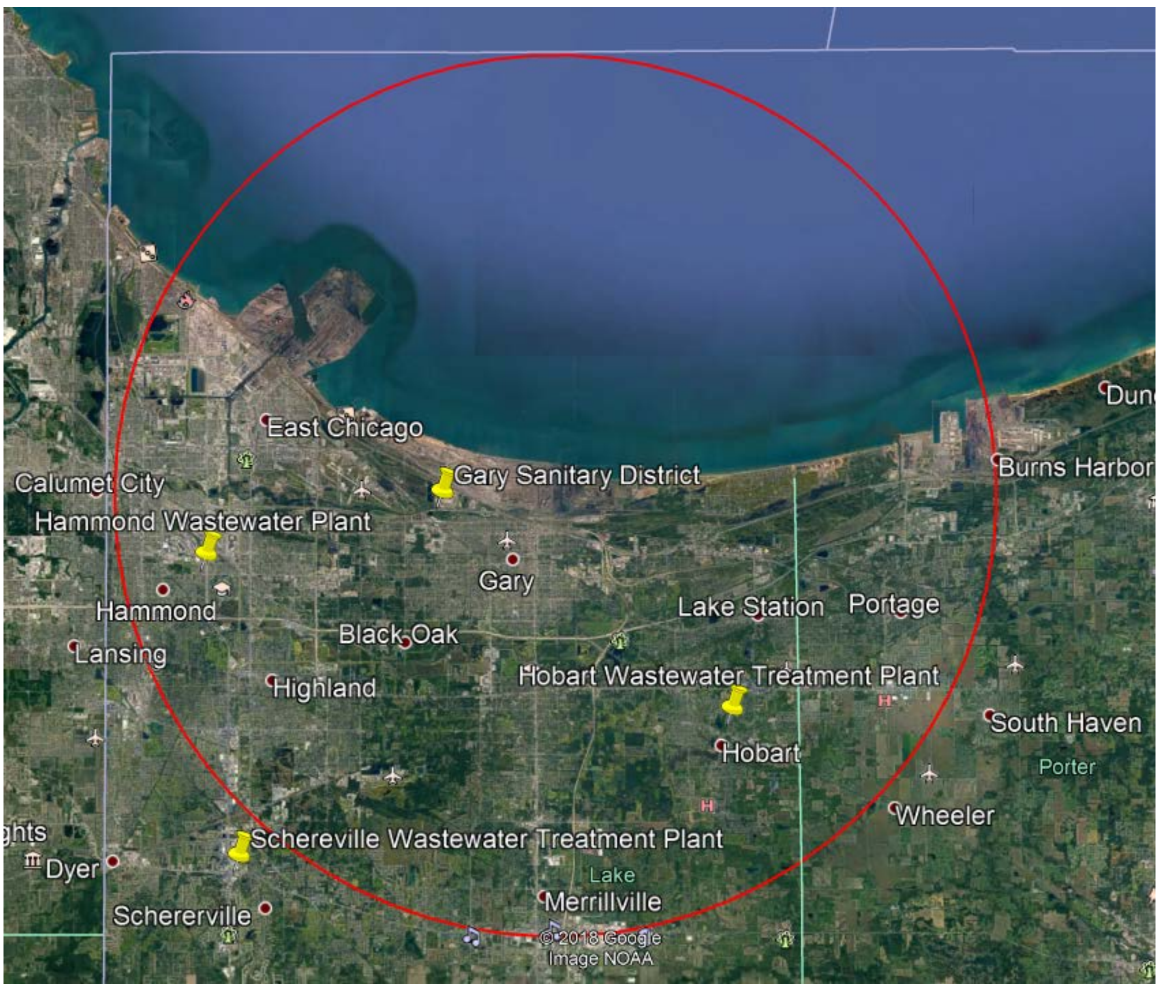


Figure 4.2: Location of Gary Works Facility with a 10-mile Radius Centered at Pump Station #2 to Show Nearby Facilities That Could Provide Discharge Water as an Alternative Water Source

4.4 Option 3: Reuse of Gary Work Facility's Waste Water:

Another option for water reclamation is the potential re-use of the waste water from onsite sources.

A majority of the waste water from Gary Works which is currently being discharged to the Grand Calumet River or to Lake Michigan is sourced from either non-contact cooling water or blowdown from the existing cooling towers which are used to cool down the recycled waste water from the hot strip mill, steel production and iron production processes. Re-use of the non-contact cooling water for additional cooling would not be feasible due to the high discharge temperature. The water would not be able to dissipate heat at the rate required by the facility's cooling water systems. From Figures 9 and 10 of Reference 1, the average flowrate of non-contact cooling water being discharged at the facility is 380 MGD. Re-use of the blowdown from the existing cooling towers for additional cooling would not be feasible due to the high effluent concentration. The blowdown has already been used within the cooling water system to the greatest potential deemed possible and is discharged to maintain the cycles of concentration within the existing closed cycle recirculation system. From Figures 9 and 10 of Reference 1, the average flowrate of blowdown from the existing cooling towers is approximately 10 MGD. These two sources of water comprise approximately 97% of the total water discharged to the Grand Calumet River or to Lake Michigan.

The remaining 15 MGD of water is considered to be waste water, which can potentially be re-used at Gary Works. This water is primarily the waste water from Hot Rolling, Sheet and Tin process or treated remediation ground water and treated land fill water. Additional chemical treatment and additional cooling via cooling ponds or hold-up tanks may be required for the re-use of this water to bring it to the operable limits of temperature and chemical concentration. In addition, installation of a substantial amount of new piping, pumps and associated components would be required. A significant system reconfiguration would also be required for the re-use of this water. The available waste water comprises approximately 3% of the total water discharged to the Grand Calumet River or to Lake Michigan. This amount of available re-use is considered negligible, particularly given the large costs required and, therefore, no comprehensive cost evaluation will be presented.

5 REFERENCES

1. United States Steel Corporation, Clean Water Act Section 316(b) Requirements for Cooling Water Intakes Structures Pursuant to 40 CFR part 122 and 125, April 2018.

2. Drawing No. 26693 Revision 3, Central Pumping Sta. Traveling Screens Gen'l Arrg't, June 1951.

3. Drawing No. 57563 Revision 2, Blast Furnace Ore Yard West Dock Wall Reinforcement Gen. Arrg't + Construction Details at No. 2 Intake, November 1941.

4. Drawing No. 113517 Revision 1, Pump Station No. 2 Installation of Traveling Screen Extension of Trough, Housing & Piping Arrangement & Details, April 1961.

5. Drawing No. 70887 Revision 5, Power & Fuel Division No. 4 Pump Station Pump Room & Screen Rm. Sections & Details, July 1996.

6. Drawing No. GS-47713 Revision 3, 84 Inch Hot Strip Mill Gary Sheet & Tin Works, Section "B-B" (South Side) Pumping Station – Mechanical, December 1967.

7. Drawing No. GS-47712 Revision 1, 84 Inch Hot Strip Mill Gary Sheet & Tin Works, Section "A-A" (North Side) Pumping Station – Mechanical, October 1965.

8. American Society of Civil Engineers, ASCE Committee on Hydraulic Structures, Design of Water Intake Structures for Fish Protection, 1982.

9. Milo C. Bell, U.S. Army Corps of Engineers, North Pacific Division, Fish Passage Development and Evaluation Program, Fisheries Handbook of Engineering Requirements and Biological Criteria, 1991.

10. Indiana State Board of Health, Bulletin S.E. 13: On-Site Water Supply and Wastewater Disposal for Public and Commercial Establishments, 1988.

11. Canadian Ice Service, Lake Ice Climatic Atlas Great Lakes 1981-2010, 2010.

12. Advanced Drainage Systems, Inc., Water Management Drainage Handbook, February 2017.

13. United States Department of Labor, Bureau of Labor Statistics, USDL-19-0449, Employer Costs for Employee Compensation – December 2018, March 2019.

14. Affidavit of Thomas C. Moorer, United States of America Nuclear Regulatory Commission Atomic Safety and Licensing Board. Accession No. ML072900666.

15. Environmental Protection Agency, EPA-821-R-14-002, Technical Development Document for the Final Section 316(b) Existing Facilities Rule.

16. Environmental Protection Agency, EPA-821-R-14-001, Economic Analysis for the Final Section 316(b) Existing Facilities Rule.

17. 2009 ASHRAE Fundamentals Handbook.

18. "Cooling Tower Fundamentals," 2nd edition. SPX Cooling Technologies.

19. National Oceanic and Atmospheric Association, National Centers for Environmental Information, Local Climatological Data, WBAN:04807.

20. U.S. Steel Gary SWPPP Topographical Map, Dickerson Aerial Surveys, Inc. Job Number 950313.

21. U.S. Department of Homeland Security, Federal Emergency Management Agency, Flood Insurance Rate Map Number 18089C0152E.

22. U.S. Department of Homeland Security, Federal Emergency Management Agency, Flood Insurance Rate Map Number 18089C0075E.

23. SPX Technical Report TR-012, "Cooling Tower Water Quality – Management, Treatment, and System Monitoring."

24. Water Resource Availability in The Lake Michigan Region, Indiana- Executive Summary by Indiana Department of Natural Resources. Accessed 5/8/2019, https://www.in.gov/dnr/water/files/lakemich_basinsums.pdf

25. DNR: Lake Michigan Region – IN.gov, https://www.in.gov/dnr/water/4109.htm

26. City of Gary, Indiana, "COMPREHENSIVE PLAN", State of the City Report- Draft, Prepared by BauerLatoza Studio, August 1, 2008. Accessed 5/8/2019, https://www.csu.edu/cerc/researchreports/documents/GaryIndianaComprehensivePlanDraft2008.pdf

27. Draft NPDES Permit No. IN0061344, City of Hobart Wastewater Treatment Plant, Lake County, dated April 10, 2019. Accessed 5/8/2019, https://www.in.gov/idem/files/notice_20190510_npdes_in0061344.pdf

28. Hammond Comprehensive Master Plan, City of Hammond, June 1, 2011. Accessed 5/8/2019, http://www.hammond.org/wp-content/uploads/2013/01/masterplan.pdf

29. Town of Schererville, Wastewater Department Bulletin. Accessed 5/8/2019, https://www.schererville.org/town-government/wastewater/

30. Unconsolidated and Bedrock Aquifer Systems of Lake County, Indiana (1990, 1994). Accessed 5/8/2019, http://www.state.in.us/dnr/water/5845.htm

ATTACHMENT 1: FINE MESH TRAVELING WATER SCREEN PRELIMINARY DESIGN SCHEDULE

U.S. STEEL – GARY WORKS

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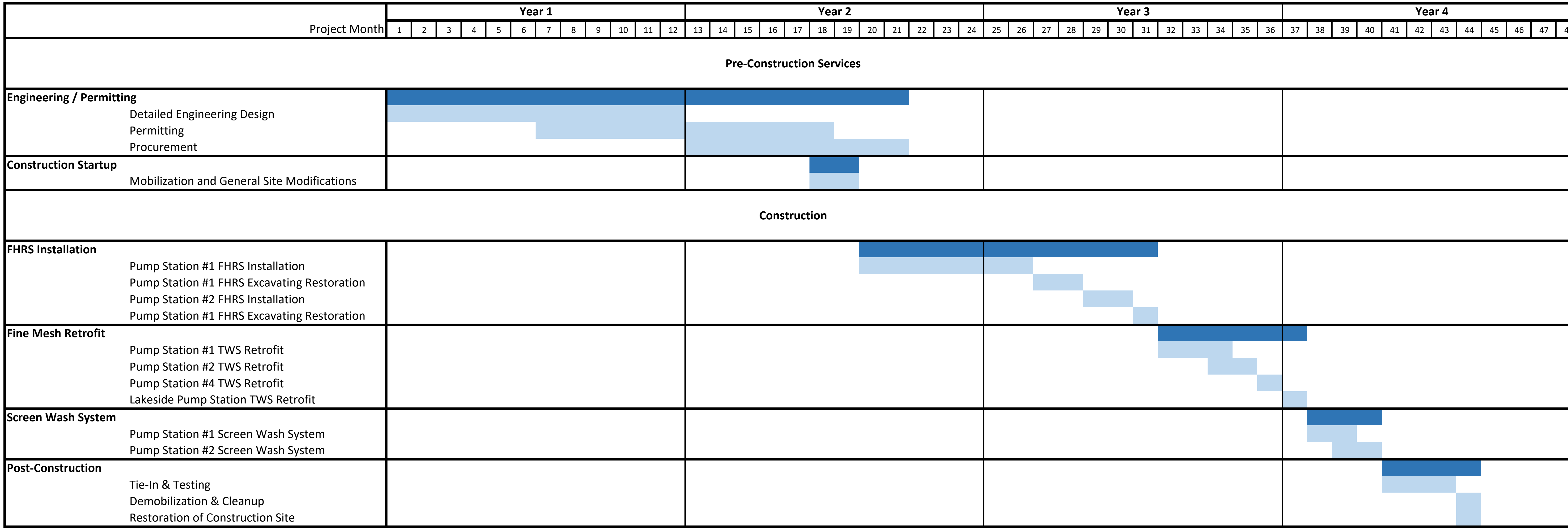
DRAFT FOR FINAL REVIEW

Fine Mesh Traveling Water Screen Preliminary Design - Schedule



Note 1: Severe weather conditions could result in schedule delays

ATTACHMENT 2: MECHANICAL DRAFT COOLING TOWER CLOSED-CYCLE RECIRCULATING SYSTEM PRELIMINARY DESIGN SCHEDULE

U.S. STEEL – GARY WORKS

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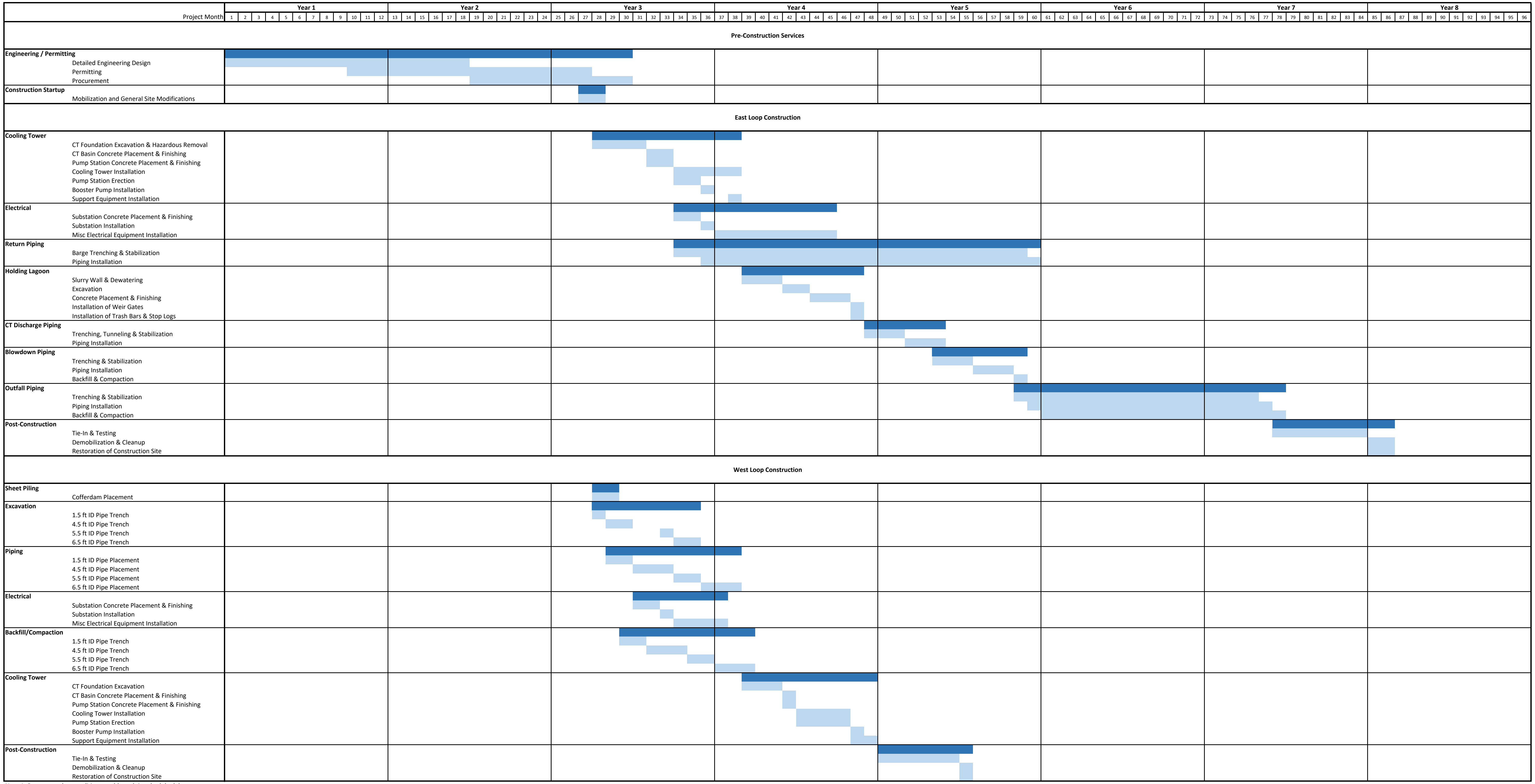
Mechanical Draft Cooling Tower Closed-Cycle Recirculating System Preliminary Design - Schedule



Note 1: Severe weather conditions could result in schedule delays

ATTACHMENT 3: FINE MESH TRAVELING WATER SCREEN PRELIMINARY DESIGN BUDGET

U.S. STEEL – GARY WORKS

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Fine Mesh Traveling Water Screen Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Pump Station #1 Screen Wash						
Screen Wash Pumps	National Pump Company VTP J12XHC-2 , 32 ft sump depth, 2,500 GPM at 86.8 ft TDH, 75 HP, 1800 RPM	2	Ea	$ 41,592.00	$ 83,184	Vendor Quotation
Screen Wash Pump Support	Installation on equipment pad	2	Ea	$ 5,000.00	$ 10,000	Prior project experience
Header Piping, 12" ID	Spec A-53 steel, welded, 12" pipe size, schedule 40	120	LF	$ 205.43	$ 24,652	RSMeans Line Number 221113442160 (Gary, IN) - Release Year 2018
Header Piping, 10" ID	Spec A-53 steel, welded, 10" pipe size, schedule 40	20	LF	$ 168.41	$ 3,368	RSMeans Line Number 221113442150 (Gary, IN) - Release Year 2018
Discharge Piping, 10" ID	Spec A-53 steel, welded, 10" pipe size, schedule 40	120	LF	$ 168.41	$ 20,209	RSMeans Line Number 221113442150 (Gary, IN) - Release Year 2018
Screen #1 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #1A Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #2 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #3 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #4 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #5 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #6 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #7 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #8 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #9 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #12 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #13 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	16	LF	$ 49.29	$ 789	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Elbow, 12" ID	Carbon steel, 90°, butt weld, 12" pipe size, standard weight	5	Ea	$ 1,337.49	$ 6,687	RSMeans Line Number 221113473170 (Gary, IN) - Release Year 2018
Elbow, 10" ID	Carbon steel, 90°, butt weld, 10" pipe size, standard weight	8	Ea	$ 1,006.05	$ 8,048	RSMeans Line Number 221113473160 (Gary, IN) - Release Year 2018
Elbow, 4" ID	Carbon steel, 90°, butt weld, 4" pipe size, standard weight	24	Ea	$ 278.54	$ 6,685	RSMeans Line Number 221113473130 (Gary, IN) - Release Year 2018
Tee, 12" ID	Carbon steel, straight, 12" pipe size, standard weight	1	Ea	$ 2,158.64	$ 2,159	RSMeans Line Number 221113473480 (Gary, IN) - Release Year 2018
Tee, 12" to 10" ID	Carbon steel, reducing on outlet, 12" x 10" pipe size, standard weight	12	Ea	$ 2,458.64	$ 29,504	RSMeans Line Number 221113474609 (Gary, IN) - Release Year 2018
Reducer, 12" ID to 10" ID	Carbon steel, concentric reducer, 12" x 10" pipe size, standard weight	2	Ea	$ 869.05	$ 1,738	RSMeans Line Number 221113474627 (Gary, IN) - Release Year 2018
Reducer, 10" ID to 8" ID	Carbon steel, concentric reducer, 10" x 8" pipe size, standard weight	12	Ea	$ 692.41	$ 8,309	RSMeans Line Number 221113474626 (Gary, IN) - Release Year 2018
Reducer, 8" ID to 6" ID	Carbon steel, concentric reducer, 8" x 6" pipe size, standard weight	12	Ea	$ 479.75	$ 5,757	RSMeans Line Number 221113474625 (Gary, IN) - Release Year 2018
Reducer, 6" ID to 4" ID	Carbon steel, concentric reducer, 6" x 4" pipe size, standard weight	12	Ea	$ 389.64	$ 4,676	RSMeans Line Number 221113474624 (Gary, IN) - Release Year 2018
Check Valve, 10" ID	Iron body, flanged, swing check valve, 125 lb, 10" pipe size	2	Ea	$ 4,633.64	$ 9,267	RSMeans Line Number 230523306090 (Gary, IN) - Release Year 2018
Check Valve, 4" ID	Iron body, flanged, swing check valve, 125 lb, 4" pipe size	12	Ea	$ 1,119.85	$ 13,438	RSMeans Line Number 230523306060 (Gary, IN) - Release Year 2018
Globe Valve, 10" ID	Iron body, flanged, OS&Y globe valve, 125 lb, 10" pipe size	1	Ea	$ 10,483.64	$ 10,484	RSMeans Line Number 230523304612 (Gary, IN) - Release Year 2018
Globe Valve, 4" ID	Iron body, flanged, OS&Y globe valve, 125 lb, 4" pipe size	12	Ea	$ 2,124.85	$ 25,498	RSMeans Line Number 230523304580 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 283,127**	
Pump Station #2 Screen Wash						
Screen Wash Pumps	National Pump Company VTP J12XHC-2 , 32 ft sump depth, 2,500 GPM at 86.8 ft TDH, 75 HP, 1800 RPM	2	Ea	$ 41,592.00	$ 83,184	Vendor Quotation
Screen Wash Pump Support	Installation on equipment pad	2	Ea	$ 5,000.00	$ 10,000	Prior project experience
Header Piping, 12" ID	Spec A-53 steel, welded, 12" pipe size, schedule 40	94	LF	$ 205.43	$ 19,310	RSMeans Line Number 221113442160 (Gary, IN) - Release Year 2018
Discharge Piping, 10" ID	Spec A-53 steel, welded, 10" pipe size, schedule 40	100	LF	$ 168.41	$ 16,841	RSMeans Line Number 221113442150 (Gary, IN) - Release Year 2018
Screen #2 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	20	LF	$ 49.29	$ 986	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #3 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	20	LF	$ 49.29	$ 986	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #4 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	20	LF	$ 49.29	$ 986	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #5 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	20	LF	$ 49.29	$ 986	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #6 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	20	LF	$ 49.29	$ 986	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Screen #7 Spray Header	Spec A-53 steel, welded, 4" pipe size, schedule 40	20	LF	$ 49.29	$ 986	RSMeans Line Number 221113442110 (Gary, IN) - Release Year 2018
Elbow, 12" ID	Carbon steel, 90°, butt weld, 12" pipe size, standard weight	5	Ea	$ 1,337.49	$ 6,687	RSMeans Line Number 221113473170 (Gary, IN) - Release Year 2018
Elbow, 10" ID	Carbon steel, 90°, butt weld, 10" pipe size, standard weight	8	Ea	$ 1,006.05	$ 8,048	RSMeans Line Number 221113473160 (Gary, IN) - Release Year 2018
Elbow, 4" ID	Carbon steel, 90°, butt weld, 4" pipe size, standard weight	12	Ea	$ 278.54	$ 3,342	RSMeans Line Number 221113473130 (Gary, IN) - Release Year 2018
Tee, 12" ID	Carbon steel, straight, 12" pipe size, standard weight	1	Ea	$ 2,158.64	$ 2,159	RSMeans Line Number 221113473480 (Gary, IN) - Release Year 2018
Tee, 12" to 10" ID	Carbon steel, reducing on outlet, 12" x 10" pipe size, standard weight	6	Ea	$ 2,458.64	$ 14,752	RSMeans Line Number 221113474609 (Gary, IN) - Release Year 2018
Reducer, 12" ID to 10" ID	Carbon steel, concentric reducer, 12" x 10" pipe size, standard weight	2	Ea	$ 869.05	$ 1,738	RSMeans Line Number 221113474627 (Gary, IN) - Release Year 2018

Fine Mesh Traveling Water Screen Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Reducer, 10" ID to 8" ID	Carbon steel, concentric reducer, 10" x 8" pipe size, standard weight	6	Ea	$ 692.41	$ 4,154	RSMeans Line Number 221113474626 (Gary, IN) - Release Year 2018
Reducer, 8" ID to 6" ID	Carbon steel, concentric reducer, 8" x 6" pipe size, standard weight	6	Ea	$ 479.75	$ 2,879	RSMeans Line Number 221113474625 (Gary, IN) - Release Year 2018
Reducer, 6" ID to 4" ID	Carbon steel, concentric reducer, 6" x 4" pipe size, standard weight	6	Ea	$ 389.64	$ 2,338	RSMeans Line Number 221113474624 (Gary, IN) - Release Year 2018
Check Valve, 10" ID	Iron body, flanged, swing check valve, 125 lb, 10" pipe size	2	Ea	$ 4,633.64	$ 9,267	RSMeans Line Number 230523306090 (Gary, IN) - Release Year 2018
Check Valve, 4" ID	Iron body, flanged, swing check valve, 125 lb, 4" pipe size	6	Ea	$ 1,119.85	$ 6,719	RSMeans Line Number 230523306060 (Gary, IN) - Release Year 2018
Globe Valve, 12" ID	Iron body, flanged, OS&Y globe valve, 125 lb, 12" pipe size	1	Ea	$ 12,753.19	$ 12,753	RSMeans Line Number 230523304614 (Gary, IN) - Release Year 2018
Globe Valve, 4" ID	Iron body, flanged, OS&Y globe valve, 125 lb, 4" pipe size	6	Ea	$ 2,124.85	$ 12,749	RSMeans Line Number 230523304580 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 222,837**	

Pump Station #1 Fish Return Trough						
Common trough	Fiber reinforced plastic (FRP), 24" wide x 33" deep, flanged, material only	200	LF	$ 212.69	$ 42,538	Prior project experience
Trough supports	W8 x 31 x 1 ft, A992 structural steel beams, 14 ft maximum spans	83	LF	$ 58.83	$ 4,866	RSMeans Line Number 051223750500 (Gary, IN) - Release Year 2018
Trough installation labor	Crew Q-6: 2 steamfitters, 1 steamfitter apprentice	15	Days	$ 1,748.29	$ 26,224	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Burried Trough Pipe	High density polyethylene plastic (HDPE), 30" diameter, DR 11, welded, excludes hangers, trenching, backfill hoising or digging equipment	5405	LF	$ 191.30	$ 1,033,977	Interpolated from RSMeans Line Numbers 221113780090 through 221113780162 (Gary, IN) - Release Year 2018
Access/sluice Pit Excavation	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	256	BCY	$ 8.12	$ 2,079	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
Burried Trough Pipe Excavation	6 to 10 ft deep, hydro excavation, w/trench box, common earth	129720	BCY	$ 5.32	$ 690,110	RSMeans Line Number 312316131370 (Gary, IN) - Release Year 2018
Dewatering	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	210	Days	$ 248.97	$ 52,284	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
Engineered Fill	Backfill, structural, from existing stockpile, no compaction, common earth	20269	LCY	$ 3.02	$ 61,212	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
Excavation Backfill	Dozer backfill, bulk, up to 300' haul, no compaction	121613	LCY	$ 1.85	$ 224,983	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
Compaction	Compacting backfill, 6" to 12" lifts, vibrating roller	97290	ECY	$ 3.33	$ 323,976	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
Selective demolition	Cutout, concrete, walls, bar reinforced, 6-12 CF	12	CF	$ 31.23	$ 377	RSMeans Line Number 024119161450 (Gary, IN) - Release Year 2018
Earth hauling	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	40538	LCY	$ 7.64	$ 309,707	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
Spoil handling	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	1680	Hr	$ 159.03	$ 267,170	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
Spoil disposal	Hazardous waste dumpsite disposal charge	6293	Ton	$ 312.93	$ 1,969,408	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 5,008,910**	

Pump Station #2 Fish Return Trough						
Common trough	Fiber reinforced plastic (FRP), 24" wide x 33" deep, flanged, material only	130	LF	$ 212.69	$ 27,649	Prior project experience
Trough supports	W8 x 31 x 1 ft, A992 structural steel beams, 14 ft maximum spans	28	LF	$ 58.83	$ 1,639	RSMeans Line Number 051223750500 (Gary, IN) - Release Year 2018
Trough installation labor	Crew Q-6: 2 steamfitters, 1 steamfitter apprentice	10	Days	$ 1,748.29	$ 17,483	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Burried Trough Pipe	High density polyethylene plastic (HDPE), 24" diameter, DR 11, welded, excludes hangers, trenching, backfill hoising or digging equipment	1380	LF	$ 119.00	$ 164,220	RSMeans Line Number 221113780146 (Gary, IN) - Release Year 2018
Access/sluice Pit Excavation	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
Burried Trough Pipe Excavation	6 to 10 ft deep, hydro excavation, w/trench box, common earth	33120	BCY	$ 5.32	$ 176,198	RSMeans Line Number 312316131370 (Gary, IN) - Release Year 2018
Dewatering	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	60	Days	$ 248.97	$ 14,938	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
Engineered Fill	Backfill, structural, from existing stockpile, no compaction, common earth	5175	LCY	$ 3.02	$ 15,629	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
Excavation Backfill	Dozer backfill, bulk, up to 300' haul, no compaction	31050	LCY	$ 1.85	$ 57,443	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
Compaction	Compacting backfill, 6" to 12" lifts, vibrating roller	24840	ECY	$ 3.33	$ 82,717	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
Selective demolition	Cutout, concrete, walls, bar reinforced, 6-12 CF	12	CF	$ 31.23	$ 377	RSMeans Line Number 024119161450 (Gary, IN) - Release Year 2018
Earth hauling	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	10350	LCY	$ 7.64	$ 79,074	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
Spoil handling	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	480	Hr	$ 159.03	$ 76,334	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
Spoil disposal	Hazardous waste dumpsite disposal charge	1607	Ton	$ 312.93	$ 502,828	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 1,217,049**	

Fine Mesh Traveling Water Screen Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Pump Station #1 TWS Conversion						
Pump Station #1 Traveling Water Screens	Conversion of existing TWS to 2 mm fine mesh with modified Ristroph type 316(b) compliant fish baskets, reuse main framework and drivetrain	12	Ea	$ 348,000.00	$ 4,176,000	Vendor Quotation - Evoqua Water Technologies
Traveling Water Screen Vendor Engineering	Stipend for support engineering, walk downs and installation support	21	Days	$ 1,200.00	$ 25,200	Prior project experience
Retrofitting Labor for Traveling Water Screens	Crew B-1: 1 labor foreman (outside), 2 laborers	76	Days	$ 1,329.22	$ 100,688	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Removal/Installation	Crew A-3H: 1 equipment operator (crane), 1 hydraulic crane - 12 ton	12	Days	$ 1,359.53	$ 16,314	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Transportation	Rent truck, flatbed, 1 axle, 3 ton tating	12	Days	$ 96.70	$ 1,160	RSMeans Line Number 015433205500 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 4,319,363**	
Pump Station #2 TWS Conversion						
Pump Station #2 Traveling Water Screens	Conversion of existing TWS to 2 mm fine mesh with modified Ristroph type 316(b) compliant fish baskets, reuse main framework and drivetrain	6	Ea	$ 348,000.00	$ 2,088,000	Vendor Quotation - Evoqua Water Technologies
Traveling Water Screen Vendor Engineering	Stipend for support engineering, walk downs and installation support	11	Days	$ 1,200.00	$ 12,600	Prior project experience
Retrofitting Labor for Traveling Water Screens	Crew B-1: 1 labor foreman (outside), 2 laborers	33	Days	$ 1,329.22	$ 43,864	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Removal/Installation	Crew A-3H: 1 equipment operator (crane), 1 hydraulic crane - 12 ton	6	Days	$ 1,359.53	$ 8,157	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Transportation	Rent truck, flatbed, 1 axle, 3 ton tating	6	Days	$ 96.70	$ 580	RSMeans Line Number 015433205500 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 2,153,202**	
Pump Station #4 TWS Conversion						
Pump Station #4 Traveling Water Screens	Conversion of existing TWS to 2 mm fine mesh, reuse main framework and drivetrain	3	Ea	$ 162,000.00	$ 486,000	Vendor Quotation - Evoqua Water Technologies
Traveling Water Screen Vendor Engineering	Stipend for support engineering, walk downs and installation support	5	Days	$ 1,200.00	$ 6,300	Prior project experience
Retrofitting Labor for Traveling Water Screens	Crew B-1: 1 labor foreman (outside), 2 laborers	22	Days	$ 1,329.22	$ 28,910	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Removal/Installation	Crew A-3H: 1 equipment operator (crane), 1 hydraulic crane - 12 ton	3	Days	$ 1,359.53	$ 4,079	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Transportation	Rent truck, flatbed, 1 axle, 3 ton tating	3	Days	$ 96.70	$ 290	RSMeans Line Number 015433205500 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 525,579**	
Lakeside Pump Station TWS Conversion						
Lakeside Pump Station Traveling Water Screens	Conversion of existing TWS to 2 mm fine mesh, reuse main framework and drivetrain	4	Ea	$ 162,000.00	$ 648,000	Vendor Quotation - Evoqua Water Technologies
Traveling Water Screen Vendor Engineering	Stipend for support engineering, walk downs and installation support	7	Days	$ 1,200.00	$ 8,400	Prior project experience
Retrofitting Labor for Traveling Water Screens	Crew B-1: 1 labor foreman (outside), 2 laborers	27	Days	$ 1,329.22	$ 35,889	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Removal/Installation	Crew A-3H: 1 equipment operator (crane), 1 hydraulic crane - 12 ton	4	Days	$ 1,359.53	$ 5,438	RSMeans Open Shop Crew Reference (Gary, IN) - Release Year 2018
Traveling Water Screen Transportation	Rent truck, flatbed, 1 axle, 3 ton tating	4	Days	$ 96.70	$ 387	RSMeans Line Number 015433205500 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 698,114**	
				Project Subtotal:	$ 14,428,179	
Contingency / Adjustments						
Conceptual Design Contingency	Contingencies, at conceptual design stage	35	%	Subtotal	$ 5,049,863	Gary Works Site Historical Project Budgets
Contractor Inexperience	General contractor management, inexperienced	20	%	Subtotal	$ 2,885,636	Gary Works Site Historical Project Budgets
Construction Management	Construction management fees, scheduling, budgeting, safety oversight, etc.	10	%	Subtotal	$ 1,442,818	Gary Works Site Historical Project Budgets
				Const. Subtotal:	**$ 23,806,496**	
Permitting / Engineering						
Environmental Permitting	Wastewater permit modifications				$ 400,000	Preliminary Estimate
Permitting	Typical construction permit requirements, most cities, maximum	2	%	Const. Subtotal	$ 476,130	RSMeans Line Number 014126500100 (Gary, IN) - Release Year 2018
Engineering	Engineering fees, mechanical, maximum	20	%	Const. Subtotal	$ 4,761,299	Gary Works Site Historical Project Budgets
				Total Cost:	**$ 29,443,925**	

ATTACHMENT 4: MECHANICAL DRAFT COOLING TOWER CLOSED-CYCLE RECIRCULATING SYSTEM PRELIMINARY DESIGN BUDGET

U.S. STEEL – GARY WORKS

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Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
West Cooling Tower System						
Mobilization and Demobilization						
Crawler and Misc.	Mobilization or demobilization, delivery charge for equipment, hauled on 20-ton capacity towed trailer	2	Ea	$ 871.15	$ 1,742.30	RSMeans Line Number 015436501400 (Gary, IN) - Release Year 2018
Barge	Mobilization, set up and remove, mobilization by water for barge driving rig, maximum	1	Ea	$ 48,262.50	$ 48,262.50	RSMeans Line Number 310660151320 (Gary, IN) - Release Year 2018
Pile Hammer	Mobilization, 75 ton, set up and remove crane, with pile leads and pile hammer	1	Ea	$ 11,832.11	$ 11,832	RSMeans Line Number 310660150200 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 61,837**	
Earthwork						
Excavation	Excavating, trench or continuous footing, common earth, 3-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	55467	BCY	$ 3.01	$ 166,955	RSMeans Line Number 312316131335 (Gary, IN) - Release Year 2018
Backfill	Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	55467	ECY	$ 3.33	$ 184,704	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
Cofferdams	Sheet piling, steel, 38 psf, 40' excavation, per ton, drive, extract and salvage, excludes wales	500	Ton	$ 1,283.57	$ 641,785	RSMeans Line Number 314116101000 (Gary, IN) - Release Year 2018
Wales	Sheet piling, wales, connections and struts, 2/3 salvage	500	Ton	$ 517.13	$ 258,565	RSMeans Line Number 314116102500 (Gary, IN) - Release Year 2018
Dewatering	Dewatering, pumping 8 hours, attended 2 hours per day, 6" centrifugal pump, includes 20 LF of suction hose and 100 LF of discharge hose, add for additional pump	33	Day	$ 375.00	$ 12,419	RSMeans Line Number 312319201120 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 1,264,427**	
Civil/Structural						
Forms	C.I.P. concrete forms, footing, continuous wall, plywood, 4 use, includes erecting, bracing, stripping and cleaning	4826	SFCA	$ 7.76	$ 37,452	RSMeans Line Number 031113450150 (Gary, IN) - Release Year 2018
Concrete	Structural concrete, ready mix, lightweight, 110 #/C.F., 3000 psi, includes lightweight aggregate, sand, portland cement and water, excludes all additives and treatments	780	CY	$ 146.09	$ 113,950	RSMeans Line Number 033116100760 (Gary, IN) - Release Year 2018
Excavation	Bulk excavation, dozer, 105 HP, 150' haul, common earth	2083	BCY	$ 4.28	$ 8,913	RSMeans Line Number 312316463220 (Gary, IN) - Release Year 2018
Concrete	Heavyweight concrete, ready mix, includes local aggregate, sand Portland cement (Type I) and water, exclues all additives and treatmens, 6000 psi	1939	CY	$ 159.75	$ 309,832	RSMeans Line Number 033113350411 (Gary, IN) - Release Year 2018
Concrete placement	Placement, includes labor and equipment to place, level (strike off) and consolidate, foundation mats, over 20 CY, direct chute	1939	CY	$ 8.29	$ 16,078	RSMeans Line Number 033113702900 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 11, A615 grade 60, mill base	557	Ton	$ 666.74	$ 371,245	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 4, A615 grade 60, mill base	3	Ton	$ 666.74	$ 1,705	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Stirrups-columns	Reinforcing plain steel bar, No 4, A615 grade 60, mill base	2	Ton	$ 666.74	$ 1,015	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 860,192**	
Rental Equipment						
Trailer	Office trailer, furnished, rent per month, 32' x 8', excl. hookups	6	Ea	$ 261.12	$ 1,567	RSMeans Line Number 015213200350 (Gary, IN) - Release Year 2018
Trailer	Office trailer, excl. hookups, air conditioning, rent per month, add	6	Ea	$ 52.80	$ 317	RSMeans Line Number 015213200700 (Gary, IN) - Release Year 2018
Weld machine, 1.5'	Welding, plastic, high density polyethylene (HDPE), single wall, machine, rental per day based on diam. capacity, 16" thru 18" diameter, weld	5	Day	$ 285.00	$ 1,425	RSMeans Line Number 221113784390 (Gary, IN) - Release Year 2018
Weld machine, 4.5' pipe	Welding, plastic, high density polyethylene (HDPE), single wall, machine, rental per day based on diam. capacity, 42" thru 54" diameter, weld	10	Day	$ 980.00	$ 9,800	RSMeans Line Number 221113784430 (Gary, IN) - Release Year 2018
Weld machine, 5.5' pipe	Welding, plastic, high density polyethylene (HDPE), single wall, machine, rental per day based on diam. capacity, 66" diameter, weld	5	Day	$ 1,106.00	$ 5,530	Interpolated from RSMeans Line Numbers 221113784390 & 221113784430 (Gary, IN) - Release Year 2018
Weld machine, 6.5' pipe	Welding, plastic, high density polyethylene (HDPE), single wall, machine, rental per day based on diam. capacity, 78" diameter, weld	12	Day	$ 1,210.57	$ 14,527	Interpolated from RSMeans Line Numbers 221113784390 & 221113784430 (Gary, IN) - Release Year 2018
Boring Machine	Rent auger horiz boring Machine 12"-48"dia 65HP, Incl. Hourly Oper. Cost.	0.5	Month	$ 8,452.13	$ 4,226	RSMeans Line Number 015433200090 (Gary, IN) - Release Year 2018
Crawler	Rent mini crawler spider crane, up to 66" wide, 13,350 lb. lifting capacity, Incl. Hourly Oper. Cost.	1	Month	$ 25,533.20	$ 25,533	RSMeans Line Number 015433600540 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Leads	Rent leads, 90' high for pile driving hammers over 20,000 ft lbs, Incl. Oper.	2	Month	$ 2,319.33	$ 4,639	RSMeans Line Number 015433202300 (Gary, IN) - Release Year 2018
Pile Hammer	Rent pile driving hammer diesel type 41300 ft lbs, Incl. Hourly Oper. Cost.	2	Month	$ 10,254.86	$ 20,510	RSMeans Line Number 015433202400 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 88,073**	
Water Monitoring						
Temperature instrumentation	Basin temperature transmitter and RTD	2	Ea	$ 3,000.00	$ 6,000	Prior project experience
Water Quality Monitoring System	Cooling water management control system	1	Ea	$ 35,000.00	$ 35,000	Prior project experience
				Category Subtotal:	**$ 41,000**	
Mechanical Items						
Mechanical draft cooling tower	2 cell mechanical draft cooling tower, 108 ft x 54 ft x 34.6 ft, Approach: 8°F & Range: 18°F at WBT: 78°F	1	Ea	$ 1,099,440.00	$ 1,099,440	Vendor quotation
North booster pump	Booster pumps, 37.4 ft TDH, 32 MGD, 300 HP, includes motor	1	Ea	$ 380,600.00	$ 380,600	Prior project experience
South booster pump	Booster pumps, 32.3 ft TDH, 19 MGD, 150 HP, includes motor	1	Ea	$ 243,300.00	$ 243,300	Prior project experience
				Category Subtotal:	**$ 1,723,340**	
Piping						
1.5' pipe	Pipe, plastic, high density polyethylene (HDPE), single wall, straight, welded, based on 40' length, 18" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	1150	LF	$ 31.00	$ 35,650	RSMeans Line Number 221113780126 (Gary, IN) - Release Year 2018
1.5' pipe, 90 elbow	Elbow, 90 Deg., plastic, high density polyethylene (HDPE), single wall, welded, 18" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	4	Ea	$ 665.00	$ 2,660	RSMeans Line Number 221113780776 (Gary, IN) - Release Year 2018
1.5' pipe, tee	Tee, plastic, high density polyethylene (HDPE), single wall, welded, 18" diam., DR 17, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	1	Ea	$ 385.00	$ 385	RSMeans Line Number 221113781076 (Gary, IN) - Release Year 2018
1.5' pipe, welding	Welding, plastic, high density polyethylene (HDPE), single wall, labor per joint, cost based on the thickest wall for each diameter, 18" pipe size, weld, excludes welding machine	25	Ea	$ 122.28	$ 3,057	RSMeans Line Number 221113784130 (Gary, IN) - Release Year 2018
4.5' pipe, installation	Pipe, plastic, high density polyethylene (HDPE), single wall, straight, welded, based on 40' length, 54" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	5290	LF	$ 268.00	$ 1,417,720	RSMeans Line Number 221113780182 (Gary, IN) - Release Year 2018
4.5' pipe, 90 elbow	Elbow, 90 Deg., plastic, high density polyethylene (HDPE), single wall, welded, 54" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	10	Ea	$ 6,925.00	$ 69,250	RSMeans Line Number 221113780432 (Gary, IN) - Release Year 2018
4.5' pipe, 45 elbow	Elbow, 45 Deg., plastic, high density polyethylene (HDPE), single wall, welded, 54" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	10	Ea	$ 2,200.00	$ 22,000	RSMeans Line Number 221113780632 (Gary, IN) - Release Year 2018
4.5' pipe, tee	Tee, plastic, high density polyethylene (HDPE), single wall, welded, 54" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	1	Ea	$ 3,838.25	$ 3,838	Interpolated from RSMeans Line Numbers 221113780776 through 221113780828 (Gary, IN) - Release Year 2018
4.5' pipe, welding	Welding, plastic, high density polyethylene (HDPE), single wall, labor per joint, cost based on the thickest wall for each diameter, 54" pipe size, weld, excludes welding machine	115	Ea	$ 152.85	$ 17,578	RSMeans Line Number 221113784220 (Gary, IN) - Release Year 2018
5.5' pipe	Pipe, plastic, high density polyethylene (HDPE), single wall, straight, welded, based on 40' length, 66" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	2990	LF	$ 371.92	$ 1,112,042	Interpolated from RSMeans Line Numbers 221113780126 through 221113780126 (Gary, IN) - Release Year 2018
5.5' pipe, 90 elbow	Elbow, 90 Deg., plastic, high density polyethylene (HDPE), single wall, welded, 66" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	8	Ea	$ 11,085.79	$ 88,686	Interpolated from RSMeans Line Numbers 221113780376 through 221113780432 (Gary, IN) - Release Year 2018
5.5' pipe, tee	Tee, plastic, high density polyethylene (HDPE), single wall, welded, 66" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	1	Ea	$ 4,476.78	$ 4,477	Interpolated from RSMeans Line Numbers 221113780776 through 221113780828 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
5.5' pipe, welding	Welding, plastic, high density polyethylene (HDPE), single wall, labor per joint, cost based on the thickest wall for each diameter, 66" pipe size, weld, excludes welding machine	65	Ea	$ 200.86	$ 13,056	Interpolated from RSMeans Line Numbers 221113784390 through 221113784220 (Gary, IN) - Release Year 2018
6.5' pipe	Pipe, plastic, high density polyethylene (HDPE), single wall, straight, welded, based on 40' length, 78" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	5175	LF	$ 517.49	$ 2,678,025	Interpolated from RSMeans Line Numbers 221113780126 through 221113780126 (Gary, IN) - Release Year 2018
6.5' pipe, 90 elbow	Elbow, 90 Deg., plastic, high density polyethylene (HDPE), single wall, welded, 78" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	6	Ea	$ 22,638.78	$ 135,833	Interpolated from RSMeans Line Numbers 221113780376 through 221113780432 (Gary, IN) - Release Year 2018
6.5' pipe, 45 elbow	Elbow, 45 Deg., plastic, high density polyethylene (HDPE), single wall, welded, 78" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	8	Ea	$ 4,845.99	$ 38,768	Interpolated from RSMeans Line Numbers 221113780576 through 221113780632 (Gary, IN) - Release Year 2018
6.5' pipe, tee	Tee, plastic, high density polyethylene (HDPE), single wall, welded, 78" diam., DR 26, add 1 weld per joint, excludes hangers, trenching, backfill, hoisting or digging equipment	3	Ea	$ 5,008.35	$ 15,025	Interpolated from RSMeans Line Numbers 221113780776 through 221113780828 (Gary, IN) - Release Year 2018
6.5' pipe, welding	Welding, plastic, high density polyethylene (HDPE), single wall, labor per joint, cost based on the thickest wall for each diameter, 78" pipe size, weld, excludes welding machine	96	Ea	$ 210.84	$ 20,240	Interpolated from RSMeans Line Numbers 221113784390 through 221113784220 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 5,678,289**	

Pump Houses						
North Pump House	Includes 10'x10'x8' structure, lighting, plumbing, heating	1	Ea	$ 100,000.00	$ 100,000	RSMeans Square Foot Estimator
South Pump House	Includes 10'x10'x8' structure, lighting, plumbing, heating	1	Ea	$ 100,000.00	$ 100,000	RSMeans Square Foot Estimator
				Category Subtotal:	**$ 200,000**	

Electrical Items						
Cooling tower feeder cables	15Kv Power Feeder Cables used for 5 Kv to water and cooling tower Motors 3/C# 2 AWG CLX 100 LF each. Qty 4	4600	LF	$16.27	$ 74,842	RSMeans Line Number 260519202500 (Gary, IN) - Release Year 2018
Booster pump feeder cables	15Kv Power Feeder Cables used for 5 Kv from secondary side of Utility 750 Kva transformer to pump switchgear 3/C# 2 AWG CLX 100 LF each. Qty 1	230	LF	$16.27	$ 3,742	RSMeans Line Number 260519202500 (Gary, IN) - Release Year 2018
Booster pump cables	5 Kv 3/C 4/0 AWG cable from Utility 1500 Kva transformer to pump and cooling tower switchgear Qty 1	1.152	LF	$22.52	$ 26	RSMeans Line Number 260519202000 (Gary, IN) - Release Year 2018
Cable connectors	15 Kv cable connectors #1 to 4/0, outdoor	36	Ea	$172.17	$ 6,198	RSMeans Line Number 260513102300 (Gary, IN) - Release Year 2018
Switchgear feeder cables	480 V Power Feeder Cables to 240/120 volt dist pnl in switchgear bldgs Qty 2. 3/C#500 MCM armored cable	4	CLF	$4,329.33	$ 17,317	RSMeans Line Number 260519205200 (Gary, IN) - Release Year 2018
Control stations	Control Stations for 2 fans and 2 pumps	4	Ea	$530.53	$ 2,122	RSMeans Line Number 262913200500 (Gary, IN) - Release Year 2018
Control cables	Misc Control Cables 12/C#12 Awg. total (cables will be used for misc. control items. Qty 6)	6	CLF	$226.23	$ 1,357	RSMeans Line Number 260523202604 (Gary, IN) - Release Year 2018
Junction boxes	Misc. Junction Boxes 12"X24" Nema 4	12	Ea	$41.04	$ 492	RSMeans Line Number 262716109040 (Gary, IN) - Release Year 2018
Terminations	Control Cable terminations #16 to #10	200	Ea	$0.34	$ 68	RSMeans Line Number 260519350050 (Gary, IN) - Release Year 2018
Vibration switch	Cooling tower fan vibration switch (Cables included in Misc.)	2	Ea	$1,600.00	$ 3,200	Prior project experience
Level switch	Basin Level Switches (Qty 2)	2	Ea	$1,500.00	$ 3,000	Prior project experience
Flow transmitter	Flow transmitter	2	Ea	$3,150.00	$ 6,300	Prior project experience
Instrument cable	Instrument cable #20, 6 pr	30	CLF	$202.20	$ 6,066	RSMeans Line Number 271513138406 (Gary, IN) - Release Year 2018
Lighting fixtures	Lighting Fixtures , LED, Exterior, Modular, Type IV, 101 watt	8	Ea	$1,301.30	$ 10,410	RSMeans Line Number 265623550310 (Gary, IN) - Release Year 2018
Lighting	Lighting Poles 10 ft., Aluminum	4	Ea	$825.83	$ 3,303	RSMeans Line Number 265613102850 (Gary, IN) - Release Year 2018
Lighting wire	Lighting Wire 3/C # 12 Awg.	5	CLF	$70.57	$ 353	RSMeans Line Number 260519209050 (Gary, IN) - Release Year 2018
Lighting controls	Lighting Controls	2	Ea	$380.38	$ 761	RSMeans Line Number 262913100100 (Gary, IN) - Release Year 2018
Grounding cable	Grounding Cable bare #500 MCM Copper	50	CLF	$715.72	$ 35,786	RSMeans Line Number 260526801240 (Gary, IN) - Release Year 2018
Grounding rod	Grounding rods 3/4 inch 10ft long	50	Ea	$42.04	$ 2,102	RSMeans Line Number 260526800100 (Gary, IN) - Release Year 2018
Grounding connections	Grounding Connections Exothermic	50	Ea	$268.27	$ 13,414	RSMeans Line Number 260526802530 (Gary, IN) - Release Year 2018
Grounding connections	1 inch RSG conduit for lighting and Misc.	5000	LF	$6.76	$ 33,800	RSMeans Line Number 260533131800 (Gary, IN) - Release Year 2018
Flex conduit	4 inch flex conduit for pumps and fans	200	LF	$7.46	$ 1,492	RSMeans Line Number 260533350410 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
RSG conduit	4 Inch RSG Conduit for 2 pumps and 2 fans	3500	LF	$20.02	$ 70,070	RSMeans Line Number 260533131970 (Gary, IN) - Release Year 2018
Lightning protection	Lightning Protection Air terminals	20	Ea	$22.52	$ 450	RSMeans Line Number 264113130400 (Gary, IN) - Release Year 2018
Lightning protection cables	Stranded copper lightning protection cables #500 MCM	20	CLF	$715.72	$ 14,314	RSMeans Line Number 260526801240 (Gary, IN) - Release Year 2018
Lightning connection	Lightning Exothermic connections	40	Ea	$268.27	$ 10,731	RSMeans Line Number 260526802530 (Gary, IN) - Release Year 2018
North substation	4Kv Pump and Cooling tower substation pre fab building 50X25	1	Ea	$750,000.00	$ 750,000	Prior project experience
South substation	4 Kv Pump Substation pre fab building 30X25	1	Ea	$450,000.00	$ 450,000	Prior project experience
Switchgear	4 Kv switchgear 1 aux, 1 bkr, 4 starters (Pump and Cooling tower fans 1 spare)	1	Ea	$420,000.00	$ 420,000	Prior project experience
Switchgear	4 Kv switchgear 1 aux, 1 bkr, 2 starters (pump and 1 spare) compartments	1	Ea	$280,000.00	$ 280,000	Prior project experience
Distribution panel	240/120 volt dist panel for pump and cooling tower substation	1	Ea	$30,000.00	$ 30,000	Prior project experience
Distribution panel	240/120 volt dist panel for pump substation	1	Ea	$30,000.00	$ 30,000	Prior project experience
Switchear battery	Battery System for MV switchgear	2	Ea	$100,000.00	$ 200,000	Prior project experience
Control system	Control System 1 lot including main processor, remote I/O etc. PLC Based	1	Ea	$250,000.00	$ 250,000	Prior project experience
Startup and Testing Labor	Crew R-1: 1 electrician foreman, 3 electrician, 2 electrician apprentices	10	Days	$3,580.93	$ 35,809	RSMeans Crews Estimate Open Shop Crew R-1 (Gary, IN) - Release Year 2018
Heat tracing	Heat tracing Cable (assume 2 lines 50 feet each)	100	LF	$8.71	$ 871	RSMeans Line Number 220533200220 (Gary, IN) - Release Year 2018
Heat tracing	Heat tracing Power kit and end seal	2	Ea	$109.11	$ 218	RSMeans Line Number 220533200300 (Gary, IN) - Release Year 2018
Heat tracing	Heat tracing Power cable 120 volts 20 circuits 50'each 3/C #12 interlocked armored.	1	CLF	$80.58	$ 81	RSMeans Line Number 260519200250 (Gary, IN) - Release Year 2018
Heat tracing	Heat Tracing Distribution Panel	1	Ea	$2,000.00	$ 2,000	Prior project experience
Heat tracing	Heat tracing main distribution panel feed assume 100 amp service 1000' long 1-3/C 1/0 cable armored	1	CLF	$1,101.10	$ 1,101	RSMeans Line Number 260519200600 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 2,771,798**	

East Cooling Tower System

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Holding Lagoon						
Slurry Wall Construction	Excavated slurry trench, backfilled with 3000 psi concrete, no reinforcing steel	7224	CF	$ 24.33	$ 175,759.92	RSMeans Line Number 315623200050 (Gary, IN) - Release Year 2018
Slurry Wall Disposal	Haul for disposal, 2 mile haul, excavated material	268	CY	$ 10.25	$ 2,742.44	RSMeans Line Number 315623200800 (Gary, IN) - Release Year 2018
Excavation	Bulk excavation, dozer, 105 HP, 150' haul, common earth	13691	BCY	$ 4.28	$ 58,597	RSMeans Line Number 312316463220 (Gary, IN) - Release Year 2018
Hauling and remediation	Haul of material to CAMU, holding and remediation of contaminated excavated earth	17114	LCY	$ 25.00	$ 427,843	In-house estimation
Drilled peir	Fixed end caisson piles, open style, machine drilled, in wet ground, pulled casing and pumping, 36" diameter, 0.116 CY/LF	7200	LF	$ 132.57	$ 954,504	RSMeans Line Number 316326131600 (Gary, IN) - Release Year 2018
Drilled peir bell	Fixed end caisson piles, open style, machine drilled, bell excavation and concrete, 6' bell diameter, 1.57 CY	144	Ea	$ 1,167.06	$ 168,057	RSMeans Line Number 316326132140 (Gary, IN) - Release Year 2018
Concrete	Heavyweight concrete, ready mix, includes local aggregate, sand Portland cement (Type I) and water, exclues all additives and treatmens, 6000 psi	8144	CY	$ 159.75	$ 1,301,080	RSMeans Line Number 033113350411 (Gary, IN) - Release Year 2018
Concrete Placement	Placement, includes labor and equipment to place, level (strike off) and consolidate, foundation mats, over 20 CY, direct chute	2689	CY	$ 12.31	$ 33,100	RSMeans Line Number 033113702950 (Gary, IN) - Release Year 2018
Concrete Placement	Placement, includes labor and equipment to place, level (strike off) and consolidate, walls, pumped	5456	CY	$ 40.83	$ 222,752	RSMeans Line Number 033113705350 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 11, A615 grade 60, mill base	576	Tons	$ 666.74	$ 384,056	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 4, A615 grade 60, mill base	29	Tons	$ 666.74	$ 19,510	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Stop logs	2 stop gates, 6 stob gate guides, 1 lifting beam, 1 storage rack	1	Set	$ 54,000.00	$ 54,000	Prior project experience
Trash bars	Exclusion of large diameter debris, 6' width, 8'-9" height, ~12° angle	6	Ea	$ 20,000.00	$ 120,000	Prior project experience
Installation of trash bars & stop logs	Crew E-20: 1 foreman, 5 structural steel workers, 2 equip operators (crane, oiler), 1 lattice boom crane 40 ton	5	Days	$ 6,553.23	$ 32,766	RSMeans Crews Estimate Open Shop Crew E-20 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 3,954,767**	

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Cooling Tower Basin						
Excavation of contaminated topsoil	3/4 CY bucket excavator to 10' deep, OSHA level C containment of hazardous waste, includes one respirator filter and two disposable suits per work day	9710	BCY	$ 35.68	$ 346,463	RSMeans Line Number 025613100110 (Gary, IN) - Release Year 2018
Concrete	Heavyweight concrete, ready mix, includes local aggregate, sand Portland cement (Type I) and water, exclues all additives and treatmens, 6000 psi	9507	CY	$ 159.75	$ 1,518,779	RSMeans Line Number 033113350411 (Gary, IN) - Release Year 2018
Concrete placement	Placement, includes labor and equipment to place, level (strike off) and consolidate, foundation mats, over 20 CY, direct chute	9507	CY	$ 8.29	$ 78,815	RSMeans Line Number 033113702900 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 11, A615 grade 60, mill base	3078	Ton	$ 666.74	$ 2,052,174	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 4, A615 grade 60, mill base	12	Ton	$ 666.74	$ 8,219	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Stirrups-columns	Reinforcing plain steel bar, No 4, A615 grade 60, mill base	183	Ton	$ 666.74	$ 121,963	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 4,126,413**	
MDCT Pump Station						
Pump station	Pre engineered building, post frame with metal panels, 25' x 60', 14' eave height, 25% contractor fees	1500	SF	$ 63.26	$ 94,890	RSMeans Square Foot Estimator (Gary, IN) - Release Year 2018
HVAC Unit	Packaged, outdoor, air-handling unit, with cooling/heating coil section and filter, weathertight, constant volume, 10,000 CFM	1	Ea	$ 67,043.23	$ 67,043	RSMeans Line Number 237413103150 (Gary, IN) - Release Year 2018
HVAC Fans	Direct drive axial flow HVAC fans, constant speed, 24", 5,850 CFM, 1 HP	2	Ea	$ 2,500.28	$ 5,001	RSMeans Line Number 233413100530 (Gary, IN) - Release Year 2018
HVAC Ducting	Spiral preformed round duct, galvenized steel, 24 ga., 20" diameter	125	LF	$ 37.63	$ 4,704	RSMeans Line Number 233113165500 (Gary, IN) - Release Year 2018
Duct Insulation	Duct thermal insulation, blanket type, fiberglass, flexible, fire rated for plenums, 1/2" thick	273	SF	$ 14.34	$ 3,911	RSMeans Line Number 230713103110 (Gary, IN) - Release Year 2018
Excavation	Bulk excavation, dozer, 105 HP, 150' haul, common earth	125	BCY	$ 4.28	$ 536	RSMeans Line Number 312316463220 (Gary, IN) - Release Year 2018
Concrete	Heavyweight concrete, ready mix, includes local aggregate, sand Portland cement (Type I) and water, exclues all additives and treatmens, 5000 psi	3380	CY	$ 155.55	$ 525,759	RSMeans Line Number 033113350400 (Gary, IN) - Release Year 2018
Concrete Placement	Placement, includes labor and equipment to place, level (strike off) and consolidate, foundation mats, over 20 CY, direct chute	3380	CY	$ 8.29	$ 28,020	RSMeans Line Number 033113702900 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 11, A615 grade 60, mill base	3	Ton	$ 666.74	$ 2,303	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, No 4, A615 grade 60, mill base	0.4	Ton	$ 666.74	$ 289	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 732,455**	
Substation Foundation						
Concrete	Heavyweight concrete, ready mix, includes local aggregate, sand Portland cement (Type I) and water, exclues all additives and treatmens, 5000 psi	54	CY	$ 155.55	$ 8,400	RSMeans Line Number 033113350400 (Gary, IN) - Release Year 2018
Concrete Placement	Placement, includes labor and equipment to place, level (strike off) and consolidate, foundation mats, over 20 CY, direct chute	54	CY	$ 8.29	$ 448	RSMeans Line Number 033113702900 (Gary, IN) - Release Year 2018
Rebar	Reinforcing plain steel bar, A615 grade 60, mill base	1	Ton	$ 666.74	$ 480	RSMeans Line Number 032111500650 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 9,328**	
Water Monitoring						
Temperature instrumentation	Basin temperature transmitter and RTD	2	Ea	$ 3,000.00	$ 6,000	Prior project experience
Water Quality Monitoring System	Cooling water management control system	1	Ea	$ 35,000.00	$ 35,000	Prior project experience
				Category Subtotal:	**$ 41,000**	
Mechanical Items						
Mechanical draft cooling tower	15 cell mechanical draft cooling tower, 810 ft x 54 ft x 49.6 ft, Approach: 8°F & Range: 17.5°F at WBT: 78°F	1	Ea	$ 7,130,160.00	$ 7,130,160	Vendor quotation
Cooling tower booster pump	Booster pumps, 74.3 ft TDH, 88.3 MGD, 1,500 HP, includes motor	4	Ea	$ 1,168,800.00	$ 4,675,200	Prior project experience
Booster pump installation	Crew B-35A: 1 foreman, 2 laborers, 1 skilled worker, 1 welder plumber, 2 equip operators (crane, oiler), 1 welder 300 amps, 1 crawler crane 75 tons	10	Days	$ 5,847.93	$ 58,479	RSMeans Crews Estimate Open Shop Crew B-35A (Gary, IN) - Release Year 2018
Substation fire protection panel	Control panel, multizone with batteries, 8 zones detection, 4 suppressors	1	Ea	$ 4,385.15	$ 4,385	RSMeans Line Number 212116500150 (Gary, IN) - Release Year 2018
Substation fire protection nozzle	Dispersion nozzle, 3" x 5"	24	Ea	$ 195.73	$ 4,698	RSMeans Line Number 212116501000 (Gary, IN) - Release Year 2018
Suppressant cyclinder	100 lb fire suppressant cylinder, high pressure	2	Ea	$ 2,092.65	$ 4,185	RSMeans Line Number 212116502100 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Cooling tower fire protection system	Fire protection for MDCT	1	Ea	$ 800,000.00	$ 800,000	Prior project experience
Cooling tower chemistry control	Monitoring, injection and control of water quality and additives	1	Ea	$ 150,000.00	$ 150,000	Estimated allowance
Weir gates	6' width, 6.5' gate height, downward opening, EPDM rubber seal, actuation by electric motor, 316 stainless steel construction	6	Ea	$ 16,000.00	$ 96,000	Vendor quotation, adjusted for quantity
Weir gate installation	Crew E-20: 1 foreman, 5 structural steel workers, 2 equip operators (crane, oiler), 1 lattice boom crane 40 ton	5	Days	$ 6,553.23	$ 32,766	RSMeans Crews Estimate Open Shop Crew E-20 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 12,955,873**	

Outfall Piping						
Outfall 033 to Pump Station GW-11	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 10" diameter	3795	LF	$ 104.59	$ 396,906	Interpolated from RSMeans Line Numbers 331413103000 & 331413103010 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	6 to 10 ft deep, hydro excavation, w/trench box, common earth	1913	BCY	$ 5.32	$ 10,178	RSMeans Line Number 312316131370 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	30	Days	$ 248.97	$ 7,469	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	344	LCY	$ 3.02	$ 1,040	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	1951	LCY	$ 1.85	$ 3,610	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	1836	ECY	$ 3.33	$ 6,115	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	2471	LCY	$ 7.64	$ 18,881	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	240	Hr	$ 159.03	$ 38,167	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	576	Ton	$ 312.93	$ 180,100	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
Outfall 030 to Outfall 020	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 36" diameter	4485	LF	$ 183.56	$ 823,267	RSMeans Line Number 331413103040 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	6 to 10 ft deep, hydro excavation, w/trench box, common earth	6312	BCY	$ 5.32	$ 33,581	RSMeans Line Number 312316131370 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	90	Days	$ 248.97	$ 22,407	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	963	LCY	$ 3.02	$ 2,909	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	5459	LCY	$ 1.85	$ 10,099	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	5138	ECY	$ 3.33	$ 17,110	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	4077	LCY	$ 7.64	$ 31,148	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	720	Hr	$ 159.03	$ 114,502	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	949	Ton	$ 312.93	$ 297,104	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Outfall 020 to Outfall 019	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 60" diameter	690	LF	$ 360.68	$ 248,866	Interpolated from RSMeans Line Numbers 331413103050 & 331413103070 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	10 to 14 ft deep, hydro excavation, w/trench box, common earth	1853	BCY	$ 5.92	$ 10,968	RSMeans Line Number 312316131375 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	30	Days	$ 248.97	$ 7,469	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	253	LCY	$ 3.02	$ 765	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	1435	LCY	$ 1.85	$ 2,656	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	1351	ECY	$ 3.33	$ 4,499	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	2396	LCY	$ 7.64	$ 18,305	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	240	Hr	$ 159.03	$ 38,167	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	558	Ton	$ 312.93	$ 174,603	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
Outfall 019 to Outfall 018	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 72" diameter	805	LF	$ 454.87	$ 366,170	RSMeans Line Number 331413103070 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	10 to 14 ft deep, hydro excavation, w/trench box, common earth	2788	BCY	$ 5.92	$ 16,503	RSMeans Line Number 312316131375 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	60	Days	$ 248.97	$ 14,938	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	365	LCY	$ 3.02	$ 1,101	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	2066	LCY	$ 1.85	$ 3,823	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	1945	ECY	$ 3.33	$ 6,476	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	3565	LCY	$ 7.64	$ 27,234	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	480	Hr	$ 159.03	$ 76,334	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	830	Ton	$ 312.93	$ 259,766	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
Outfall 018 to Outfall 015	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 84" diameter	1840	LF	$ 605.92	$ 1,114,893	RSMeans Line Number 331413103080 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	10 to 14 ft deep, hydro excavation, w/trench box, common earth	7973	BCY	$ 5.92	$ 47,202	RSMeans Line Number 312316131375 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	120	Days	$ 248.97	$ 29,876	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	1003	LCY	$ 3.02	$ 3,030	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	5685	LCY	$ 1.85	$ 10,517	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	5351	ECY	$ 3.33	$ 17,818	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	10047	LCY	$ 7.64	$ 76,757	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	960	Hr	$ 159.03	$ 152,669	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	2340	Ton	$ 312.93	$ 732,137	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Outfall 015 to MDCT Pump Station	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 96" diameter	1150	LF	$ 858.88	$ 987,712	RSMeans Line Number 331413103090 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	10 to 14 ft deep, hydro excavation, w/trench box, common earth	6091	BCY	$ 5.92	$ 36,057	RSMeans Line Number 312316131375 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	120	Days	$ 248.97	$ 29,876	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	741	LCY	$ 3.02	$ 2,237	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	4197	LCY	$ 1.85	$ 7,764	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	3950	ECY	$ 3.33	$ 13,153	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	7693	LCY	$ 7.64	$ 58,778	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	960	Hr	$ 159.03	$ 152,669	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	1792	Ton	$ 312.93	$ 560,647	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
Outfall 035 to Header	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 72" diameter	7705	LF	$ 454.87	$ 3,504,773	RSMeans Line Number 331413103070 (Gary, IN) - Release Year 2018
	Mechanical dredging marine equipment rental mobilization/demobilization	4	Ea	$ 38,438.27	$ 153,753	Averaged from RSMeans Line Numbers 352423130510 & 352423130600 (Gary, IN) - Release Year 2018
	Barge mounted dragline or clamshell, hopper dumped, pumped 1000' to shore dump, uses 2,000 gallons of water per cubic yard, with return piping	6283	BCY	$ 15.21	$ 95,567	Averaged from RSMeans Line Numbers 352423130020 & 352423130100 (Gary, IN) - Release Year 2018
	Excavating, 1' to 4' deep, common earth with no sheeting or dewatering included, 3/8 CY excavator	64	BCY	$ 8.12	$ 520	RSMeans Line Number 312316130050 (Gary, IN) - Release Year 2018
	10 to 14 ft deep, hydro excavation, w/trench box, common earth	2389	BCY	$ 5.92	$ 14,146	RSMeans Line Number 312316131375 (Gary, IN) - Release Year 2018
	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	90	Days	$ 248.97	$ 22,407	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
	Backfill, structural, from existing stockpile, no compaction, common earth	313	LCY	$ 3.02	$ 944	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
	Dozer backfill, bulk, up to 300' haul, no compaction	1771	LCY	$ 1.85	$ 3,276	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
	Compacting backfill, 6" to 12" lifts, vibrating roller	1667	ECY	$ 3.33	$ 5,551	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	3067	LCY	$ 7.64	$ 23,430	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
	Backfill trench, FE loader, 1 CY bucket, 100' haul	80	LCY	$ 4.09	$ 327	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
	Riding compactor, vibrating roller, 8" lifts, 2 passes	64	ECY	$ 0.37	$ 24	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	720	Hr	$ 159.03	$ 114,502	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
	Hazardous waste dumpsite disposal charge	714	Ton	$ 312.93	$ 223,489	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
Thrust blocks	Water supply distribution, thrust block, 90° elbow, 10" diameter	2	Ea	$ 143.23	$ 286	RSMeans Line Number 331413900125 (Gary, IN) - Release Year 2018
	Water supply distribution, thrust block, tee or deadend, 10" diameter	2	Ea	$ 97.90	$ 196	RSMeans Line Number 331413900130 (Gary, IN) - Release Year 2018
	Water supply distribution, thrust block, 90° elbow, 36" diameter	12	Ea	$ 1,539.25	$ 18,471	Interpolated from RSMeans Line Numbers 331413900110 through 331413900155 (Gary, IN) - Release Year 2018
	Water supply distribution, thrust block, tee or deadend, 60" diameter	2	Ea	$ 3,174.40	$ 6,349	Interpolated from RSMeans Line Numbers 331413900110 through 331413900155 (Gary, IN) - Release Year 2018
	Water supply distribution, thrust block, 90° elbow, 72" diameter	4	Ea	$ 6,082.72	$ 24,331	Interpolated from RSMeans Line Numbers 331413900110 through 331413900155 (Gary, IN) - Release Year 2018
	Water supply distribution, thrust block, tee or deadend, 96" diameter	6	Ea	$ 8,107.29	$ 48,644	Interpolated from RSMeans Line Numbers 331413900110 through 331413900155 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 11,593,237**	

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Cooling Tower Discharge Piping						
Gravity flow piping - 80% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 24" diameter	817	LF	$ 115.53	$ 94,330	RSMeans Line Number 331413103010 (Gary, IN) - Release Year 2018
Gravity flow piping - 80% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 24" diameter, 90 deg elbow	4	Ea	$ 2,490.88	$ 9,964	RSMeans Line Number 331413103140 (Gary, IN) - Release Year 2018
Gate valve - 80% Recirculation	Water distribution gate valves, 24", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 37,226.49	$ 37,226	RSMeans Line Number 331419103830 (Gary, IN) - Release Year 2018
Gravity flow piping - 60% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 36" diameter	817	LF	$ 183.56	$ 149,877	RSMeans Line Number 331413103040 (Gary, IN) - Release Year 2018
Gravity flow piping - 60% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 36" diameter, 90 deg elbow	4	Ea	$ 4,683.17	$ 18,733	RSMeans Line Number 331413103150 (Gary, IN) - Release Year 2018
Gate valve - 60% Recirculation	Water distribution gate valves, 36", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 63,986.19	$ 63,986	RSMeans Line Number 331419103832 (Gary, IN) - Release Year 2018
Gravity flow piping - 50% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 30" diameter	817	LF	$ 149.55	$ 122,103	Interpolated from RSMeans Line Numbers 331413103010 & 331413103040 (Gary, IN) - Release Year 2018
Gravity flow piping - 50% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 30" diameter, 90 deg elbow	4	Ea	$ 3,587.03	$ 14,348	Interpolated from RSMeans Line Numbers 331413103140 & 331413103150 (Gary, IN) - Release Year 2018
Gate valve - 50% Recirculation	Water distribution gate valves, 30", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 41,100.79	$ 41,101	RSMeans Line Number 331419103831 (Gary, IN) - Release Year 2018
Gravity flow piping - Once Through Cooling	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 54" diameter	817	LF	$ 313.58	$ 256,036	Interpolated from RSMeans Line Numbers 331413103050 & 331413103070 (Gary, IN) - Release Year 2018
Gravity flow piping - Once Through Cooling	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 54" diameter, 90 deg elbow	4	Ea	$ 12,079.88	$ 48,320	Interpolated from RSMeans Line Numbers 331413103160 & 331413103180 (Gary, IN) - Release Year 2018
Gate valve - Once Through Cooling	Water distribution gate valves, 36", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 63,986.19	$ 63,986	RSMeans Line Number 331419103832 (Gary, IN) - Release Year 2018
Valve motor	Enclosed motor, 230/460 V, 60 Hz, 1.15 service factor, 1,200 RPM, 5 HP	4	Ea	$ 1,224.69	$ 4,899	RSMeans Line Number 267113202450 (Gary, IN) - Release Year 2018
Burried Pipe Excavation	6 to 10 ft deep, hydro excavation, w/trench box, common earth	820	BCY	$ 5.32	$ 4,364	RSMeans Line Number 312316131370 (Gary, IN) - Release Year 2018
Dewatering	Dewatering, 4" diaphram pump, 8 hrs per day, attended 2 hrs per day	90	Days	$ 248.97	$ 22,407	RSMeans Line Number 312319200650 (Gary, IN) - Release Year 2018
Engineered Fill	Backfill, structural, from existing stockpile, no compaction, common earth	123	LCY	$ 3.02	$ 372	RSMeans Line Number 312323144420 (Gary, IN) - Release Year 2018
Excavation Backfill	Dozer backfill, bulk, up to 300' haul, no compaction	697	LCY	$ 1.85	$ 1,290	RSMeans Line Number 312323131300 (Gary, IN) - Release Year 2018
Compaction	Compacting backfill, 6" to 12" lifts, vibrating roller	731	ECY	$ 3.33	$ 2,433	RSMeans Line Number 312323131600 (Gary, IN) - Release Year 2018
Tunneling	Excavation tunnel, shaft construction, earth	90	CY	$ 196.78	$ 17,636	RSMeans Line Number 317116200450 (Gary, IN) - Release Year 2018
Tunneling	Cut and cover tunneling, excavation, not including hauling or backfill	1551	CY	$ 102.17	$ 158,482	RSMeans Line Number 317123102000 (Gary, IN) - Release Year 2018
Earth hauling	Excavated or borrow hauling, 20 MPH average, 4 mile cycle	2051	LCY	$ 7.64	$ 15,669	RSMeans Line Number 312323200332 (Gary, IN) - Release Year 2018
Spoil handling	Hazardous waste handling, liquid pickup, vacuum truck, 2,200 gallons	720	Hr	$ 159.03	$ 114,502	RSMeans Line Number 028120105000 (Gary, IN) - Release Year 2018
Spoil disposal	Hazardous waste dumpsite disposal charge	191	Ton	$ 312.93	$ 59,785	Averaged from RSMeans Line Numbers 028120106000 & 028120106020 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 1,147,563**	
Cooling Tower Blowdown Piping						
Trenching and stabilization	Excavating, trenching, common earth with no sheeting or dewatering included, 6' to 10' deep, 1 CY excavator with trench box	2352	BCY	$ 5.32	$ 12,512	RSMeans Line Number 312316131370 (Gary, IN) - Release Year 2018
Gravity flow piping - 80% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 24" diameter	575	LF	$ 115.53	$ 66,430	RSMeans Line Number 331413103010 (Gary, IN) - Release Year 2018
Gate valve - 80% Recirculation	Water distribution gate valves, 24", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 37,226.49	$ 37,226	RSMeans Line Number 331419103830 (Gary, IN) - Release Year 2018
Gravity flow piping - 60% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 36" diameter	575	LF	$ 183.56	$ 105,547	RSMeans Line Number 331413103040 (Gary, IN) - Release Year 2018
Gate valve - 60% Recirculation	Water distribution gate valves, 36", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 63,986.19	$ 63,986	RSMeans Line Number 331419103832 (Gary, IN) - Release Year 2018
Gravity flow piping - 50% Recirculation	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 30" diameter	575	LF	$ 149.55	$ 85,988	Interpolated from RSMeans Line Numbers 331413103010 & 331413103040 (Gary, IN) - Release Year 2018

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Gate valve - 50% Recirculation	Water distribution gate valves, 30", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 41,100.79	$ 41,101	RSMeans Line Number 331419103831 (Gary, IN) - Release Year 2018
Gravity flow piping - Once Through Cooling	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, 54" diameter	575	LF	$ 313.58	$ 180,307	Interpolated from RSMeans Line Numbers 331413103050 & 331413103070 (Gary, IN) - Release Year 2018
Gate valve - Once Through Cooling	Water distribution gate valves, 36", cast iron, 125 psi, mechanical joint, motor operated	1	Ea	$ 63,986.19	$ 63,986	RSMeans Line Number 331419103832 (Gary, IN) - Release Year 2018
Valve motor	Enclosed motor, 230/460 V, 60 Hz, 1.15 service factor, 1,200 RPM, 5 HP	4	Ea	$ 1,224.69	$ 4,899	RSMeans Line Number 267113202450 (Gary, IN) - Release Year 2018
Backfill	Backfill trench, FE loader, 1 CY bucket, 100' haul	2114	LCY	$ 4.09	$ 8,646	RSMeans Line Number 312316133040 (Gary, IN) - Release Year 2018
Compaction	Riding compactor, vibrating roller, 8" lifts, 2 passes	1691	ECY	$ 0.37	$ 626	RSMeans Line Number 312323235050 (Gary, IN) - Release Year 2018
Hydrological model	Extended model study of impacts on Grand Calumet River, bathymetry reshaping, habitat disruption, dilution impacts, head water flowrate changes	1	Ea	$ 80,000.00	$ 80,000	Prior project experience
				Category Subtotal:	**$ 751,255**	
Pump Station Return Piping						
Barge Trenching	Barge mounted dragline or clamshell, hopper dumped, pumped 1000' to shore dump, uses 2,000 gallons of water per cubic yard	79376	BCY	$ 12.67	$ 1,005,688	RSMeans Line Number 352423130510 (Gary, IN) - Release Year 2018
Underwater Pipe Laying	Crew B-76A: 1 foreman, 5 laborers, 2 equip operators (crane, oiler), 1 crawler crane 50 ton, 1 barge 400 ton	725	Days	$ 7,112.12	$ 5,154,170	RSMeans Crews Estimate Open Shop Crew B-76A (Gary, IN) - Release Year 2018
Pump Station 1 Piping	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, not including labor or equipment, 132" diameter	1610	LF	$ 2,189.81	$ 3,525,594	Interpolated from RSMeans Line Numbers 331413103090 through 331413103104 (Gary, IN) - Release Year 2018
Pump Station 1/4 Piping	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, not including labor or equipment, 144" diameter	2415	LF	$ 2,146.84	$ 5,184,619	RSMeans Line Number 331413103104 (Gary, IN) - Release Year 2018
Pump Station 2 Piping	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, not including labor or equipment, 144" diameter	6210	LF	$ 2,146.84	$ 13,331,876	RSMeans Line Number 331413103104 (Gary, IN) - Release Year 2018
Pump Station 4 Piping	Water supply prestressed concrete pipe (PCCP), 150 psi, not including excavation or backfill, not including labor or equipment, 18" diameter	575	LF	$ 108.43	$ 62,347	Interpolated from RSMeans Line Numbers 331413103000 through 331413103050 (Gary, IN) - Release Year 2018
Hydraulic model test	Model study of pump stations and pump operation impacts	3	Ea	$ 44,000.00	$ 132,000	Prior project experience
				Category Subtotal:	**$ 28,396,295**	
Electrical Items						
Booster pump feeder cables	15Kv Power Feeder Cables used for pumps 3/C# 2/0 CLX 1000 LF each. Qty 4	4600	LF	$ 26.03	$ 119,738	RSMeans Line Number 260519202900 (Gary, IN) - Release Year 2018
Cable connectors	15 Kv cable connectors #1 to 4/0, outdoor	24	Ea	$ 172.17	$ 4,132	RSMeans Line Number 260513102300 (Gary, IN) - Release Year 2018
Cable connectors	15 Kv armored cable connectors	24	Ea	$ 163.16	$ 3,916	RSMeans Line Number 260519255900 (Gary, IN) - Release Year 2018
Cooling tower feeder cables	480 V Power Feeder Cables to 15 cooling tower fans 3/C #500 MCM.	17480	LF	$ 15.32	$ 267,794	RSMeans Line Number 260519205200 (Gary, IN) - Release Year 2018
Control stations	Control Stations for 15 fans and 4 pumps	19	Ea	$ 530.53	$ 10,080	RSMeans Line Number 262913200500 (Gary, IN) - Release Year 2018
Motor heater feeder cables	480 V Misc. Power Feeder Cables for motor heaters 3/C#10 Awg. (1 each per fan and pump) QTY 19	102	CLF	$ 110.11	$ 11,231	RSMeans Line Number 260519200300 (Gary, IN) - Release Year 2018
MOV feeder cables	480 volt feeders for motor operated valves (Qty 8)	80	CLF	$ 110.11	$ 8,809	RSMeans Line Number 260519200300 (Gary, IN) - Release Year 2018
Terminations	480 Volt Cable terminations #16 to #10	500	Ea	$ 0.34	$ 170	RSMeans Line Number 260519350050 (Gary, IN) - Release Year 2018
Terminations	480 Volt Cable terminations #500	108	Ea	$ 7.36	$ 795	RSMeans Line Number 260519350450 (Gary, IN) - Release Year 2018
Pump wiring	CT wiring for large pumps 2 sets each pump 4 pumps = 8 cables 4/C#10	80	CLF	$ 180.18	$ 14,414	RSMeans Line Number 260519200320 (Gary, IN) - Release Year 2018
Booster pump RTD cable	RTD Cables for large motor stator and bearings 1-15 pair #18 shielded cable (1/motor) (4 motors 1000 ft. ea)	40	CLF	$ 815.82	$ 32,633	RSMeans Line Number 271513138515 (Gary, IN) - Release Year 2018
Control cables	Misc Control Cables 12/C#12 Awg. total (cables will be used for misc. control items i.e. fan vibration switches etc.)	350	CLF	$ 226.23	$ 79,181	RSMeans Line Number 260523202604 (Gary, IN) - Release Year 2018
Junction boxes	Misc. Junction Boxes 12"X24" Nema 4	22	Ea	$ 41.04	$ 903	RSMeans Line Number 262716109040 (Gary, IN) - Release Year 2018
Terminations	Control Cable terminations #16 to #10	420	Ea	$ 0.34	$ 143	RSMeans Line Number 260519350050 (Gary, IN) - Release Year 2018
Cooling tower cable trays	30 inch power cable trays for 480V from new substation to cooling tower building. 4 trays total splitting in two directions.	2760	LF	$ 15.22	$ 42,007	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Booster pump cable trays	30 inch power cable trays for 13.8kV from new substation building to the new 1500 HP pumps	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Substation cable trays	30 inch power cable trays for 480V from new substation building to the new 480V heaters for pumps	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018

DRAFT FOR FINAL REVIEW

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Instrument table trays	30 inch instrument cable trays from main sub to pumps.	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Control cable trays	30 inch control cable trays from main sub to pumps.	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Control cable trays	30 inch control cable trays from main sub to cooling towers. Tray splits directions.	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Instrument table trays	30 inch instrument cable trays from main sub to cooling towers. Tray splits directions.	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Cooling tower cable trays	30 inch DC cable trays from main sub to cooling towers. Tray splits directions.	1265	LF	$ 15.22	$ 19,253	RSMeans Line Number 260536103390 (Gary, IN) - Release Year 2018
Cooling tower cable trays	12 inch cable tray ladder type used for cooling tower fan motors 50 feet, 15 QTY, 15% contingency	1150	LF	$ 16.42	$ 18,883	RSMeans Line Number 260536100200 (Gary, IN) - Release Year 2018
Cable tray sections	30 inch cable tray T sections 9 inch rung spacing	5	Ea	$ 380.38	$ 1,902	RSMeans Line Number 260536101930 (Gary, IN) - Release Year 2018
Cable Tray Supports	Structural A992 steel column, 2-tier, W8x31, includes shop primer, splice plates, bolts	2250	LF	$ 54.01	$ 121,523	RSMeans Line Number 051223176850 (Gary, IN) - Release Year 2018
Roadway lighting	Roadway lighting fixture, LED, 144 LEDS, 120 VAC or 12 VDC, 120 watt	52	Ea	$ 845.85	$ 43,984	RSMeans Line Number 265619550120 (Gary, IN) - Release Year 2018
Lighting	Lighting Poles 14 ft., Aluminum	30	Ea	$ 895.90	$ 26,877	RSMeans Line Number 265613102870 (Gary, IN) - Release Year 2018
Lighting wire	Lighting Wire 3/C # 12 Awg.	25	CLF	$ 70.57	$ 1,764	RSMeans Line Number 260519209050 (Gary, IN) - Release Year 2018
Grounding cable	Grounding Cable bare #500 MCM Copper	75	CLF	$ 715.72	$ 53,679	RSMeans Line Number 260526801240 (Gary, IN) - Release Year 2018
Grounding rod	Grounding rods 3/4 inch 10ft long	100	Ea	$ 42.04	$ 4,204	RSMeans Line Number 260526800100 (Gary, IN) - Release Year 2018
Lightning protection	Lightning Protection Air terminals	110	Ea	$ 22.52	$ 2,477	RSMeans Line Number 264113130400 (Gary, IN) - Release Year 2018
Lightning protection	Stranded copper lightning protection cables #500 MCM	90	CLF	$ 715.72	$ 64,415	RSMeans Line Number 260526801240 (Gary, IN) - Release Year 2018
Lighting controls	Lighting Controls	2	Ea	$ 380.38	$ 761	RSMeans Line Number 262913100100 (Gary, IN) - Release Year 2018
RSG conduit	1 inch RSG conduit for lighting and Misc.	5000	LF	$ 6.76	$ 33,800	RSMeans Line Number 260533131800 (Gary, IN) - Release Year 2018
Lightning connections	Lightning Exothermic connections	125	Ea	$ 268.27	$ 33,534	RSMeans Line Number 260526802530 (Gary, IN) - Release Year 2018
Vibration switch	Cooling tower fan vibration switch (Cables included in Misc.)	15	Ea	$ 1,600.00	$ 24,000	Prior project expereince and RSMeans Reference
Level switch	Basin Level Switches (Qty 2)	2	Ea	$ 1,500.00	$ 3,000	Prior project expereince and RSMeans Reference
Substation building	13.8 Kv Main Electrical substation building	1	Ea	$ 900,000.00	$ 900,000	Vendor quotation
Substation building	Cooling Tower Substations	1	Ea	$ 1,200,000.00	$ 1,200,000	Vendor quotation
Transformer	20 Mva transformer	1	Ea	$ 350,000.00	$ 350,000	Vendor quotation
Transformer	2500 Kva transformer	2	Ea	$ 150,000.00	$ 300,000	Vendor quotation
Switchgear	13.8 Kv Switchgear	1	Ea	$ 800,000.00	$ 800,000	Vendor quotation
Bus duct	13.8 Kv bus duct	1	Ea	$ 60,000.00	$ 60,000	Vendor quotation
Motor control center	LV MCC	2	Ea	$ 160,000.00	$ 320,000	Vendor quotation
MOV starter	Size 1 FVR Starter for Mot. Op Valves (Qty 8)	8	Ea	$ 3,000.00	$ 24,000	Vendor quotation
Switchboard	Switchboards	2	Ea	$ 35,000.00	$ 70,000	Vendor quotation
Switchgear battery	Battery System for MV switchgear	1	Ea	$ 100,000.00	$ 100,000	Vendor quotation
Vibration cabling	Cabling for Vibration System 1-shielded triad/sensor 4 cables to each pump motor & pump	40	CLF	$ 953.48	$ 38,139	Prior project expereince and RSMeans Reference
Terminations	Terminations	96	Ea	$ 0.07	$ 7	Prior project expereince and RSMeans Reference
Control system	Control System 1 lot including main processor, remote I/O etc. PLC Based	1	Ea	$ 250,000.00	$ 250,000	Prior project expereince
Vibration monitor	Vibration monitoring system 1 lot, includes installation	1	Ea	$ 80,000.00	$ 80,000	Prior project expereince
Startup and Testing Labor	Crew R-1: 1 electrician foreman, 3 electrician, 2 electrician apprentices	18	Days	$ 3,580.93	$ 64,457	RSMeans Crews Estimate Open Shop Crew R-1 (Gary, IN) - Release Year 2018
Flow transmitter	Flow transmitter	4	Ea	$ 3,150.00	$ 12,600	Prior project expereince
Heat tracing	Heat tracing Cable (assume 2 lines 50 feet each)	900	LF	$ 8.71	$ 7,839	RSMeans Line Number 220533200220 (Gary, IN) - Release Year 2018
Heat tracing	Heat tracing Power kit and end seal	15	Ea	$ 109.11	$ 1,637	RSMeans Line Number 220533200300 (Gary, IN) - Release Year 2018
Heat tracing	Heat tracing Power cable 120 volts 20 circuits 50'each 3/C #12 interlocked armored	9	CLF	$ 80.58	$ 725	RSMeans Line Number 260519200250 (Gary, IN) - Release Year 2018
Heat tracing	Heat Tracing Distribution Panel	1	Ea	$ 2,000.00	$ 2,000	Prior project experience
Heat tracing	Heat tracing main distribution panel feed assume 100 amp service 1000' long 1-3/C 1/0 cable armored	9	CLF	$ 1,101.10	$ 9,910	RSMeans Line Number 260519200600 (Gary, IN) - Release Year 2018
				Category Subtotal:	**$ 4,797,362**	
				Project Subtotal:	$ 81,194,505	

Contingency / Adjustments						
Conceptual Design Contingency	Contingencies, at conceptual design stage	35	%	Subtotal	$ 28,418,077	Gary Works Site Historical Project Budgets

Mechanical Draft Cooling Tower Closed-Cycle Recirculation System Preliminary Design - Construction Cost

Item	Description	Quantity	Unit	Unit Price	Cost	Source
Extraneous Contingencies	Buried piping uncertainties, geotechnical uncertainties	17.5	%	Subtotal	$ 14,209,038	Estimated contingency
Contractor Inexperience	General contractor management, inexperienced	20	%	Subtotal	$ 16,238,901	Gary Works Site Historical Project Budgets
Construction Management	Construction management fees, scheduling, budgeting, safety oversight, etc.	10	%	Subtotal	$ 8,119,450	Gary Works Site Historical Project Budgets
				Const. Subtotal:	**$ 148,179,971**	
Permitting / Engineering						
Environmental Permitting	Wastewater permit modifications				$ 859,000	Preliminary Estimate
General Construction Permitting	Typical construction permit requirements, most cities, maximum	2	%	Const. Subtotal	$ 2,963,599	RSMeans Line Number 014126500100 (Gary, IN) - Release Year 2018
Engineering	Engineering fees, mechanical, maximum	20	%	Const. Subtotal	$ 29,635,994	Gary Works Site Historical Project Budgets
				Total Cost:	**$ 181,638,564**	

ATTACHMENT 5: FINE MESH TRAVELING WATER SCREEN RETROFIT BUDGETARY QUOTATION

U.S. STEEL – GARY WORKS

ENCERCON

Excellence—Every project. Every day.

