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

December 15, 2020

VIA ELECTRONIC MAIL

Mr. Donnie Brown, VP Refining – Whiting
BP Products North America Inc. – Whiting Refinery
2815 Indianapolis Boulevard
Whiting, Indiana 46394

Dear Mr. Brown:

Re: NPDES Permit No. IN0000108
Permit Modification
BP Products North America Inc.
Whiting Refinery
Whiting, Indiana – Lake County

Your request for modification of the above-referenced discharge permit 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 IDEM's permitting authority under IC 13-15.

The enclosed Pages 1, 5, 8, and 42 of 72 are intended to replace the corresponding pages of your existing NPDES Permit No. IN0000108. An accompanying Fact Sheet itemizes and explains the rationale for the revisions. All discharges from the referenced facility shall be consistent with the terms and conditions of this permit, as modified.

The draft NPDES permit for BP Products North America Inc. – Whiting Refinery was made available for public comment from October 22, 2020 through November 23, 2020 as part of Public Notice No. 20201022–IN0000108–D on IDEM's website at https://www.in.gov/idem/6408.htm. During this comment period, a comment letter dated November 4, 2020 (and updated November 18, 2020), from Natalie Grimmer, Environmental Planning Team Lead, was received. A comment letter dated November 23, 2020, from David Dabertin was also received. A response to the comments 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.

Pursuant to IC 4-21.5-3-5(f), the determination of modification in this letter becomes effective fifteen (15) days after it has been served; however, pursuant to IC 4-21.5-3-2(e), if it is served by mail it becomes effective eighteen (18) days after issued. 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

Any appeal request must be filed in accordance with IC 4-21.5-3-7, IC 13-15-7, and the enclosed Public Notice. The appeal request must include facts demonstrating that the party requesting appeal is the applicant, a person aggrieved or adversely affected by this modification or otherwise entitled to review by law. Pursuant to IC 13-15-7-3, the permit shall remain in force pending a decision on any appeal that has been timely requested under the provisions of IC 4-21.5 and IC 13-15-7.

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 forms. 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.

If you have questions concerning this modification, please contact Taylor Wissel at 317/234-4260 or twissel@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

Enclosure
cc: Chief, Permits Section, U.S. EPA, Region 5
Lake County Health Department
IDEM Northwest Regional Office
Natalie Grimmer, BP
Nick Ream, IDEM
Rose McDaniel, IDEM
Helen Demmings, IDEM
David Dabertin

STATE OF INDIANA

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

AMENDED 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 permitting authority under IC 13-15,

BP PRODUCTS NORTH AMERICA INC. WHITING REFINERY

is authorized to discharge from a petroleum refinery located at 2815 Indianapolis Boulevard, Whiting, Indiana, to receiving waters named Lake Michigan and the Lake George Branch of the Indiana Harbor Ship Canal in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III, IV, and V hereof.

The permit, as issued on February 21, 2019 is hereby amended, as contained herein. The amended provisions shall become effective January 1, 2021. All terms and conditions of the permit not modified at this time remain in effect. Further, any existing condition or term affected by the amendments will remain in effect until the amended provisions become effective. This permit may be revoked for the nonpayment of applicable fees in accordance with IC 13-18-20.

This permit and the authorization to discharge, as amended, shall expire at midnight March 31, 2024. 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 _December 15, 2020_ for the Indiana Department of Environmental Management.

Jerry Dittmer, Chief
Permits Branch
Office of Water Quality

[10] The following EPA approved test methods and associated LODs and LOQs are to be used in the analysis of the effluent samples. Alternative methods may be used if first approved by IDEM and EPA, if applicable.

Parameter	Test Method	LOD	LOQ
Mercury	1631E	-----	-----[1]
Arsenic	3113B	1 ug/l	3.2 ug/l
Arsenic	200.9	0.5 ug/l	1.6 ug/l
Arsenic	200.8	0.4 ug/l	1.3 ug/l
Selenium	3113B or 3114B	2 ug/l	6.4 ug/l
Selenium	200.8	2.1 ug/l	6.7 ug/l
Selenium	200.9	0.6 ug/l	1.9 ug/l
Benzo (a) pyrene	610	0.023 ug/l	0.073 ug/l
Benzo (a) pyrene	625, 625.1	0.022 ug/l	0.10 ug/l
Chlorine	4500-Cl-D, E, G	0.02 mg/l	0.06 mg/l

[1]The LOQ must be less than the permitted water quality-based effluent limitation for mercury of 1.3 ng/l.

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 Outfalls 003 located at Latitude: 41º 38' 59" Longitude: -87º 30' 17" and Outfall 004 located at Latitude: 41º 38' 48" Longitude: -87º 29' 05" respectively. The discharge is limited to stormwater associated with industrial activity from the J&L and Lake George areas of the refinery. 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 Lake George Branch of the Indiana Harbor Ship Canal. Such discharge shall be limited and monitored by the permittee as specified below:

DISCHARGE LIMITATIONS [1][3][4][5]

Outfall 003, 004

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	Estimate Total
TOC	--------	--------	------	Report	110	mg/l	1 X Weekly[2]	Grab
Oil & Grease	--------	--------	------	Report	15.0	mg/l	1 X Weekly[2]	Grab

Table 2

	Quality or Concentration			Monitoring Requirements	
	Daily	Daily		Measurement	Sample
Parameter	Minimum	Maximum	Units	Frequency	Type
pH	6.0	9.0	s.u.	1 X Weekly[2]	Grab

[1] See Part I.B. of the permit for the Narrative Water Quality Standards.

[2] The permittee shall sample TOC, Oil & Grease, and pH during the first discharge of each week. If there is no discharge during any particular week, then the permittee shall report No Discharge for that week on the Monthly DMR.

[3] The Storm Water Pollution Prevention Plan (SWPPP) requirements can be found in Part I.D. and I.E. of this permit.

[4] The weekly sampling period is from Monday through Sunday.

[5] Within 1 year of the permit effective date, the permittee shall submit a report on firefighting training to IDEM. The report should address the frequency of training, provide the MSDS or other information on the chemical make-up of the firefighting foam used during training, and an analysis of firefighting foam alternatives that could be used during training exercises if the foam used during training exercises contains per and polyfluoroalky substances, and any other relevant information.

H. Diffuser Monitoring Requirements

1. Biological Survey

a. No later than December 31, 2022, BP Products North America shall conduct a survey of the aquatic life found within a 200 feet radius of the diffuser. The results of this survey shall be submitted to the IDEM Office of Water Quality (OWQ) Industrial NPDES Permits Section and to the OWQ Compliance Branch. The results may be submitted by email to the Industrial NPDES Permits Section at OWQWWPER@idem.in.gov and to the Compliance Branch at wwReports@idem.in.gov.

b. Within a year of the permit effective date, the permittee will submit an updated Biological Survey sampling plan to IDEM for review and approval. The approved IDEM Biological Survey sampling plan will be used for all biological surveys throughout the duration of the permit."

I. 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 comply with any applicable standards, regulations and requirements issued or approved under section 316(b) of the Clean Water Act.

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

5. 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.

National Pollutant Discharge Elimination System
Fact Sheet for

BP Products North America Inc.
Whiting Refinery

Draft modification: October 2020
Final modification: December 2020

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:	BP Products North America Inc. – Whiting Refinery 2815 Indianapolis Boulevard Whiting, Indiana 46394
Existing Permit Information:	Permit Number: IN0000108 Expiration Date: March 31, 2024
Facility Contact:	Natalie Grimmer, Environmental – Planning Team Lead (832) 619-2908 or natalie.grimmer@bp.com
Facility Location:	2815 Indianapolis Boulevard Whiting, Indiana Lake County
Receiving Stream:	Lake Michigan, Indiana Harbor Ship Canal
GLI/Non-GLI:	GLI
Proposed Permit Action:	Modify
Date Application Received:	July 10, 2020
Source Category	NPDES Major – Industrial
Permit Writer:	Taylor Wissel, Senior Environmental Manager (317) 234-4260 or twissel@idem.in.gov

Table of Contents

1.0 INTRODUCTION

The Indiana Department of Environmental Management (IDEM) received a request from BP Products North America Inc. on July 10, 2020 to modify National Pollutant Discharge Elimination System (NPDES) Permit IN00001018. The current five-year permit was issued with an effective date of April 1, 2019 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. This Fact Sheet also identifies the modified pages of the permit as issued on February 21, 2019.

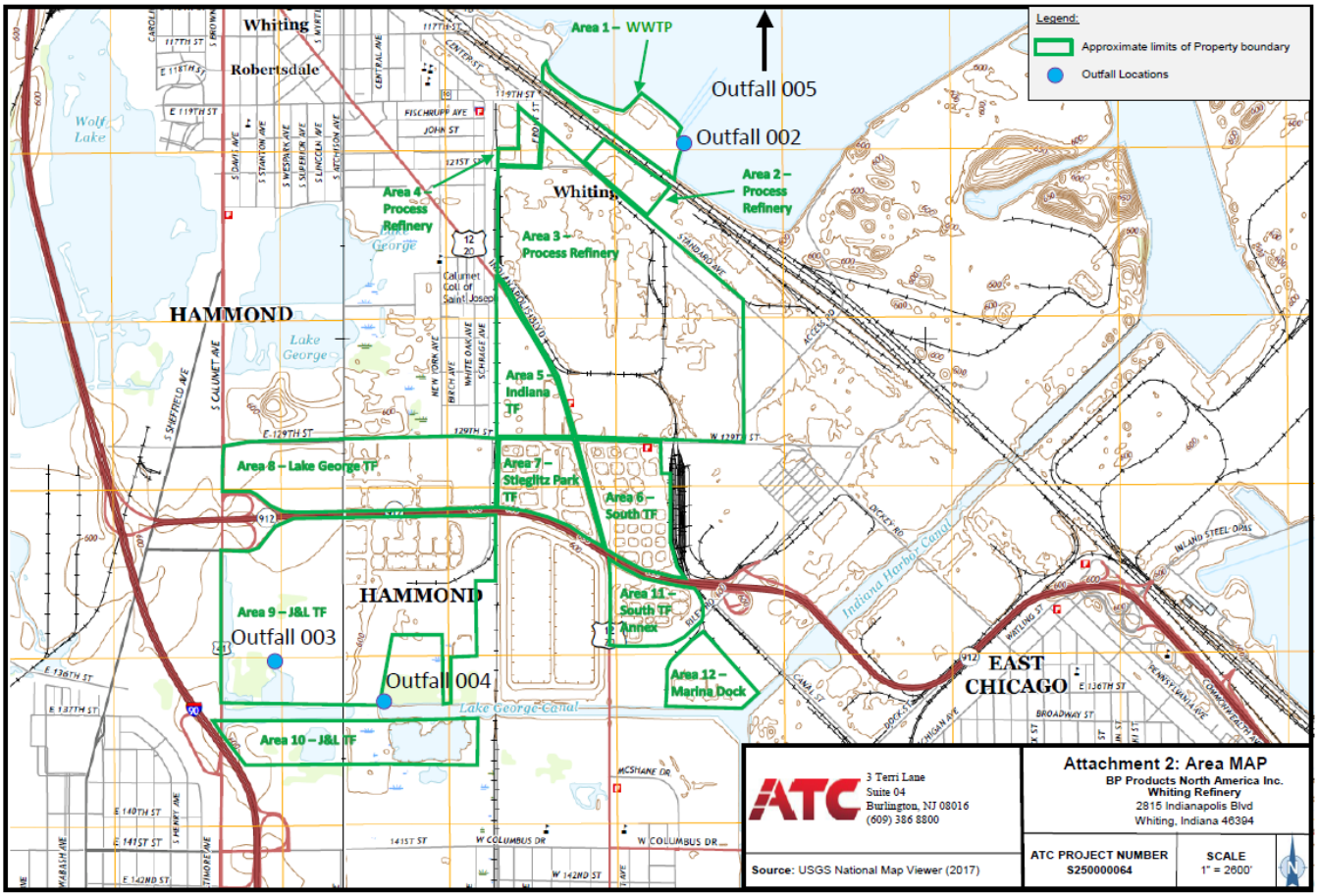
2.0 FACILITY DESCRIPTION

2.1 General

BP Products North America Inc. – Whiting Refinery is classified under Standard Industrial Classification (SIC) Code 2911 – Petroleum Refining and 2951 – Asphalt Paving Mixtures and Blocks. BP Products North America Inc. – Whiting Refinery (BP Whiting) owns and operates a petroleum refinery located on approximately 1400 acres within the boundaries of Whiting, East Chicago, and Hammond, Indiana, near the southern tip of Lake Michigan. The facility is designated as a major NPDES permitted facility.

BP Whiting is a Class B petroleum refinery which receives crude oil by pipeline and refines it into a variety of products, including gasoline, heating fuel, jet fuel, diesel, asphalt, and coke. The refinery also produces petroleum intermediates. Products may be stored prior to shipment by truck, barge, or pipeline. The facility employs approximately 1,700 people and may process up to 430,000 barrels of crude oil per day. A map showing the location of the facility has been included as Figure 1.

Figure 1: Facility Location/Site Map



BP Products North America Inc.
Whiting Refinery
2815 Indianapolis Boulevard
Whiting, Indiana 46394
Lake County

2.2 Outfall Locations

Outfall 002	Latitude: Longitude:	41° 40’ 36” -87° 28’ 18”
Outfall 003	Latitude: Longitude:	41° 38’ 59” -87° 30’ 17”
Outfall 004	Latitude: Longitude:	41° 38’ 48” -87° 29’ 05”
Outfall 005	Latitude: Longitude:	41° 41’ 03” -87° 28’ 05”

3.0 PERMIT MODIFICATION

3.1 Modification Request

BP has requested a permit modification for the following reasons:

- Diffuser monitoring requirement – biological survey frequency
- Limit of Detection and Limit of Quantitation associated with mercury analysis by USEPA Method 1631E
- Sample type for flow at stormwater outfalls 003 and 004
- Corrections for approved water treatment additives
- Corrections to the facility water flow diagram
- Changes to Footnotes regarding methods and publication dates

Diffuser monitoring requirement – biological survey frequency

In Part I.H.1.a. of the Permit issued on February 21, 2019, BP is required to conduct an aquatic life survey within a 200 feet radius of the diffuser every even numbered year. BP submitted a sampling plan in September 2019 and a revised plan in June of 2020 that addresses comments IDEM had on the original plan. In order to effectively implement the enhanced work plan, BP is requesting the survey frequency outlined in Part I.H.1.a. of the Permit be revised to read:

> In 2021 and 2023, BP Products North America shall conduct a survey of the aquatic life found within a 200 feet radius of the diffuser. The results of these surveys shall be submitted to IDEM's Office of Water Quality, Industrial NPDES Permits Section.

LOD and LOQ for mercury using Method 1631E

BP recognizes the Indiana Administrative Code (IAC) Title 327 Water Pollution Control Division specifically references requirements for analytical test procedures. These references are contained in 327 IAC 5-2-13(d)(1) which states "Test procedures identified in 40 CFR 136 shall be utilized for pollutants and parameters". Based on the most recent updates to state rules, references to the Code of Federal Regulations (CFR) within 327 IAC refers to the July 1, 2016, edition. However, significant updates to federal regulations have been implemented since the July 1, 2016 edition rendering the references within 327 IAC outdated, inappropriate, and contradictory to Permit language. The refinery's NPDES Permit (No. IN0000108) Part I.C.4 specifically states that "analytical and sampling methods used shall conform to the current version of 40 CFR 136."

Specific to Outfall 005, Part I.A. Footnote 10 stipulates EPA approved test methods and associated LODs and LOQs that are to be used in the analysis of effluent samples. For low level mercury analysis, the following is required:

Parameter	Test Method	LOD	LOQ
Mercury	1631E	0.2 ng/L	0.5 ng/L

While this language has consistently been applied in previous NPDES Permits for the facility, the language in the current Permit does not take into account the recent updates to federal regulations related to 40 CFR 136, referred to herein as the Methods Update Rule (MUR).

The MUR promulgated by the U. S. Environmental Protection Agency (EPA) and finalized on August 28, 2017 included changes to analytical test procedures that are used by industry to analyze the chemical, physical, and biological components of wastewater that are required under the Clean Water Act. Among the changes prompted by the MUR, EPA revised the procedure for determination of the method detection limit (MDL). The revised MDL procedure differs in three significant ways.

1. The MDL procedure now accounts for method blanks results in calculating an MDL, in addition to the spiked samples that have always been used to calculate the MDL.
2. The MDL now requires that the samples used to calculate the MDL are representative of laboratory performance throughout the year, rather than on a single date.
3. A laboratory has the option to pool data from multiple instruments to calculate one MDL that represents multiple instruments.

Additionally, these revisions changed the definition of MDL, functionally equivalent to limit of detection (LOD) in the current Permit, as follows:

- Previous MDL procedure (Revision 1.11, 1985) stated: “The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.” This definition is consistent with the MDL/LOD in the current Permit.
- The new definition of the MDL (Revision 2, 2016) is “The method detection limit (MDL) is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."

In March 2020, the refinery’s contract laboratory (Microbac) completed the first recalculation of MDLs for Method 1631E based on the revised MDL procedure (Revision 2, 2016). This recalculation resulted in a revised MDL equivalent to 0.426 ng/L, which exceeds the specifications in Part I.A. Footnote 10. Outfall 005 low level mercury analysis reported for 3/16/2020, 3/19/2020, 4/6/2020, 4/9/2020, 4/20/2020, and 4/23/2020 were reported with the elevated LOD. As a corrective action, a full MDL study commenced and was completed by the end of April 2020. While the MDL was able to be reduced to 0.231 ng/L, this level continues to be higher than the currently stated LOD within the Permit.

Per the EPA Method 1631, Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry (August 2002), Section 9.2.1 states:

> *"Method detection limit—To establish the ability to detect Hg, the laboratory shall achieve an MDL that is less than or equal to the MDL listed in Section 1.5* [0.2 ng/L when no interferences are present] *or one-third the regulatory compliance limit, whichever is greater* [emphasis added]. *The MDL shall be determined according to the procedure at 40 CFR 136, Appendix B using the apparatus, reagents, and standards that will be used in the practice of this Method. "*

Table 1 in Section 18 of the Method lists the criteria for the lowest ambient water quality criterion for Mercury as 1.3 ng/L, which can conservatively be applied as the "regulatory compliance limit" detailed in Section 9.2.1. As indicated above, to date the MDLs calculated by BP's contract lab are equal to or less than one-third the regulatory compliance limit (equal to 0.43 ng/L) allowed as the maximum LOD.

With the new MDL definition (Revision 2, 2016) and calculation procedures, the laboratory achieved MDL is subject to more variability than under the previous MDL procedure. As such, BP requests the removal of the required mercury LOD from Part I.A.1 Footnote [10] and suggests inclusion of language that requires labs to conform to 40 CFR 136 approved methods and procedures as detailed in Part I.C.4. Additionally, definitions of LOD and MDL in Part I.C.3.h and Part I.C.3.j respectively should be revised to reflect the current federal language.

Additionally, while the LOQ of 0.5 ng/L for Method 1631E has consistently been achieved by the contract laboratory, BP noted during this evaluation that Outfall 005 results have historically been reported with a 2:1 dilution factor elevating the LOQ to 1.0 ng/L for Outfall 005 samples. In keeping with Method 1631E requirements and guidance, BP requires the matrix spike and matrix spike duplicate (MS/MSD) to pass acceptance criteria and historically an interference has been noted affecting these recoveries. As a result, Outfall 005 effluent samples have been diluted by a factor of 2 which alleviates the interference. This is an allowable and recommended approach for interference mitigation; however, it does result in elevated LOQ values for Outfall 005 samples (greater than 0.5 ng/L).

As a corrective action going forward, BP has directed the contract laboratory to run Outfall 005 effluent samples undiluted initially to determine if the interference persists and only dilute those samples required to achieve passing MS/MSD. This will ensure that only valid data continue to be used and the lowest LOD/LOQ possible are being achieved for Outfall 005 effluent analysis. BP requests that additional language be added to the mercury LOQ in Part I.A.1 footnote [10] to allow for alternative LOQs due to dilution from interference mitigation. BP suggests language be added to Footnote 10 to denote an LOQ of 0.5 ng/L or lower is required unless it is demonstrated by the laboratory that dilution is needed to remove matrix interferences. BP envisions that the process outlined above (running first without dilution and only diluting if the associated MS/MSD criteria are not met) is adequate for demonstrating the need for dilution. BP does not anticipate submitting this information each time dilution is needed but will retain required records as indicated in Part I.C.7.

<u>Outfall 003 and 004 flow sample type</u>

The current Permit requires BP to report flow from two stormwater discharges (Outfalls 003 and 004) daily utilizing a 24-hour total sample type. Outfalls 003 and 004 are fed by vegetated drainage ditches controlled by sluice gates. The discharges from these outfalls are manually controlled. A visual daily inspection on the level of storm water in the ditch dictates operation of the manual control. When the level of the ditch is high, a valve is opened to control the release of the storm water to the Indiana Harbor Ship Canal. The automated flow meters at Outfalls 003 and 004 have proven problematic since installation and difficult to maintain in service, due in part to the rising water levels of Lake Michigan. Given the operational issues, BP asserts flow monitoring devices are not practical at this location and requests modification of the Permit to allow flow estimation for Outfalls 003 and 004 as the sample type.