April 18, 2019

To: Enercon cc: M. McIvers, Olympic

Attention: Trevor Smith

Subject: On-Site Conversion of Traveling Water Screen to
Best Technology Available (BTA) Fish Protection Traveling Water Screens
Evoqua Water Technologies LLC Budget Proposal

Evoqua Water Technologies LLC is pleased to offer this Budget Proposal on the subject project in response to your inquiry. Please be advised that the enclosed budgetary proposal is a non-binding commitment, as such it should be utilized for review and informational purposes only, and does not constitute an offer for acceptance and is subject to Evoqua Water Technologies LLC executive management approval.

Should this budgetary proposal receive your favorable consideration, Evoqua will work with you to define the scope and reach a mutual agreement on the Terms and Conditions of Sale. We will then send a new firm proposal which consolidates our understanding on all issues.

Should additional information be required, please do not hesitate to contact our local Evoqua Water Technologies LLC Intake Product Line Representative, Olympic Engineered Sales or contact me directly at (226) 378-8525, or scott.cernanec@evoqua.com. Evoqua Water Technologies LLC also invites you to visit its web site at http://www.evoqua.com.

Very truly yours,

Scott Cernanec
Regional Sales Manager
Evoqua Water Technologies LLC

BUDGET PROPOSAL

PROPOSAL NUMBER: DATE: April 18, 2019

To: Enercon

FROM: Scott Cernanec
Regional Sales Manager
Evoqua Water Technologies LLC

Attention: Trevor Smith

Subject: Materials for On-Site Conversion of Two Traveling Water Screen to Best Technology Available (BTA) Fish Protection Traveling Water Screen Evoqua Water Technologies LLC Budget Proposal

Gentlemen:

Evoqua Water Technologies LLC proposes and hereby offers to contract with your company, in accordance with the specifications and subject to the terms and conditions stated herein, to furnish, and sell certain equipment to you:

Materials for On-Site Conversion of Existing Thru-Flow Traveling Water Screen, to Best Technology Available (BTA) Fish Protection Traveling Water Screen

All the information in this proposal is confidential and has been prepared for your use solely in considering the purchase of the equipment described. Transmissions of all or any part of this information to others or use by you for other purpose is unauthorized without our written consent.

The equipment will conform to the technical specifications and descriptions contained herein:

1.0 SCOPE OF SUPPLY

1.1 BASIC DATA FOR EACH TRAVELING WATER SCREEN WITH ADDITIONAL FISH PROTECTION COMPONENTS

Width of baskets .... 10’-0”

New Screen centers .... 33’-0”

Width of screen well .... 11’-2”

Depth of screen well.. 37’-0”

Capacity ....

Low water depth.. ”

Average velocity at low water
depth with 100% clean screen .... 1.8 fps

Approximate speed of screen baskets.. 10 fpm

Horsepower of motor .... 2 HP

Wire mesh specifications... 16ga (0.063” dia)
304 Stainless Steel Wire
with ¼” x 3/16” Rectangular
Openings – <u>Smooth Top</u>

Spray Wash Water Requirements, per Screen (at Traveling Water Screen Inlet)

Debris Header:	238	GPM at	80 PSI
Dual Fish Header:	176	GPM at	15 PSI
Auxiliary Fish Header:	70	GPM at	7 PSI
Spray Wash Total – PER SCREEN	***484***	***GPM at***	***80 PSI***

1.2 NEW PARTS FOR TWO (2) EXISTING TRAVELING WATER SCREENS

1.2.1 Baskets

Quantity of baskets ....

Width of baskets .... 10'-0"

Type of basket.. Modified Ristroph Fish Basket

Wire mesh specifications.. 16ga (0.063" dia) 304 Stainless Steel Wire with ¼" x 3/16" Rectangular Openings – Smooth Top

Mesh-to-basket fasteners .... 18-8 Stainless Steel

1.2.2 Seal Plates

QuSeal Plates .... Non-Metallic

1.2.3 Basket-to-Chain Fasteners

Basket-to-Chain Fasteners .... 18-8 Stainless Steel

1.2.4 Extra Main Chain due to Raised Head Section

Quantity of Chain .... 12 feet per screen

Chain .... Non-Lube; 24" Pitch

- Sidebars ....C1045 Steel
- Rollers ....C8620 Steel
- Pins ....C8620 Steel
- Bushings...C8620 Steel

1.2.5 Head Section Assembly (Galvanized Carbon Steel)

Headshaft	C1045 Steel
Head Sprockets	Carbon Steel
Tooth Inserts	416 Stainless Steel
Fasteners for Tooth Inserts	18-8 Stainless Steel
Headshaft Bearings	Thordon bushing in cast steel housing
Take Up Screws	303 Stainless Steel
Head Section Frame	Carbon Steel
Motor	2 HP
Gear Reducer (Drive)	Shaft-Mounted Helical Gearbox
Pipe Supports	Carbon Steel
Piping U-Bolts	Stainless Steel

1.2.6 Fiberglass Splash Housings

Front Splash Housings	Fiberglass 2-Piece, Removable Rex® Style Fold Down Design With Viewing Port.
Rear Splash Housings	Fiberglass with Upper Fish Trough and Lower Debris Trough. Inspection Doors are Included.
Fish Trough and Debris Trough	Fiberglass
Trough Supports	Carbon Steel

1.2.7 Spray Piping (Painted Carbon Steel)

Auxiliary Fish Spray Pipe .... 1½" Carbon Steel

Dual Fish Spray Pipes.. 2½"/2" Carbon Steel

Debris Spray Pipe .... 3" Carbon Steel

Spray Water Supply Flange Size (1 per screen).................................... 4" Diameter

Spray Nozzles .... Brass

1.2.8 Spray Wash Valves (per screen)

- One (1) 4" Motorized Bray Butterfly Valve, cast iron body with stainless steel disc/stem; Bray Series 70 electric on/off actuator
- One (1) 4" Manual Bray Butterfly Valve, cast iron body with stainless steel disc/stem
- One (1) 3" Cla-Val Pressure Reducing Valve (80 psi to 17psi); ductile iron body with flanged ends
- One (1) 1½" Cla-Val Pressure Reducing Valve (17 psi to 7psi); ductile iron body with flanged ends
- One (1) 4" Motorized Bray Butterfly Valve, cast iron body with stainless steel disc/stem; Bray Series 70 electric on/off actuator
- One (1) 4" Manual Bray Butterfly Valve, cast iron body with stainless steel disc/stem
- One (1) 3" Manual Ball Valve Per Screen for Debris Flush Out; threaded ends
- One (1) 2½" Manual Ball Valve Per Screen for Fish Flush Out ; threaded ends
- One (1) 1½" Manual Ball Valve Per Screen for Auxiliary Fish Flush Out ; threaded ends
- Three (3) Pressure Gauges

1.2.9 Fasteners and Anchor Bolts

Fasteners and Anchor Bolts .... 18-8 Stainless Steel

1.3 DESCRIPTION OF OPERATION

1.3.1 Evoqua Modified Ristroph Fish Protection System

The Traveling Water Screen Fish Protection System as described in the attached Specifications is designed to remove fish and fingerlings which are unable to escape from in front of the screen, safely transport and return them to the source water downstream of the screen intake. This system is an optional auxiliary system designed to work in conjunction with the debris removal function of the Traveling Water Screen. The system may be furnished as described in this specification on new Traveling Water Screens or modified for site specific retrofit of existing equipment.

Fish survival rates are maximized when the traveling water screen fish protection system is employed as part of an overall screen intake design that allows fish to escape the intake current. This is accomplished by sizing the screens to limit approach velocity to and by providing escape ports or passageways for fish.

“Best Technology Available (BTA)” currently available is the Modified Ristroph High Strength Composite (HSC) Fish Basket. This design incorporates a unique flow profile that is proven to virtually eliminate turbulent vortexing within the fish conveyance zone; therefore, minimizing descaling and injuries.

1.3.2 GENERAL

Evoqua shall furnish a complete fish protection system designed to remove small fish and fingerlings unable to escape from in front of the screen and safely return them to the source water downstream of the screen intake. The fish shall be transported in water at all times and returned to the source water as soon as practical by removing the fish from the screen on the upper rear descending chain side of the screen.

1.3.3 THEORY OF OPERATION

Fish and debris removal functions of the traveling water screen shall be separate with dedicated spray headers and troughs (or chutes) for each. Fish shall be removed on the upper rear descending side of the screen and debris removed on the lower rear descending chain side of the screen.

The fish shall be lifted to the operating floor level in a watertight fish bucket which is integral with bottom member of each screen basket. The fish shall discharge by sliding off the basket, aided by a low pressure spray which shall gently flush the fish from the tray into a trough for sluicing to the source water.

1.3.4 FISH PROTECTION COMPONENTS

The screens shall be equipped with the following components for fish handling:

- A fish survival bucket of proven design integral with the bottom member/rail of each basket or tray
- A canted screen basket equipped with Smooth Tex (smooth top) wire mesh
- A low pressure spray system on the descending side for the removal of impinged fish. The spray system shall consist of an internal and external sprays located above the high-pressure debris spray.
- A flap seal to prevent fish from dropping back into the screen well.
- A separate fish trough for receiving fish removed from the screens.

The screens shall be equipped with fish handling and protection features consisting of integral fish buckets on the bottom rail of each basket, canted screen basket with Smooth Tex wire mesh, flap seal and a low pressure spray wash system for the removal of the fish. These features shall be designed and proven to minimize harm to the fish impinged on the screens. The screenings and fish shall be carried by the screen baskets above the operating floor where they are to be removed on the descending side by a series of low and high pressure sprays into a debris trough and fish trough, respectively. The low-pressure fish sprays shall be located above the high pressure sprays to preclude the high pressure sprays from damaging the fish.

FISH PROTECTION SYSTEM INCLUDES

- BTA Modified Ristroph High Strength Composite (HSC) Baskets with Integral Fish Bucket
- Smooth-Tex Screen Mesh for Baskets
- Auxiliary Fish Spray Header
- Dual Fish Spray Header
- One (1) 4” Manual Ball Valve Per Screen for manual shut-off
- One (1) 3” Cla-Val Pressure Reducing Valve Per Screen (80 psi to 17psi); ductile iron body with flanged ends
- One (1) 1½” Cla-Val Pressure Reducing Valve Per Screen (17 psi to 7psi); ductile iron body with flanged ends
- One (1) 3” Manual Ball Valve Per Screen for Debris Flush Out; threaded ends
- One (1) 2½” Manual Ball Valve Per Screen for Fish Flush Out ; threaded ends
- One (1) 1½” Manual Ball Valve Per Screen for Auxiliary Fish Flush Out ; threaded ends
- Three (3) Pressure Gauges

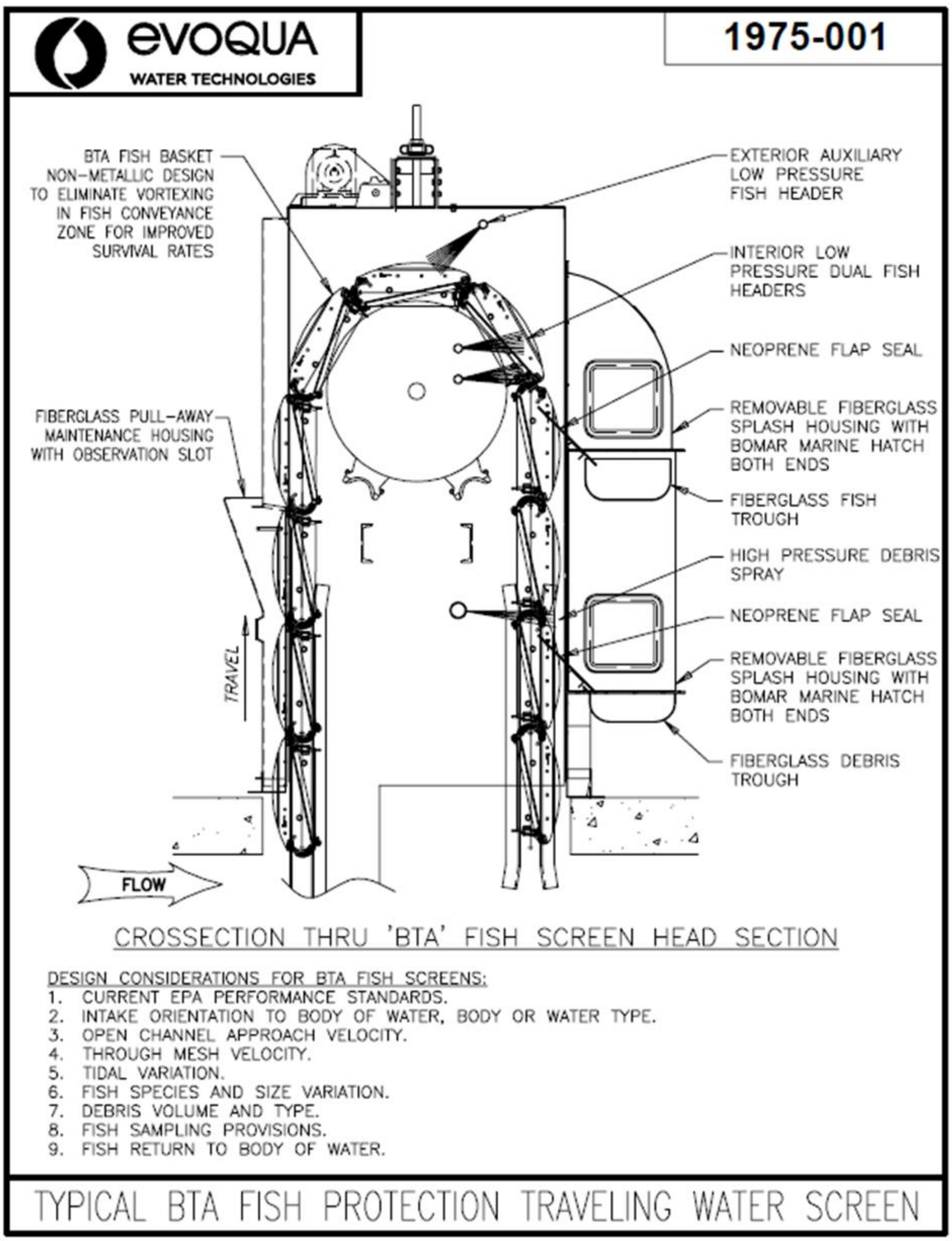
1.3.4.1 SPECIALIZED MESH

The screen mesh shall be a stainless steel Smooth Tex construction, sufficiently rigid to preclude fatigue failure due to flexing. The mesh shall have ¼" x 3/16" openings with the long dimension oriented in the vertical direction. The mesh shall be secured to the baskets by non-metallic retainer bars of sufficient number to secure the screen mesh firmly to the basket frame.
The screen mesh shall be especially designed and manufactured to minimize harm and abrasion to the impinged fish. The screen mesh shall be canted to facilitate entry of fish into the fish bucket and the discharge of fish with minimal harm. The fish bucket shall comprise an integral part of the bottom rail.

1.3.4.2 LOW PRESSURE SPRAY SYSTEM

The low-pressure spray nozzles shall consist of an upper outside spray positioned to keep the fish wet and sliding freely as the bucket is emptied, and lower inside sprays to assist in sluicing the fish into the collection trough with minimal harm. The spray wash shall be on the descending side with the low-pressure sprays above the high-pressure debris screenings spray.

The below graphic 1975-001 shows our typical BTA Fish Protection head section. The screens in this proposal will have a lower fiberglass debris “chute”, in lieu of the fiberglass debris “trough” shown below. Our debris chute will dump into the existing concrete trench.



1.3.4.3 FLAP SEAL

A flap seal will be provided just above each trough to prevent fish and debris from dropping back into the screen well and to help direct the fish and debris into the troughs and chutes.
The flap seals shall extend the full width of the screen and consist of a flexible rubber or neoprene strip attached to a rigid horizontal steel member securely fastened to the screen housing at each end. The flap seal for containing the fish shall be of a proven design and shall extend to engage the basket mesh. The flap seals shall be constructed of durable materials and easily replaced.

1.3.4.4 FISH TROUGH

The fish trough shall be constructed out of 3/16” molded fiberglass and shall extend the full width of the screens. The trough shall be a minimum of 18” wide. A minimum of 2” of water shall be provided at the shallow end of the trough at all times. The fish trough shall have rounded corners of fillets to prevent dead areas where fish can be collected. The fish trough shall be located above the debris trough which will be on the descending side of the screen, above the operating floor.

1.3.4.5 HIGH STRENGTH COMPOSITE MODIFIED RISTROPH FISH BASKETS

Evoqua Water Technologies LLC is proposing screen baskets constructed of High Strength Composite materials consisting of pultruded cross beams and compression molded end plates. The cross beams shall be reinforced polyester and the end plates shall be glass reinforced vinylester. The screen mesh retainer tabs shall be nylon and all hardware shall be stainless steel.

The integral fish bucket design of the High Strength Composite Best Technology Available (BTA) Modified Ristroph Fish Basket minimizes turbulence due to a cross section not featured in conventional steel fish baskets

Up to 50% lighter basket design than steel or stainless steel – reduces hanging weight, motor torque, wear and tear on mechanical components, and maintenance requirements which is of importance due to continuous operation requirement of 316 (b) regulation.

Constructed of advanced composites that are lighter than steel, these High Strength Composite baskets are able to withstand higher head loss pressures than standard carbon steel or stainless steel baskets.

This HSC basket design presents a lightweight, easy-to-handle, corrosion-resistant basket frame. This reduced weight, compared to carbon steel, affords easier installation and removal, while still being able to withstand higher head loss pressures than standard steel baskets. In addition, the lighter basket significantly reduces hanging weight (the weight of the baskets as they hang statically on the other machinery). The reduction in hanging weight will reduce the wear on components such as head shaft take-up bearings, sprocket tooth inserts and chain joints.

1.3.4.6 NON-METALLIC SEAL PLATES

Along with the high strength composite basket frames, Evoqua Water Technologies LLC is proposing non-metallic seal plates. These seal plates are lightweight and corrosion resistant. The curved seal plates prevent the passage of solids between ascending and the main frame and boot at the bottom of the well.

1.3.5 GUIDEWAYS
Wall guides are existing and are to be reused.

1.3.6 SHOP ASSEMBLY
Standard shop assembly includes assembly of the head section frame and shaft components for shipment as a unit. The drive assembly and spray pipes will be shipped separately for assembly in the field.

Baskets will be assembled with cloth and retainer tabs for field assembly to the chains.

Splash housings are shipped separately for assembly to the head section in the field.

NOTE: Field erector must check all sub-assemblies described above to assure that alignment was not disturbed or distorted in shipment, and correct any dimensional variations before installing.

1.3.7 Painting
All ferrous structural shapes, plates and castings, except machinery, machined items, galvanized items and main basket chains, will have surface preparation in accordance with SSPC-SP10 followed by two (2) shop coats of PPG Amercoat 370 black epoxy paint at 5-6 mils D.F.T. each coat for a total system finish D.F.T of 10-12 mils.

The main basket chain will not be painted, but lubricated and dipped in a rust preventative solution before shipment.

Stainless steel items will not be painted.

Galvanized steel items will not be painted.

2.0 DRAWINGS

We will furnish general arrangement drawings of the equipment to assist you in its installation.

3.0 SELECTION OF COMPONENTS

Where equipment specified herein is identified as that of a particular manufacturer, whether or not followed by the words "or equal", we reserve the right to furnish the equipment as specified or of equivalent specification by another manufacturer. Your preference for a manufacturer, other than selected by us, will be considered, but will make the price subject to review.

4.0 WORK NOT INCLUDED IN THIS PROPOSAL

The following work is not included in this proposal; however, if required it is to be provided by the Purchaser:

- Screen wells, concrete troughs and grouting.
- Foundation bolts and setting of foundation bolts.
- Building alterations and concrete alterations.
- Electrical controls including motor starters.
- Differential head controls.
- 460 volt, 3 PH, 60 Hertz current for screen motor.
- Electrical wire, conduit and electrical wiring.
- Spray water pumps.
- Spray water supply lines to the water screen.
- Spare parts.
- Wall guides.
- Spray water as recommended in this proposal.
- Drilled holes in fiberglass housings to match the head section.
- Field touch-up paint and painting.
- Unload, store, assemble and erect in place all material covered in this proposal.
- All required lubricants including first fill of all equipment covered in this proposal.
- Field check of dimensions and alignment of factory assembled sections before installing.
- It will be the purchaser's responsibility to check quantities and conditions of all materials immediately upon receipt of at the jobsite and to inform Evoqua Water Technologies LLC of any shortages or damaged components within 15 days after receipt of any shipment.

5.0 TECHNICAL CLARIFICATIONS

1. Our offer includes materials for an on-site conversion of Thru-Flow Traveling Water Screens to Best Technology Available (BTA) Fish Protection Traveling Water Screens.

2. Our offer included painted carbon steel piping and fittings, in lieu of galvanized carbon steel piping and fittings.

3. Our offer includes threaded piping and fittings, in lieu of welded piping and fittings.

4. Spray wash piping will terminate approximately 6” outside of the screen head section. Spray wash water pumps and spray wash water supply piping from the spray wash water pumps to the traveling water screen are not included in our proposal.

5. Our fish trough and debris trough will terminate approximately 1’-0” outside of the housing. Customer is responsible for providing troughs beyond this point.

6. Please be aware that we are not including the following items:
    - Electrical Controls
    - Pressure Switch
    - Spare Parts
    - Wall Guides
    - Spray wash pump
    - Field service
    - Removal and Installation

6.0 BUDGET PRICE

The Budget Price for the equipment covered in this Proposal shall be:

Materials for On-Site Conversion of
Existing Traveling Water Screens to Fish Protection .... $ 290,000.00

This budgetary proposal is a non-binding commitment. It is being utilized for review and informational purposes, and does not constitute an offer for acceptance. This proposal, by Evoqua Water Technologies LLC ("EWT") is contingent upon several items including: (i) resolution of mutually acceptable payment terms; (ii) EWT satisfactory completion of an anti-corruption due diligence review; (iii) a written agreement specifically acknowledging acceptance of terms and conditions mutually agreed upon by the parties and (iv) subject to credit approval by EWT.

Sales and/or use tax is not included in the price quoted. Such taxes will be added unless the purchaser can provide a direct pay permit, or an exemption certificate for the applicable tax jurisdiction.

Steel Tariff: Our price does not include any impact of the new steel tariffs as the current price impact over the term of this proposal validity cannot be determined due to market volatility. Prior to order placement please contact us for current pricing.

6.1 PURCHASER NOTE

Our prices include only the specific items detailed in this proposal. Items specified in the Owner's specifications and not included herein are to be furnished by others. Please refer to the General Information section of this proposal for a list of items generally furnished by others.

6.2 CONDITIONS OF SALE

We propose to use Evoqua Water Technologies LLC ("EWT") Standard Terms of Sale effective May 2015 attached and these terms of sale shall become part of any contract resulting from this proposal. EWT reserves the right to review the commercial Terms and Conditions of Sale with you to reach a mutual agreement at the time of any resultant Purchase Order.

EWT shall not be liable for liquidated damages or any penalty or damages relating to failure or inability to ship within the agreed schedule.

6.3 SHIPMENT INFORMATION

On any ensuing contract, we shall mutually agree upon a production schedule. Based upon our current backlog, we estimate the following project schedule:

Submittal Drawings: .... Within 3 weeks after receipt and acceptance of a complete written agreement, including complete information necessary to prepare our submittal.

Receipt of Submittal Approvals: .... Within 2 weeks from the date of our Submittal Transmittal letter.

Shipment of Equipment: .... Within 14 weeks following receipt of final approved submittal drawings.

Note: Above schedules are standard and subject to review and mutual agreement at time of order placement. We will work with you to define a schedule that meets your requirements taking into consideration our backlog at that time.

Evoqua has provided typical standard times and shipment dates. Actual times will be provided upon receipt of a Purchase Order based upon current backlog. Evoqua will work closely with the General Contractor and/or Engineer to provide delivery dates to meet the overall project schedule as possible.

If Submittal Drawing Reviews/Approvals are not received by Evoqua in accordance with the project schedule noted above, Evoqua shall be entitled to a reasonable extension of the "Shipment of Equipment" times and/or a reasonable increase in the contract price to cover costs incurred as a result of Submittal Drawing Review/Approval delays unless the delay is the fault of Evoqua.

6.4 GENERAL INFORMATION

Evoqua Water Technologies LLC prices do not include sales, use, excise, or other similar taxes, and all such taxes shall be paid by the Purchaser. Our price does not include the cost of premiums for any bonds which the purchaser may be required to furnish.

Operation and Maintenance Manuals are electronically housed and available 24/7 on Evoqua's secure ToolDOXT portal, see www.evoqua.com/intake-tooldox for additional information including Terms and Agreements. Hard copy manuals can be printed from the ToolDOX site or purchased for $50.00/copy.

The attached Standard Conditions of Sale form a part of this proposal. ALL ORDERS ARE SUBJECT TO EVOQUA WATER TECHNOLOGIES LLC CREDIT APPROVAL.

EVOQUA WATER TECHNOLOGIES LLC

Standard Terms of Sale

1. **Applicable Terms.** These terms govern the purchase and sale of equipment, products, related services, leased products, and media goods if any (collectively herein "Work"), referred to in Seller's proposal ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is expressly conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. **Payment.** Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation specifically provides otherwise, freight, storage, insurance and all taxes, levies, duties, tariffs, permits or license fees or other governmental charges relating to the Work or any incremental increases thereto shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. If Buyer claims a tax or other exemption or direct payment permit, it shall provide Seller with a valid exemption certificate or permit and indemnify, defend and hold Seller harmless from any taxes, costs and penalties arising out of same. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval by Seller. Back charges without Seller's prior written approval shall not be accepted.

3. **Delivery.** Delivery of the Work shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, delivery terms are ExWorks Seller's factory (Incoterms 2010). Title to all Work shall pass upon receipt of payment for the Work under the respective invoice. Unless otherwise agreed to in writing by Seller, shipping dates are approximate only and Seller shall not be liable for any loss or expense (consequential or otherwise) incurred by Buyer or Buyer's customer if Seller fails to meet the specified delivery schedule.

4. **Ownership of Materials and Licenses.** All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data, software and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's property. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the Work. Buyer shall not disclose any such material to third parties without Seller's prior written consent. Buyer grants Seller a non-exclusive, non-transferable license to use Buyer's name and logo for marketing purposes, including but not limited to, press releases, marketing and promotional materials, and web site content.

5. **Changes.** Neither party shall implement any changes in the scope of Work described in Seller's Documentation without a mutually agreed upon change order. Any change to the scope of the Work, delivery schedule for the Work, any Force Majeure Event, any law, rule, regulation, order, code, standard or requirement which requires any change hereunder shall entitle Seller to an equitable adjustment in the price and time of performance.

6. **Force Majeure Event.** Neither Buyer nor Seller shall have any liability for any breach or delay (except for breach of payment obligations) caused by a Force Majeure Event. If a Force Majeure Event exceeds six (6) months in duration, the Seller shall have the right to terminate the Agreement without liability, upon fifteen (15) days written notice to Buyer, and shall be entitled to payment for work performed prior to the date of termination. "Force Majeure Event" shall mean events or circumstances that are beyond the affected party's control and could not reasonably have been easily avoided or overcome by the affected party and are not substantially attributable to the other party. Force Majeure Event may include, but is not limited to, the following circumstances or events: war, act of foreign enemies, terrorism, riot, strike, or lockout by persons other than by Seller or its sub-suppliers, natural catastrophes or (with respect to on-site work), unusual weather conditions.

7. **Warranty.** Subject to the following sentence, Seller warrants to Buyer that the (i) Work shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship and (ii) the Services shall be performed in a timely and workmanlike manner. Determination of suitability of treated water for any use by Buyer shall be the sole and exclusive responsibility of Buyer. The foregoing warranty shall not apply to any Work that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other liability to Buyer under warranty, tort or any other legal theory. The Seller warrants the Work, or any components thereof, through the earlier of (i) eighteen (18) months from delivery of the Work or (ii) twelve (12) months from initial operation of the Work or ninety (90) days from the performance of services (the "Warranty Period"). If Buyer gives Seller prompt written notice of breach of this warranty within the Warranty Period, Seller shall, at its sole option and as Buyer's sole and exclusive remedy, repair or replace the subject parts, re-perform the Service or refund the purchase price. Unless otherwise agreed to in writing by Seller, (i) Buyer shall be responsible for any labor required to gain access to the Work so that Seller can assess the available remedies and (ii) Buyer shall be responsible for all costs of installation of repaired or replaced Work. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Work in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover (i) damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller) and (ii) media goods (such as, but not limited to, resin, membranes, or granular activated carbon media) once media goods are installed. THE WARRANTIES SET FORTH IN THIS SECTION 7 ARE THE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO THE LIMITATION OF LIABILITY PROVISION BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

8. **Indemnity.** Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

9. **Assignment.** Neither party may assign this Agreement, in whole or in part, nor any rights or obligations hereunder without the prior written consent of the other party; provided, however, the Seller may assign its rights and obligations under these terms to its affiliates or in connection with the sale or transfer of the Seller's business and Seller may grant a security interest in the Agreement and/or assign proceeds of the agreement without Buyer's consent.

10. **Termination.** Either party may terminate this agreement, upon issuance of a written notice of breach and a thirty (30) day cure period, for a material breach (including but not limited to, filing of bankruptcy, or failure to fulfill the material obligations of this agreement). If Buyer suspends an order without a change order for ninety (90) or more days, Seller may thereafter terminate this Agreement without liability, upon fifteen (15) days written notice to Buyer, and shall be entitled to payment for work performed, whether delivered or undelivered, prior to the date of termination.

11. **Dispute Resolution.** Seller and Buyer shall negotiate in good faith to resolve any dispute relating hereto. If, despite good faith efforts, the parties are unable to resolve a dispute or claim arising out of or relating to this Agreement or its breach, termination, enforcement, interpretation or validity, the parties will first seek to agree on a forum for mediation to be held in a mutually agreeable site. If the parties are unable to resolve the dispute through mediation, then *any dispute, claim or controversy arising out of or relating to this Agreement or the breach, termination, enforcement, interpretation or validity thereof, including the determination of the scope or applicability of this agreement to arbitrate, shall be determined by arbitration in Pittsburgh, Pennsylvania before three arbitrators* who are lawyers experienced in the discipline that is the subject of the dispute and shall be jointly selected by Seller and Buyer. *The arbitration shall be administered by JAMS pursuant to its Comprehensive Arbitration Rules and Procedures. The Arbitrators shall issue a reasoned decision* of a majority of the arbitrators, which shall be the decision of the panel. Judgment may be entered upon the arbitrators' decision in any court of competent jurisdiction. The substantially prevailing party as determined by the arbitrators shall be reimbursed by the other party for all costs, expenses and charges, including without limitation reasonable attorneys' fees, incurred by the prevailing party in connection with the arbitration. For any order shipped outside of the United States, any dispute shall be referred to and finally determined by the International Center for Dispute Resolution in accordance with the provisions of its International Arbitration Rules, enforceable under the New York Convention (Convention on the Recognition and Enforcement of Foreign Arbitral Awards) and the governing language shall be English.

12. **Export Compliance**. Buyer acknowledges that Seller is required to comply with applicable export laws and regulations relating to the sale, exportation, transfer, assignment, disposal and usage of the Work provided under this Agreement, including any export license requirements. Buyer agrees that such Work shall not at any time directly or indirectly be used, exported, sold, transferred, assigned or otherwise disposed of in a manner which will result in non-compliance with such applicable export laws and regulations. It shall be a condition of the continuing performance by Seller of its obligations hereunder that compliance with such export laws and regulations be maintained at all times. BUYER AGREES TO INDEMNIFY AND HOLD SELLER HARMLESS FROM ANY AND ALL COSTS, LIABILITIES, PENALTIES, SANCTIONS AND FINES RELATED TO NON-COMPLIANCE WITH APPLICABLE EXPORT LAWS AND REGULATIONS.

13. **LIMITATION OF LIABILITY.** NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE WORK, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR ALL WARRANTY CLAIMS OR FOR ANY BREACH OR FAILURE TO PERFORM ANY OBLIGATION UNDER THE CONTRACT, SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE WORK. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

14. **Rental Equipment / Services.** Any leased or rented equipment ("Leased Equipment") provided by Seller shall at all times be the property of Seller with the exception of certain miscellaneous installation materials purchased by the Buyer, and no right or property interest is transferred to the Buyer, except the right to use any such Leased Equipment as provided herein. Buyer agrees that it shall not pledge, lend, or create a security interest in, part with possession of, or relocate the Leased Equipment. Buyer shall be responsible to maintain the Leased Equipment in good and efficient working order. At the end of the initial term specified in the order, the terms shall automatically renew for the identical period unless canceled in writing by Buyer or Seller not sooner than three (3) months nor later than one (1) month from termination of the initial order or any renewal terms. Upon any renewal, Seller shall have the right to issue notice of increased pricing which shall be effective for any renewed terms unless Buyer objects in writing within fifteen (15) days of issuance of said notice. If Buyer timely cancels service in writing prior to the end of the initial or any renewal term this shall not relieve Buyer of its obligations under the order for the monthly rental service charge which shall continue to be due and owing. Upon the expiration or termination of this Agreement, Buyer shall promptly make any Leased Equipment available to Seller for removal. Buyer hereby agrees that it shall grant Seller access to the Leased Equipment location and shall permit Seller to take possession of and remove the Leased Equipment without resort to legal process and hereby releases Seller from any claim or right of action for trespass or damages caused by reason of such entry and removal.

15. **Miscellaneous.** These terms, together with any Contract Documents issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. To the extent the Agreement is considered a subcontract under Buyer's prime contract with an agency of the United States government, in case of Federal Acquisition Regulations (FARs) flow down terms, Seller will be in compliance with Section 44.403 of the FAR relating to commercial items and those additional clauses as specifically listed in 52.244-6, Subcontracts for Commercial Items (OCT 2014). If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. The Agreement shall be governed by the laws of the Commonwealth of Pennsylvania without regard to its conflict of laws provisions. Both Buyer and Seller reject the applicability of the United Nations Convention on Contracts for the international sales of goods to the relationship between the parties and to all transactions arising from said relationship.

ATTACHMENT 6: LOW PRESSURE SCREEN WASH PUMP BUDGETARY QUOTATION

U.S. STEEL – GARY WORKS

ENERCON

Excellence—Every project. Every day.

DRAFT FOR FINAL REVIEW

ENVIROTROL

Manufacturer's Representative

To: Trevor Smith
Attention: Estimator

May 9, 2019

RE**: Chicago Screen Wash Pumps**
Envirotrol Quote #E19-022

PRICING
All Addenda noted
Envirotrol is pleased to offer the following pricing on behalf of our principle, National Pump Company

SPEC SECTION	MFT'R	DESCRIPTION	PRICE
N/A	**National Pump Co**	VTP J12XHC-2 32 ft sump depth	**$41,592**
		18 ft sump depth	**$39,777**

FREIGHT and TAXES NOT INCLUDED: TERMS PER SCOPE OF SUPPLY

Best Regards,

Jeff Frey
Envirotrol

DRAFT FOR FINAL REVIEW

QUOTATION

Quote Prepared by: **NIKHIL MUTHUVENKATESH**
Nikhil.Muthuvenkatesh@natlpump.com
www.nationalpumpcompany.com
623-979-3560

7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTED TO:	SHIP TO:	QUOTE INFO:
ENVIRONMENTAL WATER SOLUTIONS	**ENVIRONMENTAL WATER SOLUTIONS**	**DATE:** APRIL 19, 2019
ATTN:		**QUOTE#:** Q-85316-B1
1162 E. DOMINGUEZ ST.	1162 E. DOMINGUEZ ST.	**CUSTOMER#:** 2507
CARSON, CA 90746	CARSON, CA 90746	**NAME:** Q-85316
PH:	PH:	
AP@EWSINC.ORG		

QUOTATION LINE ITEM SUMMARY

LINE	QTY	CONFIG#	CONFIG NAME / PART #	DESCRIPTION	NET PRICE	EXT. PRICE
1	1	C-131993	J12XHC-2 32 FT SUMP DEPTH	J12XHC-2		
2	1	ADDITIONAL ITEM	J12XHC-2	18 FT SUMP DEPTH		

AVAILABILITY:	FREIGHT TERMS:
8-10 WEEKS ARO	FOB ORIGIN; FREIGHT COLLECT

SPECIAL NOTES:	PAYMENT TERMS:
	NET 30 DAYS

National Pump Company (NPC) is pleased to quote these pump products for your application. All quotations are subject to NPC standard terms and conditons and acceptance from the main office in Glendale, AZ. A copy of our standard terms and conditions is attached. This quotation is valid for 30 days from the above date. This quote is in U.S. dollars. The purchase order must be issued in U.S. dollars. All quotations are subject to NPC standard progress payment terms.

USE OF VFD’s WITH CAST DISCHARGE HEADS – When using a cast discharge head, National Pump Company can only guarantee vibration free operation at full load speed. A cast discharge head may be acceptable for operating at reduced speeds if precautions are made by locking-out the operating speed(s) on the VFD IF vibration is experienced from the natural resonant frequency of the motor and discharge head structure. If a lock-out range is not acceptable or analysis is required, a fabricated discharge head must be provided.

DRAFT FOR FINAL REVIEW

QUOTATION

Quote Prepared by: **NIKHIL MUTHUVENKATESH**

Nikhil.Muthuvenkatesh@natlpump.com

www.nationalpumpcompany.com

623-979-3560

7706 NORTH 71ST AVE
GLENDALE, AZ 85303

Product: HE VTP	**Config Name:** Q-85316-1	**Config SN:** C-131993-B1

DESCRIPTION: C-131993 - J12XHC-2 32 FT SUMP DEPTH

QTY	ITEM	DESCRIPTION
1	**HE-VTP~**	J12XHC-2
1	**CONDITIONS OF SERVICE~**	2500 GPM @ 85' TDH
1	**BOWL ASSEMBLY~**	PRODUCT LUBE BOWL ASSEMBLY CAST IRON ENAMEL BOWLS BRONZE DYNAMICALLY BALANCED IMPELLERS SS BOLTING AND COLLETS 416 SS BOWL SHAFT BRONZE BEARINGS SUCTION BELL BRONZE BOWL AND IMPELLER WEAR RINGS 304 SS BASKET STRAINER
1	**COLUMN ASSEMBLY~**	STEEL BUTT COLUMN ASSEMBLY 10" X 5' AND 10" X 10' COLUMN PIPE 0.279" WALL THICKNESS STEEL COLUMN COUPLINGS 416 SS LINESHAFT 304 SS LINESHAFT COUPLINGS BRONZE BEARING RETAINERS NEOPRENE BEARINGS
1	**DISCHARGE HEAD ASSEMBLY~**	10" NF FAB STEEL DISCHARGE HEAD 16.5" DRIVER BD JOHN CRANE 5610 MECHANICAL SEAL AFS COUPLING 10-150# DISCHARGE FLANGE SOLE PLATE
1	**DRIVER~**	VERTICAL MOTOR 75 HP / 1800 RPM / VSS / NRR 16.5" DRIVER BD 3 PH / 60 HZ / 460 V WPI ENCLOSURE / CLASS B RISE 1.15 SF / 365VP FRAME / PREMIUM EFFICIENT
1	**TESTING~**	NON-WITNESSED PERFORMANCE TEST NON-WITNESSED HYDRO TEST OF BOWLS
1	**COATINGS~**	TNEMEC N140 EPOXY OD COATING OF BOWLS, HEAD AND COLUMN

Pump Data Sheet - National Pump Company

DRAFT FOR FINAL REVIEW

Company: Enercon/Chicago Project- Trevor Smith
Name: Screen Wash Pumps
Date: 4/18/2019

NATIONAL PUMP COMPANY
A GORMAN-RUPP COMPANY

Pump:

Size: J12XHC (2 stage)

Type: VERT.TURB.ENCLOSED
Synch speed: 1800 rpm

Speed: 1770 rpm
Dia: 9.6 in

Curve: CVJ12XHC4P6CY

Impeller: J12XHC (1/16)

Specific Speeds: Ns: 4500
Nss: 7800

Dimensions: Suction: ---
Discharge: ---

Vertical Turbine: Bowl size: 11.8 in
Max lateral: 1.38 in
Thrust K factor: 18.7 lb/ft

Pump Limits:

Temperature: 180 °F
Pressure: 280 psi g
Sphere size: 0.75 in

Power: 652 hp
Eye area: 38.3 in²

Search Criteria:

Flow: 2500 US gpm

Head: 85 ft

Fluid:

Water
SG: 1
Viscosity: 0.9946 cP

NPSHa: ---

Temperature: 68 °F
Vapor pressure: 0.3391 psi a
Atm pressure: 14.7 psi a

Motor:

Standard: NEMA
Enclosure: WP-I

Size: 75 hp
Speed: 1800
Frame: 365

Sizing criteria: Max Power on Design Curve

---- Data Point ----

Flow:	2500 US gpm
Head:	86.8 ft
Eff:	78.9%
Power:	69.4 hp
NPSHr:	25.4 ft

---- Design Curve ----

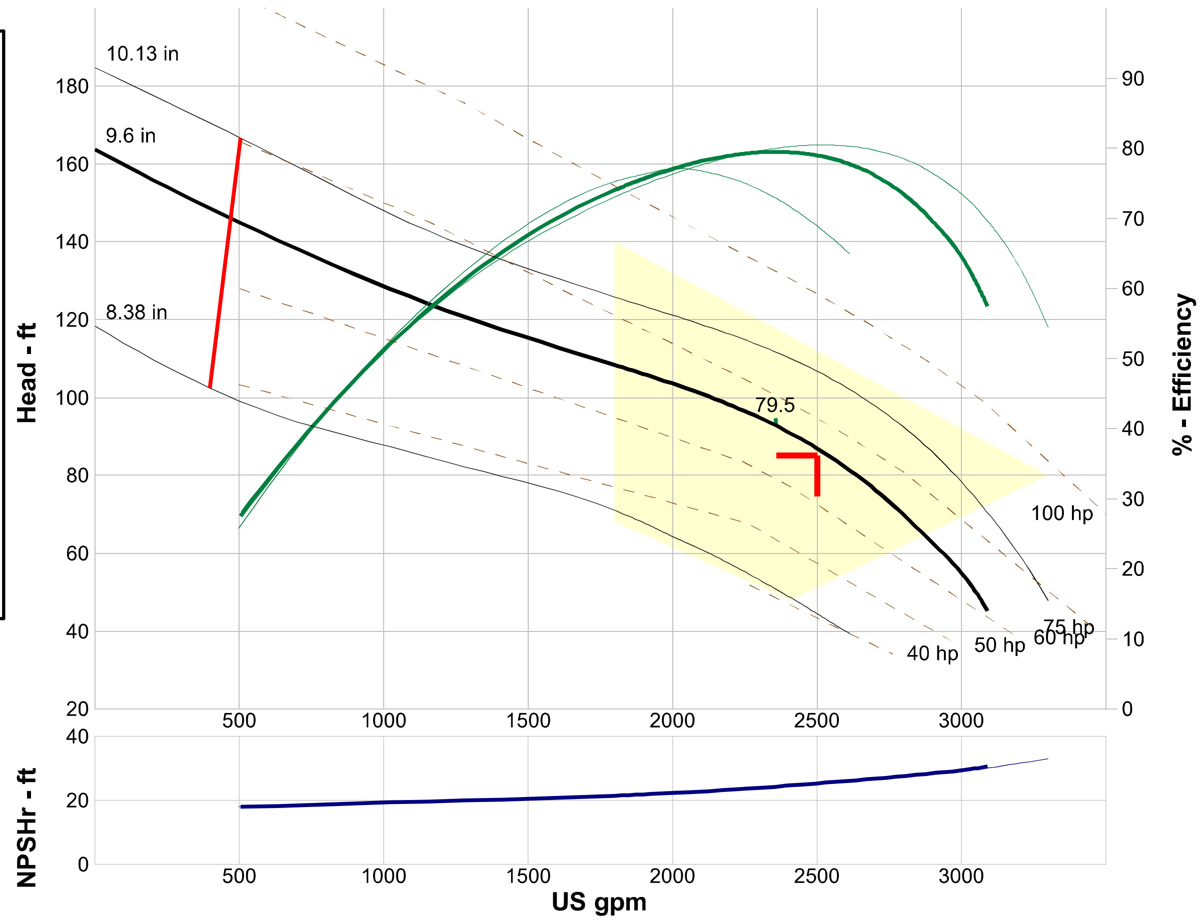
Shutoff head:	164 ft
Shutoff dP:	70.8 psi
Min flow:	471 US gpm

BEP: 79.5% @ 2357 US gpm

NOL power:
69.5 hp @ 2357 US gpm

-- Max Curve --

Max power:
83.8 hp @ 2520 US gpm



UNLESS OTHERWISE SPECIFIED: [1] PUMP LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
3000	1770	54.4	64	64.3	29.5
2500	1770	86.8	78.9	69.4	25.4
2000	1770	103	76.9	67.8	22.4
1500	1770	116	66.2	65	20.7
1000	1770	129	50.1	64.2	19.3

7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **NIKHIL MUTHUVENKATESH**
Nikhil.Muthuvenkatesh@natlpump.com
www.nationalpumpcompany.com
623-979-3560

NATIONAL PUMP COMPANY - STANDARD TERMS AND CONDITIONS OF SALE

1. ACCEPTANCE OF ORDERS: All orders are subject to acceptance by an Officer of the Company and orders and deliveries are subject to the Company's regular credit policy. The Company reserves the right to refuse any order based on a quotation containing a gross error.

2. PRICES: List prices and discount schedules are to be maintained at all times. Prices are for merchandise F.O.B. shipping points, freight collect or prepaid, are subject to change without notice and will be applied as in effect at time of shipment.

3. TERMS: Except as otherwise indicated, payment is due 30 days after date of invoices. Interest at the maximum legal rate will be charged on all overdue amounts.

4. TAXES: Taxes imposed by any Federal, State, County, or Municipal law on the sale will be added to the invoice, unless a fully executed tax exemption certificate is received with the order.

5. ORDER CHANGES: No changes in orders will be accepted from the Customer except by special written arrangement with the executive office.

6. RETURN OF GOODS: Written permission from the factory must be obtained before returning any merchandise. All transportation charges must be borne by the Customer. New material of current design accepted by the Company for credit is subject to a restocking charge of at least 15 percent.

7. CLAIMS: All goods shall be deemed delivered to purchaser at the time they are placed in the hands of carrier and consigned to purchaser.

8. ROUTING: If routing of shipment is specified on Customer's order, it will be followed whenever practical.

9. SUBSTITUTION: The Company reserves the right to substitute materials and Modify specification to the extent required in order to comply with any Government law or regulation.

10. MINIMUM ORDER AMOUNT: The minimum order amount to be charged on customer account is $50.00. All orders for less than this amount will be billed at the minimum of $50.00 not including tax or freight charges.

WARRANTY

Subject to the terms and conditions set forth below, National Pump Company ("National") warrants that its manufactured equipment is free from defects in workmanship and materials using its specifications as a standard. This warranty does not extend to anyone except the first purchaser to whom the goods are shipped from National.

National's obligation under this warranty is expressly limited to replacing or repairing, free of charge, F.O.B. point of manufacture, any defective part or parts of its manufactured equipment; however, National shall have no such liability except where it is shown to the satisfaction of National that the damage or claim resulted from breach of this warranty. All parts claimed defective must be delivered to National at its factory or any factory branch, freight or express thereon prepaid.

Every claim under this warranty shall be deemed waived unless made in writing and received by National within (30) days of the date the defect was discovered or shall have been discovered, and within one year of the date of installation. The installation date must be within six months of the date the pump was shipped from National.

This warranty does not cover those parts of the manufactured equipment which are not manufactured by National except to extend to the purchaser the same warranty, if any which is given to National by the manufacturers of said equipment.

National makes no other representation of warranty of any kind, expressed or implied, in fact or in law, including without limitation, the warranty of merchantability or the warranty of fitness for a particular purpose, other than the limited warranty set forth herein. In no event shall National be liable for any consequential or incidental damages resulting directly or indirectly from the use or loss of use of the manufactured equipment. National shall not be liable for any alleged negligence, breach of warranty, strict liability, or any other theory other than the limited liability set forth herein.

This warranty contains the entire warranty relating to the manufactured goods of National, and no conduct, oral statements or representations not contained in this warranty shall have any force or effect or be deemed a waiver thereof, this warranty shall not be modified in any way except if in writing and signed by an authorized representative of National.

This warranty, and any liability of National hereunder, shall be governed by, construed, and enforced in accordance with the laws of the State of Ohio.

NATIONAL PUMP COMPANY
A GORMAN-RUPP COMPANY
7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **NIKHIL MUTHUVENKATESH**
Nikhil.Muthuvenkatesh@natlpump.com
www.nationalpumpcompany.com
623-979-3560

NATIONAL PUMP COMPANY CONTACTS

ARIZONA

7706 North 71st Ave.
Glendale, AZ 85303

Toll free: (800) 966-5240
Phone: (623) 979-3560
Fax: (623) 979-2177

BRANCH

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Inside Sales / Customer Service	Tanya Coffman	TanyaC@natlpump.com
Inside Sales / Customer Service	Andrew Dewar	AndrewD@natlpump.com
Territory Sales Manager	Dennis Lund	DennisL@natlpump.com

EXPORT

Sales Manager/International	Richard Bowie	RichardB@natlpump.com
Sales Manager/Western Canada	Dennis Lund	DennisL@natlpump.com
Sales Manager/South America	Wilfredo Vicencio	WilfredoV@natlpump.com
Sales Manager/Asia Pacific	Gary Chee	nationalpump@singnet.com.sg

CORPORATE

VP of Sales and Marketing	Ken Kochamba	KenK@natlpump.com

ATTACHMENT 7: WEST MECHANICAL DRAFT COOLING TOWER BUDGETARY QUOTATION

U.S. STEEL – GARY WORKS

ENERCON

Excellence—Every project. Every day.

DRAFT FOR FINAL REVIEW

Budget Proposal

Evaporative Cooling Tower

Enercon - Chicago Ind. Proj.

April 1, 2019

EvapTech, Inc. is please to provide the following budgetary selection for your consideration:

EvapTech Budget Cooling Tower Selection

Selection Option	2nd Cooling Loop	
Budget Price, Excluding Sales or Uses Taxes	$ 1,099,440	
Design Conditions		
Water Flow Rate	35,347 GPM	
Hot Water Temperature	104.00 °F	
Cold Water Temperature	86.00 °F	
Design Entering Wet Bulb Temperature	78.00 °F	
Tower Description		
Model	ECE254-654T	
Structure Material	FRP	
Number of Fan Cells	2	
Fill Type | Film Thickness After Forming	TechClean 312	PVC (10 MIL)
Drift Rate | Evaporation Rate	0.001 %	1.63 %
Power Consumption		
Motor Nameplate per Cell	250.0 HP	
Power at Motor Shaft (AMS) | Total Power	248.0 HP	496.1 HP
Pumphead from Top of Basin Curb	27.10 ft	
Tower and Basin Dimensions		
Tower Overall Width x Length	54.00 ft	108.00 ft
Tower Height (Top of Curb to Top of Stack)	49.6 ft	
Concrete Basin (in to in) Width x Length	62.00 ft	116.00 ft
Tower Access: Stairs | Ladders	1	1

Basis of Pricing:

Installation labor:	Non-Union	Freight to:	Chicago, IL
Fire Protection:	No	Shipping Lead Time:	20-22 Weeks
Lightning Protection:	No	Est. Install Time:	8 Weeks
Tower Lighting:	No	Cold Water Basin:	New by Others
Power/Control Wiring:	No	Risers:	By Others
Performance Test:	None	Bypass:	None/By Others

Notes/Options:

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COOLING TOWER INQUIRY & BID FORM

Mechanical Draft Water Cooling Tower

Customer: Enercon - Chicago Ind. Proj.	**Manufacturer:** EvapTech, Inc. 8331 Nieman Road Lenexa, KS 66214
Inquiry #:	**Proposal No.:**
	Date: April 1, 2019

GENERAL:

Selection	2nd Cooling Loop 2-cells
Tower Model	ECE254-654T
Tower Type	Inline, Counter

DESIGN & OPERATING CONDITIONS:

Circulating Water Flow	35,347 GPM
Hot (Inlet) Water Temp.	104.00 °F
Cold (Outlet) Water Temp.	86.00 °F
Wet Bulb Temp., Inlet	78.00 °F
Relative Humidity	50.0 %
Tower Pump Head	27.10 ft
Total Fan Power, (Driver Output)	496.1 HP
Drift Loss, % of Circulating Flow	0.001 %
Evaporation Loss	1.63 %
Design Wind Load	IBC
Design Seismic Load	IBC
Tower Site (Ground Level, Roof, etc.)	Ground Level
Elevation Above Sea Level	0 ft
Tower Exposure	Access to all 4 sides, 4 air inlets

STRUCTURAL DETAILS:

Number of Cells	2
Fans per Cell	1
Total Number of Fans	2
Nominal Cell Dimension, LxW	54.00 ft x 54.00 ft
Overall Tower Dimension, LxW	108.00 ft x 54.00 ft
Air Inlet Height	8.00 ft
Fill Height	6.00 ft
Height-Basin Curb to Fan Deck	28.55 ft
Fan Stack Height	6.00 ft
Overall Tower Height	34.6 ft
Inside Basin Dimensions, LxW	116.00 ft x 62.00 ft

COOLING TOWER INQUIRY & BID FORM
Mechanical Draft Water Cooling Tower

STRUCTURAL DETAILS: (cont'd)

Column Extensions:	
Basin Depth	4.00 ft
Grade to Top of Basin Curb	2.00 ft
Anchorage	Floor
Hot Water Inlet:	
Number	2
Nominal Diameter	30 in
Description	Drilled to match a 125/150 lb. ANSI Flange
Height Inlet Above Basin Curb	16.30 ft
Access to Top of Tower (Stairs | Ladders)	1 | 1
Shipping Weight	278,893.5 lb
Operating Weight	416,259.0 lb

MATERIALS OF CONSTRUCTION:

Framework Members	FRP
FRP Casing	FRP FS<25 (12 OZ)
Filling	PVC (10 MIL)
Fill Supports	Structural Girts / Joists
Drift Eliminators	PVC Cellular Packs
Eliminator Spacers	N/A
Fan Stacks	FRP Non-FR
Louvers	None
Partitions	FRP FS<25 (12 OZ)
Fan Deck	FRP (Gritted)
Water Distribution - Type	Low Pressure Down Spray
Water Distribution - Materials	FRP Non-FR
Lumber Pre-Treatment	
Type of Treatment	N/A
Items Treated	N/A
Splashers or Spray Nozzles	ABS
Stairway	FRP FR
Structural Connectors	S304
Ring Joint Connectors	N/A
Bolts, Nuts, Washers	S304
Anchor Connectors	S304
Nails	N/A
Mechanical Equipment Support	Steel HDG
Anchor Bolts - Material	Series 316 Stainless Steel
Furnished by	EvapTech, Inc.
Cold Water Basin - Material	Concrete
Furnished by	New by Others
Basin Accessories, by EvapTech	None

COOLING TOWER INQUIRY & BID FORM
Mechanical Draft Water Cooling Tower

MECHANICAL EQUIPMENT:

Fans

Number	2
Type or Model	NCR 3207
Manufacturer	FanTR
Diameter	32.0 ft
Number of Blades	7
Fan Speed	118.32 rpm
Tip Speed	11,895 fpm
Power per Fan, (Driver Output)	248.0 HP
Blade Material	FRP
Hub Material	Double Epoxy
Total Static Pressure	0.6231 inWG
Velocity Pressure	0.2146 inWG
Air Delivery per Fan	1,528,873 CFM
Fan Static Efficiency	63.1 %
Fan Total Efficiency	84.8 %

Speed Reducer

Number	2
Type	Splash Lubricated, Right Angle
Model	Model 1712.5
Manufacturer	Amarillo
Reduction ratio	15.00
Service Factor at rated output of driver	2.02
Number of Reductions	2

Drive Shaft

Number	2
Type	Full Floating, Non-Lubricated
Model	Composite Series
Manufacturer	Addax/Rexnord
Model	Addax LRR850.825
Drive Shaft Material	Composite Shaft & Flange
Coupling Material	316 Stainless steel with composite flex elements

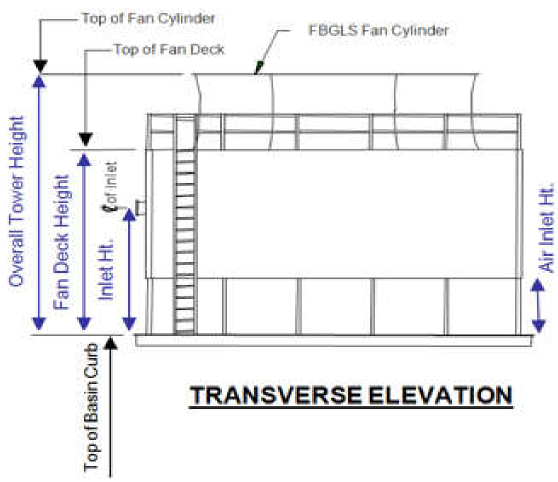
Driver

Number	2
Kind	Electric
Enclosure	TEFC
Manufacturer	No Preference
Full Load Speed, RPM	1800 RPM
Elec. Char. -Phase/Cycles/Volts	3/60/460 V
Rated Capacity	250.0 HP

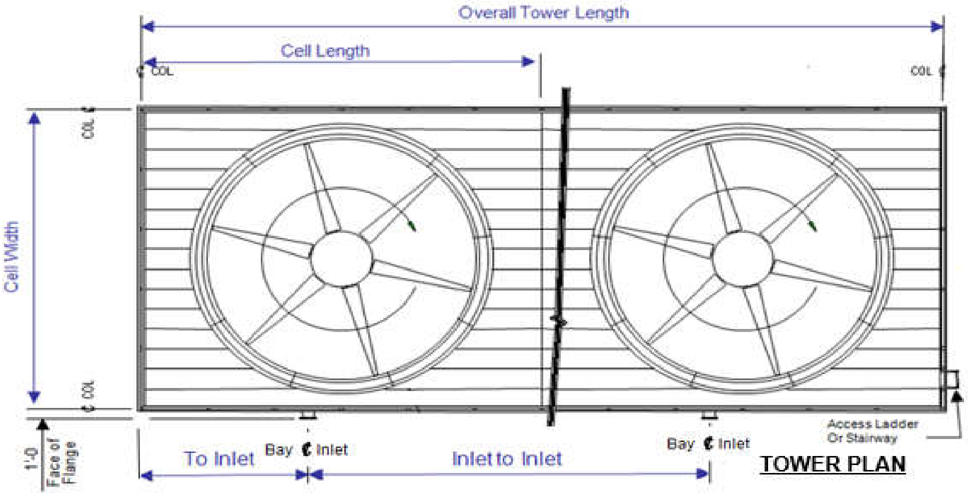
Vibration Switch

Manufacturer/Model	Metrix 5550-121-111 (mech)
Location	TT Below Motor

DRAFT FOR FINAL REVIEW

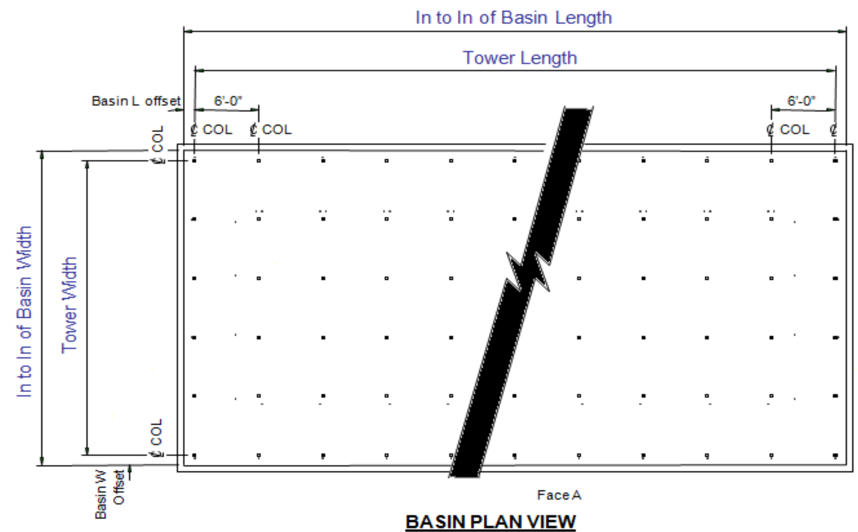


TRANSVERSE ELEVATION



TOWER PLAN

Enercon - Chicago Ind. Proj.



BASIN PLAN VIEW

Tower Model ECE254-654T			
Cell Length	54.00 ft	**Endwall to Inlet**	27.00 ft
Cell Width	54.00 ft	**Inlet to Inlet**	54
Tower Length	108.00 ft	**Fan Deck Height**	28.55 ft
Tower Width	54.00 ft	**Overall Height**	34.6 ft
Fan Diameter	32.0 ft	**Basin L Offset**	8.0 ft
Inlet Diameter	30 in	**Basin W Offset**	8.0 ft
Air Inlet Height	8.00 ft	**Basin Length**	116.00 ft
Inlet Height	16.30 ft	**Basin Width**	62.00 ft

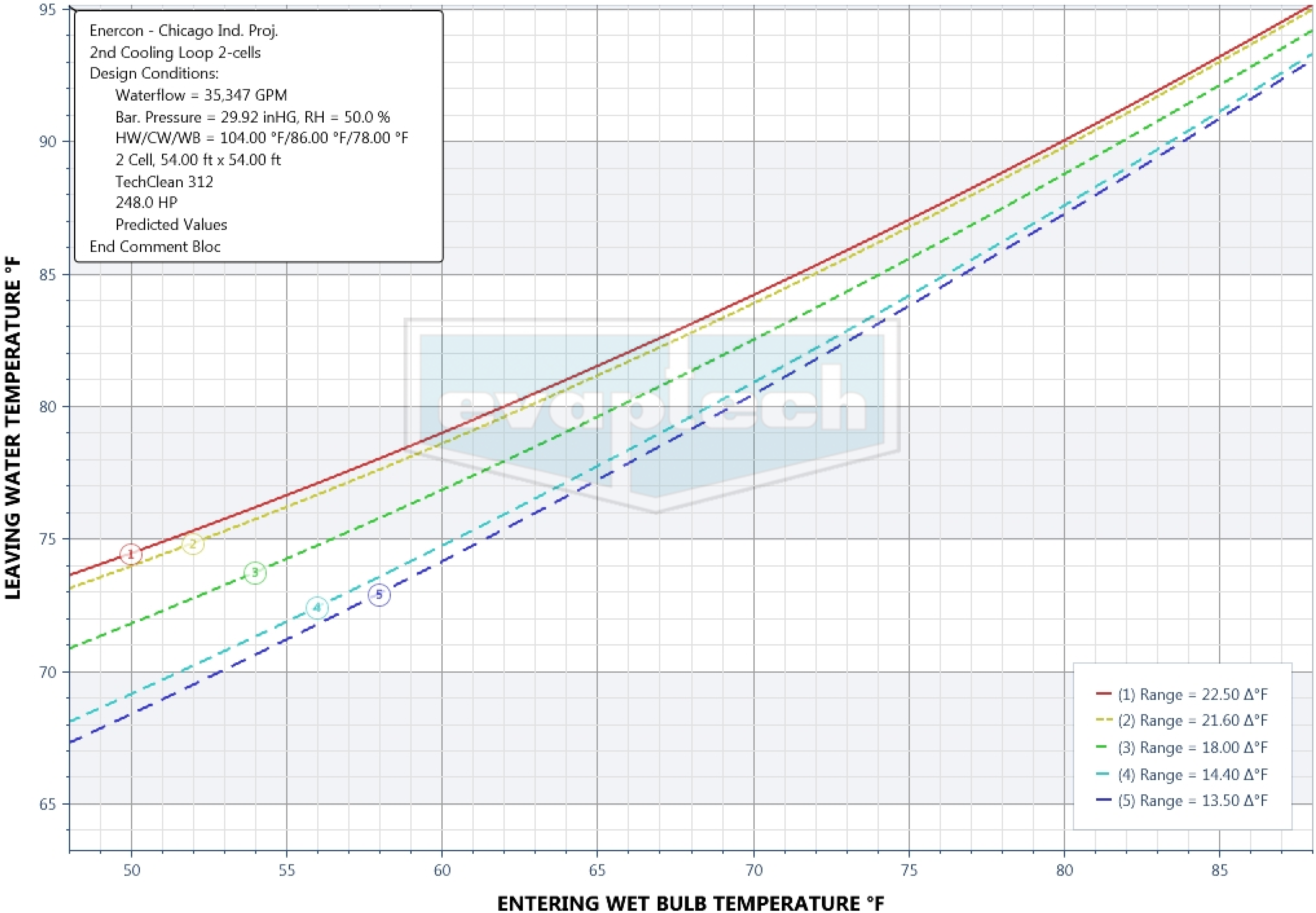
Notes:

1. This Drawing is preliminary and should be used only for general orientation purposes.
2. EvapTech piping stops at the face of the PVC flange. Flange drilling conforms to class 125# ANSI B16.1 specifications. EvapTech supports are designed to support only the weight of pipe and water within the limits of the tower. Customer must provide support for all pipe work beyond the limits of the flange. EvapTech to furnish flange gasket 3/8" thick, full face soft neoprene of shore dorometer 50 ± 5.
3. Installer Note: Connecting pipe must be proper alignet at installation to avoid damaging or moving the PVC pipe when pulling up the flange bolts.
4. Reduced water flow over a cooling tower in cold climates can result in ice formation in the fill. If purchaser's application requires a bypass system, its design must be reviewed by EvapTech.

DRAFT FOR FINAL REVIEW

COOLING TOWER PERFORMANCE CURVES

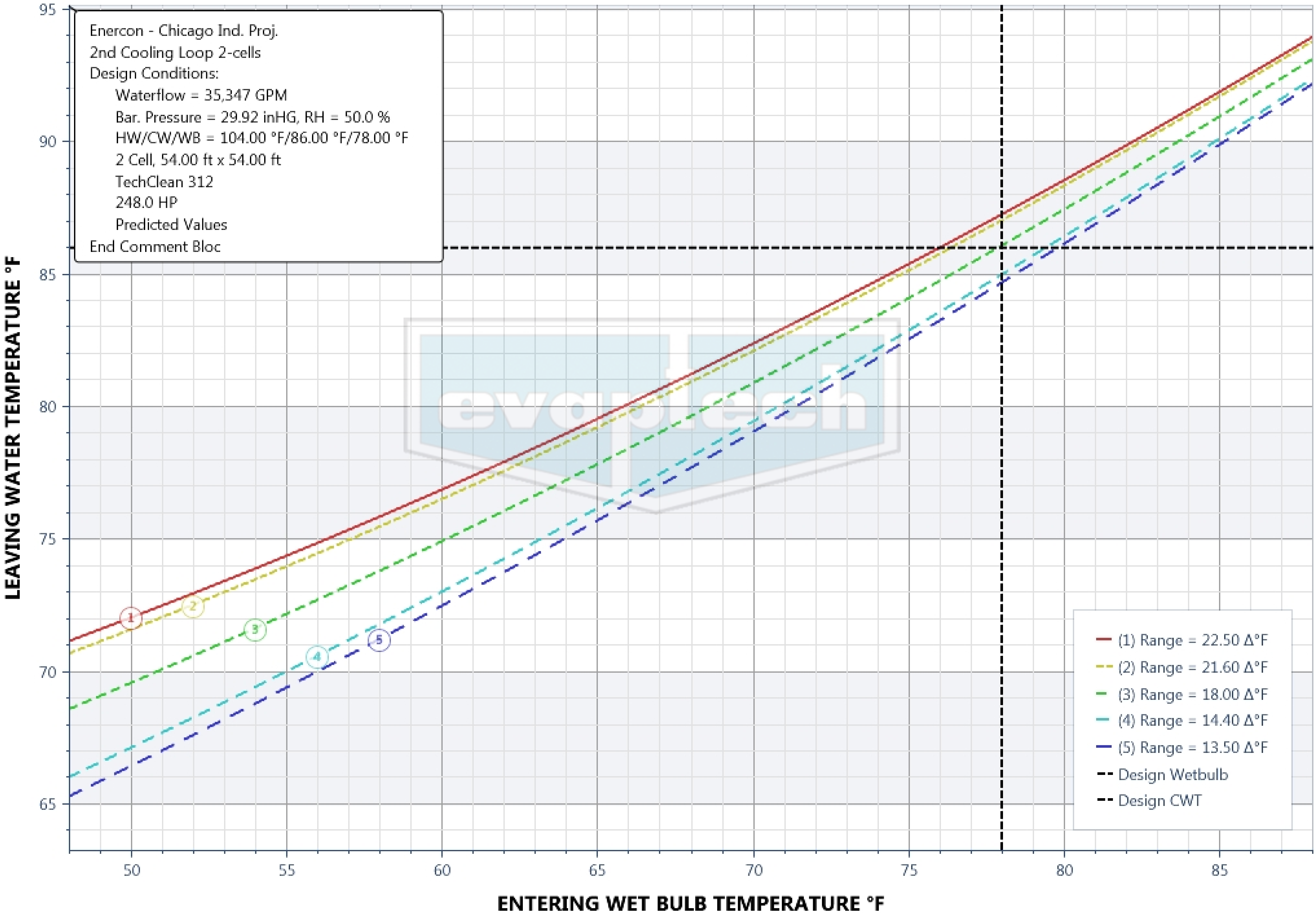
Waterflow = 38,882 GPM



COOLING TOWER PERFORMANCE CURVES

Waterflow = 35,347 GPM

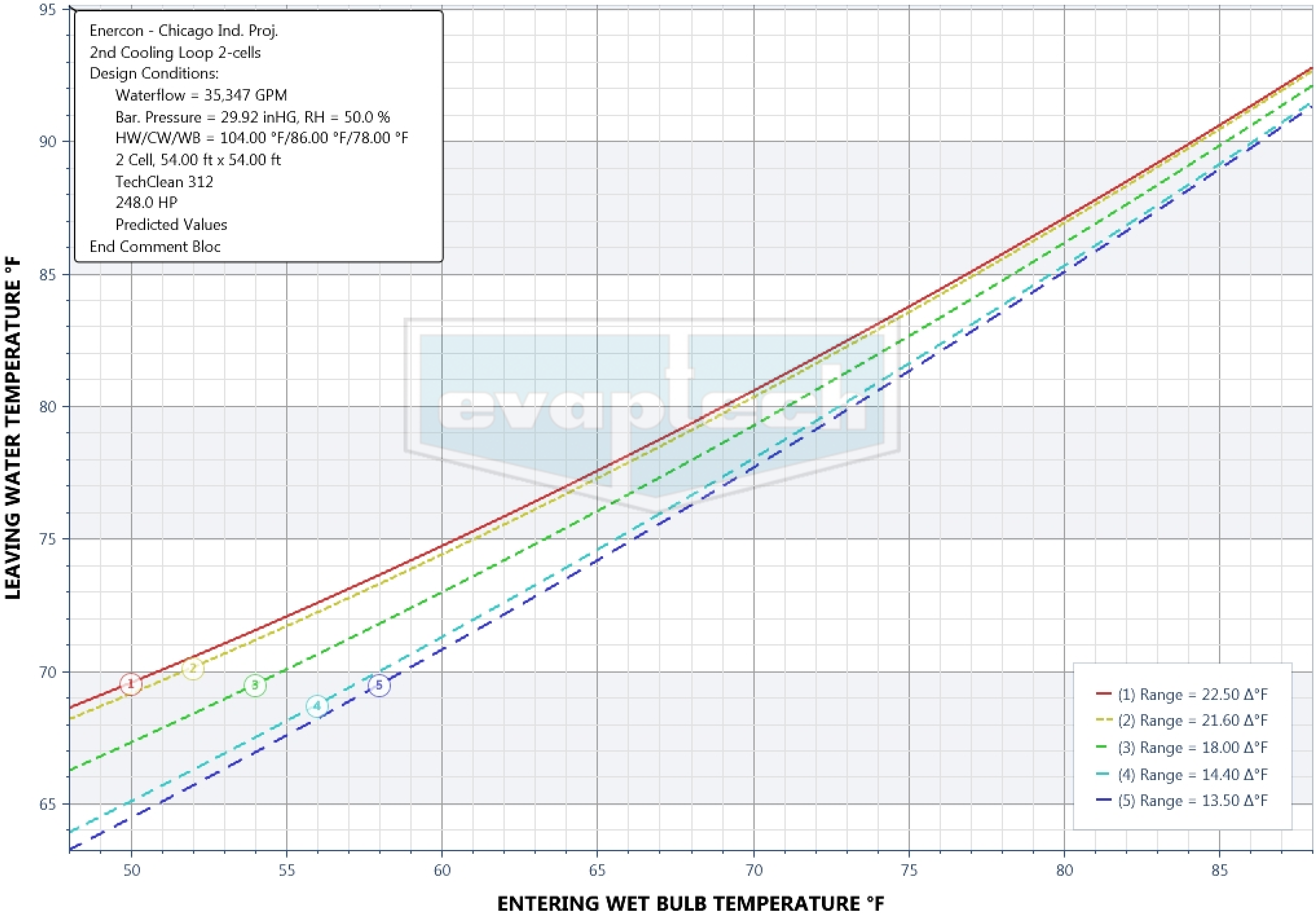
DRAFT FOR FINAL REVIEW



DRAFT FOR FINAL REVIEW

COOLING TOWER PERFORMANCE CURVES

Waterflow = 31,812 GPM



ATTACHMENT 8:
EAST MECHANICAL DRAFT COOLING TOWER BUDGETARY QUOTATION

U.S. STEEL – GARY WORKS

ENERCON
Excellence—Every project. Every day.

DRAFT FOR FINAL REVIEW

Budget Proposal

Evaporative Cooling Tower

Enercon - Chicago Ind. Proj.

June 12, 2019

EvapTech, Inc. is please to provide the following budgetary selection for your consideration:

EvapTech Budget Cooling Tower Selection

Selection Option	Option 1 - 17.5F Range	
Budget Price, Excluding Sales or Uses Taxes	$ 7,130,160	
Design Conditions		
Water Flow Rate	245,278 GPM	
Hot Water Temperature	103.50 °F	
Cold Water Temperature	86.00 °F	
Design Entering Wet Bulb Temperature	78.00 °F	
Tower Description		
Model	ECE1554-554R	
Structure Material	FRP	
Number of Fan Cells	15	
Fill Type | Film Thickness After Forming	TechClean 312	PVC (10 MIL)
Drift Rate | Evaporation Rate	0.001 %	1.59 %
Power Consumption		
Motor Nameplate per Cell	200.0 HP	
Power at Motor Shaft (AMS) | Total Power	199.7 HP	2,996.1 HP
Pumphead from Top of Basin Curb	27.90 ft	
Tower and Basin Dimensions		
Tower Overall Width x Length	54.00 ft	810.00 ft
Tower Height (Top of Curb to Top of Stack)	49.6 ft	
Concrete Basin (in to in) Width x Length	65.00 ft	812.00 ft
Tower Access: Stairs | Ladders	2	1

Basis of Pricing:

Installation labor:	Non-Union	Freight to:	Chicago, IL
Fire Protection:	No	Shipping Lead Time:	20-22 Weeks
Lightning Protection:	No	Est. Install Time:	19 Weeks
Tower Lighting:	No	Cold Water Basin:	New by Others
Power/Control Wiring:	No	Risers:	By Others
Performance Test:	None	Bypass:	None/By Others

Notes/Options:

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COOLING TOWER INQUIRY & BID FORM

Mechanical Draft Water Cooling Tower

Customer: Enercon - Chicago Ind. Proj.	**Manufacturer:** EvapTech, Inc. 8331 Nieman Road Lenexa, KS 66214
Inquiry #:	**Proposal No.:**
	Date: June 12, 2019

GENERAL:

Selection	Option 1 Rev 1 - 17.5F Range
Tower Model	ECE1554-554R
Tower Type	Inline, Counter

DESIGN & OPERATING CONDITIONS:

Circulating Water Flow	245,278 GPM
Hot (Inlet) Water Temp.	103.50 °F
Cold (Outlet) Water Temp.	86.00 °F
Wet Bulb Temp., Inlet	78.00 °F
Relative Humidity	50.0 %
Tower Pump Head	27.90 ft
Total Fan Power, (Driver Output)	2,996.1 HP
Drift Loss, % of Circulating Flow	0.001 %
Evaporation Loss	1.59 %
Design Wind Load	IBC
Design Seismic Load	IBC
Tower Site (Ground Level, Roof, etc.)	Ground Level
Elevation Above Sea Level	0 ft
Tower Exposure	Access to all 4 sides, 2 air inlets

STRUCTURAL DETAILS:

Number of Cells	15
Fans per Cell	1
Total Number of Fans	15
Nominal Cell Dimension, LxW	54.00 ft x 54.00 ft
Overall Tower Dimension, LxW	810.00 ft x 54.00 ft
Air Inlet Height	15.00 ft
Fill Height	5.00 ft
Height-Basin Curb to Fan Deck	35.55 ft
Fan Stack Height	14.00 ft
Overall Tower Height	49.6 ft
Inside Basin Dimensions, LxW	812.00 ft x 65.00 ft

COOLING TOWER INQUIRY & BID FORM
Mechanical Draft Water Cooling Tower

STRUCTURAL DETAILS: (cont'd)

Column Extensions:	
Basin Depth	4.00 ft
Grade to Top of Basin Curb	2.00 ft
Anchorage	Floor
Hot Water Inlet:	
Number	15
Nominal Diameter	30 in
Description	Drilled to match a 125/150 lb. ANSI Flange
Height Inlet Above Basin Curb	23.30 ft
Access to Top of Tower (Stairs | Ladders)	2 | 1
Shipping Weight	2,604,553.0 lb
Operating Weight	3,887,392.5 lb

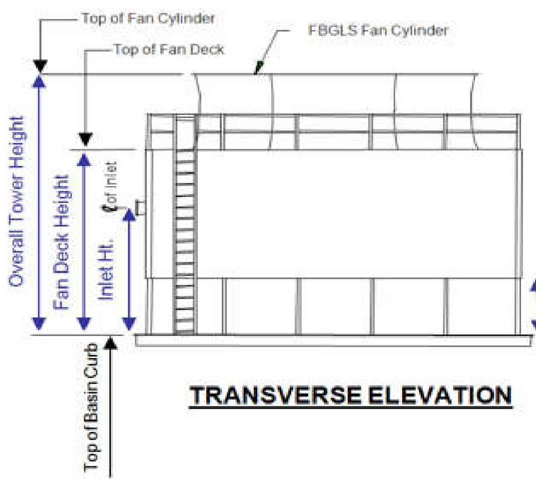
MATERIALS OF CONSTRUCTION:

Framework Members	FRP
FRP Casing	FRP FS<25 (12 OZ)
Filling	PVC (10 MIL)
Fill Supports	Structural Girts / Joists
Drift Eliminators	PVC Cellular Packs
Eliminator Spacers	N/A
Fan Stacks	FRP Non-FR
Louvers	None
Partitions	FRP FS<25 (12 OZ)
Fan Deck	FRP (Gritted)
Water Distribution - Type	Low Pressure Down Spray
Water Distribution - Materials	FRP Non-FR
Lumber Pre-Treatment	
Type of Treatment	N/A
Items Treated	N/A
Splashers or Spray Nozzles	ABS
Stairway	FRP FR
Structural Connectors	S304
Ring Joint Connectors	N/A
Bolts, Nuts, Washers	S304
Anchor Connectors	S304
Nails	N/A
Mechanical Equipment Support	Steel HDG
Anchor Bolts - Material	Series 316 Stainless Steel
Furnished by	EvapTech, Inc.
Cold Water Basin - Material	Concrete
Furnished by	New by Others
Basin Accessories, by EvapTech	None

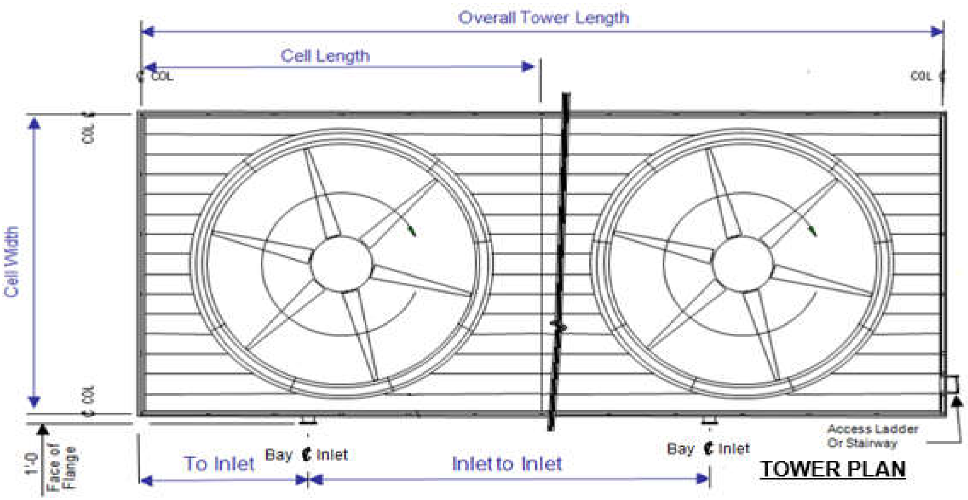
COOLING TOWER INQUIRY & BID FORM
Mechanical Draft Water Cooling Tower

MECHANICAL EQUIPMENT:

Fans	
Number	15
Type or Model	NCR 3208
Manufacturer	FanTR
Diameter	32.0 ft
Number of Blades	8
Fan Speed	118.32 rpm
Tip Speed	11,895 fpm
Power per Fan, (Driver Output)	199.7 HP
Blade Material	FRP
Hub Material	Double Epoxy
Total Static Pressure	0.5160 inWG
Velocity Pressure	0.1905 inWG
Air Delivery per Fan	1,439,447 CFM
Fan Static Efficiency	61.1 %
Fan Total Efficiency	83.6 %
Speed Reducer	
Number	15
Type	Splash Lubricated, Right Angle
Model	Model 1712
Manufacturer	Amarillo
Reduction ratio	15.00
Service Factor at rated output of driver	2.14
Number of Reductions	2
Drive Shaft	
Number	15
Type	Full Floating, Non-Lubricated
Model	Composite Series
Manufacturer	Addax/Rexnord
Model	Addax LRX650.625
Drive Shaft Material	Composite Shaft & Flange
Coupling Material	316 Stainless steel with composite flex elements
Driver	
Number	15
Kind	Electric
Enclosure	TEFC
Manufacturer	No Preference
Full Load Speed, RPM	1800 RPM
Elec. Char. -Phase/Cycles/Volts	3/60/460 V
Rated Capacity	200.0 HP
Vibration Switch	
Manufacturer/Model	Metrix 5550-121-111 (mech)
Location	TT Below Motor



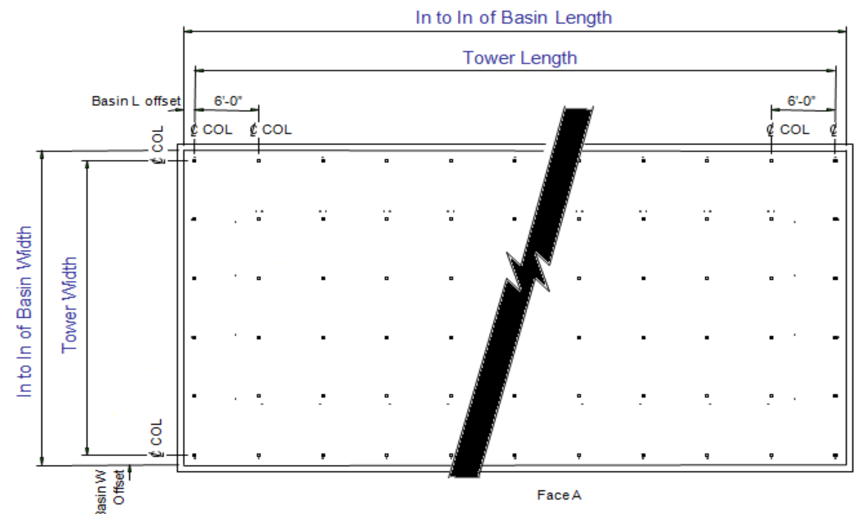
TRANSVERSE ELEVATION



TOWER PLAN

Enercon - Chicago Ind. Proj.

Tower Model ECE1554-554R			
Cell Length	54.00 ft	**Endwall to Inlet**	27.00 ft
Cell Width	54.00 ft	**Inlet to Inlet**	54
Tower Length	810.00 ft	**Fan Deck Height**	35.55 ft
Tower Width	54.00 ft	**Overall Height**	49.6 ft
Fan Diameter	32.0 ft	**Basin L Offset**	2.0 ft
Inlet Diameter	30 in	**Basin W Offset**	11.0 ft
Air Inlet Height	15.00 ft	**Basin Length**	812.00 ft
Inlet Height	23.30 ft	**Basin Width**	65.00 ft



BASIN PLAN VIEW

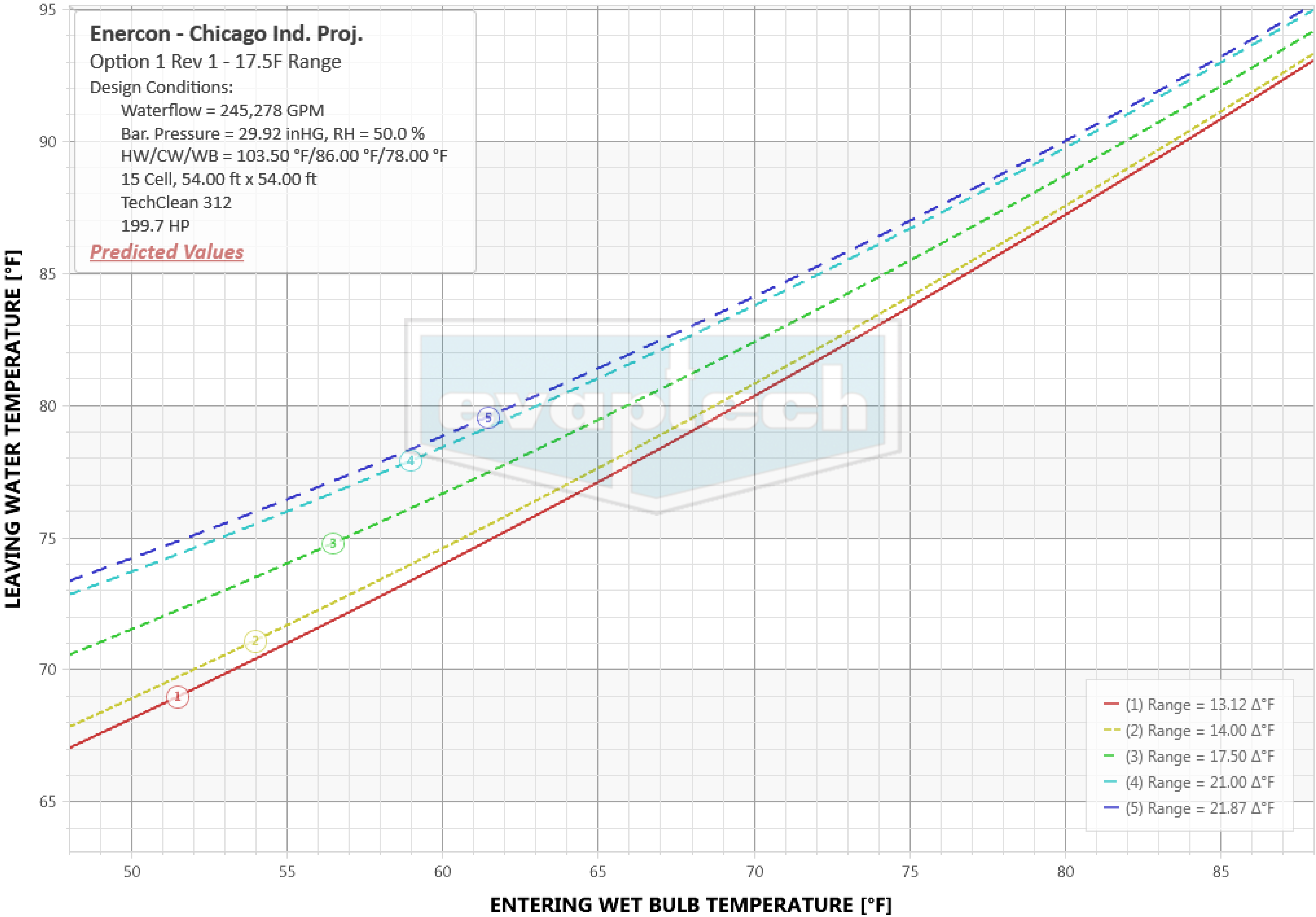
Notes:

1. This Drawing is preliminary and should be used only for general orientation purposes.
2. EvapTech piping stops at the face of the PVC flange. Flange drilling conforms to class 125# ANSI B16.1 specifications. EvapTech supports are designed to support only the weight of pipe and water within the limits of the tower. Customer must provide support for all pipe work beyond the limits of the flange. EvapTech to furnish flange gasket 3/8" thick, full face soft neoprene of shore dorometer 50 ± 5.
3. Installer Note: Connecting pipe must be proper alignet at installation to avoid damaging or moving the PVC pipe when pulling up the flange bolts.
4. Reduced water flow over a cooling tower in cold climates can result in ice formation in the fill. If purchaser's application requires a bypass system, its design must be reviewed by EvapTech.

DRAFT FOR FINAL REVIEW

COOLING TOWER PERFORMANCE CURVES

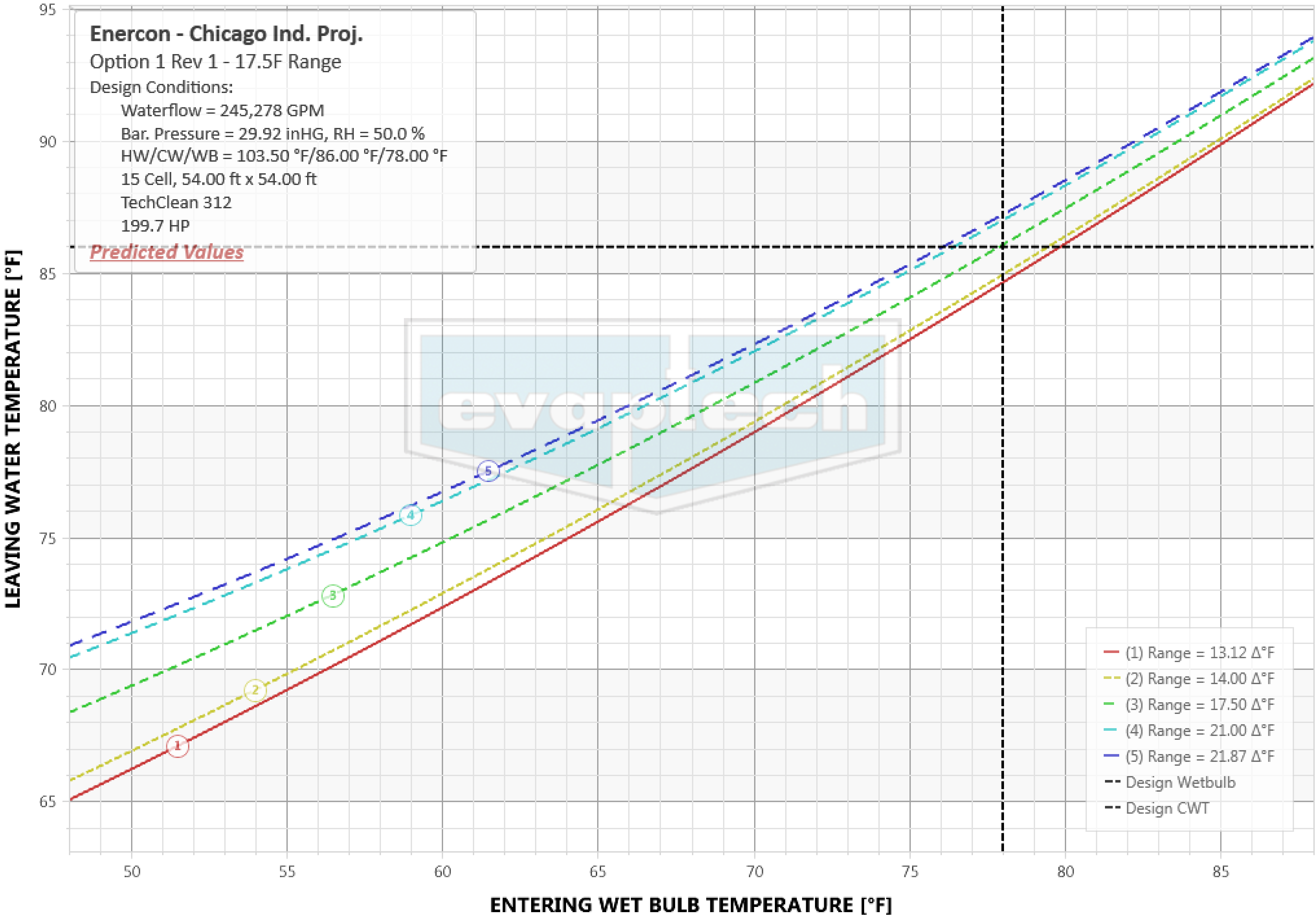
Waterflow = 269,806 GPM



DRAFT FOR FINAL REVIEW

COOLING TOWER PERFORMANCE CURVES

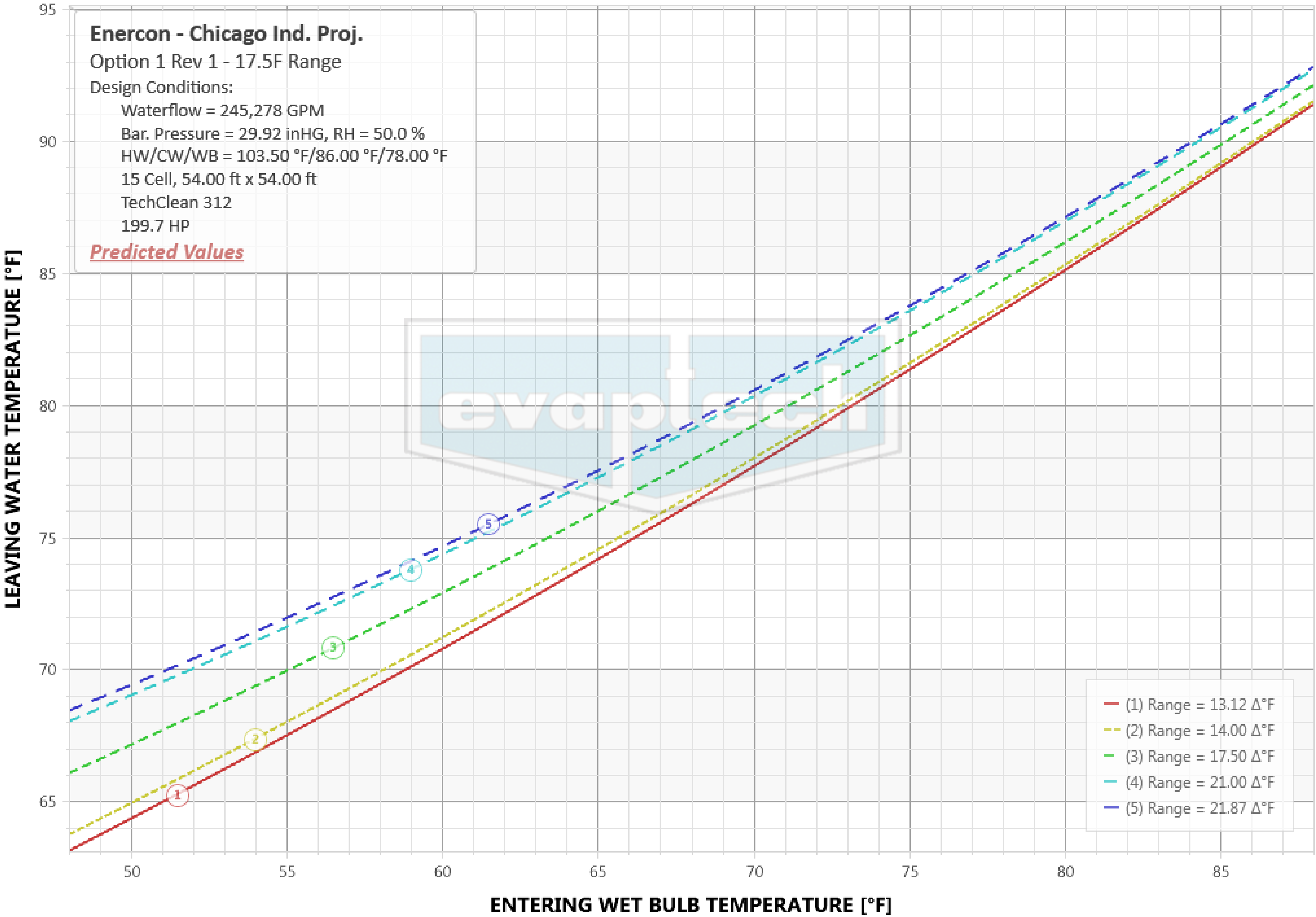
Waterflow = 245,278 GPM



COOLING TOWER PERFORMANCE CURVES

Waterflow = 220,750 GPM

DRAFT FOR FINAL REVIEW



ATTACHMENT 9: WEIR GATE BUDGETARY QUOTATION

U.S. STEEL – GARY WORKS

ENERCON

Excellence—Every project. Every day.

MUNIQUIP, LLC

Your Source For Water & Wastewater Equipment

DATE: April 1, 2019 BUDGETARY QOUTE #MQ19-1451

TO: Enercon Services Inc.

ATTN: Trevor Smith

RE: Chicago Cooling Basin

Dear Trevor,

We are pleased to offer the following items for your consideration:

ITEM 1

Per Drawing #:

Gate ID#

Ten (10) Rodney Hunt Stainless Steel Sluice Gates: 72" W x 72.5"" H 316 Stainless Steel Weir Gate w/ Electric Actuator, 316 stainless construction, self-contained, downward opening, flush bottom closure, wall mounted, assumed design head up to slide height, 316 Stainless Steel Stem, EPDM rubber seal, 316 stainless steel hardware, freight included, Startup services included, as manufactured by **Rodney Hunt.**

Please see attached Rodney Hunt Scope of Supply for further details.

Item one as described above for the price of ……………………………………………………………..$160,000.00

NOTES:

Sales tax is not included in above pricing.

Anchor bolts, seismic calculations, or vibration testing are not included unless specifically noted in individual equipment descriptions.

Freight is F.O.B. factory with freight to the jobsite included.

Quotation is valid for 60 days.

This proposal is subject to the attached MuniQuip Terms & Conditions and/or the Terms and Conditions of the individual companies MuniQuip has quoted.

Best Regards,

Taylor Hansell

Sales Engineer

MuniQuip, LLC

Specializing in Pumps, Process Equipment, & Instrumentation

2024 Opportunity Drive, Suite 130

Roseville, CA 95678

209-489-0073 cell

916-787-5641 office

916-787-5642 fax

www.muniquipllc.com

DRAFT FOR FINAL REVIEW

SCOPE OF SUPPLY

PRODUCT : **STAINLESS STEEL WEIR GATES**

PROJECT : **CHICAGO METROPOLITAN**

SUBMITTED BY : **RODNEY HUNT INC**

DATE : **APRIL 1ST, 2019**

RODNEY HUNT INC
Orange, MA

Enercon Services Inc.
7677 Oakport Street Suite 950
Oakland, CA 94621
Attention: Trevor Smith

April 1, 2019

Trevor,
Rodney Hunt Inc is pleased to offer the following proposal for stainless steel weir gates as per information provided. All stainless steel weir gates shall comply with AWWA C561.

Item #1 **Stainless Steel Weir Gates – 6' (w) x 6½' (h)**
Qty: 10 Units WG-R/1829X1981-S2-FWM-M2-URCD

Opening	Rectangular
MOC	Stainless Steel
Mounting	Wall Mounted
Design Head	Up to Slide Height
Invert to Top of Yoke	11'-9"
Operation	Yoke Mounted Manual Actuator
Type of Closure	Conventional Bottom
Stem Extension	Rising with Stem Cover
Frame Configuration	Self Contained
Type of Opening	Downward

PRICE: $___________________________________

MATERIAL OF CONSTRUCTION FOR VARIOUS COMPONENTS OF STAINLESS STEEL WEIR GATES:

Frame, Slide	: Stainless Steel ASTM A-240 Type 316L
Yoke	: Stainless Steel ASTM A-240 Type 316L
Guides	: UHMWPE ASTM D-4020
Rubber Seals	: EPDM / Neoprene ASTM D-2000
Stem	: Stainless Steel ASTM A-276 Type 316
Thrust Nut / Stem Block	: Bronze ASTM B-584
Lifting Nut	: Bronze ASTM B-584
Gate Assembly Bolts & Nuts	: Stainless Steel 316

TERMS AND CONDITIONS

1. Acceptance of this Order is final only upon written approval by MuniQuip, L.L.C. ("MQ").

2. The total sale price, as set forth on the first page hereof, including all tax, is payable by Purchaser as follows: One-Hundred percent (100%) within 30 days of notice of availability for shipment by the manufacturer. Any amount not paid when due shall bear interest at the rate of 18% *per annum*. Purchaser agrees to pay reasonable attorney's fees and all collection costs incurred by MQ if payment is not timely received. All payments by Purchaser shall be made without offset of deduction.

3. All prices are FOB source shipping point. MQ is not responsible for any loss during transit. Breakage or shortage claims arising from shipments shall be made by the Purchaser directly against the carrier. Purchaser will accept shipment within five (5) days of notice of availability from MQ.

4. Purchaser understands and acknowledges that the Equipment is not manufactured by MQ, and that MQ offers no representations or warranties of any kind or nature with respect to the Equipment. **SPECIFICALLY, MQ DOES NOT OFFER ANY EXPRESS OR IMPLIED WARRANTY OF DESCRIPTION, TITLE, OR CONDITION OF LIEN OR SECURITY INTERESTS, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE.** The only warranties with respect to the Equipment shall be those offered by the manufacturer, if any. The sole obligation of MQ shall be to assist Purchaser in connection with the presentation of any warranty claim to the Manufacturer. If applicable, MQ will assign all manufacturers' warranties to Purchaser or end user. Purchaser shall be responsible for all costs and labor for installation and start-up assistance of the Equipment.

5. MQ shall not be responsible for any loss, claim or damages resulting from any force majeure, including but not limited to strikes, accidents, unavailability of labor or materials, acts of God, weather conditions, inability of carrier to deliver, legislative, administrative, or executive law, order or requisition of any governmental entity, or any event not under the direct control of MQ. Any delay in delivery from the Manufacturer caused by a force majeure or action or inaction of the Manufacturer or carrier shall not be the responsibility of MQ.

6. In no event shall MQ be responsible for any liquidated, consequential or special damages arising from breach of this Agreement, any delay of delivery or any other cause.

7. Purchaser shall pay any sales, excise, or other government charge payable by MQ to federal, state or local authorities. Any such taxes now or hereafter imposed upon sales or shipments will be added to the purchase price. Purchaser agrees to reimburse MQ for any such tax or to provide MQ acceptable tax exemption certificates.

8. Purchaser may not cancel this Order without the prior written consent of MQ, and in any event Purchaser shall be responsible for all costs, charges and fees caused by such cancellation, including labor expended, material procured, and reasonable overhead expenses applicable thereto.

9. Any failure of MQ to insist upon the performance of any term or condition of this Agreement or any prior quotations, agreements, orders, and acceptances or orders related thereto shall not be deemed to be a waiver of such term, condition, or any other right in the future.

10. The provisions hereof shall apply to all addendums or changes hereto although not specifically set forth therein, all of these terms and conditions being considered to be additional terms and conditions to any such addendum or change.

11. Purchaser agrees to inspect the Equipment immediately upon delivery. Any claim for shortages must be made to MQ within ten (10) days after shipment or shall be deemed waived. Any other claim by Purchaser, other than warranty claims against the manufacturer, shall be made within thirty (30) days after receipt of shipment, and if not made, shall be waived.

12. Purchaser agrees to provide and maintain adequate insurance against loss of or damage to the Equipment until the purchase price to MQ has been fully paid. Any loss or damage to the Equipment after transfer of possession shall not relieve the Purchaser from obligations under this Agreement.

13. This Agreement represents the final and complete understanding of the parties with respect to all terms and conditions of the sale of Equipment as contemplated hereby, and there are no other representations, promises or agreements, whether written or oral, made in connection herewith. Purchaser specifically understands and acknowledges that no agent, employee or representative of MQ has the authority to or has made any other representation, promise or agreement except as specifically set forth in this Agreement. No amendment to this Agreement shall be effective unless it is in writing and executed by both parties.

14. This Agreement shall be construed under the laws of the State of California, and any action arising hereunder shall be commenced in that state.
15. Acceptance of this Order is final only upon written approval by MuniQuip, L.L.C. ("MQ").

16. The total sale price, as set forth on the first page hereof, including all tax, is payable by Purchaser as follows: Ninety-Five percent (95%) within 30 days of notice of availability for shipment by the manufacturer, five percent (5%) upon start-up of the Equipment or one hundred twenty (120) days after such notice, whichever is earlier. Any amount not paid when due shall bear interest at the rate of 18% *per annum*. Purchaser agrees to pay reasonable attorney's fees and all collection costs incurred by MQ if payment is not timely received. All payments by Purchaser shall be made without offset of deduction.

17. All prices are FOB source shipping point. MQ is not responsible for any loss during transit. Breakage or shortage claims arising from shipments shall be made by the Purchaser directly against the carrier. Purchaser will accept shipment within five (5) days of notice of availability from MQ.

18. Purchaser understands and acknowledges that the Equipment is not manufactured by MQ, and that MQ offers no representations or warranties of any kind or nature with respect to the Equipment. **SPECIFICALLY, MQ DOES NOT OFFER ANY EXPRESS OR IMPLIED WARRANTY OF DESCRIPTION, TITLE, OR CONDITION OF LIEN OR SECURITY INTERESTS, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE.** The only warranties with respect to the Equipment shall be those offered by the manufacturer, if any. The sole obligation of MQ shall be to assist Purchaser in connection with the presentation of any warranty claim to the Manufacturer. If applicable, MQ will assign all

manufacturers' warranties to Purchaser or end user. Purchaser shall be responsible for all costs and labor for installation and start-up assistance of the Equipment.

19. MQ shall not be responsible for any loss, claim or damages resulting from any force majeure, including but not limited to strikes, accidents, unavailability of labor or materials, acts of God, weather conditions, inability of carrier to deliver, legislative, administrative, or executive law, order or requisition of any governmental entity, or any event not under the direct control of MQ. Any delay in delivery from the Manufacturer caused by a force majeure or action or inaction of the Manufacturer or carrier shall not be the responsibility of MQ.

20. In no event shall MQ be responsible for any liquidated, consequential or special damages arising from breach of this Agreement, any delay of delivery or any other cause.

21. Purchaser shall pay any sales, excise, or other government charge payable by MQ to federal, state or local authorities. Any such taxes now or hereafter imposed upon sales or shipments will be added to the purchase price. Purchaser agrees to reimburse MQ for any such tax or to provide MQ acceptable tax exemption certificates.

22. Purchaser may not cancel this Order without the prior written consent of MQ, and in any event Purchaser shall be responsible for all costs, charges and fees caused by such cancellation, including labor expended, material procured, and reasonable overhead expenses applicable thereto.

23. Any failure of MQ to insist upon the performance of any term or condition of this Agreement or any prior quotations, agreements, orders, and acceptances or orders related thereto shall not be deemed to be a waiver of such term, condition, or any other right in the future.

24. The provisions hereof shall apply to all addendums or changes hereto although not specifically set forth therein, all of these terms and conditions being considered to be additional terms and conditions to any such addendum or change.

25. Purchaser agrees to inspect the Equipment immediately upon delivery. Any claim for shortages must be made to MQ within ten (10) days after shipment or shall be deemed waived. Any other claim by Purchaser, other than warranty claims against the manufacturer, shall be made within thirty (30) days after receipt of shipment, and if not made, shall be waived.

26. Purchaser agrees to provide and maintain adequate insurance against loss of or damage to the Equipment until the purchase price to MQ has been fully paid. Any loss or damage to the Equipment after transfer of possession shall not relieve the Purchaser from obligations under this Agreement.

27. This Agreement represents the final and complete understanding of the parties with respect to all terms and conditions of the sale of Equipment as contemplated hereby, and there are no other representations, promises or agreements, whether written or oral, made in connection herewith. Purchaser specifically understands and acknowledges that no agent, employee or representative of MQ has the authority to or has made any other representation, promise or agreement except as specifically set forth in this Agreement. No amendment to this Agreement shall be effective unless it is in writing and executed by both parties.

28. This Agreement shall be construed under the laws of the State of California, and any action arising hereunder shall be commenced in that state.

ATTACHMENT 10: FINE MESH TRAVELING WATER SCREEN RETROFIT DRAWING

U.S. STEEL – GARY WORKS

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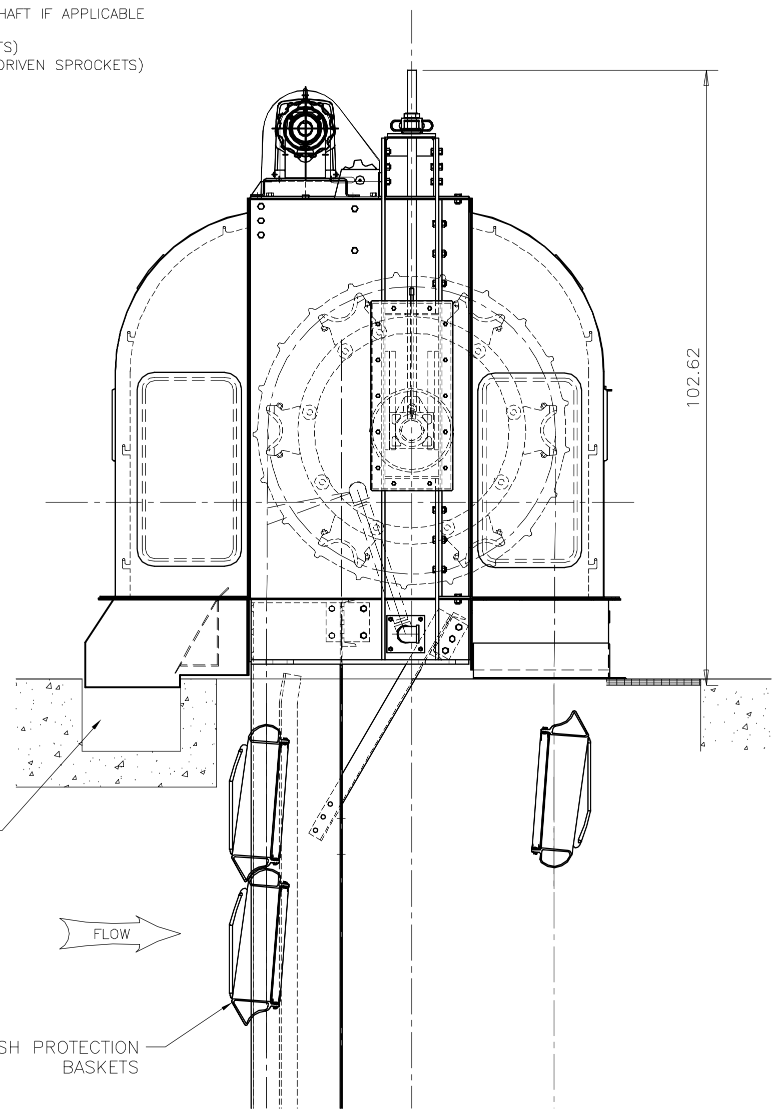
NEW ITEMS THAT WILL BE REQUIRED FOR FISH PROTECTION RETROFIT:

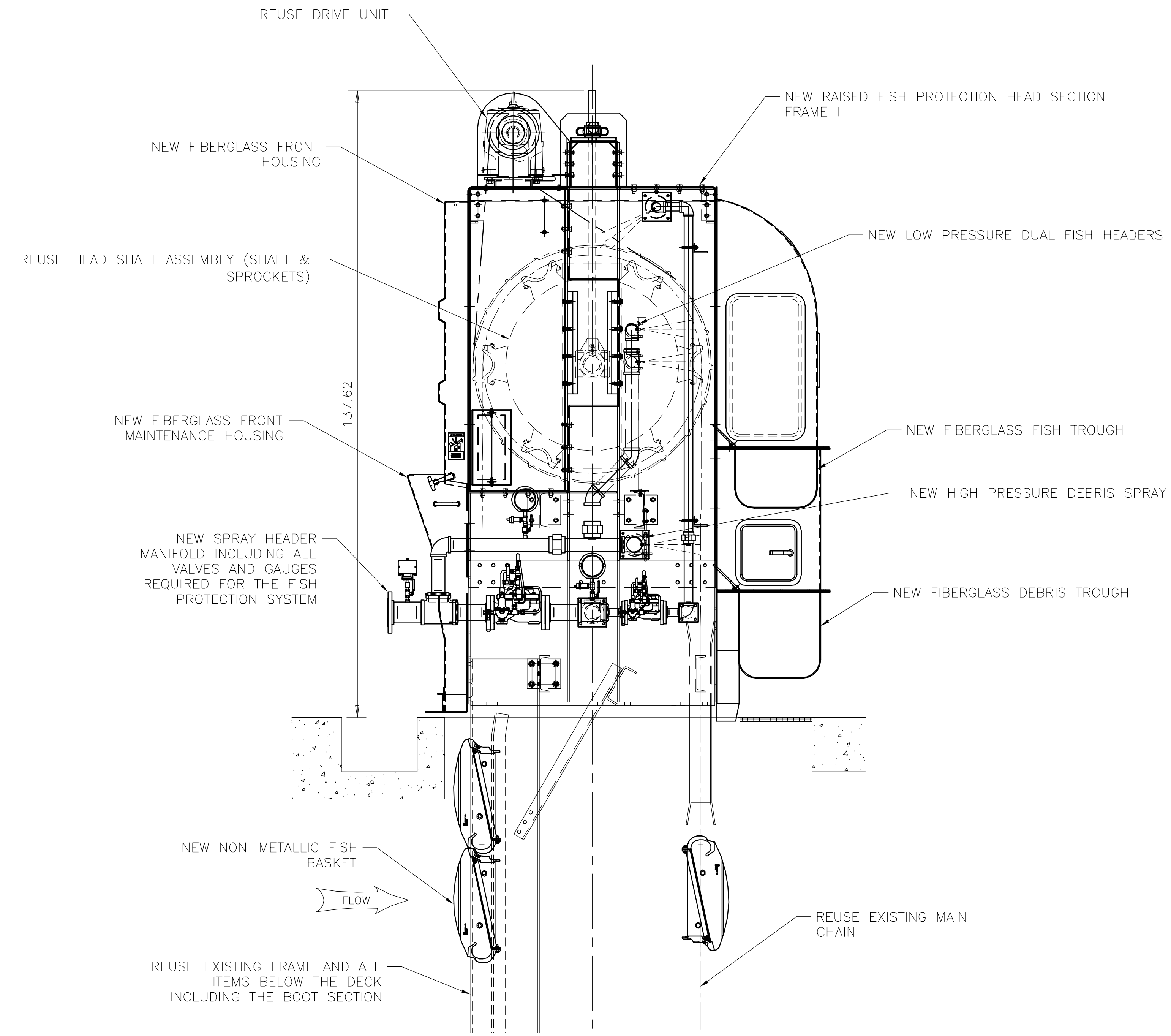
1. UPPER REAR SPLASH HOUSING WITH INTEGRAL DEBRIS TROUGH
2. LOWER REAR SPLASH HOUSING WITH INTEGRAL FISH TROUGH
3. FRONT FIBERGLASS SPLASH HOUSING
4. LOW PRESSURE DUAL FISH SPRAY HEADERS
5. LOW PRESSURE AUX. FISH SPRAY HEADER
6. PRESSURE REDUCING VALVES AND MANIFOLD FOR LOW PRESSURE FISH SYSTEM
7. NON-METALLIC FISH BASKETS
8. ADDITIONAL WATER SUPPLY FOR LOW PRESSURE SPRAY
9. 6 FEET EACH HAND MAIN CHAIN DUE TO RAISED HEAD SECTION

ITEMS TO BE REUSED FOR FISH PROTECTION RETROFIT:

1. MAIN FRAMEWORK
2. FOOT SECTION INCLUDING SPROCKET & SHAFT IF APPLICABLE
3. MAIN CHAIN
4. HEAD SHAFT ASSEMBLY (SHAFT, SPROCKETS)
5. DRIVE UNIT (MOTOR, REDUCER, DRIVE & DRIVEN SPROCKETS)



TYPICAL "STANDARD" TRAVELING WATER SCREEN



THE SAME SCREEN RETROFITTED TO MEET 316(B) FISH PROTECTION REQUIREMENTS

FOR INFORMATIONAL AND REFERENCE USE ONLY

COMPANY CONFIDENTIAL PER BELOW NOTE

EVOQUA IS THE DEVELOPER AND OEM OF THE MODIFIED RISTROPH NON-METALLIC FISH PROTECTION BASKET, AND THE SUPPLIER OF THE INDUSTRY'S ONLY COMPLETELY NON-METALLIC MODIFIED RISTROPH BASKET.

DRAWN PER ASME Y14.5M
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
AND TOLERANCES TO BE AS FOLLOWS

FABRICATION	MACHINE
.XX ± .06	.XX ± .03
[X ± 2]	.XXX ± .005
< ± 2°	[X ± 1]
X/X ± 1/16	[.X ± .1]
	< ± 1°

MACHINED SURFACES 250√

BAR = 1" AT PLOT SCALE

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
.	.	.	.	.	.	.

DESIGNER	DATE
BSH	8/17/17
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE

FILE: 0077-326
SCALE: NONE

TITLE: SALES DRAWING SHOWING RETROFIT OF EVOQUA FISH PROTECTION SYSTEM TO A STANDARD TRAVELING WATER SCREEN

CLIENT

evoqua WATER TECHNOLOGIES
WATER TECHNOLOGIES
CHALFONT, PA
215–712–0280

PROJECT	CODE	DRAWING	SHEET	REV
		0077-326	1 OF 1	0

STD: 2–0799–22x34D
MADE FROM:

ATTACHMENT 11:
HOLDING LAGOON CONCEPTUAL DESIGN DRAWING

U.S. STEEL – GARY WORKS

ENCERCON

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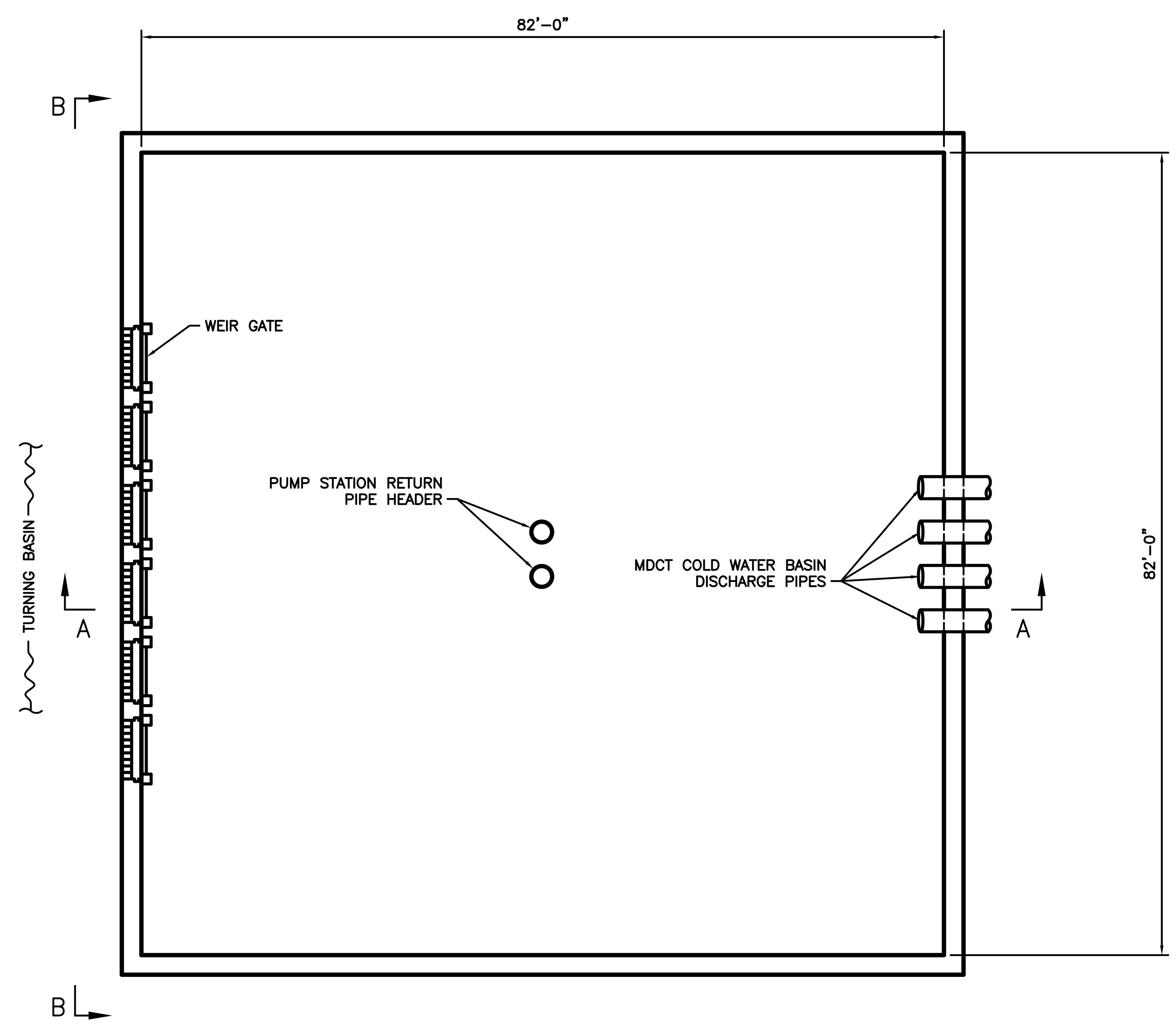
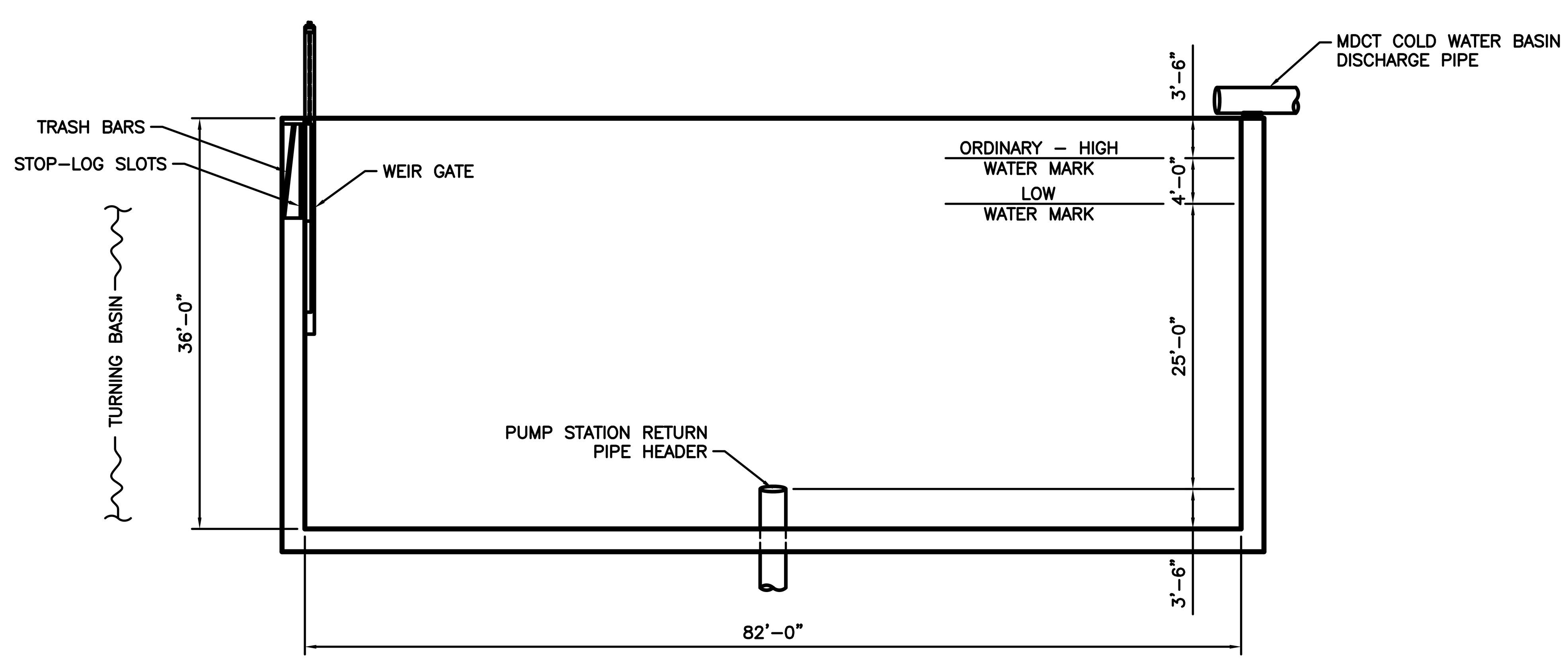
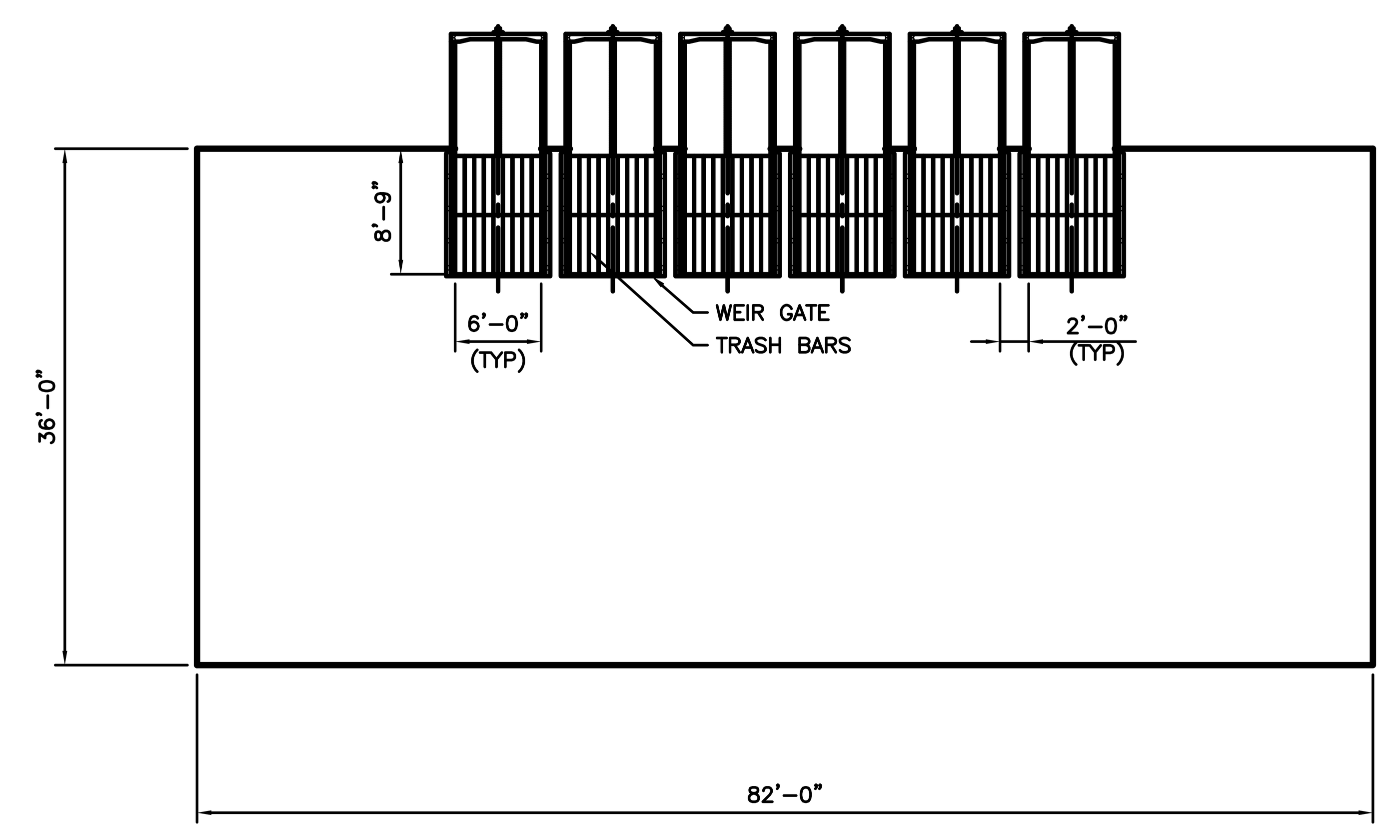


LAGOON PLAN



SECTION A–A



SECTION B–B

REV	DESCRIPTION	DRN	CHK	REV	APP	DATE
0	INITIAL ISSUE	PKC				

ENERCON
Enercon Office Location

U.S. STEEL
GARY WORKS

HOLDING LAGOON
CONCEPTUAL DESIGN
GENERAL ARRANGEMENT

SIZE E | DWG NO. RAMBOLL00004-M-002 | REV 0
SCALE NONE | SHEET 1 of 1

ATTACHMENT 12: MECHANICAL DRAFT COOLING TOWER WATER QUALITY GUIDELINES

U.S. STEEL – GARY WORKS

ENERCON

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RECOMMENDED COOLING TOWER WATER QUALITY AND FILL SELECTION

pH	6.5 to 9.0 (special materials may be required beyond these limits)
Temperature	52° C maximum, or up to 66° C with special materials
Langelier Saturation Index	0.0 to 1.0
M-Alkalinity	100 to 500 ppm as CaCO3
Silica	150 ppm as SiO2 maximum
Iron	3 ppm maximum
Manganese	0.1 ppm maximum
Sulfides	Greater than 1 ppm can be corrosive to copper alloys, iron, steel, and galvanized steel. Limit to 0.5 ppm for cross flute film fill and 1.5 ppm for anti-fouling film fill.
Ammonia	50 ppm maximum if copper alloys present
Chlorine	Limit for wood structure: 1 ppm free residual intermittently (shock), or 0.4 ppm continuously maximum.
Organic solvents	These can attack plastics and promote bio-growth. Trace amounts (e.g., <50ppm) may be acceptable.
TDS	Over 5000 ppm can affect thermal performance and be detrimental to wood in alternately wet/dry areas such as fan deck and inlet louver face.
Individual Ions:	**Maximum:**
Cations: **Calcium**	800 ppm as CaCO3
Magnesium	Depends on pH and Silica level
Sodium	No limit
Anions: **Chlorides**	750 ppm as NaCl (455 ppm as Cl-); upgrades are required for higher chloride levels. Note: limit is 500 ppm as NaCl for galvanized towers.
Sulfates	800 ppm as CaCO3
Nitrates	300 ppm as NO3 (bacteria nutrient)
Carbonates/Bicarbonates	300 ppm as CaCO3 maximum preferred for wood

Biological/Bacteria and Total Suspended Solids

Fill Type	High Performance film fill 12mm or 19mm Spacing Cross Fluted **(EVAPAK®)**	Low Fouling film fill 19 mm, 21mm or 25mm Spacing Vertical Fluted **(TechClean™)**	Anti-fouling film fill 19mm Vertical Flow **(VertiClean™)**	Splash Fill Bars / Grids **(Opti-Bar™ Arch-Bar™ Opti-Grid™)**
TSS (ppm) Bacteria Count (ppm) Std Plate Count	<25 <10,000	<50 <100,000	<100 <1,000,000	>100 >1,000,000
TSS (ppm) **Peak** (1)	<50	<100	<200	>200
Salinity (ppm)	0	<35,000	<70,000	>70,000
Bio & Scale Control	Required	Required	Required	Lower to none

* Any amount of oil or grease is likely to adversely degrade thermal performance

Miscellaneous Solids and Nutrients

Avoid high performance cross-fluted film fill with water containing bacteria nutrients such as alcohols, nitrates, ammonia, fats, glycols, phosphates, and black liquor. Anti-fouling fills should be considered in each case. For all film fills, avoid fibrous, oily, greasy, fatty, or tarry materials in the water, which will cause fill plugging.

Note: General rule is to avoid using film fill in Steel Plants, Pulp & Paper Mills, Food Processing Operations, or similar applications unless leaks and contamination by airborne or waterborne particulates, oil, or fibers are unlikely and with regimental water treatment control of biological growth.

(1) Peak is defined as the measurement that may occur during normal operation where the maximum reading can exceed the Annual Average limit, but it does not exceed the Peak limit. The time spent with the reading above the Annual Average limit should not exceed 2 days during any one occurrence and the total time above the Annual Average limit should not exceed 10% of the time during a year.

CWA Section 316(b) Requirements for CWIS
Pursuant to 40 CFR 122.21(r)(9)-(12)

APPENDIX 2

Social Costs of Purchasing and Installing Entrainment Reduction Technologies
Veritas Economic Consulting (March 2020)

Social Costs of Purchasing and Installing Entrainment Reduction Technologies:

U.S. Steel's Gary Works Facility
NPDES Permit IN0000281

Final Report

Prepared for:

U.S. Steel Corporation

Prepared by:

Veritas Economic Consulting

March 2020

1851 Evans Road
Cary, NC 27513

Office: 919.677.8787
Fax: 919.677.8331

VERITAS
Economic Consulting
VeritasEconomics.com

Table of Contents

Section **Page**

List of Figures and Tables

Figure **Page**

Table **Page**

1. The Social Costs of Purchasing and Installing Technologies

The U.S. Environmental Protection Agency's (USEPA's) Section (§) 2014 316(b) Rule (79 *Fed. Reg*. 158, 48,300–48,439) (hereafter Rule) applies to existing power generation, manufacturing, and industrial facilities with actual intake flows (AIF) of greater than 125 million gallons per day (MGD). As part of the National Pollutant Discharge Elimination System (NPDES) permit renewal process, the Rule requires submission of studies of technologies or operational measures that can reduce entrainment. This report is the Cost Evaluation (§ 122.21 (r)(10)(iii)), which must contain "engineering cost estimates of all technologies considered in paragraphs § 122.21(r)(10)(i) and (ii)" and "facility costs must also be adjusted to estimate social costs." This report evaluates the social costs of installing entrainment reduction technologies at the electric generating facility that powers the Gary Works steel manufacturing plant (Gary Works). By social costs, USEPA means

> costs estimated from the viewpoint of society, rather than individual stakeholders. Social cost represents the total burden imposed on the economy; it is the sum of all opportunity costs incurred associated with taking actions. These opportunity costs consist of the value lost to society of all the goods and services that will not be produced and consumed as a facility complies with permit requirements, and society reallocates resources away from other production activities and towards minimizing adverse environmental impacts (79 *Fed. Reg*. 158, 48432).

Reducing entrainment can generally be accomplished by altering operations; closing the facility; or by purchasing, installing, and operating entrainment reduction technologies. Installing and operating entrainment reduction technologies would lead to a number of physical changes and financial effects that give rise to opportunity costs. When monetized, these are social costs. Social costs from entrainment reductions can arise from several sources (Electric Power Research Institute [EPRI] 2015; Bingham and Kinnell 2014):

- Compliance Costs—the owner's cost for purchasing, permitting, installing, operating, and maintaining entrainment reduction technologies.
- Government Regulatory Costs—permitting, monitoring, administering, and enforcing regulatory compliance.
- Power System Costs—increased fuel costs from running more expensive units when the facility is subject to outage, capacity reductions, or closure due to the implementation of entrainment reducing technologies.
- Environmental Externalities—changes in environmental quality, such as those to water consumption, noise, emissions, safety, and viewsheds.
- Economic Impacts—unit closures and electricity price increases.

The analysis conducted for Gary Works includes quantitative estimates for the first three categories listed above, as well as environmental externalities from safety impacts. Enercon (2019) considered several alternative screen, water reuse, and closed-cycle cooling technologies and identified the following options as potentially feasible at Gary Works:

- Fine-mesh traveling water screens (TWS)
- Closed-cycle cooling system retrofit.

1.1 Summary of Social Costs

The first step in estimating social costs is to determine whether the entrainment reducing technology costs will result in the manufacturing facility becoming uneconomic to operate. A premature shutdown of the facility would have social costs related to and including loss of jobs, loss of income and expenditures, and loss of tax base. Whether or not the plant would close for economic reasons depends on considerations including the costs of installing and operating any required entrainment reducing technology and expectations of future economic conditions. Although facility closure is a potential outcome of entrainment reduction compliance requirements a shutdown analysis was not performed for this evaluation and all social costs evaluated are based on the facility continuing to operate.

The social costs of installing entrainment reduction technologies are estimated by determining the design, construction, and installation costs of the evaluated technologies along with the operation and maintenance (O&M), power system, externality, and permitting costs. The analysis assumes that all compliance costs would reduce cash flow on U.S. Steel's balance sheet and would be passed on to U.S. Steel's shareholders. Table 1 summarizes the results of this evaluation and its implication for social costs.

Following the requirements of the rule, Table 1 evaluates social costs under two discount rates: 3 and 7 percent (79 *Fed. Reg*. 158, p. 48428). As the first column of Table 1 shows, the top half of the table presents the present value of social costs discounted at 3 percent, and the bottom half presents the social costs discounted at 7 percent. The next column of the table presents each of the feasible compliance options evaluated at Gary Works. The third and fourth columns present the total compliance costs estimated for each option. The third column presents the estimated design, construction, and installation costs, the fourth column presents the annual O&M costs for each feasible option, and the fifth column lists the costs associated with the replacement of cooling tower fill.

Table 1
Total Compliance & Social Costs of Feasible Technology Options at Gary Works

		Compliance Costs[a]			Social Costs (Present Value)					
Discount Rate	Technology Type	Total Design, Construction, and Installation Costs	Annual O&M Costs	Tower Fill Replacement[b]	Compliance Costs[c]	Power System Costs[d]	Externality Costs[e]	Government Regulatory Costs[f]	Total Social Costs	Annual Social Costs
3%	Closed-Cycle Cooling Retrofit	$181.64M	$0.24M	$5.32M	$108.20M	$41.07M	$0.07M	$0.03M	$149.38M	$4.98M
	Fine-Mesh TWS	$29.45M	$0.20M	NA	$21.05M	$1.38M	NA	$0.01M	$22.44M	$0.75M
7%	Closed-Cycle Cooling Retrofit	$181.64M	$0.24M	$5.32M	$52.19M	$19.83M	$0.04M	$0.02M	$72.08M	$2.40M
	Fine-Mesh TWS	$29.45M	$0.20M	NA	$11.44M	$0.74M	NA	$0.01M	$12.19M	$0.41M

[a] Compliance costs presented in Table 1 are undiscounted and in 2018 dollars. The social costs associated with each technology are in 2019 dollars and discounted at 3 and 7 percent using the specifications outlined in Table 2.

[b] Low fouling counterflow cooling tower fill replaced once every 10 years of operation beginning at start-up. This cost is incurred in 2037 and 2047.

[c] The analysis specifies that compliance costs would reduce cash flow on U.S. Steel's balance sheet and would be passed on to U.S. Steel's shareholders.

[d] Power system costs represent the additional power needed to operate the new technologies.

[e] Externality costs include expenditures to maintain baseline safety conditions and avoid increased mortality and morbidity effects of potential accidents from cooling tower induced fogging and icing.

[f] Governmental regulatory costs include the total costs associated with permitting, monitoring, administering, and enforcing the technology selection and installation.

The remaining columns in the table present the individual categories of social costs developed for this analysis: compliance costs, power system costs, externality costs, and government regulatory costs. The analysis discounts the future stream of each of these social costs at the relevant discount rate and sums them over the years they are specified to occur to develop the Total Social Cost estimate presented in the penultimate column. The table concludes by presenting the Annual Social Cost estimate for each technology. The annual estimate divides the Total Social Cost by the number of years used the analysis.

Compliance costs are specified as occurring over a 30-year time period for both fine-mesh traveling screens and a closed-cycle cooling retrofit. Replacement of the low fouling counterflow cooling tower fill is assumed once every ten years of operation beginning at start-up (Enercon 2019). Power system costs are specified to occur after construction based on efficiency and auxiliary load impacts. Regulatory documents are specified to be submitted in 2020. The timing for activities related to installation depends on the technology selected. Permitting, design, construction, and installation of a closed-cycle retrofit is assumed to take approximately seven years with the tower operating from 2027 through 2056 (Enercon 2019). Permitting, design, construction, and installation of fine-mesh traveling screens is estimated to take more than three years with the screens operating from 2024 through 2053 (Enercon 2019). Table 2 reflects the timing specifications for each of the alternatives evaluated.

Table 2
Timing Specified for Feasible Technologies at Gary Works (Years)

Entrainment Reducing Technology	Regulatory Documents Submitted	Permitting, Design, Construction, and Installation	O&M Costs Begin	Years of Operation
Closed-cycle cooling retrofit	2020	2020–2026	2027	30
Fine-mesh traveling screens	2020	2020–2023	2024	30

As Table 1 shows, the social costs of each technology include the option's compliance costs, the additional power system costs that would be incurred with each technology, the externality costs, and the government regulatory costs. The analysis specifies that compliance costs would reduce cash flow on U.S. Steel's balance sheet and would be passed on to U.S. Steel's shareholders. To estimate the cash flow decreases, the design, construction, and installation costs are allocated over the specified construction and installation time periods presented in Table 2. Operation and maintenance costs are then added for each year the technology is operational, and the future streams of those costs are discounted by 3 and 7 percent to develop the present value estimate for each discount rate. The social costs of compliance costs are discussed in more detail in Section 2. Governmental regulatory costs include the total costs associated with permitting, monitoring, administering, and enforcing the technology selection and installation. The social costs of government regulatory costs also are discussed in more detail in Section 2.

Power system costs represent the additional power needed to operate the new technologies. The fuel costs are developed by evaluating auxiliary load and electricity consumption associated with each technology. Details of the fuel cost estimates are presented in Section 3.

Externality costs represent the environmental impacts associated with the installation of entrainment reducing technologies, such as safety. Operation of a closed-cycle cooling system results in increased cooling tower plumes, which have the potential to affect safety in the area because of fogging and icing. Details of the externality cost analyses are presented in Section 4. Section 5 provides a conclusion based on the analysis presented in Sections 2 through 4.

2. The Social Costs of Compliance and Governmental Regulation Costs

This section describes the methods used for estimating the social costs associated with the compliance costs of designing, constructing, installing, permitting, operating, and maintaining entrainment reduction technologies. The section also describes the method for estimating the social costs associated with governmental costs of permitting, monitoring, administering, and enforcing regulatory compliance.

2.1 Social Costs of Compliance Costs

Gary Works is a steel manufacturing plant located on the southern shore of Lake Michigan in Gary, Indiana. Situated on 3,700 acres, Gary Works is U.S. Steel's largest manufacturing plant with the capability to produce 7.5 million tons of steel annually. The site contains a cogeneration plant that provides process steam and electricity to the facility. Gary Works withdraws water from Lake Michigan and uses it for industrial processes and for operating the cogeneration plant (U.S. Steel 2019).

As Figure 1 shows, expenditures on entrainment reduction technologies would have implications for U.S. Steel's balance sheet and construction activities. Balance sheet implications would accompany the purchase, installation, and operation of any of these entrainment reduction technologies. Balance sheet implications are transmitted through financial markets to register as social costs (i.e., consumer and producer surplus) to groups that potentially include shareholders and the general population.

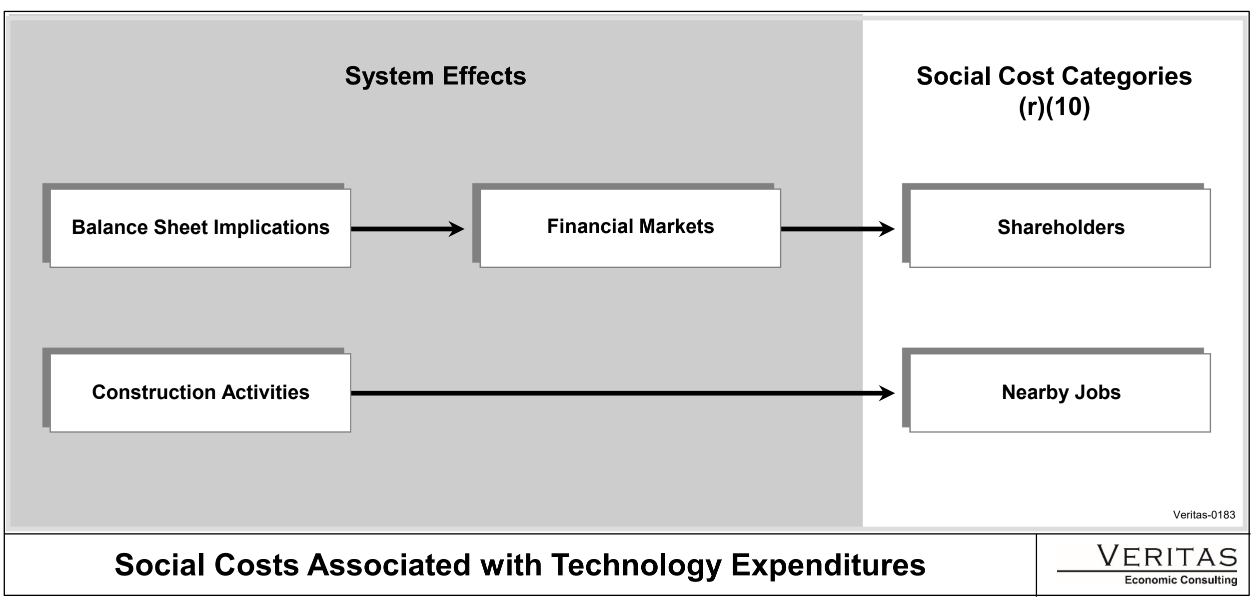

Figure 1: Social Costs Associated with Technology Expenditures

In addition, as the figure depicts, construction generates nearby economic activity, which can lead to good social outcomes such as more jobs. These economic impacts can be studied by using economic input-output analysis techniques. As related local outcomes are typically considered good, they are not measured under social costs and not considered further here.

2.2 Social Costs of Governmental Regulation Costs

Government regulatory costs include the total costs associated with permitting, monitoring, administering, and enforcing the technology selection and installation. Costs are incurred by the government as the permitting and review process is undertaken. These vary with the type of technology as certain technologies require substantially more permitting. Those with more significant environmental effects would have higher permitting costs. These costs are initially borne by the government but ultimately paid by taxpayers.

Government regulatory costs are developed from USEPA's estimates in the Economic Analysis document developed for the 2014 Rule (USEPA 2014). Following Table 7-7 in USEPA's Economic Analysis document (USEPA 2014), government administrative costs (i.e., regulatory costs) are specified to be 0.02 percent of compliance costs.

3. Social Costs of Power System Effects

This section describes the methods and results for estimating the social costs associated with changes in energy consumption and the offsite emissions associated with increased energy consumption. Energy consumption and emissions impacts arise from plant outages for technology installation, additional electricity consumption required to operate the technology, and unit-efficiency changes related to warmer cooling water temperatures.

3.1 Outages

Extended outage times during technology installation are, effectively, temporary capacity reductions. As depicted in Figure 2, these construction outages lead to system-level efficiency and capacity changes.[1]

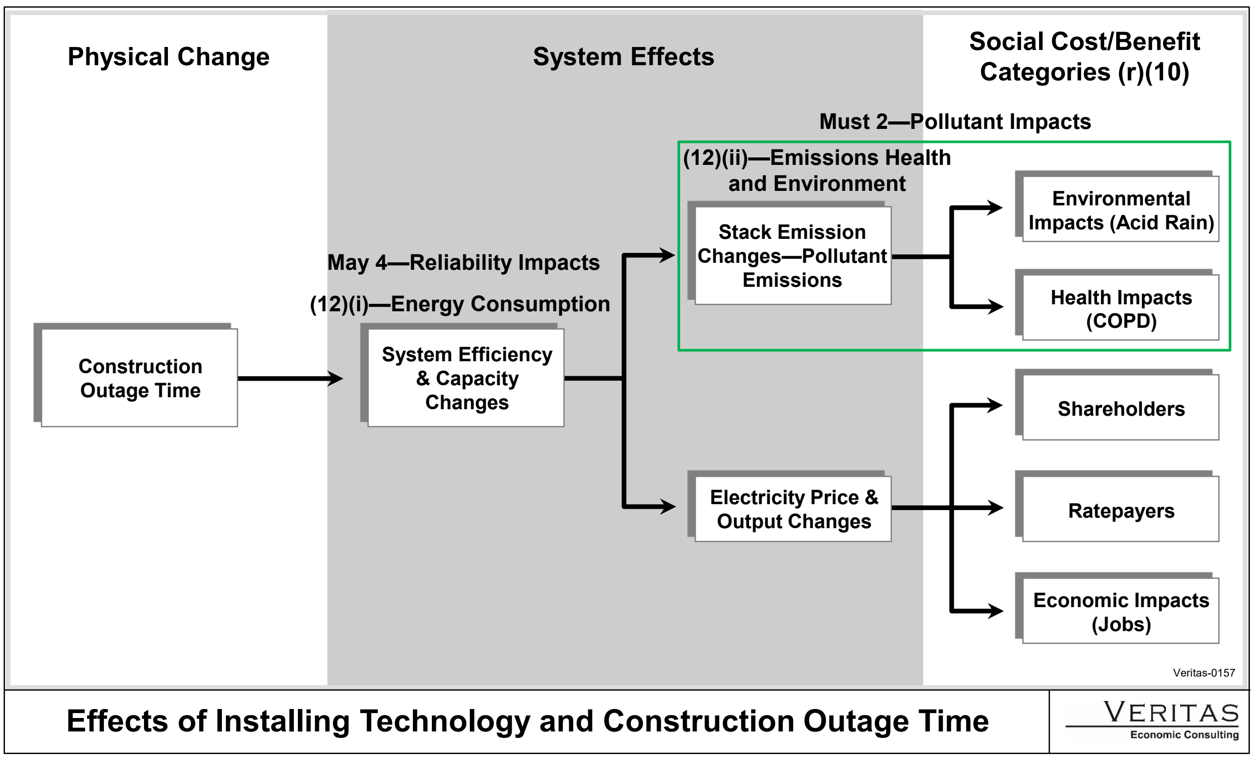

Figure 2: Effects of Construction Outage Time

Shutdowns and outages lead to less efficient dispatch and changes in energy consumption. These are to be assessed under § 122.21(r)(12)(i)—Energy Consumption.

[1] Significant capacity reductions can affect system reliability which can have social costs. Reliability effects are to be evaluated under (r)(12)(v)—Facility Reliability and are a factor that Directors may consider under § 125.98(f)(3)(iv) (May Factor 4—Grid Reliability Impacts). These are unlikely with planned outages, but offset costs may be identified if extended outages for multiple units are anticipated. The social costs of reliability effects are not evaluated in this study.

Changes in energy consumption will affect electricity production costs, leading to social costs that must be quantified in § 122.21(r)(10)(iii)—Outages Other.[2] Also, the re-dispatch associated with system-level efficiency changes leads to stack emission changes, which are to be studied under (r)(12)(ii)—Emissions Health and Environment. These emissions are a factor that Directors are required to consider (§ 125.98(f)(2)(ii) Must Factor 2—Pollutant Impacts).

The next most important capacity effect comes from outages. Outages occur when facilities are unable to access cooling water during equipment installation. According to Enercon (2019), neither the cooling tower nor fine-mesh screen retrofit at Gary Works would require an outage during construction, installation, tie-in, or testing.

3.2 Backpressure and Equipment Load

Certain other effects become important once entrainment reduction is underway. These can occur with most types of entrainment reduction technologies, but are typically more pronounced with cooling towers. As depicted in Figure 3, when operated, cooling towers require electricity to operate. This leads to net electrical generation capacity and efficiency effects and increases in decibel levels (primarily from operating fans). These effects result in energy consumption that must be identified under (r)(12)(i)—Energy Consumption. As with outages, these energy consumption changes have social costs and lead to stack emission changes from the electrical grid as different units operate. The Rule requires a "detailed" and peer-reviewable assessment of related effects under (r)(12)(i)—Energy Consumption and (r)(12)(ii)—Emissions Health and Environment—and these are a factor Directors must consider (Must 2—Pollutant Impacts). Moreover, there is significant discussion in the preamble indicating the importance of related effects.[3,4,5,7]

2 "Outages Other" refers to the component of (r)(10)(iii) which requires that, "…only that portion of lost net revenue [from any outages, downtime, or other impacts to facility net revenue] that does not accrue to other producers can be included in social costs."