Approved water treatment additives

Section 5.7 of the Fact Sheet issued in February of 2019 included a list of approved water treatment additives at the facility. In preparation of the final permit renewal application, some of the water treatment additives on the original Excel file did not get included when the file was converted to PDF. As such, BP provided an updated, complete list of water treatment additives to be included in the Fact Sheet.

Water flow diagram

During recent reviews of the refinery water flow diagram, BP identified several items that had been included in historical diagrams which were omitted from the current version:

- Steam condensate to the process sewer routed to the WWTP;
- Raw boiler feed water from the main water treatment plant (MWTP) routed to the OTCW System (dotted line; not normally used); and
- Steam condensate to the OTCW System (dotted line; not normally used).

In order to accurately reflect all industrial wastewater streams, BP submitted a revised water flow diagram to be included in the Fact Sheet. This revised diagram has been included as Figure 2.

Changes to footnotes

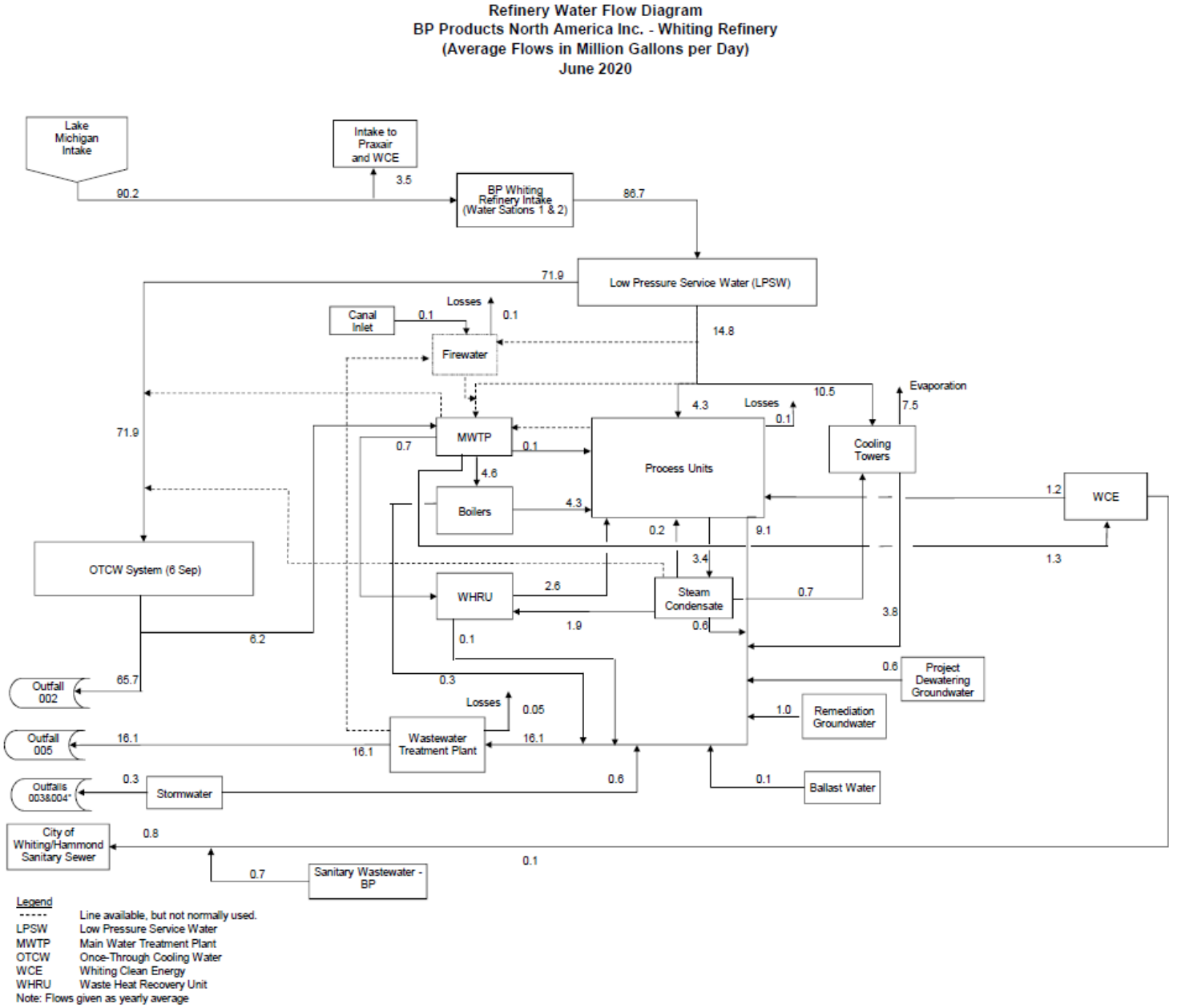
On September 14, 2020, BP submitted several additional modification requests regarding methods and publication dates listed in the Permit:

1. Removal of specific method version information (e.g., publication dates) in the footnote [10] of Part I.A.1. This would be consistent with the language in footnote [6] of Part I.A.2 and minimize conflicts between the permit listed methods and those in 40 CFR 136.

2. For footnote [10] of Part I.A.1, revision of the Method 625 listing to Method 625.1 in keeping with the currently utilized and 40 CFR 136 approved methodology.

3. For footnote [6] of Part I.A.2, addition of similar expanded language related to the allowance of methods and techniques approved under the most current version of 40 CFR 136.

Figure 2: Water Balance Diagram



3.2 IDEM's Proposed Modification

IDEM has been working with BP on changes to the diffuser biological study plan over the past several months. One of the proposed changes is regarding sampling years. In an email to BP on September 2, 2020, IDEM proposed a single sampling event no later than 2022. In accordance with that, IDEM proposes to modify Part I.H.1.a. of the Permit to read:

> No later than December 31, 2022, BP Products North America shall conduct a survey of the aquatic life found within a 200 feet radius of the diffuser. The results of this survey shall be submitted to the IDEM Office of Water Quality (OWQ) Industrial NPDES Permits Section and to the OWQ Compliance Branch. The results may be submitted by email to the Industrial NPDES Permits Section at OWQWWPER@idem.in.gov and to the Compliance Branch at wwReports@idem.in.gov.

IDEM proposes to modify Footnote [10] of Part I.A.1. of the Permit to remove the specified Limit of Detection (LOD) and Limit of Quantitation (LOQ) values. BP is requesting to use an LOQ of 0.5 ng/l, which is lower than the permitted water quality-based effluent limitation (WQBEL) of 1.3 ug/l. Pursuant to 327 IAC 5-2-11.1(f), the permit is not required to include an LOD/LOQ as long as the WQBEL for the substance is greater than the LOQ. IDEM proposes to include a requirement in Footnote [10] that the LOQ must be less than the permitted WQBEL of 1.3 ng/l. The condition of using Method 1631E is required in the SMV rule, so IDEM will retain the specified method in Footnote [10].

IDEM will also remove the publication dates in Footnote [10] of Part I.A.1. of the Permit to be consistent with Footnote [6] in Part 1.A.2. of the Permit. IDEM will not change the test method for benzo(a)pyrene to 625.1 as requested by BP, nor will IDEM make any changes regarding request #3 from BP in the "Changes to footnotes" part of Section 3.1 above. Part I.C.4. of the Permit states that analytical and sampling methods used shall conform to the current version of 40 CFR 136. As specified at 327 IAC 5-2-13(d)(1), test procedures identified in 40 CFR 136, including analytical and sampling methods, shall be used for pollutants or pollutant parameters listed in that part unless an alternate test procedure has been approved under 40 CFR 136.5. The State of Indiana has currently incorporated by reference the July 1, 2016 version of 40 CFR 136 under 327 IAC 5-2-1.5 and 327 IAC 1-1-2; therefore, this is the version of 40 CFR 136 currently applicable in NPDES permits. Method 625 is the approved method in the 2016 version of 40 CFR 136.

IDEM proposes to modify Part 1.A.3. of the permit to change the sample type for flow from a 24-hour total to estimate total. This is consistent with industrial storm water outfalls in other NPDES permits issued by IDEM.

IDEM has included an updated list of approved water treatment additives in this Fact Sheet. See Appendix 1 for the current list. Additionally, IDEM notes the corrected water balance diagram and has included it as Figure 2 above. No changes will be made to the Permit to reflect the updated list of water treatment additives or the revised flow diagram.

3.3 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 are less stringent than the comparable effluent limitations in the previous permit, therefore, backsliding is not an issue in accordance with 327 IAC 5-2-10(a)(11).

3.4 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 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 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 NPDES permit does not propose to establish a new or increased loading of a regulated pollutant; therefore, the Antidegradation Implementation Procedures in 327 IAC 2-1.3-5 and 2-1.3-6 do not apply to the permitted discharge.

3.5 Spill Response and Reporting Requirement

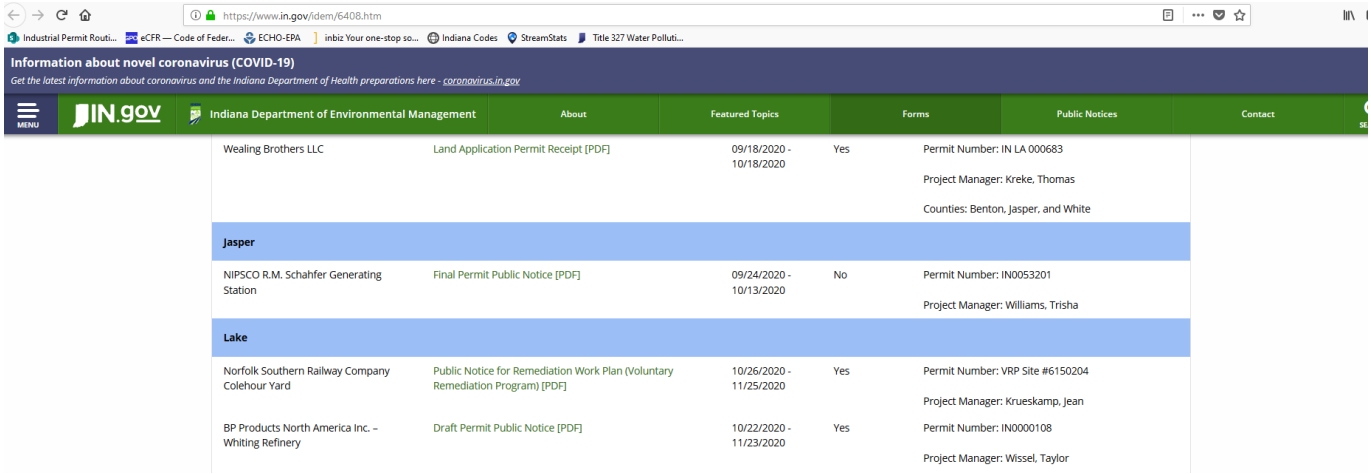
Reporting requirements associated with the Spill Reporting, Containment, and Response requirements of 327 IAC 2-6.1 are included in Part II.B.2.(d), Part II.B.3.(c), and Part II.C.3. of the NPDES permit. Spills from the permitted facility meeting the definition of a spill under 327 IAC 2-6.1-4(15), the 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.

3.6 Permit Processing/Public Comment

Pursuant to IC 13-15-5-1, IDEM will publish the draft permit document online at https://www.in.gov/idem/6408.htm; additional information on options to receive notification of permit actions occurring can be found at https://www.in.gov/idem/6777.htm. A 30-day comment period is available in order to solicit input from interested parties, including the general public.

3.7 Post Public Notice Addendum



https://www.in.gov/idem/6408.htm

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Information about novel coronavirus (COVID-19)

Get the latest information about coronavirus and the Indiana Department of Health preparations here - coronavirus.in.gov

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Wealing Brothers LLC	Land Application Permit Receipt [PDF]	09/18/2020 - 10/18/2020	Yes	Permit Number: IN LA 000683 Project Manager: Kreke, Thomas Counties: Benton, Jasper, and White
Jasper				
NIPSCO R.M. Schahfer Generating Station	Final Permit Public Notice [PDF]	09/24/2020 - 10/13/2020	No	Permit Number: IN0053201 Project Manager: Williams, Trisha
Lake				
Norfolk Southern Railway Company Colehour Yard	Public Notice for Remediation Work Plan (Voluntary Remediation Program) [PDF]	10/26/2020 - 11/25/2020	Yes	Permit Number: VRP Site #6150204 Project Manager: Krueskamp, Jean
BP Products North America Inc. – Whiting Refinery	Draft Permit Public Notice [PDF]	10/22/2020 - 11/23/2020	Yes	Permit Number: IN0000108 Project Manager: Wissel, Taylor

The draft NPDES permit for BP Products North America Inc. – Whiting Refinery was made available for public comment from October 22, 2020 through November 23, 2020 as part of Public Notice No. 20201022–IN0000108–D on IDEM's website at https://www.in.gov/idem/6408.htm. During this comment period, a comment letter dated November 4, 2020 (and updated November 18, 2020), from Natalie Grimmer, Environmental Planning Team Lead, was received. A comment letter dated November 23, 2020, from David Dabertin was also received. The comments submitted by Ms. Grimmer and Mr. Dabertin, and this Office's corresponding responses are summarized below. Any changes to the permit and/or Fact Sheet are so noted below.

Comments from BP:

<u>Comment #1</u>

BP recognizes the State of Indiana has currently incorporated by reference the July 1, 2016 version of 40 CFR 136 under 327 IAC 5-2-1.5 and 327 IAC 1-1-2; therefore, this is the version of 40 CFR 136 currently applicable in Indiana NPDES permits. Method 625 is the approved method in the 2016 version of 40 CFR 136 and therefore is listed by default within Footnote 10 for analysis of benzo(a)pyrene in effluent samples.

However, per Part I.A.1 Footnote [10], there is also an allowance for use of alternative methods if first approved by IDEM and EPA. BP asserts that Method 625.1 for analysis of benzo(a)pyrene has been approved by EPA based on incorporation in the current version of 40 CFR 136.3 Table IC and requests IDEM approval to use this method as an alternative to Method 625. The associated LODs and LOQs designated for Method 625 will be maintained using Method 625.1 for the analysis of effluent samples.

BP respectfully requests Footnote [10] be updated to reflect approval of this alternative method.

Response #1
As EPA has already approved Method 625.1, IDEM will include the alternate method in Footnote [10] of Part I.A.1. of the Permit. The LOD and LOQ values will remain unchanged as the permittee has indicated these values will be maintained with Method 625.1.

Comment #2
Two previously approved water treatment additives (WTAs), 50 wt% sol NAOH and Praestol A3040 LTR, were not included in Appendix 1 of the October 2020 Fact Sheet. BP respectively requests that these WTAs be added to Appendix 1. BP requests that the approval date for BKZ 102 and Magnetite be changed to 6/20/2018 versus 6/21/2018. Attached are the emails from IDEM to support this. Nalco 1404 was approved for two different applications on two different dates. BP requests that the date of 12/19/2018 be added for Nalco 1404. Attached is the documentation to support this. BPB 59470 and BPC 60005 have been approved by IDEM for both Outfall 002 and Outfall 005. Please add Outfall 005 to Appendix 1 for these WTAs. BP requests that the supplier for chemicals that are commodity chemicals be listed as "Various – Commodity Chemical" as the manufacturer for these commodity chemicals can be variable. The approved WTA commodity chemicals include 30%-sol HCL, 50 wt% solution NaOH, 50% Caustic, H3PO4 75%, H3PO4 Solution, Hydrochloric Acid – 31%, Sodium Bisulfite 40%, Sodium Carbonate – anhydrous, Sodium Hypochlorite 12.5% , Sulfuric Acid, and Zinc Chloride 50%. BP requests that the Outfall listed for Guardian 9405 be updated to Outfall 005. We believe Outfall 001 was listed in error.

Response #2
IDEM will make the requested changes to Appendix 1 of this Fact Sheet.

Comments from Mr. Dabertin:

Comment #1
The proposed permit lists only two outfalls for the J & L Site. (Outfalls 003 and 004). These outfalls discharge rain water and drain the J & L Site. There does not appear to be any active discharge of process water from this site. If this is the case, then the permit would appear to be deficient in that it falls to note all discharges from the J & L Site. The J & L Site contains many more outfalls, or more specifically point sources, that must be regulated under the Clean Water Act. In fact, because the J & L Site actually sits on a former lake bed, I submit that the entire site is a "point source" of pollution.

The subject permit is issued pursuant to the "National Pollutant Discharge Elimination System" or NPDES program as set forth by the federal Clean Water Act 33 U.S.C. §1251 et seq. It is the federal Clean Water Act that provides Indiana with its authority to issue these "national" permits. The federal Clean Water Act makes clear that water permits regulate the "discharge" of pollutants from point sources into navigable waters. Section 502 of the Clean Water Act defines point source as follows:

(14) The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture.

An offsite review of the J & L Site would indicate that there are a number of such point sources along the western side of the property. The northernmost portion of the property drains along 129th Street to the intersection of this street with Calumet Avenue. Following times of wet weather or a high water table, there is a continuous discharge flowing from the east to the intersection of this street with Calumet Avenue.

Response #1
An IDEM wastewater inspector visited the site in December 2018 and no additional point sources or outfalls were identified. No changes are being made to the Permit or Fact Sheet as a result of this comment.

Comment #2
I had noted a concern regarding the use and disposal of synthetic firefighting foam nearly two years ago. The environmental dangers associated with the fate of these substances are well established. Chemicals contained in the foam including per- and polyfluoroalky substances. Studies have associated these chemicals with a host of health problems, including kidney, testicular, bladder, and prostate cancer, as well as immune, reproductive, and hormonal dysfunction. Synthetic firefighting foams are toxic groundwater contaminants. Some chemicals associated with these foams are persistent and bio accumulative.

It is without question that firefighting foam has been used extensively at the J &L Site. Requesting a study one year from now fails to protect human health and the environment. More importantly, the amended permit only looks forward regarding ongoing use of such foam. It fails to note that firefighting foam has been used for years at this site and this material has possibly contaminated a wide area.

Response #2
IDEM included a footnote in the 2019 renewal of the Permit in Part I.A.3. that required a report on firefighting training to be submitted to IDEM within 1 year of the effective date. IDEM received that report and it can be found on IDEM's Virtual File Cabinet here: https://ecm.idem.in.gov/cs/idcplg?IdcService=GET_FILE&dID=83006190&dDocName=83005853&Rendition=web&allowInterrupt=1&noSaveAs=1

No changes are being made to the Permit or Fact Sheet as a result of this comment.

Comment #3
While the proposed amendments may be an improvement, they are far from protection of our health and our environment.

I am requesting that the Indiana Department of Environmental Management hold a Public Hearing on this matter before it issues any final permit.

Response #3

IDEM only received two comment letters on the draft permit modification (one from the permittee) and only one request for a public hearing. Additionally, the comments received from Mr. Dabertin are essentially identical to those submitted during the 2019 permit renewal and they were addressed in the response to comments of that permit. IDEM believes that the concerns raised have been appropriately addressed in this Post Public Notice Addendum and will not be convening a public hearing. No changes are being made to the Permit or Fact Sheet as a result of this comment.

Appendix 1 – Approved Water Treatment Additives

Supplier	Additive	Outfall	Approval Date
NALCO	Nalcolyte 8100	005	2/14/2019
Various – Commodity Chemical	H_3PO_4 75%	005	2007 permit
Various – Commodity Chemical	H_3PO_4 Solution	005	2007 permit
Ashland	Praestol A3025 LA floc	005	2013 permit
Ashland	Praestol A3040 LA floc	005	2007 permit
Ashland	Praestol A3040 LTR floc	005	2007 permit
Ashland	Praestol K122L	005	2007 permit
Ashland	Praestol K260FL	005	2007 permit
Azure	Redux-620	005	7/17/2019
Various – Commodity Chemical	Sodium Bisulfite 40%	005/002	2007 permit
Various – Commodity Chemical	Sodium Carbonate, anhydrous	005	3/13/2014
Various – Commodity Chemical	Sodium Hypochlorite 12.5%	005/002	6/27/2013
Baker Hughes	SpectraFloc 600B	005	2016
Baker Petrolite	Spectrafloc 875	005	2013 permit
Various – Commodity Chemical	Sulfuric Acid	005	2007 permit
NALCO	Ultrion 8187	005	2016
Usalco	Usalco 38	005	2013 permit
Usalco	Usalco GU-55	005	2013 permit
Baker Petrolite	Y9BH1233	005	2013 permit
Various – Commodity Chemical	Zinc Chloride 50%	005	2007 permit
Various – Commodity Chemical	30%-sol HCl	002	2007 permit
Various – Commodity Chemical	50 wt% solution NaOH	002	2007 permit
Various – Commodity Chemical	50% Caustic	005	2007 permit
Ondeo-NALCO	71-D5 Plus Antifoam	005	2007 permit
Alchem Specialties, Inc.	ACS 2125	005	2013 permit
Alchem Specialties, Inc.	ACS2000	005	2016
Muldon Minerals, Inc.	Bentonite	005	2016
Baker Hughes	BKZ 102	005	6/20/2018
Baker Petrolite	BPB 55715	005	2007 permit
Baker Petrolite	BPB 59316	005	6/14/2002
Baker Petrolite	BPB 59396	005	2007 permit
Baker Petrolite	BPB 59430	005	2/27/2004
Baker Petrolite	BPB 59455	002	2007 permit

Baker Petrolite	BPB 59460	005	2007 permit
Baker Petrolite	BPB 59466	005	2007 permit
Baker Petrolite	BPB 59470	002/005	2007 permit
Baker Petrolite	BPC 60005	002/005	2007 permit
Baker Petrolite	BPC 65610	005	2007 permit
Baker Petrolite	BPC 67015	005	2007 permit
Baker Petrolite	BPC 67280	005	2007 permit
Baker Petrolite	BPC 67375	005	2007 permit
Baker Petrolite	BPC 67525	005	2007 permit
Baker Hughes	BPC 68155	005	11/23/2015
Baker Petrolite	BPC 68160	005	2007 permit
Baker Petrolite	BPC 68915	005	2013 permit
Baker Petrolite	BPC 68970	005	2007 permit
Baker Petrolite	BPW 75890	005	2007 permit
Baker Petrolite	BPW 76001	005	2013 permit
NALCO	CAT-FLOC 8108 Plus	005	3/13/2017
Baker Petrolite	CL2OUT1100	005	2007 permit
NALCO	Core Shell 71306	005	8/2/2016
NALCO	Core Shell 71321	005	12/19/2018
NALCO	Core Shell 71301	005	4/4/2017
NALCO	CT603SO	005	12/19/2018
Baker Petrolite	Demand Trac 480	005	2007 permit
Baker Petrolite	Demand Trac 990	005	2013 permit
Baker Hughes	Demand Trac 990T	005	7/17/2019
Graymont	Dolomitic hydrated lime type N	005	8/13/2019
Carmeuse	Dolomitic hydrated lime type S	005	8/13/2019
Baker Petrolite	Ferric chloride	005	11/21/2013
Kemra	Ferric sulfate	005	2013 permit
River Bend Labs	FlocLoad	005	6/12/2014
Baker Petrolite	Guardion 9405	005	2007 permit
Various – Commodity Chemical	Hydrochloric Acid – 31%	005	2007 permit
NALCO	INOC 8166 Plus	005	12/19/2018
Baker Hughes	Lifeshield NP 1001 (LSH1001)	005	9/26/2017
Evoqua Water Technologies, LLC	Magnetite	005	6/20/2018
Premier Magnesia	MAGOX 98 HR	005	3/13/2014
NALCO	N 9353	002	2016
NALCO	1404	005	12/19/2018
NALCO	7473	005	2/7/2017
NALCO	7767	005	2/28/2017
NALCO	7768	005	2/28/2017

STATE OF INDIANA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
PUBLIC NOTICE NO. 20201215 – IN0000108 - F
DATE OF NOTICE: DECEMBER 15, 2020

The Office of Water Quality issues the following NPDES FINAL PERMIT.

MAJOR– MODIFICATION

BP WHITING, Permit No. IN0000108, LAKE COUNTY 2815 Indianapolis Boulevard, Whiting, IN. This major modification is because BP Whiting has requested a modification to update the flow diagram and water treatment additive list, as well as change compliance dates for diffuser sampling and storm water flow monitoring requirements. Permit Manager: Taylor Wissel, 317/234-4260, twissel@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.

BP Products North America Inc.
Whiting Refinery
2815 Indianapolis Blvd.
P.O. Box 710
Whiting, IN 46394-0710

July 8, 2020

SUBMITTED ELECTRONICALLY BY EMAIL

Ms. Nicole Gardner
Section Chief – Industrial NPDES Permits Section
Indiana Department of Environmental Management
Office of Water Quality, Room 1255
100 North Senate Avenue
Indianapolis, IN 46204-2251

Re: NPDES Permit No. IN0000108 Modification Request
BP Products North America Inc. – Whiting Refinery

Dear Ms. Gardner:

Enclosed herein is a request for modification of the BP Products North America Inc. – Whiting Refinery NPDES Permit No. IN0000108 (effective April 1, 2019) including a copy of the receipt for the required permit application fee for processing ($50).

The modification request is focused on the following topics outlined below:

1. Diffuser Monitoring Requirement – Biological Survey Frequency;
2. Limits of Detection (LOD) and Limits of Quantitation (LOQ) Associated with Mercury Analysis by USEPA Method 1631E;
3. Sample Type for Flow at Stormwater Outfalls 003 and 004;
4. Corrections for Approved Water Treatment Additives; and
5. Corrections to the facility Water Flow Diagram.

For clarity, specific permit modification requests are denoted by **bolded** text and proposed revisions to permit language are shown in red text herein.

1. Diffuser Monitoring Requirement – Biological Survey Frequency

The Diffuser Monitoring Requirements specified in Part I.H of the current Permit require the following:

(a) Every even numbered year, BP Products North America shall conduct a survey of the aquatic life found within a 200 feet radius of the diffuser. The results of this survey shall be submitted to IDEM's Office of Water Quality, Industrial NPDES Permits Section.

(b) Within a year of the permit effective date, the permittee will submit an updated Biological Survey sampling plan to IDEM for review and approval. The approved IDEM Biological Survey sampling plan will be used for all biological surveys throughout the duration of the permit.

The original work plan for the 2020 field work was submitted to the Indiana Department of Environmental Management (IDEM) in October 2019 in advance of the March 30, 2020 permit deadline to allow sufficient time for IDEM review/approval of the plan prior to study implementation in 2020. Methodologies in the Work Plan dated September 2019 mirrored historical biological surveys conducted at the site. Feedback on the original study plan from IDEM was provided via a teleconference on March 17, 2020. The following verbal recommendations were requested by IDEM during this teleconference:

- More robust sampling regime for macroinvertebrates (benthic organisms);
- Review of the appropriateness of the identified sampling locations; and
- Determination on the presence or absence of fish at the diffuser location.

The revised work plan addressing the verbal comments from the March 17, 2020 teleconference was submitted to IDEM on June 22, 2020. **In order to effectively implement the enhanced work plan, BP Whiting requests the survey frequency outlined in Part I.H.1.a of the permit be modified.**

Proposed revisions to Permit Part I.H.1.a language are shown in red text for consideration:

> In 2021 and 2023, BP Products North America shall conduct a survey of the aquatic life found within a 200 feet radius of the diffuser. The results of these surveys shall be submitted to IDEM's Office of Water Quality, Industrial NPDES Permits Section.

2. LOD and LOQ Associated with Mercury Analysis by USEPA Method 1631E

BP recognizes the Indiana Administrative Code (IAC) Title 327 Water Pollution Control Division specifically references requirements for analytical test procedures. These references are contained in 327 IAC 5-2-13(d)(1) which states "Test procedures identified in 40 CFR 136 shall be utilized for pollutants and parameters". Based on the most recent updates to state rules, references to the Code of Federal Regulations (CFR) within 327 IAC refers to the July 1, 2016, edition.[1] However, significant updates to federal regulations have been implemented since the July 1, 2016 edition rendering the references within 327 IAC outdated, inappropriate, and contradictory to Permit language. The refinery's NPDES Permit (No. IN0000108) Part I.C.4 specifically states that "analytical and sampling methods used shall conform to the current version of 40 CFR 136."

Specific to Outfall 005, Part I.A. Footnote 10 stipulates EPA approved test methods and associated LODs and LOQs that are to be used in the analysis of effluent samples. For low level mercury analysis, the following is required:

Parameter	Test Method	LOD	LOQ
Mercury	1631E	0.2 ng/L	0.5 ng/L

[1] 327 IAC 1-1-2

2.1. USEPA Method 1631E Specified LOD

While this language has consistently been applied in previous NPDES Permits for the facility, the language in the current Permit does not take into account the recent updates to federal regulations related to 40 CFR 136, referred to herein as the Methods Update Rule (MUR).

The MUR promulgated by the U. S. Environmental Protection Agency (EPA) and finalized on August 28, 2017 included changes to analytical test procedures that are used by industry to analyze the chemical, physical, and biological components of wastewater that are required under the Clean Water Act. Among the changes prompted by the MUR, EPA revised the procedure for determination of the method detection limit (MDL). The revised MDL procedure differs in three significant ways.

1. The MDL procedure now accounts for method blanks results in calculating an MDL, in addition to the spiked samples that have always been used to calculate the MDL.
2. The MDL now requires that the samples used to calculate the MDL are representative of laboratory performance throughout the year, rather than on a single date.
3. A laboratory has the option to pool data from multiple instruments to calculate one MDL that represents multiple instruments.

Additionally, these revisions changed the definition of MDL, functionally equivalent to limit of detection (LOD) in the current Permit, as follows:

- Previous MDL procedure (Revision 1.11, 1985) stated: "The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte." This definition is consistent with the MDL/LOD in the current Permit.
- The new definition of the MDL (Revision 2, 2016) is "The method detection limit (MDL) is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."

In March 2020, the refinery's contract laboratory (Microbac) completed the first recalculation of MDLs for Method 1631E based on the revised MDL procedure (Revision 2, 2016). This recalculation resulted in a revised MDL equivalent to 0.426 ng/L, which exceeds the specifications in Part I.A. Footnote 10. Outfall 005 low level mercury analysis reported for 3/16/2020, 3/19/2020, 4/6/2020, 4/9/2020, 4/20/2020, and 4/23/2020 were reported with the elevated LOD. As a corrective action, a full MDL study commenced and was completed by the end of April 2020. While the MDL was able to be reduced to 0.231 ng/L, this level continues to be higher than the currently stated LOD within the Permit.

Per the EPA Method 1631, Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry (August 2002), Section 9.2.1 states:

> *"Method detection limit—To establish the ability to detect Hg, the laboratory shall achieve an MDL that is less than or equal to the MDL listed in Section 1.5* [0.2 ng/L when no interferences are present] *or one-third the regulatory compliance limit, whichever is greater* [emphasis added]. *The MDL shall be determined according to the procedure at 40 CFR 136, Appendix B using the apparatus, reagents, and standards that will be used in the practice of this Method. "*

Table 1 in Section 18 of the Method lists the criteria for the lowest ambient water quality criterion for Mercury as 1.3 ng/L, which can conservatively be applied as the "regulatory compliance limit" detailed in Section 9.2.1. As indicated above, to date the MDLs calculated by BP's contract lab are equal to or less than one-third the regulatory compliance limit (equal to 0.43 ng/L) allowed as the maximum LOD.

With the new MDL definition (Revision 2, 2016) and calculation procedures, the laboratory achieved MDL is subject to more variability than under the previous MDL procedure. **As such, BP requests the removal of the required mercury LOD from Part I.A.1 Footnote [10] and suggests inclusion of language that requires labs to conform to 40 CFR 136 approved methods and procedures as detailed in Part I.C.4. Additionally, definitions of LOD and MDL in Part I.C.3.h and Part I.C.3.j respectively should be revised to reflect the current federal language.**

2.2 USEPA Method 1631E Specified LOQ

Additionally, while the LOQ of 0.5 ng/L for Method 1631E has consistently been achieved by the contract laboratory, BP noted during this evaluation that Outfall 005 results have historically been reported with a 2:1 dilution factor elevating the LOQ to 1.0 ng/L for Outfall 005 samples. In keeping with Method 1631E requirements and guidance, BP requires the matrix spike and matrix spike duplicate (MS/MSD) to pass acceptance criteria and historically an interference has been noted affecting these recoveries. As a result, Outfall 005 effluent samples have been diluted by a factor of 2 which alleviates the interference. This is an allowable and recommended approach for interference mitigation; however, it does result in elevated LOQ values for Outfall 005 samples (greater than 0.5 ng/L).

As a corrective action going forward, BP has directed the contract laboratory to run Outfall 005 effluent samples undiluted initially to determine if the interference persists and only dilute those samples required to achieve passing MS/MSD. This will ensure that only valid data continue to be used and the lowest LOD/LOQ possible are being achieved for Outfall 005 effluent analysis. BP requests that additional language be added to the mercury LOQ in Part I.A.1 footnote [10] to allow for alternative LOQs due to dilution from interference mitigation. **BP suggests language be added to Footnote 10 to denote an LOQ of 0.5 ng/L or lower is required unless it is demonstrated by the laboratory that dilution is needed to remove matrix interferences.** BP envisions that the process outlined above (running first without dilution and only diluting if the associated MS/MSD criteria are not met) is adequate for demonstrating the need for dilution. BP does not anticipate submitting this information each time dilution is needed but will retain required records as indicated in Part I.C.7.

2.3 Proposed Permit Revisions

Proposed revisions to Footnote 10 language are shown in red text for consideration:

[10] The following EPA approved test methods and associated LODs and LOQs are to be used in the analysis of the effluent samples. Analytical and sampling methods used shall conform to the current version of 40 CFR 136. Alternative methods may be used if first approved by IDEM and EPA, if applicable.

Parameter	Test Method	LOD	LOQ
Mercury	1631E	---	0.5 ng/L*
Arsenic	3113B-2004	1 ug/L	3.2 ug/L

Arsenic	200.9	0.5 ug/L	1.6 ug/L
Arsenic	200.8	0.4 ug/L	1.3 ug/L
Selenium	3113B-2004 or 3114B-2009	2 ug/L	6.4 ug/L
Selenium	200.8	2.1 ug/L	6.7 ug/L
Selenium	200.9	0.6 ug/L	1.9 ug/L
Benzo(a)pyrene	610	0.023 ug/L	0.073 ug/L
Benzo(a)pyrene	625	0.022	0.10
Chlorine	4500-Cl-D-2000, E-2000 or 4500-Cl-G-2000	0.02 mg/L	0.06 mg/L

*Unless demonstrated dilution is needed to remove matrix interferences

3. Outfall 003 and 004 Sample Type for Flow

BP is authorized to discharge stormwater associated with industrial activity from the J&L and Lake George areas of the refinery from Outfalls 003 and 004 into the Lake George Branch of the Indiana Harbor Ship Canal. Stormwater in the J&L Tank Field can be retained in tank dikes for infiltration and evaporation or removed via vacuum trucks or manual pumping to the refinery process sewer system if an oil sheen is present. If the storm water has no visible oil sheen, it can be routed to Outfalls 003 or 004 either manually by vacuum trucks or by a pumping system. Stormwater outside of the tank dikes is collected in low lying areas for infiltration, or overflows to the west ditch and into the Turning Basin through Outfall 003, or overflows to the East Ditch to the Indiana Harbor Ship Canal (IHC) through Outfall 004. The Outfall 003, 004 Discharge Limitations in the current Permit Part I.A.3 are as follows:

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily					Measurement	
Parameter	Average	Maximum	Units	Monthly Average	Daily Maximum	Units	Frequency	Sample Type
Flow	Report	Report	MGD	-	-	-	Daily	24 Hr. Total
TOC	-	-	-	Report	110	mg/L	1 X Weekly [2]	Grab
O&G	-	-	-	Report	15.0	mg/L	1 X Weekly [2]	Grab
pH				6.0 (daily min)	9.0 (daily max)	s.u.	1 X Weekly [2]	Grab

The pH, TOC, and O&G limitations are based on effluent limitation guidelines pursuant to 40 CFR 419.22(e)(1) for wastewater consisting solely of contaminated runoff from the Petroleum Refining Point Source – Cracking Subcategory. Consistent with 40 CFR 419(e)(1) and as shown in Part I.A.3, the Outfall 003 and 004 limitations are concentration-based rather than mass-based limitations. Therefore, the reported flow is not used to calculate/demonstrate compliance with discharge limitations per Part I.A.3, but rather used as an estimation of pollutant loading to the IHC during storm events.

Outfalls 003 and 004 are fed by vegetated drainage ditches controlled by sluice gates. The discharges from the Outfalls 003 and 004 are manually controlled. A visual daily inspection of the level of storm water in the ditch dictates operation of the manual control. When the level of the ditch is high, a valve is opened to control the release of the storm water to the IHC. The automated flow meters at Outfalls 003 and 004 have proven problematic since installation and difficult to maintain in service, due in part to the rising water levels of Lake Michigan. **Given the operational issues, BP asserts flow monitoring devices are not practical at this location and requests modification of the Permit to allow flow estimation for Outfalls 003 and 004 as the sample type.** The request for a modified sample type for flow is consistent with other stormwater-only outfalls in individual NPDES Permits issued by IDEM. IDEM also references available guidance from USEPA on their website

(https://www.in.gov/idem/stormwater/2390.htm) related to stormwater sampling which designates various methods for estimating flow rates for storm water. Per the NPDES Storm Water Sampling Guidance Document[2] referenced by IDEM, there are a variety of techniques for estimating flow rates including the Float Method, Bucket and Stopwatch Method, Slope and Depth Method, and Runoff Coefficient Method.

BP proposes to utilize a technique for estimating the flow rate similar to the Float Method for open channel flow. Given the sluice gate configuration, the velocity of the flow will be estimated which can then be used in combination with the known cross-sectional area to calculate the flow rate. This approach may be expanded and/or simplified to include other generally accepted methods for calculating open channel flow following the same principles.

Proposed revisions to Part I.A.3 language are shown in red text for consideration:

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
	Monthly	Daily					Measurement	
Parameter	Average	Maximum	Units	Monthly Average	Daily Maximum	Units	Frequency	Sample Type
Flow	Report	Report	MGD	-	-	-	Daily	Estimated Total [6]
TOC	-	-	-	Report	110	mg/L	1 X Weekly [2]	Grab
O&G	-	-	-	Report	15.0	mg/L	1 X Weekly [2]	Grab
pH				6.0 (daily min)	9.0 (daily max)	s.u.	1 X Weekly [2]	Grab

[6] Flow shall be estimated using methods consistent with USEPA guidance as specified in the NPDES Storm Water Sampling Guidance Document.

4. Approved Water Treatment Additives

Section 5.7 of the current Permit Fact Sheet contains a list of water treatment additives currently approved for use at the facility. The Fact Sheet Section 5.7 is based on the List of Water Treatment Additives submitted with the most recent NPDES Permit Renewal Application – Attachment 10 (received by IDEM on April 9, 2018). Attachment 10 contained the complete listing of water treatment additives previously approved by use at the facility by IDEM. However, in preparation of the final Permit Renewal Application, some of the water treatment additives on the original Excel file did not get included when the file was converted to PDF. As such, BP is providing the corrected complete list of previously approved water treatment additives for incorporation into the Permit Fact Sheet. Any WTAs that have been approved by IDEM since April 9, 2018 are also included in the listing. See Appendix 1 enclosed herein.

A complete listing of approved water treatment additives (organized alphabetically) to be included in the Permit Fact Sheet Section 5.7 is shown in the table below. Additions to the current February 2019 Permit Fact Sheet language are shown in red text for consideration. Please note, all water treatment additives listed in the "June 2020 Update" column have been previously approved for use.

Permit Fact Sheet - Section 5.7 Original (February 2019)	Permit Fact Sheet - Section 5.7 June 2020 Update
30% sol HCL	30% sol HCL
50 wt% sol NAOH	50 wt% sol NAOH

[2] United States Environmental Protection Agency, Office of Water (EN-336), EPA 8333-8-92-001, July 1992 (https://www.in.gov/idem/stormwater/files/rule_6_stormwater_sampling_guidance.pdf

Permit Fact Sheet - Section 5.7 Original (February 2019)	Permit Fact Sheet - Section 5.7 June 2020 Update
50% Caustic	50% Caustic
71-D5 PLUS Antifoam	71-D5 PLUS Antifoam
	ACS 2125
	ACS 2000
	Bentonite
BioKlenz 102	BioKlenz 102 (BKZ 102)
BPB 55715	BPB 55715
BPB 59316	BPB 59316
BPB 59396	BPB 59396
BPB 59430	BPB 59430
BPB 59455	BPB 59455
BPB 59460	BPB 59460
BPB 59466	BPB 59466
BPB 59470	BPB 59470
BPC 60005	BPC 60005
BPC 65610	BPC 65610
BPC 67015	BPC 67015
BPC 67280	BPC 67280
BPC 67375	BPC 67375
BPC 67525	BPC 67525
	BPC 68155
BPC 68160	BPC 68160
BPC 68915	BPC 68915
BPC 68970	BPC 68970
BPW 75890	BPW 75890
BPW 76001	BPW 76001
	CAT-FLOC 8108 Plus
CL2OUT1100	CL2OUT1100
	Core Shell 71306
	CORE SHELL 71321
	CORE SHELL® 71301
	CT603SO
Demand Trac 480	Demand Trac 480
Demand Trac 990	Demand Trac 990
	Demand Trac 990T
	DOLOMITIC HYDRATED LIME TYPE N
	DOLOMITIC HYDRATED LIME TYPE S
Ferric Chloride	Ferric Chloride
Ferric Sulfate	Ferric Sulfate
	FlocLoad
Guardion 9405	Guardion 9405
Hydrochloric Acid – 31%	Hydrochloric Acid - 31%
	INOC 8166 Plus
	LIFESHIELD NP 1001 (LSH1001)
Magnetite	Magnetite
MAGOX 98 Hr.	MAGOX® 98 HR
	N 9353

Permit Fact Sheet - Section 5.7 Original (February 2019)	Permit Fact Sheet - Section 5.7 June 2020 Update
	Nalco 1404
	NALCO 7473
	NALCO 7767
	NALCO 7768
	Nalcolyte 8100
Phosphoric Acid – 75%	Phosphoric Acid - 75%
Phosphoric Acid Solution	Phosphoric Acid Solution
	Praestol A3025 LA Flocculant
Praestol A3040 LA Flocculant	Praestol A3040 LA Flocculant
	Praestol K 269 FLX
	Praestol K 274
Praestol K122L	Praestol K122L
	Praestol K260FL
	Redux-620
Sodium Bisulfite 40%	Sodium Bisulfite - 40%
Sodium Carbonate, Anhydrous	Sodium Carbonate (Anhydrous)
Sodium Hypochlorite – 12.5%	Sodium Hypochlorite - 12.5%
	SpectraFloc 600B
Spectrafoc 875	Spectrafoc 875
Sulfuric Acid	Sulfuric Acid
	Ultrion 8187
Usalco 38	Usalco 38
Usalco GU-55	Usalco GU-55
Y9BH1233	Y9BH1233
Zinc Chloride – 50%	Zinc Chloride - 50%

5. Water Flow Diagram Corrections

The Permit Fact Sheet Section 2.3, Figure 2 contains the Refinery Water Flow Diagram which was submitted with the most recent NPDES Permit Renewal Application (received by IDEM on April 9, 2018). During recent reviews of the Refinery Water Flow Diagram, BP identified several items that had been included in historical diagrams which were omitted from the current version:

- Steam Condensate to the process sewer routed to the WWTP;
- Raw Boiler Feed Water from the Main Water Treatment Plant (MWTP) routed to the OTCW System (dotted line; not normally used); and
- Steam Condensate to the OTCW System (dotted line; not normally used).