3 "… the social cost of the energy penalty is the cost of generating the electricity that would otherwise be available for consumption except for the energy penalty. Again, an assessment of these costs would be determined under the § 122.21(r)(10) demonstration" (79 *Fed. Reg.* 158, 48370).

5 "EPA's review of emissions data … suggests that impacts from these pollutant discharges could be significant. These include the human health and welfare and global climate change effects—all associated with a variety of pollutants that are emitted from fossil fuel combustion" (79 *Fed. Reg.* 158, p. 48341).

6 "While both of these factors contribute to increased air emissions, the larger contributor to projected increased air emissions is by far the energy penalty" (79 *Fed. Reg.* 158, p. 48341).

7 "EPA is not able to quantify the frequency with which facilities could experience these local impacts, and therefore has concluded that the proper forum to address such local impacts fully is in a site-specific setting" (79 *Fed. Reg.* 158, 48342).

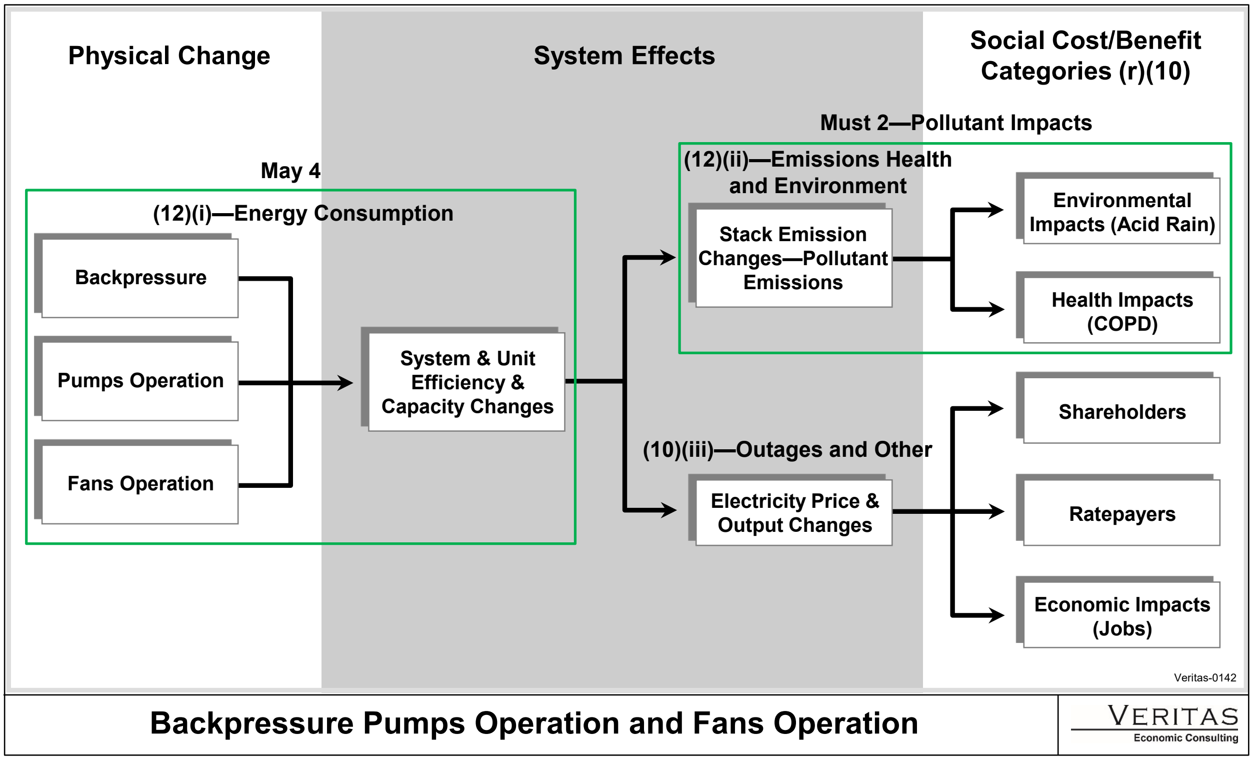

Figure 3: Effects of Operating Cooling Towers—Backpressure, Pumps Operation, and Fans Operation

The energy penalty evaluation is an important input to a number of studies necessary for the § 122.21(r)(12) report, as well as social costs that must be studied under § 122.21(r)(10). Energy penalties arise from "slightly lower generating efficiency attributed to higher turbine backpressure when the condenser is not replaced with one optimized for closed-cycle operation when retrofitting existing units" (79 *Fed. Reg*. 158, 48341). Studying energy penalty effects is important because:

(1) They relate directly to energy consumption, which must be studied under (r)(12)(i).

> "The study must include the following: Estimates of changes to energy consumption, including but not limited to auxiliary power consumption and turbine backpressure energy penalty" (§ 122.21(r)(12), 79 *Fed. Reg*. 158, page 48428).

(2) They produce indirect and direct social costs, which must be studied under (r)(10).

> "EPA is using energy penalty to mean only the opportunity costs associated with reduced power production due to derating (turbine backpressure)" (79 *Fed. Reg*. 158, 48370).

> "… the social cost of the energy penalty is the cost of generating the electricity that would otherwise be available for consumption except for the energy

penalty. Again, an assessment of these costs would be determined under the § 122.21(r)(10) demonstration" (79 *Fed. Reg*. 158, 48370).

(3) They affect air emissions, which must be studied under (r)(12)(iii).

"…increased air emissions … due to the energy penalty" (79 *Fed. Reg*. 158, 48341)

"The study must include the following: … Estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions. (79 *Fed. Reg*. 158, 48428)

(4) These air emissions lead to environmental, health, and social cost (welfare effects), which must be studied under § 122.21(r)(12)(iii) and (r)(10):

"…due to the energy penalty when retrofitting to cooling towers" related to "human health, welfare, and global climate" (79 *Fed. Reg*. 158, 48341).

"Estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions" (79 *Fed. Reg*. 158, 48428).

The required studies under (r)(12) are described as "a detailed, facility-specific discussion." Both (r)(10) and (r)(12) reports are subject to peer review (79 *Fed. Reg*. 158, 48368). Energy efficiency impacts result in important social costs and can also be an important determinant in their own right. For example, decision-makers looking ahead to greenhouse gas requirements may find these effects and their costs more important than comparable capital costs.

Unlike losses from operating pumps and fans, the energy penalty effect is difficult to generalize. Energy penalties on the hottest days of summer can be higher (EPRI 2011a; U.S. Department of Energy Office of Electricity Delivery and Energy Reliability 2008). The U.S. Department of Energy estimates that the energy penalty associated with wet cooling towers for a fossil fuel plant in the Great Lakes Region is about 1.47 percent for the annual average temperature conditions and about 3.08 percent for the hottest months of the year. An important consideration is that energy penalty effects vary hourly and tend to be at their worst when atmospheric conditions are already leading to high air-conditioning loads, generation costs, and wholesale electricity prices.

3.3 Energy Penalty Study Approach

The temperature of cooling water affects turbine performance. Generally speaking, colder cooling water improves efficiency (EPRI 2011a). Energy penalty effects are attributable to the difference in cooling water temperatures of the cooling towers as compared with that of once-through waterbody temperatures. With once-through cooling, the cooling water is the temperature of the source waterbody. With closed-cycle cooling, the cooling water temperature is related to cooling tower design characteristics and atmospheric conditions, in particular wet-bulb temperatures.

As wet-bulb temperatures increase, units cooled by closed-cycle recirculating systems become less efficient. Some fossil facilities have the capability to “over-fire” to compensate for efficiency impacts. Depending upon operational considerations, these facilities may experience increased fuel costs and less dramatic capacity reductions.[6] Generally speaking, capacity reductions are experienced when fuel input is at the boiler rated maximum and/or unit backpressure is at the highest tolerated point. At this point, fossil units cannot increase BTU input, and therefore experience capacity reductions. Nuclear units cannot vary fuel input. As noted by EPA, “the cost may be incurred by the facility … or by another generating unit” (79 *Fed. Reg*. 158, 48370). In both cases, costs (and environmental effects) of providing lost electricity are incurred by other units.[7]

Figure 4 depicts the generalized approach for identifying efficiency effects from a closed-cycle conversion. The approach uses the Baseline and Counterfactual structure recommended in USEPA (1991) *Guidelines for Preparing Regulatory Impact Analysis*. The baseline (red) input-output curve has output limited by line 1 and input (in MMBTUs) limited at line 2 (number of BTUs per kilowatt hour.) With an energy penalty from operating the cooling tower, the new input-output curve is represented by the blue line. If the unit cannot over-fire, the output is limited to where line 2 intersects the blue curve as indicated by line 3. Additionally, auxiliary load increases as cooling tower fans are operated. This is represented by the shift in capacity to line 4. The original fuel input is maintained to serve the parasitic load. The resulting input-output curve (5) represents reduced efficiency and lost net capacity.

[6] An important consideration is that both electricity prices and cooling tower performance are correlated with wet-bulb temperatures.

[7] When cooling towers result in lower cooling water temperatures, the opposite occurs.

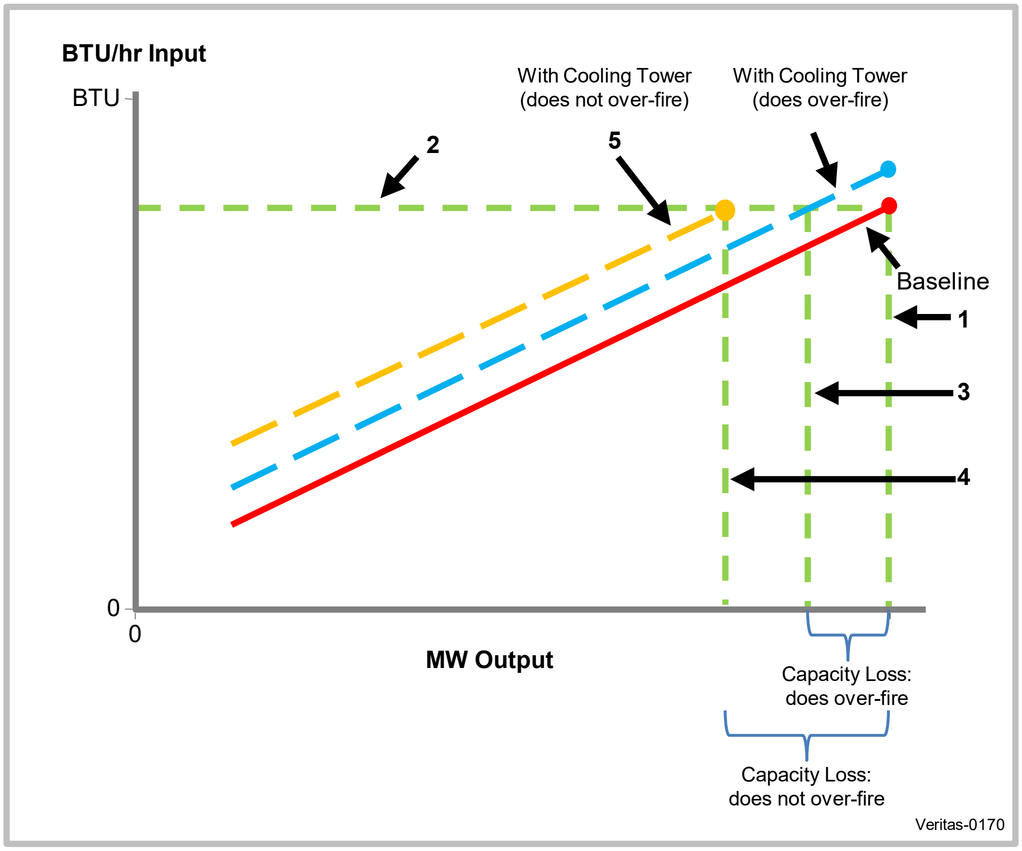

Figure 4: Potential for Efficiency Effects from Closed-Cycle Cooling

Because atmospheric conditions vary hourly, these curves move up and down. Figure 5 depicts the energy penalty effect for time periods when the source water is cooler than the cooling tower water. As depicted in the figure, the magnitude of the energy penalty depends upon fixed (time invariant) technical factors, including the slope of the turbine backpressure curve and cooling tower design parameters. The energy penalty also depends upon factors that vary somewhat predictably over the course of a year, including source waterbody temperatures and wet-bulb temperatures. To evaluate this effect, these are combined in Baseline and Counterfactual simulations.

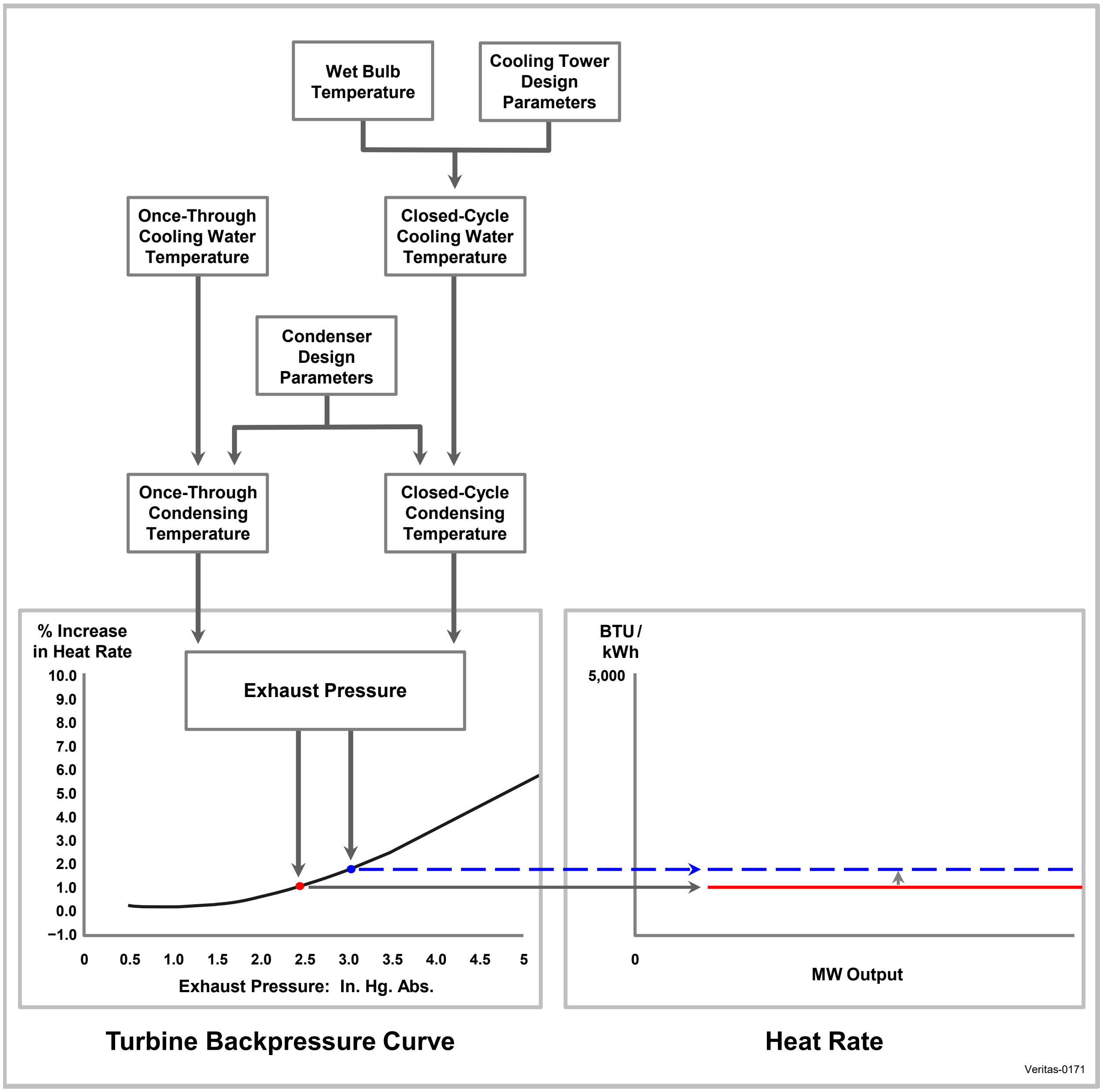

Figure 5: Technical Parameters and Ambient Conditions Underlie Efficiency Effects

Efficiency effects for Gary Works were characterized utilizing U.S. Department of Energy estimates of energy penalty for a fossil fuel plant retrofitted with wet cooling towers in the Great Lakes Region, along with the average heat rate of cogeneration plants (U.S. Department of Energy Office of Electricity Delivery and Energy Reliability 2008; Nyberg 2014). These data are used to identify maximum generation under baseline and with cooling towers conditions. The maximum efficiency impact during the hottest (i.e., summer) months is 3.08 percent, while the efficiency impact for all other timeframes is specified to be 1.47 percent.

3.4 Power System Background

The operational implications described previously are initial physical effects. The costs would be reflected in the power system as social costs. Understanding how these physical effects would ultimately be reflected as social costs requires considering the relevant power system relation to unit owners and customers within the associated electric service territory.

Retail electric markets in Indiana are served by regulated, investor-owned utilities, municipally owned utilities, and electric membership cooperatives. The utilities generate, transmit, distribute, and sell electricity to local customers living in their defined geographic service territory. The Indiana Utility Regulatory Commission (IURC) regulates investor-owned utilities in Indiana through a rate-making process ensuring that electricity is produced and delivered cost effectively, while allowing the utilities to recover costs along with a fair rate of return (IURC 2019).

Gary Works is geographically located within the Northern Indiana Public Service Company (NIPSCO) electric service territory and purchases power from NIPSCO. Gary Works would need to purchase additional power from NIPSCO to install and operate entrainment reducing technologies (Enercon 2019). Figure 6 depicts NIPSCO's electric service territory and location of Gary Works (NIPSCO 2018, 2019).

NIPSCO participates in the Midcontinent Independent System Operator (MISO) regional transmission organization. MISO provides electric reliability and coordination services in 9 geographically defined local resource zones across 15 states and Manitoba, Canada. Figure 7 depicts NIPSCO's location within MISO.

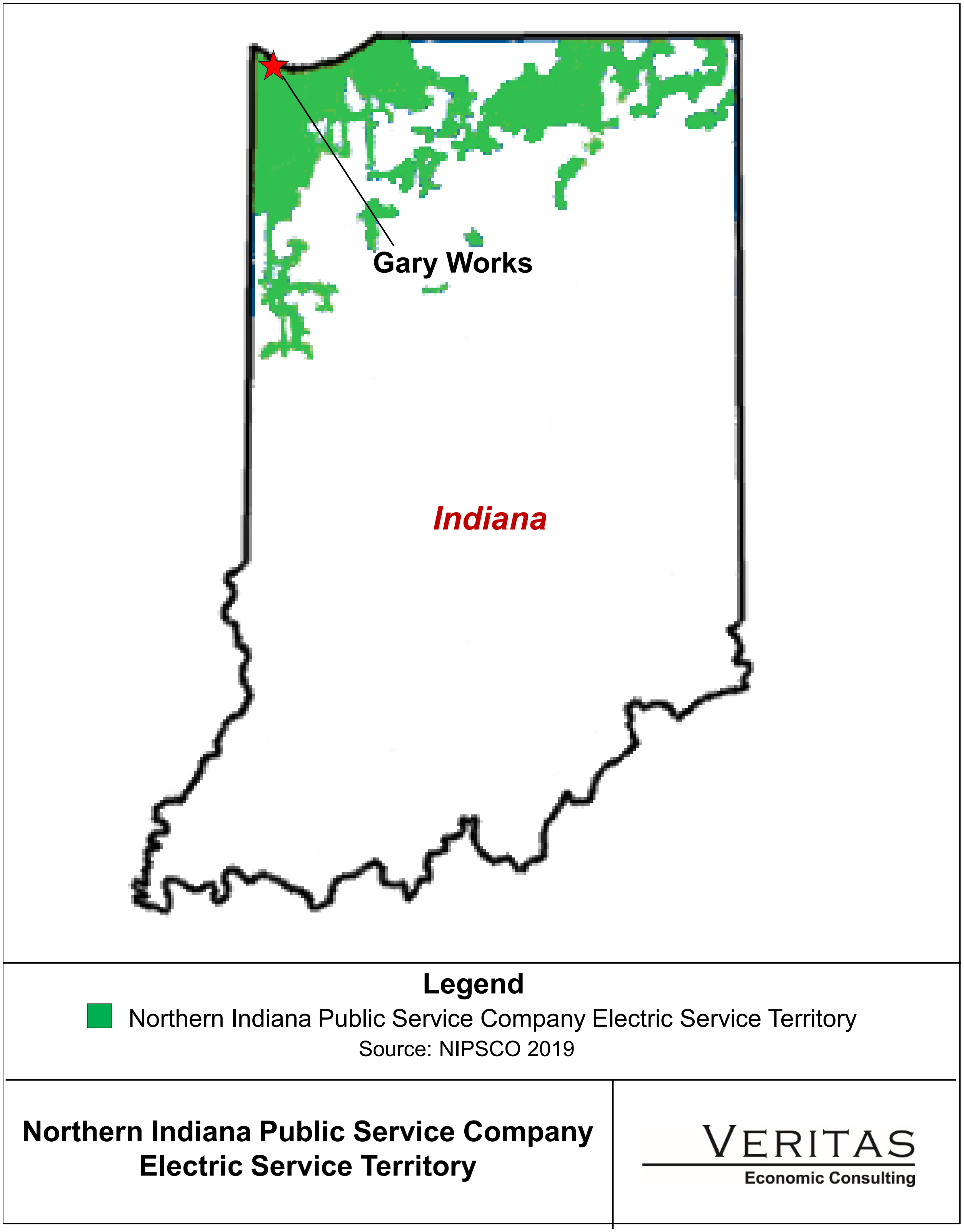

Figure 6: NIPSCO's Electric Service Territory and Location of Gary Works

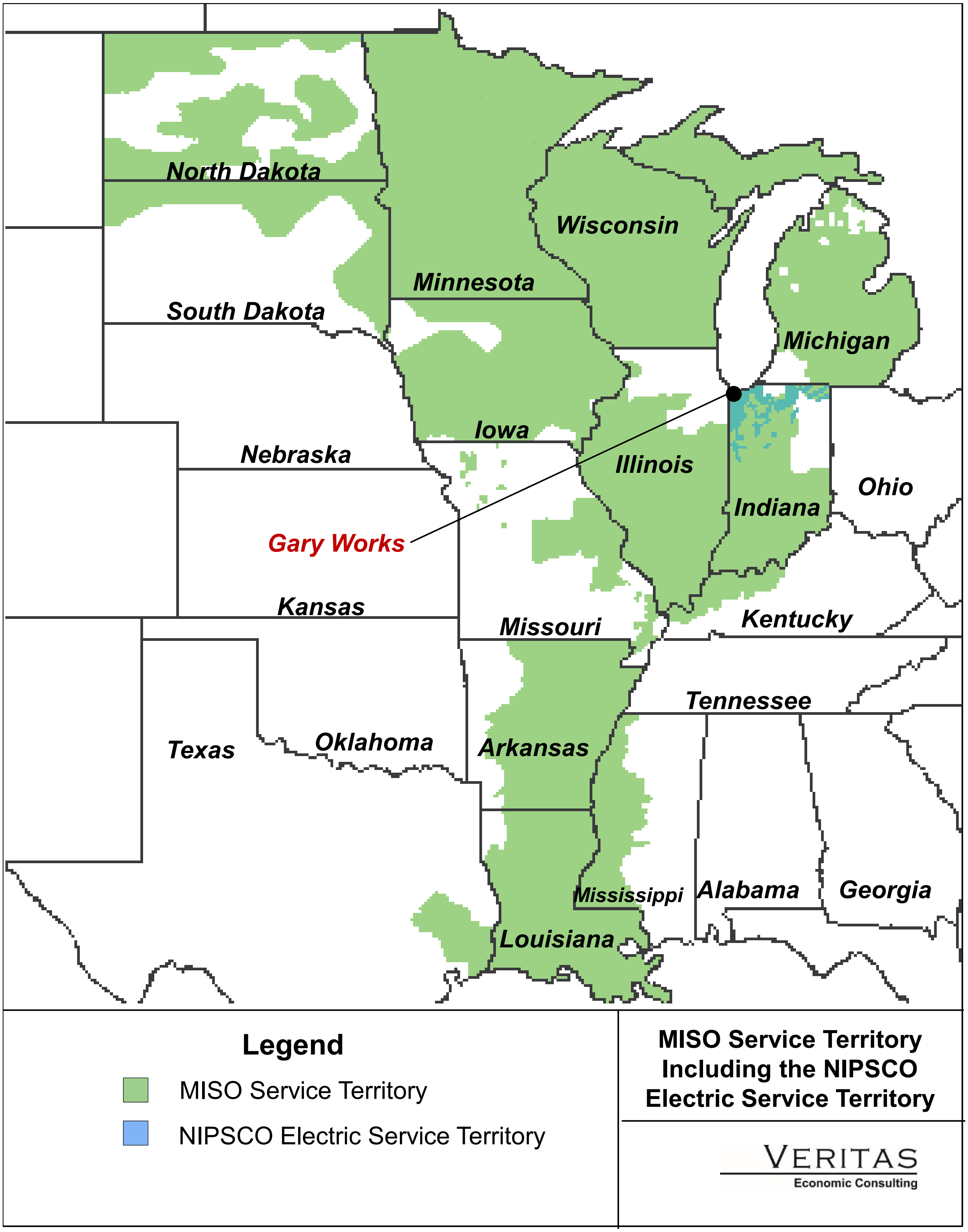

Figure 7: Gary Works in Relation to NIPSCO and MISO

To estimate the power system effects from capacity losses, the relevant Baseline and Counterfactual conditions are specified and input into the NIPSCO module of Veritas' Environmental Policy Simulation Model (EPSM) (Veritas Economic Consulting 2011), a 316(b)-focused power system model. Figures 8 and 9 present an overview of this modeling process.[8] In these figures, the vertical bars represent generating units. Their height is their marginal cost, and width represents capacity. The figures represent an individual hour out of the 8,760 hours in a year. System electrical load for that hour is represented by the green line.

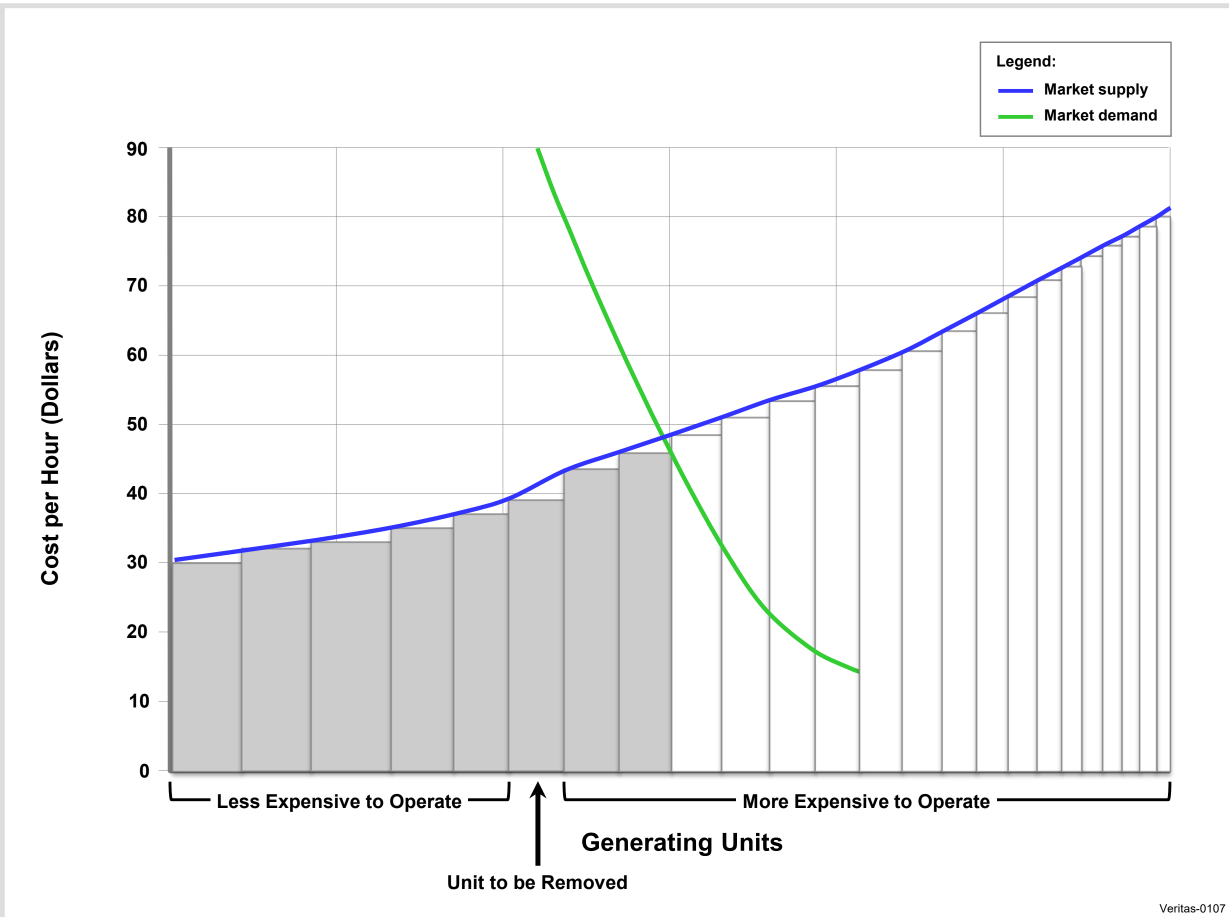

Figure 8: Electricity System under Baseline Conditions

Figure 8 represents market outcomes under Baseline conditions. The marginal cost of generation occurs where load intersects the dispatch order (slightly below $50 per MWh for illustration purposes). The dispatched units (in gray) all produce electricity at this price or less. The units that are not dispatched (in white) are all more expensive to operate. The total cost of

[8] The Baseline and Counterfactual modeling structure is the EPA-endorsed methodology for conducting benefit-cost analysis (USEPA 2010).

meeting load is represented by the area of the shaded units. An operating unit (or equivalently an amount of generating capacity) that is to be taken offline is identified.

Figure 9 depicts the power system outcomes when this previously operating capacity is no longer available. As this figure indicates, when a previously operating generation capacity is removed from the stack, more expensive to operate units "shift" to the left. Some of this capacity must operate to meet the existing load (which is fixed in this one-hour example).

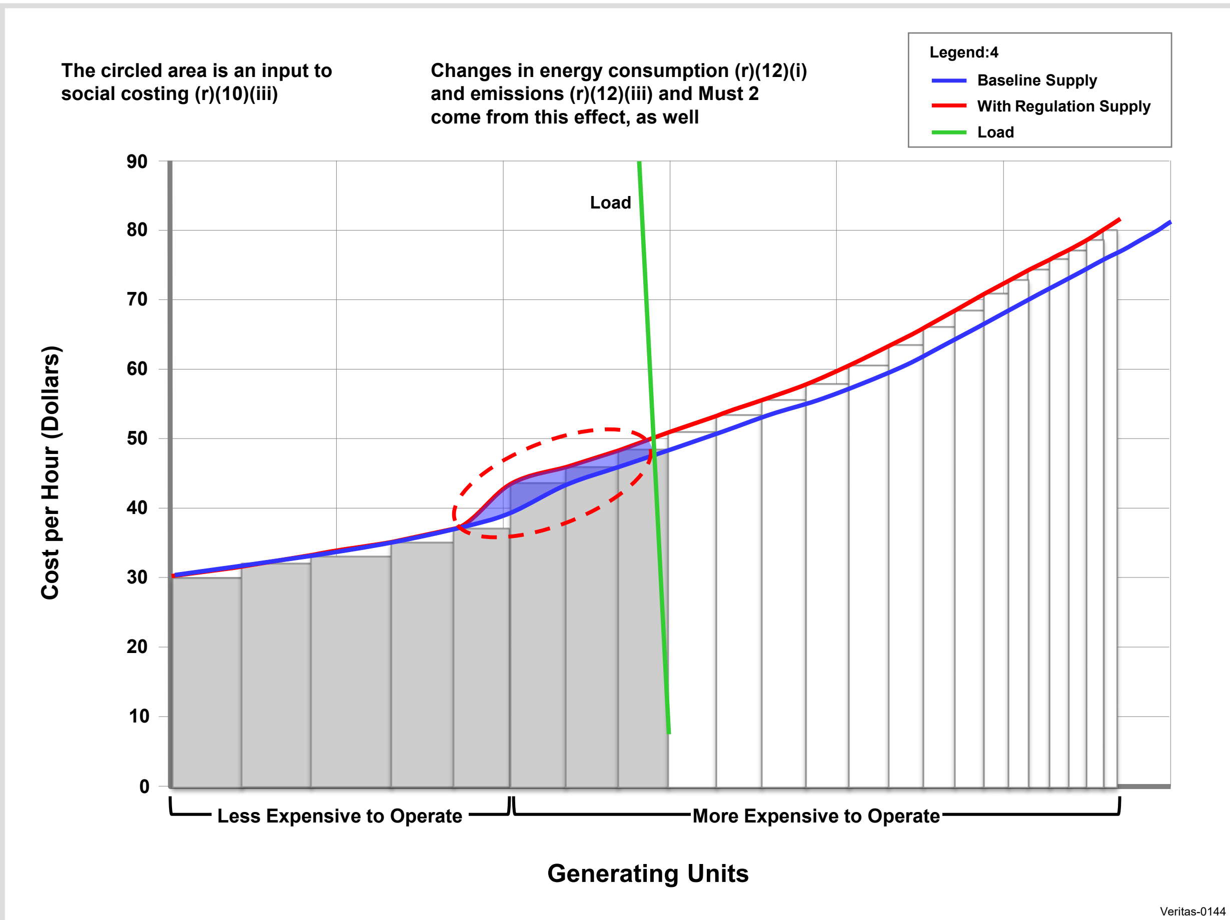

Figure 9: Electricity System Under With Regulation Conditions That Reduce Capacity

During other time periods (not pictured), load moves up and down. Power is more expensive to generate at all load levels above the generation cost of the previously operating unit (slightly under $40 in Figure 9). Additional outcomes include changes in fuel consumption and emissions as different units operate.

The overall impact is an increased cost of electricity to the consumer, which is a social cost resulting from use of cooling towers. However, because they occur in the context of price effects in competitive markets, this means there are financial transfers that make it difficult to identify who bears the social costs. In the case of Gary Works, the amount of net power the plant produces will decrease, meaning the amount of electricity the plant needs to purchase to operate would increase. Shareholders would bear the cost of the additional energy purchased.

3.5 Power System Simulation

The effects of auxiliary loads and backpressure are evaluated by modeling them within the context of NIPSCO's power and economic systems. This is accomplished by developing Baseline and Counterfactual (With Technology) specifications which are input into the NIPSCO module of Veritas' EPSM (Veritas Economic Consulting 2011), a 316(b)-focused power system model. Given market and unit specific inputs, the model simulates the operation of the electric power system. Calculation of least cost dispatch estimates may be affected by several characteristics of the electric system, such as generation must run requirements associated with transmission constraints, voltage control and ancillary requirements, and other factors. In addition, plant retirements, unit efficiencies, and replacement generation alter the dispatch order over time. Initially, annual system production costs are determined based on existing operations (i.e., Baseline conditions). With Technology annual system production costs are determined based on the entrainment reduction alternatives evaluated for this study, which include closed-cycle cooling and screen technologies.

The conceptual process described previously is implemented for Gary Works by carrying out the following steps:

1. Determine regional hourly load.
2. Conduct NIPSCO module of EPSM to meet load under Baseline conditions.
3. Create With Technology conditions that characterize conversion operating conditions.
4. Conduct NIPSCO module of EPSM to identify changes under With Technology conditions.
5. Calculate differences in annual costs, fuel consumption, and emissions.

These steps are implemented as follows.

3.5.1 Specify Hourly Load

Because electricity production costs vary hourly and because important cooling tower effects that arise from wet-bulb temperature vary hourly, modeling power system effects at the hourly level is useful. Modeled hourly load follows the shape of the MISO Local Resource Zone 6 region 2018 hourly load and it is scaled to the 2018 NIPSCO average monthly load (Figure 10).

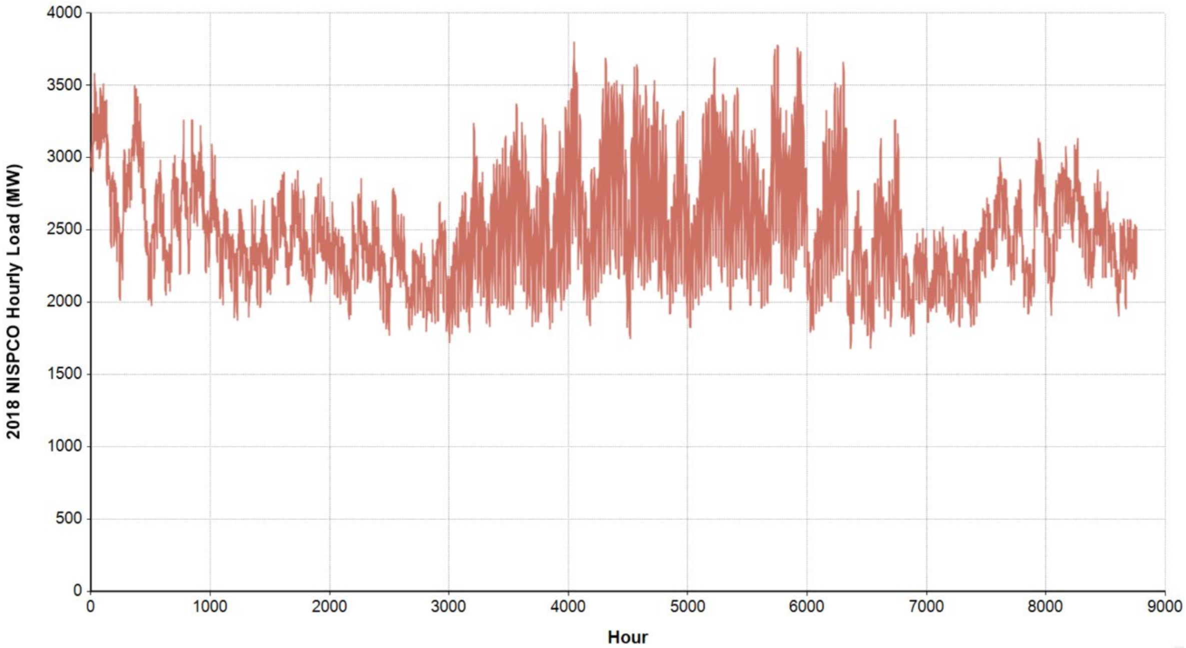

Figure 10: NIPSCO 2018 Modeled Hourly Load

3.5.2 Operate Model Under Baseline Conditions

Under Baseline conditions, operations are consistent with typical operating practices. The relationship between output and water temperature is based on once through water temperatures. Operating the model under these Baseline conditions produces hourly generation costs that are consistent with historical averages. Model generated hourly costs are depicted in Figure 11.

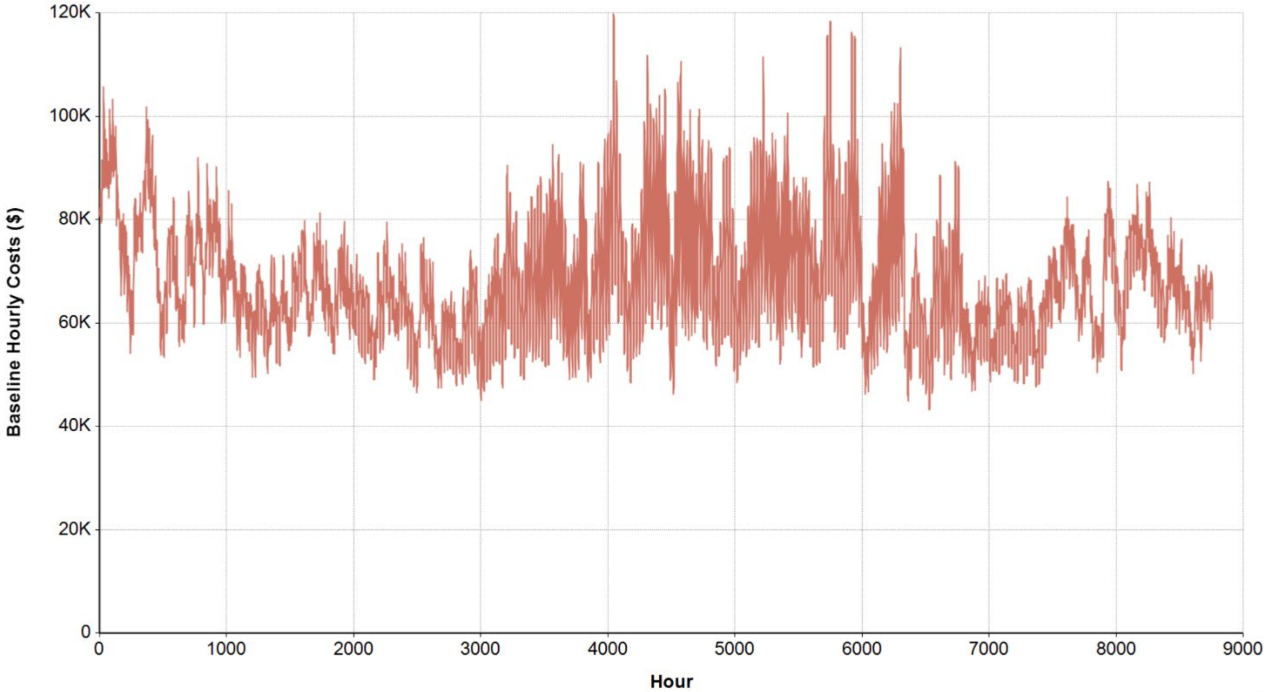

Figure 11: Baseline Hourly Generation Costs

3.5.3 Create Scenarios Representing Gary Works' Conversion and Ongoing Operations

Counterfactual scenarios are created for two years. These reflect the physical implications of conversion and ongoing operations at Gary Works. Post-conversion operations reflect net efficiency reductions from backpressure effects and auxiliary load. The engineering evaluation estimates that an average 8.334 MW is required for additional pumping power and fan operation (Enercon 2019). Figure 12 depicts the total net load implications for a typical year.

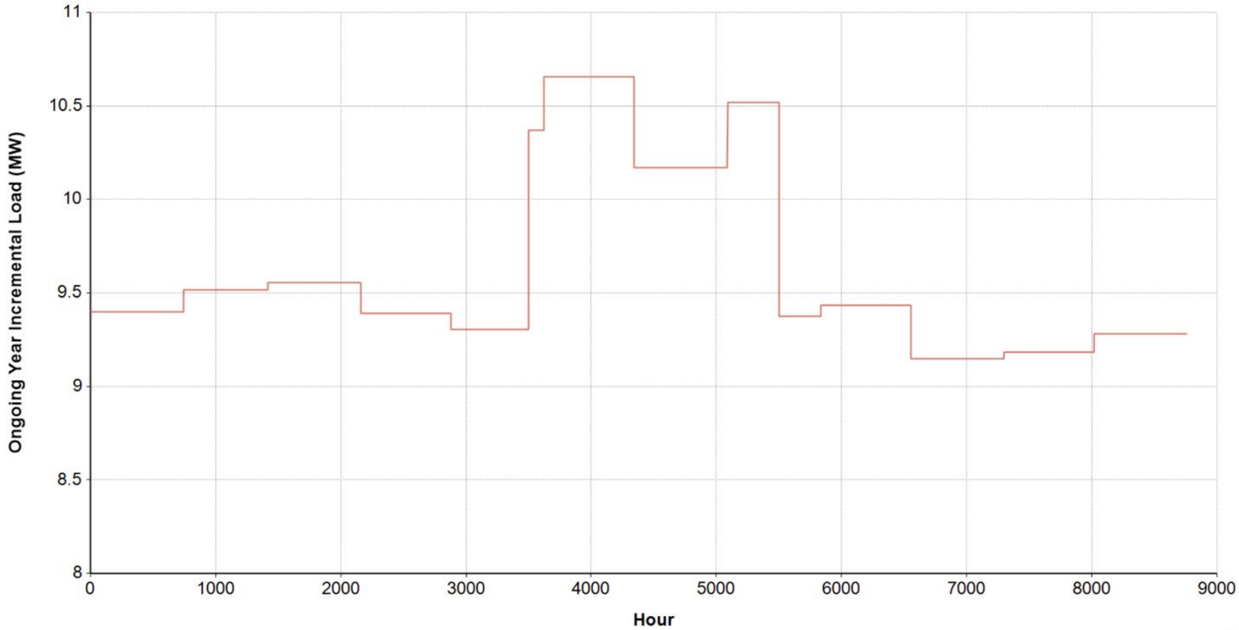

Figure 12: Total Hourly Load Changes from Backpressure Effects and Auxiliary Load

3.5.4 Run Simulations to Create Counterfactual Dispatch

With the counterfactual conditions set, the model is simulated to identify the counterfactual outcomes. These counterfactual outcomes are similar to those depicted in Figure 9. As Figure 9 indicates, additional units are dispatched to make up for lost net generation. Under a least cost dispatch approach, this leads to equal or higher hourly costs. Figure 13 depicts the hourly change in costs that occur in the conversion year.

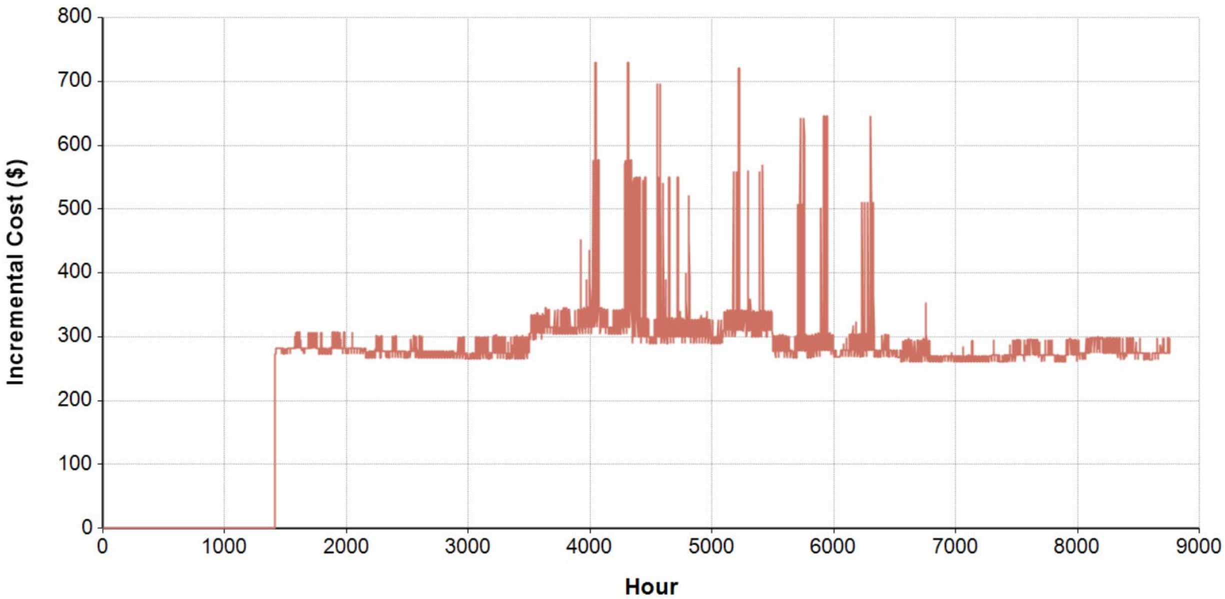

Figure 13: Incremental Hourly Costs in Conversion Year

As depicted, the market is operating under Baseline conditions until the cooling tower comes online in hour 1,417. Because Gary Works has to purchase power to support current operations, any increased power needs would require the plant to purchase additional power at the marginal rate set at the closest MISO node. Power system costs for the conversion year are $2.18M.

A typical year with cooling tower operation has costs like those of the post-conversion period depicted in Figure 13. However, these effects occur over the entire year as depicted in Figure 14.

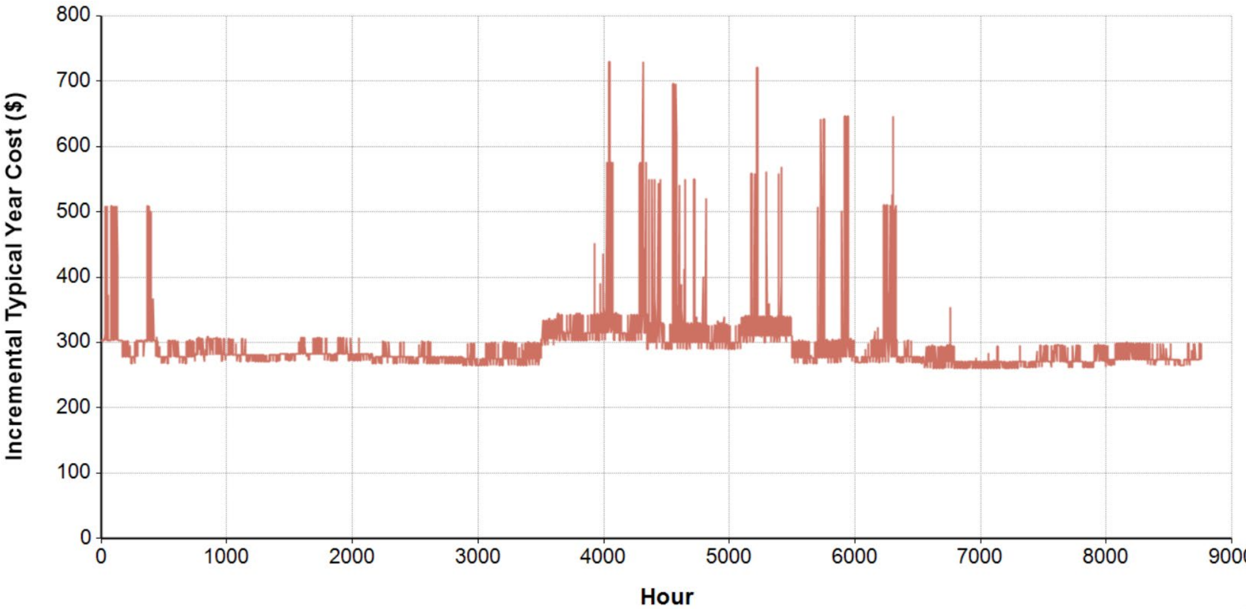

Figure 14: Incremental Hourly Costs in Typical Ongoing Year with Closed-Cycle Cooling

As Figure 14 indicates, ongoing costs reach their maximum at about $730 per hour. Because of continual pump operation, costs occur in all hours with a minimum of about $265. Power system costs for the typical ongoing year total $2.598M.

Similar calculations were conducted for auxiliary loads from fine-mesh traveling screens. Annual power requirements to rotate the screens and operate the screen wash pumps are estimated to be approximately 263kW total across all of the pump stations. In addition, the existing drivetrain motors would extend to year round operation, with a load of 32 kW (Enercon 2019).

Table 3 summarizes the incremental power system costs by year for each technology. Table 4 lists the incremental fuel consumption for each technology, and Table 5 presents the resulting emissions associated with those increases.

Table 3
Incremental Power System Costs by Technology

Technology	Conversion Year	Ongoing Year
Closed-Cycle Cooling Retrofit	$2.18M	$2.598M
Fine-Mesh TWS	$66.63K	$79.67K

Table 4
Incremental Fuel Consumption by Technology (MMBTUs)

Technology	Conversion Year	Ongoing Year
Closed-Cycle Cooling Retrofit	828.9K	971.6K
Fine-Mesh TWS	25.47K	29.92K

Notes: EPSM specifies that lost generation during the conversion and ongoing years that cannot be made up by NIPSCO units is imported from MISO. To estimate fuel consumption of the imported generation, the model uses the heat rate of a load-following fossil fuel plant in MISO.

Table 5
Incremental Emissions by Technology (Tons)

Technology	Emissions	Conversion Year	Ongoing Year
Closed-Cycle Cooling Retrofit	CO_2 Output	952,000	1,235,100
	SO_2 Output	1,300	1,700
	NOx Output	800	1,000
Fine-Mesh TWS	CO_2 Output	28,760	37,610
	SO_2 Output	40	52
	NOx Output	24	31

4. Social Costs of Externalities

A number of potential externalities can result from installing entrainment reduction technologies. At Gary Works the highly industrialized nature of the site mitigates against many of these, such as effects to property values and recreation. One area where there may be social costs from externalities is safety. Assessing changes in safety attributable to implementation of entrainment reduction technologies is required under § 122.21(r)(12)(iv), which specifically requires a "discussion of impacts to safety, including documentation of the potential for plumes, icing, and availability of emergency cooling water." This section describes the results of quantifying the externalities associated with safety impacts attributable to icing and fogging from cooling tower plumes.

4.1 Safety Effects

The potential for plume and icing-related safety effects from entrainment reduction technologies at Gary Works would arise from operating closed-cycle cooling towers. As depicted in Figure 15 below, tower evaporation adds water vapor to the atmosphere and causes the majority of water loss and plume generation. Plumes can lead to fogging and icing, which can affect safety.

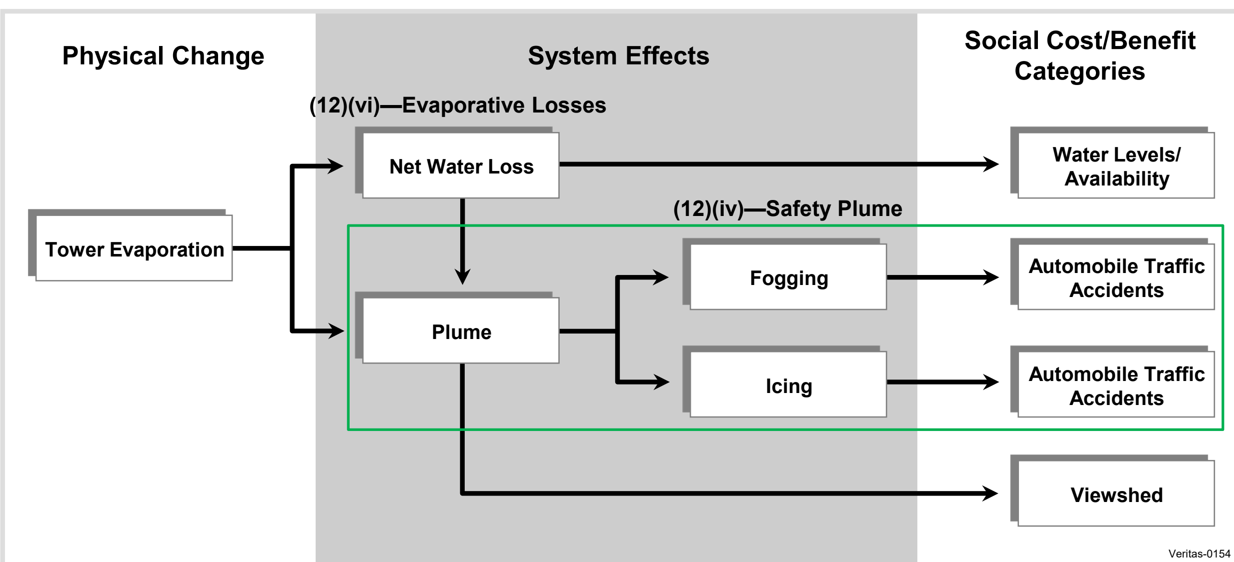

Figure 15: Effects of Operating Cooling Towers—Tower Evaporation

To evaluate the safety effects of cooling towers, EPRI (2011b) used the Seasonal Annual Cooling Tower Impact (SACTI) model to estimate plume visibility and ground-level icing attributable to a closed-cycle cooling system (EPRI 2011b). Results indicate that tower location, type, and height combine with ambient conditions to create the potential for safety effects, which are primarily related to fog and ice conditions on roadways.

4.2 Influence of Tower Location, Type, and Height

Because ice and fog on roadways is a primary driver of safety effects, towers sited proximate to heavily travelled roadways have the most potential for related safety effects. EPRI (2011b) defined fogging as the “visibility and path of the heated air/vapor stream that exits the cooling tower; if visible and close to the ground, then it is referred to as fog, and if visible and elevated, then it is referred to as a plume.” Accordingly, by virtue of their height, mechanical draft towers are more likely to produce fog than the taller, natural draft towers (National Thermal Pollution Research Program and Great Lakes Regional Office 1970).[9] Prevailing onshore winds and topographic features may have a mitigating effect; for example, Ryznar (1977) noted that orographic lifting by sand dunes paralleling a shoreline causes a cooling tower plume to remain aloft as it moves inland.

4.3 Fog and Ice Potential

Under the right atmospheric conditions, fog forms when a cooling tower adds sufficient quantities of water vapor to the atmosphere. Meteorological conditions favoring natural fog formation also favor cooling tower fogging (U.S. Nuclear Regulatory Commission 2013). Some researchers point out that a cooling tower plume could thicken an existing fog (Huff et al. 1971).

EPRI (2011b) evaluated the environmental and social effects of closed-cycle cooling conversions at 24 facilities throughout the United States. One of the environmental and social effects evaluated in the EPRI (2011b) study was the potential safety effects from plumes, fogging, and icing related to cooling towers. Specific cooling tower plume modeling was not conducted at Gary Works. Therefore, to estimate safety effects at Gary Works, the analysis transfers the plume modeling results from one of EPRI’s (2011b) 24 facilities (Representative Facility F) to represent the expected plume from a closed-cycle cooling retrofit at Gary Works and the accompanying fogging and icing effects. The analysis uses the results from Representative Facility F because it is located on a Great Lake and has the most potential similar impacts of any of the 24 studied facilities.

Considering the potential location of cooling towers at Gary Works, roadway fog and icing could have significant impacts by creating unsafe driving conditions on Gary Works’ onsite delivery roads. If increased fogging or icing from plumes makes these roads unsafe or

[9] SACTI analysis of natural draft cooling towers showed that fogging related to those towers may be insignificant because of the towers’ height (U.S. Nuclear Regulatory Commission 2013).

impassable, Gary Works employees would need to engage in averting behavior to maintain baseline (without cooling-tower) safety conditions. The averting behaviors would entail taking a detour that is expected to add an additional hour per trip. To estimate the social costs of the averting behavior, the analysis assumes that these employees are currently working full-time, so the detour would cause them to work an additional hour per day to maintain baseline safety conditions. The analysis also assumes that the additional wage they would be paid to compensate them for their extra time equals the opportunity cost of their time and willingness to work additional time to maintain baseline safety conditions. The additional compensation received by the employees is therefore used as a proxy for the social costs of the potential safety impacts from the cooling tower plume. Table 6 summarizes the inputs to the social cost calculation using results transferred from Representative Facility F in EPRI (2011b).

Table 6
Estimating Incidents of Fogging and Icing from Cooling Towers at Gary Works

Category	Estimate
Roadway affected by fog or ice	On-Site Delivery Road
Estimated trips	100 per day
Roadway fogging:	
Events	9 per year
Duration of event	2.11 hours
Roadway icing:	
Events	8 per year
Duration of event	1.42 hours

Notes: Table adapted from EPRI (2011b)

The analysis specifies that 100 trips occur per day on the on-site delivery road that would be affected by cooling tower plumes. Using the results from Representative Facility F in EPRI (2011b), roadway fogging is estimated to occur 9 times per year with a duration of 2.11 hours per event, and roadway icing is estimated to occur 8 times per year with a duration of 1.42 hours per event. These events would result in 30.35 hours per year when the onsite delivery road would be deemed unsafe and workers would be required to take the detour to complete each trip.

Enercon (2019) calculated operation and maintenance costs under the assumption that labor was provided by a unionized workforce compensated at the national average rate of unionized employees in the manufacturing industry weighted to the average city cost index for labor in Gary, Indiana. This results in an hourly wage of $48.51. This evaluation assumes that these employees are already working full-time and the additional driving time caused by the detour would have to be compensated at an overtime rate of $72.77 per hour. This results in U.S. Steel paying an additional $4,585 a year to maintain baseline safety conditions and avoid increased mortality or morbidity effects from potential accidents caused by increased roadway fogging and icing.

5. Conclusion

The social costs of installing entrainment reduction technologies are estimated by determining the design, construction, and installation costs of the evaluated technologies along with the operation and maintenance (O&M), power system, externalities, and government regulatory costs. The analysis assumes that all compliance costs of both fine-mesh traveling screens and a closed-cycle cooling retrofit would reduce cash flow on U.S. Steel's balance sheet and would be passed on to U.S. Steel's shareholders.

Power system costs represent the additional power needed to operate the new technologies and are developed by evaluating auxiliary load and electricity consumption associated with each technology. Externality costs represent the environmental impacts associated with the installation of entrainment reducing technologies, such as safety. Governmental regulatory costs include the total costs associated with permitting, monitoring, administering, and enforcing the technology selection and installation.

Following the requirements of the rule, the analysis evaluates social costs under two discount rates: 3 and 7 percent (79 *Fed. Reg*. 158, p. 48428). The total social cost of a closed-cycle cooling retrofit ranges from over $72 million (7 percent discount rate) to almost $149.4 million (3 percent discount rate). Social costs of fine-mesh traveling screens range from almost $12.2 million (7 percent discount rate) to over $22.4 million (3 percent discount rate).

6. References

Bingham, Matthew, and Jason Kinnell. 2014. "EPA's New 316(b) Rule and the Opportunity of Social Costs." *Power* 158(9)48,51–54.

Electric Power Research Institute. 2011a. *Full-Time/Seasonal Closed-Cycle Cooling*. Product ID 1023100. Palo Alto, CA: EPRI.

Electric Power Research Institute. 2011b. *Net Environmental and Social Effects of Retrofitting Power Plants with Once-Through Cooling to Closed-Cycle Cooling: Final Report*. Product ID 1022760. Palo Alto, CA: EPRI.

Electric Power Research Institute. 2015. *An Introduction to Social Costs and Resources for 316(b) Entrainment Evaluations*. Product Id: 3002006306. Palo Alto, CA: EPRI.

Enercon. 2019. "Comprehensive Technical Feasibility and Cost Evaluation Study: U.S. Steel—Gary Works." Kennesaw, GA. October 29,2019.

Huff, F.A., R.C. Beebe, D.M.A. Jones, G.M. Morgan, Jr., and R.G. Semonin. 1971. "Preliminary Report: Effect of Cooling Tower Effluents on Atmospheric Conditions in Northeastern Illinois." Available at http://www.isws.illinois.edu/pubdoc/c/iswsc-100.pdf. Retrieved on December 10, 2015.

Indiana Utility Regulatory Commission. 2019. "About the IURC." Available at https://www.in.gov/iurc/2451.htm. Retrieved May 2019.

National Thermal Pollution Research Program and Great Lakes Regional Office. 1970. "Feasibility of Alternative Means of Cooling for Thermal Power Plants Near Lake Michigan." Available at http://nepis.epa.gov/Exe/ZyPDF.cgi/2000R0VV.PDF?Dockey=2000R0VV.PDF. Retrieved on November 17, 2015.

NIPSCO. 2018. "NIPSCO 2018 Integrated Resource Plan." Available at https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/2018-nipsco-irp.pdf?sfvrsn=15. Retrieved May 2019.

NIPSCO. 2019. "About Us." Available at https://www.nipsco.com/our-company/about-us. Retrieved May 2019.

Nyberg, Michael. 2014. *Thermal Efficiency of Gas-Fired Generation in California: 2014 Update*. California Energy Commission. CEC 200-2014-005.

Ryznar, Edward. 1977. "Advection-Radiation Fog Near Lake Michigan." *Atmospheric Environment* 11:427–430.

U.S. Department of Energy Office of Electricity Delivery and Energy Reliability. 2008. *Electricity Reliability Impacts of a Mandatory Cooling Tower Rule for Existing Steam Generation Units.* Available at http://www.netl.doe.gov/energy-analyses/pubs/Cooling_Tower_Report.pdf. Retrieved on September 15, 2015.

U.S. Environmental Protection Agency. 1991. *Guidelines for Preparing Regulatory Impact Analysis*. Available at http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0228A-1.pdf/$file/EE-0228A-1.pdf. Retrieved on August 5, 2014.

U.S. Environmental Protection Agency. 2010. *Guidelines for Preparing Economic Analyses*. Report Number EPA 240-R-10-001. December. Washington, DC: U.S. EPA. Available at http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf. Retrieved on June 19, 2013.

U.S. Environmental Protection Agency. 2014. *Economic Analysis for the Final Section 316(b) Existing Facilities Rule*. May 2014. EPA-821-R-14-001.

U.S. Nuclear Regulatory Commission. 2013. *Environmental Impact Statement for the Combined License (COL) for Enrico Fermi Unit 3*. Available at http://static1.1.sqspcdn.com/static/f/356082/21587990/1357712560473/Vol+1+part+5.pdf?token=nJpMc7tTgzoeNdydbuYPy%2FSLgRc%3D. Retrieved on November 12, 2015.

U.S. Steel. 2019. Company Website. Available at https://www.ussteel.com/. Retrieved May 2019.

Veritas Economic Consulting. 2011. *Veritas Economics Environmental Policy Simulation Model (EPSM)*. Working Paper 2011-01. Cary, NC: Veritas Economic Consulting, LLC. Available at http://www.veritaseconomics.com/Working%20Papers/EPSM_201101.pdf.

CWA Section 316(b) Requirements for CWIS Pursuant to 40 CFR 122.21(r)(9)-(12)

APPENDIX 3

Entrainment Reduction Benefits Study
Veritas Economic Consulting (March 2020)

Entrainment Reduction Benefits Study:

United States Steel Corporation Gary Works NPDES Permit IN0000281

Final Report

Prepared for:

U.S. Steel Corporation

Prepared by:

Veritas Economic Consulting

March2020

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Table of Contents

List of Figures

List of Tables

Table **Page**

1. Overview and Results

The U.S. Environmental Protection Agency's (EPA's) 2014 Section (§) 316(b) Rule (79 *Fed. Reg.* 158, 48300–48439) (Rule) requires that applicants submit studies of technologies or operational measures that can reduce entrainment (USEPA 2014a). The studies must discuss cost, feasibility, impact, and social costs and benefits of technologies including cooling towers, 2–millimeter (mm) or smaller screens, and water reuse or alternative water sources (§ 122.21(r)(10)(i–iii) and § 122.21(r)(11)(i-vi)). The Benefits Valuation Study presents the benefits of each technology and must include the following elements as defined in 79 *Fed. Reg.* 158, 48428 (r)(11):

(i) Incremental changes in the numbers of individual fish and shellfish lost due to impingement mortality and entrainment as defined in 40 *CFR* 125.92, for all life stages of each exposed species;

(ii) Description of basis for any estimates of changes in the stock sizes or harvest levels of commercial and recreational fish or shellfish species, or forage fish species;

(iii) Description of basis for any monetized values assigned to changes in the stock size or harvest levels of commercial and recreational fish or shellfish species, forage fish, and to any other ecosystem or nonuse benefits;

(iv) A discussion of mitigation efforts completed prior to October 14, 2014 including how long they have been implemented and level of effectiveness;

(v) Discussion, with quantification and monetization where possible, of any other benefits expected to accrue to the environment and local communities, including but not limited to improvements for mammals, birds, and other organisms and aquatic habitats; and

(vi) Discussion, with quantification and monetization where possible, of benefits expected to result from any reductions in thermal discharges from entrainment technologies.

This report contains the results, data, and methods for estimating the fishing benefits associated with entrainment reductions at United States Steel Corporation Gary Works (Gary Works). The remainder of this section summarizes the data, methods, and results for the § 122.21(r)(11)(i)-(iii) requirements listed above.

1.1 § 122.21(r)(11)(i): Incremental Changes in Fish

Table 1.1 demonstrates the documented level of impingement occurring at Gary Works based on impingement data collected between March 28, 2011 and May 26, 2015 (Ramboll 2018). The data represent impingement mortality at cooling water withdrawal volumes based on daily intake flow. Daily intake flow data use actual flow from 2012 through 2015. The table also represents the reduction in impingement mortality for all species and life stages of fish and shellfish that would occur with 100 percent reduction of Gary Works' impingement. The incremental change data for impingement also identify species based on their economic and ecological roles (i.e., forage, recreational, and commercial) in the fishery.

Table 1.1
Gary Works Impingement, 2011–2015

Taxa	No. 1 Pump Station	No. 2 Pump Station	Lakeside Pump Station	Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
Alewife	5,414	2,529	386	8,329	●			
Black Bullhead	3	0	0	3			●	
Bluegill	60	31	0	91			●	
Bluntnose Minnow	80	2	0	82	●			
Brook Silverside	6	1	0	7	●			
Brook Trout	1	0	0	1			●	
Burbot	3	0	2	5		●		
Chinook Salmon	4	0	0	4			●	
Coho Salmon	2	0	0	2			●	
Emerald Shiner	364	62	9	435	●			
Flathead Catfish	3	0	3	6			●	
Freshwater Drum	1	0	3	4		●	●	
Fundulus	3	0	0	3	●			
Gizzard Shad	42,432	1,919	23	44,374	●			
Golden Shiner	0	1	0	1	●			
Goldfish	7	1	0	8	●			
Great Lakes Mottled Sculpin	1	0	0	1	●			
Green Sunfish	6	0	0	6			●	
Lake Trout	5	0	0	5		●	●	
Largemouth Bass	3	1	0	4			●	
Mottled Sculpin	3	0	0	3	●			
Nine-Spined Stickleback	3	3	0	6	●			
Rainbow Smelt	387	261	77	725	●			
Rainbow Trout	2	5	0	7			●	
Rock Bass	1	0	1	2			●	
Round Goby	1,384	327	3,323	5,034	●			
Sand Shiner	65	11	20	96	●			
Sea Lamprey	3	0	0	3	●			
Silver Redhorse	3	0	0	3			●	
Slimy Sculpin	3	0	3	6	●			
Smallmouth Bass	30	11	6	47			●	
Spoonhead Sculpin	1	0	0	1	●			

Table 1.1, continued

Taxa	No. 1 Pump Station	No. 2 Pump Station	Lakeside Pump Station	Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
Spotfin Shiner	7	0	0	7	●			
Spottail Shiner	3,699	292	191	4,182	●			
Three-Spined Stickleback	8	10	0	18	●			
Trout Perch	1	0	1	2	●			
Walleye	6	0	1	7			●	
Warmouth	0	1	1	2			●	
White Crappie	5	1	0	6			●	
White Perch	4	0	10	14			●	
White Sucker	3	0	2	5			●	
Whitefish	1	0	1	2		●		
Yellow Perch	24,243	3,930	4,204	32,377		●	●	
Total	**78,260**	**9,399**	**8,267**	**95,926**				

Sources: Ramboll (2018); U.S. Fish and Wildlife Service (USFWS) (2019)

Annual ichthyoplankton entrainment was estimated for 2012 through 2014 based on entrainment sampling data collected at Gary Works from January 2012 through December 2014 (Ramboll 2019) and annual average intake flow data based on Gary Works' operations in 2012 through 2014.[1] Tables 1.2, 1.3, and 1.4 present the estimates of annual entrainment and the classification of species as forage, recreationally and/or commercially harvested, or threatened or endangered for No. 1 Pump Station (PS), No. 2 PS, and Lake Side (LS) PS respectively. No threatened or endangered species were entrained at Gary Works during the study period. The tables also represent the reduction in entrainment for all species and life stages of fish and shellfish that would occur with 100 percent reduction of Gary Works' entrainment. While round goby entrainment estimates are presented in Tables 1.2 through 1.4, they are excluded from the analysis because the Indiana Department of Natural Resources (INDNR) has classified them as a nuisance species (INDNR 2003) per 312 Indiana Administrative Code (IAC) 9-6-7 Exotic Fish The Rule allows the nuisance species to be excluded from the analysis noting that, "The Director may determine that all life stages of fish and shellfish does not include other specified nuisance species (§125.92(b))." Given the INDNR's classification that round goby are a nuisance species, round goby eggs, larvae, and juveniles are excluded from the benefits analysis.

[1] Data from 2011 and 2015 were not used as there is not a complete calendar year of data for annualized entrainment estimates.

Table 1.2
Gary Works: Total Entrainment, No. 1 Pump Station, 2012–2014

Species	Eggs	Larvae	Juvenile	Species Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
2012								
Round Goby	0	0	0	0	•			
Clupeidae	**0**	**116,256**	**0**	**116,256**				
Gizzard Shad	0	103,101	0	103,101	•			
Alewife	0	13,155	0	13,155	•			
Unidentified Actinopterygii	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	•			
Alewife	0	0	0	0	•			
Yellow Perch	0	0	0	0		•	•	
Spottail Shiner	0	0	0	0	•			
Rainbow Smelt	0	0	0	0	•			
Emerald Shiner	0	0	0	0	•			
Round Goby	0	0	0	0	•			
Annual Estimate	**0**	**116,256**	**0**	**116,256**				
2013								
Round Goby	0	78,031	25,867	103,898	•			
Clupeidae	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	•			
Alewife	0	0	0	0	•			

Table 1.2, continued

Species	Eggs	Larvae	Juvenile	Species Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
Unidentified Actinopterygii	**8,430,154**	**0**	**0**	**8,430,154**				
Gizzard Shad	4,635,208	0	0	4,635,208	•			
Alewife	591,417	0	0	591,417	•			
Yellow Perch	2,648,269	0	0	2,648,269		•	•	
Spottail Shiner	404,073	0	0	404,073	•			
Rainbow Smelt	0	0	0	0	•			
Emerald Shiner	0	0	0	0	•			
Round Goby	151,186	0	0	151,186	•			
Annual Estimate	**8,430,154**	**78,031**	**25,867**	**8,534,052**				
2014								
Round Goby	0	332,019	0	332,019	•			
Clupeidae	**0**	**118,206**	**0**	**118,206**				
Gizzard Shad	0	104,830	0	104,830	•			
Alewife	0	13,376	0	13,376	•			
Unidentified Actinopterygii	**501,389**	**0**	**0**	**501,389**				
Gizzard Shad	275,682	0	0	275,682	•			
Alewife	35,175	0	0	35,175	•			
Yellow Perch	157,507	0	0	157,507		•	•	
Spottail Shiner	24,033	0	0	24,033	•			
Rainbow Smelt	0	0	0	0	•			
Emerald Shiner	0	0	0	0	•			
Round Goby	8,992	0	0	8,992	•			
Annual Estimate	**501,389**	**450,225**	**0**	**951,614**				

Sources: Ramboll (2019); U.S. Fish and Wildlife Service (2019)
Notes: Entrainment numbers based on January 2012 through December 2014 entrainment sampling and 2012 through 2014 annual average intake flow. The Final Rule at §125.92(b) allows Indiana Department of Environmental Management to make a nuisance species determination and since round goby have been so designated by the Indiana Department of Natural Resources (INDNR), round goby eggs, larvae, and juveniles were not included in this analysis (INDNR 2003).

Table 1.3
Gary Works: Total Entrainment, No. 2 Pump Station, 2012–2014

Species	Eggs	Larvae	Juvenile	Species Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
2012								
Round Goby	0	0	0	0	•			
Clupeidae	**0**	**73,920**	**0**	**73,920**				
Gizzard Shad	0	31,891	0	31,891	•			
Alewife	0	42,029	0	42,029	•			
Unidentified Actinopterygii	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	•			
Alewife	0	0	0	0	•			
Yellow Perch	0	0	0	0		•	•	
Spottail Shiner	0	0	0	0	•			
Rainbow Smelt	0	0	0	0	•			
Emerald Shiner	0	0	0	0	•			
Round Goby	0	0	0	0	•			
Annual Estimate	**0**	**73,920**	**0**	**73,920**				
2013								
Round Goby	0	69,497	23,038	92,534	•			
Clupeidae	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	•			
Alewife	0	0	0	0	•			

Table 1.3, continued

Species	Eggs	Larvae	Juvenile	Species Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
Unidentified Actinopterygii	**7,508,106**	**0**	**0**	**7,508,106**				
Gizzard Shad	1,545,929	0	0	1,545,929	●			
Alewife	2,037,339	0	0	2,037,339	●			
Yellow Perch	3,165,972	0	0	3,165,972		●	●	
Spottail Shiner	235,232	0	0	235,232	●			
Rainbow Smelt	210,259	0	0	210,259	●			
Emerald Shiner	49,947	0	0	49,947	●			
Round Goby	263,428	0	0	263,428	●			
Annual Estimate	**7,508,106**	**69,497**	**23,038**	**7,600,641**				
2014								
Round Goby	0	383,897	0	383,897	●			
Clupeidae	**0**	**136,675**	**0**	**136,675**				
Gizzard Shad	0	58,966	0	58,966	●			
Alewife	0	77,710	0	77,710	●			
Unidentified Actinopterygii	**579,731**	**0**	**0**	**579,731**				
Gizzard Shad	119,367	0	0	119,367	●			
Alewife	157,311	0	0	157,311	●			
Yellow Perch	244,457	0	0	244,457		●	●	
Spottail Shiner	18,163	0	0	18,163	●			
Rainbow Smelt	16,235	0	0	16,235	●			
Emerald Shiner	3,857	0	0	3,857	●			
Round Goby	20,340	0	0	20,340	●			
Annual Estimate	**579,731**	**520,572**	**0**	**1,100,303**				

Sources: Ramboll (2019); U.S. Fish and Wildlife Service (2019)
Notes: Entrainment numbers based on January 2012 through December 2014 entrainment sampling for No. 1 Pump Station scaled to 2012 through 2014 annual average intake flow for No. 2 Pump Station. The Final Rule at §125.92(b) allows Indiana Department of Environmental Management to make a nuisance species determination and since round goby have been so designated by the Indiana Department of Natural Resources (INDNR), round goby eggs, larvae, and juveniles were not included in this analysis (INDNR 2003).

Table 1.4
Gary Works: Total Entrainment, Lakeside Pump Station, 2012–2014

Species	Eggs	Larvae	Juvenile	Species Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
2012								
Round Goby	0	403,068	337,850	740,918	•			
Clupeidae	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	•			
Alewife	0	0	0	0	•			
Unidentified Actinopterygii	**0**	**0**	**0**	**0**				
Gizzard Shad					•			
Alewife	0	0	0	0	•			
Yellow Perch	0	0	0	0		•	•	
Spottail Shiner	0	0	0	0	•			
Rainbow Smelt	0	0	0	0	•			
Emerald Shiner	0	0	0	0	•			
Round Goby	0	0	0	0	•			
Annual Estimate	**0**	**403,068**	**337,850**	**740,918**				
2013								
Round Goby	0	132,332	0	132,332	•			
Clupeidae	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	•			
Alewife	0	0	0	0	•			

Table 1.4, continued

Species	Eggs	Larvae	Juvenile	Species Total	Classification: Forage	Classification: Commercial	Classification: Recreational	Threatened or Endangered
Unidentified Actinopterygii	**101,980**	**0**	**0**	**101,980**				
Gizzard Shad	0	0	0	0	●			
Alewife	4,812	0	0	4,812	●			
Yellow Perch	52,405	0	0	52,405		●	●	
Spottail Shiner	2,381	0	0	2,381	●			
Rainbow Smelt	960	0	0	960	●			
Emerald Shiner	0	0	0	0	●			
Round Goby	41,423	0	0	41,423	●			
Annual Estimate	**101,980**	**132,332**	**0**	**234,312**				
2014								
Round Goby	0	104,951	0	104,951	●			
Clupeidae	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	●			
Alewife	0	0	0	0	●			
Unidentified Actinopterygii	**0**	**0**	**0**	**0**				
Gizzard Shad	0	0	0	0	●			
Alewife	0	0	0	0	●			
Yellow Perch	0	0	0	0		●	●	
Spottail Shiner	0	0	0	0	●			
Rainbow Smelt	0	0	0	0	●			
Emerald Shiner	0	0	0	0	●			
Round Goby	0	0	0	0	●			
Annual Estimate	**0**	**104,951**	**0**	**104,951**				

Sources: Ramboll (2019); U.S. Fish and Wildlife Service (2019)

Notes: Entrainment numbers based on January 2012 through December 2014 entrainment sampling and 2012 through 2014 annual average intake flow. The Final Rule at §125.92(b) allows Indiana Department of Environmental Management to make a nuisance species determination and since round goby have been so designated by the Indiana Department of Natural Resources (INDNR), round goby eggs, larvae, and juveniles were not included in this analysis (INDNR 2003).