In order to accurately reflect all industrial wastewater streams, BP is submitting a revised Refinery Water Flow Diagram contained herein (Appendix 2) and requests updates to the Permit Fact Sheet Section 2.3, Figure 2.

BP appreciates the IDEM's review of this request for a modification to BP's permit. Should you have any questions or clarifications regarding this request, please contact Natalie Grimmer via electronic mail at Natalie.grimmer@bp.com or at 832-619-2908.

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.

Sincerely,

David Kurt
Whiting Refinery Manager

Attachment: Copy of Receipt for payment of permit processing fee of $50.00

Appendix 1. Revised List of Previously Approved Water Treatment Additives
Appendix 2. Revised Refinery Water Flow Diagram

cc: Taylor Wissel, IDEM (TWissel@idem.IN.gov)
OWQ@idem.IN.gov

Grimmer, Natalie R

From: INgov <NoReplyOTC@egov.com>
Sent: Wednesday, July 01, 2020 1:59 PM
To: Grimmer, Natalie R
Subject: INgov - Receipt

PURCHASE RECEIPT

IDEM

100 N Senate Avenue
Indianapolis IN 46204
(317)234-3099
billing@idem.IN.gov
OTC Local Ref ID: 49181486
7/1/2020 01:58 PM

If you have any questions, please email us at billing@idem.IN.gov.

This acknowledges receipt of your payment. Thank you.

Status:	**APPROVED**
Customer Name:	Natalie R Grimmer
Type:	MasterCard
Credit Card Number:	**** **** **** 4589

Items	Quantity	TPE Order ID	Total Amount
2C Existing Operations	1	130129146	$50.00

Company Name: **BP Products North America Inc. Whiting Refinery**

Permit Number: **IN0000108**

Total remitted to the IDEM	$50.00
INgov total amount charged	$52.01

Appendix 1

Revised List of Previously Approved Water Treatment Additives

(Revised Permit Renewal Application Attachment 10)

Additive Name	Demand Trac 480	Demand Trac 990	Zinc Chloride - 50%	Phosphoric Acid - 75%	BPC 68160	BPC 67525	BPC 68970	BPC 67280
Supplier	Baker Petrolite	Baker Petrolite	Vopak (commodity chemical)	Ashland	Baker Petrolite	Baker Petrolite	Baker Petrolite	Baker Petrolite
New or Replacement	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Cooling Towers (#1 - #6) & SBS Unit	Cooling Towers (#1 - #6) & SBS Unit	Cooling Towers (#1 - #6) & SBS Unit	Cooling Towers (#1 - #6) & SBS Unit	Cooling Towers (#1 - #6)	Cooling Towers (#1 - #6) & SBS Unit	Cooling Towers (#1 - #6) + PIB plant + Administration Building Cooling Tower + SBS Unit	Cooling Towers (#1 - #6) & SBS Unit
Feed Rate	352,896 grams/day	352,896 grams/day	63,231 grams/day	59,575 grams/day	140,037 grams/day	5711 grams/day (annual average)	4,356 grams/day	1641 grams/day (average daily use)
Water Treatment Concentration	5.0 - 7.0 mg/l (active residual)	5.0 - 7.0 mg/l (active residual)	1.5 mg/l	6.5 mg/l	2.0 mg/l	1 - 3 mg/l	100 - 200 mg/l	1.0 mg/l
Duration of Use (hrs/day)	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day	as needed	as needed	intermittent
Duration of Use (days/year)	365 days/year	365 days/year	365 days/year	365 days/year	365 days/year	as needed	as needed	intermittent
Final Discharge Concentration at Outfall	4.69 mg/l (worst case)	4.69 mg/l (worst case)	0.84 (worst case)	0.79 mg/l (worst case)	1.86 mg/l (worst case)	1.38 mg/l (worst case)	11.2 mg/l (worst case)	0.31 mg/l (worst case)
Determination of Discharge Concentration	Removed with the solids in the DAF unit. Any remaining material will be consumed in the Activated Sludge Plant. Expected final discharge concentration should approach zero.	Removed with the solids in the DAF unit. Any remaining material will be consumed in the Activated Sludge Plant. Expected final discharge concentration should approach zero.	Worst case based upon 100% of additive remaining in final discharge and no removal takes place in API separator, DAF, activated sludge plant and final filters.	This phosphoric acid additive serves as a nutrient source for the activated sludge plant, and is augmented with additional phosphoric acid at the WWTP. Typical final discharge concentrations are 0.3 - 0.5 mg/l based on measured results.	Worst case based upon 100% of additive remaining in final discharge and no removal takes place in API separator, DAF, activated sludge plant and final filters.	Worst case based upon 100% of additive remaining in final discharge when the additive is used no removal takes place in API separator, DAF, activated sludge plant and final filters.	Worst case assumes the biocide does not react with any organisms prior to final discharge. However, it is likely that the additive will react with microorganisms in the sewer and that the likely concentration entering the WWTP is close to zero. The activated sludge plant will reduce the final discharge concentration to zero.	Removed with the solids in the DAF unit. Any remaining material will be consumed in the Activated Sludge Plant. Expected final discharge concentration should approach zero.
Control Description	Each cooling tower is analyzed for dispersant residual and additive rates are adjusted accordingly.	Each cooling tower is analyzed for dispersant residual and additive rates are adjusted accordingly.	Zinc addition is based on analysis of cooling tower supply water which drives addition rate changes. Samples are taken 3 per week and tested for the concentration of zinc.	Each cooling tower has an online phosphate analyzer to control the pump rate to meet the set point concentration. In the event of an analyzer failure, the pump is set based upon manual grab samples.	Additive addition is based on analysis of cooling tower supply water which drives addition rate changes. Samples are taken 3 per week and tested for the concentration of tolytriazole.	Additive is used dependent upon foam levels in the cooling towers.	The biocide is added based upon tower conditions and microbiological monitoring results. It is used as needed and is not normally dosed to more than one cooling tower at any given time.	Feed rate is based upon tower conditions. When heat exchangers leak oil into the cooling water, chemical is added to clean and dispearse oil.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	18% Traced Carboxylate Sodium Salt 6% HEDP 2% Sulfonated Alkylbenzene	18% Traced Carboxylate Sodium Salt 7.5% PBCT 1% Sulfonated Alkylbenzene	50% Zinc Chloride	75% Phosphoric Acid	50% Sodium Tolytriazole	25% n-methylsiloxane in kerosene	45% Glutaraldehyde	16% Pluronic L-61 79% Pluronic L-64 5% Pegol P-2000
Treatment System Blowdown Rate	2.1 mgd	2.1 mgd	2.1 mgd	2.1 mgd	2.1 mgd	2.1 mgd	2.1 mgd	2.1 mgd
Outfall Flow Rate	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD
Treatment System Temperature	70 - 90 deg F	70 - 90 deg F	70 - 90 deg F	70 - 90 deg F	70 - 90 deg F	70 - 90 deg F	70 - 90 deg F	70 - 90 deg F
Treatment System pH	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
Toxicity Data	Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.	Toxicity data was not available for the organisms listed below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.
Brown Shrimp 96h/LC50								

Additive Name	Demand Trac 480	Demand Trac 990	Zinc Chloride - 50%	Phosphoric Acid - 75%	BPC 68160	BPC 67525	BPC 68970	BPC 67280
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50			18.6 mg/l		143 mg/l		12 mg/l	625 mg/l
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50						>10,000 mg/l		
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50						285 mg/l		2875 mg/l
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50			5.0 mg/l		333 mg/l		11 mg/l	
Daphnia Magna 24h/EC50								
Daphnia Magna 48h/EC50								
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00								
Daphnia Magna 96h/LC00								
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50					25 mg/l		27 mg/l	
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50					>173 mg/l		24 mg/l	
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50								
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)								
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50								
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3								
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50								

Additive Name	Demand Trac 480	Demand Trac 990	Zinc Chloride - 50%	Phosphoric Acid - 75%	BPC 68160	BPC 67525	BPC 68970	BPC 67280
Threespone stickleback 96h/LC50 (aerated)								
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50					122 mg/l			
Flannelmouth sucker 96h/LC50								
Coho salmon 96 h/LC50								
Chinook salmon 96h/LC50								
Chinook salmon 216h/LC00								
Bobwhite quail LD50								
Mosquito Fish 24h/LC50				138 mg/l				
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50							1.9 mg/l	
Mallard Duck LD50							1036 mg/kg	
Freshwater Invertebrates & Fish Acute EC50/LC50	50 - 100 mg/l							
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50								
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D	<20%				70%			
Freshwater Biodegradability 5 Day/2.0mg/l							71%	
Freshwater Biodegradability 5 Day/3.8mg/l							55%	
Relationship of toxicity to pH	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 7.0 - 8.8	Effective pH range: 7.0 - 8.8	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3
Relationship of toxicity to water hardness	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.
N Octanol-Water Partition Coefficient								
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	**BPC 67375**	**Sodium Hypochlorite - 12.5%**	**BPC 67015**	**BPC 60005**	**BPW 75890**	**BPB 59396**	**Sodium Bisulfite - 40%**	**Y9BH1233**
Supplier	Baker Petrolite	K. A. Steel	Baker Petrolite	Baker Petrolite	Baker Petrolite	Baker Petrolite	Brenntag	Baker Petrolite
New or Replacement	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Administration Building Cooling Tower	Cooling Towers (#1 - #6) + SBS Unit	Cooling Towers (#1 - #6) + Administration Building Cooling Tower + SBS Unit	Raw Water to Lime Softeners	Hot Lime Softeners	Boiler Feed Water	Hot Lime Softener Effluent and condensate drum treatment at PIB	Refinery Steam Condensate Treatment
Feed Rate	4378 grams/day	3,716,613 grams/day	3822 grams/day	155,760 grams/day	540,763 grams/day	22,843 grams/day	231,432 grams/day + 6,300 grams/day at PIB	100 - 150 gpd
Water Treatment Concentration	8 mg/l	0.2 – 0.5 mg/l free available chlorine	30 mg/l	3 - 4 mg/l	15 mg/l	0.8 mg/l	2.0 mg/l (40% Sodium bisulfite)	20 ppm
Duration of Use (hrs/day)	24 hrs/day	24 hrs/day	intermittent	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day
Duration of Use (days/year)	180 days/year (summer)	365 days/year	before & after tower shutdowns	365 days/year	365 days/year	365 days/year	365 days/year	365 days/year
Final Discharge Concentration at Outfall	0.058 mg/l (worst case)	7.4 mg/l free available chlorine (worst case)	0.05 mg/l (worst case)	2.07 mg/l (worst case)	6.6 mg/l (worst case)	0.30 mg/l (worst case)	3.07 mg/l as sulfate. (worst case)	Varies
Determination of Discharge Concentration	Worst case based upon 100% of additive remaining in final discharge and no removal takes place in API separator, DAF, activated sludge plant and final filters.	All of free available chlorine will be removed prior to discharge. This is based upon the rate of consumption observed in the cooling towers, and the amount of oxidizable material that this material will contact in the sewer system, in the API separator, DAF and particularly the activated sludge plant.	The orthophosphate in this product will serve as a portion of the nutrient supplied to the activated sludge plant and is augmented with additional phosphoric acid at the WWTP. The Outfall 001 orthophosphate is measured, results are 0.3 to 0.5 mg/l.	Removed with the solids in the DAF unit. Any remaining material will be consumed in the Activated Sludge Plant. Expected final discharge concentration should approach zero.	This worst case is based on all of the sodium aluminate going to the sewer via boiler blowdown and not precipitating in the hot lime softeners. The additive precipitates in the hot lime softener and is removed with the sludge from the softeners. Any filtrate from the sludge dewatering would have the API separator, DAF, activated sludge plant and final filters for additional removal.	The additive should get consumed prior to the WWTP; therefore, the final discharge concentration should approach zero.	This is a reducing agent and all of this material will react to form sulfate prior to final discharge.	Material would most likely be consumed in the process
Control Description	The cooling tower is analyzed for dispersant residual and additive rates are adjusted accordingly.	Each cooling tower has an online ORP probe or free available chlorine analyzer to control the pump rate to meet the set point concentration. In the event of an analyzer failure, the pump is set based upon manual grab samples.	Feed rate is based upon grab sample analysis for Orthophosphate and total phosphate.	Additive is used based upon a measure of the filtered calcium upstream and downstream of process heat exchangers and also the heat transfer efficiency.	Additive is injected based upon hot lime softener operation.	Pump rate adjusted based upon DEHA sample residuals, and online oxygen analyzer results.	Injection rates are adjusted based uopn an online dissolved oxygen meter, checks at PIB done on Dissolved Oxygen and quarterly coupon analysis .	pH control
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	7% sodium hydroxide 4% PBTC 1% sulfonated alkylbenzene 4% sodium tolytriazole	12.5% Sodium Hypochlorite	33% Sodium Hexametaphosphate	50% Polyacrylic Acid (PAA)	38% Sodium Aluminate	30% DEHA 3% hydroquinone	40% Sodium Bisulfite	Morpholine Cyclohexyamine Alkyl ether amine
Treatment System Blowdown Rate	7200 gals/day	2.1 mgd	2.1 mgd	1.25 mgd	0.59 mgd	0.59 mgd	0.59 mgd at utilities, 20 gpd at PIB	1.15 mgd
Outfall Flow Rate	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD
Treatment System Temperature	70 - 90 deg F	70 - 90 deg F	60 - 80 deg F	40 - 70 deg F	230 deg F	230 deg F	225 deg F and ambient temp at PIB	250 - 450 deg F
Treatment System pH	8.2	7.8	7.0	8.0	10.0	10.0	10 at utilities and 4.0 at PIB	8.0 - 9.0
Toxicity Data	Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity data was not available for the organisms listed below.
Brown Shrimp 96h/LC50								

Additive Name	BPC 67375	Sodium Hypochlorite - 12.5%	BPC 67015	BPC 60005	BPW 75890	BPB 59396	Sodium Bisulfite - 40%	Y9BH1233
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50			>1000 mg/l			>1000 mg/l		
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50								
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50		1.57 mg/l	224 mg/l			6.4 mg/l		
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50								
Daphnia Magna 24h/EC50								
Daphnia Magna 48h/EC50								
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00					5 - 40 mg/l			
Daphnia Magna 96h/LC00					5 - 40 mg/l			
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50		1.94 mg/l						
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50		5.3 mg/l						
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50								
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)								
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50								
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3								
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50							127 mg/l	

Additive Name	BPC 67375	Sodium Hypochlorite - 12.5%	BPC 67015	BPC 60005	BPW 75890	BPB 59396	Sodium Bisulfite - 40%	Y9BH1233
Threespone stickleback 96h/LC50 (aerated)							756 mg/l	
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50								
Flannelmouth sucker 96h/LC50								
Coho salmon 96 h/LC50								
Chinook salmon 96h/LC50								
Chinook salmon 216h/LC00					5 - 40 mg/l			
Bobwhite quail LD50								
Mosquito Fish 24h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50								
Mallard Duck LD50								
Freshwater Invertebrates & Fish Acute EC50/LC50	25 - 100 mg/l			> 500 mg/l				
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50								
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D	20 - 30%			20 - 40%				
Freshwater Biodegradability 5 Day/2.0mg/l								
Freshwater Biodegradability 5 Day/3.8mg/l								
Relationship of toxicity to pH	Effective pH range: 8.0 - 8.3	Effective pH range: 7.0 - 8.8	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	
Relationship of toxicity to water hardness	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	
N Octanol-Water Partition Coefficient								
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	**BPB 59460**	**BPB 59470**	**Guardion 9405**	**Praestol K122L**	**Praestol K122L**	**Praestol K260FL**	**Praestol K260FL**	**71-D5 PLUS Antifoam**
Supplier	Baker Petrolite	Baker Petrolite	Baker Petrolite	Ashland Chemical	Ashland Chemical	Ashland Chemical	Ashland Chemical	ONDEO Nalco
New or Replacement	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
Outfall	Outfall 005	Outfall 005	Outfall 001	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Steam condensate system	Boiler Feed Water	Zeolite Resin @ Water Treating Plant	Activated Sludge prior to Clarification	Activated sludge thickening prior to DAF	Activated Sludge prior to Belt Press	Dewatering additive for centrifuges.	Aeration Basin & Clarifier inlets
Feed Rate	3,403 grams/day	107,047 grams/day	114,635 grams/day	27,850 grams/day	238,970 grams/day	37,040 grams/day	101,535 grams/day	47,727 grams/day
Water Treatment Concentration	15 mg/l	9.94 mg/l (annual average)	dosage based on size of bed	9.3 mg/l	3.3 mg/l	0.5 mg/l	1.4 mg/l	conc varies w/ current conditions
Duration of Use (hrs/day)	24 hrs/day	24 hrs/day	one time	4 hrs/day	12 hrs/day	intermittent	24 hrs/day	as needed
Duration of Use (days/year)	365 days/year	365 days/year	4 times/year	90 days/year	365 days/year	90 days/year (approximately)	365 days/year	as needed
Final Discharge Concentration at Outfall	0.05 mg/l (worst case)	1.42 mg/l (worst case)	1.52 mg/l (worst case)	0.047 mg/l	0.0 mg/l	0.0 mg/l	0.0 mg/l	0.0 mg/l
Determination of Discharge Concentration	This additive will be consumed in the activated sludge plant. Expected final discharge concentration should approach zero.	This additive will be consumed in the activated sludge plant. Expected final discharge concentration should approach zero.	This worst case is based upon 100% of additive remaining in final discharge when the additive is used.	This concentration would remain in the secondary effluent based on manufacturer's engineered estimate of recovered chemical in the water phase. This residual may react with suspended solids in the filters and be filtered out.	Concentration in final discharge approaches 0.0 mg/l. 0.016 mg/l would remain in the DAF effluent based on manufacturer's engineered estimated recovered chemical in the water phase. Any concentration that is present in the DAF effluent will be oxidized in the activated sludge plant and/or separated in the secondary clarifier and/or filtered in the final filters.	Based on the manufacturer's engineered estimated recovered chemical in the water phase and a calculation of the volume of filtrate from the rotary drum operation, 0.0025 mg/l would remain in the filtrate which is routed to the activated sludge plant. This residual will be further oxided in the activated sludge plant and the final discharge concentration will approach 0.0 mg/l.	Based on the manufacturer's engineered estimated recovered chemical in the water phase and a calculation of the volume of filtrate from this press operation, 0.007 mg/l would remain in the press filtrate which is routed to the front end of the WWTP. This residual will be further oxided in the activated sludge plant and the final discharge concentration will approach 0.0 mg/l.	100% of the material is reacted in the system and consumed; therefore, 0 mg/l is expected in the final discharge.
Control Description	Pump rate adjusted based upon condensate sample pH and iron results.	Pump rate adjusted based upon condensate sample pH and iron results.	The additive is added to a zeolite bed during the brine step of regeneration and the dosage is based on the size of the bed.	Addition rate is based on stability of the sludge beds in the clarifiers. If the beds are rising, polymer is injected to compress the sludge beds.	Addition rate is based on DAF performance and solids content of the activated sludge. DAF performance is measured by effluent turbidity every 2 hours.	Additive is used when additional sludge wasting is required. Addition rate is based on solids content of the activated sludge and performance of the rotary drum thickener.	Addition rate is based on the drain section of the press operation and % cake solids. Drain section is monitored via video cameras.	This additive is fed as needed directly to the aeration basin until foaming is reduced. Addition varies with current conditions and is added manually as needed based on visual inspection of foam in tank.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	40% Cyclohexylamine	5% aminomethylpropanol 25% cyclohexylamine 9% dimethylaminopropanol	7% Organic phosphonate 2% Surfactant 2% Oxalic Acid	43% Acrylamide Copolymer 30% Petroleum Hydrocarbon	43% Acrylamide Copolymer 30% Petroleum Hydrocarbon	47% Acrylamide Copolymer 30% Petroleum Hydrocarbon	47% Acrylamide Copolymer 30% Petroleum Hydrocarbon	1-5% n-Decanol 5-10% n-Octanol 0-1% Paraffin Wax 10-20% Hydrotreated light distillate
Treatment System Blowdown Rate	59,917 gals per day	2.85 mgd	N/A	N/A	N/A	N/A	N/A	N/A
Outfall Flow Rate	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD
Treatment System Temperature	240 deg F	330 - 450 deg F	180 deg F	80 - 90 deg F	80 - 90 deg F	80 - 90 deg F	80 - 90 deg F	80 deg F
Treatment System pH	8.0 - 9.0	8.0 - 9.0	10.0	7.0 - 8.0	7.0 - 8.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0
Toxicity Data	Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.	Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.
Brown Shrimp 96h/LC50								