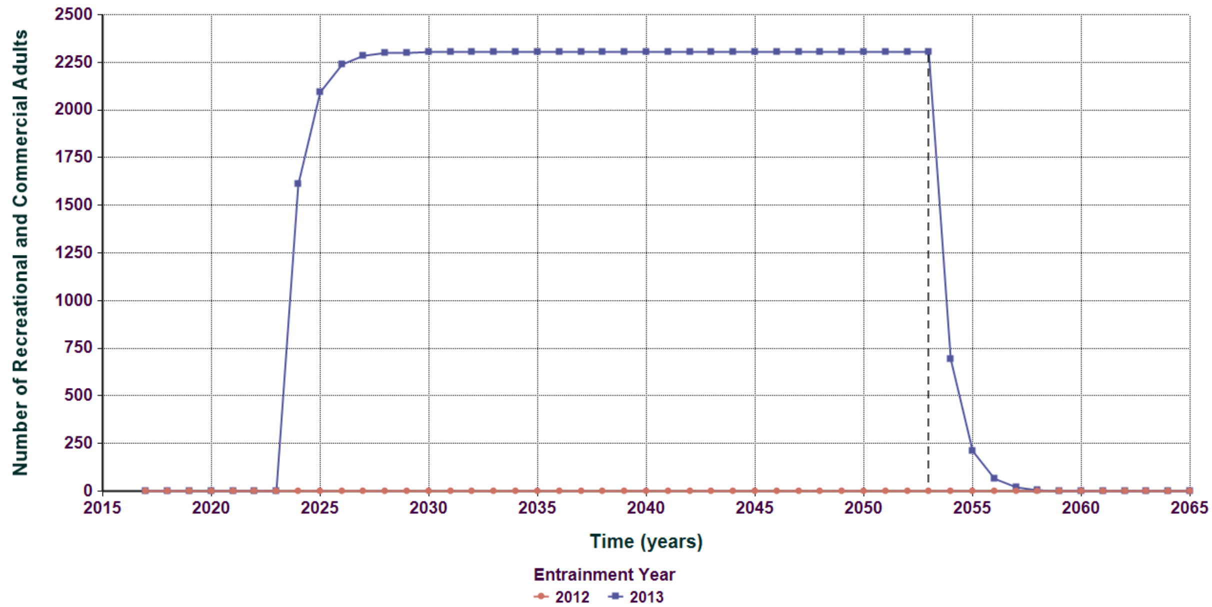
1.2 § 122.21(r)(11)(ii): Description of Changes in Stock or Harvest Levels

Differences between With Entrainment (baseline) and Reduced-Entrainment conditions are used to quantify the benefits of entrainment reduction technologies by modeling fishery stocks. This is accomplished by creating age-structured transition (i.e., Leslie) matrices (Leslie 1945, 1948; Caswell 2001) that characterize the survival rates by age of modeled stocks. The Leslie matrix model is frequently used in fisheries management and has traditionally been an important component of best professional judgment (BPJ) § 316(b) assessments under 1977 draft guidance (Akçakaya et al. 2002; Public Service Electric and Gas Company 1999; USEPA 2002). These dynamic matrix models are populated with survival rates and weights-at-age, simulated through the remaining useful plant life to identify changes in fish stocks (based on ecological or economic use classifications: forage, commercial, or recreational) with each evaluated technology.

The following figures presented throughout this section depict results using two years of entrainment data (2012 and 2013). These two years are selected from Tables 1.2 through 1.4 because they represent the low and high end of observed entrainment. The summation of entrainment for 2012 and 2013 from No. 1 PS (Table 1.2), No. 2 PS (Table 1.3), and LS PS (Table 1.4) was used to quantify entrainment impacts from the facility as a whole. Please note, No. 4 PS is not included in the facility entrainment estimate as total intake flow is estimated to be less than or equal to 1 MGD and therefore entrainment impacts are estimated to be negligible given the magnitude of the other intakes. The No. 3 PS is a backup system that is currently not in use. The simulated model results using each year of entrainment data are presented individually so the effects that interannual variation of flow and species composition have on each component of the benefit estimation process are transparent.

The results are also depicted for the complete elimination of entrainment. This is done for simplicity and clarity in presenting the results. Presenting the results for the multiple technologies being considered adds additional complexity to the figures and makes them difficult to interpret; therefore, the results of the estimated benefits of each technology are presented in a table at the end of this section.

As Tables 1.2 through 1.4 show, the entrained species included in the analysis that has commercial or recreational value is yellow perch. Figure 1.1 depicts the estimated changes in fish stocks with the complete elimination of entrainment at Gary Works.



Recreational and Commercial Species (Yellow Perch)

Notes:
The decline in the number of recreational and commercial adults occurring in 2053 signifies the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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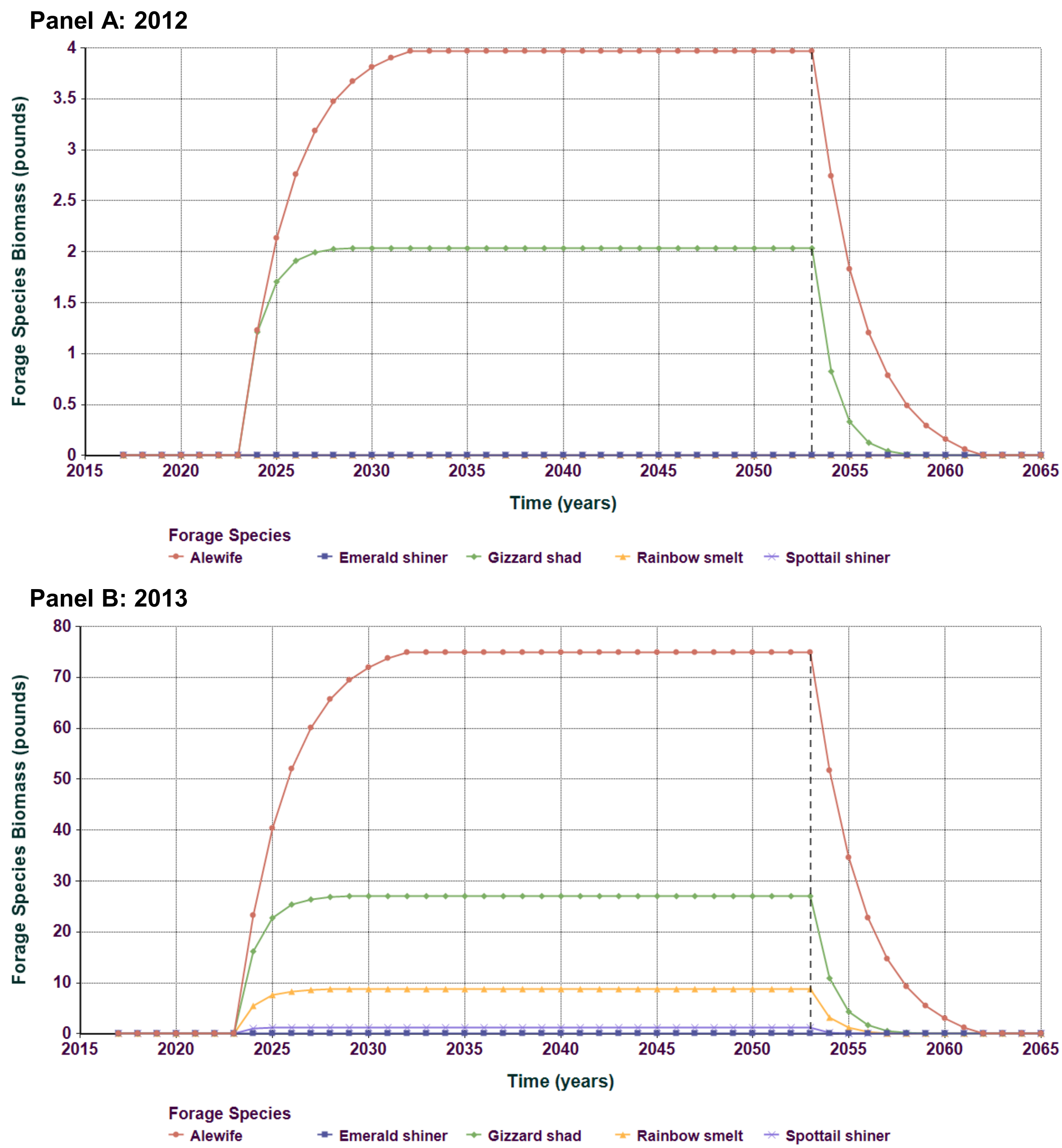
Figure 1.1: Direct Changes in Recreational and Commercial Yellow Perch Stocks as Number of Fish with Elimination of Entrainment at Gary Works

Monetizing impacts to forage species is accomplished by converting them to an equivalent number and biomass of recreational and commercial species via the "trophic-transfer" method, detailed in the Electric Power Research Institute (EPRI) document *Extrapolating Impingement and Entrainment Losses to Equivalent Adults and Production Foregone* (EPRI 2004). As typically applied, this approach multiplies adult equivalent forage biomass (i.e., production forgone) by a conversion factor to identify changes in higher trophic level species that are recreationally and commercially valuable. Figure 1.2 depicts the adult equivalent forage biomass for the forage species entrained at Gary Works. The top panel of Figure 1.2 presents the results using 2012 entrainment data, and the bottom panel presents the results using the 2013 entrainment data.



Change in Forage Species Biomass

Notes:
The range of the vertical axis in each panel varies to show the relative difference in forage species biomass across species and sample years.

The decline in forage species biomass occurring in 2053 signifies the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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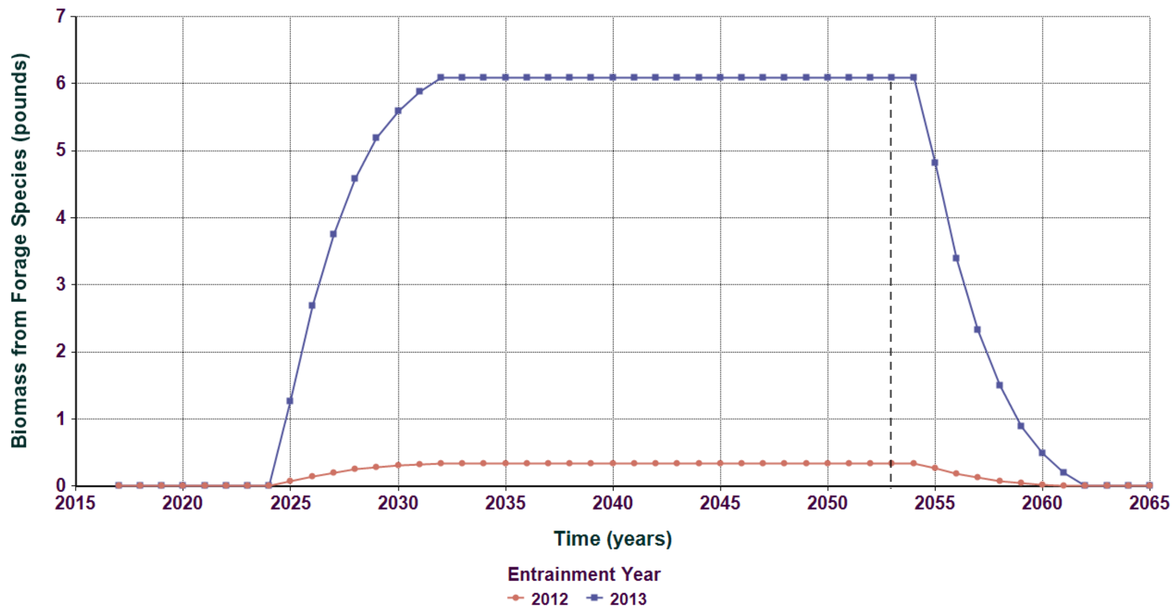
Figure 1.2: Direct Changes in Forage Stocks as Biomass (pounds) with Elimination of Entrainment at Gary Works

The approach of directly converting this biomass into commercial/recreational fish biomass has had some important advantages in the historical §316(b) regulatory context. These include that it allows "accounting for" all entrained species and that it is straightforward to implement in that it requires no conceiving of the complex and changeable predator-prey relationships of actual food webs.

Under the 2014 Rule's peer-review requirement, it is important that the deficiencies of this approach not be ignored. Primarily, the trophic-transfer approach interprets observed average biomasses at different trophic levels (i.e., 10-to-1 forage to predator) as causal without meaningful foundations for doing so and in the face of extensive information that indicates otherwise (Pauly and Christensen 1995; Zhao, Kocovsky, and Madenjian 2013; Madenjian et al. 1996). Perhaps the most glaring issue with this approach is its inconsistency with the estimates developed for recreational and commercial species. In particular, it is specified that higher trophic level species are under fishing pressure from above (humans), rendering them unlikely to be constrained by forage availability. Moreover, if forage constraints *do* limit populations of higher trophic levels, consistency would require considering that some or all of the increased stocks implied by the reduced entrainment such as those depicted in Figure 1.1 would consume the increase in forage biomass. Unlike complex, food-web based considerations this concern about the trophic-transfer approach is a simple one of consistency and the avoidance of double counting within a benefits analysis. With these deficiencies recognized, the trophic-transfer approach is applied. The selected predator is Coho salmon (National Oceanic and Atmospheric Administration Great Lakes Environmental Research Laboratory 2009). Figure 1.3 depicts trophic transfer-based changes to Coho salmon stock as a result of the changes in forage biomass (in pounds).

To identify the yield changes associated with changes in stocks, harvest rates are applied to stock changes. When possible, these harvest rates are based on fishery stock assessments of the source waterbody. When stock-specific recreational or commercial harvest rates are not available, they are developed based on species-specific harvest rates provided in the literature (USEPA 2006; EPRI 2004, 2012a) with adjustments based on BPJ.



Biomass from Forage Species (pounds)

Notes:
As the fishery evolves, the biomass reaches a steady state when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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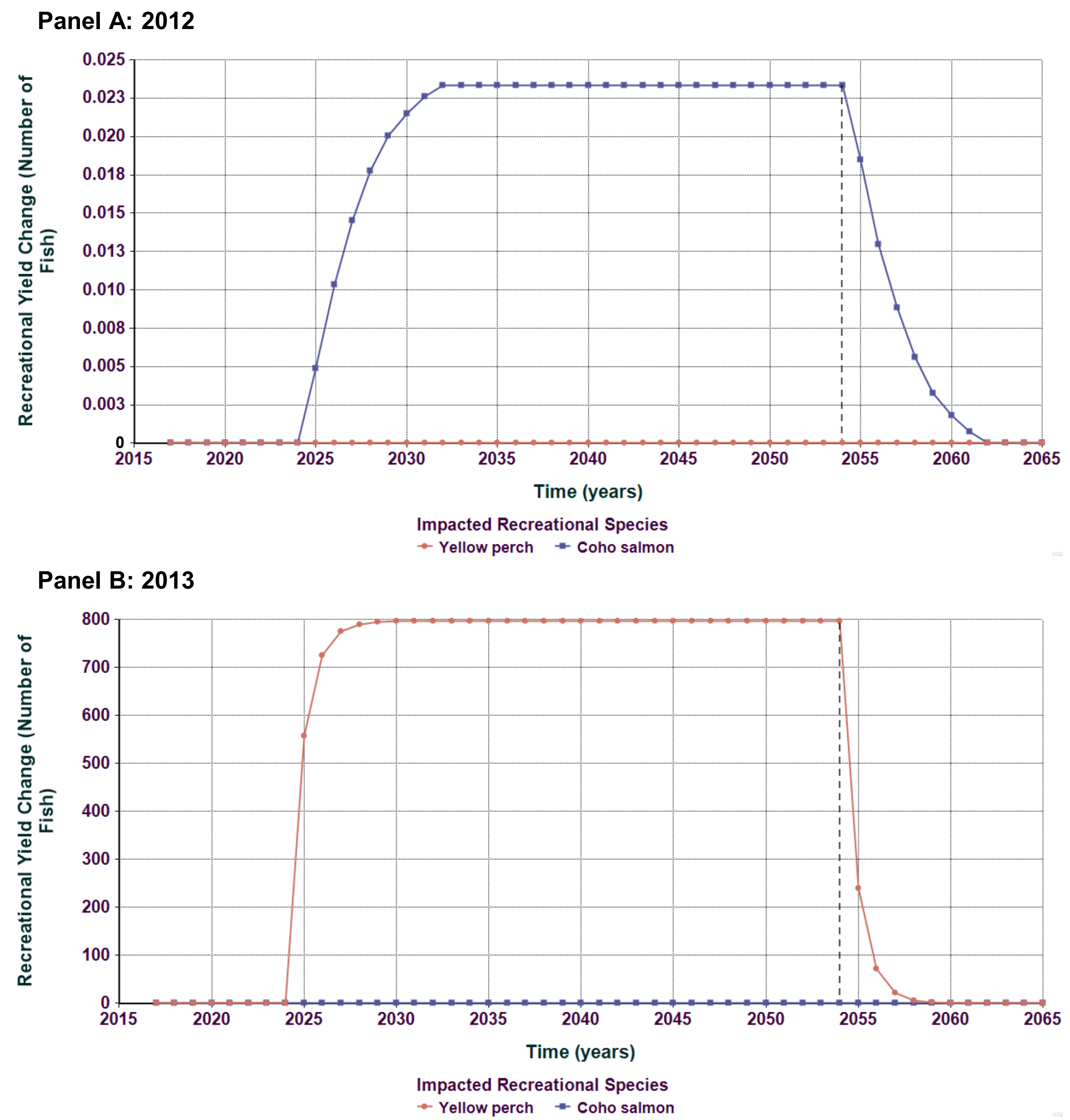
Figure 1.3: Trophic Transfer Based Changes in Pounds of Coho Salmon Biomass with Elimination of Entrainment at Gary Works

Commercial anglers may not fish in the Indiana waters of Lake Michigan (Indiana General Assembly 2017); however, both Michigan and Wisconsin allow commercial fishing in their states' waters of Lake Michigan. Yellow perch are harvested recreationally and commercially, so the direct and indirect annual increase in these species is distributed across recreational and commercial yield. The analysis specifies that 99 percent of yellow perch are caught recreationally. This percentage is applied to the annual increase in yield to distribute the increase across commercial and recreational yield. Figure 1.4 depicts the estimated yield changes for the impacted recreational species at Gary Works inclusive of the stock changes in Coho salmon as a result of forage biomass.

In addition to recreational yield changes, the analysis also considers commercial yield changes. As Tables 1.2, 1.3, and 1.4 illustrate, yellow perch are identified as being harvested commercially. Based on the level of yellow perch entrainment and commercial fishing conditions, the analysis evaluates changes in commercial yield for yellow perch. Figure 1.5 depicts the estimated changes (both direct and indirect) in pounds of commercially harvested yellow perch if there were to be a complete reduction of Gary Works' entrainment.



Recreational Yield

Notes:
The range of the vertical axis in each panel varies to show the relative difference in recreational yield change across species and sample years.

As the fishery evolves, the recreational yield reaches a steady state when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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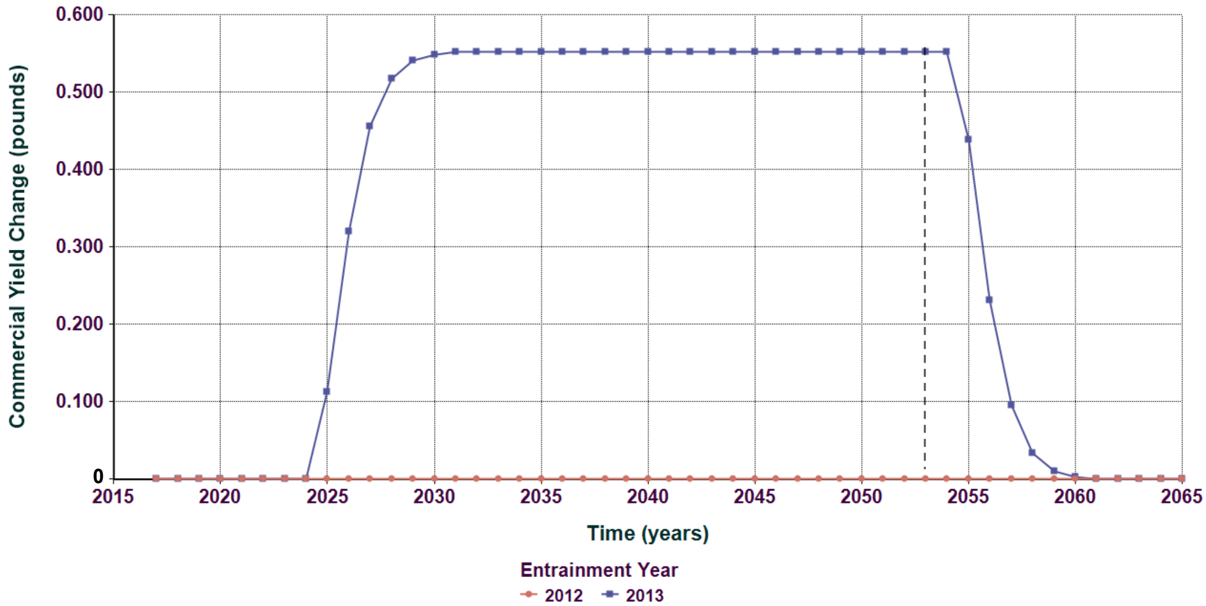
Figure 1.4: Total (Direct and Indirect) Changes in Recreational Yield with Elimination of Entrainment at Gary Works



Commercial Yield (Yellow Perch)

Notes:
As the fishery evolves, the commercial yield reaches a steady when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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Figure 1.5: Total (Direct and Indirect) Changes in Commercial Yield with Elimination of Entrainment at Gary Works

1.2.1 § 122.21(r)(11)(iii): Description of Monetized Values of Recreational, Commercial, and Forage Species

Estimating the benefits of entrainment reductions requires assessing the relationship between entrainment, fishery changes, and the impact that fishery changes have on people. For recreational values this includes understanding how Gary Works' entrainment affects recreational fishing catch rates and how those changed catch rates affect angler well-being. To assess the commercial fishing benefits, the analysis applies the price per pound for harvested commercial species to the changes in commercial yield estimated to result from entrainment reduction technologies.

To evaluate these relationships, the methodology uses a site-choice simulation to evaluate the effects that entrainment has on recreational fisheries. To evaluate the effect of entrainment, the analysis modifies site catch estimates to generate recreational catch that could occur with entrainment reductions. The methodology determines the economic value of the estimated catch changes by linking them to models of recreational angling demand presented in Melstrom and Lupi (2013).

The analysis developed the models used to generate age-structured changes in stock using survival parameters from EPRI (2012). These are linked to the site-choice simulation model through fishery-specific catch and effort rates. This forms a bio-economic equilibrium (i.e., yield, trips, and expected catch are integrated) for the With-Entrainment representation of the fishery expected to be affected by Gary Works' entrainment. These integrated partial equilibrium models are used to simulate conditions under With-Entrainment (baseline) and Reduced-Entrainment conditions, and the monetized welfare differences between these two conditions determine the benefits of entrainment reductions. As described in USEPA's *Guidelines for Preparing Economic Analysis*, equilibrium modeling using the With- and Without- Impact approach is central to all sound benefit estimation processes and regulatory impact analysis (USEPA 2010).

1.2.2 Recreational Benefits

Changes in yield could occur at recreational sites throughout Lake Michigan and are specified to occur at the set of aggregated sites illustrated by the red circles in Figure 1.6. In addition to the affected sites, Figure 1.6 also shows the angling population that is specified to be most likely affected by changes in Gary Works' entrainment. These are the anglers located in the counties that are within 50 miles of the affected sites. Anglers located in counties within 50 miles of the affected sites are specified to represent the angling population that is most likely to be taking single day trips to the affected sites. The shading illustrates the number of anglers residing in each ZIP Code contained in the counties. Figure 1.6 also illustrates the location of alternative, substitute sites (blue triangles) included in the model. These are sites where anglers can fish that are not affected by Gary Works' entrainment. Table 1.5 summarizes the data on anglers, trips, and sites illustrated in Figure 1.6 that are used to develop the site-choice simulation of recreational angling demand.

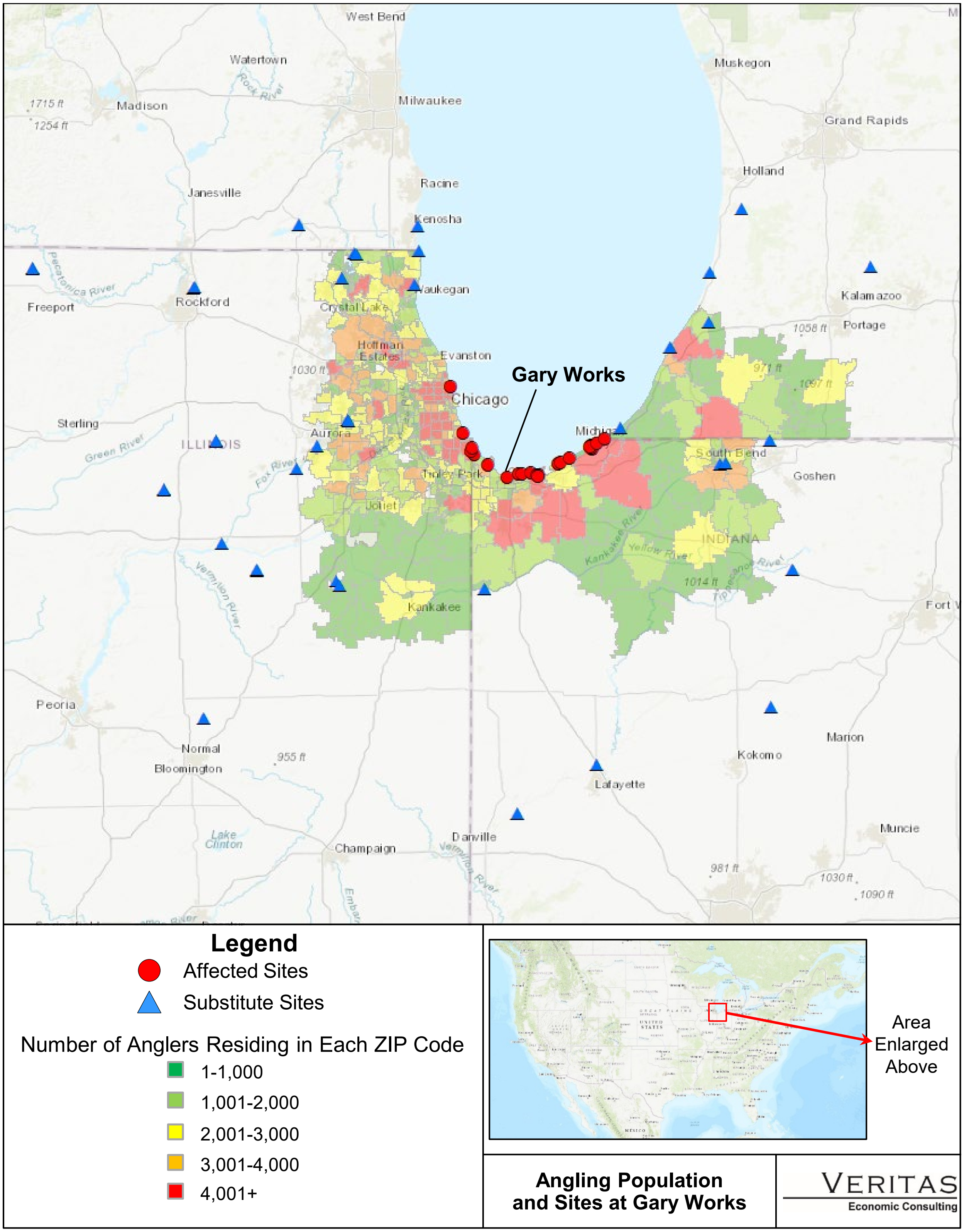


Figure 1.6: Location of Sites with Affected Catch Rates, Location of Substitute Sites, and the Concentration of Anglers

Table 1.5
Affected Population, Trips, and Sites included in the Recreation Angling Demand Model

Data Components	Estimate
Total Number of ZIP Codes in Affected Population [a]	406
Total Population Residing in Affected ZIP Codes [b]	9,333,740
Total Anglers Residing in Affected ZIP Codes [c]	799,267
Total Annual Fishing Days by Anglers in Affected ZIP Codes [c]	13,227,538
Number of Modeled Fishing Sites	60
Total Annual Fishing Days by Affected Population to Modeled Sites [d]	442,255
Number of Affected Sites	21
Total Annual Fishing Days to Affected Sites [e]	57,902

Sources and Notes:

[a] The analysis specifies the affected population as those anglers residing in counties located within 50 miles of the plant.

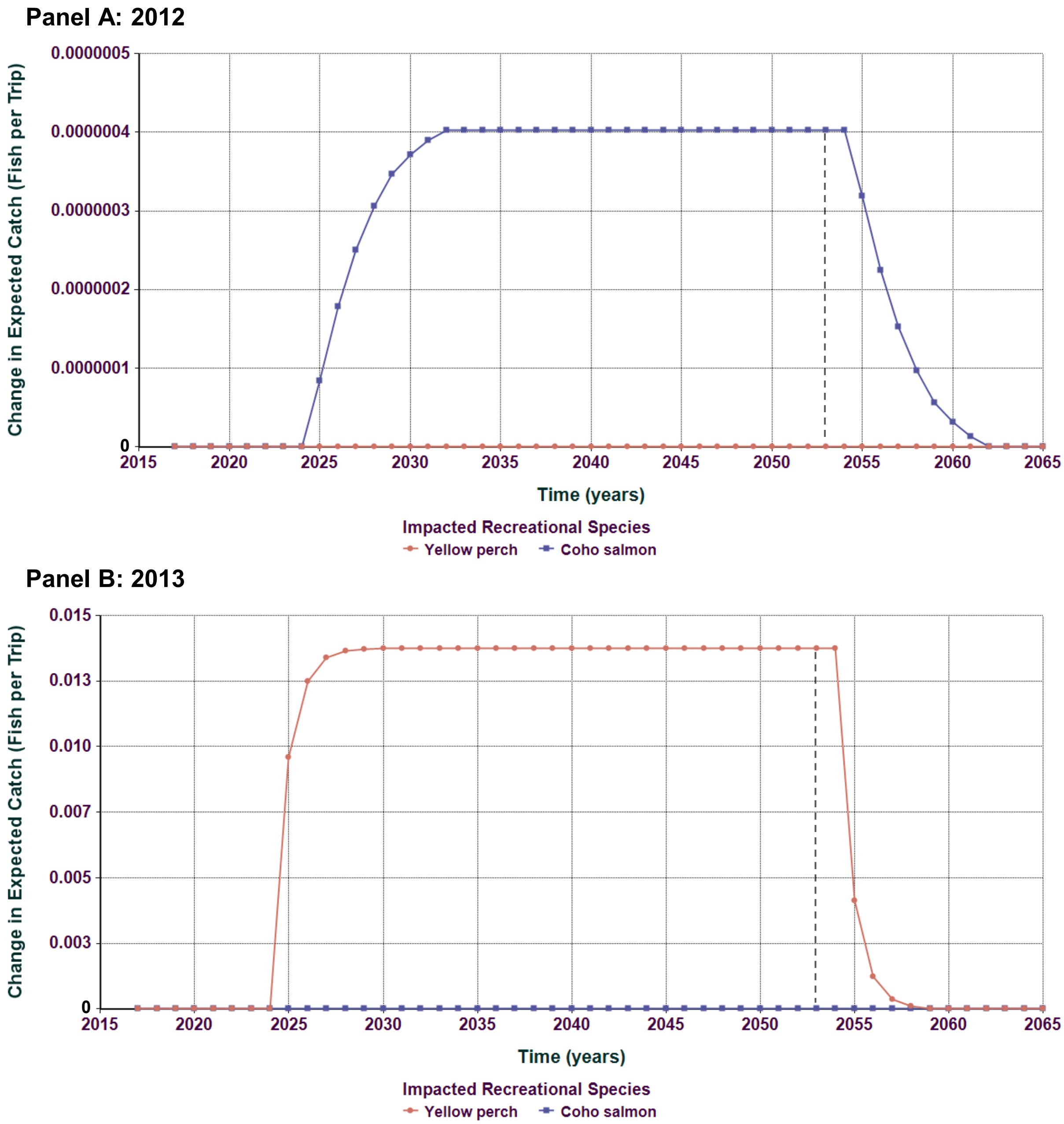
[b] ZIP Code population is from the 2017 American Community Survey (ACS) (U.S. Census Bureau 2019).

[c] The estimate of the total anglers in the affected population is developed from the U.S. Fish and Wildlife Service's 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for Indiana, Illinois, and Michigan, the 2010 U.S. Census, and the 2017 ACS (USFWS 2013a, 2013b, 2013c; U.S. Census Bureau 2019). The analysis uses the 2010 Census population for Indiana, Illinois, and Michigan and the 2011 estimate of the total number of resident freshwater anglers from the 2011 USFWS to estimate the percentage of the population that are anglers (10.96% [IN], 8.05% [IL], 14.20% [MI]). The analysis applies this percentage to the 2017 ACS population in the affected ZIP Codes. To develop the estimate of total angling days, the analysis applies the average number of days that these anglers spend fishing freshwater sites from the 2011 USFWS (29 days [IN], 14 days [IL], 19 days [MI]) to the number of anglers residing in the affected ZIP Codes.

[d] While the model accounts for all of the anglers in the affected population, it does not account for all of the sites where they can take their fishing trips. Therefore, not all of their trips are included in the model. The analysis uses annual trip information that is available for each site in the model to determine the total number of modeled trips (3.34% of affected population's total trips).

[e] The estimated number of total angling days to Lake Michigan is developed from the following publicly available sources: Michigan Department of Natural Resources (2019); Palla (2011); Roswell and Czesny (2018); Schmidt (2018).

The analysis apportions the estimated yield changes over the affected sites according to angling pressure. This approach results in similar changes in per-trip expected catch across sites. Figure 1.7 presents the per-trip change in the expected catch of each recreationally harvested species at the affected sites.



Expected Catch

Notes:
The range of the vertical axis in each panel varies to show the relative difference in expected catch across species and sample years.

As the fishery evolves, change in expected catch reaches a steady state when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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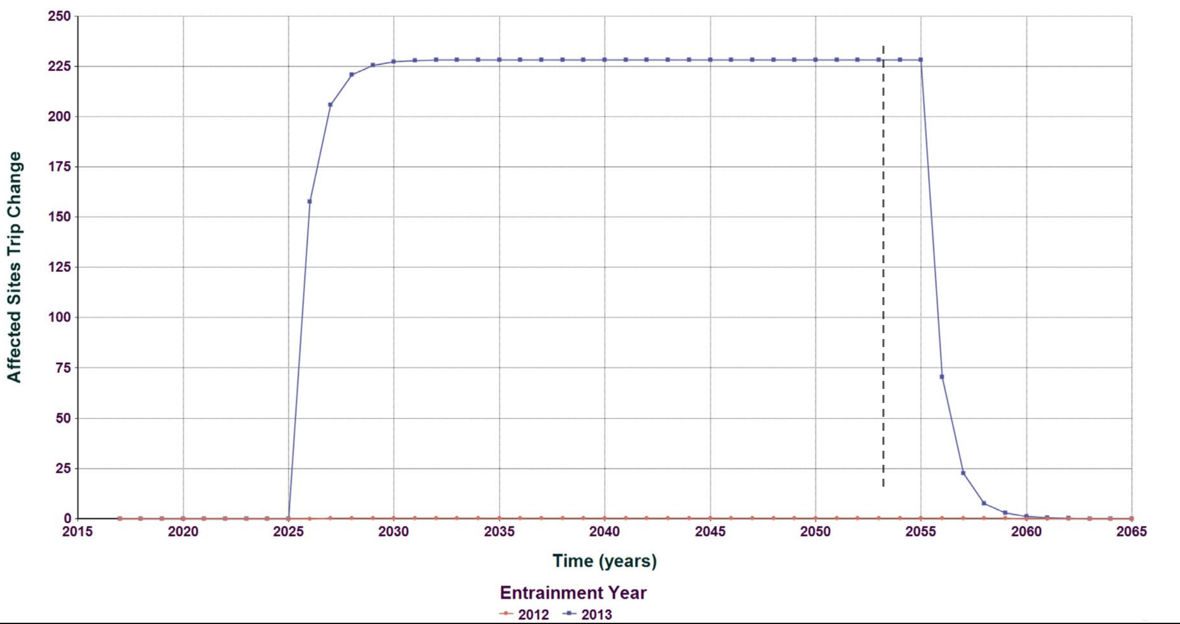
Figure 1.7: Change in Expected Catch per Trip by Species

Based on these expected catch changes, equations from welfare economics are used to identify annual changes in trips and economic benefits (based on changes in expected catch for all affected species). As detailed in Section 4, changes in consumer surplus that arise from changes in site demand is the metric for economic benefits. This methodology is consistent with economic theory and adheres to rule discussion with respect to considering "the availability of alternative competing water resources for recreational usage [alternative substitute sites], and the resulting estimated change in demand for use and value of the affected water resources" (USEPA 2014a, p. 48,371). Figure 1.8 depicts the total change in trips at the sites where catch changes are specified to occur based on the complete elimination of Gary Works' entrainment.



Affected Sites Change in Trips

Notes:
As the fishery evolves, changes in expected catch reach a steady state when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. Angler behavior is based on expected catch in the previous year, extending the change in trips two years past the end of the useful life. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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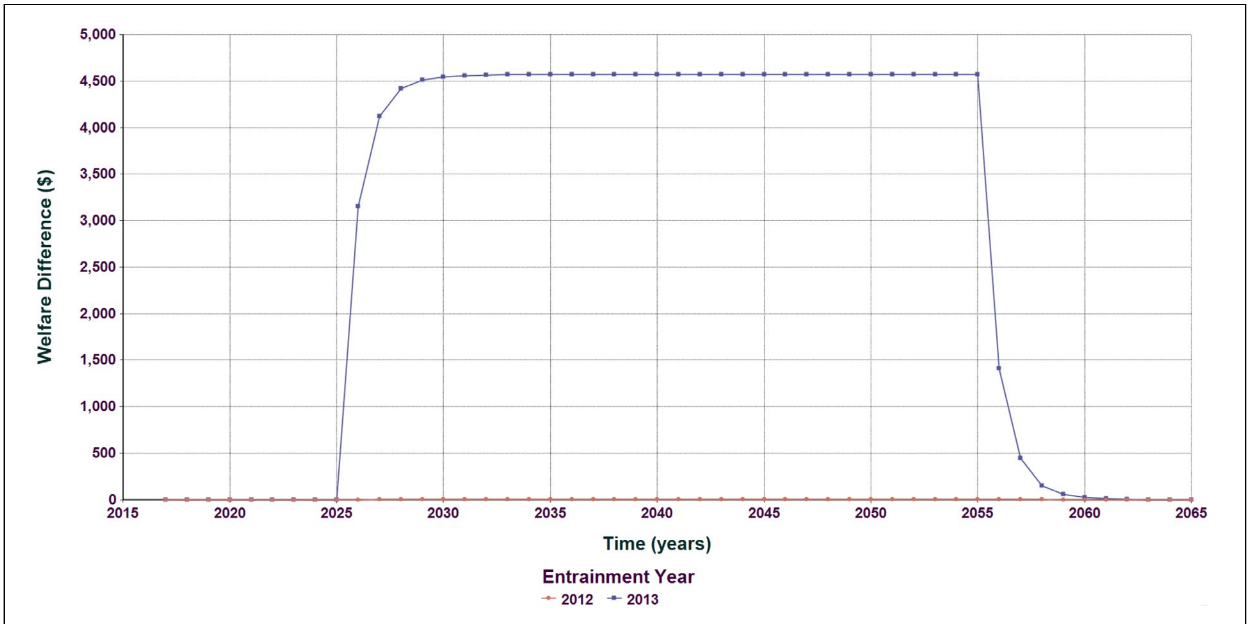
Figure 1.8: Estimated Trip Change with Elimination of Entrainment at Gary Works

Figure 1.9 depicts the annual change in dollar-valued welfare (i.e., change in recreational angler well-being) associated with the estimated trip changes from a complete reduction in Gary Works' entrainment.



Welfare Difference in US Dollars

Notes:
As the fishery evolves, changes in expected catch reach a steady state when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. Angler behavior is based on expected catch in the previous year, extending the change in welfare two years past the end of the useful life. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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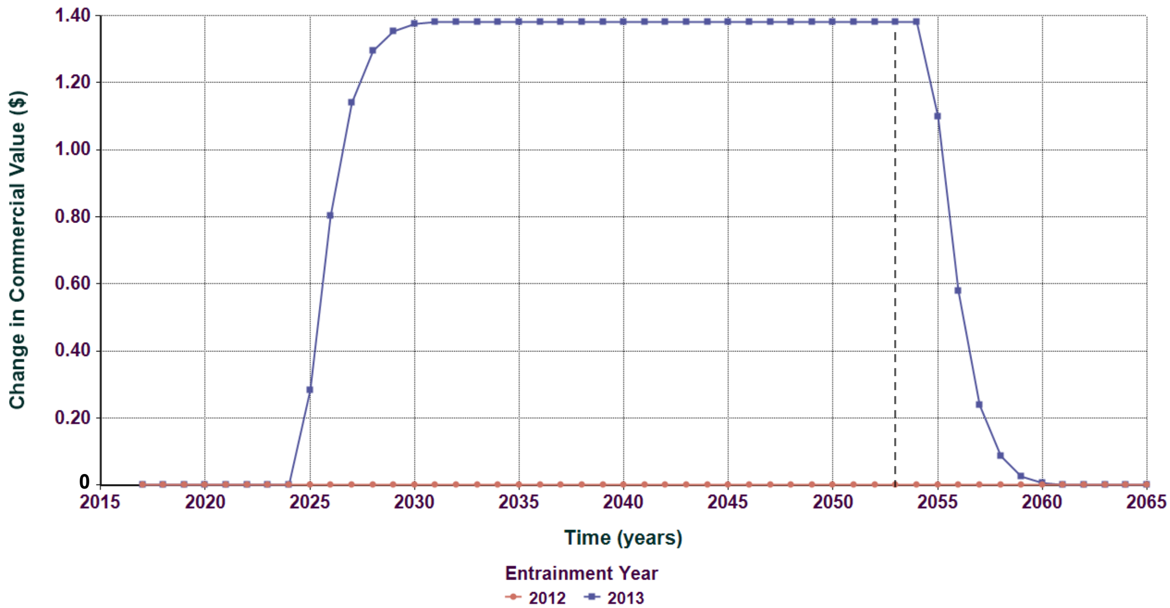
Figure 1.9: Change in Welfare with Elimination of Entrainment at Gary Works

1.2.3 Commercial Benefits

To assess the commercial fishing benefits, the analysis applies the price per pound from the U.S. Geological Survey's 2016 data of annual landings in the Michigan and Wisconsin waters of Lake Michigan to the changes in commercial yield estimated to result from a complete elimination of Gary Works' entrainment (U.S. Geological Survey 2019). Commercial fishing is not allowed in the Indiana waters of Lake Michigan (Indiana General Assembly 2017), but there is a commercial fishery in the Wisconsin and Michigan waters of Lake Michigan (U.S. Geological Survey 2019). The analysis therefore presumes that any increase in commercial yield as a result of decreases in Gary Works' entrainment are harvested in Wisconsin or Michigan waters of Lake Michigan. The analysis specifies that no price changes would occur as a result of reductions in Gary Works' entrainment and all of the additional harvest will be sold at existing prices (the latest reported price data are for 2016). Figure 1.10 presents the results of the evaluation using both the 2012 and 2013 entrainment data.



Change in Commercial Value in US Dollars

Notes:
As the fishery evolves, the commercial yield reaches a steady state when the fish not entrained have either been caught or have died naturally and are no longer part of the fishery. This steady state (and therefore commercial value) continues one year past the end of the useful life of the entrainment reduction technologies evaluated in this analysis (illustrated by the vertical dashed line at 2053). This is because the juveniles not entrained in 2053 are eligible to be caught in 2054. The illustrated decline does not suggest that U.S. Steel expects to cease operations in 30 years. Rather it provides a consistent time frame to evaluate and compare the benefits of entrainment reduction to their social costs. The social cost analysis in r(10) and the benefits analysis presented in this report both evaluate the present value of each technology's social costs and benefits over the same 30-year time period.

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Figure 1.10: Change in Commercial Value with Elimination of Entrainment at Gary Works

1.2.4 Nonuse Benefits

The final category of benefits that could be monetized is nonuse benefits. Krutilla (1967) presented the original philosophical underpinning for nonuse values, arguing that individuals do not have to be active consumers of unique, irreplaceable resources in order to derive value from the continuing existence of such resources. He wrote:

> "when the existence of a grand scenic wonder or a unique and fragile ecosystem is involved, its preservation and continued availability are a significant part of the real income of many individuals" (Krutilla 1967, p. 779).

Important components of Krutilla's original concept are that nonuse values are related to the continuing existence of unique resources. Under this framework, common resources suffering from limited injury do not generate significant nonuse values. The economic literature emphasizes the relationship between nonuse values and both the uniqueness of the resource in question and the irreversibility of the loss or injury (Freeman et al. 2014; Freeman 2003). Freeman (2003) summarizes this relationship as follows:

> "…economists have suggested that there are important nonuse values in …preventing the global or local extinction of species and the destruction of unique ecological communities. In contrast, resources such as ordinary streams and lakes or a subpopulation of a widely dispersed wildlife species are not likely to generate significant nonuse values because of the availability of close substitutes" (Freeman 2003, p. 156).

As Freeman's text indicates, common resources (i.e., resources that are not unique) that do not experience irreversible losses are not likely to generate significant nonuse value. Entrainment sampling indicates that no threatened or endangered species are being entrained at Gary Works. Therefore, reductions in Gary Works' entrainment are not likely to generate significant nonuse values.

While experts tend to agree on the existence of nonuse values, there is a high degree of debate on the ability to develop reliable estimates of nonuse benefits (Barnthouse, Bingham, and Kinnell 2016). There is also uncertainty regarding what population can hold nonuse values for an individual facility and whether individuals with no prior knowledge of a resource can hold nonuse values (Johnson et al. 2001). Nonuse values have therefore not been quantified as part of this effort. Section 2 of this document summarizes the approaches that were applied to quantify nonuse values both in the context of entrainment reductions and, more generally, and describes why those approaches have not been used to develop a quantitative estimate of nonuse values at Gary Works.

Rather than quantify nonuse values, we consider them qualitatively. Given estimated entrainment reduction costs and benefits, reliably measured nonuse benefits are not expected to impact a Best Technology Available (BTA) determination that considers benefits and costs.

1.3 Summary of Benefits

The results presented in this section have shown the effects of each step to develop the benefits of a complete reduction in Gary Works' entrainment. In addition to a 100-percent reduction, the analysis also considers the benefits that would result from the entrainment reduction alternatives that have been evaluated at Gary Works. Table 1.6 presents the timing specifications for each of the feasible technologies.

Table 1.6
Timing Specified for Feasible Technologies at Gary Works (Years)

Entrainment Reducing Technology	Regulatory Documents Submitted	Permitting, Design, Construction & Installation	O&M Costs Begin	Years of Operation
Mechanical Draft Cooling Towers (MDCT)	2020	2020-2026	2027	30
2.0mm Fine Mesh Traveling Water Screens (FMS)	2020	2020-2023	2024	30

Table 1.7 presents the recreational and commercial benefits for each evaluated technology for both the present and annual value of benefits. To develop the present value estimates so the benefits are consistent with the social costs, the benefits for each feasible alternative are discounted at 3 and 7 percent annually and summed over the specified time period used in the analysis (79 *Fed. Reg*. 158, p. 48428).

Table 1.7
Summary of Recreational (Rec) and Commercial (Com) Social Benefits of Entrainment Reduction Alternatives at Gary Works

Discount Rate	Technology	2012 Entrainment Data						2013 Entrainment Data					
		Present Value			Annual Value			Present Value			Annual Value		
		Rec	Com	Total	Rec	Com	Total	Rec	Com	Total	Rec	Com	Total
3%	100% Reduction	$64	$0	$64	$2	$0	$2	$74,005	$22	$74,027	$2,467	$1	$2,468
	MDCT[a]	$50	$0	$50	$2	$0	$2	$57,954	$18	$57,972	$1,932	$1	$1,933
	2.0mm FMS[b]	$64	$0	$64	$2	$0	$2	$0	$0	$0	$0	$0	$0
7%	100% Reduction	$30	$0	$30	$1	$0	$1	$36,677	$11	$36,688	$1,223	$1	$1,224
	MDCT[a]	$21	$0	$21	$1	$0	$1	$25,620	$8	$25,628	$854	$1	$855
	2.0mm FMS[b]	$30	$0	$30	$1	$0	$1	$0	$0	$0	$0	$0	$0

Notes: Totals may not sum due to rounding

[a] The percent reduction for mechanical draft cooling towers is estimated using the cooling tower system average annual configuration frequency presented in the Comprehensive Technical Feasibility and Cost Evaluation Study (122.21(r)(10)). Baseline flow is calculated by multiplying the once through cooling flow rate by the total number of annual hours. The cooling tower flow is calculated by multiplying the flow rate by the number of annual hours under each cooling tower configuration and summing across configurations. The percent reduction is then estimated as the difference between Baseline and cooling tower flow.

[b] The percent reduction for 2.0mm fine mesh screens is based on Ramboll (2019). No eggs are excluded with 2.0mm fine mesh screens, and all larvae and juveniles are excluded with 2.0mm fine mesh screens (Ramboll 2019). The large difference in benefits across years and technologies results from differences in egg entrainment in 2012 and 2013 (0 in 2012 vs more than 16 million in 2013).

1.4 Report Organization

The following sections present more detailed discussions of the data and methods. Section 2 presents a detailed discussion on the methods used to assess the recreational, commercial, and nonuse values associated with entrainment reduction alternatives. Section 3 provides a characterization of the baseline fishery (i.e., the state of the fishery with Gary Works' current entrainment). Section 4 presents the methods for evaluating the recreational and commercial benefits resulting from the changes in yield. Section 5 provides a conclusion based on the analysis presented in Sections 1 through 4.

2. Methodological Overview

Gary Works is located in Gary, Lake County, Indiana. In the course of its normal operation, Gary Works withdraws water from Lake Michigan through a system of cooling water intake structures (CWIS). As this water is withdrawn, entrainment of fish occurs. This section presents an overview of the methods for estimating the fishing benefits associated with entrainment reductions at Gary Works as required by § 122.21(r)(11)(i-iii)).

2.1 Methods

Under the Rule, social benefits and social costs of entrainment reduction technologies play a key role in establishing case-by-case BTA entrainment mortality reduction standards (§ 125.98(f)). Social benefits must be assessed by the facility owner and included in the plant's permit application submissions. An important part of this evaluation is the identification of fishery impacts from entrainment. These impacts are uncertain and could result in no effect.[2]

Estimating the benefits of entrainment reductions requires assessing the relationship between entrainment, its corresponding changes to the relevant fishery, and the impact that fishery changes have on people. For example, properly assessing recreational values requires understanding how Gary Works' entrainment affects recreational fishing catch rates and how those changed catch rates affect the well-being of anglers located in the plant's relevant vicinity. Properly assessing commercial values requires understanding how entrainment affects commercial catch rates, the profitability of commercial harvesters, and the prices consumers pay for commercially harvested fish.

The methodology uses a resource-economic simulation to evaluate the effects that entrainment has on recreational and commercial fisheries. To evaluate the effect of entrainment, we modify site-catch estimates to generate recreational and commercial catch that could occur without the facility's entrainment. The methodology determines the economic value of the estimated changes by linking them to a model of recreational angling demand and evaluations of the relevant commercial fishing markets.

The methodology extends the most relevant fishery and resource-economic studies published in the peer reviewed literature. Important modeling features include linking yield equivalence, expected catch, and choice-based behavioral fishing models. These integrated partial equilibrium models are used to simulate conditions under With-Entrainment (baseline) and Reduced-Entrainment conditions, and the differences between these two states determine the

[2] Barnthouse (2013) notes that the available peer-reviewed literature does not support a conclusion that entrainment reductions will produce measurable improvements in recreational or commercial fish populations.

benefits of entrainment reductions. As described in USEPA's *Guidelines for Preparing Economic Analysis*, equilibrium modeling using the With- and Without-Impact approach is central to all sound benefit estimation processes and regulatory impact analysis (USEPA 2016).

Figure 2.1 provides an overview of the methodology for evaluating the economic benefits of reducing entrainment at Gary Works. The shading in the bottom portion of the figure denotes that the evaluation is separated into two parts: a Baseline (With-Entrainment) evaluation (top white portion) and a Reduced-Entrainment evaluation (bottom shaded portion). The calculated difference in recreational and commercial yield, catch rates, trips, angler welfare, and commercial profits represent the benefits of entrainment reductions. As the top portion of the figure shows, the approach begins by specifying the baseline yield for each evaluated species and dividing that into recreational (R) and commercial (C) yield. The model then relates that yield to expected catch rates for the affected waterbody under the baseline, With-Entrainment, conditions (for brevity, the figure illustrates this process for estimating recreational fishing benefits). Those catch rates are apportioned over the estimated number of trips that are estimated for affected sites.

Under the Reduced-Entrainment conditions, the reduction in entrainment and the change in recreational and commercial yield that would accompany the entrainment reduction are identified. The new recreational yield is incorporated into changes in expected catch rates and the corresponding changes in trips that would accompany increase catch rates are estimated. To calculate recreational fishing benefits the model evaluates the differences between conditions with existing and reduced entrainment including yield, expected catch, and trips. The box around the expected catch and trip differentials identifies that these result in the recreational fishing benefits measured as the consumer surplus differential. Consumer surplus is the difference between what an angler has to pay for a fishing trip and what the angler would be willing to pay.

Simulating the linked models produces equilibrium-based changes in stock, yield, trips and expected catch under the Reduced-Entrainment conditions. Equations from welfare and market-based economics are used to identify changes in consumer and producer surplus which are then discounted to calculate present values. The following subsections provide additional detail on the recreational, commercial, and nonuse value components of the model.

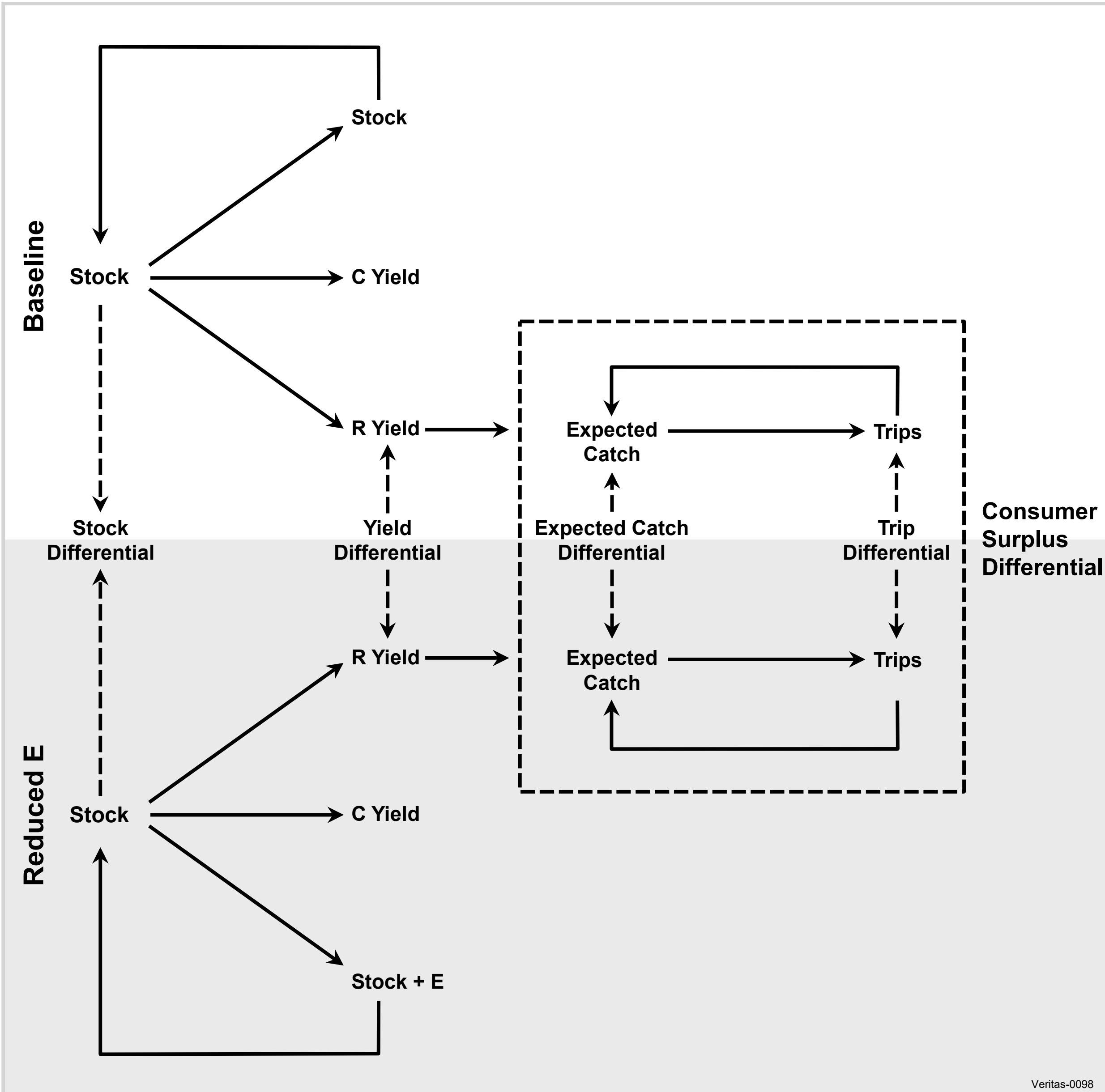

Figure 2.1: Overview of Methodology for Estimating the Benefits of Entrainment Reductions

2.2 Recreational Benefits Overview

Correctly calculating recreational benefits requires a significant amount of information and calculations. As stated in the Rule,

> "…assessing recreational use benefits involves estimating the improvements in recreational fishing opportunities resulting from reduced impingement mortality and entrainment, and assigning a value to these improvements. The value assignment is based on the estimated population profile—in particular, number and proximity to affected water resources—of recreational users, the availability of

> alternative competing water resources for recreational usage [alternative substitute sites], and the resulting estimated change in demand for use and value of the affected water resources based on reduced impingement mortality and entrainment and increased recreational fishing performance (USEPA 2014a, p. 48,371)."

To account for all this information, the methodology for estimating recreational angler benefits is based on simulating angler behavior and changes in social welfare resulting from reductions in entrainment and the associated increases in expected catch. To do this, a mathematical representation of angler demand (Recreational Angling Demand Model) for the population expected to be affected by reductions in Gary Works' entrainment was developed. The Recreational Angling Demand Model identifies angler behavior using site characteristics that occur in both the Baseline and Reduced-Entrainment conditions. Important modeling features include fusing an existing, behavioral (choice-based) preference function to spatially represented population data. This fusing process produces integrated partial equilibrium models that are used to simulate conditions under Baseline and Reduced-Entrainment conditions. The differences between these two conditions determine the social welfare changes associated with the entrainment reductions resulting from an individual entrainment control technology.

Important factors accounted for in the Recreation Angling Demand Model include angler preferences; attributes associated with the fishing sites they have to choose from; the number, quality, and availability of substitute fishing sites; the geographic range of impacted species; the number of trips with improved catch rates; and the number of anglers associated with those trips.

Preference functions are used to identify how anglers trade off the characteristics of alternative fishing sites when they choose how and where to participate in recreational fishing. When anglers take a trip, they have a choice of which site to visit. The sites from which they can choose have numerous characteristics such as the distance from their home, catch rates, facility amenities (e.g., presence of a boat launch), and water-body characteristics and surroundings (e.g., fresh versus saltwater, level of crowding, and remoteness of the surroundings).

Preference functions include the (nonmarket) price of fishing as the costs anglers incur in traveling from their homes to recreation sites. These "prices" vary according to angler locations. When existing fishing sites have their features changed, such as a change in catch rates that could occur with entrainment reductions at a power plant, the preference function allows interpreting the value of the quality change in terms of travel costs. Anglers respond to catch rate changes by reallocating their trips so as to maximize the value of their fishing experience. For example, if entrainment rates are reduced and catch rates increase, an angler who typically visits a site farther away with a higher catch rate under Baseline conditions, would not have to travel as far to achieve a similar fishing experience under Reduced Entrainment conditions. This angler would incur lower travel and time costs and experience welfare improvement because the same fishing experience costs the angler less in avoided travel and time costs.

Random utility analysis is the best method for evaluating angler preferences and valuing entrainment reductions on recreational fishing.[3] However, conducting an original random utility maximization (RUM) study can require extensive primary data collection. Developing a recreation demand model using a site-calibrated transfer of a preference function from an existing RUM study can capture important behavioral responses (i.e., changes in trip-taking behavior as a result of changes to a fishery) without requiring survey-data collection. The accuracy of this methodology is limited only by the analyst's ability to calibrate an already estimated preference function to a different population using appropriate economic methodologies (Smith, van Houtven, and Pattanayak 2002).

Economists have long used the preference functions from random utility models (RUMs) to estimate demand curves (Bingham et. al 2011; Kinnell et al. 2006; Bockstael, Hanemann, and Strand 1986; Bockstael, Hanemann, and Kling 1987; Bockstael, McConnell, and Strand 1991; Morey, Shaw, and Rowe 1991; Caulkins, Bishop, and Bouwes 1986; Feenberg and Mills 1980). The USEPA's *Benefits Analysis for the Final Section 316(b) Existing Facilities Rule* uses the results of a meta-analysis of existing RUMs in the economics literature to estimate the benefits of the 2014 Rule (USEPA 2014b). In addition, USEPA's *Guidelines for Preparing Economic Analysis* describe the use of RUMs to estimate the benefits of changes in environmental quality (USEPA 2016).

The RUM model is based on welfare theory and posits that individuals make choices that maximize their utility, subject to constraints. RUM models divide fishing areas into discrete sites, each site being a plausible destination for fishing. In this framework, anglers choose which sites to visit, based on costs and fishing opportunities at the sites. Because anglers trade off factors, such as the cost of getting to the site against the quality of the fishing opportunity, this approach can evaluate the relative influence of these variables as revealed by anglers' decisions. Incorporating the relevant alternative, substitute sites allows evaluating the importance of site characteristics at each of these sites to identify the site-demand curves. These form the

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[3] Random Utility Maximization (RUM) models are recognized in the Department of the Interior (DOI) regulations (43 *CFR* §11.83) as an appropriate method for quantifying recreation service losses in natural resource damage claims. Currently, the RUM is the most widely used model for quantifying and valuing natural resource services. RUMs are also widely accepted in other areas of the economics profession. RUMs have been used in transportation (Beggs, Cardell, and Hausman 1981; Hensher 1991), housing (McFadden 1997), and electricity demand estimation (Cameron 1985), as well as more recently in environmental and resource economics.

foundation for appropriately estimated economic benefits of changes in site attributes such as catch rate improvements.

The focus on site characteristics, such as catch rates, allows for the isolation of benefits to recreational fishing due to entrainment reductions. All other site characteristics are held constant. The better the characteristics of a site are, the higher the probability that an angler will choose that site, which is reflected in a higher value for the site. RUMs can be used to estimate both the distribution of trips among various sites and the total satisfaction received from a given set of fishing opportunities.

The analysis uses four main steps to develop the Recreational Angling Demand Model and estimate the benefits associated with reductions in Gary Works' entrainment.

1. The first step involves selecting the angling preference function from the best available RUM study.
2. The next step identifies the appropriate geographic scope for substitute sites and selects a representative sample of substitute sites. Available information on recreation in the area and typical travel distances are used to develop an appropriate area of alternative, substitute sites to include in the model (generally within 100–200 miles of the affected site). Most RUMs based on original data use studies providing high-quality data. Several substitute sites are used that are representative and reasonable and provide a similar fishing experience for anglers who potentially fish near Gary Works. By capturing substitution among sites, the simulation adds a critical level of realism relative to approaches that ignore substitution possibilities.
3. The third step in the analysis entails fusing the preference function to the affected population and calibrating the model's prediction of the population's trips. For this analysis, affected anglers can include any of the anglers located in counties within a 50-mile radius of Gary Works. Because distance-based travel cost is an important variable in the Recreational Angling Demand Model, anglers closer to the site have a higher predicted likelihood of visiting the site than those farther away, but the model does not make any specification of which anglers are included in the model or not. For the sites affected by Gary Works' entrainment, the number of trips is set to correspond to the best available information on current visitation. Within these constraints, the remaining trips are distributed among the substitute sites in an appropriate manner, also based on available visitation information.

   The distance traveled to a site is one of the most important site characteristics in a RUM. It directly influences the travel cost to each site for each angler. A critical factor for the site-calibrated benefits transfer is distance from each angler's residence (ZIP code) to each site included in the Recreational Angling Demand Model. These distances are calculated using the most recent version of a popular transportation routing software called PC*Miler (ALK Technologies 2016). Travel costs reflect both direct costs and travel time costs. Direct costs are calculated by multiplying the round-trip miles by $0.2054 per mile, which is the American Automobile Association's (AAA) 2019 per-mile cost of operating a motor vehicle (AAA 2019). The cost per mile includes gas, maintenance, and tires and is averaged across nine types of vehicles: small, medium, and large sedans; small and medium SUVs; minivans; crew cab pickups; hybrid vehicles; and electric vehicles. The average hourly wage of each ZIP code within the model is calculated by dividing household income from the U.S. Census by 2,000 work hours per year (U.S. Census Bureau 2019).[4] Travel time in minutes is also calculated by PC*Miler. The round-trip time estimate is multiplied by one-third of the average hourly wage rate to reflect the opportunity cost of time based on the original research of Cesario (1976) and the more recent evaluation by Phaneuf and Smith (2004).[5]

4. In the fourth step, changes in trip patterns that anglers make in response to changes in catch rates are simulated. For purposes of this assessment, we increase catch only for sites in Lake Michigan. The increased catch rate is incorporated into the calibrated RUM while all other site characteristics for the relevant sites are held constant.

2.3 Commercial Benefits

Commercial benefits from entrainment reductions accrue to commercial anglers as increased profits attributable to the higher catch per unit effort (CPUE). The CPUE is associated with increases in fish populations and/or to fish consumers in the form of lower prices. The ability of commercial anglers to realize *sustained* increased profits depends on the responsiveness of market prices to higher CPUE. Market extremes determine the upper and lower bounds on commercial benefits. In competitive markets, prices adjust instantly, and benefits accrue for consumers. In restricted markets, prices do not change, and commercial benefits are maximized in the form of producer surplus at price times quantity (P * Q). As the Rule describes, estimating the commercial benefits of entrainment reductions involves consideration of the fishery's relevant market conditions. Specifically, the Rule notes that

> "…assessing the productivity and value of commercial fisheries involves estimating the expected increases in commercial yield of economically valued species over time as a result of reduced impingement mortality and entrainment, and valuing these at market prices minus any incremental production costs associated with the incremental catch (p. 48,371)."

To assess the commercial fishing benefits, the methodology first characterizes the current market conditions that exist in the relevant vicinity of Gary Works, examining the type of commercial species entrained at Gary Works and the relevant range of where those species could be caught. Harvest and price data are collected for each commercial species using available commercial fisheries data. Under Reduced Entrainment conditions, the analysis specifies that all

[4] While the U.S. Census' household income data can include income from more categories than just the amount of earnings for a household's hourly wages times the number of hours worked in a year, the U.S. Census' household income by ZIP Code is the best data source available to estimate the modeled population's opportunity cost of time. The potential effect on benefit estimates from using the U.S. Census income data would be to have an upward bias on benefit estimates.

[5] Some studies such as Fezzi, Bateman, and Ferrini (2014) suggest that the adjustment factor could be potentially be as high as three-fourths of the hourly wage rate. Using one-third of the average hourly wage rate as an adjustment factor is the most common approach for estimating opportunity cost in a RUM model, but the benefits calculation is sensitive to the chosen adjustment factor.

increased harvest can be sold at existing prices and applies the existing prices to the estimated increased commercial yield.

2.4 Nonuse Benefits

Recreational and commercial benefits from entrainment reductions arise from changes in catch rates and therefore accrue to people who use the affected resource. Another benefit category, nonuse benefits, results from changes in values that people may hold for a resource, independent of their use of the resource. These can arise for a number of reasons: they may be happy that other people can use the resource, they may want it to be available for people to use in the future, or they may believe the resource has some inherent right to exist.

While experts tend to concur on the existence of nonuse values, they are inherently difficult to observe. As a result, these values are looked upon quite differently from recreational and commercial values. By comparison with use values, there is less agreement among experts about how nonuse values should be measured, and the reliability of measurement techniques (Barnthouse, Bingham, and Kinnell. 2016).

There are a handful of approaches that have been applied to quantify nonuse values both in the context of entrainment reductions and more generally. These include the non-economic methods Habitat Replacement Cost (HRC) and Societal Revealed Preference (SRP), a “rule-of-thumb” approach called the Fisher-Raucher approximation, and two approaches that require administering surveys that pose hypothetical questions called Contingent Valuation (CV) and Discrete Choice Experiments (DCE).[6] The following text summarizes these methods as they’ve been applied for entrainment and evaluates their applicability.

2.4.1 Non-Economic Methods

We refer to HRC and SRP as non-economic methods because they do not attempt to measure economic value. Considering HRC, the costs estimated are the total costs of restoring habitats so that they produce ecological services equivalent to those expected from technological alternatives. These are not benefits, and over the course of USEPA’s § 316(b) rulemaking, numerous reviewers commented as such. Rather, they are alternative costs for achieving similar objectives. Mitigation approaches, such as stocking and habitat restoration, may achieve similar waterbody-level outcomes as entrainment reductions. However, the cost of such alternatives bears no implicit relationship to the benefits of reducing entrainment.

[6] Both CV and DCE can also appropriately be called “Stated Preference” (SP) techniques as they both rely on stated rather than revealed (i.e., by taking fishing trips) preferences. Although DCE is often called SP, here we use the more precise term. Also, DCE is often referred to as “conjoint analysis” which is a related, but not identical technique.

The underlying reason for this is that measures of economic benefits must be based on the willingness-to-pay (WTP) principle, and HRC is not based on this principle. In many cases, the cost of developing a resource can substantially exceed the resource's value. Although USEPA extensively evaluated HRC during its development of the Phase II Rule, USEPA ultimately decided that the HRC method should not be used as a means of estimating nonuse benefits due to limitations and uncertainties regarding the application of this methodology (69 *Fed. Reg.* 131, p. 41,625).

The second cost-based methodology considered in USEPA rulemaking is called Societal Revealed Preference (SRP). Rather than using the cost of a hypothetical alternative (as under HRC), SRP uses historical costs under prior government mandates to measure benefits. Like the HRC method, this is a cost-based approach that has no foundation in economics. Accordingly, it is not accepted by economists as a legitimate method of empirical valuation. In fact, the SRP method is a corrupted application of the legitimate revealed preference (RP) method. An essential characteristic of RP analysis, that is not part of SRP, is that willingness to pay is revealed by those who are doing the paying. In contrast, the SRP methodology inappropriately takes the fact that a program exists as evidence that its benefits exceed its costs.

The drawbacks of these methods, with respect to valuation, would seem to indicate that they should not be used for estimating the nonuse values of entrainment reductions. This position is, strictly speaking, correct. However, as the following discussions will describe, the methods that appear at least theoretically capable of quantifying nonuse values are subject to disagreement regarding their reliability and there remain important questions about bias in nonuse survey estimates and extrapolation of nonuse survey results. In part because of these difficulties, Natural Resource Damage Assessments (NRDAs) have effectively abandoned nonuse valuation and embraced the Habitat and Resource Equivalency Analysis (HEA and REA) methods.

2.4.2 Rule-of-Thumb Method

USEPA has also considered the Fisher-Raucher or "50 percent" rule. This approach approximates nonuse values at 50 percent of recreational use values. The approximation is derived from a comparison of use and nonuse values for water-quality improvements, where the nonuse values were estimated using the CV method (Fisher and Raucher 1984). Applying this "50-percent rule" for entrainment reductions has the great advantage of being simple. However, it is based on CV studies which are subject to questions about their reliability. This rule-of-thumb was based on water quality improvements. There is a lack of good evidence that the ratio of nonuse to use benefits from water-quality improvements is similar to that same ratio for environmental improvement from reductions in entrainment. In particular, use values from fish often arise from their consumption whereas use values from water quality are typically non-consumptive.

2.4.3 Hypothetical Scenario Survey Methods

Currently, the only conceptually correct methods (i.e., those applying the WTP concept) available for estimating nonuse values are survey-based techniques that ask respondents to value, or choose natural resource services in a hypothetical context. These are the Contingent Valuation and Discrete Choice survey methods.

2.4.3.1 Contingent Valuation

The CV method involves surveying individuals to elicit their WTP for different levels of services.[7] For example, the survey may ask respondents a question such as, "What is the maximum amount you would pay to restore wild salmon runs in the Columbia River Basin?"[8] The responses are analyzed to determine the average WTP for preserving wild salmon runs. This method requires that individuals be able to express their value for changes in the fishery and, furthermore, that their responses to hypothetical questions indicate their actual valuations of the changes described in the questions.

The CV method attempts to establish, through the course of a survey, a hypothetical market where environmental changes can be traded like commodities. Ultimately, the goal of the CV survey is to establish circumstances that represent an exchange of money for the environmental service. Oral or written descriptions, supplemented by visual aids, are used to make the survey informative and realistic.

The validity and reliability of CV has been questioned because respondents' hypothetical payment for a nonuse service has no behavioral experience to support or test the expressed value. This lack of a linkage between actual behavior and the hypothetical payment makes CV estimates particularly sensitive to variations in survey design, implementation, and analysis.

In addition to this sensitivity, the hypothetical nature of CV makes responses subject to bias. The inclination is for respondents to state that they would pay a higher amount for a good or service than they would actually pay. This problem was recognized by the National Oceanic and Atmospheric Administration (NOAA) when it suggested that CV estimates be treated to the

[7] See Champ, Boyle, and Brown (2017); Carson (2012); Hausman (1993, 2012); and Arrow et al. (1993) for a more detailed critique of CV.

[8] Natural resource economists have used a variety of question formats. This question is an open-ended format. Alternatives include bidding games, payment cards, and referendum or dichotomous choice. In the dichotomous choice format, respondents are offered a particular payment amount and allowed to accept or reject that amount. See Mitchell and Carson (1989) for a detailed discussion.

"divide by 2" procedure. That is, to account for hypothetical bias, researchers should divide estimates of WTP from CV by 2.

NOAA's "divide by two" rule has no strong empirical basis, but it did set economists on the task of calibrating hypothetical valuations by comparing them with values derived from real exchanges, where respondents gave up real money for real goods. Bias from valuation for public goods (such as fisheries) is especially difficult to investigate, however, because hypothetical versus real experiments for public goods are difficult to design.

The value estimate from CV data is typically the average WTP from the survey question. Researchers may model these responses to determine what characteristics of respondents influence their WTP. An important implication is that, in addition to designing the survey, researchers must determine the relevant population for the survey. That is, they must determine "to whom do these results apply?" Identifying this group is important because survey WTP estimates must be aggregated over the affected population to determine total WTP. A critical and unresolved consideration is that, by its nature, participating in a survey raises awareness. This is a fundamental difference between the surveyed "aware" population and the not-surveyed population that is less aware of the impact, but sometimes makes up the vast majority of the WTP population.

2.4.3.2 Discrete Choice Experiments

A more sophisticated stated preference technique is DCE. DCE's explicitly recognize that commodities have value because of their attributes. For example, a car has value because of such specific characteristics as size, color, comfort, body style, handling, gas mileage, price, etc. A DCE survey asks respondents to choose among a series of different alternatives with different levels of attributes and different costs. By analyzing the choices made by respondents, researchers can uncover the underlying preferences for these attributes and respondents' WTP for different attributes or attribute bundles such as environmental programs.

DCE methods have been applied in the fields of environmental and health economics as an alternative to the CV method. For example, the DCE technique has been used to value hunting and fishing trips (Gan and Luzar 1993; Mackenzie 1993; Roe, Boyle, and Teisl 1996), to explain recreation site-choice selection (Adamowicz, Louviere, and Williams 1994), and to determine public preferences for siting an industrial facility (Opaluch et al. 1993). DCE has also been applied to measure values for changes in fishery services such as catch (Banzhaf, Johnson, and Mathews 2001).

The USEPA conducted a DCE to evaluate total (use and nonuse) values for entrainment reductions (USEPA 2012). USEPA selected a total target sample of 2,000 completed surveys across four regions and a national sample. The USEPA allocated these surveys across regions based on an experimental design which presents a set of three hypothetical choices to each respondent. Figure 2.2 presents an example of the choice questions.

Question 4. Assume that Options A and B would require a different mix of filters and closed cycle cooling in different areas. Assume all types of fish are affected. How would you vote?

Policy Effect NE Waters	Current Situation (No policy)	Option A NE Waters	Option B NE Waters
Commercial Fish Populations (in 3-5 Years)	43% (100% is populations that allow for maximum harvest)	44% (100% is populations that allow for maximum harvest)	45% (100% is populations that allow for maximum harvest)
Fish Populations (all fish) (in 3-5 Years)	31% 100% is populations without human influence)	32% (100% is populations without human influence)	35% (100% is populations without human influence)
Fish Saved per Year (Out of 1.1 billion fish lost in water intakes)	0% No change in status quo	25% 0.3 billion fish saved	50% 0.6 billion fish saved
Condition of Aquatic Ecosystems (in 3-5 Years)	48% (100% is pristine condition)	49% (100% is pristine condition)	50% (100% is pristine condition)
$ Increase in Cost of Living for Your Household	$0 No cost increase	$24 **per year** ($2 per month)	$36 **per year** ($3 per month)
HOW WOULD YOU VOTE? (CHOOSE ONE ONLY)	☐ I would vote for NO POLICY	☐ I would vote for OPTION A	☐ I would vote for OPTION B

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Figure 2.2: Example of the Choice Question Format in the Stated-Preference Survey

As Figure 2.2 shows, the choices presented to respondents are profiles that include a monetary payment and improvement in environmental variables, including reductions in entrainment, improvements in fish populations, commercial fish populations, and overall aquatic health. Responses to the choice experiment are modeled for a Northeast, Southeast, Inland (containing the Great Lakes), Pacific, and National region using the mixed logit econometric technique.

Although many environmental variables are insignificant, in all cases the variable representing reductions in entrainment is statistically significant. The USEPA approximated the WTP of survey respondents for a 1 percent change in yield increase due to entrainment reductions by conducting simulations for alternative uncertainty distributions of resulting preference coefficients. Ultimately, USEPA estimated that WTP for a 1 percent reduction in the number of fish impinged and entrained varies between $0.75 and $2.52 per household per year for the four regions surveyed, and averages at $1.13 per household per year for the National region (USEPA 2012, Exhibit II-10).[9]

DCE, such as that conducted by USEPA, has advantages over CV. DCE encourages respondents to explore their preferences for various attribute combinations through a series of choices. The process of explicitly trading off attributes encourages greater respondent introspection than is likely to occur in a traditional CV format. The absence of such introspection has been a major criticism of the validity and reliability of CV estimates (Schkade and Payne 1994). The approach also allows analysts to devise internal consistency checks because respondents provide answers to multiple questions. Having more information from respondents on their relative preferences for the scenarios allows analysts to systematically evaluate whether a respondent's pattern of answers is plausible and consistent with economic theory used to construct social values (Johnson and Bingham 2001). These internal consistency checks are a significant improvement over the rudimentary technique of using general follow-up questions to assess respondents' motives for answers to single CV questions.

Because it provides values for individual components of commodities, as well as for commodities as a whole in a single survey, DCE has general applicability. DCE is frequently used to evaluate the market potential for new goods or services that are being developed and have not yet been brought to market or have only recently been introduced to the market. The large number of such studies that have been done have given the technique substantial credibility in the area of new product development and forecasting demand for unfamiliar products (Louviere,

[9] "National" refers to the survey administered to a national sample and is referred to as a region for convenience.

Flynn, and Carson 2010). Certain of these are for environmental products that have a “nonuse flavor” such as green electricity (Johnson et al. 1995) or residential solar (EPRI 2017), but others are more traditional goods such as alternative electricity service plans that offer different rate structures (Neenan et al. 2016) or new pharmaceutical products (Bingham, Johnson, and Miller 2001).

Despite these advantages, DCE has significant drawbacks for calculating nonuse values. Like CV, it elicits expressed preferences under hypothetical conditions. As a result, the responses are likewise hypothetical, which implies that respondents do not have to make a real dollar commitment as they would in a real-market situation. Experimental evidence demonstrating hypothetical bias in choice experiments has been found by Johansson-Stenman and Svedsäter (2008). Also, like CV, the question of the affected population is critical. DCE offers higher potential for connecting WTP to personal characteristics (EPRI 2012b). However, there is currently no solution to the fact that, by nature of them having taken the survey, the surveyed population is fundamentally different from the not surveyed population (EPRI 2012b). Although there is no study of nonuse values in which these obstacles have been surmounted, recent efforts have proposed novel extensions of typical DCE surveys that propose methods for minimizing bias and extrapolating to the not surveyed population (Barnthouse, Bingham, and Kinnell 2016).

2.4.4 Evaluating the Applicability of Quantitative Methods for Estimating Nonuse Benefits for Entrainment Reduction at Gary Works

As this overview of methods indicates, certain approaches that have been proposed for evaluating the nonuse value of entrainment impacts are not consistent with WTP, the economic concept of monetary value. Considering the use of replacement cost and societal revealed preference approaches, some analysts attempt to use per-fish stocking costs as indicators of value. However, setting aside questions as to the validity of this approach, the recreational and commercial values of entrainment reductions are already considered in the analysis.

Forage species are also accounted for in the monetization of benefits through the trophic transfer to economically important species. Lack of stocking of forage species would tend to indicate these species would not be assigned value in the SRP approach. While HEA and REA (techniques that are similar to HRC and could be used to value forage) are implemented under Natural Resource Damage Assessment (NOAA 2000), they are cost-based approaches and are not consistent with WTP.

The “rule of thumb” approach is straightforward to implement. However, the approach is based on water quality instead of fishery impacts. Although the approach is based on methods that are conceptually capable of identifying nonuse values, the reliability of these methods is questionable. Moreover, the approach is dated. If the approach were applied, nonuse benefits would simply be half of the estimated recreational benefits.

The USEPA DCE study elicits values from users and nonusers and therefore elicits both use and nonuse values. It is potentially feasible to extract a use/nonuse ratio from this study and apply those results to an individual facility. However, this has not been attempted and may not be straightforward – users can experience nonuse values and it is not clear how to disentangle them from use values. In addition, as described in EPRI (2012b) and Barnthouse, Bingham, and Kinnell (2016), an important consideration with nonuse values is the appropriate population to extrapolate over. Identifying an appropriate population of individuals who may hold nonuse values for entrainment reductions at an individual facility such as Gary Works is problematic because there is no utility theoretic foundation that allows unaware nonusers to experience welfare increases (Johnson et al. 2001).

The reason this is problematic for a plant-specific evaluation is because USEPA's DCE provides information to respondents explaining what entrainment is before they are asked the willingness to pay questions. By comparison, members of the general population have not received such information and do not have the same awareness level of the survey respondents (Veritas Economics 2012). Any extrapolation of study results would therefore have to take the population's awareness level into consideration.

The results from the Veritas Economics (2012) Environmental Impacts Awareness survey provide insight into this concept. The survey was administered to Harris Interactive's representative sample of more than 2,000 U.S. residents and asked questions about their current awareness of environmental impacts, including impacts from power plants (Veritas Economics 2012). The results of the survey indicate that slightly over 13 percent of the U.S. population is aware of aquatic impacts from steam electric plants. These include impacts such as water pollution, thermal discharge, wastewater impacts, and impacts to fish. No respondents specifically mentioned impingement and entrainment, only one respondent was aware that fish could be impacted through cooling water intakes, and fewer than five percent of respondents are aware that fish can be affected by power plant operations (this includes respondents who are aware of fish impacts resulting from either steam electric or hydroelectric plants).

The most site-specific approach would be to develop and administer a stated preference survey that elicits nonuse values for impacts at Gary Works. Although a significant amount of work has been done in this area, conducting a site-specific study for an individual facility like Gary Works would be a significant undertaking and has not been contemplated for this effort because the likely magnitude of reliably estimated nonuse benefits for entrainment reductions at Gary Works is expected to be modest relative to the cost of achieving those benefits. In addition, the inclusion of reliably estimated nonuse values is not expected to change a best technology available determination for the facility.

2.4.5 Qualitative Evaluation of Nonuse Benefits for Entrainment Reduction at Gary Works

An individual receiving nonuse benefits from reductions in Gary Works impingement and entrainment would receive those benefits through two different pathways: the direct reduction in impingement and entrainment and the indirect result of the effects of impingement and entrainment reductions on environmental outcomes such as aquatic health, fish population levels, and catch rates. In almost all cases, receiving the nonuse benefits requires both awareness of impingement and entrainment reductions and a measurable change in aquatic health, fish populations, and/or catch rates. Awareness of impingement and entrainment is very low (Veritas Economics 2012). In contrast, there is a relatively higher rate of awareness of Lake Michigan. Though technology installation at Gary Works would produce a measurable change in entrainment and lesser change in impingement, there is not a demonstrated empirical link between impingement and entrainment and the health of Lake Michigan.

An extensive body of literature has found that entrainment impacts on fish populations are small in comparison to other impacts such as over-fishing, habitat loss, pollution, and invasive species. A robust example of this are the studies conducted at the Connecticut Yankee plant over the course of 30 years (Merriman and Thorpe 1976; Jacobson et al. 2004). These studies encompassed plant operation as well as the time period after operations ceased in 1996. Though there were documented changes in the fish community in the Connecticut River, these changes were not attributed to Connecticut Yankee operation. The authors concluded there were no long-term ecological impacts of plant operation (Jacobson et al. 2004).

Similarly, Lorda et al (2000) utilized 25 years of winter flounder impingement and entrainment data from Millstone Nuclear Power Station in conjunction with time-series data detailing the abundance and age-structure of this population. Lorda et al. (2000) found that the impacts of fishing far outweighed the effects of impingement and entrainment over this time period.

Using conventional fishery assessment models, Jensen (1982) found that while yellow perch equilibrium biomass decreased by 2% to 3% as a result of impingement and entrainment at the Monroe Power Plant, fishing at the level of maximum sustainable yield would reduce equilibrium biomass of the population by 50%. Jensen et al (1982) used this same model to evaluate 15 power plants on Lake Michigan and found the impacts of impingement and entrainment on all three species studied reduced the population biomass between 0.28% and 2.86%, depending on the species.

Barnthouse at al. (2003) utilized long-term monitoring data and population-level assessment models and found no evidence that Salem Generating Station's 25 years of operation had any effect on fish community abundance or diversity. This study, along with those described above and others reviewed in Barnthouse (2013), represent different types of power plants on various waterbodies, implying that similar results would be expected at other plants. In reviewing such studies, Barnthouse (2013) notes that impingement and entrainment are not identified by the Pew Oceans Commission or the U.S. National Research Council as threats to diversity or abundance of fish populations in their reports or regulatory recommendations. Further, impacts of impingement and entrainment are not discussed as potential influences on costal conditions in USEPA's National Costal Conditions reports. Barnthouse (2013) concludes that the available scientific evidence does not support the conclusion that reducing entrainment and impingement mortality will result in measurable improvements in the diversity or abundance of recreational or commercial fish populations, especially when compared to other detrimental factors such as overfishing, pollution, water quality, and habitat loss.

Pearsall et al. (2012) have shown that the Calumet River coastal watershed unit located in the Chicago-Gary metropolitan region has a high level of biodiversity. Though the Great Lakes ecosystem itself is unique, the ecosystem present near Gary Works is not unique in the context of the Great Lakes, and similar ecosystems can be found elsewhere in Lake Michigan. Further, The Great Lakes National Program Office (GLNPO) of the USEPA (1981) estimated that impingement and entrainment at all intakes on Lake Michigan at full flow would only reduce biomass by 2.86% for alewife, 0.76% for smelt, and 0.28% for yellow perch. Given the relatively low flow at Gary Works' intakes and the fact that the only recreationally or commercially valuable species entrained at Gary Works is yellow perch, it is unlikely that Gary Works impingement and entrainment would have any appreciable effect on Lake Michigan populations. This suggests the results in Barnthouse (2013) are expected to be applicable to Gary Works—that is, the scientific evidence does not support the conclusion that reducing Gary Works impingement and entrainment would result in measurable improvements in the diversity or abundance of recreational and commercial fish populations in Lake Michigan. In addition, no threatened or endangered species were entrained at Gary Works (Ramboll 2019). Without measurable improvements in species diversity or abundance from impingement and entrainment reductions, there is no link to nonuse benefits via resource improvement.

3. Baseline Recreational and Commercial Fishing Conditions

The analysis relies upon establishing Baseline conditions and models that can be subjected to counterfactual experiments (reductions in entrainment). To accomplish this, integrated models were developed of baseline stocks, yields, catch per trip, and angler trip-taking behavior. This section discusses the Baseline fishing conditions.

3.1 Characterizations of Stock Dynamics

Simulation models of fish stocks in dynamic equilibrium were developed to represent the stocks affected by entrainment reduction technologies. This is accomplished by creating age-structured transition (i.e., Leslie) matrices (Leslie 1945, 1948; Caswell 2001) that characterize the modeled stocks. The Leslie matrix model is frequently used in fisheries management and has long been an important component of professional judgment (PJ) 316(b) assessments under 1977 draft guidance (Akçakaya, Burgman, and Ginzburg 2002; PSEG 1999; USEPA 2002).

The mathematical representation of the Leslie matrix is:

$$\underbrace{\begin{pmatrix} N_{1,t+1} \\ N_{2,t+1} \\ N_{3,t+1} \\ \vdots \\ N_{A,t+1} \end{pmatrix}}_{\substack{\textbf{Estimated}\\ \textbf{Population at}\\ \textbf{Time t + 1}}} = \underbrace{\overset{\textbf{Fecundity}}{\begin{pmatrix} S_0 f_1 & S_0 f_2 & \cdots & S_0 f_A \\ S_1 & 0 & \cdots & 0 \\ 0 & S_2 & 0\ldots & 0 \\ \vdots & 0 & \vdots & \vdots \\ 0 & \cdots & S_{A-1} & 0 \end{pmatrix}}}_{\textbf{Transition Matrix}} \underbrace{\begin{pmatrix} N_{1,t} \\ N_{2,t} \\ N_{3,t} \\ \vdots \\ N_{A,t} \end{pmatrix}}_{\substack{\textbf{Initial}\\ \textbf{Population at}\\ \textbf{Time t}}} \qquad \textbf{(1)}$$

The transition matrix (in the middle of Equation 1) contains survival rates, represented by the S_n. Survival rates include both natural mortality (M) estimates and fishing mortality (F) estimates. Survival rates in the transition matrix represent the probabilities that a fish in a population will survive to the next life stage. Applied at the population level, these survival probabilities are the percentage of one life stage that survives to the next. In this development, survival is an exponential relationship of M and F:

$$Survival\ (S) = e^{-(M+F)} \qquad \textbf{(2)}$$

When a population at time t is multiplied by the transition matrix, a proportion of the age ones will survive the year and become age twos at time t+1. As the equality condition indicates, multiplying the age-structured population vector at time t by the transition matrix returns the age-structured population vector at time t + 1. Thus, with knowledge of a population's structure and the transition matrix, it is possible to predict the population's structure in the next time period. Proceeding in an iterative way allows simulation of populations for future periods. Survival estimates used for populating the Leslie Matrix were obtained from a recent EPRI fish life history reference document (EPRI 2012a).

One of the most important advantages of using age-structured population modeling for estimating entrainment reduction impacts is the information that survival rates imply for recreational and commercial catch. Specifically, it is possible to structure the transition matrix to decompose death outcomes into commercial, recreational, and natural components. A dynamic simulation with specified fishing mortality rates by age can be used to identify numeric changes in catch for each age class and future year. The equations below demonstrate how the components of survival are represented in a typical life history table, where "rate" can be interpreted as the probability of advancing to another stage in the next year.

$$\textit{Total Death Rate} = 1 - \textit{Total Survival Rate} \quad (3)$$

$$\textit{Natural Death Rate} = M/(M+F) * \textit{Total Death Rate} \quad (4)$$

$$\textit{Fishing Death Rate} = F/(M+F) * \textit{Total Death Rate} \quad (5)$$

$$\textit{Commercial Death Rate} = \%\textit{ of Commercial Fishing Mortality} * \textit{Fishing Death rate} \quad (6)$$

$$\textit{Recreational Death Rate} = (1 - \%\textit{ of Commercial Fishing Mortality}) * \textit{Fishing Death rate} \quad (7)$$

3.2 Baseline Fishing Conditions

Baseline fishing conditions are defined as the current conditions at Gary Works, which include entrainment. The characterization of baseline fishing conditions considers recreational and commercial fishing, both current and into the future. To characterize baseline fishing conditions, we assess current recreational and commercial yield with Gary Works' entrainment, the number of recreational and commercial anglers potentially affected by the impact of Gary Works' entrainment on recreational and commercial yield, the number of fishing trips the anglers take, the sites that those anglers visit, and catch rates.

3.2.1 Baseline Recreational Fishing Conditions

When anglers take a fishing trip, they have many sites to choose from with varying attributes. These attributes include how far the site is from the angler's home, the type and number of fish the angler can expect to catch at each site, and the level of development at each site. Angler preferences across varying site attributes are characterized using Recreational Angling Demand Models.

3.2.2 Angler Preferences

The most sophisticated angling demand models are econometrically estimated using RUM models. The RUM model is based on choice theory and posits that individuals make choices that maximize their utility, subject to constraints. In this framework, anglers choose which sites to visit, based on costs and fishing opportunities at the sites. Because anglers trade off factors, such as the cost of getting to the site against the quality of the fishing opportunity, this approach can evaluate the relative influence of these variables as revealed by anglers' decisions.

To evaluate the factors influencing anglers' decisions, the analysis uses the angler preference function presented in Melstrom and Lupi (2013). Melstrom and Lupi estimated two models to characterize the demand for recreational fishing in the Great Lakes, Michigan. The authors used data from a general survey on sportfishing trips in Michigan. The survey process was consistent with accepted survey protocols. The study's response rate is consistent with survey research standards (Melstrom and Lupi 2013).

The statistical models estimated in Melstrom and Lupi (2013) are nested logits. To delineate potential differences in angler preferences with respect to fishery type, Melstrom and Lupi (2013) use a two-level fishing structure for each model. In the target-species-nested model, anglers choose coldwater or warmwater species. Nested within each target species category are the alternative fishing sites.

In the lake-nested model, sites are grouped according to Great Lake, and nested within each Great Lake are the alternative fishing sites for that lake. The four nests in the lake-nested model are Lake Huron, Lake Michigan, Lake Superior, and a joint Lake Erie-Lake St. Clair grouping. The nesting structure of the lake-nested model is "more consistent with the observed choices of anglers" (Melstrom and Lupi 2013).

The model output is a coefficient for each site characteristic. Each coefficient reflects the importance of that site characteristic to angler welfare. These coefficients play a key role in the approach used in this assessment. Table 3.1 contains the relevant coefficients and standard error (SE) from the Melstrom and Lupi (2013) models.

When considering yield changes, value at the species level is a critical component of overall value. The Melstrom and Lupi (2013) model includes coefficients for catch rates for both coldwater and warmwater species. The coldwater species are Chinook and coho salmon, steelhead, and lake trout. Walleye and yellow perch are the warmwater species in Melstrom and Lupi's study. Relative species values can be evaluated by comparing the coefficients.

Table 3.1
Coefficients from the Melstrom and Lupi (2013) Model

Parameter or Variable	Target-Species-Nested Model		Lake-Nested Model	
	Coefficient	SE	Coefficient	SE
Travel cost	-0.065	0.006	–0.028	0.001
Catch rate (CR), Chinook salmon	17.909	1.430	8.907	0.744
CR, coho salmon	11.554	2.871	5.786	1.575
CR, lake trout	3.130	0.672	0.234	0.378
CR, steelhead	17.915	4.685	5.490	2.119
CR, walleye	5.267	0.579	2.550	0.258
CR, yellow perch	0.366	0.086	0.254	0.036

3.2.3 Angler Participation: Population Size and Annual Fishing Trips

The U.S. Fish and Wildlife Service (USFWS) conducts the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation every five years. Among other information, the survey collects data on anglers and the types of fish that they catch. This assessment uses data from the 2011 survey for Indiana, Illinois, and Michigan because those are the most recent, complete data on angling activity. According to the national survey, 10.96 percent of Indiana residents, 8.05 percent of Illinois residents, and 14.20 percent of Michigan residents 16 years of age and older fished freshwater waterbodies during 2011 (USFWS 2013a, 2013b, 2013; U.S. Census Bureau 2019). To develop the estimate of total angling days, the analysis applies the average number of days that these anglers spend fishing freshwater waterbodies from the 2011 USFWS (29 days for IN, 14 days for IL, and 19 days for MI) to the number of anglers residing in the affected ZIP Codes.

3.2.4 Angling Sites

In addition to using information on angler preferences and participation, the Recreational Angling Demand Model has to contain information on the sites an angler can potentially visit. We collect information from publicly available sources on the most popular inland river and lake sites. Model sites include fishing sites on Lake Michigan and other Indiana, Illinois, Michigan, and Wisconsin lakes and rivers. Fishing sites include shore and boat fishing. Appendix B presents the characteristics of the sites included in the model, and Table 3.2 lists conditions at affected sites included in the model. Catch rates are specified to be the catch per hour and are listed for six categories.

Table 3.2
Conditions of Affected Lake Michigan Sites

Category	Indiana Shore Sites	Indiana Boating Sites	E 102 St, Chicago, IL	Calumet Park, IL	Jackson Park, IL	Montrose Harbor, IL
Angler trips	4,352	37,253	404	1,296	1,307	13,290
Catch rate:						
Chinook salmon	0.0036	0.0450	0.0151	0.0000	0.0258	0.0068
Coho salmon	0.0032	0.0769	0.1292	0.0449	0.0057	0.0184
Steelhead/rainbow trout	0.0175	0.0239	0.0027	0.0000	0.0000	0.0006
Lake trout	0.0000	0.0380	0.0131	0.0000	0.0000	0.0000
Walleye	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Yellow perch	0.3259	0.6989	0.0050	0.0050	0.0258	0.1508

Sources: Palla (2011), Roswell and Czesny (2018)

The distance traveled to a site is one of the most important site characteristics in a Recreational Angling Demand Model. It directly influences the travel cost to each site for each angler. Thus, a critical factor in the simulation model is distance from each angler's residence (ZIP Code) to each site. These distances are calculated using the most recent version of a popular transportation routing software called PC*Miler (ALK Technologies 2016). Travel costs reflect both direct costs and travel time costs. Direct costs are calculated by multiplying the round-trip miles by the standard per mile reimbursement. The average hourly wage of each ZIP Code in counties within 50 miles is calculated by dividing household income from the U.S. Census by 2,000 work hours per year (U.S. Census Bureau 2019). Travel time in minutes is also calculated by PC*Miler. The round-trip time estimate is multiplied by one-third of the average hourly wage rate to reflect the opportunity cost of time. The travel cost included in the model is the sum of the direct travel cost and the opportunity cost of time.

3.2.5 Calibrated Baseline Trips and Expected Catch

Travel costs and the other site characteristics are combined with the coefficients from the Melstrom and Lupi (2013) model to allocate the estimated annual trips by the affected angling population to the affected and substitute sites. Total trips to Lake Michigan are calibrated to correspond to the best available visitation information for the affected sites. This process results in the distribution of trips to the affected sites listed in Table 3.2. The remaining trips are distributed among the substitute sites using the best available visitation information. In the calibrated baseline dynamic recreational fishing model, baseline trips and yield are combined by dividing recreational catch by trips to identify a calibrated baseline expected catch for each affected species.

3.2.6 Baseline Commercial Fishing Conditions

No commercial fishing is allowed in the Indiana waters of Lake Michigan (Indiana General Assembly 2017); however, commercial fishing does occur in the Michigan and Wisconsin waters of Lake Michigan. Commercial landings from the Michigan waters of southern Lake Michigan are mostly lake whitefish, along with a few thousand pounds of chubs and channel catfish. Ninety-one percent of commercial landings from the Wisconsin waters of Lake Michigan are lake whitefish. Chubs and yellow perch provide about 7.6 percent of commercial catch from Wisconsin waters of Lake Michigan (U.S. Geological Survey 2019).

Table 3.3 lists the 2016 commercial catch (the latest year with published data) from the Michigan and Wisconsin waters of Lake Michigan (the U.S. Geological Survey data does not list commercial landings from Illinois waters of Lake Michigan in recent years). The ex-vessel price per pound is given in 2016 dollars (U.S. Geological Survey 2019).

Table 3.3
Commercial Catch from the Michigan and Wisconsin Waters of Lake Michigan

Species	Wisconsin Pounds	Price/lb. (2016)	Michigan State Licensed Pounds	Price/lb. (2016)	Michigan Tribe Licensed Pounds	Price/lb. (2016)
Lake whitefish	1,129,591	$1.750	733,565	$1.364	448	$1.650
Chubs	50,019	$3.751	—		—	
Chubs	12,408	$0.083	2,413	$2.501	—	
Yellow perch	31,201	$2.505	—		—	
Burbot	8,987	$0.352	—		—	
Alewife	3,330	$0.100	—		—	
Round whitefish	1,039	$0.500	—		—	
White perch	454	$0.515	—		—	
Channel catfish	109	$4.000	150	$0.433	—	
Brown bullhead	210	$0.105	—		—	
Freshwater drum	74	$0.149	—		—	
Suckers	51	$0.098	—		—	
Rainbow smelt	37	$4.000	—		—	
White bass	21	$0.714	—		—	

Source: U.S. Geological Survey (2019)

3.3 Future Baseline Fishing Participation, Trips, and Site Quality

Because the modeling predicts decades into the future, differences from the current state of fishing could impact results. This means anticipated changes in site quality and availability or changes in economic conditions and fishing preferences should be expressed in the baseline case going forward.

Although participation in recreational fishing declined nationally years ago, fishing license sales have rebounded in recent years—dramatically in some states. According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, the number of anglers rose 19 percent nationwide from 2006 to 2016 (USFWS 2017). However, in Indiana fishing participation decreased between 2001 and 2011 (2011 data are the most recent USFWS data for Indiana as state-specific participation was not published for 2016). In addition, between 2001 and 2012, Indiana's fishing license sales decreased from 619,383 to 495,272 (USFWS 2004, 2015). Based on this information, the future baseline of fishing participation, trips to sites, and expected catch was specified consistent with the pre-2012 calibrated baseline estimates described above.

4. Modeling and Valuing Changes in Recreational and Commercial Yield

Once the baseline stock and fishing conditions have been established, the next step in the analysis was to model the recreational and commercial yield impacts associated with Gary Works' entrainment. The model uses two types of yield changes associated with simulating a reduction in Gary Works' entrainment: direct and indirect yield changes. The direct yield changes are the increases in recreational and commercial species that would occur as a result of removing entrainment. The indirect yield changes are the increases in recreational and commercial yields that would occur as a result of removing Gary Works' entrainment of forage species.

After modeling the yield impacts associated with Gary Works' entrainment, changes in recreational and commercial yield was valued. Developing these values requires assessing the relationship between the recreational and commercial yield changes and the impact that these yield changes have on people. For example, properly assessing recreational values requires understanding how Gary Works' entrainment affects recreational fishing catch rates and how those changed catch rates affect the well-being of anglers located in the plant's relevant vicinity. Properly assessing commercial values requires understanding how Gary Works' entrainment affects fishery yields and how those changes in fishery yields affect commercial catch rates, the profitability of commercial harvesters, and the prices consumers pay for commercially harvested fish

4.1 Valuing Changes in Recreational Yield

For a recreational fishery, the appropriate measure for valuing changes in recreational yield is the increase in consumer surplus resulting from changes in catch rates attributable to entrainment reductions. Consumer surplus is measured using demand functions. Demand functions describe the maximum number of trips a person would be willing to take at each price over a given time period. For a nonmarket service like recreational fishing, "price" is the cost of taking a trip to that site. This cost may include transportation costs, the opportunity cost of time, entrance fees, and other trip-related costs. Differences across demand functions under Baseline and Reduced-Entrainment catch rates are used to identify economic benefits.

Figure 4.1 depicts an econometrically estimated demand curve from Bingham et al. (2011) for exposition purposes. Here, the example angler's round-trip travel cost is $25.[10] Consistent with the concept of diminishing marginal utility, each additional trip is valued somewhat less than the previous trip. The fifth (and higher) trip is valued at less than travel cost. Therefore, the angler

[10] Travel cost consists of direct expenditures and the value of time going to and from the site.

maximizes his utility by taking four trips. In the figure, the gray area above the per-trip cost and below the demand curve is the difference between what an angler pays for fishing trips to a site and the value that the angler has for those trips. This area is called consumer surplus, and it is the dollar measure of the satisfaction received from trips to the site. It is the difference between what the angler actually has to pay to visit a site and how much they would be willing to pay to visit the site.

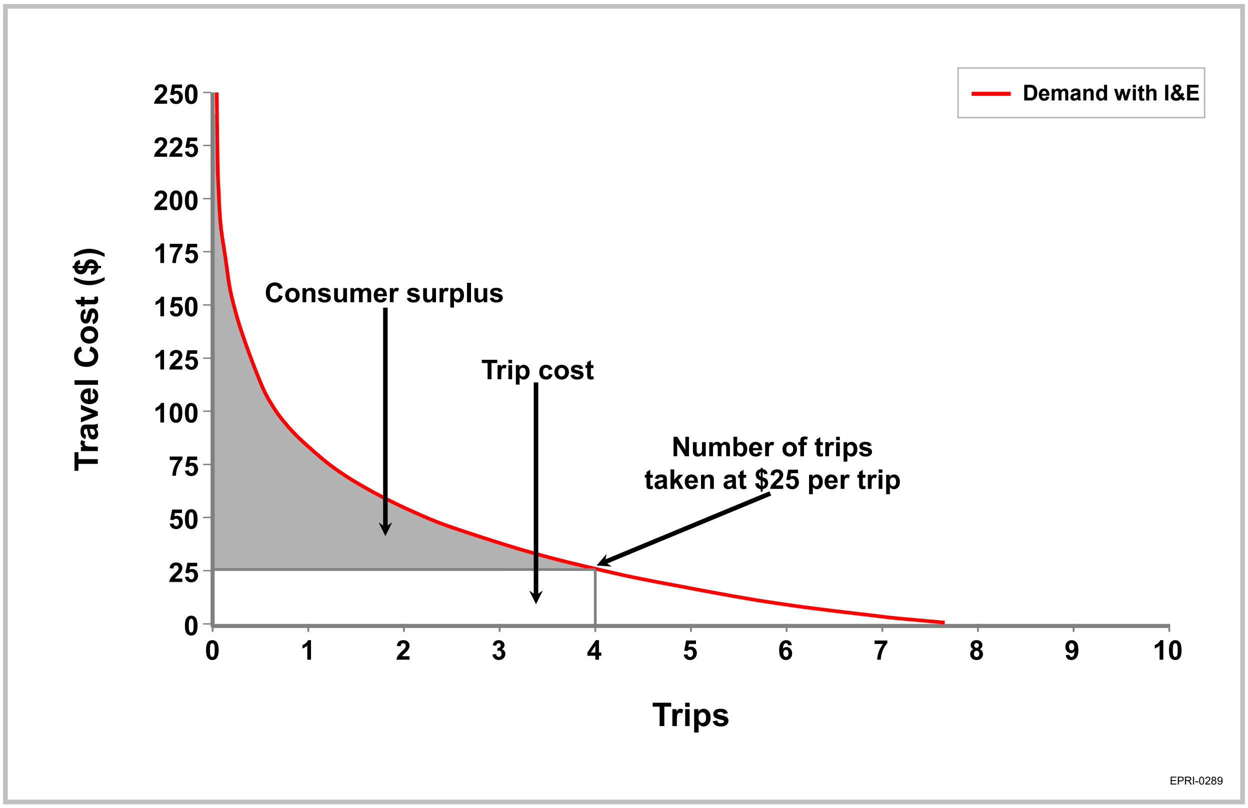

Figure 4.1: Example Site Demand Curve and Consumer Surplus

Consumer surplus changes when a site's catch rates change. Figure 4.2 depicts the process. In the figure, the red demand curve reflects catch rates with entrainment. The blue curve depicts demand curve when the site has higher, Reduced-Entrainment catch rates. This new demand curve is to the right of the With Entrainment curve. For each level of visitation, the trip is more valuable because of the higher catch rates. Consequently, the angler takes more trips to the site (five trips rather than four) and these trips have a higher value.

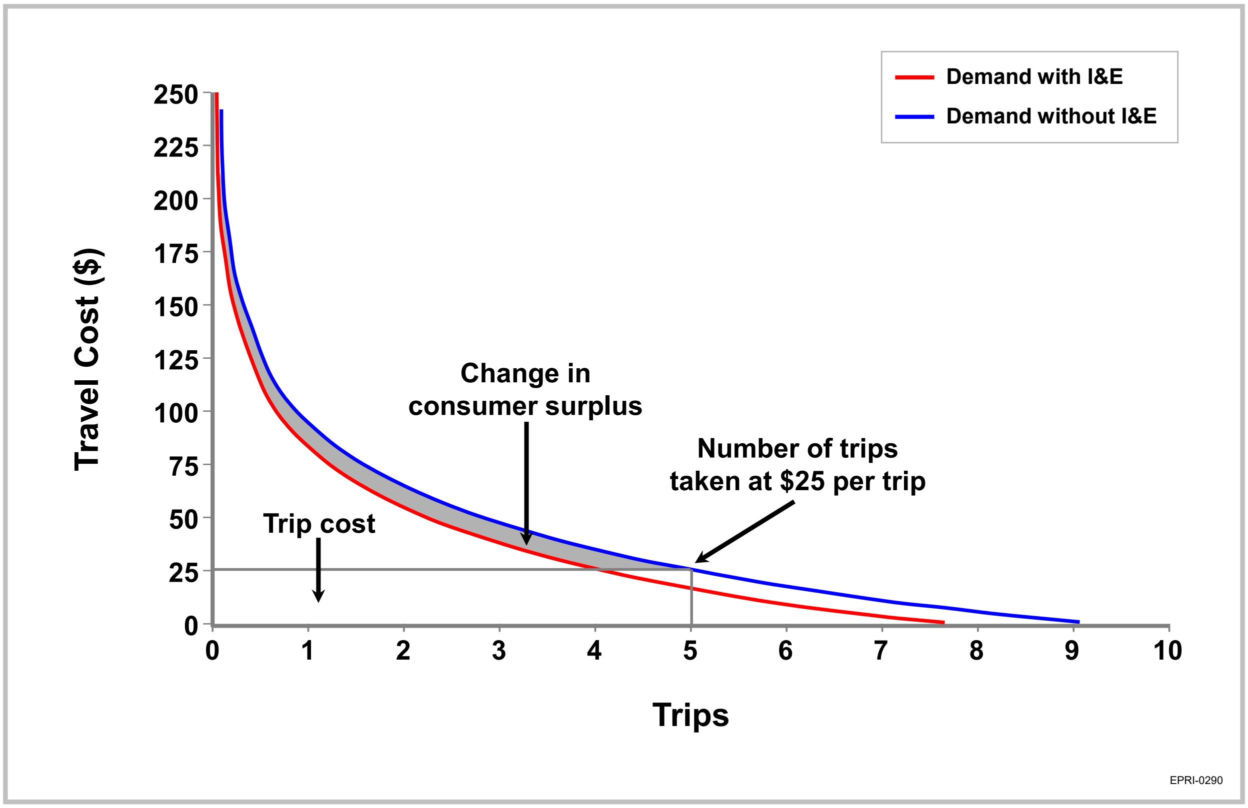

Figure 4.2: Example Increase in Consumer Surplus from Increase in Catch Rates

Developing these estimates of demand and changes in consumer surplus requires estimating changes in angler utility associated with changes in catch rates resulting from entrainment reductions. In mathematical terms, an individual angler's utility, U_{ipwj} (the well-being they receive from a fishing trip), is treated as a random variable composed of a deterministic component and a random component. The utility associated with a recreational fishing trip to site j of waterbody type w after making participation decision p by angler i can be expressed as:

$$U_{ipwj} = V_{ipwj} + \varepsilon_{ipwj} \quad (1)$$

where V_{ipwj} is the deterministic part of the utility function and ε_{ipwj} represents the random terms, which are assumed to be jointly distributed according to the generalized extreme value (GEV) distribution. V is a function of site characteristics, such as how far the site is from the angler's house, what type of fish he can catch there, how many fish he might expect to catch there, and how developed the site is.

For this assessment, the analysis uses the structure from Melstrom and Lupi (2013) to estimate changes in angler utility resulting from reductions in Gary Works' entrainment. An important aspect of the angling demand model is that it can be used to estimate changes in consumer surplus attributable to site quality changes, such as improved catch rates resulting from reduced entrainment, as well as the addition or elimination of a site. For this analysis, to estimate the changes in demand that would occur if Gary Works' entrainment was not occurring, the analysis uses the results from Melstrom and Lupi (2013) to determine how changes in catch would change anglers' trip-taking behavior and utility. The coefficients on expected catch in Melstrom and Lupi (2013) are used to link the recreational yield changes to the preferences of affected anglers presented earlier.

After estimating the changes in catch resulting from the reduced entrainment, the analysis simulates the changes in trip patterns that anglers make in response to changes in catch rates in Lake Michigan. The economic assessment proceeds by developing the estimated changes in social welfare, in dollars, associated with the changes in trips that result from the changes in catch and trips. The analysis estimates the monetized benefits by calculating the difference in angler welfare without and with the increased catch rates and trips associated with reduced entrainment at Gary Works.

4.2 Valuing Changes in Commercial Yield

Valuing changes in commercial yield entails evaluating the effect of changes in commercial harvest rates on the economic welfare of both commercial anglers and consumers of commercially harvested fish. This involves understanding how changes in catch rates affect the profitability of commercial harvesters and the prices faced by fish consumers. Doing so requires adding the supply curve to the concepts of demand curves and consumer surplus presented in Section 5.1 and evaluating supply implications under the current conditions versus the conditions that would result with reductions in Gary Works' entrainment. Economic benefits from entrainment reductions could accrue to commercial anglers as increased profit attributable to higher CPUE, as surplus to consumers arising from lower fish prices, or some mixture of these. The ability of commercial anglers to realize sustained increased profits depends on the responsiveness of market prices to higher CPUE.

Generally speaking, the nature of commercial fishing benefits resulting from yield increases or improvements in CPUE depend on the type of fishery as summarized below:

- Case 1: Commercial anglers experience increases in catch rates, but fish prices do not change.
- Case 2: Commercial anglers experience increases in catch rates, and fish prices do change.

- Case 3: Commercial anglers experience increases in catch rates, the commercial fishing market is in short-run equilibrium, and there are no explicit regulatory quotas.

Appendix A provides a detailed discussion of these three cases for commercial fisheries. As Appendix A describes, commercial harvesters consider many factors when making business decisions about fishing including the fact that catch rates are seasonal and stochastic, fish and fuel prices vary, vessels often target a variety of species and can switch gear if needed, boats can sail from and offload at various ports, the number of crewmembers can vary, the weather has implications for catch and safety, and so on. This complicated supply picture interacts with consumer demand that is impacted by a number of factors, including quality of catch (i.e., freshness), cost of substitutes (other fish and foods), and eating trends. Regulatory actions, such as quota-setting, impact both harvest costs and market prices.

Economic benefits from entrainment reductions could accrue to commercial anglers as increased profit attributable to higher CPUE, as surplus to consumers arising from lower fish prices, or some mixture of these. The ability of commercial anglers to realize sustained increased profits depends on the responsiveness of market prices to higher CPUE. Given the commercial yield changes associated with reductions in Gary Works' entrainment, the analysis specifies that no price changes would occur as a result of reductions in Gary Works' entrainment and uses Case 1 as the approach to estimate commercial benefits. It also specifies that commercial anglers would be able to sell all their additional harvest at the unchanged prices. To assess benefits under these specifications, the analysis applies the price per pound from the U.S. Geological Survey (2019) to the changes in commercial yield estimated to result from reductions in Gary Works' entrainment.

5. Conclusion

Under the Rule, social benefits and social costs of entrainment reduction technologies play a key role in establishing case-by-case BTA entrainment mortality reduction standards (§ 125.98(f)). Social benefits must be assessed by the facility owner and included in the plant's permit application submissions.

Estimating the benefits of entrainment reductions requires assessing the relationship between entrainment, its corresponding changes to the relevant fishery, and the impact that fishery changes have on people. For example, properly assessing recreational values requires understanding how Gary Works' entrainment affects recreational fishing catch rates and how those changed catch rates affect the well-being of anglers located in the plant's relevant vicinity. Properly assessing commercial values requires understanding how entrainment affects commercial catch rates, the profitability of commercial harvesters, and the prices consumers pay for commercially harvested fish.

Of the four years of entrainment data collected at Gary Works, the analysis uses entrainment data from 2012 and 2013 because they represent the low and high end of observed entrainment. The analysis evaluates social benefits under two discount rates: 3 and 7 percent. Using the 2012 entrainment data, the total social benefit of a closed-cycle cooling retrofit ranges from $10 (7 percent discount rate) to almost $23 (3 percent discount rate) and almost $12,000 (7 percent discount rate) to almost $27,000 (3 percent discount rate) using the 2013 entrainment data. Social benefits of fine-mesh traveling screens range from $14 (7 percent discount rate) to $30 (3 percent discount rate) using the 2012 entrainment data and are $0 using the 2013 data.[11]

[11] In the 2013 entrainment data, only eggs are entrained (once nuisance species are omitted). Because the fine-mesh traveling screens do not exclude eggs, there are no social benefits.

6. References

AAA. 2019. "Your Driving Costs." Available at https://exchange.aaa.com/wp-content/uploads/2019/09/AAA-Your-Driving-Costs-2019.pdf. Retrieved on October 18, 2019.

Adamowicz, Wiktor, Jordan Louviere, and Michael Williams. 1994. "Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities." *Journal of Environmental Economics and Management* 26:271–292.

Akçakaya, H. Resit, Mark A. Burgman, and Lev Ginzburg. 2002. *Applied Population Ecology Principles and Computer Exercises Using RAMAS: Second Edition*. Available at http://www.ramas.com/contents.htm. Retrieved on August 7, 2012.

ALK Technologies, Inc. 2016. PC*Miler software. Princeton, NJ: ALK Technologies, Inc.

Arrow, Kenneth J., Robert M. Solow, Paul R. Portnoy, E.E. Leamer, R. Radner, and H. Schuman. 1993. "Report of the NOAA Panel on Contingent Valuation." 58 *Fed. Reg*. 4601 *et. seq*. January 15.

Banzhaf, Melissa R., F .Reed Johnson, and Kristy E. Mathews. 2001. "Opt-Out Alternatives and Anglers' Stated Preferences." In *The Choice Modelling Approach to Environmental Evaluation,* Jeff Bennett and Russell Blamey, eds. Northampton, MA: Edward Elgar Publishing.

Barnthouse, Lawrence W. 2013. "Impacts of Entrainment and Impingement on Fish Populations: A Review of the Scientific Evidence." *Environmental Science & Policy* 31(August):149–156.

Barnthouse, Lawrence W., Matthew Bingham, and Jason Kinnell. 2016. "Quantifying Nonuse and Indirect Economic Benefits of Impingement & Entrainment Reductions at U.S. Power Plants." *Environmental Science and Policy* 60:53–62.

Barnthouse, L.W., D.G. Heimbuch, V.C. Anthony, R.W. Hilborn, and R.A. Myers. 2003. "Indicators of AEI applied to the Delaware Estuary." In *Defining and Assessing Adverse Environmental Impact from Power Plant Impingement and Entrainment of Aquatic Organisms*, D.A. Dixon, J.A. Veil, and J. Wisniewski, eds., pp. 165–184. Lisse, The Netherlands: A.A. Balkema Publishers.

Beggs, S., S. Cardell, and J. Hausman. 1981. "Assessing the Potential Demand for Electric Cars." *Journal of Econometrics* 17(1):1–19.

Bingham, M.F., Z. Li, K.E. Mathews, C. Spagnardi, J. Whaley, S. Veale, and J. Kinnell. 2011. "An Application of Behavioral Modeling to Characterize Urban Angling Decisions and Values." *North American Journal of Fisheries Management* 31:257–268.

Bingham, M.F, F.R. Johnson, and D. Miller. 2001. "Modeling Choice Behavior for New Pharmaceutical Products." *Value in Health* 4(1):32–44.

Bockstael, N.E., W.M. Hanemann, and Catherine L. Kling. 1987. "Estimating the Value of Water Quality Improvements in a Recreational Demand Framework." *Water Resources Research* 23(5):951–960.

Bockstael, N.E., W.M. Hanemann, and I.E. Strand, Jr. 1986. *Measuring the Benefits of Water Quality Improvements Using Recreation Demand Models*. Report to the U.S. Environmental Protection Agency. College Park, MD: University of Maryland.

Bockstael, N.E., K.E. McConnell, and I.E. Strand. 1991. "Recreation." In *Measuring the Demand for Environmental Quality*, J.B. Braden and C.D. Kolstad, eds. North Holland: Elsevier Science Publishers B.V.

Cameron, Trudy Ann. 1985. "A Nested Logit Model of Energy Conservation Activity by Owners of Existing Single Family Dwellings." *The Review of Economics and Statistics* 67(2):205–211.

Carson, Richard T. 2012. "Contingent Valuation: A Practical Alternative When Prices Aren't Available." *Journal of Economic Perspectives* 26(4):27–42. Available at http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.26.4.27. Retrieved on December 5, 2012.

Caswell, H. 2001. *Matrix Population Models. Construction, Analysis, and Interpretation, 2nd Edition*. Sunderland, MA: Sinauer.

Caulkins, Peter P., Richard C. Bishop, and Nicolaas W. Bouwes, Sr. 1986. "The Travel Cost Model for Lake Recreation: A Comparison of Two Methods for Incorporating Site Quality and Substitution Effects." *American Journal of Agricultural Economics* 68(2):291–297.

Cesario, Frank J. 1976. "Value of Time and Recreation Benefit Studies." *Land Economics* 52(1):32–41.

Champ, Patricia A., Kevin J. Boyle, and Thomas C. Brown, eds. 2017. *A Primer on Nonmarket Valuation, Second Edition*. Dordrecht, The Netherlands: Springer.

Electric Power Research Institute. 2004. *Extrapolating Impingement and Entrainment Losses to Equivalent Adults and Production Foregone*. Product ID 1008471. Palo Alto, CA: EPRI.

Electric Power Research Institute. 2012a. *Fish Life History Parameter Values for Equivalent Adult and Production Foregone Models: Comprehensive Update*. Product No. 1023103. Palo Alto, CA: EPRI.

Electric Power Research Institute. 2012b. *Technical Comments on EPA's National Pollutant Discharge Elimination System Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities: Notice of Data Availability Related to EPA's Stated Preference Survey* (*Federal Register* V77, N113; June 12, 2012). 1025381(B). Palo Alto, CA: EPRI.

Electric Power Research Institute. 2017. *Photovoltaic (PV) Adoption Influencers: Estimating the Drivers of Residential Solar Choice*. Product ID 3002011012. Principal Investigators: S. Coley, N. Enbar, M.F. Bingham, J.S. Kinnell, S.G. Hickman, V.L. MacPherson, and Z. Li. Palo Alto, CA: Electric Power Research Institute.

Feenberg, Daniel, and Edwin S. Mills. 1980. *Measuring the Benefits of Water Pollution Abatement*. New York: Academic Press.

Fezzi, Carlo, Ian Bateman, and Silvia Ferrini. 2014. "Using Revealed Preferences to Estimate the Value of Travel Time to Recreation Sites." *Journal of Environmental Economics and Management* 67(1):58–70.

Fisher, A., and R. Raucher. 1984. "Intrinsic Benefits of Improved Water Quality: Conceptual and Empirical Perspectives." In *Advances in Applied Micro-Economics*, V.K. Smith, ed. Greenwich, CT: JAI Press Inc.

Freeman, A. Myrick, III. 2003. *The Measurement of Environmental and Resource Values: Theory and Methods, Second Edition.* Washington, DC: Resources for the Future, Inc.

Freeman, A. Myrick, III, Joseph A. Herriges, and Catherine L. Kling. 2014. *The Measurement of Environmental and Resource Values: Theory and Methods, Third Edition.* Washington, DC: Resources for the Future, Inc.

Gan, Christopher, and E. Jane Luzar. 1993. "A Conjoint Analysis of Waterfowl Hunting in Louisiana." *Journal of Agricultural and Applied Economics* 25:36–45.

Hammond Port Authority. 2019. "Fishing." Available at https://hammondportauthority.com/activities/fishing/. Retrieved on March 4, 2019.

Hausman, J.A., ed. 1993. *Contingent Valuation: A Critical Assessment*. Amsterdam: Elsevier Science Publishers.

Hausman, Jerry A. 2012. "Contingent Valuation: From Dubious to Hopeless." *Journal of Economic Perspectives* 26(4):43–56. Available at http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.26.4.43. Retrieved on December 5, 2012.

Hensher, David A. 1991. "The Use of Discrete Choice Models in the Determination of Community Choices in Public Issue Areas Impacting on Business Decision Making." *Journal of Business Research* 23(4):299–309.

Indiana Department of Natural Resources. 2003. "Indiana Aquatic Nuisance Species (ANS) Management Plan." Available at https://www.in.gov/dnr/fishwild/4627.htm. Retrieved on November 12, 2019.

Indiana General Assembly. 2017. "Title 312 Natural Resources Commission." Available at http://www.in.gov/legislative/iac/20170719-IR-312170262PHA.xml.html. Retrieved on March 1, 2019.

Jacobson, Paul M., Douglas A. Dixon, William C. Leggett, Barton C. Marcy, Jr., and Ronald R. Massengill, eds. 2004. *The Connecticut River Ecological Study (1965–1973) Revisited: Ecology of the Lower Connecticut River 1973–2003*. Washington, DC: American Fisheries Society.

Jensen, A.L., S.A. Spigarelli, and M.M. Thommes. 1982. "Use of Conventional Fishery Models to Assess Entrainment and Impingement of Three Lake Michigan Fish Species." *Transactions of the American Fisheries Society* 111:21–34.

Johansson-Stenman, Olof, and Henrik Svedsäter. 2008. "Measuring Hypothetical Bias in Choice Experiments: The Importance of Cognitive Consistency." *The B.E. Journal of Economic Analysis & Policy* 8(1) (Topics), Article 41.

Johnson, F. Reed, and Matthew F. Bingham. 2001. "Evaluating the Validity of Stated-Preference Estimates of Health Values." *Swiss Journal of Economics and Statistics* 137(1):49–64.

Johnson, F.R., W.H. Desvousges, E.E. Fries, and L.L. Wood. 1995. "Conjoint Analysis of Individual and Aggregate Environmental Preferences." TER Technical Working Paper T-9502. Durham, NC: Triangle Economic Research.

Johnson, F. Reed, Richard W. Dunford, William H. Desvousges, and Melissa Ruby Banzhaf. 2001. "Role of Knowledge in Assessing Nonuse Values for Natural Resource Damages." *Growth and Change* 32(Winter):43–68.

Kinnell, Jason C., Matthew F. Bingham, Ateesha F. Mohamed, William H. Desvousges, Thomas B. Kiler, Elizabeth K. Hastings, and Karen T. Kuhns. 2006. "Estimating Site Choice Decisions for Urban Recreators." *Land Economics* 82(2):257–272.

Krutilla, John V. 1967. "Conservation Reconsidered." *American Economic Review* 57(4):777–786.Leslie, P.H. 1945. "On the Use of Matrices in Certain Population Mathematics." *Biometrika* 33:183–212.

Leslie, P.H. 1948. "Some Further Notes on the Use of Matrices in Population Mathematics." *Biometrika* 35:213–245.

Lorda, Ernesto, Donald J. Danila, and John D. Miller. 2000. "Application of a Population Dynamics Model to the Probabilistic Assessment of Cooling Water Intake Effects of Millstone Nuclear Power Station (Waterford, CT) on a Nearby Winter Flounder Spawning Stock." *Environmental Science & Policy* 3:S471–S482.

Louviere, Jordan J., Terry N. Flynn, and Richard T. Carson. 2010. "Discrete Choice Experiments Are Not Conjoint Analysis." *Journal of Choice Modelling* 3(3):57–72.

Mackenzie, John. 1993. "A Comparison of Contingent Preference Models." *American Journal of Agricultural Economics* 75(3):593–603.

Madenjian, Charles P., Jeffrey T. Tyson, Roger L. Knight, Mark W. Kershner, and Michael J. Hansen. 1996. "First-Year Growth, Recruitment, and Maturity of Walleyes in Western Lake Erie." *Transactions of the American Fisheries Society* 125:821–830.

McFadden, Daniel. 1997. "Modelling the Choice of Residential Location." In *The Economics of Housing*, Volume 1, J.M. Quigley, ed. Northampton, MA: Elgar.

Melstrom, Richard T., and Frank Lupi. 2013. "Valuing Recreational Fishing in the Great Lakes." *North American Journal of Fisheries Management* 33:1184–1193.

Merriman, D., and L.M. Thorpe. 2004. "Introduction." Pages 3–25 in *The Connecticut River Ecological Study (1965–1973) Revisited: Ecology of the Lower Connecticut River*, Monograph 9, P.M. Jacobsen, D.A. Dixon, W.C. Leggett, B.C.J. Marcy, and R. R. Massengill, editors. Bethesda, MD: American Fisheries Society.

Michigan Department of Natural Resources. 2019. "Michigan Creel Data Effort" and "Michigan Creel Data Harvest." Available at http://gis-midnr.opendata.arcgis.com/datasets?q=creel. Retrieved on February 26, 2019.

Mitchell, R.C., and R.T. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Baltimore: John Hopkins University Press.

Morey, Edward R., W. Douglas Shaw, and Robert D. Rowe. 1991. "A Discrete-Choice Model of Recreational Participation, Site Choice, and Activity Valuation When Complete Trip Data Are Not Available." *Journal of Environmental Economics and Management* 20(2):181–201.

National Oceanic and Atmospheric Administration. 2000. "Habitat Equivalency Analysis: An Overview." Silver Spring, MD: Damage Assessment and Restoration Program. Available at https://casedocuments.darrp.noaa.gov/northwest/cbay/pdf/cbhy-a.pdf. Retrieved on June 8, 2017.

National Oceanic and Atmospheric Administration Great Lakes Environmental Research Laboratory. 2009. "Lake Michigan Food Web." Available at https://www.glerl.noaa.gov/res/projects/food_web/food_web.html. Retrieved on July 8, 2019.

Neenan, Bernard, Jason Kinnell, Matthew Bingham, and Sara Hickman. 2016. "Consumer Preferences for Electric Service Alternatives." *The Electricity Journal* 29:62–71.

Opaluch, James J., Stephen K. Swallow, Thomas Weaver, Christopher W. Wessells, and Dennis Wichelns. 1993. "Evaluating Impacts from Noxious Facilities: Including Public Preferences in Current Siting Mechanisms." *Journal of Environmental Economics and Management* 24:41–59.

Palla, Janel S. 2011. *Lake Michigan 2010 Creel Survey Report*. Available at in.gov/dnr/fishwild/files/fw-2010_Lake_Michigan_creel_report.pdf. Retrieved on December 22, 2017.

Pauly, D., and V. Christensen. 1995. "Primary Production Required to Sustain Global Fisheries." *Nature* 374:255–257.

Pearsall, D., P. Carton de Grammont, C. Cavalieri, P. Doran, L. Elbing, D. Ewert, K. Hall, M. Herbert, M. Khoury, S. Mysorekar, S. Neville, J. Paskus, and A. Sasson. 2012. Michigami: Great Water. Strategies to Conserve the Biodiversity of Lake Michigan. Technical Report. A joint publication of The Nature Conservancy and Michigan Natural Features Inventory. 309 pp. with Appendices.

Phaneuf, Daniel J., and V. Kerry Smith. 2004. "Recreation Demand Models." Prepared for *Handbook of Environmental Economics, Volume 2*, K.-G. Mäler and J.R. Vincent, eds. Amsterdam: Elsevier Science Publishers B.V.

Public Service Electric and Gas Company. 1999. Permit Renewal Application, NJDPES Permit No. NJ0005622, Salem Generating Station. March 4.

Ramboll US Corporation. 2018. *Clean Water Act Section 316(b) Requirements for Cooling Water Intakes Structures Pursuant to 40 CFR Part 122 and 125*. Denver, CO: Ramboll US Corporation.

Ramboll US Corporation. 2019. Entrainment estimates for Gary Works.

Roe, Brian, Kevin J. Boyle, and Mario F. Teisl. 1996. "Using Conjoint Analysis to Derive Estimates of Compensating Variation." *Journal of Environmental Economics and Management* 31:145–59.

Roswell, Charles R., and Sergiusz J. Czesny. 2018. "A Survey of Sport Fishing in the Illinois Portion of Lake Michigan." INHS Technical Report 2018 (43). Champaign, IL: Illinois Natural History Survey.

Schkade, David A., and John W. Payne. 1994. "How People Respond to Contingent Valuation Questions: A Verbal Protocol Analysis of Willingness to Pay for an Environmental Regulation." *Journal of Environmental Economics and Management* 26(1):88–109.

Schmidt, Laura. 2018. "Wisconsin's 2017 Open Water Sportfishing Effort and Harvest from Lake Michigan and Green Bay." Available at https://dnr.wi.gov/topic/fishing/lakemichigan/managementreports.html. Retrieved on March 1, 2019.

Smith, V. Kerry, George L. van Houtven, and Subhrendu Pattanayak. 2002. "Benefit Transfer via Preference Calibration: 'Prudential Algebra' for Policy." *Land Economics* 78(1):132–152.

U.S. Census Bureau. 2019. "American Fact Finder: Advanced Search." Available at https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t. Retrieved March–April 2019.

U.S. Environmental Protection Agency. 1981. *Assessment of the Impacts of Water Intakes on Alewife, Rainbow Smelt, and Yellow Perch Populations in Lake Michigan*. Report Number EPA-905/3-81-001. February. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2002. *Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule*. Report Number 821-R-02-001. February. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2006. *Regional Benefits Analysis for the Final Section 316(b) Phase III Existing Facilities Rule*. EPA-821-R-04-007. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2010. *Guidelines for Preparing Economic Analyses*. Report Number EPA 240-R-10-001. December. Washington, DC: U.S. EPA. Available at http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf. Retrieved on June 19, 2013.

U.S. Environmental Protection Agency. 2012. "Survey Support Document in Support of Section 316(b) Stated Preference Survey Notice of Data Availability." June. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2014a. National Pollutant Discharge Elimination System—Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities; Final Rule. *Federal Register* Vol. 79, No. 158 (August 15):48300–48439.

U.S. Environmental Protection Agency. 2014b. *Benefits Analysis for the Final Section 316(b) Existing Facilities Rule*. EPA 821-R-14-005.

U.S. Environmental Protection Agency. 2016. *Guidelines for Preparing Economic Analyses*. Report Number EPA 240-R-10-001. December. Washington, DC: U.S. EPA. Available at https://www.epa.gov/sites/production/files/2017-08/documents/ee-0568-50.pdf. Retrieved on October 22, 2018.

U.S. Fish and Wildlife Service. 2004. "National Fishing License Report." Available at https://wsfrprograms.fws.gov/subpages/licenseinfo/FishingLicCertHistory.pdf.

U.S. Fish and Wildlife Service. 2013a. *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Indiana*. Available at http://www.census.gov/prod/2013pubs/fhw11-in.pdf. Retrieved on August 29, 2013.

U.S. Fish and Wildlife Service. 2013b. *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Illinois*. Available at http://www.census.gov/prod/2013pubs/fhw11-il.pdf. Retrieved on August 29, 2013.

U.S. Fish and Wildlife Service. 2013c. *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Michigan*. Available at http://www.census.gov/prod/2013pubs/fhw11-mi.pdf. Retrieved on May 6, 2013.

U.S. Fish and Wildlife Service. 2015. "National Fishing License Report." Available at http://wsfrprograms.fws.gov/Subpages/LicenseInfo/FishingLicCertHistory20042015.pdf. Retrieved on September 10, 2015.

U.S. Fish and Wildlife Service. 2017. *2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: National Overview.* Available at https:/wsfrprograms.fws.gov/subpages/nationalsuruvey/nat_survey2016.pdf. Retrieved on April 18, 2018.

U.S. Fish and Wildlife Service. 2019. "Listed Animals." Available at https://ecos.fws.gov/ecp0/reports/ad-hoc-species-report?kingdom=V&kingdom=I&status=E&status=T&status=EmE&status=EmT&status=EXPE&status=EXPN&status=SAE&status=SAT&mapstatus=3&fcrithab=on&fstatus=on&fspecrule=on&finvpop=on&fgroup=on&header=Listed+Animals. Retrieved on May 31, 2019.

U.S. Geological Survey. 2019. "Commercial Fish Production Pounds and Value, 2016." Available at https://www.sciencebase.gov/catalog/item/5b99907ce4b0d966b4842829. Retrieved on May 14, 2019.

Veritas Economic Consulting. 2012. The Role of Knowledge in Assessing Nonuse Values for Site-Specific 316(b) Determination: Results and Implications from the National Environmental Impacts Awareness Survey. Available at http://www.veritaseconomics.com/publications.asp?p=3. Retrieved on May 3, 2017.

Zhao, Yingming, Patrick M. Kocovsky, and Charles P. Madenjian. 2013. "Development of a Stock-Recruitment Model and Assessment of Biological Reference Points for the Lake Erie Walleye Fishery." *North American Journal of Fisheries Management* 33:956–964.

Appendix A
Commercial Fishery Benefits Theoretical Overview

Both the supply and demand components of commercial fishing markets are quite complex and empirical applications that link commercial catch rates to economic benefits are limited. These limitations vis-a-vis the economic valuation of entrainment reductions were thoroughly considered by authors of this study and Ted McConnell (resource economist, University of Maryland) as part of the EPRI Closed-Cycle Cooling Program (EPRI 2011). As described in the body of this report, the limited change in commercial yield that is projected from entrainment reductions at Gary Works is monetized by specifying that no price changes occur as a result of reductions in Gary Works' entrainment and that commercial anglers are able to sell all of their additional catch at these unchanged prices. This approach does not rely on the preferred partial equilibrium structure and as such produces only economic values with no characterization of behaviors. This is a result of the lack of study information for performing functional benefits transfer.

This appendix is intended for reviewers with interest in the rationale for not applying partial equilibrium modeling and provides a conceptual characterization of commercial fishing economics. Consistent with relevancy for entrainment reductions the focus is on the supply side. To provide a behavioral foundation for the concept of the supply curve, this exposition uses results from a simulation model of vessel behavior. This model simulates optimizing behavior under various complex changes. It was constructed to understand behaviors in the important and contentious New England groundfish fleet (Bingham et al. 2010).

To provide a behavioral foundation for the concept of the supply curve, this exposition uses a model of vessel behavior that is based on the New England groundfish fleet.[12] A typical vessel in this fleet might be a trawler that is 55 to 65 feet in length. Fixed annual costs for owning such a vessel include dock fees, insurance, and loan repayment.[13] For owning the boat to be profitable, the fixed costs of ownership must be covered by revenues net of operating costs. Revenues are the dockside value of catch (i.e., pounds landed times price per pound). Boat owners seek to increase revenues by traveling to fishing grounds with high catch rates. Operating (or variable) costs include costs for fuel, ice, and the crew. Owners consider these costs when deciding where to fish.

An optimization model was developed to simulate the behavior of owners of groundfish trawlers less than 65 feet operating out of New Bedford. The model simulates behavior of a profit-

[12] Ultimately analysts are interested in knowing impacts to *all* commercial fishing. This example considers a single vessel out of approximately 1,000 similar vessels participating in the New England groundfishery.

[13] Typical terms for purchase of a fishing boat might be 25 percent down with a payout over 7–12 years. There might be a fixed interest rate for the first five years at about 2.5 percent to 2.75 percent over the cost of funds, which is the federal home loan bank rate (Tim Kelleher, TD Bankworth).

maximizing vessel owner who chooses where and when to fish based on costs and catch rates. The model is calibrated to produce trip-taking behavior that is like the "average" or "typical" behavior. Under these conditions, the minimum cost of catching any given quantity of groundfish is determined, and from that cost one can derive the marginal cost curve depicted in Figure A.1 below.[14] This With Entrainment minimum cost curve is generated by successively simulating the behavior of a typical groundfishing vessel, where dockside price is fixed and the quantity of catch is constrained at various (increasing) levels.

The profit-maximizing vessel owner chooses the most profitable opportunities first. As the artificially imposed catch constraint is loosened, less productive (or equivalently more costly) alternatives are chosen.

The successive loosening of the total catch constraint produces the rising marginal cost curve shown below. By implication, the average cost of harvest also increases. Including the market price for groundfish allows assessing the variable economics of the boat. In the figure, a market price of $1 per pound is specified.[15] With market price at $1 per pound, the owner chooses to take all trips that are expected to result in an average per-trip harvest cost of less than $1 per pound. This leads to an annual groundfish harvest of 80,000 pounds for this vessel.[16] This is consistent with a typical vessel in the New England groundfishery from 2003 to 2008. Total variable costs observed visually as the area under the marginal cost (supply) curve, equals approximately $40,000 in fuel and ice costs. The remaining $40,000 (the area above the supply curve and below price) is revenue less non-labor variable costs. Skipper and crew shares generally are about 50 percent of net returns. This would total about $20,000, leaving $20,000 to pay for dock fees, insurance, boat loan payments, and maintenance.

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[14] Optimization is conducted in Analytica 4.2 using mixed integer formulation and Frontline optimizer.
[15] This is consistent with average historical dockside price for groundfish in New England.
[16] This curve is also known as the boat's *supply* curve because it represents the quantity of fish that the boat would supply at each market price.

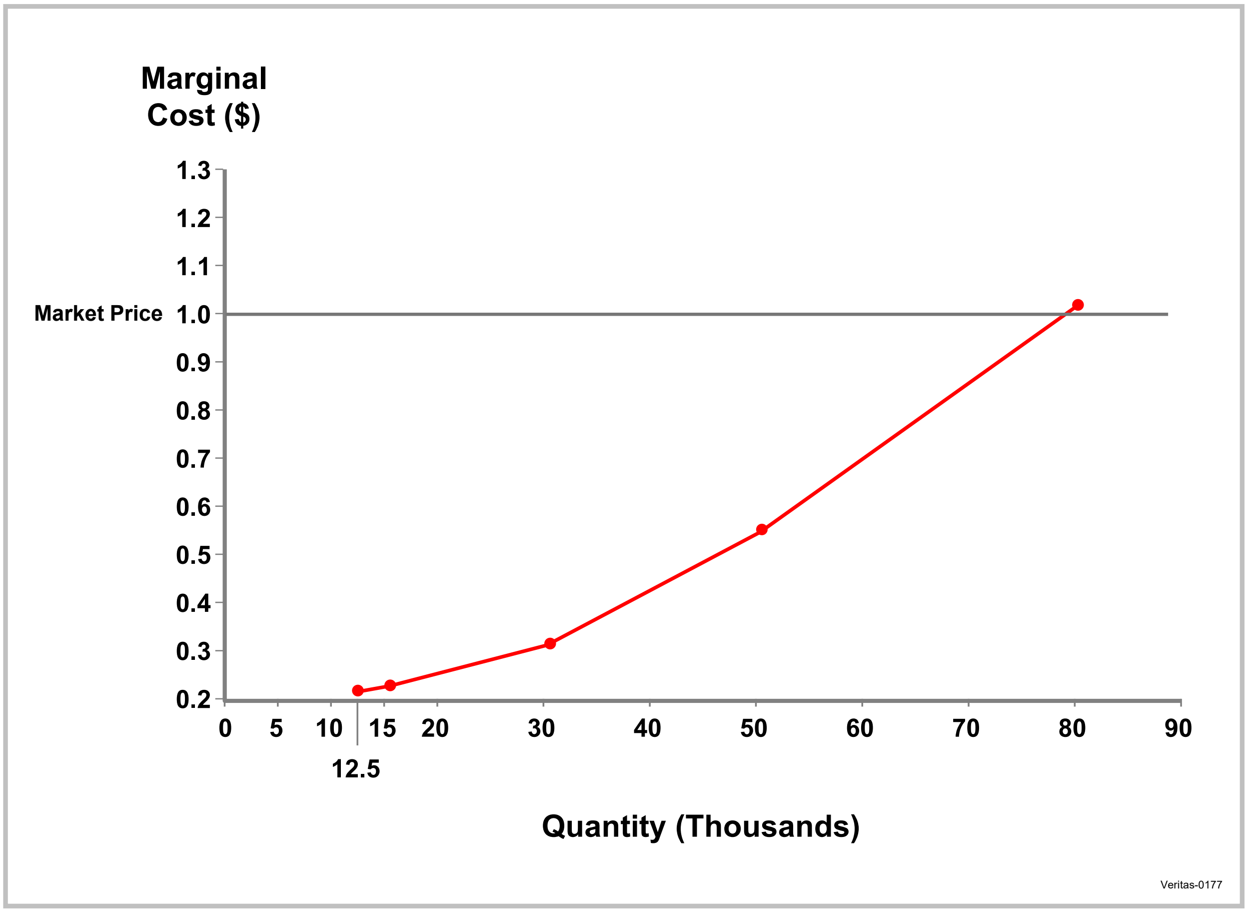

Figure A.1: With Entrainment Variable Costs

Commercial Fishing with Reduced Entrainment

The difficulty of identifying economic benefits under Reduced-Entrainment conditions depends upon a number of factors that are considered in the cases described below.

Case 1: Harvesters experience an increase in catch rates, but fish prices do not change.

In this simple case, higher catch rates lead to harvest increases and/or cost decreases. Depending on the form (i.e., magnitude and location) of catch-rate improvements, the vessel can either fish as it did under With Entrainment conditions; adjust its effort in a number of ways, including changing gear, fishing longer, choosing different locations; or make many other marginal adjustments short of investment or exit/entry. To simulate this effect in the model of commercial fishing behavior, catch rates are increased within the optimization model at certain locations and times. This effect can be seen graphically in the new cost curve depicted below.

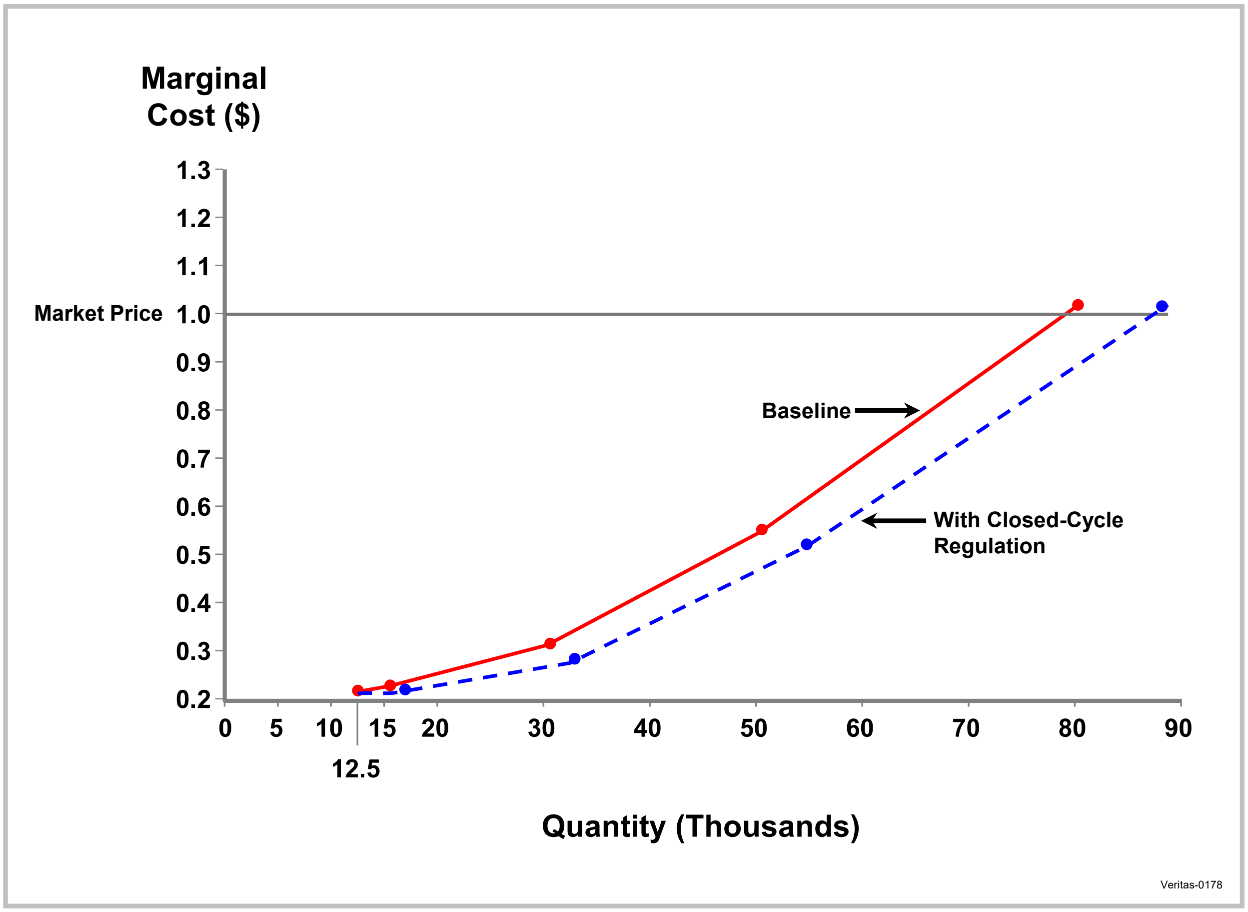

Figure A.2: Vessel Supply Curve with Improved Catch Rates and Constant Prices

With this new cost curve, the financial picture of the boat is improved. If that market price stays at $1 per pound, the boat increases its harvest to 90,000 pounds and total revenue increases to $90,000. Now total variable costs are $45,000. Of the $45,000 remaining ($90,000–$45,000) half goes to the captain and crew. Their economic status is somewhat improved; they now divide $22,500 compared to the previous $20,000. Furthermore, under these Reduced-Entrainment catch rates, there is a return to ownership of the vessel of $2,500 per year.

Ultimately analysts are interested in understanding how economic welfare might change across *all* commercial fishing. The fishery regulatory structure most likely to have constant prices is a fishery regime that restricts harvest. In such markets there is a strict quota on the quantity of commercial stock sold, which determines the equilibrium price. As shown in Figure A.3, improved catch rates reduce costs; however, the quantity supplied remains at the quota level and the corresponding equilibrium price remains at the original (With-Entrainment) price. In this situation, there would be an increase in producer surplus because costs are lower, but revenues remain the same.

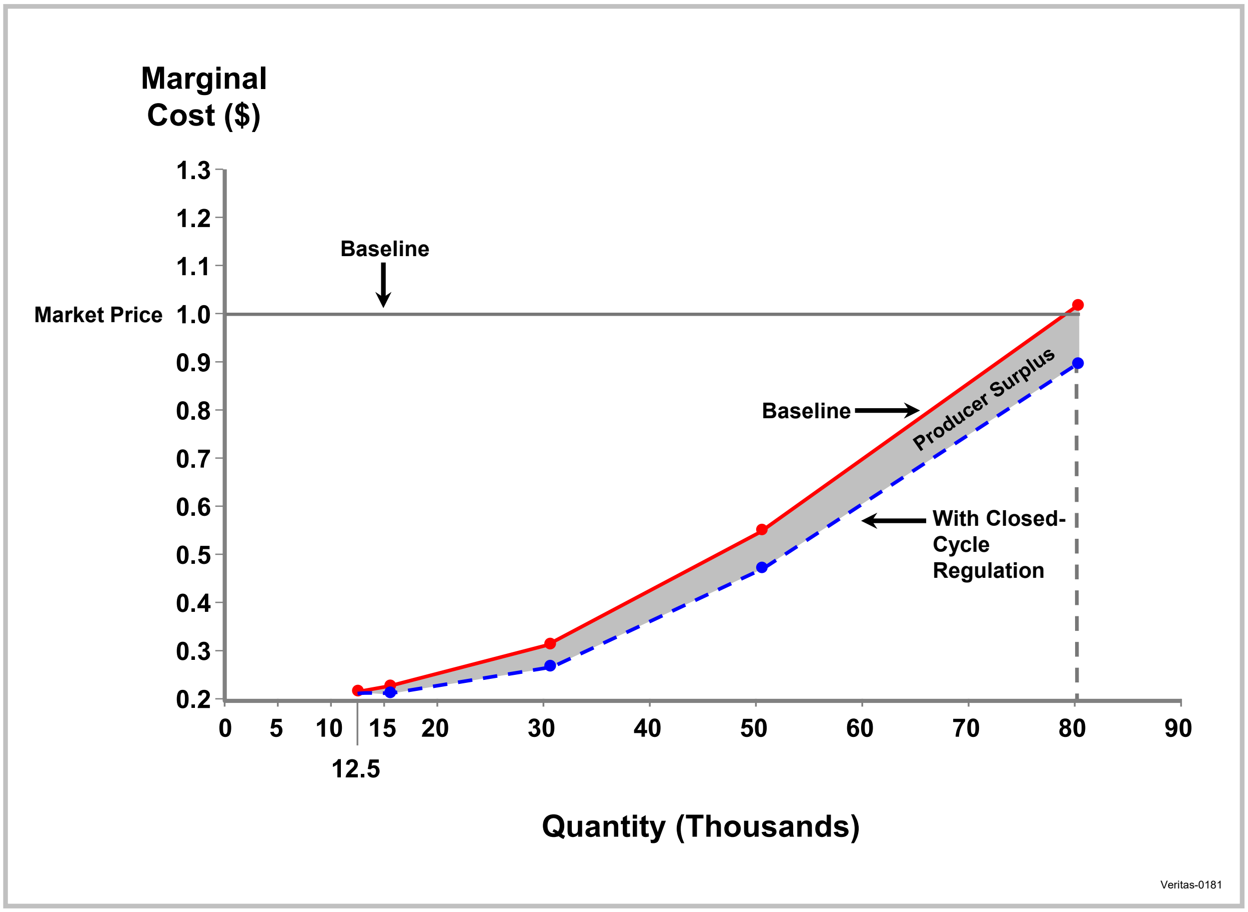

Figure A.3: Commercial Fish Market (with a Quota)

In the very simplest of cases, there is no change in fishing behavior, and the change in producer surplus is equal to the change in catch multiplied by dockside value. In the more general case when fishing behavior changes, identifying producer surplus changes requires estimating the area between the two supply curves. Doing so requires a times series of data on the market of the species as well as sufficient data to estimate the impact of biomass changes. This would include harvest, effort, price of output, input prices, biomass, and information on the regulatory structure.

Under these conditions, econometric modeling of the response of commercial harvesters to changes in biomass falls roughly into one of these categories:

1. Estimating a random utility model of harvester choice among locations, using the idea that improved biomass at some of the locations could then be valued using the same ideas as recreational anglers (for example, Haynie and Layton 2004). This requires trip-level data on expenditures by vessel and expected returns or catch rates by location.

2. Using trip or seasonal-level data by vessel to estimate cost or production function that can be converted to supply functions. These models are estimated at the individual level and typically not aggregated. (See Squires and Kirkley 1991 for an example.)
3. Estimating models of bioeconomic equilibrium. This approach typically begins by modeling effort, including the biological growth function and then whatever market structure is appropriate. This approach implicitly creates a cost function, but it entails an equilibrium bioeconomic model of the species. These models are more appropriate for the long run when both vessels and biomass adjust. See, for example, Homans and Wilen (1997).
4. Estimating each of these models is feasible but far exceeds the time and expense warranted for assessment of the benefits for the typical species affected by entrainment.

Case 2: Harvesters experience an increase in catch rates and fish prices do change.

In the previous example, the wholesale price of ground fish has been specified as remaining constant. This example was motivated at the market level by introducing a quota based management system. For open-access fisheries, the degree to which prices of commercial fish are “sticky” (i.e., not responsive to changes in quantity) would depend on a number of factors. For example, small percentage yield changes would be less likely to lead to price changes. Species that are marketed from different areas would tend to keep those differences damped by absorbing supply increases across a broader area. The more general case in which prices respond to yield changes is depicted at the vessel level in Figure A.4.

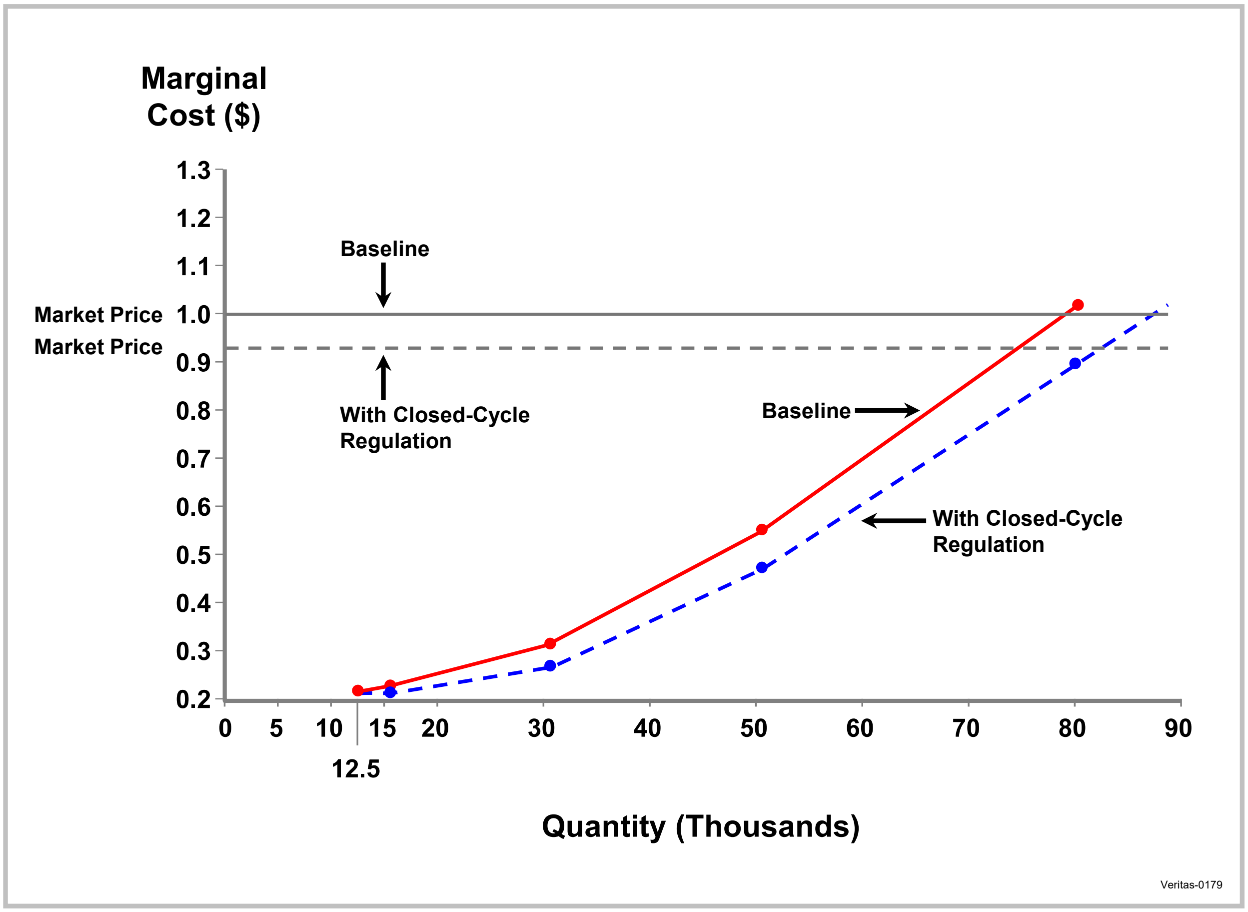

Figure A.4: Commercial Fish Market with Open Access

In this figure, with higher catch rates, the vessel maximizes profit by increasing harvest. When all harvesters face lower harvest costs, they may compete to sell additional fish by lowering prices. If the market for fish is small relative to the increased harvest, these individual efforts can result in lower market prices. This is a natural consequence of a large number of owners independently maximizing profit. The introduction of the market demand curve in Figure A.5 represents this condition, Case 3.

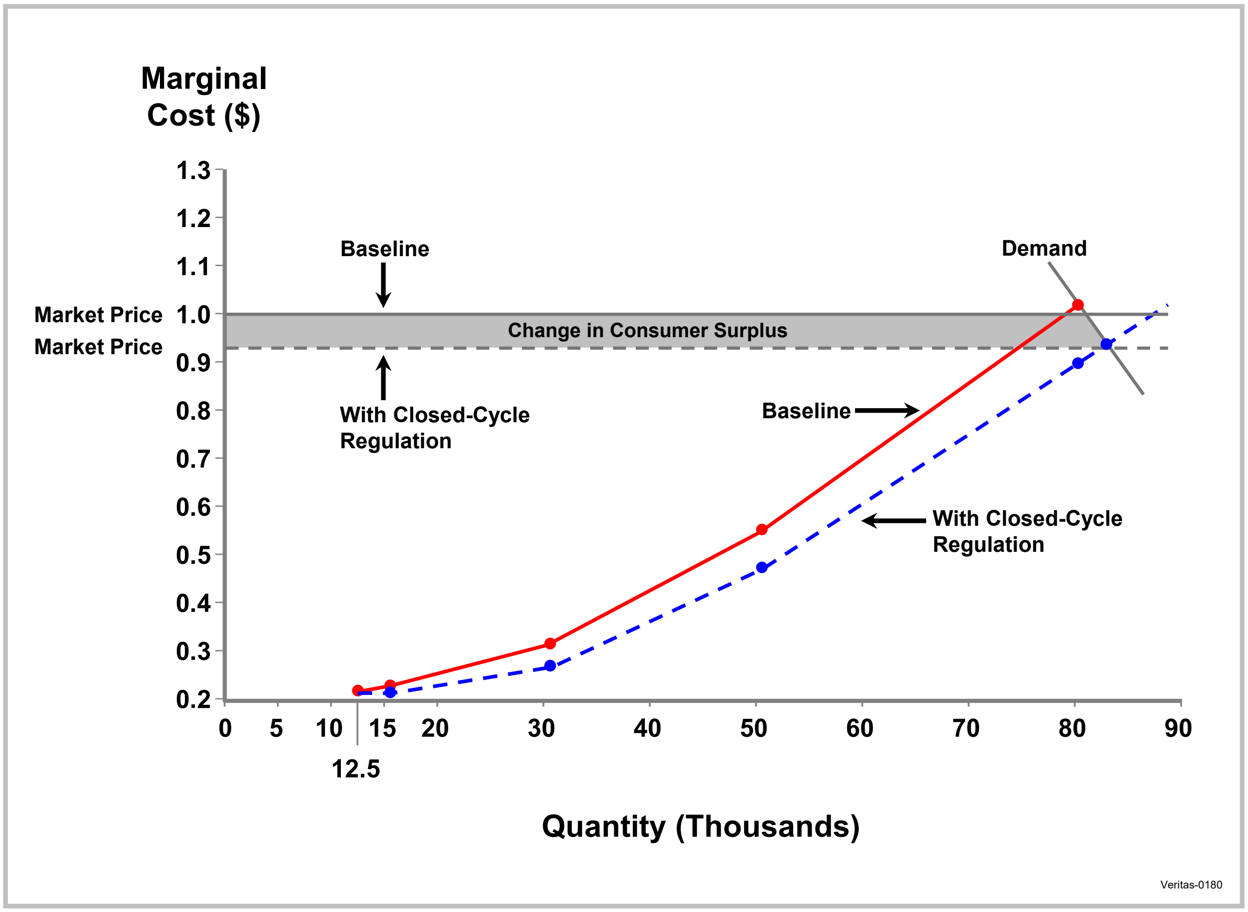

Figure A.5: Case 3: Most Complicated Case—Effort and Price Changes

This figure shows a new supply curve generated from the model with more identical vessels and more output per vessel. Two points on the market demand curve arise from the price and quantity observed in With Entrainment, and the price observed in Reduced-Entrainment conditions. Solving for profit-maximizing output for each boat at this new market price and summing returns the total quantity supplied.[17] Consumer surplus is the difference between what consumers are willing to pay (as represented by the demand curve) and market price.

This case has the same intense need for data and modeling as in Case 1. In addition, it is now necessary to have the correct instruments for identifying both supply and demand curves because structural econometric modeling of these benefits takes the supply and how it shifts with increases in biomass, as well as the dockside demand curve. This means the demand function must be estimated and the market model and data must allow the identification of supply and

[17] Here this is greatly simplified by assuming 1,000 identical boats.

demand curves. This would require the estimation of a system such as Hermann and Criddle (2006) or a bioeconomic model such as Homans and Wilen (1997) with endogenous demand.