Additive Name	BPB 59460	BPB 59470	Guardion 9405	Praestol K122L	Praestol K122L	Praestol K260FL	Praestol K260FL	71-D5 PLUS Antifoam
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50			268 mg/l					440 mg/l
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50								
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50			150 mg/l	1.75 mg/l	1.75 mg/l	1.75 mg/l	1.75 mg/l	
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50								130 mg/l
Daphnia Magna 24h/EC50								
Daphnia Magna 48h/EC50								
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00								
Daphnia Magna 96h/LC00								
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50								310 mg/l
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50								
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50								
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)								
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50				11.0 mg/l	11.0 mg/l	11.0 mg/l	11.0 mg/l	
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3								
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50								

Additive Name	BPB 59460	BPB 59470	Guardion 9405	Praestol K122L	Praestol K122L	Praestol K260FL	Praestol K260FL	71-D5 PLUS Antifoam
Threespone stickleback 96h/LC50 (aerated)								
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50								
Flannelmouth sucker 96h/LC50								
Coho salmon 96 h/LC50								
Chinook salmon 96h/LC50								
Chinook salmon 216h/LC00								
Bobwhite quail LD50								
Mosquito Fish 24h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50								
Mallard Duck LD50								
Freshwater Invertebrates & Fish Acute EC50/LC50	10 - 50 mg/l	10 - 50 mg/l						
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50	1 - 10 mg/l	1 - 10 mg/l						
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D	>50%	30 - 50%						
Freshwater Biodegradability 5 Day/2.0mg/l								
Freshwater Biodegradability 5 Day/3.8mg/l								
Relationship of toxicity to pH	Effective pH range: 8.0 - 8.3	Effective pH range: 7.5 - 8.2	Effective pH range: 7.5 - 8.2	Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's>7.0	Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's>7.0	Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's>7.0	Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's>7.0	Toxicity does not change with pH.
Relationship of toxicity to water hardness	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC. Toxicity decreases with increasing humic acid concentration.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC. Toxicity decreases with increasing humic acid concentration.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC. Toxicity decreases with increasing humic acid concentration.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC. Toxicity decreases with increasing humic acid concentration.	Toxicity does not change with water hardness.
N Octanol-Water Partition Coefficient								5.5
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	**Ferric Sulfate**	**Ferric Sulfate**	**Phosphoric Acid Solution**	**50% Caustic**	**BPB 55715**	**Sulfuric Acid**	**50% Caustic**	**Sodium Hypochlorite - 12.5%**
Supplier	Kemra	Kemra	Ashland	DOW	Baker Petrolite	Marsulex	Old World Industries, Inc.	K. A. Steel
New or Replacement	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 002
Point of Injection	Activated Sludge Plant Clarifiers	Oily sludge feed to centrifuges	Activated Sludge Plant	Barscreen and/or Oil/Water Separator effluent and/or Activated Sludge Plant	Boiler Feed Water	Cooling Towers (#1 - #6)	SBS Unit Tower	WWTP Intake
Feed Rate	486,864 grams/day	205,457 grams/day	481,760 gram/day	7,200,800 grams/day (as needed)	209,091 grams/day	1,625,867 grams/day	30,000 grams/day (estimated)	2,117,900,000 grams/day
Water Treatment Concentration	50 mg/l	21 mg/l	2.4 mg/l	47.6 mg/l	6.0 mg/l	21.6 mg/l	30.0 mg/l	4.4 mg/l as product and 1.0 mg/l free available chlorine
Duration of Use (hrs/day)	24 hrs/day as needed	24 hrs/day as needed	as needed	as needed	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day
Duration of Use (days/year)	90 days/yr	365 days/yr	as needed	as needed	365 days/year	365 days/year	365 days/year	56 days/year
Final Discharge Concentration at Outfall	1.7 mg/l (worst case)	0.75 mg/l (worst case)	0.3 - 0.5 mg/l orthophosphate	0.0 mg/l	0.0 mg/l	21.6 mg/l as sulfate	0.0 mg/l	< 0.05 mg/l total residual chorine
Determination of Discharge Concentration	This worst case is based upon 100% of additive remaining in final discharge when the additive is used.	This worst case is based upon 100% of additive remaining in final discharge when the additive is used.	The WWTP orthophosphate concentration is measured.	100% of the material is reacted in the system and consumed; therefore, 0 mg/l is expected in the final discharge.	100% of the material is reacted in the system and consumed; therefore, 0 mg/l is expected in the final discharge.	The additive is injected into 6 cooling towers on site. This additive is injected continuously All acidic properties have been neutralized by the alkalinity of the cooling tower water.	The additive is injected continuously into the cooling tower. All alkaline properties have been neutralized by the acidity of the cooling tower water.	All of free available chlorine will be removed prior to discharge. This is accomplished with the injection of sodium bisulfite in # 6 separator.
Control Description	Additve use is only temporary to help with settling the clarifier bed to normal depths	Additve use is to reduce H2S concentration in the oily sludge.	Dosage is based on orthophosphate results on WWTP effluent. Final discharge concentration is maintained between 0.3 - 0.5 orthophosphate.	Dosage is based on pH samples taken on the WWTP effluent every 2 hours. The pH of the WWTP effluent is maintained between 7.0 - 7.5	Feed rate is based on an algorithm which takes into account both boiler feed water flow and hardness which is measured.	Each cooling tower has an online pH meter to control the pump rate to meet the set point pH of 7.8. In the event of a pH meter failure, the pump is set based upon manual grab samples.	The SBS unit cooling tower will have an online pH meter to control the pump rate to meet the set point pH of 7.8. In the event of a pH meter failure, the pump will be set based upon manual grab samples.	# 6 separator has an online ORP probe that controls the pump rate to meet the set point concentration.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	12.2% Ferric Iron (Fe+3) 0.001% Ferrous Iron (Fe+2) <0.1% Sulfuric Acid 55%-66% Ferric Sulfate	12.2% Ferric Iron (Fe+3) 0.001% Ferrous Iron (Fe+2) <0.1% Sulfuric Acid 55%-66% Ferric Sulfate	37% Phosphoric Acid 6% Sulfuric Acid 1% Nitric Acid	50% Sodium Hydroxide	Acrylate polymer Sulfonate	70 - 100% Sufuric Acid		12.5% Sodium Hypochlorite
Treatment System Blowdown Rate	N/A	N/A	N/A	N/A	9.2 mgd	2.1 mgd	2.1 mgd	N/A
Outfall Flow Rate	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	86.2 MGD
Treatment System Temperature	80 - 90 deg F	80 - 90 deg F	70 deg F	70 deg F	400 deg F	70 - 90 deg F	70 - 90 deg F	50 - 110 deg F
Treatment System pH	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	10.0	7.8	7.8	7.0 - 9.0
Toxicity Data	No data.	No data.	No data.	Material is slightly toxic to aquatic organisms on an acute basis (LC50 between 10 - 100 mg/l in most sensitive species).	None of the components of the additive are considered toxic; therefore, no toxicity testing was performed on this additive.	Toxicity results for this additive provided below.	Material is slightly toxic to aquatic organisms on an acute basis (LC50 between 10 - 100 mg/l in most sensitive species).	Toxicity results for this additive provided below.
Brown Shrimp 96h/LC50								

Additive Name	Ferric Sulfate	Ferric Sulfate	Phosphoric Acid Solution	50% Caustic	BPB 55715	Sulfuric Acid	50% Caustic	Sodium Hypochlorite - 12.5%
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50								
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50								1.57 mg/l
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50								
Daphnia Magna 24h/EC50								
Daphnia Magna 48h/EC50								
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00								
Daphnia Magna 96h/LC00								
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50								1.94 mg/l
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50								5.3 mg/l
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50								
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)								
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50								
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3								
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50								

Additive Name	Ferric Sulfate	Ferric Sulfate	Phosphoric Acid Solution	50% Caustic	BPB 55715	Sulfuric Acid	50% Caustic	Sodium Hypochlorite - 12.5%
Threespone stickleback 96h/LC50 (aerated)								
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50								
Flannelmouth sucker 96h/LC50								
Coho salmon 96 h/LC50								
Chinook salmon 96h/LC50								
Chinook salmon 216h/LC00								
Bobwhite quail LD50								
Mosquito Fish 24h/LC50						138 mg/l		
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50								
Mallard Duck LD50								
Freshwater Invertebrates & Fish Acute EC50/LC50								
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50								
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D								
Freshwater Biodegradability 5 Day/2.0mg/l								
Freshwater Biodegradability 5 Day/3.8mg/l								
Relationship of toxicity to pH				Toxicity increases outside the pH range of 5 - 10.	See above.	Effective pH range: 7.0 - 8.8	Toxicity increases outside the pH range of 5 - 10.	Effective pH range: 7.0 - 8.8
Relationship of toxicity to water hardness				Toxicity increases with increasing water hardness.	See above.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Toxicity increases with increasing water hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.
N Octanol-Water Partition Coefficient								
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	**Sodium Bisulfite - 40%**	**BPB 59466**	**BPB 59316**	**Hydrochloric Acid - 31%**	**ACS 2125**	**Praestol A3025 LA Flocculant**	**Spectrafoc 875**	**Praestol A3040 LA Flocculant**
Supplier	PVS Chemical Solutions	Baker Petrolite	Baker Petrolite	Vopak (commodity chemical)	Alchem Specialties, Inc.	Ashland	Baker Petrolite	Ashland
New or Replacement	Existing	Existing	Existing	Existing	Existing	NEW/ Future use	NEW/ Future use	NEW/ Future use
Outfall	Outfall 002	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	# 6 Separator Effluent	Steam Condensate System	Boiler Feed Water	Cooling Towers (#1 - #6)	DAF influent	WWTP Brine Treatment	WWTP Brine Treatment and AFU	DAF influent
Feed Rate	550,380,000 grams/day	49,164 grams/day	232,221 grams/day	1,934,135 grams/day	167,750 grams/day	167,750 grams/day	167,750 grams/day	167,750 grams/day
Water Treatment Concentration	2.8 mg/l	8.5 mg/l	7.0 mg/l	75 mg/l	2.3 mg/l	2.3 mg/l	2.3 mg/l	2.3 mg/l
Duration of Use (hrs/day)	24 hrs/day	24 hrs/day	24 hrs/day	1 hr/day	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day
Duration of Use (days/year)	56 days/year	365 days/year	365 days/year	30 days per year	365 days/year	365 days/year	365 days/year	365 days/year
Final Discharge Concentration at Outfall	2.8 mg/l as sulfate. (worst case)	0.65 mg/l (worst case)	3.08 mg/l (worst case)	0.95 mg/l as chloride (worst case)	0.0 mg/l	0.0 mg/l	0.0 mg/l	0.0 mg/l
Determination of Discharge Concentration	This is a reducing agent that is applied to scavenge available oxidant during zebra mussel treatment.	This additive will be consumed in the activated sludge plant. Expected final discharge concentration should approach zero.	This additive will be consumed in the activated sludge plant. Expected final discharge concentration should approach zero.	0.95 mg/l as chloride in the final discharge from the cooling tower blowdown. Residual based on a calculation of the smallest cooling tower system volume, as a worst case estimate. All acidic properties have been neutralized by the alkalinity of the cooling tower water.	Based on the manufacturer's engineered estimated recovered chemical in the water phase, 0.012 mg/l would remain in the DAF effluent. The organic component will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters. The inorganic component will be separated in the clarifier and/or filtered in the final filters	Based on estimated recovered chemical in the water phase, 0.015 mg/l would remain in the Brine treatment effluent. This will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters.	Based on estimated recovered chemical in the water phase, 0.015 mg/l would remain in the Brine treatment effluent. This will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters.	Based on estimated recovered chemical in the water phase, 0.015 mg/l would remain in the Brine treatment effluent. This will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters.
Control Description	Injection rates are adjusted based uopn an online dissolved oxygen meter.	Feed rate is based upon condensate sample results for pH and iron.	Feed rate is adjusted based upon online control using the inert molybdate tracer.	Hydrochloric acid is injected into the cooling water inlet of heat exhangers to remove scale. The low pH effluent flows to the recirculating cooling tower where pH is neutralized by the alkalinity of the cooling tower water.	Addition rate is based on DAF performance which includes oil and grease as well as influent and effluent turbidity measured every 2 hours.	Feed rate is based on flow and performance for oil and grease	Feed rate is based on flow and performance for oil and grease	Addition rate is based on DAF performance which includes oil and grease as well as influent and effluent turbidity measured every 2 hours.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	40% Sodium Bisulfite	70% Morpholine	2% Caustic 8% Polyacrylate 8% Acrylic Polymer 1% Sodium Molybdate	31% Hydrochloric Acid	30% aluminum chloride hydroxide 10% polyalkylammonium chloride	20-30% aliphatic hydrocarbon 5% ethyloxilated nonylphenol 5% polyoxyalkylened nonionic surfactant	20-30% petroleum distillates oxyalkylated alkylphenol	30% Petroleum Distillates 5-10% Alcohols <5% nonylphenol polyethoxylate >5% polyethylene glycol alkyl ether
Treatment System Blowdown Rate	N/A	6.33 mgd	6.33 mgd	2.1 mgd	N/A	N/A	N/A	N/A
Outfall Flow Rate	86.2 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	19.9MGD
Treatment System Temperature	50 - 110 deg F	330 - 450 deg F	330 - 450 deg F	70 - 90 deg F	80 - 90 deg F	70 -90 deg F	70 -90 deg F	80 - 90 deg F
Treatment System pH	7.0 -9.0	8.0 - 9.0	8.0 - 9.0	7.8	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0
Toxicity Data	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	No data available for Toxicity results for this additive.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.
Brown Shrimp 96h/LC50								

Additive Name	Sodium Bisulfite - 40%	BPB 59466	BPB 59316	Hydrochloric Acid - 31%	ACS 2125	Praestol A3025 LA Flocculant	Spectrafoc 875	Praestol A3040 LA Flocculant
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50		177 mg/l	3318 mg/l	18.6 mg/l			>100 mg/l	
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50								
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50			891 mg/l					16 mg/l
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50				5.0 mg/l				
Daphnia Magna 24h/EC50		144 mg/l						
Daphnia Magna 48h/EC50								
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00								
Daphnia Magna 96h/LC00								
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50		543 mg/l			1.3 mg/l			1.8 mg/l
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50		500 mg/l						
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50								
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)								
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50								
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3	127 mg/l							
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50	756 mg/l							

Additive Name	Sodium Bisulfite - 40%	BPB 59466	BPB 59316	Hydrochloric Acid - 31%	ACS 2125	Praestol A3025 LA Flocculant	Spectrafoc 875	Praestol A3040 LA Flocculant
Threespone stickleback 96h/LC50 (aerated)								
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50								
Flannelmouth sucker 96h/LC50								
Coho salmon 96 h/LC50								
Chinook salmon 96h/LC50								
Chinook salmon 216h/LC00								
Bobwhite quail LD50								
Mosquito Fish 24h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50								
Mallard Duck LD50								
Freshwater Invertebrates & Fish Acute EC50/LC50								<1 mg/l
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50								
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D								
Freshwater Biodegradability 5 Day/2.0mg/l								
Freshwater Biodegradability 5 Day/3.8mg/l					Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's > 7.0			
Relationship of toxicity to pH	Effective pH range: 8.0 - 8.3	Effective pH range: 7.5 - 8.2	Effective pH range: 7.5 - 8.2	Effective pH range: 7.5 - 8.2	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC.			
Relationship of toxicity to water hardness	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.				
N Octanol-Water Partition Coefficient								
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	Praestol A 3040 LTR Flocculant	BPB59430	CL2OUT1100	BPC 60005	30% sol HCL	50 wt% sol NAOH	BPB 59455	BPB 59470	Usalco 38	Usalco GU-55
Supplier	Ashland	Baker Petrolite	Baker Petrolite	Baker Petrolite	Fisher	BPAmoco	Baker Petrolite	Baker Petrolite	Usalco	Usalco
New or Replacement	NEW/ Future use	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 002	Outfall 002	Outfall 002	Outfall 002	Outfall 002	Outfall 005	Outfall 005
Point of Injection	DAF Influent	SRU/VRU steam condensate system	WWTP Effluent Recycle to Cooling Towers	Pipestills	OTCW Heat exchanger inlet	OTCW Heat exchanger outlet	Steam condensate system	Steam condensate	Hot Lime Softeners	Hot Lime Softeners
Feed Rate	167,750 grams/day	36,015 grams/day	101,364 grams/day	23,364 grams/day	505 lbs/day	248 lbs/day	4,831 grams/day	1,606 grams/day	540,763 grams/day	205,490 grams/day
Water Treatment Concentration	2.3 mg/l	12 mg/l	0.30 mg/l	3 - 4 mg/l	300,000 mg/l	500,000 mg/l	13.4 mg/l	9.94 mg/l (annual average)	15 mg/l	15 mg/l
Duration of Use (hrs/day)	24 hrs/day	24 hrs/day	24 hrs/day (when using recycle line)	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day
Duration of Use (days/year)	365 days/year	365 days/year	365 days/year (when using recycle line)	365 days/year	120 days/year	120 days/year	365 days/year	365 days/year	365 days/year	365 days/year
Final Discharge Concentration at Outfall	0.0 mg/l	0.192 mg/l (worst case)	0.0 mg/l	.05 mg/l (worst case)	NA -Neutralized	NA -Neutralized	.01 mg/l (worst case)	.004 mg/l (worst case)	6.6 mg/l (worst case)	2.73 mg/l (worst case)
Determination of Discharge Concentration	Based on estimated recovered chemical in the water phase, 0.015 mg/l would remain in the Brine treatment effluent. This will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters.	Worse case is based upon 100% of additive remaining in the final discharge when the additive is used. Assume no removal at the activated sludge plant.	100% of the material is reacted in the system and consumed; therefore, 0 mg/l is expected in the final discharge.	Material would most likely be consumed in the process	Stoichiometric calculation	Stoichiometric calculation	Material would most likely be consumed in the process	Material would most likely be consumed in the process	This worst case is based on all of the sodium aluminate going to the sewer via boiler blowdown and not precipitating in the hot lime softeners. The additive precipitates in the hot lime softener and is removed with the sludge from the softeners. Any filtrate from the sludge dewatering would have the API separator, DAF, activated sludge plant and final filters for additional removal.	This worst case is based on all of the sodium aluminate going to the sewer via boiler blowdown and not precipitating in the hot lime softeners. The additive precipitates in the hot lime softener and is removed with the sludge from the softeners. Any filtrate from the sludge dewatering would have the API separator, DAF, activated sludge plant and final filters for additional removal.
Control Description	Addition rate is based on DAF performance which includes oil and grease as well as influent and effluent turbidity measured every 2 hours.	Rates will be determined from condensate sample of PH and iron results.	Feed rate is based on flow and halogen residual which is measured.	Additive is used based upon a measure of the filtered calcium upstream and downstream of process heat exchangers and also the heat transfer efficiency.	Additive is used during heat exchanger cleaning only, and no more than 55 gallons of solution will be injected to inlet of exchanger.	Additive is used during heat exchanger cleaning only, and approx 27 gallons of solution will be injected at outlet of exchanger for nuetralization of acid wash cleaning.	Pump rate adjusted based upon condensate sample pH and iron results.	Pump rate adjusted based upon condensate sample pH and iron results.	Additive is injected based upon hot lime softener operation.	Additive is injected based upon hot lime softener operation.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	20-30% aliphatic hydrocarbon 5% ethoxylated nonylphenol	Alkyl Ether amine 30-60%	30-60% Sodium Bromide	50% Polyacrylic Acid (PAA)	30 wt% HCL	50 wt% NAOH	20% Morpholine 20% Cyclohexylamine	5% aminomethylpropanol 25% cyclohexylamine 9% dimethylaminopropanol	38% Sodium Aluminate	100% Granulated Sodium Aluminate
Treatment System Blowdown Rate	N/A	1.15 mgd	N/A	1.44 mgd	.0001 mgd	.0001 mgd	1.44 mgd	1.44 mgd	0.59 mgd	0.59 mgd
Outfall Flow Rate	19.9MGD	19.9 MGD	19.9 MGD	86.2MGD	86.2MGD	86.2MGD	86.2MGD	86.2MGD	19.9 MGD	19.9 MGD
Treatment System Temperature	80 - 90 deg F	50-110 deg F	70 - 90 deg F	50-110 deg F	40-70 deg F	40-70 deg F	330 - 450 deg F	330 - 450 deg F	230 deg F	230 deg F
Treatment System pH	7.0 - 9.0	7.0-9.0	7.8	7.0-9.0	3.0 - 4.0	11.0-12.0	8.0 - 9.0	8.0 - 9.0	10-Jan	10-Jan
Toxicity Data	No data available for Toxicity results for this additive.			Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.			Toxicity results for this additive provided below.	Toxicity results are estimated based on data generated on similar chemistry/components and from literature sources.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.
Brown Shrimp 96h/LC50										