Summary and Implications for Methods

Figure A.6 provides a summary of the most complicated case. This figure features a fishery in short-run equilibrium without explicit regulatory quotas.

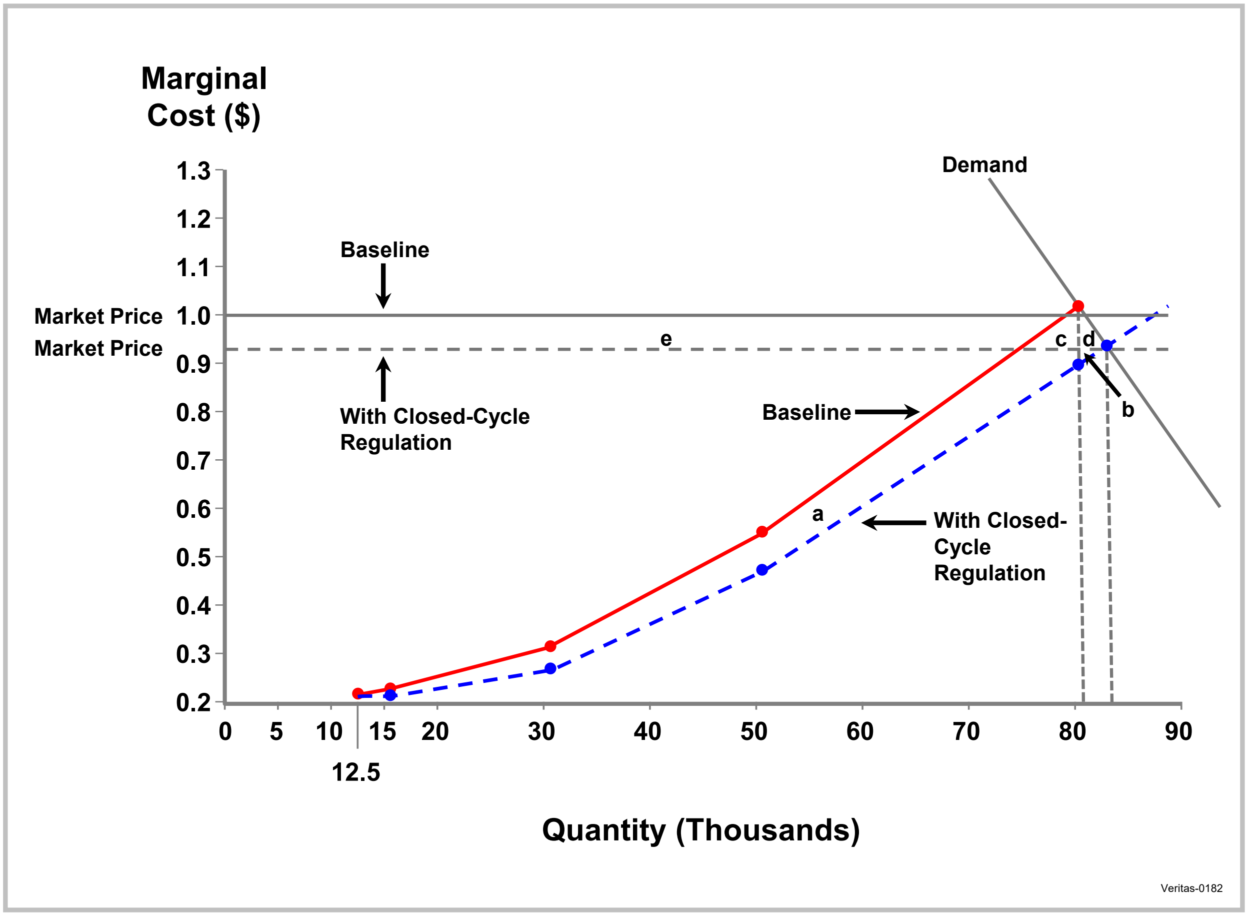

Figure A.6: Summary of the Benefits of Reduced Entrainment

As depicted in the figure, catch-rate improvements reduce the cost of harvesting. This leads to the supply curve shift across With-Entrainment and Reduced-Entrainment. The dockside demand is given by the Demand curve. In the figure, landings increase and the price falls. The change in producer surplus equals the area a+b-e. The change in consumer surplus is c+d+e. The net change in social surplus is the sum: a+b+c+d.

Important to the analysis of benefits to commercial fisheries is that even this admittedly complicated example is a great simplification of commercial fishing behavior and markets. Commercial harvesters consider many factors when making business decisions about fishing.

Among these considerations, catch rates are seasonal and stochastic; fish and fuel prices vary; vessels often target a variety of species and can switch gear if needed; boats can sail from and offload at various ports; the number of crewmembers can vary; the weather has implications for catch and safety, and so on. This complicated supply picture interacts with consumer demand that is impacted by a number of factors, including quality of catch (i.e., freshness), cost of substitutes (other fish and foods), and eating trends. Regulatory actions impact both harvest costs and market prices. Given these complexities, it is useful to assess what approaches are available and to consider their implications with respect to errors in the estimation of benefits.

In many cases familiarity with the fishery, including processing and downstream marketing, can help determine whether price changes could be expected for given changes in landings. Such judgments would help rule out price changes in some cases, but would not provide empirical support when price would be expected to change. Using data sets such as those employed by Kirkley (2006) and Bishop and Holt (2002), it would be feasible to estimate aggregate inverse demand functions.

The flexibility of price with respect to landings separates Case 1 from Case 2. To sort out the cases, it would be necessary to have estimates of the price flexibility or to estimate the relationship. Estimating the flexibility of price with respect to landings involves a model with price as a function of landings and other exogenous variables. This model stems from the notion that landings are exogenous with respect to contemporaneous price and the fact that the commodity is perishable, so that supply cannot be provided from storage. Each assumption is true at some time scale, but the scale differs across species. Increasingly fish are flash frozen as they are harvested, making supply more endogenous.

There are two basic approaches to estimating this model. One is to assume that the correct model represents the valuation placed on harvest by consumers and to adopt a flexible functional form of consumers' preferences. This is the approach taken by Bishop and Holt (2002) and others. The other approach is to estimate a model with less structure—basically an aggregate inverse demand function.

The Holt-Bishop paper provides flexibilities that could be used with entrainment cases on the Great Lakes. Kirkley (2006) provides estimates for a number of saltwater species. There are reasons to be concerned with these estimates. First, the preference functions are based on household's valuation of exogenous changes in fish. The structure of dockside demand reflects in part the structure of household demand buyers for households paying posted prices. Fish are not exogenous to them. Further, there are other outlets for landings so the supply going to households will be endogenous. For example, landings of species that are traded internationally will be divided between domestic consumption and export.

The more low-tech but intuitive approach of Graddy (2006) is perhaps more appropriate for modeling dockside demand. This model explains the price as a function of landings. This is an aggregate dockside price model that captures the various influences on price. Structurally it is an inverse demand function, and so represents the responses of buyers. It provides estimates of price flexibility that would be ideal for using in entrainment assessments. It recognizes that price responds to landings, but does not give more structure to the model than that.

References

Bingham, M.F, D.M. Woodard, Z. Li, and G. Crownfield. 2010. “Behavioral and Bioeconomic Considerations of Catch Share Policies.” Presented at the American Fisheries Society Conference, Pittsburgh, Pennsylvania. September 14.

Bishop, R.C., and M.T. Holt. 2002. “A Semiflexible Normalized Quadratic Inverse Demand System: An Application to the Price Formation of Fish." *Empirical Economics* 27(1):23–47.

Electric Power Research Institute. 2011. *National Benefits of a Closed-Cycle Cooling Retrofit Requirement*. Product ID 1023401. Palo Alto, CA: EPRI.

Graddy, K. 2006. “The Fulton Market.” *Journal of Economic Perspectives* 20(2):207–220.

Haynie, A.C., and D.F. Layton. 2004. “Estimating the Economic Impact of Stellar Sea Lion Conservation Area: Developing and Applying New Methods for Evaluating Spatially Complex Area Closures.” In *Proceedings of the International Institute for Fisheries Economics and Trade*, Japan.

Hermann, M., and K. Criddle. 2006. “An Econometric Market Model for the Pacific Halibut Fishery.” *Marine Resource Economics* 21(2):129–158.

Homans, F.R., and J.E. Wilen. 1997. “A Model of Regulated Open Access Use.” *Journal of Environmental Economics and Management* 32(1):1–21.

Kirkley, J. 2006. *Potential Economic Ramifications of Reissuing the Rule to Implement the Fish and Seafood Promotion Act of 1986*. Report prepared for NOAA Fisheries, Office of Constituent Services, Silver Spring, MD.

Squires, Dale, and James Kirkley. 1991. “Production Quota in Multiproduct Pacific Fisheries.” *Journal of Environmental Economics and Management* 21:109–126.

Appendix B
Fishing Sites and Characteristics of Sites

Table B.1 lists the site characteristics of Lake Michigan and substitute fishing sites in Indiana, Illinois, Michigan, and Wisconsin. Other details listed include the size of the waterbody, amenities, number of boat ramps, and sportfish caught at the site.

Table B.1
Site Characteristics of Lake Michigan and Substitute Fishing Sites

Water Body	Miles/Acres	Site Characteristics	Fish	No. of Boat Ramps
Indiana				
Lake Michigan	43 miles	Adjoins Indiana Dunes National Lakeshore and Indiana Dunes State Park; beaches, campgrounds, casinos, local parks, marinas	Black bass, brown and lake trout, catfish, Chinook and coho salmon, freshwater drum, steelhead, yellow perch	Multiple
Kankakee River	3.5 miles	Adjoins LaSalle Fish and Wildlife Area	Bluegill, channel catfish, crappie, largemouth bass, northern pike, rock bass, walleye	1
Mississinewa Reservoir	3,180 acres	Adjoins Miami State Recreation Area, Frances Slocum State Recreation Area; near Pearson Mill State Recreation Area; campgrounds, fishing piers, trails, wildlife watching	Bluegill, catfish, crappie, largemouth and smallmouth bass, sunfish, walleye, white bass	4
Pike Lake	228 acres	Adjoins two local parks, beach, and Pike Lake Campground	Bluegill, channel catfish, crappie, largemouth bass, northern pike, redear sunfish, walleye, white bass, yellow perch	1
Simonton Lake	299 acres	Boating, water sports	Bluegill, crappie, largemouth bass, redear and other sunfish, walleye, yellow perch	1
St. Joseph River (St. Joseph County)	15 miles	Adjoins several local parks	Bluegill, brown trout, channel catfish, chinook and coho salmon, common carp, crappie, largemouth and smallmouth bass, pumpkinseed, rock bass, steelhead, sucker, walleye, yellow perch	6
Wabash River (Sectors 5 and 6)	90 miles	Adjoins campgrounds and local parks	Blue sucker, bluegill, carp, carpsucker, channel and flathead catfish, crappie, freshwater drum, gar, largemouth and smallmouth bass, redhorse, shovelnose sturgeon, skipjack herring, striped bass, walleye	4
Illinois				
Lake Michigan	63 miles	Adjoins Illinois Beach State; beaches, campgrounds, local parks, marinas, trails	Chinook and coho salmon, common carp, freshwater drum, goby, largemouth and smallmouth bass, trout (brown, lake, rainbow), yellow perch	14
Braidwood Lake	2,241 acres	Adjoins Mazonia-Braidwood State Fish and Wildlife Area; boating, fishing tournaments, hunting	Black crappie, bluegill, catfish (blue, channel, flathead), carp, freshwater drum, largemouth bass	2
Fox River	5 miles	Adjoins Fox River Park	Bluegill, carp, catfish, freshwater drum, largemouth and smallmouth bass, northern pike, redhorse, walleye, yellow bass	1

Table B.1, continued

Water Body	Miles/Acres	Site Characteristics	Fish	No. of Boat Ramps
Illinois, continued				
Fox Chain O' Lakes (Bluff, Catherine, Channel, Marie, Pistakee)	2,891 acres	Near Chain O' Lakes State Park, archery range, campgrounds, trails, fishing tournaments	Bluegill, black crappie, bullhead, carp, channel catfish, freshwater drum, green sunfish, largemouth bass, muskellunge, northern pike, pumpkinseed, rock bass, walleye, warmouth, white bass, yellow bass, yellow perch	7
Fox River Montgomery Dam	15 acres	Adjoins Porter Park, South Broadway Park	Black crappie, bluegill and other sunfish, carp, channel and flathead catfish, freshwater drum, largemouth and smallmouth bass, northern pike, walleye, white bass	0
Fox River Yorkville Dam	10 acres	Adjoins Bicentennial Riverfront Park	Black crappie, bluegill, carp, channel and flathead catfish, freshwater drum, largemouth and smallmouth bass, muskellunge, walleye, white bass	0
Lake Bloomington	365 acres	Adjoins day use areas	Bluegill, bullhead, carp, catfish (channel, flathead), crappie (black, white), freshwater drum, gizzard shad, hybrid striped bass, largemouth and smallmouth bass, northern pike, rock bass, striped bass, sunfish, walleye, yellow bass	1
Lake Kakusha	53 acres	Fishing pier, trails	Bluegill, bullhead, channel catfish, crappie (black, white), largemouth bass, shiner	1
Lake Le-Aqua-Na	43 acres	Within Lake Le-Aqua-Na State Recreation Area, campgrounds, trails	Black crappie, bluegill and other sunfish, bullhead, channel catfish, largemouth bass, northern pike, walleye, warmouth	1
Lasalle Lake	1,864 acres	Adjoins Lasalle Lake State Fish and Wildlife Area	Bluegill, bullhead, carp, catfish (blue, channel), freshwater drum, hybrid striped bass, largemouth and smallmouth bass, white bass, white crappie, yellow bass	1
Pierce Lake	147 acres	Within Rock Cut State Park; campgrounds, fishing pier, trails	Black crappie, bluegill and other sunfish, bullhead, channel catfish, largemouth and smallmouth bass, muskellunge, northern pike, walleye, white bass, yellow perch	1
Ponderosa Lake	149 acres	Within Mazonia State Fish and Wildlife Area, near other lakes	Black crappie, bluegill, bullhead, channel catfish, green sunfish, largemouth bass, muskellunge, northern pike, pumpkinseed, redear sunfish, rock bass, yellow perch	1
Shabbona Lake	304 acres	Within Shabbona Lake State Recreation Area; campgrounds, hunting, trails, winter sports	Bluegill and other sunfish, bullhead, carp, catfish, crappie, freshwater drum, largemouth and smallmouth bass, muskellunge, northern pike, sauger, striped bass, walleye, yellow perch	1
Silver Lake	65 acres	Adjoins Blackwell County Forest Preserve and St. James Farm Forest Preserve; campgrounds	Bluegill and other sunfish, carp, channel catfish, crappie (black, white), largemouth and smallmouth bass, rainbow trout, yellow perch	1

Table B.1, continued

Water Body	Miles/Acres	Site Characteristics	Fish	No. of Boat Ramps
Michigan				
Lake Michigan	25 miles	Adjoins Grand Mere State Park, Warren Dunes State Park; beaches, campgrounds, local parks, marinas, trails	Chinook and coho salmon, drum, smallmouth bass, trout (brown, lake, steelhead), yellow perch	10
Gull Lake	2,030 acres	Near Kellogg Bird Sanctuary, adjoins town parks	Black crappie, bluegill, largemouth and smallmouth bass, northern pike, rock bass, yellow perch	2
Kalamazoo River	Est. 18 miles	Adjoins local parks	Bluegill, channel catfish, Chinook and coho salmon, largemouth and smallmouth bass, rock bass, trout (brown, rainbow), walleye	4
Paw Lake	900 acres	Marina, near campgrounds	Black crappie, bluegill, bullhead, carp, channel catfish, largemouth and smallmouth bass, northern pike, pumpkinseed, rock bass, walleye, yellow perch	2
Wisconsin				
Lake Michigan	15.9 miles	Adjoins Simmons Island Park, town parks, beaches, marinas	Brook trout, brown trout, Chinook and coho salmon, lake trout, northern pike, rainbow trout, smallmouth bass, walleye, yellow perch	Multiple
Geneva Lake	5,262 acres	Adjoins Big Foot Beach State Park; campgrounds, trails, near other lakes	Black crappie, bluegill, bowfin, brown trout, bullhead, cisco, lake trout, largemouth and smallmouth bass, muskellunge, pumpkinseed, rock bass, walleye, yellow perch	6

Sources: Benjamin et al. (2000); Clark-Kolaks, Carnahan, and Ball (2011); Edgell (2006, 2007, 2009); Google Earth (2019); Grant County Visitors Bureau (2019); Illinois Coastal Management Program (2011); Illinois Department of Natural Resources (DNR) 2018a–g, 2019a–b); Indiana DNR (2019a–c); Lake Michigan Committee (2016, 2017); McClanahan and Hansen (2005); Michigan DNR (2019); Miller-Ishmael et al, (2001, 2010); Palla (2011), Perea et al. (1998); Price and Robertson (2005); Roffler, Krall, and Merley (2015); Roswell and Czesny (2018); Schmidt (2018); Southeastern Wisconsin Regional Planning Commission (2008); Stein et al. (2002, 2003, 2004, 2005, 2008, 2009); Su, Lockwood, and Sutton (2006); Wisconsin DNR (undated, 2008, 2018a–b)

References

Benjamin, D.M., R.A. Illyes, T. Kassler, and D.P. Philipp. 2000. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R Segment 13. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Clark-Kolaks, Sandra, Dan Carnahan, and Robert L. Ball. 2011. "Wabash River Angler, Recreational, and Commercial Fisher Activity Survey of 2005 to 2006." Available at http://www.iwra.info/2011/2011_Program/I.06.Clark-Kolaks.pdf. Retrieved on November 9, 2016.

Edgell, Rod A. 2006. "St. Joseph River, St. Joseph County: 2006 Angler Creel Report." Indianapolis, IN: Indiana Department of Natural Resources Division of Fish and Wildlife.

Edgell, Rod A. 2007. “Simonton Lake, Elkhart County: 2007 Fish Management Report.” Available at www.indiana.gov/dnr/fishwild/files/fw_simonton_Lake2007.pdf. Retrieved on February 25, 2018.

Edgell, Rod A. 2009. “Pike Lake, Kosciusko County 2008 Fish Management Report.” Available at www.state.in.us/dnr/fishwild/files/fw-Pike_Lake_2008.pdf. Retrieved on February 25, 2018.

Google Earth. 2019. Google Earth Pro, version 7.3. Available at Google.com.

Grant County Visitors Bureau. 2019. “Mississinewa Reservoir.” Available at https://www.showmegrantcounty.com/places/mississinewa-reservoir/. Retrieved on March 6, 2019.

Illinois Coastal Management Program. 2011. “5. Shore Access and Recreation.” Available at https://www.dnr.illinois.gov/cmp/documents/5_access_recreation.pdf. Retrieved on March 6, 2019.

Illinois Department of Natural Resources. 2018a. “Adeline Jay Geo-Karis Illinois Beach State Park.” Available at https://www.dnr.illinois.gov/parks/pages/adelinejaygeo-karisillinoisbeach.aspx. Retrieved on March 6, 2019.

Illinois Department of Natural Resources. 2018b. “Mazonia-Braidwood State Fish and Wildlife Area.” Available at https://www.dnr.illinois.gov/parks/pages/mazonia-braidwood.aspx. Retrieved on March 6, 2019.

Illinois Department of Natural Resources. 2018c. “Chain O’Lakes State Park.” Available at https://www.dnr.illinois.gov/parks/pages/chainolakes.aspx. Retrieved on March 6, 2019.

Illinois Department of Natural Resources. 2018d. “Lake Le-Aqua-Na State Recreation Area.” Available at https://www.dnr.illinois.gov/Parks/Pages/LakeLeAquaNa.aspx. Retrieved on March 7, 2019.

Illinois Department of Natural Resources. 2018e. “Lasalle Lake State Fish and Wildlife Area.” Available at https://www.dnr.illinois.gov/Parks/Pages/LaSalleLake.aspx. Retrieved on March 7, 2019.

Illinois Department of Natural Resources. 2018f. “Rock Cut State Park.” Available at https://www.dnr.illinois.gov/Parks/Pages/RockCut.aspx. Retrieved on March 7, 2019.

Illinois Department of Natural Resources. 2018g. “Shabbona Lake State Recreation Area.” Available at https://www.dnr.illinois.gov/parks/pages/shabbonalake.aspx. Retrieved on March 7, 2019.

Illinois Department of Natural Resources. 2019a. “Fox Chain O’Lakes.” Available at https://www.ifishillinois.org/profiles/display_lake.php?waternum=00080. Retrieved on March 6, 2019.

Illinois Department of Natural Resources. 2019b. “Ponderosa Lake.” Available at https://www.ifishillinois.org/profiles/display_lake.php?waternum=20060. Retrieved on March 7, 2019.

Indiana Department of Natural Resources. 2019a. "Lake Michigan Fishing." Available at https://www.in.gov/dnr/fishwild/3625.htm. Retrieved on March 4, 2019.

Indiana Department of Natural Resources. 2019b. "Fish Stocking and State Hatcheries." Available at http://www.in.gov/dnr/fishwild/5457.htm. Retrieved on March 4, 2019.

Indiana Department of Natural Resources. 2019c. "Lake Michigan Fishing." Available at https://www.in.gov/dnr/fishwild/3625.htm. Retrieved on March 4, 2019.

Lake Michigan Committee. 2016. "Lake Michigan Management Reports." Available at https://dnr.wi.gov/topic/fishing/Documents/LakeMichigan/GLFCReport2015.pdf. Retrieved on February 26, 2018.

Lake Michigan Committee. 2017. "Lake Michigan Management Reports." Available at https://dnr.wi.gov/topic/fishing/Documents/LakeMichigan/GLFCReport2016.pdf. Retrieved on February 27, 2018.

McClanahan, Dee R., and Michael J. Hansen. 2005. "A Statewide Mail Survey to Estimate 2000-2001 Angler Catch, Harvest, and Effort in Wisconsin." Fisheries Management Report 151. Madison, WI: Wisconsin Department of Natural Resources. Available at dnr.wi.gov/topic/fishing/documents/publications/anglersurvey_final.pdf. Retrieved on April 20, 2017.

Michigan Department of Natural Resources. 2019. "Michigan Creel Data Effort" and "Michigan Creel Data Harvest." Available at http://gis-midnr.opendata.arcgis.com/datasets?q=creel. Retrieved on February 26, 2019.

Miller-Ishmael, Lynnette, Betty Carroll, Amy B. Osterman, Julie Claussen, Darren M. Benjamin, Robert F. Illyes, and David B. Philipp. 2001. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources, Federal Aid Project F-69-R, Segment 14. Champaign, IL: Illinois Natural History Survey Center for Aquatic Ecology.

Miller-Ishmael, Lynnette, Jeffrey A. Stein, Robert F. Illyes, Thomasine McNamara, Betty Carroll, Aaron D. Shultz, Julie Claussen, Cory D. Suski and David P. Philipp. 2010. *Research and Analysis of Fisheries in Illinois Final Report*. Submitted to Division of Fisheries, Illinois Department of Natural Resources, Federal Aid Project F-69-R, Segment 19–23. Champaign, IL: Illinois Natural History Survey.

Palla, Janel S. 2011. *Lake Michigan 2010 Creel Survey Report*. Available at http://www.in.gov/dnr/fishwild/files/fw-2010_Lake_Michigan_creel_report.pdf. Retrieved on July 9, 2018.

Perea, Pacifico J., Robert A. Illyes, Trent Thomas, Todd Kassler, Ralf Riedel, and David P. Philipp. 1998. *Data Base Management and Analysis of Fisheries in Illinois Lakes* (F-69-R-11) Volume 1 Annual Report. Segment 111 March, 1997–28 February, 1998. Champaign, IL: Lake Michigan Biological Station Center for Aquatic Ecology, Illinois Natural History Survey.

Price, Jeremy, and Bob Robertson. 2005. "Fishery, Habitat, and Recreational Use Surveys for the Kankakee River, Indiana." Available at www.state.in.us/dnr/fishwild/files/kankakee.pdf. Retrieved on February 22, 2019.

Roffler, Luke, Josh Krall, and Sean Merley. 2015. "Comprehensive Fisheries Survey Report of Geneva Lake—Walworth County." Madison, WI: Wisconsin Department of Natural Resources.

Roswell, Charles R., and Sergiusz J. Czesny. 2018. "A Survey of Sport Fishing in the Illinois Portion of Lake Michigan." INHS Technical Report 2018 (43). Champaign, IL: Illinois Natural History Survey.

Schmidt, Laura. 2018. "Wisconsin's 2017 Open Water Sportfishing Effort and Harvest from Lake Michigan and Green Bay." Available at https://dnr.wi.gov/topic/fishing/lakemichigan/managementreports.html. Retrieved on March 1, 2019.

Southeastern Wisconsin Regional Planning Commission. 2008. *A Lake Management Plan for Geneva Lake Walworth County, Wisconsin*. Community Assistance Planning Report Number 60, 2nd Edition. Available at dnr.wi.gov/lakes/grants/largereports/LPL-756-01_GENEVA_LAKE.pdf. Retrieved on February 28, 2019.

Stein, Jeffrey A., Robert F. Illyes, Betty Carroll, Lynette Miller-Ismael, Julie Claussen, Todd Kassler, John Epifanio, and David P. Philipp. 2002. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R Segments 13–15, Aquatic Ecology Technical Report 02/04. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Stein, Jeffrey A., Robert F. Illyes, Betty Carroll, Lynette Miller-Ismael, Thomasine McNamara, Julie Claussen, John Epifanio, and David P. Philipp. 2004. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R-17 Segment 17. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Stein, Jeffrey A., Robert F. Illyes, Lynette Miller-Ismael, Betty Carroll, Julie Claussen, John Epifanio, and David P. Philipp. 2003. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R Segment 16, Aquatic Ecology Technical Report 03/03. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Stein, Jeffrey A., Robert F. Illyes, Thomasine McNamara, Lynette Miller-Ismael, Betty Carroll, Julie Claussen, John Epifanio, and David P. Philipp. 2005. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R Segments 16–18. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Stein, Jeffrey A., Lynette Miller-Ismael, Robert F. Illyes, Thomasine McNamara, Betty Carroll, Julie Claussen, John Epifanio, and David P. Philipp. 2008. *Database Management and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R Segment 21. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Stein, Jeffrey A., Lynnette Miller-Ishmael, Robert F. Illyes, Thomasine McNamara, Betty Carroll, Aaron D. Shultz, Julie Claussen, and David P. Philipp. 2009. *Annual Report: Research and Analysis of Fisheries in Illinois*. Submitted to Division of Fisheries, Illinois Department of Natural Resources. Federal Aid Project F-69-R Segment 22. Champaign, IL: University of Illinois at Urbana-Champaign, Illinois Natural History Survey.

Su, Zhenming, Roger Lockwood, and Al Sutton. 2006. “Angler Surveys on Michigan Inland Waters, 2000–2006.” Ann Arbor, MI: Department of Natural Resources, Institute of Fisheries Research.

Wisconsin Department of Natural Resources. Undated. “Great Lakes Boat Access.” Available at dnr.wi.gov/topic/Beaches/documents/BeachBoatLaunches.pdf. Retrieved on February 26, 2018.

Wisconsin Department of Natural Resources. 2008. *2008 Wisconsin Fishing Report*. PUB-FH-506 2008. Available at dnr.wi.gov/wnrmag/html/images/PDFs/FishingReport.pdf. Retrieved on February 28, 2018.

Wisconsin Department of Natural Resources. 2018a. “Find a Lake.” Available at https://dnr.wi.gov/lakes/lakepages/results.aspx?page=boating. Retrieved on February 28, 2018.

Wisconsin Department of Natural Resources. 2018b. “Big Foot Beach State Park.” Available at https://dnr.wi.gov/topic/parks/name/bigfoot/. Retrieved on March 7, 2019.

CWA Section 316(b) Requirements for CWIS
Pursuant to 40 CFR 122.21(r)(9)-(12)

APPENDIX 4

Non-Water Quality Environmental and Other Impacts Study
ENERCON (March 31, 2020)

MARCH 31, 2020

DRAFT FOR
FINAL REIVEW

NON-WATER QUALITY ENVIRONMENTAL AND OTHER IMPACTS STUDY

U.S. STEEL – GARY WORKS

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Non-water Quality Environmental and Other Impacts Study

U.S. Steel – Gary Works

Lake County, Indiana

Submitted to:

U.S. Steel

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3/31/20

TABLE OF CONTENTS

Page No.

LIST OF TABLES

Page No.

LIST OF FIGURES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ºF	degrees Fahrenheit
µm	Micrometers
§	Section
AIF	actual intake flow
BTA	best technology available
CFR	Code of Federal Regulations
CO_2	carbon dioxide
CWA	Clean Water Act
CWIS	cooling water intake structure
dBA	A-weighted decibels
DIF	design intake flow
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
FEMA	Federal Emergency Management Agency
FHRS	Fish handling and return systems
gpm	gallons per minute
hp	Horsepower
IDEM	Indiana Department of Environmental Management
kW	Kilowatt
MDCT	mechanical draft cooling tower
MGD	million gallons per day
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
PM	particulate matter
PM_{10}	particulate matter with a diameter less than 10 microns
$PM_{2.5}$	particulate matter with a diameter less than 2.5 microns
SO_2	sulfur dioxide
TDS	total dissolved solids
TWS	traveling water screen
U.S. Steel	U.S. Steel – Gary Works

1.0 INTRODUCTION

On May 19, 2014, the U.S. Environmental Protection Agency (EPA) finalized the Clean Water Act (CWA) §316(b) Rule for Existing Facilities, which establishes requirements for cooling water intake structures (CWISs) at existing facilities. On August 15, 2014, the EPA published in the *Federal Register* the "National Pollutant Discharge Elimination System – Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities" (EPA 2014a). The Final Rule establishes requirements under Section (§) 316(b) of the CWA to ensure that location, design, construction, and capacity of CWISs reflect the best technology available (BTA) for minimizing adverse environmental impacts. The purpose of this action is to reduce impingement and entrainment of fish and other aquatic organisms at CWISs used by power generation and manufacturing facilities to withdraw cooling water. The regulations apply to facilities that use CWISs to withdraw water from waters of the U.S. and have or require a National Pollutant Discharge Elimination System (NPDES) permit. The Final Rule establishes requirements for facilities that are designed to withdraw more than 2 million gallons per day (MGD) of water from waters of the U.S. and use at least 25 percent or more of the water withdrawn exclusively for cooling purposes.

U.S. Steel – Gary Works (U.S. Steel), situated on the south shore of Lake Michigan, is U.S. Steel's largest manufacturing plant. The facility currently features four independent CWISs, which provide process and cooling water to several stages of steel manufacturing. The location of the plant is shown in Figure 1.

Discharges from the plant are permitted under NPDES Permit IN0000281.

The Final Rule applies to U.S. Steel – Gary Works due to the following:

- U.S. Steel has an NPDES permit and is a point source for industrial discharge of wastewater. NPDES Permit No. IN0000281, issued on October 2, 2015 and will expire on October 31, 2020.

- U.S. Steel withdraws water from waters of the U.S., Lake Michigan, through CWIS. Further, U.S. Steel – Gary Works has a design intake flow (DIF) greater than 2 MGD, an actual intake flow (AIF) greater than 125 MGD and uses at least 25 percent of the water intake for cooling purposes.

Therefore, U.S. Steel is required to prepare permit application requirements 40 CFR §122.21(r)(2) through (13) for submittal to the Indiana Department of Environmental Management (IDEM).

1.1 Final Rule Requirements

The Final Rule requires that a non-water quality environmental and other impacts study be prepared as one of four entrainment-related studies required of facilities with an average annual AIF greater than 125 MGD. A facility-specific discussion of the changes in non-water quality environmental and other impacts attributed to each technology and operational measure considered in the comprehensive technical feasibility and cost evaluation study prepared to comply with § 122.21(r)(10) of the Final Rule is required. The following are the requirements of the non-water quality environmental and other impacts study in §122.21(r)(12) of the Final Rule:

i. *Estimates of changes to energy consumption, including but not limited to auxiliary power consumption and turbine backpressure energy penalty;*

ii. *Estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions;*

iii. *Estimates of changes in noise;*

iv. *A discussion of impacts to safety, including documentation of the potential for plumes, icing, and availability of emergency cooling water;*

v. *A discussion of facility reliability, including but not limited to facility availability, production of steam, impacts to production based on process unit heating or cooling, and reliability due to cooling water availability;*

vi. *Significant changes in consumption of water, including a facility-specific comparison of the evaporative losses of both once-through cooling and closed-cycle recirculating systems, and documentation of impacts attributable to changes in water consumption; and*

vii. *A discussion of all reasonable attempts to mitigate each of these factors.*

This report evaluates the non-water quality environmental and other impacts for technology and operational measures considered in the comprehensive technical feasibility and cost evaluation study: retrofits of the existing through-flow with fine mesh traveling water screens (TWS) and for construction of mechanical draft cooling towers (MDCT).

1.2 Report Organization

This report provides the NPDES permit application requirements in the Final Rule under §122.21(r)(12) at U.S. Steel. Table 1 shows the organization of this report.

Table 1-1: Report Organization

SECTION	RELEVANT PERMIT REQUIREMENT	REPORT CHAPTER TITLE
2	122.21(r)(12)(i)	Estimates of Changes to Energy Consumption
3	122.21(r)(12)(ii)	Estimates of Air Pollutant Emissions and Human Health and Environmental Impacts
4	122.21(r)(12)(iii)	Estimates of Changes in Noise
5	122.21(r)(12)(iv)	Discussion of Impacts to Safety
6	122.21(r)(12)(v)	Discussion of Facility Reliability
7	122.21(r)(12)(vi)	Changes in Consumption of Water
8	122.21(r)(12)(vii)	Discussion of Mitigation Measures
9	NA	Literature Cited

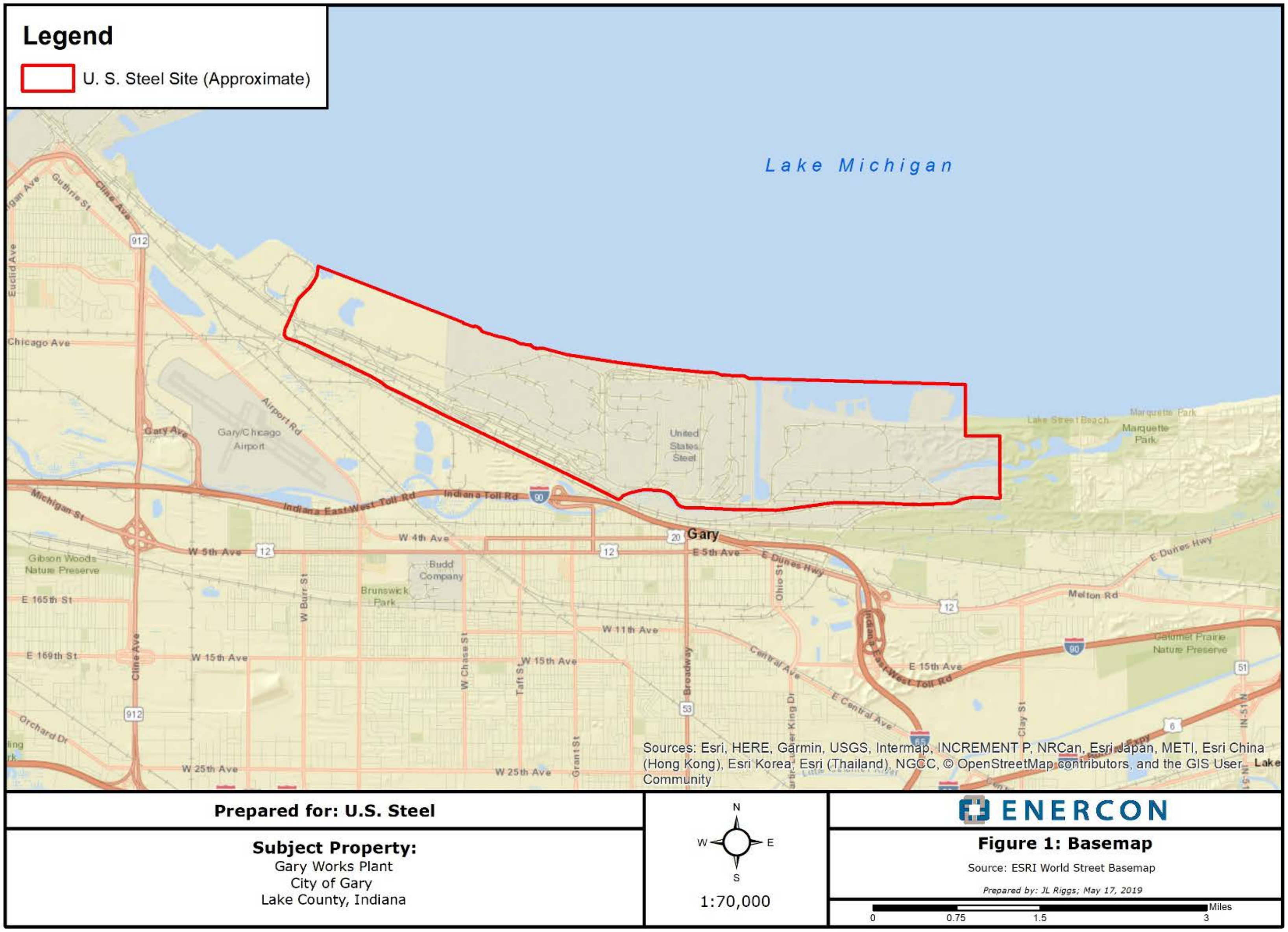

Figure 1: Site location map.

2.0 ESTIMATES OF CHANGES TO ENERGY CONSUMPTION

Estimates of changes to energy consumption are provided for the closed-cycle cooling retrofit to two MDCT and fine mesh TWSs.

2.1 Mechanical Draft Cooling Tower

The feasibility of retrofitting to cooling towers at U.S. Steel was discussed in the comprehensive technical feasibility and cost evaluation study as required in § 122.21(r)(10) of the Final Rule. The preliminary design for an MDCT retrofit at U.S. Steel would include the installation of two new cooling towers, with the west loop tower consisting of 2 cells, and the east loop tower containing 15 cells. The west loop would require two pump stations to recirculate flow (redirects flow from NDPES Outfalls 034, 037, and 039) and the east loop would require a booster pump station to recirculate flow (redirects flow from NPDES Outfalls 015, 018, 019, 020, 028, 030 , 033 and 035). Water would be routed from existing outfalls through new pump stations to the cooling tower. From there, blowdown (when required) would be gravity fed to receiving water bodies. Much of the year blowdown would be via process water consumption. Retrofitting to closed-cycle cooling would result in an energy penalty, which will lead to increased power usage. The energy penalty includes increased parasitic loads from the additional electrical demand to operate the cooling tower.

Parasitic loads would increase with the addition of cooling tower fans, larger pumps for circulating the cooling water, equipment used for supplying cooling tower make-up water (including water treatment equipment), and equipment for handling cooling tower blowdown. For this analysis, energy lost to parasitic loads associated with the operation of the cooling tower was determined by summing the expected total kilowatt (kW) load requirements for the equipment. The expected load for cooling tower fans was based on preliminary sizing of the cooling towers (number of fans). The expected load for the new circulating water pumps was based on preliminary sizing using estimated hydraulic requirements (additional pump head for closed-cycle cooling) and original pump design flow. Circulating water pumps and fans to operate the cooling towers are shown below in Tables 2-1 and 2-2; each of these loads are assumed to be operating at full capacity year-round for both West and East loops. The West and East loops would add an additional load of approximately 9 MW. The additional power need could be meet through the plant's cogeneration turbine's output or purchased power (U.S. Steel, 2019).

Table 2-1: West Cooling Loop

COMPONENT	NAMEPLATE CAPACITY	QUANTITY	TOTAL LOAD
MDCT Fans	250 HP	2	439 kW
North Pump	300 HP	1	263 kW
South Pump	150 HP	1	132 kW

Table 2-2: East Cooling Loop

COMPONENT	NAMEPLATE CAPACITY	QUANTITY	TOTAL LOAD
MDCT Fans	200 HP	15	2,632 kW
Booster Pumps	1,500 HP	4	5,264 kW

The parasitic loads for equipment used to supply cooling tower make-up water were estimated based on previous projects with similar equipment and were consistent with the design basis in the comprehensive technical feasibility and cost evaluation study.

2.2 Fine Mesh Traveling Water Screens

The feasibility of fine mesh TWSs was discussed in the comprehensive technical feasibility and cost evaluation study as required in § 122.21(r)(10) of the Final Rule. Fine mesh TWSs in Pump Station #1, Pump Station #2 and Lakeside Pump Station would be operated year-round. Fine mesh TWSs in Pump Station #4 would be operated on an as-needed basis.

For this analysis, energy lost to parasitic loads associated with the use of fine mesh TWSs was determined by summing the expected total load requirements for the additional equipment. The parasitic loads for additional equipment were estimated based on previous projects with similar equipment and are consistent with the design basis in the comprehensive technical feasibility and cost evaluation study.

For the screen wash pumps an additional electric operating load of 263 kW would be required to power the new 75 HP screen wash pump motors. Existing drivetrain motors have a combined electric operating load of 32 kW and may be operated more frequently with the installation of the fine mesh TWS. All other electric operating loads for additional new equipment (e.g., valves, lighting, etc.) are assumed to be negligible in quantity and duration.

3.0 ESTIMATES OF AIR POLLUTANT EMISSIONS AND HUMAN HEALTH AND ENVIRONMENTAL IMPACTS

Air pollutant emissions and human health and environmental impacts associated with the closed-cycle cooling retrofit to two MDCTs are discussed in this section. Fine mesh TWSs would have negligible air pollutant emissions and human health impacts as compared to the existing screen conditions and are therefore not discussed in those associated sections. Only the aquatic environmental impacts of these screening technologies are discussed in Section 3.3.

3.1 Air Pollutant Emissions

Mechanical draft evaporative cooling towers provide a transfer of system heat load to the atmosphere by use of latent heat transfer. Discharge of visible plumes results in “drift” that will contain the same type and concentration of total dissolved solids (TDS) and impurities in the water flowing through the cooling tower, as well as organic matter (e.g., bacteria, spores, insects, and plant material) entrained into the towers’ discharge by the fans (EPRI 2011a). The TDS in the cooling tower drift results in particulate matter emissions as water evaporates. MDCTs and the associated plumes also contain the potential for icing, noise, wastewater (blowdown) discharge, water consumption, and visual impacts. Plume abatement is not considered here due to the presence of other active discharge stacks on the property that result in plumes.

3.1.1 Cooling Tower Drift and Particulate Matter

Water from the cooling towers will be cycled through the circulating water system to remove heat. The make-up water supplied to the cooling towers will contain trace amounts of dissolved minerals. Liquid water droplets containing the dissolved minerals can become entrained in the air exiting the cooling towers (drift). The liquid water evaporates after leaving the towers, leaving behind the dissolved solids as particulate matter (PM) emissions. Particles with a mean aerodynamic diameter of less than or equal to 10 microns or 2.5 microns are classified within the National Ambient Air Quality Standards (NAAQS) as PM_{10} or $PM_{2.5}$, respectively. Because of their associated human health impacts, these particles are of the greatest concern.

Drift would not only potentially impact the surrounding natural communities (Figure 4), it would also impact surrounding structures and equipment. Structures and equipment near cooling towers experience accelerated corrosion and degradation; therefore, onsite structures would be susceptible. Table 3-1 provides a summary of the system attributes and drift rates.

Conservative estimates of PM_{10} emissions were made for the West and East Loop cooling towers using EPA’s A-42 formula for wet cooling tower PM emissions (EPA 1995) and the total dissolved solids value from blowdown water quality estimates for each tower.

PM_{10} (lb/hr) = Water Circulation (lb/hr) x Drift rate (%) x [Total Dissolved Solids (TDS, ppm) x Cycles of Concentration]/1,000,000

The PM_{10} estimates are approximately 0.2 tons per year for the West Loop cooling tower and for the greater volume flow, the East Loop cooling tower, approximately 2.0 tons per year.

Table 3-1: System Attributes – Design Values

SYSTEM CRITERIA	WEST LOOP	EAST LOOP
Number of Cells	2	15
Range	18°F	17.5°F
Approach	8°F	8°F
Design System Flow Rate	35,347 gpm	245,278 gpm
Drift Rate	0.4 gpm	2.5 gpm
Evaporation Rate	576 gpm	3,901 gpm
Cycles of Concentration (COC)*	2	2

* Due to large consumption values and therefore large makeup of freshwater, the operating COC would be close to 1.1-1.2. A COC of 2 would be a conservative value based on typical freshwater cooling tower guidelines.

3.2 Human Health Impacts

The size of the particles emitted is directly linked to their potential for causing adverse health effects. Small particles less than 10 micrometers (μm) in diameter pose the greater hazard because they can penetrate deeper into the respiratory track than larger particles and cause adverse health effects. Exposure to PM primarily impacts the respiratory system, and secondarily the cardiovascular system.

Scientific studies have linked PM pollution exposure to a variety of health problems, including:

- Premature death in people with heart or lung disease;
- Nonfatal heart attacks;
- Irregular heartbeat;
- Aggravated asthma;
- Decreased lung function; and

- Increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

People with heart or lung diseases, children, and older adults are the most likely to be affected by PM pollution exposure.

Additional air pollutants such as nitrogen oxides, sulfur dioxide, and carbon dioxide (NO_x, SO_2, and CO_2) will be generated because of the installation of the cooling towers. Like PM, these additional air pollutants can cause an increased likelihood of respiratory problems, including inflammation of the lungs, bronchitis, and complications with asthma. Additional health impacts directly associated with NO_x, SO_2, and CO_2 could occur; however, the estimated operating emissions from the cooling towers would be negligible in comparison with the plant's current operating Title V permitted emissions.

3.3 Environmental Impacts

A discussion of environmental impacts is provided for the closed-cycle cooling retrofit to two MDCTs and fine mesh TWSs.

3.3.1 <u>Environmental Setting</u>

The U.S. Steel – Gary Works plant is located on approximately 4,000 acres on the south shore of Lake Michigan. The site is zoned as M-3 (heavy industrial) and has been in operation since 1908. The plant is in Lake County, Indiana, which is in non-attainment for ozone. The county is in attainment for all other criteria pollutants (State of Indiana 2019; EPA 2019). A Title V operating permit (089-39777-00121) for the site was renewed on May 16, 2019. As stated previously, plume abatement technology is not considered for the cooling towers as other discharge stacks that produce plumes exist on the property. Section 5.1 provides a discussion of the potential safety impacts from the plume.

3.3.2 <u>Mechanical Draft Cooling Towers</u>

Two cooling towers are proposed for the retrofit at U.S. Steel. The proposed location of the west loop tower, consisting of 2 cells, is shown in Figure 2. Figure 3 illustrates the location of the east loop cooling tower.

In addition to direct impacts, PM can be carried over long distances by wind and then settle on ground or water. Depending on the chemical composition, the effects of this settling may include:

- Making freshwater bodies acidic;

- Changing the nutrient balance in large river basins;
- Depleting the nutrients in soil;
- Damaging sensitive forests and farm crops;
- Affecting the diversity of ecosystems; and
- Contributing to acid rain effects.

Drift that leaves the top of the tower will reflect the same water chemistry as that of the CW system. Based on the salinity of the water used in the cooling tower, the drift may contain high levels of dissolved solids. When these small droplets are released into the air, evaporation occurs, leaving behind the solids that were once dissolved. This has the effect of introducing fine particulate matter into the atmosphere. Particles with a mean aerodynamic diameter of less than or equal to 10 microns or 2.5 microns are classified within the National Ambient Air Quality Standards (NAAQS) as PM10 or PM2.5, respectively (40 CFR § 50.6, § 50.7, § 50.13, § 50.18). This can increase the permitting requirements necessary to construct and operate a cooling tower.

Without detailed air emission dispersion modeling, the magnitude of the potential impacts is uncertain. In lieu of detailed modeling, the direction that the PM would settle was evaluated using data from meteorological station GYY located at Gary Regional Airport. A wind rose was developed to characterize the wind speed and direction (Figure 5). Based on these data, the PM would typically settle east of the cooling towers. The west loop cooling tower is proposed for the west side of the site with most of the plant's infrastructure lying to the east, so drift from the low-profile cooling tower (less than 40 feet in height) would potentially impact existing plant infrastructure. The east loop cooling tower is also a low-profile cooling tower (less than 50 feet in height). It is proposed for the east side of the site which is closer to offsite undeveloped urban green space. Drift from the proposed east loop cooling tower has a greater potential of impacting offsite areas including this green space.

3.3.3 Fine Mesh Traveling Water Screens

Environmental impacts from implementing fine mesh modified TWSs are primarily associated with construction activities discussed below in Section 3.3.5. The new fish handling and return systems (FHRS) for Pump Station 1 and Pump Station 2 would be designed to minimize impacts to aquatic organisms, promote smooth conveyance of fish, minimizing the potential for injury; have sufficient water flow to return the fish directly to the source water in a manner that does not promote predation or re-impingement; and the return outlets would be located outside the hydraulic zone of influence of each CWIS's intake to avoid re-impingement. Materials used would minimize bio-fouling. No FHRS would be installed at Lakeside Pump Station nor Pump Station 4 due to the low withdrawal rates and low through-screen velocities allowing for evacuation of motile fish from the cooling water intake structure by their own motive. A description of the fine mesh retrofit, cost estimates, implementation schedule and discussion of potential risks are provided in the Comprehensive Technical Feasibility and Cost Evaluation Study.

3.3.4 Construction-related Impacts – Mechanical Draft Cooling Towers

Construction of MDCTs would involve land clearing as a first step. The locations of both the east loop and west loop towers would be on land previously disturbed, and no sensitive species or environments would be disturbed. The east loop includes construction of a holding lagoon of 1M gallon capacity, approximately 86 feet wide, 86 feet long, and 35 feet deep.

During construction, best management practices (BMPs) such as applying water before and during earthwork, use of wind fences, phasing work to limit dust, and installing silt fence, rock check dams, and sediment basins or other appropriate BMPs, as necessary, would be implemented to minimize fugitive dust.

Neither cooling tower footprint is identified by the Federal Emergency Management Agency (FEMA) as being in the 100-year floodplain (FEMA, Map 18089C0151E, effective on 01/18/2012).

Numerous remediation activities are actively being handled on the property, including Solid Waste Management Units (SMWU) for mitigation of historic pollution. Construction would occur on previously developed land, so the discovery of unknown potentially hazardous substances or materials is possible. Should potentially hazardous materials or substances be identified during construction, appropriate measures for protecting the environment and workers would be implemented which may include a work stoppage and/or remediation activity.

Construction-related noise impacts would include the operation of vehicles, earthmoving equipment, and other equipment such as generators and compressors used in the construction of the facility. These noises would be intermittent and last for the 30-month duration of active construction activities. The U.S. Steel property is an industrial location with no sensitive noise receptors onsite. Construction activities would be conducted in compliance with local noise regulations and are not expected to raise the noise levels offsite to such a degree as to jeopardize the health and welfare of residents to the east of the site, approximately 2 miles from the proposed east loop cooling tower location. Other sensitive receptors such as persons in schools, churches, and parks would be a greater distance away from the noise and likewise would not be impacted by construction noise.

Potential impacts on minority and low-income populations from construction would primarily be associated with socioeconomic effects. These impacts would consist of the short-term increase in worker expenditures at local businesses and potential rental housing shortages during the construction phase of the project. Given the existing transportation routes and proximity of Interstate Highway 90, the increases in traffic on roads would result in negligible to small impacts to traffic that could affect local minority and low-income populations. Environmental impacts to these populations would be minor and likely would result in no impacts to minority and low-income populations.

3.3.5 Construction-related Impacts – Fine Mesh Traveling Water Screens

A direct retrofit of the existing TWS would meet the design requirements but would require major modifications to the existing intake structure or TWS and surrounding areas, specifically for the installation of the FHRS piping. The proposed retrofit of the existing through-flow TWS would be completed by removal the existing TWS from the respective screen bay to an onsite work area, direct replacement of relevant components by vendor-authorized personnel, and installation of the TWS to the screen bay. Each existing TWS will be removed sequentially by removing roofing panels from the respective CWISs, securing the TWS, installing stop logs in the screen bay, lifting the TWS from the screen bay via hydraulic crane through the access panels in the roof and delivering the TWS to the onsite workspace via flatbed truck. The modified TWS in Pump Station 1 and Pump Station 2 would be required to operate with FHRS to meet the definition of a modified traveling screen. Additionally, new low-pressure fish spray systems would be added to the modified TWS in Pump Station 1 and Pump Station 2. Due to the low withdrawal rates and low through-screen velocities, Pump Station 4 and Lakeside Pump Station would not have a FHRS and would only have 2 mm fine mesh screens. FHRS piping outside the CWISs would be buried below the frost depth and installed primarily using hydro excavation techniques. The new return outlet would be located several hundred feet from the CWIS's intake to avoid re-impingement and extend into Lake Michigan. No blasting will be used for any of the installation, minimizing habitat disruption

Retrofits to the TWS at Pump Stations 1, 2, and 4, and Lakeside Pump Station would involve disturbance in water-based environments and would therefore require acquisition of a CWA

Section 404 permit. When a project is planned in Indiana that will impact a wetland, stream, river, lake, or other water of the U.S., IDEM must issue a Section 401 water quality certification (401 WQC). The placement of the FHRS piping in Lake Michigan would also require a Section 10 of the Rivers and Harbors Act of 1899 permit from the U.S. Army Corps of Engineers.

Construction activities would be restricted to previously developed land and open water habitat. Therefore, no impacts to upland terrestrial habitat would result from construction activities. Construction would be subject to the conditions of the CWA 404 permit which would establish mitigation measures and restrictions designed to minimize impacts to water quality and aquatic communities. No pile driving, or blasting will be used for any of the installation, and habitat disruption would not occur, since activities primarily constitute a retrofit of existing facilities.

Construction-related noise impacts would include the operation of vehicles, earthmoving equipment, and other equipment such as generators and compressors used in the construction of the facility. These noises would be intermittent and last for the duration of construction activities projected to be 22 months. The U.S. Steel property is an operating industrial site with no sensitive noise receptors onsite and nearby sensitive noise receptors limited to the east side of the property. Construction activities would be conducted in compliance with local noise regulation (Lake County Code of Ordinances Title IX, § 93.03) and are not expected to raise the noise levels to such a degree to jeopardize the health and welfare of nearby residents to the east.

The air quality impacts associated with installation of the fine mesh TWSs system are small given that the primarily aquatic-based nature of the associated construction activities and the use of hydro excavation techniques, providing little or no opportunity to generate fugitive dust from land disturbance activities. Some additional vehicle-related air emissions can be expected from the small number workforce personal vehicles and over-the-road project construction vehicles. Self-propelled earthmoving equipment will be unnecessary, but there may be some emissions sources on temporary offshore platforms or barges, if necessary. Air quality degradation should not be noticeable given the adjacent interstate highways during delivery of construction supplies, inshore fine screen intake and related-piping.

Potential impacts on minority and low-income populations from construction would like those of the MDCTs discussed above in Section 3.3.4.

Numerous remediation activities are actively being handled on the property, including Solid Waste Management Units (SMWU) for mitigation of historic pollution. Construction would occur on previously developed land, so the discovery of unknown potentially hazardous substances or materials is possible. Should potentially hazardous materials or substances be identified during construction, appropriate measures for protecting the environment and workers would be implemented which may include a work stoppage and/or remediation activity.

Figure 2: West loop cooling tower location (center yellow pin)

Figure 3: Location of 18-cell east tower location (shown in red).

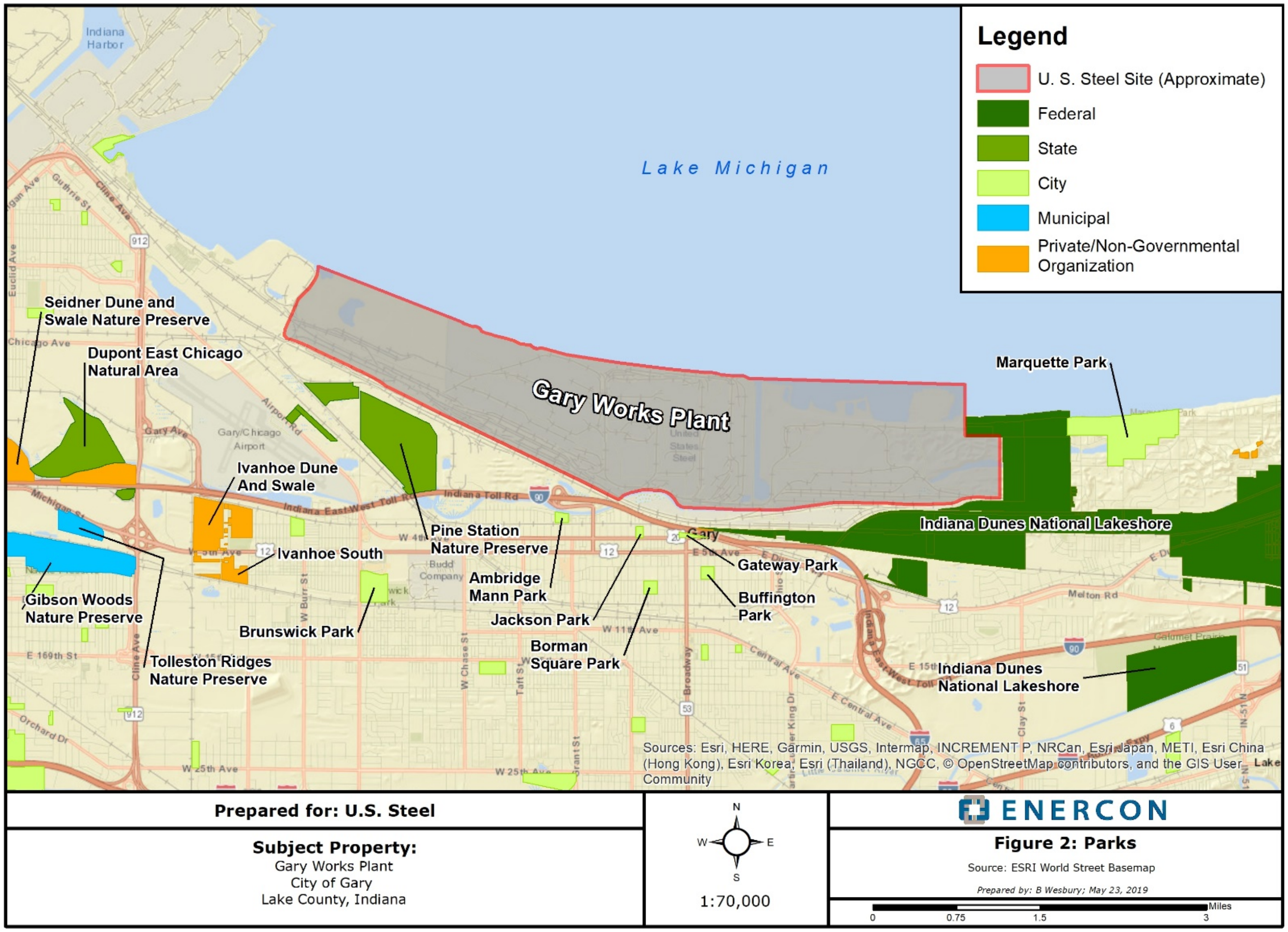

Figure 4: Natural areas proximal to the plant.

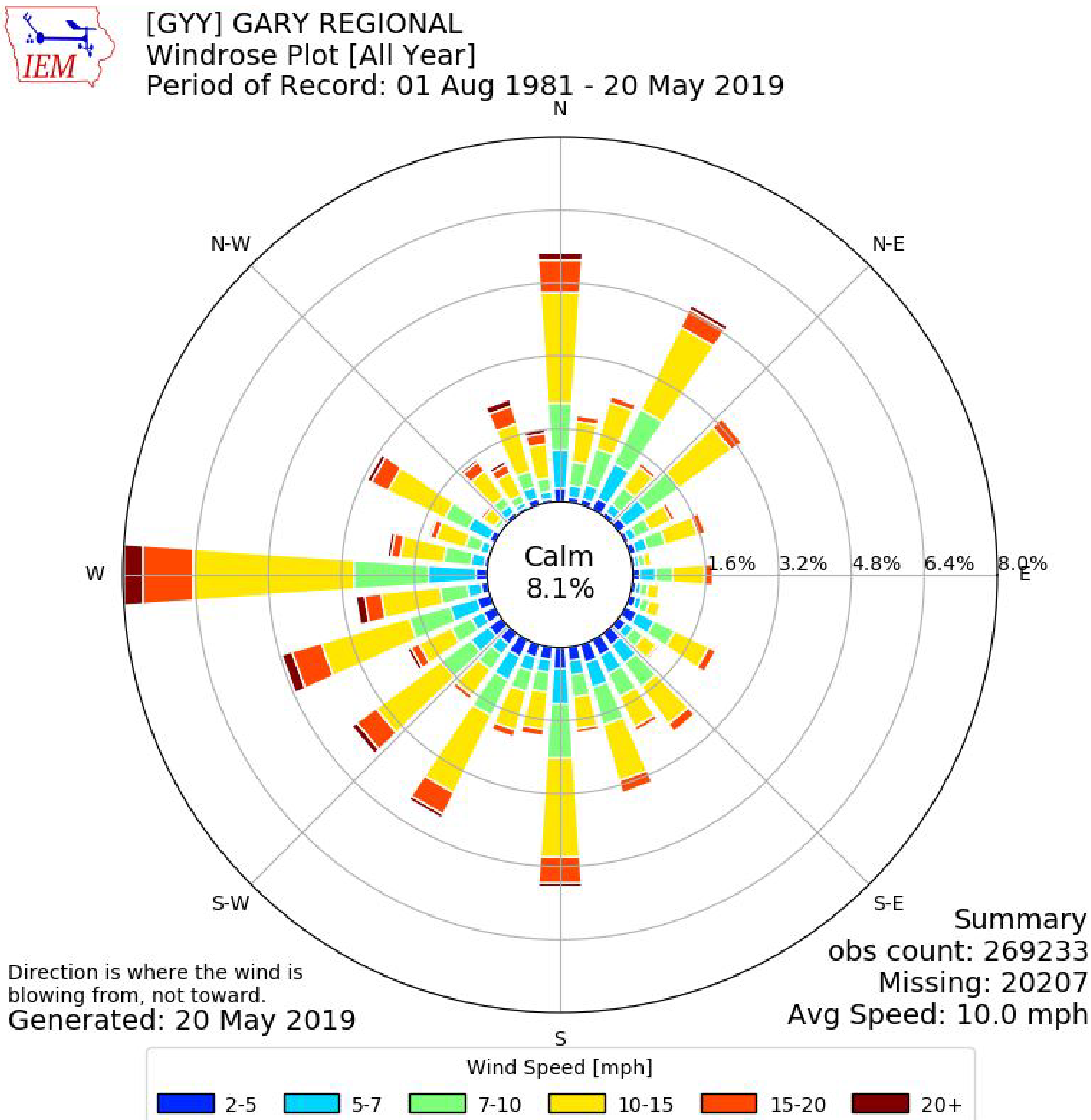

Figure 5: Wind rose at Gary Regional Airport (data extracted from the Iowa State University Mesonet).

4.0 ESTIMATES OF CHANGES IN NOISE

This section focuses on the changes in noise associated with the closed-cycle cooling retrofit to two MDCTs. The installation and operation of fine mesh TWSs would not result in appreciable changes in noise from the existing condition and are therefore not discussed in this section.

The primary sources of noise from MDCTs are from pumps and fans, and “fill” noise caused by the flow of water through the tower fill (EPRI 2011b), all of which combine to produce a typical sound level of 70 dBA at a horizontal distance of 50 feet from the louvered face of the tower (EPRI 2011b). Depending on location, these impacts can affect adjacent or nearby communities as well as cause impairments to recreational use. The impacts associated with increased noise levels from retrofitting to closed-cycle cooling are dependent upon the size of the tower, existing noise emission sources onsite, the relative position of the cooling tower to these noise sources, offsite ambient noise, distance to and number of receptors, relative sensitivity of these receptors, and topography (EPRI 2011a). Given that the cooling towers will be in an already heavily industrialized site, operational impacts from noise are expected to be minimal.

5.0 DISCUSSION OF IMPACTS TO SAFETY

This section provides a discussion on impacts to safety associated with the closed-cycle cooling retrofit to two mechanical draft cooling towers and the fine mesh TWSs.

5.1 Mechanical Draft Cooling Towers

Wet cooling towers can produce large visible plumes during cold ambient air temperatures as the warm, saturated air leaving the cooling towers mix with the cold ambient air, and water vapor condenses. The visible plume is produced by the condensation of water vapor from the heat transfer media, and the vapor refracting sunlight at different angles. The result is the water vapor appears as white, visible clouds.

Visible plumes may produce adverse social impacts in surrounding areas, such as fogging and icing of roadways and railroads, interference with air traffic and nearby airports, particulate deposition, and viewshed degradation.

Safety impacts such as fogging, low visibility, and icing due to the cooling tower plumes are dependent on weather conditions including ambient air temperature and wind direction. Typically, fogging would occur at ground levels when the combination of ambient humidity and moisture from a cooling tower plume create a relative humidity of 100 percent at those elevations. Icing would occur when the ambient dry bulb temperature is below 32 degrees Fahrenheit (ºF) during a fogging event. Plume-induced fogging and icing conditions would typically occur during times when ambient conditions favor fog, rain, or snow. The probable frequency of ground-level plume fogging and icing were not estimated using a seasonal annual cooling tower impact model. However, the following provides a qualitative analysis of the potential impacts to safety from visible plumes.

Fogging and icing could have impacts to operating conditions by creating unsafe working conditions at U.S. Steel. Ice accumulation and low visibility would create hazardous working conditions and could lead to an increase in safety-related injuries. Increased incidents of fogging and icing of interior roadways east of the conceptual cooling towers, could create an increase in hazardous driving conditions and increased vehicle accidents. While unlikely due to the distance from the MDCTs, there is the potential for impacts to Interstate 90 and U.S. Highways 12 and 20. Furthermore, the facility and other customers rely on shipments from railroad lines running along the southern border of the plant. Because portions of these tracks run southeast of the cooling towers, icing or fogging could create safety challenges for rail delivery. On the facility site, fogging currently occurs from existing cooling towers, particularly in winter, causing a decrease in travel speeds and potential safety concerns on the road, and this would be expected to continue and worsen with the new towers. The plume, however, is not anticipated to interfere with air traffic control because the closest airport (Gary) is located west of U.S. Steel, and prevailing winds will push plumes to the east.

5.2 Fine Mesh Traveling Water Screens

The primary impact to safety for the fine mesh TWSs is the potential for waterborne traffic to be damaged or capsized from running into the submerged piping. Barge traffic tying up could also risk reliability and onsite safety. To help mitigate potential injuries and damage to barges, safety buoys and warning signs or acoustic/light systems may be installed near the piping. However, this would require additional permitting and an increase in costs which has not been included herein.

6.0 DISCUSSION OF FACILITY RELIABILITY

The degree of reliability may be measured by the frequency, duration, and magnitude of adverse effects on consumer services.

This section provides a discussion on impacts to facility reliability associated with the closed-cycle cooling retrofit to two MDCTs and the fine mesh TWSs. Due to the high heat load nature of the steelmaking process, monitoring, operation and reliability of critical cooling water systems are imperative to safe operation of the facility. Partial or total loss of cooling and process water could result in serious risk to the health and wellbeing of U.S. Steel personnel and the local community.

6.1 Mechanical Draft Cooling Towers

Studies have been completed to investigate reliability impacts that could potentially result from retrofitting existing once-through facilities to closed-cycle cooling systems. The EPA conducted an analysis to evaluate energy reliability issues associated with construction downtime and increased power requirements for closed-cycle auxiliary power and turbine efficiency reduction. Corresponding issues during and following the conversion to closed-cycle cooling would affect the safe operation of Gary Works should there be a risk to the reliability of the critical cooling water systems.

On a facility-level basis, the energy use due to construction during a cooling tower retrofit and the energy penalty (parasitic load and turbine efficiency reduction) at U.S. Steel would not be anticipated to compromise facility operations or safety features; however, a detailed risk assessment of the cooling water systems and associated components would be required to assess the potential safety issues, available mitigation options and acceptable safety margins which the system would be designed to operate above.

6.2 Fine Mesh Traveling Water Screens

The installation schedule for the traveling screens would be sequenced to retrofit one screen at a time. This would leave each CWIS operational while the retrofit is taking place since the flow can be redirected temporarily through the remaining traveling screens in each respective CWIS. Due to the age of the facility and complex heavy manufacturing infrastructure in the path of the FHRS piping, the installation would require extensive and potential intrusive excavation. Detailed pipe route planning and specialized coordination would be required to avoid reliability and/or safety impacts that may occur during the installation of the buried FHRS piping.

Screen damage from commercial or recreational vessels and large debris could occur. If significant damage to the fine mesh TWSs occurs, the inability to withdraw sufficient cooling water could result in loss of infrastructure and risk to U.S. Steel personnel and the local community.

The implementation of fine mesh TWS would also increase the likelihood of screen blockage which could interfere with the ability to withdraw the needed volume of cooling water. Due to the lower percent of open area and the opening width of fine mesh TWS, the screens are at increased risk for fouling, debris stapling, and other debris related blockages. Large-scale screen blockage is mitigated through redundancy in design. If one or more fine mesh TWS develop large-scale screen blockage, flow would be diverted through other fine mesh TWS.

Other mechanical disruptions of the TWS and FHRS system (e.g., circulating pump failure; failure in the screen wash nozzles, valves, or piping; or discharge piping leak or break) could also cause a partial loss of flow. While any form of blockage would result in a partial loss of flow, the severity is lessened through redundancy in the pump stations, as previously discussed, and redundancy in the screen wash system. Also, standby pumps can draw in supplemental water to mitigate the emergent issue. A complete break of any discharge pipe is highly unlikely, a leak or small break would result in a smaller reduction in system flow.

7.0 CHANGES IN CONSUMPTION OF WATER

This section focuses on the changes in water consumption associated with the closed-cycle cooling retrofit to two MDCTs. The TWSs would not have changes in consumption of water and are therefore not discussed in this section.

Table 7-1: Average Water Withdrawal and Consumption Volumes

WEST LOOP	Consumption Makeup	80% Recirculation	60% Recirculation	50% Recirculation	Once Through Cooling
Flow Rate (MGD)	5.8	11.2	22.4	28	56
Annual Hours	7,179	301	737	190	358
% of Year	81.9%	3.4%	8.4%	2.2%	4.1%
EAST LOOP	**Consumption Makeup**	**80% Recirculation**	**60% Recirculation**	**50% Recirculation**	**Once Through Cooling**
Flow Rate (MGD)	53.6	80	160	200	400
Annual Hours	8,423	80	216	36	11
% of Year	96.1%	0.9%	2.5%	0.4%	0.1%

* Estimates only. New withdrawals will vary depending on ambient wet bulb temperatures. Some portion of the year the system will draw in extra water to help with cooling. For most of the year, the required blowdown is much less than shown – closed cycle operation of the West Loop is 0.8 MGD; closed cycle operation of the East Loop is 5.6 MGD

A cooling tower evaporates a large portion of the circulating water flow to cool the remainder of the water. A typical evaporation rate for mechanical draft cooling towers is 10 gpm/MW, representing 50 to 80 percent of the intake flow (EPRI 2011b), depending on the cycles of concentration (EPRI 2011b). Current plant processes for the West Loop withdraw approximately 56 MGD year-round. Current consumption would increase by approximately 6 MGD due to the new evaporation and drift losses. For the East Loop, existing withdrawal for current plant processes is approximately 400 MGD year-round. Current consumption would increase by approximately 54 MGD due to the new evaporation and drift losses.

Moreover, the closed-cycle cooling retrofit would minimize discharges to the East Branch of the Grand Calumet River (current receiving stream designated in NPDES Permit No. IN0000281 for Outfalls 015, 018, 019, 020, 023, 026, 028, 030, 032, 033, and 034). The common low flow statistics, i.e. lowest daily flow with a reoccurrence interval of 10 years

(Q1,10) and lowest average flow over a period of one week with a recurrence interval of 10 years (Q7,10), of the East Branch of the Grand Calumet River upstream of Outfall 015 are zero. Therefore, discharges from U. S. Steel are essentially equivalent to the flow in this portion of the Grand Calumet River. Elimination of these discharges has the potential to impact aesthetics, recreation, and aquatic community due to stagnant water and associated low dissolved oxygen conditions. To fully understand impacts of elimination of these flow contributions, a detailed hydrologic study would be required.

Potable water supplies would not be affected as drinking water sources are sufficiently separate from water drawn into the existing intakes.

8.0 DISCUSSION OF MITIGATION MEASURES

This section provides a discussion of potential mitigation measures associated with the closed-cycle cooling retrofit to two MDCTs and the fine mesh TWSs. The installation and operation of modified TWSs would not require additional mitigation measures as compared to the existing condition and is therefore not discussed in this section.

8.1 Mechanical Draft Cooling Towers

Mitigation measures to reduce non-water quality impacts to offsite areas from the cooling towers are discussed below. This section focuses on the mitigation measures for drift, visual plumes and associated fogging and icing, and noise emissions.

8.1.1 Drift

To reduce the drift from cooling towers, drift eliminators can be incorporated into the cooling tower design to remove water droplets from the airstream before exiting the tower. The drift eliminators used in cooling towers rely on inertial separation caused by direction changes while passing through the eliminators. Efficient drift eliminators are commonly used in cooling towers and are typically required for permitting. Efficient drift eliminators were included in the cooling tower design at U.S. Steel.

8.1.2 Visible Plumes, Fogging and Icing

In general, plume abatement improves the aesthetics of cooling towers by reducing the visible fog-like discharge that is a byproduct of evaporation. Plume abatement can be achieved by different methods depending on the proprietary designs of various suppliers. However, traditionally, and in general, plume abatement is accomplished through the addition of a dry heat exchanger above the fill and drift eliminators of a cooling tower. Hot water from the process first circulates through the dry air heat exchanger, then through the evaporative fill section. Ambient air is drawn simultaneously through the dry air heat exchanger and the warm, wet fill. Mixing the dry, hot air with the saturated air from the fill in the plenum above the drift eliminators reduces the relative humidity of the air and water vapor mixture leaving the tower. The reduction of the relative humidity in the tower exhaust air reduces or eliminates the visible plume as the exhaust air mixes with cool ambient air. A plume abatement system would increase the overall height of the cooling tower, require larger spacing between towers, and typically increase pump head.

The need for plume abatement is typically based on the potential for negative effects on the viewsheds in the surrounding areas at sensitive receptors or for potential safety and operational impacts on critical areas or systems near the tower due to plume-induced ground fog or icing. Viewshed degradation on residential communities, parks, and historic landmarks can be significant and is dependent on site-specific conditions. However, visual plume impacts are anticipated to be low at U.S. Steel, because the neighboring areas are industrial, and no sensitive receptors are within a 1-mile radius of the conceptual cooling towers. As discussed in Section 5.1, fogging does occur on the plant site from existing cooling towers and has impacts to onsite and local safety. Therefore, a plume abatement system was not included in the cooling tower design at U. S. Steel.

8.1.3 Noise

Offsite noise levels from the cooling towers can be partially attenuated (mitigated) by either reducing the noise emitted by the source, blocking the direct path of noise from the source to the receptor, increasing the distance between the source and receptor, or a combination of these approaches. The primary noise sources in an MDCT are the fans (including their gear boxes) and the electric motors that drive the fans. The air inlets on the sides of the towers also emit noise that is mostly generated by the fan inlets. Splash noise in the basin at the bottom of the towers also can be noticeable but is usually dominated by the other sources. Noise walls can be used to block the direct transmission of noise; however, the walls must be of sufficient height to block the direct line of sight between the source and receptors. If plume abatement is used to reduce the visible plume, in addition to the usual wet inlets that are located low on the tower side, dry inlets higher up on the tower could be mitigated by constructing a wall from the ground to at least the top of the dry inlet to block noise from both of these inlets. The noise from the fan discharges at the top of the cooling towers also can be reduced by placing barriers around the tops of the towers that extend up at least to the fan discharge elevation.

If required, additional noise mitigation could be implemented. Both the fan discharge noise (located at the top of the round fan stacks on the top of the towers) and the air inlet noise (located at the dry and wet inlets on the sides of the towers) can be mitigated by using silencers (or mufflers). These are typically sections of duct that have noise-absorbing baffles on the inside. The baffles usually consist of noise-absorbent material covered with a thin plastic sheet and expanded metal to protect against erosion from the airflow. These can be effective in reducing noise; however, they introduce additional pressure drop for the fans to overcome, requiring higher horsepower fan motors to be used. If noise walls and silencers are used, the fan motors may then become significant contributors to the overall cooling tower noise. Many motor manufacturers offer an option for lower noise levels; they achieve these lower levels by using better motor casings and muffling fan noise for fan-cooled motors.

The U.S. Steel site in general would be unaffected by the cooling tower noise, due to high ambient noise levels already associated with an industrialized site. There likely would be no impacts to sensitive receptors such as residential communities, parks, historic places, schools, hospitals, retirement communities, or places of worship because none are located within a 1-mile radius of the cooling towers. Therefore, noise mitigation on the cooling towers at U.S. Steel is not anticipated or included as part of the design basis.

9.0 LITERATURE CITED

40 CFR Part 50 § 50.6 – National primary and secondary ambient air quality standards for PM10. [52 FR 24663, July 1, 1987, as amended at 62 FR 38711, July 18, 1997; 65 FR 80779, Dec. 22, 2000; 71 FR 61224, Oct. 17, 2006]

40 CFR Part 50 § 50.7 – National primary and secondary ambient air quality standards for PM2.5. [62 FR 38711, July 18, 1997, as amended at 69 FR 45595, July 30, 2004]

40 CFR Part 50 § 50.13 – National primary and secondary ambient air quality standards for PM2.5. [71 FR 61224, Oct. 17, 2006, as amended at 81 FR 58149, Aug. 24, 2016]

40 CFR Part 50 § 50.18 – National primary ambient air quality standards for PM2.5. [78 FR 3277, Jan. 15, 2013]

Electric Power Research Institute (EPRI). 2011a. Net Environmental and Social Effects of Retrofitting Power Plants with Once-through Cooling to Closed-cycle Cooling. Technical Report 1022760. Palo Alto, CA: EPRI.

Electric Power Research Institute (EPRI). 2011b. Closed-Cycle Cooling System Retrofit Study. Capital and Performance Cost Estimates. Technical Report 1022491. Palo Alto, CA: EPRI.

Federal Emergency Management Agency (FEMA). 2012. Map 18089C0151E. Accessed 05/28/19. https://msc.fema.gov/portal/search#searchresultsanchor

Indiana Department of Environmental Management. 2019. Storm Water Regulations and Permitting. 327 IAC 15-5 (Rule 5). Accessed 05/15/19. https://www.in.gov/idem/stormwater/2331.htm

Lake County Code of Ordinances 2018 S. 6, Title IX, §93.03

State of Indiana. 2019. County List: All Regulated Criteria Pollutants. Accessed 05/21/19. https://www.in.gov/idem/airquality/2339.htm

U.S. Environmental Protection Agency (EPA) 1995. AP 42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume 1, Chapter 13 Miscellaneous Sources, Section 13.4 Wet Cooling Towers. January 1995.

U.S. Environmental Protection Agency (EPA). 2014a. National Pollutant Discharge Elimination System—Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities; Final Rule. 40 CFR Parts 122 and 125. August 15, 2014. EPA–HQ–OW–2008–0667, FRL–9817–3.

U.S. Environmental Protection Agency (EPA). 2019. Green Book: Indiana Whole or Part County Nonattainment Status by Year Since 1992 for all Criteria Pollutants. Accesses 05/21/19. https://www3.epa.gov/airquality/greenbook/phistory_in.html

U.S. Steel. 2019. Power Usage by Month. Provided in excel spreadsheet by Brandon Miller on July 9, 2019.

CWA 316(b) Requirements for CWIS

40 CFR 122.21(r)(13) Materials

Intended for
United States Steel Corporation Gary Works
One North Broadway
Gary, Indiana 46402
NPDES Permit No. IN0000281

Date
May 2020

Prepared by
Ramboll US Corporation

CWA SECTION 316(B)
PEER REVIEW REPORT

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CWA SECTION 316(B)
PEER REVIEW REPORT

Project name	**USS: Gary 316(b)**
Project no.	**1690010512**
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CONTENTS

APPENDICES

1. INTRODUCTION

As an applicant required to submit studies under paragraphs (r)(10) through (12) of this section, U. S. Steel Gary Works conducted an external peer review of applicable reports to be submitted with the permit application. A peer review is a documented critical review of a specific technical work product by qualified individuals who are collectively equivalent in technical expertise to those who performed the original work. The peer review is conducted to ensure that activities are technically adequate, competently performed, properly documented, and satisfy established quality requirements. The peer review focused on identification of technical issues or inconsistencies within the Comprehensive Technical Feasibility and Cost Evaluation Study, Benefits Valuation Study, and Non-water Quality Environmental and Other Impacts Study defined in 40 CFR 122.21(r)(10), (11), and (12) respectively.

2. PEER REVIEW PROCESS

Development of the 122.21(r)(10) through (12) studies required an experienced, multifaceted project team due to the complexity and level of detail mandatory for this type of evaluation. The peer review therefore necessitated the involvement of experts from the three distinct disciplines including engineering, biology, and economics. The general scope for the peer review process is codified within the Final 316(b) Rule and summarized in the table below for reference.

Topic	Citation	Regulatory Language	Engineering	Biology	Economics
Technical feasibility	122.21(r)(10)(i)(A)	A description of all technologies and operational measures considered (including alternative designs of closed-cycle recirculating systems such as natural draft cooling towers, mechanical draft cooling towers, hybrid designs, and compact or multi-cell arrangements)	X		
Technical feasibility	122.21(r)(10)(i)(B)	A discussion of land availability, including an evaluation of adjacent land and acres potentially available due to generating unit retirements, production unit retirements, other buildings and equipment retirements, and potential for repurposing of areas devoted to ponds, coal piles, rail yards, transmission yards, and parking lots	X		
Technical feasibility	122.21(r)(10)(i)(C)	A discussion of available sources of process water, grey water, waste water, reclaimed water, or other waters of appropriate quantity and quality for use as some or all of the cooling water needs of the facility	X		
Technical feasibility	122.21(r)(10)(i)(D)	Documentation of factors other than cost that may make a candidate technology impractical or infeasible for further evaluation	X	X	
Technical feasibility	122.21(r)(10)(ii)	An evaluation of additional technologies for reducing entrainment may be required by the Director	X	X	
Cost Evaluations	122.21(r)(10)(iii)(A)	Compliance costs are calculated as after-tax, while social costs are calculated as pre-tax. Compliance costs include the facility's administrative costs, including costs of permit application, while the social cost adjustment includes the Director's administrative costs. Any outages, downtime, or other impacts to facility net revenue, are included in compliance costs, while only that portion of lost net revenue that does not accrue to other producers can be included in social costs. Social costs must also be discounted using social discount rates of 3 percent and 7 percent. Assumptions regarding depreciation schedules, tax rates, interest rates, discount rates and related assumptions must be identified	X		X

Topic	Citation	Regulatory Language	Engineering	Biology	Economics
Cost Evaluations	122.21(r)(10)(iii)(B)	Costs and explanation of any additional facility modifications necessary to support construction and operation of technologies considered in paragraphs (r)(10)(i) and (ii) of this section, including but not limited to relocation of existing buildings or equipment, reinforcement or upgrading of existing equipment, and additional construction and operating permits. Assumptions regarding depreciation schedules, interest rates, discount rates, useful life of the technology considered, and any related assumptions must be identified	X		X
Cost Evaluations	122.21(r)(10)(iii)(C)	Costs and explanation for addressing any non-water quality environmental and other impacts identified in paragraph (r)(12) of this section. The cost evaluation must include a discussion of all reasonable attempts to mitigate each of these impacts.	X		X
Benefits Valuation	122.21(r)(11)(i)	Incremental changes in the numbers of individual fish and shellfish lost due to impingement mortality and entrainment as defined in 40 CFR 125.92, for all life stages of each exposed species		X	
Benefits Valuation	122.21(r)(11)(ii)	Description of basis for any estimates of changes in the stock sizes or harvest levels of commercial and recreational fish or shellfish species or forage fish species		X	
Benefits Valuation	122.21(r)(11)(iii)	Description of basis for any monetized values assigned to changes in the stock size or harvest levels of commercial and recreational fish or shellfish species, forage fish, and to any other ecosystem or non use benefits			X
Benefits Valuation	122.21(r)(11)(iv)	A discussion of mitigation efforts completed prior to October 14, 2014 including how long they have been in effect and how effective they have been		X	
Benefits Valuation	122.21(r)(11)(v)	Discussion, with quantification and monetization, where possible, of any other benefits expected to accrue to the environment and local communities, including but not limited to improvements for mammals, birds, and other organisms and aquatic habitats		X	X
Benefits Valuation	122.21(r)(11)(vi)	Discussion, with quantification and monetization, where possible, of any benefits expected to result from any reductions in thermal discharges from entrainment technologies	X	X	X
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(i)	Estimates of changes to energy consumption, including but not limited to auxiliary power consumption and turbine backpressure energy penalty	X		

Topic	Citation	Regulatory Language	Engineering	Biology	Economics
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(ii)	Estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions	X		
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(iii)	Estimates of changes in noise	X		
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(iv)	A discussion of impacts to safety, including documentation of the potential for plumes, icing, and availability of emergency cooling water	X		
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(v)	A discussion of facility reliability, including but not limited to facility availability, production of steam, impacts to production based on process unit heating or cooling, and reliability due to cooling water availability	X		
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(vi)	Significant changes in consumption of water, including a facility-specific comparison of the evaporative losses of both once-through cooling and closed-cycle recirculating systems, and documentation of impacts attributable to changes in water consumption	X	X	
Non-water Quality Environmental and Other Impacts Study	122.21(r)(12)(vii)	A discussion of all reasonable attempts to mitigate each of these factors	X		

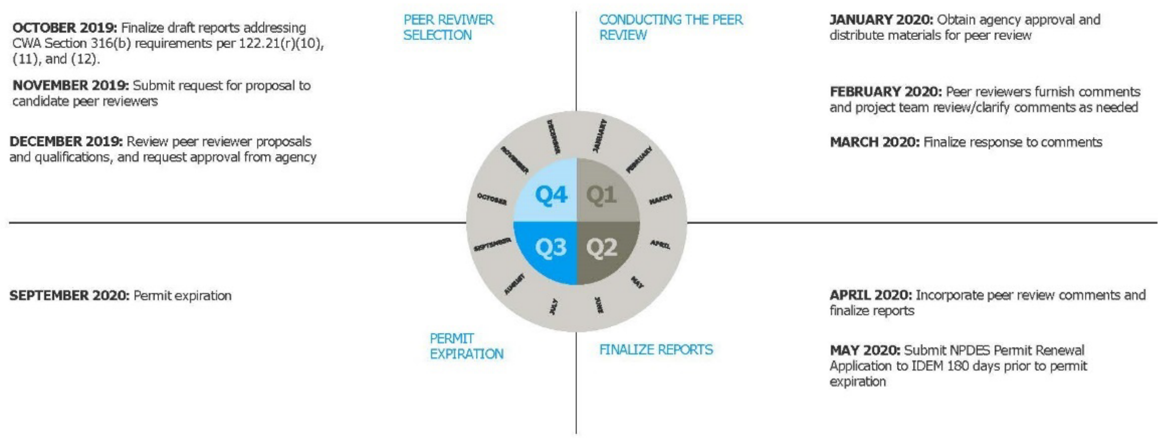
Based on the regulatory requirements to be evaluated, U. S. Steel solicited proposals from qualified individuals in the fields of engineering, biology, and economics from industry, academia, and consulting organizations. The proposals received were reviewed with a focus on qualifications, expertise, impartiality, availability/timing, and cost considerations.

Below is a general schedule of events for the peer review process:

1. Select and Receive Approval for Peer Reviewers;
2. Conduct the Peer Review;
3. Respond to Comments; and
4. Finalize Reports.

Figure 1 outlines the peer review process schedule specific to the U. S. Steel Gary Works NPDES Permit Renewal Application.

FIGURE 1. PEER REVIEW PROCESS SCHEDULE



3. PEER REVIEWER SELECTION & APPROVAL

Based on a review of qualifications and experience, the following peer reviewers were selected:

- Economics – Mr. Paul Jakus, PhD, Professor of Applied Economics, Utah State University
- Engineering – Mr. Jim Cuchens, P.E., Principal Consultant, Cuchens and Associates, Inc.
- Biology and Engineering – Mr. John Gulvas, Cooling Water Intake Consultant, Consumers Energy

3.1 Subject Matter Expert – Economics

Mr. Paul M. Jakus holds a Ph.D. in Economics from North Carolina State University and currently is employed as a Professor in the Department of Applied Economics at Utah State University. He has over 30 years' experience in nonmarket valuation and has published numerous water-related economics studies in respected journals such as Water Resources Research, J. of Risk and Uncertainty, J. of Environmental Economics and Management, Ecological Economics, and American J. of Agricultural Economics. The bulk of his water-related studies have tackled the empirical challenge of valuing water quality changes in freshwater and estuarine ecosystems, primarily due to pollutants such as mercury, arsenic, and nutrients. In the course of completing these studies, he has developed expertise in the full suite of non-market valuation methods needed to evaluate the benefits and costs of reducing impingement and entrainment of fish species under different facility cooling water configurations. Professor Jakus has also completed seven 316(b) peer evaluations for facilities located in Florida, North Carolina, North Dakota, and Texas with standing contracts to conduct seven additional reviews through February 2021. A detailed Curriculum Vitae for Mr. Paul M Jakus is included in Appendix 1.

3.2 Subject Matter Expert – Engineering

Mr. Jim Cuchens holds a Bachelor of Science in Mechanical Engineering from Mississippi State University and is a registered professional engineer in Alabama, Florida, Georgia, and Mississippi. Mr. Cuchens currently has 46 years of experience in power plant engineering and is currently the Principal Consultant of his own firm (Cuchens and Associates, Inc.). Mr. Cuchens was formerly employed with Southern Company from 1973 to 2015 as the Principal Engineer over cooling systems. Mr. Cuchens has been actively engaged in addressing EPA 316b rule provisions in efforts to integrate industry experience related to best practices in water use/consumption, protection of aquatic species, and application of alternative cooling system technologies which promote and support environmentally compliant and efficient cooling systems. As the Principal Engineer for Southern Company, Mr. Cuchens conducted and/or directed engineering studies in support of compliance with 316(b) including closed loop cycle conversion, reuse of treated effluent (greywater) water sources, and/or modified intake systems with fish-friendly traveling water screens. Mr. Cuchens has served as a subject matter expert to conduct peer reviews associated with Clean Water Act Section 316(b) requirements pursuant to 40 CFR 122.21 (r)(5), (r)(10), and (r)(12). A detailed resume for Mr. Jim Cuchens is included in Appendix 2.

3.3 Subject Matter Expert – Biology and Engineering

Mr. John A. Gulvas holds a Master of Science in Fisheries Management from Michigan State University and just prior to his retirement in 2014, served as the Cooling Water Intake Program manager for Consumers Energy, formerly CMS Energy. Mr. Gulvas has 42 years' experience conducting environmental programs at fossil, hydro and nuclear plants on Lake Michigan, Lake Huron, Lake Erie and tributary rivers in Michigan. The focus of the majority of work at CE was development, testing, installation, and maintenance of fish protection systems for cooling water intakes are CE facilities. During his career, Mr. Gulvas was responsible for fish impingement, entrainment, and impact assessment studies at all of the facilities to fulfill EPA/NPDES and FERC license requirements. A detailed resume for Mr. John A. Gulvas is included in Appendix 3.

3.4 Agency Approval

Qualifications for the selected candidate peer reviewers were sent to Richard Hamblin of IDEM for review and approval on Tuesday, December 17, 2019.

Approval was received from IDEM on January 7, 2020 and a copy of the electronic mail correspondence is included in Appendix 4.

4. CONDUCTING THE PEER REVIEW

Following approval from IDEM, a teleconference call was held on Friday, January 10, 2020 to commence the peer review process. Attendees on the teleconference included key project personnel from U. S. Steel, Ramboll US Corporation, and the agency-approved peer review team (Mr. Paul Jakus, Mr. James W. Cuchens, and Mr. John Gulvas). The purpose and scope of the teleconference focused on project team introductions, implementation logistics, brief facility overview, general timeline of activities, and an open discussion to review comments/questions regarding the scope of work. Within one week of the teleconference, draft studies (i.e. Comprehensive Technical Feasibility and Cost Evaluation Study, Benefits Valuation Study, and Non-water Quality Environmental and Other Impacts Study defined in 40 CFR 122.21(r)(10), (11), and (12)) were distributed to peer reviewers including a comment/response matrix developed specifically for each discipline to streamline the review process. Comments for all three peer reviewers were received and compiled into a comment/response matrix for ease of tracking and incorporation of report revisions in March 2020.

5. RESPONSE TO COMMENTS

Comments received from peer reviewers were reviewed and compiled into a comprehensive comment/response matrix. These comments were distributed to the project team, reviewed for content, and clarified with the appropriate peer reviewer as required. Response to all comments were documented within the comment/response matrix. Significant comments that required revisions to the draft studies were incorporated and the reports were subsequently finalized. The comprehensive comment/response matrix is included in Appendix 5.

The information contained herein meets the requirements for the external peer review to be submitted with the permit application. Per requirements specified in 40 CFR 122.21(r)(13), U. S. Steel selected peer reviewers, notified the Director in advance of the peer review, and provided an explanation for significant reviewer comments. All peer reviewers have appropriate qualifications and their names and credentials have been included herein.

APPENDIX 1
SUBJECT MATTER EXPERT – ECONOMICS

Item B: Water-Related Curriculum Vitae

PAUL M. JAKUS
2018 E. 1730 N. St.
North Logan, UT 84341
435-770-9332 (cell)

Current Position

Professor, Department of Applied Economics, Utah State University (May 2008-present)

Professional Experience

Faculty Fellow, Institute for Outdoor Recreation and Tourism, Utah State University (August 2019 – present)
Faculty Associate, Ecology Center, Utah State University (August 2014 – present)
Professor and Head, Dept. of Applied Economics, Utah State University (May 2008-May 2012)
Associate Professor/Professor, Department of Economics, Utah State University (July 2001-May 2008)
Assistant/Associate Professor, Dept. of Agricultural Economics, University of Tennessee (February 1992 – June 2001)
Associate Editor, *Water Resources Research*, 1999-2002

Education

Ph.D., North Carolina State University, Economics, 1992
M.S., Colorado State University, Agricultural and Natural Resource Economics, 1984
B.S., University of Nevada, Reno, Agricultural and Natural Resource Economics, 1982

Water Publications Appearing in Refereed Journals (42 total refereed publications)

Jakus, Paul M., Nanette Nelson, and Jeffrey Ostermiller. 2017. "Using Survey Data to Determine a Numeric Criterion for Nutrient Pollution." *Water Resources Research*, 53(12):10,188-10,200. doi:10.1002/2017WR021527

Nelson, Nanette, John Loomis, Paul M. **Jakus**, Mary Jo Kealy, Nicholas von Stackelberg, and Jeffrey Ostermiller. 2015. "Linking Ecological Data and Economics to Estimate the Total Economic Value of Improving Water Quality by Reducing Nutrients." *Ecological Economics*, 118:1-9.

Coulibaly, Lassina, Paul M. **Jakus** and John E. Keith. 2014. "Modeling Water Demand When Households Have Multiple Sources of Water." *Water Resources Research*, 50, doi:10.1002/2013WR015090.

Shaw, W. Douglass, Paul M. **Jakus**, and Mary Riddel. 2012. "Perceived Arsenic-Related Mortality Risks for Smokers and Non-smokers." *Contemporary Economic Policy*, 30(3):417-429.

Nguyen, To N., Paul M. **Jakus,** W. Douglass Shaw and Mary Riddel. 2010. "An Empirical Model of Perceived Mortality Risks for Selected United States Arsenic Hot Spots." *Risk Analysis* 30(10):1550-1562.

Jakus, Paul M., W. Douglass Shaw, To N. Nguyen, and Mark Walker. 2009. "Risk Perceptions of Arsenic in Tap Water and Consumption of Bottled Water." *Water Resources Research*, 45, W05405, doi:10.1029/2008WR007427.

Swain, Edward B., Paul M. **Jakus**, Glenn Rice, Frank Lupi, Peter Maxson, Joseph Pacyna, Alan Penn, Samuel Spiegel, and Marcello Viega. 2007. "Socioeconomic Consequences of Mercury Use and Pollution." *Ambio*, 36(1):45-61.

Jakus, Paul M. and W. Douglass Shaw. 2003. "Perceived Hazard and Product Choice: An Application to Recreational Site Choice." *J. Risk and Uncertainty*, 26(1):77-92.

Jakus, Paul M., Paula Dowell, and Matthew N. Murray. 2000. "The Effect of Fluctuating Water Levels on Reservoir Fishing." *J. Agricultural and Resource Economics*, 25(2):520-532.

Parsons, George R., Paul M. **Jakus**, and Theodore D. Tomasi. 1999. "A Comparison of Welfare Estimates from Four Models for Linking Seasonal Recreational Trips to Multinomial Logit Models of Site Choice." *J. Environmental Economics and Management*, 38(2):143-157.

Jakus, Paul M., Dimitrios Dadakas, and J. Mark Fly. 1998. "Fish Consumption Advisories: Incorporating Angler-Specific Knowledge, Habits, and Catch Rates in a Site Choice Model." *American J. Agricultural Economics*, 80(5):1019-1024. (Proceedings article)

Jakus, Paul M., Mark Downing, Mark S. Bevelhimer and J. Mark Fly. 1997. "Do Fish Consumption Advisories Affect Reservoir Anglers' Site Choice?" *Agricultural and Resource Economics Review*, 26(2):198-204.

Jakus, Paul M., J. Mark Fly, and J. Larry Wilson. 1996. "Explaining Public Support for Fisheries Management Alternatives." *North American J. of Fisheries Management*, 16:41-48.

Jakus, Paul M., J. Mark Fly and J. Larry Wilson. 1993. "Activities, Regulatory Preferences and Regulatory Perceptions of Tennessee Anglers." *Proceedings of the Southeastern Association of Fish and Wildlife Agencies*, 47:767-774. (Refereed)

Smith, V. Kerry, Raymond B. Palmquist and Paul M. **Jakus**. 1991. "Combining Farrell Frontier and Hedonic Travel Cost Models for Valuing Estuarine Quality." *Review of Economics and Statistics*, 73(4):694-699.

Miller, Watkins W., Chauncey T.K. Ching, John F. Yanagida and Paul M. **Jakus**. 1985. "Agricultural Water Pollution Control: An Interdisciplinary Approach." *Environmental Management*, 9(1):1-6.

Water-Related Book Chapters and Non-Refereed Proceedings

Kealy, Mary Jo, Nick von Stackelberg, Jeffrey Ostermiller, Nanette Nelson, John Loomis, and Paul M. **Jakus**. 2014. "The Value of Improving Water Quality: Case Study of Nutrient Reductions in Utah's Waters." *Proceedings of the Annual Meeting of the Water Environment Federation*, 2014(7):6237-6252.

Jakus, Paul M. 2013. "Economic Analysis of Fish Consumption Advisories." Chapter 33 in Biology and Management of Inland Striped Bass and Hybrid Striped Bass, James S. Bulak, Charles C. Coutant, and J.A. Rice, eds. American Fisheries Society.

Jakus, Paul M., John C. Bergstrom, Marty Phillips, and Kelly O'Brien. 2011. "Modeling Behavioral Response to Changes in Reservoir Operations in the Tennessee Valley Region." Chapter 17 in Preference Data for Environmental Valuation, John Whitehead, Ju-Chin Huang, and Tim Haab, eds. Routledge.

Five Recent Publications (non-water)

Kim, Man-Keun, and Paul M. **Jakus**. 2019. "Wildfire, National Park Visitation, and Changes in Regional Economic Activity." *J. Outdoor Recreation and Tourism*, 26(June):34-42.

Jakus, Paul M. and Sherzod B. Akhundjanov. 2019. "The Antiquities Act, Large National Monuments, and the Regional Economy." *J. Environmental Economics and Management*, 95(May):102-117.

Jakus, Paul M., and Sherzod B. Akhundjanov. 2018. "Neither Boon nor Bane: The Economic Effects of a Landscape-Scale National Monument." *Land Economics*, 94(3):323-339.

Jakus, Paul M. 2018. "A Review of Economic Studies Related to the Bureau of Land Management's Wild Horse and Burro Program." *Human-Wildlife Interactions*, 12(1):58-74.

Jakus, Paul M., Jan E. Stambro, Michael T. Hogue, John C. Downen, Levi Pace, and Therese C. Grijalva. 2017. "Western Public Lands and the Fiscal Implications of a Transfer to States." *Land Economics* 93(3):371-389.

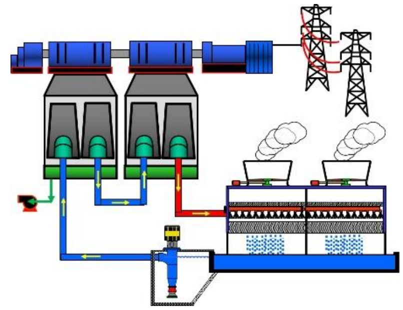
Completed and Ongoing Professional Consulting Contracts, Water

Firm	Topic
Resources for the Future	Mercury contamination in Chesapeake Bay (MD, VA)
Industrial Economics, Inc.	PCB contamination benefits transfer (GA, SC)
Kleinschmidt Associates	Tennessee Valley Administration Reservoir Operations System review (AL, GA, KY, NC, TN, VA)
Rocky Mountain Social Science	Oneida Narrows (ID) recreation study, prepared for FERC review
John Keith Associates	Urban water demand model, Zarqa Governate, Kingdom of Jordan
CH2M Hill Companies, Ltd	Benefits of nutrient pollution reduction in UT
ECT, Inc.	Clean Water Act 316(b) peer reviews (powerplants in ND, FL)
HDR, Inc.	Clean Water Act 316(b) peer reviews (powerplants in FL, IN, NC)
Limno Tech	Clean Water Act 316(b) peer review (powerplant in WI)
WCM Group, Inc.	Clean Water Act 316(b) peer reviews (powerplants in TX)

A complete CV is available upon request.

APPENDIX 2
SUBJECT MATTER EXPERT – ENGINEERING

J. W. CUCHENS, P.E.
Principal Consultant / Cooling Systems
B.S., Mechanical Engineering,
Mississippi State University, 1973



EDUCATION & BACKGROUND

Jim was born and raised in northwest Florida and currently resides in the Birmingham, Alabama with family. Jim graduated from Tate High School in Pensacola FL in 1968 after which he attended Perkinston Jr. College near Gulfport MS prior to attending Mississippi State University (MSU) in Starkville, MS. Jim graduated from MSU with a B.S. Degree in Mechanical Engineering and is a registered professional engineer in Alabama, Florida, Georgia, and Mississippi. During college, Jim worked as an intern engineer with the Florida Department of Transportation prior to employment with the Southern Company in 1973. Jim currently has 46 years of experience in power plant engineering associated with cooling system conceptual design, technical specifications/procurement, and operation and maintenance.

EXPERIENCE SUMMARY

Jim Cuchens, Principal Consultant, Cuchens and Associates, Inc. was formerly employed with Southern Company engineering from 1973 to 2015 as the Principal Engineer over cooling systems. Jim has over 46 years of experience in all phases of power plant cooling systems design, construction and operation with various types of generating units including nuclear, fossil, gas-fired co-generation facilities, and industrial process facilities. Engineering experience includes conducting conceptual design studies, equipment specifications, procurement/bid evaluations, field support, and engineering oversight. Experience within the past 43 years has primarily been associated with power plant cooling systems which included cooling towers, cooling ponds/lakes, steam-surface and air-cooled condensers, air removal/vacuum systems, auxiliary heat exchangers, cooling water pumps/sumps, service water equipment, and other related piping systems. Mr. Cuchens experience also specialized in the development and use of computer simulation models for performance analysis of the cooling systems/components.

RELATED EXPERIENCE

Power Engineering experience includes optimization of thermal/power island cycle in support of resource forecast modeling (future generation plans) for various types of generation including fossil fuel units; pulverized fluidized bed units; gas fired/combined cycle units; and nuclear units. Mr. Cuchens Power engineering experience supported the development of numerous power generation projects as shown in the project list below.

Steam Cycle / Balance of Plant Design experience includes the development of thermal cycle configurations including feedwater heater and balance of plant equipment configurations. Additional steam cycle engineering experience includes evaluation of turbine design criteria for once-through and closed-loop cooling cycles in establishing guaranteed performance parameters. Additional steam cycle experience includes the evaluation of steam cycle performance constraints and limitations with consideration of equipment design (single pressure, multipressure, etc.) and site specific conditions (climatology, geology, etc.).

Cooling Cycle Design experience includes various types of technical/feasibility studies which became the basis in development of equipment technical specifications, bid evaluations, and applied research of cooling cycle equipment technology. Mr. Cuchens' experience also consisted of design and operating knowledge for various types of cooling cycles including closed loop, once-through, and/or cooling ponds, serving nuclear units, fossil units, and cogeneration units. Mr. Cuchens design experience involved the optimization of the cooling system equipment (towers, pumps, and condensers) for new and/or existing units with consideration of performance, capital cost, and operation and maintenance. His expertise includes development of computer programs for selection of cooling cycle equipment design as well as analysis of equipment and/or plant performance.

Cooling Tower experience includes the design of natural draft and/or mechanical draft cooling towers for numerous power generating facilities. Design experience includes the development of tower design standards for utilization of concrete, wood, and/or fiberglass construction materials for both cross-flow and counter-flow type cooling towers. Cooling tower experience includes field services and engineering oversight in new project installation, system retrofits, and cooling system operations and maintenance activities. Cooling tower experience includes field testing for development of a system data base for in-depth analysis of tower thermal design and evaluation of vendor proposals. Cooling tower experience includes feasibility studies for modifying and/or upgrading existing towers for enhancing tower performance and reducing operations and maintenance costs. Retrofit experience includes specifications and site support for refurbishing/retrofitting existing cooling towers as well as installation of helper cooling towers for supplementing existing tower performance. Mr. Cuchens experience provided enhanced tower/unit performance capability throughout the Southern Electric system.

Condenser Design experience involved the design of both air-cooled and steam surface condensers including single pressure, multi-pressure, single pass, and multi-pass configurations. Mr. Cuchens' experience includes the development of condenser design standards for field erected and modular type condenser construction. Mr. Cuchens provided field inspection/consulting services to plant personnel (tube inspections, air leakage trouble shooting, etc.) in support of operations and maintenance (O&M) and plant outage activities. Mr. Cuchens directed and/or participated in field testing to assess condenser tube cleanliness and overall condenser performance. Mr. Cuchens was responsible for conducting feasibility studies for modifying and/or upgrading condensers to enhance overall system/unit performance. Mr. Cuchens retrofit experience involved numerous re-tubing projects (modular and conventional) as well as condenser waterbox and hotwell replacement.

Circulating Water Pumps/System Design experience includes the engineering design of various types of circulating water pumps and piping systems including mixed-flow vertical can-type pumps and vertical volute type pumps. Mr. Cuchens expertise includes the capability for providing hydraulics analysis for determination of system pumping head requirements as well as the testing and evaluation of pump performance. Pump design experience includes development of pump design standards for closed suction systems as well as open pit sump designs. Mr. Cuchens has been responsible for conducting feasibility studies for modifying and/or upgrading existing pumps for enhancing pump/condenser flow. Retrofit experience includes refurbishing existing pump impellers as well as and installation of new pump rotating assemblies and modification of pump motors. Mr. Cuchens provided guidance in best practices associated with the design of pump sumps based on sump model studies to mitigate vortex issues.

ENVIRONMENTAL PROJECTS & INDUSTRY RELATED EXPERIENCE

EPA 316b Experience - Mr. Cuchens has been actively engaged in addressing EPA 316b rule provisions in efforts to integrate industry experience related to best practices in water use/consumption, protection of aquatic species, and application of alternative cooling system technologies which promote and support environmentally compliant and efficient cooling systems. As the Principal Engineer for Southern Company, Mr. Cuchens has conducted and/or directed engineering studies in support of compliance with 316(b) including for the system fleet including closed loop cycle conversion, use of treated effluent (greywater) water sources, and/or modified intake systems with fish-friendly traveling water screens.

Subsequent to employment as the Principal Engineer of cooling systems with the Southern Company for 42 years, Mr. Cuchens has acted as the Principal Consultant of Cuchens & Associates. Mr. Cuchens has been contracted by several A/E and/or Environmental Firms and/or Utilities to conduct peer reviews associated with compliance of EPA 316(b) - 40 CFR 122.21 (r)(5), (r)(10), (r)(12), and (r)(13). The scope of peer review varies subject to the type of facility, complexity of options evaluated, and charge questions applicable to site specifics.

Peer reviews include reports include reports generated for industrial and/or utility/power generation facilities. Customer/client information can be provided upon request under confidential agreement.

Anti-Fouling Fill Media Research - Film fill media designs used in counter-flow type cooling towers have a tendency to foul or plug under certain water chemistry conditions. Mr. Cuchens has been involved for ~ 20 years in the research and investigation of anti-fouling fill designs for prevention of fouling in counterflow cooling towers. Mr. Cuchens has also been involved in the investigation of the use of surfactants to enhance cross-flow cooling tower performance. The results of these in-situ programs have provided long term reliable cooling tower performance with minimal fouling,

Industry Related Experience & Training

Mr. Cuchens has participated in and authored numerous papers and articles for EPRI Cooling System Conferences, Cooling Technology Conferences, International Water Conferences, Industry Trade Magazines, and Educational Seminars. Mr. Cuchens has conducted numerous training seminars related to cooling tower/condenser technology.

Industrial / Process Engineering

Mr. Cuchens experience includes design and maintenance support for various cooling systems and/or process heat exchanger systems for refineries and cogeneration facilities. Experience included refurbishment and/or replacement of heat exchanger and/or cooling systems components for enhanced production capability. Experience also included inspection of plant systems and vendor oversite for minimizing turnaround duration and associated costs. Mr. Cuchens experience also includes design and construction support for an Integrated Gasified Combined Cycle (IGCC) facility.

J. W. Cuchens, P.E.

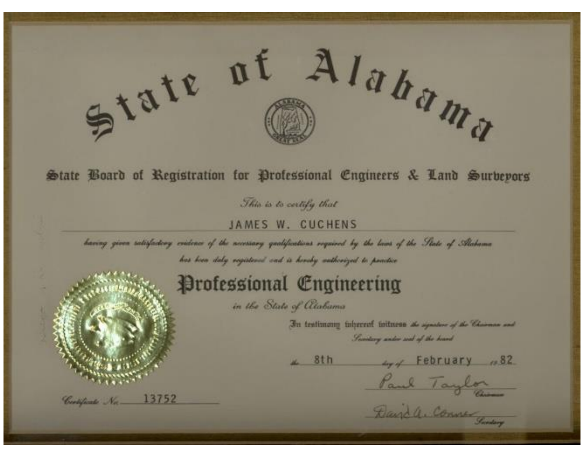
Component Specifications Experience

Mr. Cuchens experience includes the development of design specifications and construction oversight for various components of plant cooling systems serving power industry/utility and industrial facilities including but not limited to the following:

1. Cooling Tower Specifications
   a. Mechanical Draft (crossflow and counterflow)
   b. Natural Draft Towers (crossflow and counterflow)
   c. Wood, Concrete, Fiberglass construction & repair
2. Condenser Specifications
   a. Steam surface condenser installation/construction
   b. In-field construction or shop assembled construction
   c. Retubing specifications
   d. Hotwell Replacement
   e. Modular Bundle replacement
   f. Turnkey retrofit (tubes, coating, staking, etc.)
   g. Air Cooled condenser/heat exchangers
   h. Air removal Equipment (SJAE/Vacuum Pumps, etc.)
3. Circulating Water Pumps
   a. New pump installation
   b. Retrofit pump installation
   c. Pump component replacement (impellers, shaft, etc.)

CERTIFICATIONS AND AFFILIATIONS

Registered Professional Engineer in Four States
Alabama PE # 13752; Florida PE # 37709; Georgia PE # 16164; Mississippi PE #09905
American Society of Mechanical Engineers – Member and Committee Representative
Cooling Tower Institute - Board of Directors 1995-2001; 2012-2016 (Current)
Cooling Tower Institute - Vice President 2001, President 2000
Cooling Tower Institute – Engineering Standards & Maintenance Committee - Chairman
ASME - Power Test Code (PTC) 23 – Cooling Tower Test Code - Committee Member
ASME - Power Test Code (PTC) 30 – Air Cooled Condenser Test Code - Committee Member



State of Alabama

State Board of Registration for Professional Engineers & Land Surveyors

This is to certify that

JAMES W. CUCHENS

having given satisfactory evidence of the necessary qualifications required by the laws of the State of Alabama has been duly registered and is hereby authorized to practice

Professional Engineering

in the State of Alabama

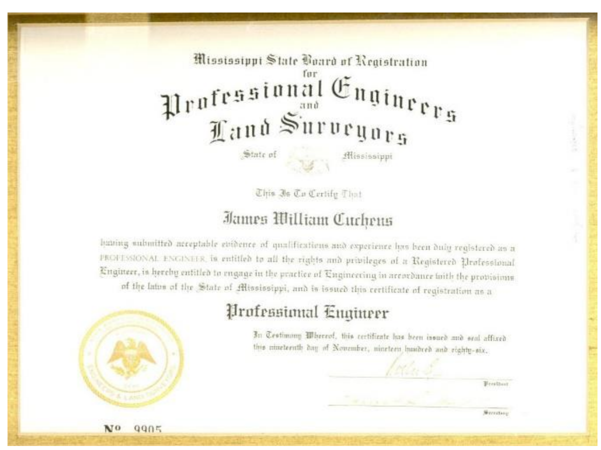
In testimony whereof witness the signature of the Chairman and Secretary under seal of the board

the 8th day of February 1982

Paul Taylor, Chairman

David A. Conner, Secretary

Certificate No. 13752



Mississippi State Board of Registration
for
Professional Engineers
and
Land Surveyors

State of Mississippi

This Is To Certify That

James William Cuchens

having submitted acceptable evidence of qualifications and experience has been duly registered as a PROFESSIONAL ENGINEER, is entitled to all the rights and privileges of a Registered Professional Engineer, is hereby entitled to engage in the practice of Engineering in accordance with the provisions of the laws of the State of Mississippi, and is issued this certificate of registration as a

Professional Engineer

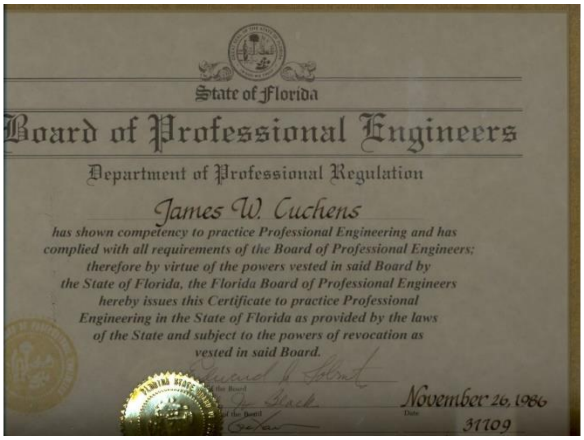
In Testimony Whereof, this certificate has been issued and seal affixed this nineteenth day of November, nineteen hundred and eighty-six.

President

Secretary

No 9905

J. W. Cuchens, P.E.


State of Florida
Board of Professional Engineers
Department of Professional Regulation
James W. Cuchens
has shown competency to practice Professional Engineering and has complied with all requirements of the Board of Professional Engineers; therefore by virtue of the powers vested in said Board by the State of Florida, the Florida Board of Professional Engineers hereby issues this Certificate to practice Professional Engineering in the State of Florida as provided by the laws of the State and subject to the powers of revocation as vested in said Board.
November 26, 1986
31709


State of Georgia
State Board of Registration for Professional Engineers & Land Surveyors
This is to certify that
James William Cuchens
having given satisfactory evidence of the necessary qualifications as required by the laws of the State of Georgia has been duly registered as a
Professional Engineer
in the State of Georgia
2nd December 86
15164

PROJECT EXPERIENCE (PARTIAL)

The following is a partial experience list of various generation and/or retrofit projects involving cooling system components (Cooling Towers, Condensers, CW Pumps/Sumps, Air Removal Systems, etc.)

Bowen Units 1-4 Cooling Systems W/ Natural Draft Towers – Repack/Refurbishment
Scherer Units 1-4 Cooling Systems W/ Natural Draft Towers – Repack/Refurbishment
Vogtle Units 1 & 2 Cooling Systems W/ Natural Draft Towers – Repair/Refurbishment
Vogtle Units 3 & 4 AP1000 Cooling Systems W/ Natural Draft Towers – Under Construction
Millers Units 1 & 2 Cooling Systems W/ Crossflow Natural Draft Tower - Refurbishment
Millers Units 3 & 4 Cooling Systems W/ Counterflow Natural Draft Tower - Refurbishment
Plant Hatch Nuclear Units 1 & 2 – Tower Replacement/Retrofit
Plant Farley Nuclear Units 1 & 2 – Tower Replacement/Retrofit
Crist Steam Plant Units 6 & 7 Cooling Tower Retrofit/Replacement
Watson Steam Plant Unit 5 - Cooling Tower Retrofit/Replacement
Watson Steam Plant Unit 4 – Environmental Cooling Tower – Installation/Repair
Wansley Units 1&2 - Crossflow Concrete Tower – Repack/Refurbishment
Gaston Unit 5 - Crossflow Concrete Tower – Repack/Refurbishment
Sweatt Units 1&2 - Crossflow Wood Tower – Repack/Refurbishment
Plant Branch Units 1 & 2 – Environmental Cooling Tower
Plant Yates Units 1 - 4 Cooling Tower Retrofit - Open/Closed Loop Conversion
Plant McDonough Units 1 & 2 Cooling Tower Retrofit - Open/Closed Loop Conversion
Combined Cycle (CC) Cooling Systems Experience Including Cooling Towers, Condensers, Cooling Water Pumps, Vacuum Systems, and Related Auxiliaries

- Barry CC Units 6 & 7
- Daniel CC Units 3 & 4
- Wansley CC Units 6 & 7
- Lansing Smith CC Unit 3
- Plant Harris CC Units 1 & 2
- Plant Franklin CC Units 1, 2, & 3
- Plant Theodore Cogeneration Unit

Olin/Washing County Cogeneration Unit
McIntosh CC Units 10 & 11
Plant McDonough CC Units 3, 4, & 5
Kemper County Integrated Gasified Combined Cycle (IGCC)

PROJECT EXPERIENCE (CONTINUED)

Daniel Units 1 & 2 Condenser Retube (Titanium)
Watson Units 4 & 5 Condenser Retube (Titanium)
Crist Units 6 & 7 Condenser Retube (Titanium)
Yates 7 Condenser Retube (Titanium)
Plant Hatch Nuclear Units 1 & 2 Condenser Retube (Titanium)
Gaston Units 1, 2 & 3 Condenser Retube (SeaCure, 90/10 CuNi, & Titanium)
Crist Units 6 CW Pump Replacement/Retrofit
Watson Unit 5 CW Pump Replacement/Retrofit
McIntosh 11 – Cooling Tower On-Line Replacement (Tornado Destruction)t
Crist 6 & 7, Watson 4 & 5 – Cooling Tower Repair - Hurricane Destruction
Miller Units 3 & 4 – On-Line Cooling Tower Fill Replacement
Chevron Refinery – Process Cooling & Chevron Cogeneration Facility
Olin Chemical Plant - Process Cooling & Washington County Cogeneration Facility
Mitsubishi Polycrystalline Chemical Plant & Theodore Cogeneration Facility
Kemper County IGCC Facility

316(b) - 40 CFR 122.21 (r)(5), (r)(10), (r)(12), Project Experience (Incl. Compliance Studies)

Plant Crist – Units 1-5 (Gulf Power Company
Lansing Smith Steam Plant – Units 1&2 (Gulf Power Company)
Barry Steam Plant – Units 1-5 (Alabama Power Company)
Gorgas Steam Plant – Units 1-10 (Alabama Power Company)
Gaston Steam Plant – Units 1-4 (Alabama Power Company)
Green County Steam Plant – Units 1 & 2 (Alabama Power Company)
Watson Steam Plant – Units 1-4 (Mississippi Power Company)
Daniel Steam Plant – Units 1&4 (Mississippi Power Company)
McIntosh Steam Plant – Units 1&2 (Georgia Power Company)
Scherer Steam Plant – Units 1-4 (Georgia Power Company)

Dania Beach Energy Center (Florida Power & Light)
Culbreath Bayside Power Station (Tampa Electric Company)
Labadie Energy Center (Ameren)
Port Everglades Energy Center (Florida Power & Light

J. W. Cuchens, P.E.

J. W. Cuchens, P.E.
Principal Consultant / Cooling Systems
Cuchens & Associates, Inc.
1924 Mission Rd., Birmingham AL 35216
jwcuchens@aol.com
(205) 527 9695

APPENDIX 3
SUBJECT MATTER EXPERT – BIOLOGY & ENGINEERING

JOHN A GULVAS

Cooling Water Intake Consultant

OBJECTIVE

Provide companies assistance with cost effective cooling water intake solutions for 316(b) regulations

Peer review of 316(b) required submittals for biological studies, cooling water intake design and cost evaluations and benefit assessments.

EXPERIENCE

Consumers Energy, formerly CMS Energy, Consumers Power Company

Biologist: 1972 – 1984

Senior Environmental Planner: 1984 – 1990

Cooling Water Intake Program Manager: 1990 – 2014

- My career at CE provided 42 years of experience with a utility company conducting environmental programs at fossil, hydro and nuclear plants on Lake Michigan, Lake Huron, Lake Erie and tributary rivers in Michigan.
- The focus of the majority of work at CE was development, testing, installation, and maintenance of fish protection systems for cooling water intakes are CE facilities.
- Responsible for fish impingement and entrainment, and impact assessment studies at all of the facilities to fulfill EPA/NPDES and FERC license requirements
-

EDUCATION

BS Fisheries and Wildlife Biology, Michigan State University, 1972.

MS Fisheries Management, Michigan State University, 1976

REPRESENTATIVE PROJECTS

- **IMPINGEMENT AND ENTRAINMENT STUDIES**

Responsible for the performance of fish impingement and entrainment studies for Karn-Weadock, JHCampbell, BCCobb, JRWhiting, Palisades and Midland generating facilities.

Performance of fish entrainment mortality studies at Ludington Pumped Storage Plant with Michigan State University, and hydro fish entrainment studies at facilities on the Manistee, Muskegon and AuSable Rivers in Michigan .

FISHERY IMPACT ASSESSMENT STUDIES

Managed comprehensive fishery impact assessment studies for CE at the Ludington Pumped Storage Plant and JHCampbell Plants on Lake Michigan. Studies were required for the demonstration of wedge screens at Campbell and the fish barrier net at Ludington.

FISH PROTECTION SYSTEMS

Responsible for the installation, operation and demonstration of the fish deterrent net at JRWhiting plant on Lake Erie as Best Technology Available to minimize environmental impact.

Responsible for the onshore and offshore testing of cylindrical wedge-wire screens at the JHCampbell Plant and eventual installation and demonstration of the wedge-wire screen system as BTA for Campbell.

Responsible for the installation and demonstration of fish barrier nets at DEKarn plant on Saginaw Bay, BCCobb Plant on Muskegon Lake, Midland cooling pond at Midland Michigan and the Ludington Pumped Storage Plant on Lake Michigan.

Responsible for the installation and demonstration of an electrical deterrent system at the Karn-Weadock facilities on Saginaw Bay.

Responsible for the completion and submission of the Comprehensive Demonstration Studies as required by Section 316(b) of the Clean Water Act.

APPENDIX 4
AGENCY APPROVAL

From: Benoit, Nicole H
To: Lauren Elizabeth Hill
Cc: Williams, Eric C; Miller, Brandon S; Hanning, Joseph E
Subject: FW: [External]-RE: 316(b) Peer Review Approval Request - U. S. Steel Gary Works
Date: Monday, January 6, 2020 11:56:07 AM
Attachments: image001.png

Lauren, we received approval today.

Nicole H. Benoit, P.E.
Environmental Affairs
United States Steel Corporation
Office: 412-433-6365
Cell: 412-551-6733
Email: nhbenoit@uss.com

From: Hamblin, Richard <rhamblin@idem.IN.gov>
Sent: Monday, January 6, 2020 11:57 AM
To: Benoit, Nicole H <nhbenoit@uss.com>
Cc: Williams, Eric C <ewilliams@uss.com>; Miller, Brandon S <BSMiller@uss.com>; Hanning, Joseph E <JEHanning@uss.com>
Subject: [External]-RE: 316(b) Peer Review Approval Request - U. S. Steel Gary Works

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

We have no objections to the peer reviewers proposed.

Richard L. Hamblin

Richard L. Hamblin
Senior Environmental Manager
Industrial NPDES Permits Section
Indiana Department of Environmental Management
Office of Water Quality, Mail Code 65-42
100 N. Senate Ave.
Indianapolis, IN 46204-2251
Phone: (317)232-8696
Fax: (317)232-8637

From: Benoit, Nicole H [mailto:nhbenoit@uss.com]

Sent: Thursday, January 02, 2020 4:04 PM
To: Hamblin, Richard <rhamblin@idem.IN.gov>
Cc: Williams, Eric C <ewilliams@uss.com>; Miller, Brandon S <BSMiller@uss.com>; Hanning, Joseph E <JEHanning@uss.com>
Subject: RE: 316(b) Peer Review Approval Request - U. S. Steel Gary Works

**** This is an EXTERNAL email. Exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. ****

Hi Richard,

Has IDEM had a chance to review the proposed peer review list for the Gary Works 316(b) submittal? Please let us know if you have any concerns or questions. We're looking to send documents to the peer reviewers in the very near future in order to stay on schedule for submittal with the permit renewal application due this spring.

Thank you,

Nicole H. Benoit, P.E.
Environmental Affairs
United States Steel Corporation
Office: 412-433-6365
Cell: 412-551-6733
Email: nhbenoit@uss.com

From: Benoit, Nicole H
Sent: Tuesday, December 17, 2019 1:39 PM
To: Hamblin, Richard <rhamblin@idem.IN.gov>
Cc: Williams, Eric C <ewilliams@uss.com>; Miller, Brandon S <BSMiller@uss.com>; Hanning, Joseph E <JEHanning@uss.com>
Subject: 316(b) Peer Review Approval Request - U. S. Steel Gary Works

Richard,

U. S. Steel has been actively working on development of the permit renewal application materials due to IDEM in May 2020 for our Gary Works facility, including development of the required cooling water intake structure submittals detailed in 40 CFR 122.21(r)(2) – (13). Per 40 CFR 122.21(r)(13), U. S. Steel must conduct an external peer review of studies required under paragraphs (r)(10) through (12) to be submitted with the permit application and must notify the Director of selected peer reviewers in advance of the peer review.

U. S. Steel has solicited proposals from qualified individuals in the fields of engineering, biology, and economics from industry, academia, and consulting organizations. The proposals received were reviewed with a focus on qualifications, expertise, impartiality, and cost considerations. Based on the considerations mentioned, the following peer reviewers were selected:

Biology and Engineering – Mr. John Gulvas, Cooling Water Intake Consultant, Consumers Energy

- Engineering – Mr. Jim Cuchens, P.E., Prinicipal Consultant, Cuchens and Associates, Inc.
- Economics – Mr. Paul Jakus, PhD, Professor of Applied Economics, Utah State University

As part of the peer review process, U. S. Steel has attached to this email the qualifications of these proposed peer reviewers to you as a representative of IDEM's Office of Water Quality prior to initiating peer review activities. To support a timely submittal of the required 316(b) reports with the permit renewal application, U. S. Steel respectfully requests review and approval of peer reviewers no later than December 31, 2019. Should you have any additional comments and/or questions regarding this request, please reach out to Brandon Miller at 219-888-3369 or via electronic mail at BSMiller@uss.com.

We appreciate your attention to this matter and look forward to working with you throughout this process.

Thank you,

Nicole H. Benoit, P.E.
Environmental Affairs
United States Steel Corporation
Office: 412-433-6365
Cell: 412-551-6733
Email: nhbenoit@uss.com

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APPENDIX 5
COMMENT/RESPONSE MATRIX

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Was a discussion provided on the available alternative water sources and water reuse opportunities?	Jim Cuchens	The study included a discussion on investigation of all available alternate fresh water sources within a 10 mile radius of the plant site to conclude no available resources were available in quantities necessary for use. The study also considered/investigated use of reclaimed groundwater, municipal water, and well water.	No action needed
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	Jim Cuchens	The consideration of alternate water resources included consideration of proximity to the plant site and any/all requirements associated with accumulation, transport and/or reclamation of water to the site. The use of well water would require substantial infrastructure and consequential impact on environment/aquifer supply. If amply supply was available, use of reclaimed waste water would also incur additional expense for additional treatment to be suitable for plant use.	No action needed
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	The study did a comprehensive review and investigation in assessment of potential alternate water resources to conclude the lack of adequate resources available in proximity to the plant, infeasibility of alternate resources due to exorbitant costs for reliable use, and impact of transport from distant resources.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were assumptions, variables, and unknowns clearly identified within the design?	Jim Cuchens	Assumptions and variables were clearly identified associated with conversion to closed cycle recirculation system (CCRS). Design variables included consideration of wet/hybrid design technologies. Interferences were identified to a reasonable levels outside of a detailed design study. Assessment of hydraulics and pump/piping designs are subject to potential unknowns as determined from a detailed design study and/or hydraulic model study.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Did the design consider features and/or constraints specific to the facility? Yes: design features specific to each intake were identified and addressed.	Jim Cuchens	The evaluation and assessment of CCRS system design included consideration of facility flows, heat loads, available/required real estate, cooling tower size/orientation, cooling water temperatures (performance) and ambient/site meteorological data specific to the facility.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Was the design reasonable and adequate?	Jim Cuchens	The level of detail performed was sufficient to provide an adequate and reasonable assessment of component costs as well as overall implementation costs essential for evaluation of technical feasibility as required by the rule.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Was a thorough description of all technologies and operational measures considered included?	Jim Cuchens	All closed cycle cooling compliance technologies were thoroughly discussed including operating capabilities, energy/station service requirements, operations & maintenance (O&M) requirements, performance, size/proximity issues, and variation in technology costs. Operational measures included consideration of plume abatement as a function of site meteorological conditions as well as impact on plant performance.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Was a discussion on land availability reasonable and adequate?	Jim Cuchens	The technical feasibility assessment included appropriate consideration of land requirements for the various CCRS technologies. I would concur that there is insufficient area/space available for Natural Draft (ND) Cooling Towers and that Dry Cooling would require even more space (3X ±) than a ND tower. The location of the two mechanical draft towers were appropriately discussed relative to available space subject to other construction and/or implementation issues (proximity issues, plume abatement/recirculation, piping, etc.).	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	Jim Cuchens	Other factors (other than costs) considered in determination of candidate viability included constructability (do-able), impact on implementation (outage time, impact on performance, environmental compliance (impact on water, air, aquatic species, etc.)	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were estimated capital and O&M costs reasonable and accurate?	Jim Cuchens	The reports includes an assessment of O&M costs associated with the CCRS including energy requirements, and routine maintenance costs. An independent cost analysis of cooling tower O&M costs was examined in comparison with study results. The O&M costs for CCRS technology (cooling towers) was based on the impact to facility operations, performance, production, and reliability and were considered reasonable assessments.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were estimated capital and O&M costs presented appropriately (i.e. annualized net present value)?	Jim Cuchens	O&M costs were presented on an annualized bases. Valuation of parasitic energy costs may have been included but were not detailed or presented/discussed in the report. Capital costs were clearly presented as annualized net present values.	Parasitic load and costs were covered in the Power System chapter (pages 8-25) of the Social Cost Report.
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were costs clearly identified as compliance costs versus social costs?	Jim Cuchens	All costs identified associated with implementation of compliance technologies were identified as compliance cost per rule definitions.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	Comment 1: Tower design drift rate of 0.001 % is slightly higher than state of the art (0.0005%) but still an insignificant (low) value.	It is noted and agreed that the PVC cellular pack drift eliminators specified by the cooling tower vendor are marginally less efficient than state-of-the-art drift eliminators used on cooling towers of equivalent design. It should be further noted that the drift rate listed in the budgetary quotation is a high level estimate consistent with an ASTM E2516-11 Class 5 cost estimate and, as such, would be subject to more definitive analysis if a detailed design were completed.

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	Comment 2: Cross examination of tower evaporation and Makeup/Blowdown rates closely approximated study values based on assumed value of latent heat.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	Comment 3: The design of the counterflow towers proposed/selected for closed cycle cooling were modeled to confirm thermal performance capability coincident with meeting plant performance initiatives based on site ambient meteorological data. The tower design basis was reviewed in comparison with similar tower designs in operation and was considered a prudent viable cooling tower design selection.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were assumptions, variables, and unknowns clearly identified within the design?	Jim Cuchens	The evaluation of fine mesh included consideration of a number of variables including flow volume, plant operations, through screen velocity, debris/fouling, and impact on pump submergence/NPSH & capacity.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Did the design consider features and/or constraints specific to the facility?	Jim Cuchens	The design features of the fine mesh screening technology included site specific operating conditions (flows, hydraulics, etc.) for each of the four intakes. Each intake has specific design issues relative to maintaining adequate cooling water to plant cooling systems/components and overall plant reliability.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Was the design reasonable and adequate?	Jim Cuchens	The level of detail performed was sufficient to provide an adequate and reasonable assessment of component costs as well as overall implementation costs essential for evaluation of technical feasibility as required by the rule.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Was a thorough description of all technologies and operational measures considered included?	Jim Cuchens	There was no discussion and/or evaluation of various alternate fine mesh screen technologies such as fine mesh wedge-wire screens, fine mesh barrier nets, dual flow TWS, or expansion of existing intakes (adding screens) to reduce through screen velocities while minimizing screen ΔP. However, based on intake screen and/or plant location, it is not anticipated that consideration of alternate technologies would prove prudent and/or technically viable.	It is agreed that it is not anticipated that comprehensive technical feasibility and cost evaluation studies of technologies other than fine mesh traveling water screens would find alternate fine mesh technologies to be more prudent and/or technically viable.
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	Jim Cuchens	Feasibility of candidate technology included factors other than costs including compliance with rule requirements, operations & maintenance (O&M), impact on facility reliability, viability (do-able), and implementation requirements/impacts. While technically viable (do-able), the magnitude of implementation costs required for implementation does not constitute prudency/practicality as discussed in the study.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were estimated capital and O&M costs reasonable and accurate?	Jim Cuchens	Costs estimates for retrofitting existing intake screens included appropriate design considerations to reflect reasonable costs estimates/accuracy as required by the rule.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were estimated capital and O&M costs presented appropriately (i.e. annualized net present value)?	Jim Cuchens	Capital costs and O&M costs were presented as annualized cost as required by the rule. These cost represent implementation costs (capital & construction) and annual O&M associated with implementation of compliance technologies presented.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were costs clearly identified as compliance costs versus social costs?	Jim Cuchens	Requirements of the rule require all costs to be clearly identified as compliance costs or social costs.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	Comment 1: The evaluation of hydraulics included consideration of pump characteristics conducive to negatively impact pump NPSH/submergence. The hydraulic evaluation yielded theoretical values for acceptable screen cleanliness and ΔP. Screen cleanliness is typically not uniform to yield theoretical results. Secondly, screen fouling often results in a hydraulic gradient (static head) across the screen in addition to the theoretical friction losses/ΔP. As such, the values presented for acceptable cleanliness and/or ΔP are considered somewhat optimistic.	It is agreed that the analysis performed is based on theoretical ΔP across the screens and does not account for nonuniform screen fouling, system transients, approaching/departing flow patterns, and other presently unidentified effects. Due to the relatively large available margin, these effects are not anticipated to impact the technical feasibility or cost evaluation provided in this study. Detailed analysis of these results would be required to quantify appropriate operating margins and complete modification of the control system setpoints.
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	Comment 2: Routing of FHRS was not identified. As such interferences and/or unknowns may be significant to impact cost estimates, project schedule, and implementation accordingly.	Preliminary, high level routing of FHRS is provided on Figures 2.12 through 2.15. It is concurred that the extensive amount of buried infrastructure at Gary Works poses an appreciable amount of unknowns and risks to the completion of the project, as well as to safety/operations at Gary Works. Contingencies associated with the unknowns at the conceptual design stage and the uncertainties of potential buried interferences are included in the construction cost estimate, provided in Attachment 4. These contingencies are consistent with the ASTM E2516-11 Class 5 cost estimate basis and are subject to an expected accuracy range associated with the Class 5 cost estimate basis.
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	Jim Cuchens	Comment 3: There was no minimal discussion and/or cost considerations included for any additional requirements and/or maintenance provisions for removal and disposal of increased debris with use of fine mesh screening systems.	Per Table 2-16, it was estimated that an additional 3,125 labor-hours of on-site personnel effort would be required annually to support the operation and maintenance of the retrofitted fine mesh through-flow traveling water screens. It was assumed that the high-pressure screen wash systems would be sufficient to remove debris from the screens under typical operating conditions. During high debris events, removal of debris by on-site personnel may be required to maintain operability.

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Was a discussion provided on the available alternative water sources and water reuse opportunities?	John Gulvas	Yes: A thorough assessment of alternative water sources was completed and discussed.	No action needed
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	John Gulvas	Yes: reasons why alternative water sources were infeasible were provided	No action needed
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	None	No action needed
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Was a discussion provided on the available alternative water sources and water reuse opportunities?	John Gulvas	Available alternative water sources were identified, clearly discussed and evaluated.	No action needed
§122.21(r)(10)	Alternative Water Sources and Water Reuse	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	John Gulvas	Previously discussed.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	John Gulvas	Yes. Other factors were appropriately considered	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	The authors did an excellent job of addressing all rule aspects.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were assumptions, variables, and unknowns clearly identified within the design?	John Gulvas	Yes: assumptions and uncertainties identified and sufficiently addressed.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Did the design consider features and/or constraints specific to the facility? Yes: design features specific to each intake were identified and addressed.	John Gulvas	Yes: the USS Gary Works site is a very large and industrialized site that presents several design challenges and constraints that the authors did an excellent job of addressing.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Was the design reasonable and adequate?	John Gulvas	Yes: The mechanical draft/hybrid design is reasonable, adequate, well supported and documented.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Was a thorough description of all technologies and operational measures considered included?	John Gulvas	A thorough description of alternative cooling tower designs and operational measures was provided and discussed.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Was a discussion on land availability reasonable and adequate?	John Gulvas	Land availability issues were clearly identified and addressed	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	John Gulvas	Yes: Several other factors other than costs were identified and appropriately addressed.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were estimated capital and O&M costs reasonable and accurate?	John Gulvas	Yes: The estimates of capital and O&M costs for this complex site were very well done and reasonable.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were estimated capital and O&M costs presented appropriately (i.e. annualized net present value)?	John Gulvas	Yes; both capital and O&M costs were presented as annualized cost and net present value.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Were costs clearly identified as compliance costs versus social costs?	John Gulvas	What was considered as compliance costs and social costs was explained well and clearly presented in the report.	No action needed
§122.21(r)(10)	Closed-Cycle Recirculating System (CCRS)	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	The authors did an excellent job on the design and cost evaluation for the cooling tower technology. The report was well organized, clearly written, and provides reasonable and adequate information for decision making on the cooling tower technology.	No action needed

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Was the screen design reasonable and adequate?	John Gulvas	The retrofit of the screens to fine mesh with fish friendly collection and transport systems was reasonable and adequate	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Was the fish handling and return system design reasonable and adequate?	John Gulvas	The fish handling and return system to offshore Lake Michigan avoids reimpingement and was reasonable and adequate	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	John Gulvas	Yes, other factors were sufficiently considered	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	None	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were assumptions, variables, and unknowns clearly identified within the design?	John Gulvas	Yes: Retrofitting the travelling screens with fine mesh panels and a fish handling and return system involves several assumption, variables, and unknowns that were identified and addressed in the evaluation. Most noteworthy would be larval survival through the collection and handling system and extensive piping at this site for return to Lake Michigan.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Did the design consider features and/or constraints specific to the facility?	John Gulvas	Yes: design features specific to each intake were identified and addressed.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Was the design reasonable and adequate?	John Gulvas	The design for the fine mesh screen technology appears reasonable and adequate.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Was a thorough description of all technologies and operational measures considered included?	John Gulvas	Descriptions of operational measures and other alternatives to meet the required standards were provided.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were factors other than cost that may make a candidate technology impractical or infeasible discussed?	John Gulvas	Other factors affecting screen operation and fish survival were identified and discussed.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were estimated capital and O&M costs reasonable and accurate?	John Gulvas	Estimated capital and O&M costs were thorough, reasonable and adequate.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were estimated capital and O&M costs presented appropriately (i.e. annualized net present value)?	John Gulvas	Capital and O&M costs were appropriately presented as annualized cost and net present value.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Were costs clearly identified as compliance costs versus social costs?	John Gulvas	Compliance costs and social costs were well explained and presented.	No action needed
§122.21(r)(10)	Fine-Mesh Screen with Fish Return System	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	A very thorough evaluation of the fine mesh screen alternative, well organized and presented to address the rule requirements.	No action needed
§122.21(r)(10)	All Technologies	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the charge questions.	Paul Jakus	The booster pumps and holding lagoon are first discussed on page 63/64, but the location of the lagoon is not shown until very late in the document, and the booster pump location is never shown. These locations could be identified on Figures 3-16, 3-17 (pps 80-81), or on the piping schematics (Figures 3-21 and 3-22).	Location of the holding lagoon and booster pump stations has been added to Figures 3-16 and 3-17.

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(10)	All Technologies	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the charge questions.	Paul Jakus	P. 111. The contingency adjustment for capital costs of the CCRS are 47% of total costs. This seems quite large; is this standard for AACE Class 5 estimates?	The cost estimates developed in this Comprehensive Technical Feasibility and Cost Evaluation Study are Class 5 estimates per ASTM E2516-11, a similar cost estimation classification standard to AACE 18R-97. The amount of construction cost estimate contingencies vary with project scope, complexity, industry and site-specific information. Construction cost estimate contingencies for feasibility study conceptual designs typically range between 30% and 50% but could exceed 100% if a given project is highly uncertain. For comparisons of suggested contingcy ranges by estimate classification and project maturity, see DOE 2005 (Table A.1), DOE 1999 (Table 3) and USACE 2016 (Page 16). United States Department of Energy (DOE), DOE/FETC-99/1100, Waste Management Project Congingency Analysis, August 1999. United States Department of Energy (DOE), TN2358 Rev. 2.02, Cost Estimating Guidelines for Generation IV Nuclear Energy Systems, September 2005. United States Army Corps of Engineers (USACE), ER 1110-2-1302, Civil Works Cost Engineering, June 2016.
§122.21(r)(10)	All Technologies	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the charge questions.	Paul Jakus	The CCRS and the FMS options are both costed according to an AACE Class 5 estimate (e.g., bottom, page 110). Other 316(b) submittal documents have used an AACE Class 4 estimate. Does a Class 5 estimate satisfy 316(b) requirements?	The cost estimates developed in this Comprehensive Technical Feasibility and Cost Evaluation Study are Class 5 estimates per ASTM E2516-11, a similar cost estimation classification standard to AACE 18R-97. A Class 5 estimate per ASTM E2516-11 is defined as having a projection definition between 0% and 2%, and is intended for an end usage of screening or feasibility. Given the conceptual nature of the Comprehensive Technical Feasibility and Cost Evaluation Study, relatively low candidate project maturity of the CCRS and FMS options, and the intended use for determination of feasibility, it is belived that Class 5 estimates per ASTM E2516-11 are appropriate and satisfactory for compliance with 40 CFR 122.21(r)(10)(iii).
§122.21(r)(10)	All Technologies	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the charge questions.	Paul Jakus	P.45, Table 2-14: the total cost estimate for FMS ($23.81M) does not match the value used in other portions of the report ($29.45M).	The total estimate listed in Table 2-14 (page 45) is a summation of the construction budget and does not account for construction support costs (i.e. engineering and permitting). Table 2-17 (page 50) provides the cost estimates associated with construction support costs ($5.64M). The sum of the values listed in Tables 2-14 and 2-17 ($23.81M + $5.64) is equal to the total cost estimate listed in other portions of the report ($29.45M).
§122.21(r)(10)	All Technologies	Technical Feasibility and Cost	Please provide additional relevant comments not addressed by the charge questions.	Paul Jakus	P.50, Table 2-17: I am presuming that the cost proportions used for engineering (20%) and construction permitting (2%) support costs are standard values used in Class 5 AACE estimates.	The cost estimates developed for engineering and construction permitting are based on site-specific historical budgets, cost engineering typical values from the RSMeans cost estimating databook, and previous project experience. The selected proportions are consistent with a Class 5 estimate per ASTM E2516-11.
§122.21(r)(10)	All Technologies	Social Cost	Were the social costs identified reasonable and adequate?	Paul Jakus	Section 3 (Power system costs). This entire section leaves me a bit bewildered. It is unclear to me why relatively marginal increases in power demand—300 kW for FMS and 9 MW for CCRS—leads to such large power system costs ($2.6 million annually, or over $41 million under the 3% discount rate for CCRS). Page 9 of the (r)(12) document (Non-Water Quality Environmental And Other Impacts Study) states that USS Gary Works produces 133 MW at its onsite powerplant and purchases only 69 MW on the market. Any energy penalty costs should be very small at worst (3% of the relatively small 133 MW onsite plant) during summer months, and even less during the remainder of the year. Given the description of Gary Works, the penalty should be restricted to only the Gary Work plant. (Minor question: should this penalty be valued at a transfer price, or the market price?) Further, at no point do the planned construction schedules call for the Gary Works power plant to shut down, so there should be no temporary capacity reduction within the NIPSCO or MISO service areas. Instead, there is a small increase in demand with the FMS technology, and a larger, but still small, increase for the CCRS technology. In both cases, the additional load seems well within the capacity of the broader regional power system. Thus, Figures 8 and 9 are irrelevant for this case. It seems logical that this additional load could be handled during most hours of the year using standard NIPSCO/MISO dispatch without impacting reserve requirements, or any other restrictions. If this is not the case, then the "generic" description provided in the (r)(10) social cost study should be abandoned in favor of details specific to USS Gary Works, NIPSCO, and/or MISO.	This analysis assumes that Gary Works operates continuously. Due to this, it is assumed that there are parasitic loads in excess of 85,000 MWh for cooling towers. Gary Works has to purchase power to support current operations and it is expected that any additional power would be purchased to compensate for parasitic loads. The average price per MWh at the MISO Indiana hub in 2017 was $29.38. Considering the 85,000 MWh of parasitic load specified for cooling tower operation, this yields $2.5 million in power system costs annually. This compensatory power comes from NIPSCO and the MISO region, so even through the parasitic load is specific to Gary Works, the impact is borne by the market. While it is true that there is no required construction outage for Gary Works, the reduction in net generation can also be thought of as a capacity reduction as the amount of power supplied by Gary Works is decreasing by the level of parasitic load. The conclusions of this sections are correct even without a specified outage: "The overall impact is an increased cost of electricity to the consumer, which is a social cost resulting from use of cooling towers. However, because they occur in the context of price effects in competitive markets, this means there are financial transfers that make it difficult to identify who bears the social costs. In the case of Gary Works, the amount of net power the plant produces will decrease, meaning the amount of electricity the plant needs to purchase to operate would increase. Shareholders would bear the cost of the additional energy purchased." The text has been revised to clarify the fact that costs are directly related to the marginal cost of purchased power that would be required to compensate for additional load requirements at Gary Works.
§122.21(r)(10)	All Technologies	Social Cost	Were the methods for estimation of social costs reasonable and adequate?	Paul Jakus	See other question related to social cost	No action needed
§122.21(r)(10)	All Technologies	Social Cost	Were social costs represented as an annualized cost and net present value?	Paul Jakus	Yes	No action needed

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(10)	All Technologies	Social Cost	Were assumptions, variables, and unknowns clearly identified?	Paul Jakus	Yes	No action needed
§122.21(r)(10)	All Technologies	Social Cost	Please provide additional relevant comments not addressed by the questions above.	Paul Jakus	Page 4, Middle of second paragraph—no facility outages are anticipated, so they should not be mentioned in costs.	Agreed, the text has been revised to read "Power system costs are specified to occur after construction based on efficiency and auxiliary load impacts."
§122.21(r)(10)	All Technologies	Social Cost	Please provide additional relevant comments not addressed by the questions above.	Paul Jakus	The Veritas document (p. 6) says USS Gary Works has a 116 MW plant; (r)(12) says it has a 133 MW plant (p. 9). Which is correct?	Generation data for the cogeneration plant is as follows for 2016, 2017, and 2018 respectively: 83 MWe, 114 MWe, and 133 MWe. Describing the plant with a single power output is an oversimplification of how USS operates the plant. A discussion which captures the historical operation of the plant was determined to be more appropriate and has been revised accordingly. References to the Gary Works nameplate capacity have been removed.
§122.21(r)(10)	All Technologies	Social Cost	Please provide additional relevant comments not addressed by the questions above.	Paul Jakus	The vertical axes on Figures 10, 11, and 12 are missing units. (In order, are the units MW? Cost per MW? MW?).	The figures have been revised to include the appropriate units.
§122.21(r)(11)	Closed-Cycle Recirculating System (CCRS)	Thermal Discharges	Was a discussion of benefits related to reductions in thermal discharges from entrainment technologies included?	Jim Cuchens	Paragraph 4.6 of Addendum 316(b) Addendum 122.21(r)(9) - (13) contained a discussion of benefits related to thermal discharges from entrainment technologies. I would concur that conversion to closed cycle cooling would reduce thermal discharges to Lake Michigan and Grand Calumet River. Based on information provided, I would also concur with the conclusion that there would be minimal if any benefit due to reduction in thermal discharge. "U.S. Steel is in compliance with § 316(a) requirements for the Grand Calumet River which indicate that the thermal discharge does not have a dramatic negative ecological effects under baseline conditions."	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Was the method for estimating entrainment reduction reasonable and adequate?	John Gulvas	Yes: a sound determination for entrainment reduction	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Were inputs from the Entrainment Characterization Study reasonable and adequate?	John Gulvas	Yes: appropriately done	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Were the methods for estimating changes in commercial or recreational species reasonable and adequate?	John Gulvas	yes: methods to estimate changes in commercial and recreational harvest are very well done.	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Was the selection of taxa or relevant species reasonable and adequate?	John Gulvas	Taxa selection was reasonable and adequate	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Was the discussion on mitigation efforts prior to October 14, 2014 reasonable and adequate?	John Gulvas	Yes: mitigation factors prior to October 14, 2014 were appropriately addressed	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Were assumptions, variables, and unknowns clearly identified?	John Gulvas	Authors did an excellent job of explaining assumptions and variables	No action needed
§122.21(r)(11)	All Technologies	Benefit Valuation	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	None	No action needed
§122.21(r)(11)	Closed-Cycle Recirculating System (CCRS)	Thermal Discharges	Was a discussion of benefits related to reductions in thermal discharges from entrainment technologies included?	John Gulvas	No benefitsanticipated from reduction of thermal. Good explanation of compliance with current standards.	No action needed
§122.21(r)(11)	Closed-Cycle Recirculating System (CCRS)	Thermal Discharges	Was a discussion of benefits related to reductions in thermal discharges from entrainment technologies included?	John Gulvas	Yes	No action needed

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(11)	All Technologies	Benefits Valuation	Were the methods for estimation of recreational and commercial fishery benefits reasonable and adequate?	Paul Jakus	The entrainment numbers are huge, yet they convert to only very small numbers of adult equivalents or biomass. For example, 2013 entrainment of yellow perch eggs (as shown on pps. 4-9, Tables 1.2 through 1.4) totals nearly 5.9 million eggs for Pumps #1 and #2, and Lakeside, yet these convert to only about 2,325 adults (p.11, Figure 1.1). Similarly, some 6.2 million gizzard shad eggs convert to only 27.5 pounds of biomass (p. 12, Figure 1.2, panel B)—nearly a quarter million eggs to produce a pound of biomass! I'm not a biologist and will defer to their expertise, so here's my question: did the biology peer reviewer sign off on these numbers?	Eggs have a very low probability of survival to proceeding lifestages. Those that survive to larval or juvenile life stages are very unlikely to survive to adulthood. Because of this, even a large amount of eggs will yield a small amount of biomass. Biology peer review approved methods used.
§122.21(r)(11)	All Technologies	Benefits Valuation	Were biological benefits, other than entrainment impacts, identified and/or quantified?	Paul Jakus	Yes	No action needed
§122.21(r)(11)	All Technologies	Benefits Valuation	Were any significant environmental benefits omitted from the evaluation?	Paul Jakus	The increases in fish stocks due to entrainment reductions were converted to catch rates per unit of effort, to be used in the recreational fishing demand model and the commercial fishing demand model. The number of fish impinged are included in this study document (Table 1.1 on pages 2-3) but reductions in impingement mortality (IM) are not included in catch rates per unit effort and are therefore excluded in the benefits modeling. This greatly reduces measured benefits of a CCRS retrofit because the IM losses under current operations (with 32,000 yellow perch and 44,000 gizzard shad impinged, for example, in Table 1) appear to be much greater than entrainment losses. IM benefits may not be required from a legal standpoint, but exclusion does affect the estimated benefits of the CCRS technology.	The Rule requires the implementation of an impingement reduction technology while the implementation of entrainment reduction technologies are subject to a site-specific BTA determination. Because the impingement table included in the report reflects impingement under current conditions, it is not an appropriate baseline to estimate the benefits of the entrainment reduction technologies. The true impingement benefits of the entrainment reduction technologies would be the incremental benefit over the chosen impingement compliance technology. Because the r(11) does not evaluate the technology chosen for impingement compliance, the benefits of impingement reduction as a result of the entrainment reduction technologies is not evaluated.
§122.21(r)(11)	All Technologies	Benefits Valuation	Were assumptions, variables, and unknowns clearly identified?	Paul Jakus	P. 34, top. Fezzi et al. (JEEM, 2014) use Monte Carlo analysis to examine the appropriate adjustment to the wage rate when calculating the opportunity cost of time. They argue that 1/3 of the wage rate is too low and biases benefit estimates downward. In the absence of additional information about anglers, they argue that the best adjustment factor is 0.75 × wage rate. I am not asking that the analysis be re-estimated with this adjustment factor. Rather, I'd like to see an acknowledgement that the 1/3 wage rate approach is the most common and time-honored approach, but benefits are sensitive to the adjustment factor selected by the analyst.	The following footnote has been added to page 34: "Some studies such as Fezzi, Bateman, and Ferrini (2014) suggest that the adjustment factor could be potentially be as high as three-fourths of the hourly wage rate. Using one-third of the average hourly wage rate as an adjustment factor is the most common approach for estimating opportunity cost in a RUM model, but the benefits calculation is sensitive to the chosen adjustment factor."
§122.21(r)(11)	All Technologies	Benefits Valuation	Please provide additional relevant comments not addressed by the questions above.	Paul Jakus	I was pleased to see the Melstrom and Lupi (2013) Great Lakes model used as the basis of the benefit transfer. This paper applies modern TCM methods to a reasonably recent data set (2009), and does so for a fishery for which a reliable transfer is reasonably likely. It is rare that one has such a good model "match" when conducting a transfer exercise. To make sure I understand the transfer procedure used, the predicted change in CPUE (e.g., roughly 0.014 for yellow perch in 2013—Figure 1-7, panel B on p. 20), added it to the catch rate reported in Table 3.2 (p. 49), and then calculated the predicted change in trips and welfare using standard nested logit formulae and the parameters from Melstrom and Lupi. True? The reason I ask is that the per trip welfare gain (about $2,150 for an additional 215 trips or so) is very small. This implies an average CS per trip of $10, which is well below the $27.50 value reported by M&L (which was measured in $2009). What's going on here? Why don't the increases in welfare and the number of trips scale to something near M&L's (inflation-adjusted) baseline value of a trip?	In responding to this comment, we found that the benefit model used contained the travel cost coefficient from Lupi et al's 1998 paper. The model has been revised to use the travel cost coefficient from Melstrom and Lupi (2013) and the results have been updated in the report. More generally, when conducting a functional benefits transfer we do not necessarily expect for average per trip impacts to be the same across geographic locations and choice sets. The reason is that the characteristics of the underlying origins and sites differ across situations. For example, closing a site that is close to a population center with no nearby substitutes is expected to have a larger average impact per affected trip than closing a site with equidistant and comparable substitutes.
§122.21(r)(11)	All Technologies	Benefits Valuation	Please provide additional relevant comments not addressed by the questions above.	Paul Jakus	Section 2.4 (pp. 35-41): The nonuse value discussion hits all the important points, yet the references are very old. Simply adding a few more modern references would strengthen this section—for example, a couple of the chapters from Champ et al.'s 2017 nonmarket valuation book would be helpful, and perhaps a couple of references from the group of CVM papers published in J. Econ. Perspectives in 2012.	The following footnote has been added to the report, "See Champ, Boyle, and Brown (2017); Carson (2012); Hausman (1993, 2012); and Arrow et al. (1993) for a more detailed critique of CV."
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of changes to energy consumption, including but not limited to auxiliary power consumption and turbine backpressure energy penalty, reasonable and adequate?	Jim Cuchens	Energy changes were thoroughly evaluated which included impact on plant reliability during construction and implementation as well as operation of modified plant with closed cycle cooling. Auxiliary Parasitic energy (station service loads) consumption was examined included for cooling tower fans and pumping energy.as well as for modified traveling water screens. Turbine cycle (condenser backpressure) performance was also considered with closed cycle cooling deviations from existing once through water conditions/temperatures The closed cycle cooling towers were thermally modeled to review cold water deviations from once through cooling performance.	No action needed

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions reasonable and adequate?	Jim Cuchens	The study included a evaluation of incremental emissions attributed to closed cycle cooling and fine mesh screens. Additional air pollutant emissions associated with closed cycle cooling (cooling towers) would include pm10 emissions (particulate) which was discussed in r(12). Estimates of pm10 particulates could be estimated from current water quality analysis (suspended/dissolved solids).	A conservative estimate of PM10 emissions were made for the West and East Loop cooling towers using EPA's AP-42 formula (EPA 1995) and the total dissolved solids value from blowdown water quality estimates for each tower. PM10 (lb/hr) = Water Circulation (lb/hr) x Drift rate (%) x [Total Dissolved Solids (TDS, ppm) x Cycles of Concentration]/1,000,000 The PM10 estimates are approximately 0.2 tons per year for the West Loop cooling tower and for the greater volume flow East Loop cooling tower approximately 2.0 tons per year. Add to Section 9, Literature Cited: U.S. Environmental Protection Agency (EPA) 1995. AP 42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume 1, Chapter 13 Miscellaneous Sources, Section 13.4 Wet Cooling Towers. January 1995
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of changes in noise reasonable and accurate?	Jim Cuchens	Changes in site noise levels included consideration of construction equipment (temporary noise) as well as operating noise from cooling towers fans, falling water, pumps, etc.). Changes in noise was considered to have a minimal impact due to being located on an industrial site. I would concur that the cooling tower noise impact would be minimal due to site location and proximity, to other industrial equipment.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are impacts to safety reasonable and adequate?	Jim Cuchens	Impacts on safety included consideration of cooling tower plume dispersion, visibility, proximity, roadway fogging/icing, and personnel exposure. The plume was estimated to primarily impact the plant site with some reductions in ground traffic speed but would not have any impact on air traffic/travel. Use of fine mesh screens and piping was estimated to be a potential safety hazard associated with waterborne traffic which would require appropriate warning/lighting/acoustic provisions. These impacts were considered reasonable & appropriate.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are impacts to facility reliability reasonable and adequate?	Jim Cuchens	Both compliance technologies would have varying impacts on facility reliability during implementation and construction. Damage to fine mesh screens was properly considered as a potential impact on facility reliability. The impact on facility reliability associated with operation of closed cycle cooling with cooling towers was also reasonable and accurate. Site unknowns may also impact facility reliability through discovery during any detailed design study. The fish return system was not detailed to asses other impacts but is also anticipated to have potential; impacts.	The following two paragraphs added to Section 6.2: The implementation of fine mesh TWS would also increase the likelihood of screen blockage which could interfere with the ability to withdraw the needed volume of cooling water. Due to the lower percent of open area and the opening width of fine mesh TWS, the screens are at increased risk for fouling, debris stapling, and other debris related blockages. Large-scale screen blockage is mitigated through redundancy in design. If one or more fine mesh TWS develop large-scale screen blockage, flow would be diverted through other fine mesh TWS. Other mechanical disruptions of the TWS and FHRS system (e.g., circulating pump failure; failure in the screen wash nozzles, valves, or piping; or discharge piping leak or break) could also cause a partial loss of flow. While any form of blockage would result in a partial loss of flow, the severity is lessened through redundancy in the pump stations, as previously discussed, and redundancy in the screen wash system. Also, standby pumps can draw in supplemental water to mitigate the emergent issue. A complete break of any discharge pipe is highly unlikely, a leak or small break would result in a smaller reduction in system flow.
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are changes in consumption of water reasonable and adequate? Changes in water consumption due to cooling tower evaporation are evaluated and estimates appear reasonable and adequate.	Jim Cuchens	An independent analysis was conducted to examine water consumption (cooling tower evaporation) as well as makeup and blowdown requirements at the expected cycles of concentration. Values of consumption presented were reasonable and accurate based on assumptions and operating conditions.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Is the discussion to mitigate each of these factors reasonable and adequate?	Jim Cuchens	Mitigation of various factors was thoroughly reviewed and discussed to minimize and/or eliminate potential impacts associated with cooling towers or fine mesh traveling water screens. Mitigation measure included potential sound barriers, off-shore warning barriers, or other viable measures to reasonably and accurately address potential impacts associated with each compliance technology.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of changes to energy consumption, including but not limited to auxiliary power consumption and turbine backpressure energy penalty, reasonable and adequate?	John Gulvas	Yes: thoroughly addressed.	No action needed

Peer Review Comment Summary

Regulatory Requirement	Technology	General Topic	Charge Question	Peer Reviewer	Peer Reviewer Answer	Comment Response
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions reasonable and adequate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of changes in noise reasonable and accurate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are impacts to safety reasonable and adequate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are impacts to facility reliability reasonable and adequate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are changes in consumption of water reasonable and adequate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Is the discussion to mitigate each of these factors reasonable and adequate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Please provide additional relevant comments not addressed by the questions above.	John Gulvas	None	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of changes to energy consumption, including but not limited to auxiliary power consumption and turbine backpressure energy penalty, reasonable and adequate?	John Gulvas	Yes: the changes to energy consumption are clearly described and estimates appear reasonable and adequate.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions reasonable and adequate?	John Gulvas	Yes: Estimates of air pollutant emissions and of human health and environmental impacts are reasonable and adequate.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are estimates of changes in noise reasonable and accurate?	John Gulvas	Estimates of changes in noise with the cooling tower option are identified and estimates appear reasonable and accurate.	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are impacts to safety reasonable and adequate?	John Gulvas	Yes	No action needed
§122.21(r)(12)	Non-water Quality Environmental and Other Impacts Study	Impact Study	Are impacts to facility reliability reasonable and adequate?	John Gulvas	Yes	No action needed