Additive Name	Praestol A 3040 LTR Flocculant	BPB59430	CL2OUT1100	BPC 60005	30% sol HCL	50 wt% sol NAOH	BPB 59455	BPB 59470	Usalco 38	Usalco GU-55
Danio rerio 96 h/ LC50										
Fathead Minnow 96h/LC50			16,479 mg/l				152 mg/l			
Fathead Minnow 96h/NOEC										
Fathead Minnow 7 days/NOEC										
Fathead Minnow 96h/LOEC										
Fathead Minnow 24h/LC50										
Fathead Minnow 48h/LC50										
Fathead Minnow 72h/LC50										
Fathead Minnow 96h/LC50										
Fathead Minnow 24h/EC50										
Fathead Minnow 48h/EC50										
Fathead Minnow 72h/EC50										
Fathead Minnow 96h/EC50										
Fathead Minnow 7 days/EC25/IC25										
Fathead Minnow 7 days/LOEC										
Crangon crangon (shrimp) 96h/LC50										
Ceriodaphnia 48h/LC50							68 mg/l			
Ceriodaphnia 48h/EC50										
Ceriodaphnia 24h/LC50										
Ceriodaphnia 24h/EC50										
Ceriodaphnia 48h/NOEC										
Ceriodaphnia 7 days/NOEC										
Ceriodaphnia 48h/LOEC										
Ceriodaphnia 7 days/LOEC										
Ceriodaphnia 7 days/EC25/IC25										
Cyprinus Carpius 96h/LC50										
Cyprinodon variegatus (sheepshead minnow) 96h/LC50										
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC										
Daphnia Magna 24h/LC 50										
Daphnia Magna 48h/LC 50			11,000 mg/l							
Daphnia Magna 24h/EC50			>1000 mg/l							
Daphnia Magna 48h/EC50										
Daphnia Magna 48h/NOEC										
Daphnia Magna 48h/LOEC										
Daphnia Magna 24h/LC00										
Daphnia Magna 96h/LC00										
Daphnia Magna 96h/LC50										
Daphnia Magna 96h/NOEC										
Daphnia Magna 21day/NOEC										
Daphnia Magna-juvenile (21 day/NOEC										
Juvenile Plaice 96h/LC50										
Inland Silverside 48h/LC50										
Inland Silverside 96h/LC50										
Inland Silverside 96h/NOEC										
Rainbow Trout 96h/LC50		187 mg/l	>1000 mg/l							
Rainbow Trout 96h/NOEC										
Rainbow Trout 48h/LC50										
Bluegill Sunfish 96h/LC50			>1000 mg/l							
Lepomis macrochrius 48 hr/LC50										
Lepomis macrochrius 96 hr/LC50										
Lepomis macrochrius 96hr/NOEC										
LitopenaeusVannamei 48hr/LC50 (White Shrimp)										
Marine Algae (Skeletonema costatum) 72h/EC50										
Acartia tonsa 48h/LC50										
Striped Bass (fingerling) 24H/LC50										
Striped Bass (larvae) 24H/LC51										
Pimephales promelas 48h/LC50										
Pimephales promelas 96h/LC50; 180 mg/l CaCO3										
Pimephales promelas 96h/LC50; 100 mg/l CaCO3										
Pimephales promelas 96h/NOEC										
Pseudokirchnerella subcapitata 72h/IC0										
Tetrahymena pyriformis 48h/EC50										
Threespone stickleback 96h/LC50										

Additive Name	Praestol A 3040 LTR Flocculant	BPB59430	CL2OUT1100	BPC 60005	30% sol HCL	50 wt% sol NAOH	BPB 59455	BPB 59470	Usalco 38	Usalco GU-55
Threespone stickleback 96h/LC50 (aerated)										
Zebra Danio 96h/LC50										
Zebra-fish (Brachydanio rerio) 96h/LC50										
Flannelmouth sucker 96h/LC50										
Coho salmon 96 h/LC50										
Chinook salmon 96h/LC50										
Chinook salmon 216h/LC00			>2250 mg/kg						5 - 40 mg/l	
Bobwhite quail LD50										
Mosquito Fish 24h/LC50										
Mysid Shrimp (Mysidopsis bahia) 96h/LC50										
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC										
Mysid Shrimp (Mysidopsis bahia) 96h/EC50										
Mysid Shrimp (Mysidopsis bahia) 48h/EC50										
Mysid Shrimp (M. litoralis)) 96h/LC50										
Scenedesmus subspicatus 96h/EC50			6,000 mg/l							111 mg/l
Mallard Duck LD50			>5633 ppm							
Freshwater Invertebrates & Fish Acute EC50/LC50			>1000 mg/l	> 500 mg/l				10 - 50 mg/l		
Freshwater Invertebrates Static Acute 48h/LC50										
Freshwater Algae Static Acute EC50			>1000 mg/l					1 - 10 mg/l		
Freshwater Fish Static Acute 96h/LC50										
Freshwater Fish Acute 96h/LC50										
Limanda punctatissima-pre-larvae 96h/LC50										
Moina irrasa-neonate 48h/LC50										
Lemna aequinoctialis 96h/EC50										
Oncorhynchus mykiss 30 day/NOEC										
Oncorhynchus mykiss 96h/LC0										
Oncorhynchus mykiss 28day/NOEC										
Algae 48h/EC50										
Algae 72h/EC50										
Algae 96h/EC50										
Algae 96h/NOEC										
Algae 72h/IC50										
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC										
Crustaceans-Procambarus clarkii-intermolt 48h/LC50										
Bacteria										
Freshwater Biodegradability 28 Day OECD 301D				20 - 40%				30 - 50%		
Freshwater Biodegradability 5 Day/2.0mg/l										
Freshwater Biodegradability 5 Day/3.8mg/l										
Relationship of toxicity to pH				Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.	Effective pH range: 8.0 - 8.3	Effective pH range: 8.0 - 8.3	Effective pH range: 7.5 - 8.2		
Relationship of toxicity to water hardness				Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	unknown	unknown
N Octanol-Water Partition Coefficient									unknown	unknown
Bioconcentration Factor (if available)										
Product Resistence in the Environment (if available)										
Product Decay Rate (attach source of data)										

Additive Name	BPC 68915	BPC 65610	BPW 76001	Ferric Chloride	MAGOX® 98 HR	Sodium Carbonate, Anhydrous	FlocLoad	BPC68155
Supplier	Baker Petrolite	Baker Petrolite	Baker Petrolite	Baker Petrolite	Premier Magnesia	FMC	River Bend Labs	Baker Hughes
New or Replacement	Existing	Existing	New	New	New	New	New for use	New
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Cooling Towers (#1 - #6) + Administration Building Cooling Tower + SBS Unit	Cooling Towers (#1 - #6)	12 Pipestill Desalter (D103A and D102A) Brine Effluent	Aeration Effluent (At Weir), Clarifier Feed (Splitter Box) or Clarifier Effluent (At Weir)	Hot Lime Softeners	Hot Lime Softeners	Aeration Tank 5001	Cooling towers 1, 2, 3, 4, 5, 6, and 7
Feed Rate	4,356 grams/day	155,431 grams/day	23 gallons per day	471 gallons per day	45,359 grams/day	22,680 grams/day	45,000 lbs at one time	90 gpd
Water Treatment Concentration	100 - 200 mg/l	4 - 5 mg/l	25 mg/L as product	5 mg/l	50 mg/L	10-100 mg/L	300 ppm	3-4 mg/L
Duration of Use (hrs/day)	as needed	24 hrs/day	16	24 hrs/day	24 hrs/day	24 hrs/day	One addition of approximately 1.5 hours	24
Duration of Use (days/year)	as needed	365 days/year	365	365	365 days/year	365 days/year	Up to 365 days	365
Final Discharge Concentration at Outfall	11.2 mg/l (worst case)	2.06 mgl (worst case)	0.0 mg/L	<0.5ppm	0.80 mg/l (worst case)	0.40 mg/l (worst case)	<0.5 ppm	1.5 mg/L (worst case)
Determination of Discharge Concentration	Worst case assumes the biocide does not react with any organisms prior to final discharge. However, it is likely that the additive will react with microorganisms in the sewer and that the likely concentration entering the WWTP is close to zero. The activated sludge plant will reduce the final discharge concentration to zero.	Worst case based upon 100% of additive remaining in final discharge and no removal takes place in API separator, DAF, activated sludge plant and final filters.	0.0 mg/L	Data in the Module 3 Argonne report shows that residual concentration of Fe in the filtrate is <0.5 ppm after addition of the ferric chloride reagent at concentrations up to 50 ppm. Hence, the addition is not anticipated to impact the Fe discharge limit.	This worst case is based on all of the magnesium oxide going to the sewer via boiler blowdown and not precipitating in the hot lime softeners. The additive precipitates in the hot lime softener and is removed with the sludge from the softeners. Any filtrate from the sludge dewatering would have the API separator, DAF, activated sludge plant and final filters for additional removal.	This worst case is based on all of the sodium carbonate going to the sewer via boiler blowdown and not precipitating in the hot lime softeners. The additive precipitates in the hot lime softener and is removed with the sludge from the softeners. Any filtrate from the sludge dewatering would have the API separator, DAF, activated sludge plant and final filters for additional removal.	Material is a dense floc building particle that will aid in adding density to biological flocs. Since it is more dense, the material will settle more quickly in the clarifier than general biomass. Therefore the effluent concentration will be no more than, and likely much less than, the current effluent TSS.	Worst case scenario assuming no treatment occurs across the wastewater treatment plant. Assumes 4 mg/L blow down water at 7.5 MGD.
Control Description	The biocide is added based upon tower conditions and microbiological monitoring results. It is used as needed and is not normally dosed to more than one cooling tower at any given time.	Molybdate addition is based on analysis of cooling tower supply water which drives addition rate changes. Samples are taken 3 per week and tested for the concentration of molybdate.	The active aluminum chlorohydrate will precipitate with the desalter brine and be removed with the float off the brine treatment unit. Any remaining active that is present in the brine treatment effluent should be adsorbed in the activated sludge plant and removed with the waste activated sludge.	WTA will be used for solids precipitation. Filter backwash containing precipitated WTA and solids will be discharged to the process sewer downstream of API separators, where it will be removed in ASU clarifiers.	Additive is injected based upon hot lime softener operation.	Additive is injected based upon hot lime softener operation.	Material will remain with the biological flocs. The ultimate disposition is the WAS flow to the beltpress.	Addition is based on analysis of cooling tower supply water which drives addition rate changes. Samples are taken 3 per week and tested to determine concentration. Chemical will be oxidized in the activated sludge plant and concentration at the outfall should approach 0.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/L	217 mg/L	216 mg/l	216 mg/l	Not applicable	216 mg/l
Chemical Composition	5-chloro-2-methyl-4-isothiazolin-3-one 2.5% 2-Methyl-4-isothiazolin-3-one 0.5%	35% Sodium Molybdate	Aluminum Chloride Hydroxide	30-60% Iron Chloride (FeCl3)	100% Magnesium Oxide	100% Sodium Carbonate	Trace crystalline silica, 99+% Proprietary Mineral Blend	Modified arylamine, 20-30% Triazole derivative, 10-20% Triazole derivative, 5-10%
Treatment System Blowdown Rate	2.1 mgd	2.1 mgd	N/A	N/A	0.59 mgd	0.59 mgd	NA	7.5 MGD
Outfall Flow Rate	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	15.0 MGD	15.0 MGD	18 - 22 MGD	19.9 MGD
Treatment System Temperature	70 - 90 deg F	70 - 90 deg F	80 - 90 F	81 - 90 F	200 deg F	200 deg F	80 - 90 deg F	50 - 110 deg F
Treatment System pH	7.8	7.8	7.0 - 9.0	7.0 - 9.1	10.0	10.0	7.0 - 9.0	6-9
Toxicity Data	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity Data from MSDS, ihl-hmn TCLo: 400 mg/m3; itr-ham TDLo: 480 mg/kg/30w-I: ETA. No LC50/LD50 data available for this product	Toxicity results for this additive provided below.	None	96-hr NOEC for fathead minnow = 40 mg/L; 48-hr NOEC for daphnia magna = 50 mg/L
Brown Shrimp 96h/LC50								

Additive Name	BPC 68915	BPC 65610	BPW 76001	Ferric Chloride	MAGOX® 98 HR	Sodium Carbonate, Anhydrous	FlocLoad	BPC68155
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50	4.1		609 mg/L					106 mg/L
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50								
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50	13.3					200-227 mg/l		
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50	8.7		397 mg/L					140 mg/L
Daphnia Magna 24h/EC50								141 mg/L
Daphnia Magna 48h/EC50				9.6 mg/l				119 mg/L
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00								
Daphnia Magna 96h/LC00								
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50	12.7							
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50	18.7					300 mg/l		
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50				20.26 mg/l				
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)				52.5 mg/l				
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50								
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3								
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50								

Additive Name	BPC 68915	BPC 65610	BPW 76001	Ferric Chloride	MAGOX® 98 HR	Sodium Carbonate, Anhydrous	FlocLoad	BPC68155
Threespone stickleback 96h/LC50 (aerated)								
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50								
Flannelmouth sucker 96h/LC50		1940 mg/l						
Coho salmon 96 h/LC50		>1000 mg/l						
Chinook salmon 96h/LC50		>1000 mg/l						
Chinook salmon 216h/LC00								
Bobwhite quail LD50								
Mosquito Fish 24h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50								
Mallard Duck LD50								
Freshwater Invertebrates & Fish Acute EC50/LC50								
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50								
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D								
Freshwater Biodegradability 5 Day/2.0mg/l								
Freshwater Biodegradability 5 Day/3.8mg/l								
Relationship of toxicity to pH		Effective pH range: 7.5 - 8.2			Effective pH range: 10.0 - 11.0	Effective pH range: 8.0 - 8.3	No pH impacts or issues related to this product.	Effective pH range: 8.0 - 8.3
Relationship of toxicity to water hardness		Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.			Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	Effective hardness 150 - 160 mg/l as CaCO3. Literature indicates that toxicity generally increases with decreasing hardness.	No impact on water hardness. This is a solid that will settle in the water.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity generally increases with decreasing hardness.
N Octanol-Water Partition Coefficient								
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	**Praestol K 274**	**Bentonite**	**Praestol K 269 FLX**	**SpectraFloc 600B**	**N 9353**	**Core Shell 71306**	**Ultrion 8187**	**ACS2000**
Supplier	Ashland Chemical	Muldoon Minerals, Inc.	Solenis	Baker Hughes	Nalco	Nalco	Nalco	Aluminum Chemical Specialties
New or Replacement	Replacement	New	Replacing Praestol K260	Replacing Praestol K260	Replacing BPC 60005	New	New	New
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 002	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Sludge feed to the DNF Centrifuge	Sludge feed to the DNF Centrifuge	Sludge feed to DNF Centrifuge	Sludge feed to DNF Centrifuge	Once through Cooling Water - Pipestill Exchanger System	Feed to DNF	Feed to DNF	Feed to DNF
Feed Rate	132,404 grams/day	10,000 lbs/day	35 gals/d	35 gals/d	23,364 grams/day	60 gallons/day	120 gallons/day	200 gal/day
Water Treatment Concentration	200 ppm	-	200 ppm	200 ppm	3 - 4 mg/l	1 - 5 mg/l	10 - 50 mg/l	40-100 mg/L
Duration of Use (hrs/day)	24	24	24	24	24 hrs/day	24 hrs/day	24 hrs/day	24 hrs/day
Duration of Use (days/year)	365	365	365	365	365 days/year	365 days/year	365 days/year	365 days/year
Final Discharge Concentration at Outfall	0.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm	0.6 mg/l	0.1 mg/l	<0.1 mg/l	< 0.1 mg/l
Determination of Discharge Concentration	Based on the manufacturer's engineered estimated recovered chemical in the water phase and a calculation of the volume of filtrate from this centrifuge operation, ___ mg/l would remain in the centrifuge filtrate which is routed to the front end of the WWTP. This residual will be further oxided in the activated sludge plant and the final discharge concentration will approach 0.0 mg/l.	Based on the manufacturer's engineered estimated recovered chemical in the water phase and a calculation of the volume of filtrate from this centrifuge operation, a small residual amount would remain in the centrifuge filtrate which is routed to the front end of the WWTP. This residual will be further oxided in the activated sludge plant and the final discharge concentration will approach 0.0 mg/l.	Based on the manufacturer's engineered estimated recovered chemical in the water phase and a calculation of the volume of filtrate from this centrifuge operation, a small residual amount would remain in the centrifuge filtrate which is routed to the front end of the WWTP. This residual will be further oxided in the activated sludge plant and the final discharge concentration will approach 0.0 mg/l.	Based on the manufacturer's engineered estimated recovered chemical in the water phase and a calculation of the volume of filtrate from this centrifuge operation, a small residual amount would remain in the centrifuge filtrate which is routed to the front end of the WWTP. This residual will be further oxided in the activated sludge plant and the final discharge concentration will approach 0.0 mg/l.	Material would most likely be consumed in the process.	It is estimated all of this material will go with the solids that are floated in the DNF. Final discharge concentration is low. All of the solids are potentially removed before sending to secondary treatment.	It is estimated all of this material will go with the solids that are floated in the DNF. Final discharge concentration is low. All of the solids are potentially removed before sending to secondary treatment.	It is estimated all of this material will go with the solids that are floated in the DNF. Final discharge concentration is low.
Control Description	Addition rate is based on the drain section of the centrifuge operation and % solids dryness.	Addition rate is based on the drain section of the centrifuge operation and % solids dryness.	DNF Centrifuge polymer	DNF Centrifuge polymer	Additive is used based upon a measure of the filtered calcium upstream and downstream of process heat exchangers and also the heat transfer efficiency. The pump is manually controlled.	This addition will be monitored frequently by turbidity data from the unit.	This addition will be monitored frequently by turbidity data from the unit.	This addition will be monitored frequently by turbidity data from the unit.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/L	216 mg/L	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	≥20 - < 30% Aliphatic Hydrocarbon	> 95% Bentonite	≥20 - < 30% distillates, petroleum, hydrotreated light ≥1.00 - < 1.50% alochols, C12-16, ethoxylated	30-40% hydrotreated naphthenic distillates 1-5% alkoxylated alcohol 1-5% oxyalkylated alkyphenol 1-5% stoddard solvent 0.1-1% ethoxylated alcohol 0.1-1% petroleum distillates 0.1-1% adipic acid	45-50% Polyacrylic Acid (PAA)	Hydrotreated Light Distillate (10-30%) Ethoxylated Sorbitan Monostearate (1-5%) Oxyalkylated alcohol (1-5%)	Aluminum Chloride Hydroxide (30-60%)	Aluminum Chlorohydrate (50%) Water (50%)
Treatment System Blowdown Rate	N/A	N/A	N/A	NA	1.44 mgd			
Outfall Flow Rate	19.9 MGD	19.9 MGD	19.9 MGD	19.9 MGD	86.2 MGD	15 MGD	15 MGD	15 MGD
Treatment System Temperature	80 - 90 deg F	80 - 90 deg F	80 - 90 deg F	80 - 90 deg F	50 - 110 deg F	50 - 110 deg F	50 - 110 deg F	50 - 110 deg F
Treatment System pH	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0
Toxicity Data	Pimephales Promelas LC50 96 hr = 10.29 mg/L	Pimephales Promelas LC50 96 hr = 10.29 mg/L	Oncorhynchus mykiss LC50 96 hr = 2-5 mg/L Fish LC50 96 hr >1-10 mg/L	Fish LC50 96 hr = 97 mg/L ; Fish LC50 1 hr = >300 mg/L; Lepomis macrochirus 4 days = 2200 ug/L; Oncorhynchus mykiss 96 hr = 2900 ug/L		Rainbow trout NOEC 96 hr = 0.25 mg/L; Fathead Minnow NOEC 96 hr = 1.3 mg/L; Daphnia magna NOEC 48 hr = 0.63 mg/L; Algae EC50 48 hr >1000 mg/L	Rainbow trout NOEC 96 hr = 250 mg/L; Fathead Minnow NOEC 96 hr = 313 mg/L; Daphnia magna NOEC 48 hr = 5000 mg/L	
Brown Shrimp 96h/LC50								

Additive Name	Praestol K 274	Bentonite	Praestol K 269 FLX	SpectraFloc 600B	N 9353	Core Shell 71306	Ultrion 8187	ACS2000
Danio rerio 96 h/ LC50								
Fathead Minnow 96h/LC50					700 mg/L	3.5 mg/L	590 mg/L	609 mg/L
Fathead Minnow 96h/NOEC								
Fathead Minnow 7 days/NOEC								
Fathead Minnow 96h/LOEC								
Fathead Minnow 24h/LC50								
Fathead Minnow 48h/LC50								
Fathead Minnow 72h/LC50								
Fathead Minnow 96h/LC50								
Fathead Minnow 24h/EC50								
Fathead Minnow 48h/EC50								
Fathead Minnow 72h/EC50								
Fathead Minnow 96h/EC50								
Fathead Minnow 7 days/EC25/IC25								
Fathead Minnow 7 days/LOEC								
Crangon crangon (shrimp) 96h/LC50								
Ceriodaphnia 48h/LC50					Ceriodaphnia dubia = 375 mg/L		5000 mg/L	
Ceriodaphnia 48h/EC50								
Ceriodaphnia 24h/LC50								
Ceriodaphnia 24h/EC50								
Ceriodaphnia 48h/NOEC								
Ceriodaphnia 7 days/NOEC								
Ceriodaphnia 48h/LOEC								
Ceriodaphnia 7 days/LOEC								
Ceriodaphnia 7 days/EC25/IC25								
Cyprinus Carpius 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/LC50								
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC								
Daphnia Magna 24h/LC 50								
Daphnia Magna 48h/LC 50	0.95 mg/L	0.95 mg/L	1.4 mg/L			1.9 mg/L	5000 mg/L	397 mg/L
Daphnia Magna 24h/EC50								
Daphnia Magna 48h/EC50			>1-10 mg/L					
Daphnia Magna 48h/NOEC								
Daphnia Magna 48h/LOEC								
Daphnia Magna 24h/LC00								
Daphnia Magna 96h/LC00								
Daphnia Magna 96h/LC50								
Daphnia Magna 96h/NOEC								
Daphnia Magna 21day/NOEC								
Daphnia Magna-juvenile (21 day/NOEC								
Juvenile Plaice 96h/LC50								
Inland Silverside 48h/LC50								
Inland Silverside 96h/LC50								
Inland Silverside 96h/NOEC								
Rainbow Trout 96h/LC50			2-5 mg/L			0.47 mg/L	590 mg/L	
Rainbow Trout 96h/NOEC								
Rainbow Trout 48h/LC50								
Bluegill Sunfish 96h/LC50								
Lepomis macrochrius 48 hr/LC50								
Lepomis macrochrius 96 hr/LC50				2900 ug/L				
Lepomis macrochrius 96hr/NOEC								
LitopenaeusVannamei 48hr/LC50 (White Shrimp)								
Marine Algae (Skeletonema costatum) 72h/EC50								
Acartia tonsa 48h/LC50								
Striped Bass (fingerling) 24H/LC50								
Striped Bass (larvae) 24H/LC51								
Pimephales promelas 48h/LC50								
Pimephales promelas 96h/LC50; 180 mg/l CaCO3								
Pimephales promelas 96h/LC50; 100 mg/l CaCO3								
Pimephales promelas 96h/NOEC								
Pseudokirchnerella subcapitata 72h/IC0								
Tetrahymena pyriformis 48h/EC50								
Threespone stickleback 96h/LC50								

Additive Name	Praestol K 274	Bentonite	Praestol K 269 FLX	SpectraFloc 600B	N 9353	Core Shell 71306	Ultrion 8187	ACS2000
Threespone stickleback 96h/LC50 (aerated)								
Zebra Danio 96h/LC50								
Zebra-fish (Brachydanio rerio) 96h/LC50								
Flannelmouth sucker 96h/LC50								
Coho salmon 96 h/LC50								
Chinook salmon 96h/LC50								
Chinook salmon 216h/LC00								
Bobwhite quail LD50								
Mosquito Fish 24h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/LC50								
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC								
Mysid Shrimp (Mysidopsis bahia) 96h/EC50								
Mysid Shrimp (Mysidopsis bahia) 48h/EC50								
Mysid Shrimp (M. litoralis)) 96h/LC50								
Scenedesmus subspicatus 96h/EC50								
Mallard Duck LD50								
Freshwater Invertebrates & Fish Acute EC50/LC50								
Freshwater Invertebrates Static Acute 48h/LC50								
Freshwater Algae Static Acute EC50								
Freshwater Fish Static Acute 96h/LC50								
Freshwater Fish Acute 96h/LC50								
Limanda punctatissima-pre-larvae 96h/LC50								
Moina irrasa-neonate 48h/LC50								
Lemna aequinoctialis 96h/EC50								
Oncorhynchus mykiss 30 day/NOEC								
Oncorhynchus mykiss 96h/LC0								
Oncorhynchus mykiss 28day/NOEC								
Algae 48h/EC50								
Algae 72h/EC50								
Algae 96h/EC50								
Algae 96h/NOEC								
Algae 72h/IC50								
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC								
Crustaceans-Procambarus clarkii-intermolt 48h/LC50								
Bacteria								
Freshwater Biodegradability 28 Day OECD 301D								
Freshwater Biodegradability 5 Day/2.0mg/l								
Freshwater Biodegradability 5 Day/3.8mg/l			0.586					
Relationship of toxicity to pH	Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's>7.0	Effective pH range: 1 - 14. Toxicity of cationic polymers decrease at pH's>7.0						
Relationship of toxicity to water hardness	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC. Toxicity decreases with increasing humic acid concentration.	Effective hardness 150 - 160 mg/l as $CaCO_3$. Literature indicates that toxicity decreases with increasing water hardness and increasing TOC. Toxicity decreases with increasing humic acid concentration.						
N Octanol-Water Partition Coefficient								
Bioconcentration Factor (if available)								
Product Resistence in the Environment (if available)								
Product Decay Rate (attach source of data)								

Additive Name	NALCO 7473	NALCO 7767	NALCO 7768	CAT-FLOC 8108 Plus	CORE SHELL® 71301	LIFESHIELD NP 1001 (LSH1001)
Supplier	Nalco	Nalco	Nalco	Nalco	Nalco	Baker Hughes a Ge Company
New or Replacement	New	Replacement	Replacement	New	New	New
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Clarifier and/or 5001 Basin	WWTP DNF	WWTP DNF	Inlet of the clarifiers at the splitter box and/or outlet of the 2nd stage biological aeration tank	Secondary Clarifier	Cooling Towers 1- 8N/8S
Feed Rate	30 gal/day on Average	120 gals/day	120 gals/day	150 gal/day	150 gal/day	131,316 grams/day
Water Treatment Concentration	0.5 - 10.0 mg/l	8 mg/l	8 mg/l	2 - 30 mg/l	2 - 10 mg/l	80 mg/l
Duration of Use (hrs/day)	Intermittent	24 hrs/day	24 hrs/day	24hrs/day	24hrs/day	24hrs/ day
Duration of Use (days/year)	Intermittent	365 days/year	365 days/year	Intermittent	Intermittent	365 days/ year
Final Discharge Concentration at Outfall	< 0.1 mg/l	0.01 mg/l	0.01 mg/l	<0.1 mg/l	<0.1 mg/l	1.36 mg/l as product (0.07 mg/l as zinc)
Determination of Discharge Concentration	Based on vendor information, the majority of the material is reacted in the system and consumed; therefore, <0.1 mg/l is expected in the final discharge.	Based on vendor information: Based on estimated recovered chemical in the water phase, 0.1 mg/l would remain in the DNF treatment effluent. This will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters.	Based on vendor information: Based on estimated recovered chemical in the water phase, 0.1 mg/l would remain in the DNF treatment effluent. This will be oxidized in the Activated Sludge Plant and/or separated in the clarifier and/or filtered in the final filters.	It is estimated that most of this material (approx. 99% based on vendor information) will adhere to the solids which will stay in the clarifier or be collected in the filters. Therefore based on this assumption, the final discharge concentration is expected to be low with an estimated 99.7% removal in the clarifiers and filters.	It is estimated that most of this material (>90% based on vendor information) will adhere to the solids which will stay in the clarifier or be collected in the filters. Therefore based on this assumption, the final discharge concentration is expected to be <0.1 mg/l.	As Zinc,worst case based upon 100% of additive remaining in final discharge and no removal takes place in API separator, DAF, activated sludge plant and final filters.
Control Description	This addition will be frequently monitored visually. Based on vendor inforamtion, 7473 will destabilize any gas, so the amount of product feed is dependent on the amount of gas.	Feed rate is based on flow and will be monitored 24 hours a day	Feed rate is based on flow and will be monitored 24 hours a day	This addition will be monitored frequently by turbidity data from the unit. Jar testing will verify dosages.	This addition will be monitored frequently by turbidity data from the unit. Jar testing will verify dosages.	Feed rates set to 80 mg/l based blowdown rates.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	Polypropylene Glycol (65-70%) Other proprietary ingredients	10-30% Hydrotreated Light Distillate Proprietary Oxyalkylated alcohol Other Proprietary Ingredients	10-30% Hydrotreated Light Distillate Proprietary Oxyalkylated alcohol Other Proprietary Ingredients	Poly(Diallyl-Dimethyl-Ammonium Chloride) (10-30%) Other proprietary ingredients	Hydrotreated Light Distillate (10-30%) Ethoxylated Sorbitan Monostearate (1-5%) Ethoxylated C10-16 Alcohols (1-5%) Urea (1-5%) Other proprietary ingredients	Proprietary Non P Corrosion Inhibitor - 40- 60% Zinc Chloride - 1 - 5% PTSA Dye Tracer- < 1.0 % Water - - Balance
Treatment System Blowdown Rate		N/A	N/A			0.2 MGD (200,000 GPD)
Outfall Flow Rate	15 MGD	15 MGD	15 MGD	15 MGD	15 MGD	15 MGD
Treatment System Temperature	50 - 110 deg F	70 -90 deg F	70 -90 deg F	50 - 110 deg F	50 - 110 deg F	50 - 110 deg F as WWTP temp (85 - 100 F as cooling water temp)
Treatment System pH	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0	7.0 - 9.0 as WWTP pH (7.2-7.6 as cooling water pH)
Toxicity Data	Toxicity results for this additive provided below	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below.	Toxicity results for this additive provided below
Brown Shrimp 96h/LC50						

Additive Name	NALCO 7473	NALCO 7767	NALCO 7768	CAT-FLOC 8108 Plus	CORE SHELL® 71301	LIFESHIELD NP 1001 (LSH1001)
Danio rerio 96 h/ LC50						
Fathead Minnow 96h/LC50	> 100 mg/l	93 mg/l (similar product)				
Fathead Minnow 96h/NOEC		32 mg/l (similar product)				
Fathead Minnow 7 days/NOEC						
Fathead Minnow 96h/LOEC						
Fathead Minnow 24h/LC50						
Fathead Minnow 48h/LC50						(2000 mg/l)*
Fathead Minnow 72h/LC50						
Fathead Minnow 96h/LC50						(707.10 mg/l)*
Fathead Minnow 24h/EC50						
Fathead Minnow 48h/EC50						
Fathead Minnow 72h/EC50						
Fathead Minnow 96h/EC50						
Fathead Minnow 7 days/EC25/IC25						
Fathead Minnow 7 days/LOEC						
Crangon crangon (shrimp) 96h/LC50						
Ceriodaphnia 48h/LC50						
Ceriodaphnia 48h/EC50						
Ceriodaphnia 24h/LC50						
Ceriodaphnia 24h/EC50						
Ceriodaphnia 48h/NOEC						
Ceriodaphnia 7 days/NOEC						
Ceriodaphnia 48h/LOEC						
Ceriodaphnia 7 days/LOEC						
Ceriodaphnia 7 days/EC25/IC25						
Cyprinus Carpius 96h/LC50						
Cyprinodon variegatus (sheepshead minnow) 96h/LC50			>1,000 mg/l (1% aqueous solution of a similar product)			
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC			1,000 mg/l			
Daphnia Magna 24h/LC 50						(160 mg/l)*
Daphnia Magna 48h/LC 50	> 100 mg/l	3.1 mg/l (product)	200 mg/l (1% aqueous solution of product) 0.694 mg/l (product)	1.8 mg/l (tested in clean water), 3.7 mg/l (tested with 50 mg/l clay), 49.6 (tested with 1000 mg/l clay)		(34.01 mg/l)*
Daphnia Magna 24h/EC50						
Daphnia Magna 48h/EC50			2.0 mg/l (tested with 20mg/l humic acid)		2.4 mg/l (Product tested in clean water)	100 ug/l Fresh water
Daphnia Magna 48h/NOEC		1.3 mg/l (product)	130 mg/l (1% aqueous solution of a similar product) 0.313 mg/l (product)			
Daphnia Magna 48h/LOEC						
Daphnia Magna 24h/LC00						
Daphnia Magna 96h/LC00						
Daphnia Magna 96h/LC50			400 mg/l (1% aqueous solution of a similar product)			
Daphnia Magna 96h/NOEC			180 mg/l (1% aqueous solution of a similar product)			
Daphnia Magna 21day/NOEC						
Daphnia Magna-juvenile (21 day/NOEC						80 ug/l Fresh water
Juvenile Plaice 96h/LC50						
Inland Silverside 48h/LC50						
Inland Silverside 96h/LC50	101 mg/l		90.7 mg/l (product)	4,988.87 mg/l	>1000 mg/l (1% aqueous solution of product)	
Inland Silverside 96h/NOEC			50 mg/l (product)	2500 mg/l		
Rainbow Trout 96h/LC50	> 100 mg/l	101 mg/l (product)	8,500 mg/l (1% aqueous solution of a similar product) 157.5 (Product)	0.76 mg/l	0.31 mg/l (Product tested in clean water)	
Rainbow Trout 96h/NOEC		78 mg/l (product)	1,300 mg/l (1% aqueous solution of product) 62.5 mg/l (product)			
Rainbow Trout 48h/LC50						
Bluegill Sunfish 96h/LC50				1.07 mg/l		
Lepomis macrochrius 48 hr/LC50						
Lepomis macrochrius 96 hr/LC50				1.07 mg/l		
Lepomis macrochrius 96hr/NOEC						
LitopenaeusVannamei 48hr/LC50 (White Shrimp)						
Marine Algae (Skeletonema costatum) 72h/EC50						
Acartia tonsa 48h/LC50						
Striped Bass (fingerling) 24H/LC50						
Striped Bass (larvae) 24H/LC51						
Pimephales promelas 48h/LC50						
Pimephales promelas 96h/LC50; 180 mg/l CaCO3						
Pimephales promelas 96h/LC50; 100 mg/l CaCO3						
Pimephales promelas 96h/NOEC						
Pseudokirchnerella subcapitata 72h/IC0						
Tetrahymena pyriformis 48h/EC50						
Threespone stickleback 96h/LC50						

Additive Name	NALCO 7473	NALCO 7767	NALCO 7768	CAT-FLOC 8108 Plus	CORE SHELL® 71301	LIFESHIELD NP 1001 (LSH1001)
Threespone stickleback 96h/LC50 (aerated)						
Zebra Danio 96h/LC50				10 - 100 mg/l		
Zebra-fish (Brachydanio rerio) 96h/LC50						
Flannelmouth sucker 96h/LC50						
Coho salmon 96 h/LC50						
Chinook salmon 96h/LC50						
Chinook salmon 216h/LC00						
Bobwhite quail LD50						
Mosquito Fish 24h/LC50						
Mysid Shrimp (Mysidopsis bahia) 96h/LC50	154 mg/l		67.4 (product)	92 mg/l	57 mg/l (1% aqueous solution of product)	
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC			12.5 mg/l (product)	62.5 mg/l		
Mysid Shrimp (Mysidopsis bahia) 96h/EC50					49 mg/l (1% aqueous solution of product)	
Mysid Shrimp (Mysidopsis bahia) 48h/EC50						
Mysid Shrimp (M. litoralis)) 96h/LC50			188.9 mg/l (product)			
Scenedesmus subspicatus 96h/EC50						
Mallard Duck LD50						
Freshwater Invertebrates & Fish Acute EC50/LC50						
Freshwater Invertebrates Static Acute 48h/LC50						(10 - 50 mg/L)*
Freshwater Algae Static Acute EC50						
Freshwater Fish Static Acute 96h/LC50						(75 - 150 mg/L)*
Freshwater Fish Acute 96h/LC50						
Limanda punctatissima-pre-larvae 96h/LC50						0.027 mg/l Marine water
Moina irrasa-neonate 48h/LC50						49.99 ug/l Fresh water
Lemna aequinoctialis 96h/EC50						1.8 mg/l Fresh water
Oncorhynchus mykiss 30 day/NOEC						31.5 ug/l
Oncorhynchus mykiss 96h/LC0						
Oncorhynchus mykiss 28day/NOEC						
Algae 48h/EC50		>1,000 mg/l (Hydrotreated Light Distillate)			>1000 mg/l	
Algae 72h/EC50			23 mg/l (product)			34 ug/l Fresh water
Algae 96h/EC50						26 ug/l, (10 - 50 mg/L Static Acute, Freshwater)*
Algae 96h/NOEC						0.02 mg/l Fresh water
Algae 72h/IC50						
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC						1000 ug/l Fresh water
Crustaceans-Procambarus clarkii-intermolt 48h/LC50						
Bacteria		>1,000 mg/l (Hydrotreated Light Distillate)	>1,000 mg/l (Hydrotreated Light Distillate)			
Freshwater Biodegradability 28 Day OECD 301D						(40 - 70%)*
Freshwater Biodegradability 5 Day/2.0mg/l						
Freshwater Biodegradability 5 Day/3.8mg/l						
Relationship of toxicity to pH						
Relationship of toxicity to water hardness						
N Octanol-Water Partition Coefficient						
Bioconcentration Factor (if available)						
Product Resistence in the Environment (if available)						
Product Decay Rate (attach source of data)						

• (X) * = Data taken from two supplemental environmental assessments of aquatic toxicity completed by Baker Hughes. This aquatic toxicity is different to what is described in section 12 of the SDS. The SDS data is specific for zinc chloride (1 to 5%) as the active component only and not for the product LSH1001. According to Baker Hughes, the aquatic toxicity data in two supplemental Environmental Assessments is a better indicator of the overall toxicity of the product because it is reporting the overall product toxicity and not simply the toxicity in a component of the product.

• All other toxicity data is taken from Data from section 12 of the SDS specific for zinc chloride (1 to 5%) as the active component only.

Additive Name	**BKZ 102**	**Magnetite**	**CORE SHELL 71321**	**1404**	**INOC 8166 Plus**
Supplier	Baker Hughes a GE Company	Evoqua Water Technologies, LLC	Nalco	Nalco	Nalco
New or Replacement	New	New	New	New	New
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	All Cooling Water Applications	Return Activated Sludge (clarifier underflow return to aeration tanks)	Belt Press	Belt Press	ASP - 5001 and 5002 basins
Feed Rate	110,000 grams/day	30,000 lbs/ 24 hrs	25-100 GPD	25-100 GPD	30 GPD
Water Treatment Concentration	0.2-0.5 mg/l	2500 mg/L (normal) to 5250 mg/L (max)	100-200 mg/L in Belt Press Influent	100-200 mg/L in Belt Press Influent	1 mg/L
Duration of Use (hrs/day)	24 hrs/day	24 hrs/day	24hrs/ day	24hrs/ day	2hr/ day
Duration of Use (days/year)	365 days/year	365 days/year	365 days/ year	365 days/ year	5 days/ year
Final Discharge Concentration at Outfall	0.46 to 1.14 mg/l as product	0.72 mg/L (estimated)	0.01 mg/L as product	0.01 mg/L as product	1 mg/L as product
Determination of Discharge Concentration	As Chlorine Dioxide, additive can be tested using wet chemistry testing to determine remaining concentrations. The product degrades in sunlight to salts of chlorides, chlorites and chlorates.	Clarifier effluent TSS is reduced by the dual bed media final filtration system. The average value of final filter effluent TSS in the final filter effluent was approximately 1.2 mg/l in 2017. The magnetite should result in improved clarifier effluent TSS, and thereby reduce TSS loading to the final filters. But, in order to provide a conservative estimate of magnetite in the final filter effluent, an assumption is made that the final filter effluent TSS remains the same (1.2 mg/l), but that is comprised of 60% by weight magnetite, resulting in 0.72 mg/L magnetite in the final effluent. This is a long term average projection.	Product is designed to attach to solids. Estimated that greater than 90% will go with belt press cake. The rest will go to the front of the ASP then through clarifier. Clarifier will again reduce the solids by an estimated greater than 90%. Water then goes to sand filters, which reduce the solids by an estimated greater than 90%.	Product is designed to attach to solids. Estimated that greater than 90% will go with belt press cake. The rest will go to the front of the ASP then through clarifier. Clarifier will again reduce the solids by an estimated greater than 90%. Water then goes to sand filters, which reduce the solids by an estimated greater than 90%.	Assuming no removal, concentration is estimated to be well below toxicity levels listed in the SDS.
Control Description	Fed to maintain 0.2-0.5ppm as Chlorine Dioxide	Magnetite will be fed from a silo into the blending section of the Evoqua Biotag process, where magnetite and activated sludge are brought together so that the magnetite can be incorporated into the activated sludge. This blended stream is then pumped into the Return Activated Sludge line. The silo is on a weight scale, which will allow accurate metering of the required amount of magnetite over a specified period of time. One method which will be used to estimate the concentration of magnetite in the activated sludge is by measuring the total suspended solids (TSS) and the volatile suspended solids (VSS) of the activated sludge, which are routine measurements done today. The relative concentration of VSS to TSS can be used to provide a calculation of the concentration of magnetite in the activated sludge. The concentration of magnetite in the activated sludge can be decreased by reducing the metering rate of magnetite into the blending section and allowing the concentration to fall through activated sludge wastage. The concentration of magnetite can be increased by increasing the metering rate of magnetite from the silo into the blending process.	Feed rate is controlled by pump settings. The output is then controlled by regaulr draws and chemical inventory loss.	Feed rate is controlled by pump settings. The output is then controlled by regaulr draws and chemical inventory loss.	Product is poured into the basins from 1 gallon jugs.
Hardness of Discharge Water	216 mg/l	205 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	10-20% Hydrochloric Acid Water - - balance	Iron Oxide (common name: magnetite) - 72% Oxygen - 27%	Hydrotreated Light Distilate 10-30% Ethoxylated Sorbitan Monostearate 1-5% Oxyalkylated Alcohol 1-5% Urea 1-5% Other proprietary ingredients - please see the NALCO 71321 Composition Report in the individual WTA application submitted to IDEM.	Hydrotreated Light Distilate 10-30% Ethoxylated Sorbitan Monostearate 1-5% Oxyalkylated Alcohol 1-5% Inorganic salt 1-5% Other proprietary ingredients - please see attached NALCO 1404 Composition Report in the individual WTA application submitted to IDEM.	Proprietary ingredient - please see attached NALCO 8166 Plus Composition Report in the individual WTA application submitted to IDEM.
Treatment System Blowdown Rate	0.2 MGD (200,000 GPD)	N/A	0.29MGD	0.29MGD	0.29MGD
Outfall Flow Rate	15 MGD	16.1 MGD	15 MGD	15 MGD	15 MGD
Treatment System Temperature	50 - 110 deg F as WWTP temp (85 - 100 F as cooling water temp)	75 - 105 deg F	50 - 110 deg F as WWTP temp	50 - 110 deg F as WWTP temp	50 - 110 deg F as WWTP temp
Treatment System pH	7.0 - 9.0 as WWTP pH (7.2-7.6 as cooling water pH)	6.0 - 9.0	7.0 - 9.0 as WWTP pH	7.0 - 9.0 as WWTP pH	7.0 - 9.0 as WWTP pH
Toxicity Data	Toxicity results for this additive provided below	Toxicity results for this additive provided below	Toxicity results for this additive provided below	Toxicity results for this additive provided below	Toxicity results for this additive provided below
Brown Shrimp 96h/LC50					

Additive Name	BKZ 102	Magnetite	CORE SHELL 71321	1404	INOC 8166 Plus
Danio rerio 96 h/ LC50					
Fathead Minnow 96h/LC50				1.83 mg/l (similar product)	> 10,000 mg/l (product)
Fathead Minnow 96h/NOEC		100 mg/L*			10,000 mg/l (product)
Fathead Minnow 7 days/NOEC			1.25 mg/l (similar product tested in clean water)		
Fathead Minnow 96h/LOEC		>100 mg/L*			
Fathead Minnow 24h/LC50		>100 mg/L*			
Fathead Minnow 48h/LC50		>100 mg/L*			
Fathead Minnow 72h/LC50					
Fathead Minnow 96h/LC50					
Fathead Minnow 24h/EC50		>100 mg/L*			
Fathead Minnow 48h/EC50		>100 mg/L*			
Fathead Minnow 72h/EC50					
Fathead Minnow 96h/EC50					
Fathead Minnow 7 days/EC25/IC25			1.92 mg/l (similar product tested in clean water)		
Fathead Minnow 7 days/LOEC			2.5 mg/l (similar product tested in clean water)		
Crangon crangon (shrimp) 96h/LC50					
Ceriodaphnia 48h/LC50		>100 mg/L*			
Ceriodaphnia 48h/EC50		>100 mg/L*			
Ceriodaphnia 24h/LC50		>100 mg/L*			
Ceriodaphnia 24h/EC50		>100 mg/L*			
Ceriodaphnia 48h/NOEC		100 mg/L*			
Ceriodaphnia 7 days/NOEC			0.1 mg/l (similar product tested in clean water), test type: 3 brood		
Ceriodaphnia 48h/LOEC		>100 mg/L*			
Ceriodaphnia 7 days/LOEC			0.2 mg/l (similar product tested in clean water), test type: 3 brood		
Ceriodaphnia 7 days/EC25/IC25			0.134 mg/l (similar product tested in clean water), test type: 3 brood		
Cyprinus Carpius 96h/LC50					
Cyprinodon variegatus (sheepshead minnow) 96h/LC50					
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC					
Daphnia Magna 24h/LC 50		>100 mg/L*			
Daphnia Magna 48h/LC 50		>100 mg/L*	10 - 100 mg/l (Representative polymer tested in water with DOC)	0.21 mg/l (similar product), 10 - 100 mg/L (representative polymer tested in water with DOC)	> 10,000 mg/L (product)
Daphnia Magna 24h/EC50		>100 mg/L*			
Daphnia Magna 48h/EC50		>100 mg/L*			> 10,000 mg/L (product)
Daphnia Magna 48h/NOEC		100 mg/L*	1.5 mg/l (similar product tested in clean water)		> 10,000 mg/L (product)
Daphnia Magna 48h/LOEC		>100 mg/L*			
Daphnia Magna 24h/LC00					
Daphnia Magna 96h/LC00					
Daphnia Magna 96h/LC50					
Daphnia Magna 96h/NOEC					
Daphnia Magna 21day/NOEC					
Daphnia Magna-juvenile (21 day/NOEC					
Juvenile Plaice 96h/LC50					
Inland Silverside 48h/LC50					
Inland Silverside 96h/LC50			82.31 mg/l (similar product tested in clean water)		
Inland Silverside 96h/NOEC			31.3 mg/l (similar product tested in clean water)		
Rainbow Trout 96h/LC50			0.31 mg/l (similar product tested in clean water)	1 mg/l (similar product)	
Rainbow Trout 96h/NOEC			0.16 mg/l (similar product tested in clean water)		
Rainbow Trout 48h/LC50					
Bluegill Sunfish 96h/LC50					
Lepomis macrochrius 48 hr/LC50					
Lepomis macrochrius 96 hr/LC50					
Lepomis macrochrius 96hr/NOEC					
LitopenaeusVannamei 48hr/LC50 (White Shrimp)					
Marine Algae (Skeletonema costatum) 72h/EC50					
Acartia tonsa 48h/LC50					
Striped Bass (fingerling) 24H/LC50					
Striped Bass (larvae) 24H/LC51					
Pimephales promelas 48h/LC50					
Pimephales promelas 96h/LC50; 180 mg/l CaCO3					
Pimephales promelas 96h/LC50; 100 mg/l CaCO3					
Pimephales promelas 96h/NOEC					
Pseudokirchnerella subcapitata 72h/IC0					
Tetrahymena pyriformis 48h/EC50					
Threespone stickleback 96h/LC50					

Additive Name	BKZ 102	Magnetite	CORE SHELL 71321	1404	INOC 8166 Plus
Threespone stickleback 96h/LC50 (aerated)					
Zebra Danio 96h/LC50			1 - 10 mg/l (Representative polymer tested in water with DOC)	> 1 - 10 mg/L (representative polymer tested in water with DOC)	
Zebra-fish (Brachydanio rerio) 96h/LC50					
Flannelmouth sucker 96h/LC50					
Coho salmon 96 h/LC50					
Chinook salmon 96h/LC50					
Chinook salmon 216h/LC00					
Bobwhite quail LD50					
Mosquito Fish 24h/LC50					
Mysid Shrimp (Mysidopsis bahia) 96h/LC50			2.99 mg/l (similar product tested in clean water)	3.5 mg/l (similar product)	
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC			1.25 mg/l (similar product tested in clean water)		
Mysid Shrimp (Mysidopsis bahia) 96h/EC50					
Mysid Shrimp (Mysidopsis bahia) 48h/EC50			2.4 mg/l (similar product tested in clean water)		
Mysid Shrimp (M. litoralis)) 96h/LC50					
Scenedesmus subspicatus 96h/EC50					
Mallard Duck LD50					
Freshwater Invertebrates & Fish Acute EC50/LC50					
Freshwater Invertebrates Static Acute 48h/LC50					
Freshwater Algae Static Acute EC50					
Freshwater Fish Static Acute 96h/LC50					
Freshwater Fish Acute 96h/LC50	282 mg/l (Gambusia Affinis)				
Limanda punctatissima-pre-larvae 96h/LC50					
Moina irrasa-neonate 48h/LC50					
Lemna aequinoctialis 96h/EC50					
Oncorhynchus mykiss 30 day/NOEC					
Oncorhynchus mykiss 96h/LC0					
Oncorhynchus mykiss 28day/NOEC					
Algae 48h/EC50			Hydrotreated Light Distillate: > 1,000 mg/L		
Algae 72h/EC50				Hydrotreated Light Distillate: > 1,000 mg/l	
Algae 96h/EC50					
Algae 96h/NOEC					
Algae 72h/IC50					
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC					
Crustaceans-Procambarus clarkii-intermolt 48h/LC50	240,000 µg/l (Marine, Carcinus Maenas)				
Bacteria			Hydrotreated Light Distillate: > 1,000 mg/L	Hydrotreated Light Distillate: > 1,000 mg/l (48hr)	
Freshwater Biodegradability 28 Day OECD 301D					
Freshwater Biodegradability 5 Day/2.0mg/l					
Freshwater Biodegradability 5 Day/3.8mg/l					
Relationship of toxicity to pH		No relation since pH was neutral and did not favor ionized form of iron, rather it favored the oxidized form.			
Relationship of toxicity to water hardness		None; The test was conducted with hardness conditions as recommended for the testing of metals (EPA 1994 600 4-91-002, Short term methods for estimating the chronic toxicity of effluents and receiving waters to aquatic organisms".			
N Octanol-Water Partition Coefficient					
Bioconcentration Factor (if available)					
Product Resistence in the Environment (if available)					
Product Decay Rate (attach source of data)					

* = the SDS for magnetite did not contain any aquatic toxicity data. All toxicity data listed above is taken from toxicity tests commissioned by BP - please see the toxicity reports attached to the WTA Application submitted to IDEM on 5/22/18.

Additive Name	**CT603SO**	**Nalco 1404**	**Nalcolyte 8100**	**Demand Trac 990T**
Supplier	Nalco	Nalco	Nalco	Baker Hughes
New or Replacement	0	New	New	Replacement for DMT990
Outfall	Outfall 005	Outfall 005	Outfall 005	Outfall 005
Point of Injection	DNF	Sewer Clean Up Projects	Sewer Clean Up Projects	Cooling Towers #1 - #8
Feed Rate	50-100 GPD	20-60 GPD	60-180 GPD	453,723 grams/day
Water Treatment Concentration	5 - 15 mg/L	500-1500 mg/L in Centrifuge Influent	500-1500 mg/L in Clarifier Box Influent	7.0 - 10.0 mg/l (active residual) or 35 mg/L as product
Duration of Use (hrs/day)	24hrs/ day	24hrs/ day	24hrs/ day	24 hrs/day
Duration of Use (days/year)	365 days/ year	270 days/ year	270 days/ year	365 days/year
Final Discharge Concentration at Outfall	1 mg/L as product	0.01 mg/L as product	0.01 mg/L as product	<0.01 mg/l
Determination of Discharge Concentration	It is assumed that the product will be consumed as it neutralizes scale. Product is made of organic compounds that are expected to be biological removed in the ASP.	Product is designed to attach to solids. Estimated that greater than 90% will go with centrifuge cake. The rest will go through the waste treatment plant. It will go to a DNF, which will again reduce the solids by an estimated greater than 90% Then to a clarifier, which will again reduce the solids by an estimated greater than 90%. Water then goes to sand filters, which will reduce the solids by an estimated greater than 90%.	Product is designed to attach to solids. Estimated that greater than 90% will removed in clarifier boxes. The rest will go through the waste treatment plant. It will go to a DNF, which will again reduce the solids by an estimated greater than 90% Then to a clarifier, which will again reduce the solids by an estimated greater than 90%. Water then goes to sand filters, which will reduce the solids by an estimated greater than 90%.	Removed with the solids in the DNF unit. Any remaining material will be consumed in the Activated Sludge Plant. Expected final discharge concentration should approach zero.
Control Description	Feed rate is controlled by pump settings. The output is then controlled by regaulr draws and chemical inventory loss.	Feed rate is controlled by pump settings. The output is then controlled by regular draws and chemical inventory loss.	Feed rate is controlled by pump settings. The output is then controlled by regular draws and chemical inventory loss.	Each cooling tower is analyzed for dispersant residual and additive rates are adjusted accordingly.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	Polycarboxylic Acid Polymer- 30-60% Maleic Acid- 10-30% Methylpheny Methyl Butanedioic Acid 1-5% Other proprietary ingredients - please see attached NALCO CT603SO Composition Report in the individual WTA application submitted to IDEM.	Hydrotreated Light Distillate 10-30% Ethoxylated Sorbitan Monostearate 1-5% Oxyalkylated Alcohol 1-5% Inorganic salt 1-5% Other proprietary ingredients - please see attached NALCO 1404 Composition Report in the individual WTA application submitted to IDEM.	Sodium Chloride 1-5% Other proprietary ingredients - please see attached NALCO 8100 Composition Report in the individual WTA application submitted to IDEM.	Organic Phosphonate 5-10%, Traced Carboxylate Sodium salt.
Treatment System Blowdown Rate	N/A	0.03MGD	0.11MGD	2.1 mgd
Outfall Flow Rate	15 MGD	15 MGD	15 MGD	16 MGD (average flow)
Treatment System Temperature	50 - 110 deg F as WWTP temp	50 - 110 deg F as WWTP temp	50 - 110 deg F as WWTP temp	50 - 110 deg F as WWTP temp (85 - 100 F as cooling water temp)
Treatment System pH	7.0 - 9.0 as WWTP pH	7.0 - 9.0 as WWTP pH	7.0 - 9.0 as WWTP pH	7.0 to 9.0 pH
Toxicity Data	Toxicity results for this additive provided below	Toxicity results for this additive provided below	Bluegill sunfish NOEC 96 hr = 0.18 mg/L; Rainbow trout NOEC 96 hr = 0.18 mg/L; Sheepshead minnow NOEC 96 hr = 0.65 mg/L; Inland Silverside NOEC 96 hr = 250 mg/l; Mysid shrimp NOEC 96 hr = 0.156 mg/l	Toxicity results for this additive provided below.
Brown Shrimp 96h/LC50				

Additive Name	CT603SO	Nalco 1404	Nalcolyte 8100	Demand Trac 990T
Danio rerio 96 h/ LC50				
Fathead Minnow 96h/LC50		1.83 mg/l (similar product)		
Fathead Minnow 96h/NOEC				50 mg/l
Fathead Minnow 7 days/NOEC				
Fathead Minnow 96h/LOEC				
Fathead Minnow 24h/LC50				
Fathead Minnow 48h/LC50				193.20 mg/l
Fathead Minnow 72h/LC50				
Fathead Minnow 96h/LC50				123.10 mg/l
Fathead Minnow 24h/EC50				
Fathead Minnow 48h/EC50				141.40 mg/l
Fathead Minnow 72h/EC50				
Fathead Minnow 96h/EC50				70.71 mg/l
Fathead Minnow 7 days/EC25/IC25				
Fathead Minnow 7 days/LOEC				
Crangon crangon (shrimp) 96h/LC50	2,160 mg/L (pH adjusted product)			
Ceriodaphnia 48h/LC50				193.20 mg/l
Ceriodaphnia 48h/EC50				180.30 mg/l
Ceriodaphnia 24h/LC50				268.90 mg/l
Ceriodaphnia 24h/EC50				207.10 mg/l
Ceriodaphnia 48h/NOEC				100 mg/l
Ceriodaphnia 7 days/NOEC				
Ceriodaphnia 48h/LOEC				
Ceriodaphnia 7 days/LOEC				
Ceriodaphnia 7 days/EC25/IC25				
Cyprinus Carpius 96h/LC50				
Cyprinodon variegatus (sheepshead minnow) 96h/LC50			2.2 mg/l	
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC			0.65 mg/l	
Daphnia Magna 24h/LC 50				
Daphnia Magna 48h/LC 50		0.21 mg/l (similar product), 10 - 100 mg/L (representative polymer tested in water with DOC)	0.167 mg/l	
Daphnia Magna 24h/EC50				
Daphnia Magna 48h/EC50	> 1,000 mg/l (pH adjusted product)			
Daphnia Magna 48h/NOEC				
Daphnia Magna 48h/LOEC				
Daphnia Magna 24h/LC00				
Daphnia Magna 96h/LC00				
Daphnia Magna 96h/LC50				
Daphnia Magna 96h/NOEC				
Daphnia Magna 21day/NOEC				
Daphnia Magna-juvenile (21 day/NOEC				
Juvenile Plaice 96h/LC50				
Inland Silverside 48h/LC50				
Inland Silverside 96h/LC50			707.1 mg/l	
Inland Silverside 96h/NOEC			250 mg/l	
Rainbow Trout 96h/LC50	> 1,000 mg/l (pH adjusted product)	1 mg/l (similar product)	0.24 mg/l	
Rainbow Trout 96h/NOEC			0.18 mg/l	
Rainbow Trout 48h/LC50				
Bluegill Sunfish 96h/LC50	> 1,000 mg/l (pH adjusted product)			
Lepomis macrochrius 48 hr/LC50				
Lepomis macrochrius 96 hr/LC50			0.52 mg/l	
Lepomis macrochrius 96hr/NOEC			0.18 mg/l	
LitopenaeusVannamei 48hr/LC50 (White Shrimp)				
Marine Algae (Skeletonema costatum) 72h/EC50				
Acartia tonsa 48h/LC50				
Striped Bass (fingerling) 24H/LC50				
Striped Bass (larvae) 24H/LC51				
Pimephales promelas 48h/LC50				
Pimephales promelas 96h/LC50; 180 mg/l CaCO3				
Pimephales promelas 96h/LC50; 100 mg/l CaCO3				
Pimephales promelas 96h/NOEC				
Pseudokirchnerella subcapitata 72h/IC0				
Tetrahymena pyriformis 48h/EC50				
Threespone stickleback 96h/LC50				

Additive Name	CT603SO	Nalco 1404	Nalcolyte 8100	Demand Trac 990T
Threespone stickleback 96h/LC50 (aerated)				
Zebra Danio 96h/LC50		> 1 - 10 mg/L (representative polymer tested in water with DOC)	10 - 100 mg/l (representative polymer tested in water with DOC)	
Zebra-fish (Brachydanio rerio) 96h/LC50				
Flannelmouth sucker 96h/LC50				
Coho salmon 96 h/LC50				
Chinook salmon 96h/LC50				
Chinook salmon 216h/LC00				
Bobwhite quail LD50				
Mosquito Fish 24h/LC50				
Mysid Shrimp (Mysidopsis bahia) 96h/LC50		3.5 mg/l (similar product)	0.825 mg/l	
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC			0.156 mg/l	
Mysid Shrimp (Mysidopsis bahia) 96h/EC50				
Mysid Shrimp (Mysidopsis bahia) 48h/EC50				
Mysid Shrimp (M. litoralis)) 96h/LC50				
Scenedesmus subspicatus 96h/EC50				
Mallard Duck LD50				
Freshwater Invertebrates & Fish Acute EC50/LC50				
Freshwater Invertebrates Static Acute 48h/LC50				
Freshwater Algae Static Acute EC50				
Freshwater Fish Static Acute 96h/LC50				
Freshwater Fish Acute 96h/LC50				
Limanda punctatissima-pre-larvae 96h/LC50				
Moina irrasa-neonate 48h/LC50				
Lemna aequinoctialis 96h/EC50				
Oncorhynchus mykiss 30 day/NOEC				
Oncorhynchus mykiss 96h/LC0				
Oncorhynchus mykiss 28day/NOEC				
Algae 48h/EC50				
Algae 72h/EC50		Hydrotreated Light Distillate: > 1,000 mg/l		
Algae 96h/EC50				
Algae 96h/NOEC				
Algae 72h/IC50				
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC				
Crustaceans-Procambarus clarkii-intermolt 48h/LC50				
Bacteria		Hydrotreated Light Distillate: > 1,000 mg/l (48hr)		
Freshwater Biodegradability 28 Day OECD 301D				
Freshwater Biodegradability 5 Day/2.0mg/l				
Freshwater Biodegradability 5 Day/3.8mg/l				
Relationship of toxicity to pH				
Relationship of toxicity to water hardness				
N Octanol-Water Partition Coefficient				
Bioconcentration Factor (if available)				
Product Resistence in the Environment (if available)				
Product Decay Rate (attach source of data)				

Additive Name	**Redux-620**	**DOLOMITIC HYDRATED LIME TYPE N**	**DOLOMITIC HYDRATED LIME TYPE S**
Supplier	Azure Water Services	Graymont	Carmeuse
New or Replacement	New	New	New
Outfall	Outfall 005	Outfall 005	Outfall 005
Point of Injection	Remediation well / components cleaning	Main Water Treatment Plant	Main Water Treatment Plant
Feed Rate	32 gal/day	3628800 grams/day	3628800 grams/day
Water Treatment Concentration	800 mg/L	63 mg/l	63 mg/l
Duration of Use (hrs/day)	24 hrs (Continuous)	24 hrs/day	24 hrs/day
Duration of Use (days/year)	365 days/ year	365 days/year	365 days/year
Final Discharge Concentration at Outfall	2.0 mg/L (worse case assuming no biological degradation occurs)	≤ 6.3 mg/l as product	≤ 6.3 mg/l as product
Determination of Discharge Concentration	Redux-620 maximum concentration based on design recovery well flowrates and continuous injection rate.	Based upon an estimated at least 90% removal efficiency in the filter lime press compared to the initial concentration of added lime.	Based upon an estimated at least 90% removal efficiency in the filter lime press compared to the initial concentration of added lime.
Control Description	Dosage concentration and volume controlled by chemical metering pump.	Fed to maintain OH alkalinity of 12-18, the alkalinity is measured manually twice a shift and monitored by a 24/hour pH analyzer.	Fed to maintain OH alkalinity of 12-18, the alkalinity is measured manually twice a shift and monitored by a 24/hour pH analyzer.
Hardness of Discharge Water	216 mg/l	216 mg/l	216 mg/l
Chemical Composition	TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULFATE 19-23% SODIUM HYDROXIDE 0.1-2% Other proprietary ingredients - please see attached Redux-620 Composition Report in the individual WTA application submitted to IDEM.	Calcium hydroxide 50-60% Magnesium hydroxide 4-5% Magnesium oxide 30-40% Silica-crystalline quartz 0.0001 - 1%	Calcium hydroxide 58% Magnesium hydroxide 40% Magnesium oxide < 2% Silica-crystalline quartz < 1%
Treatment System Blowdown Rate	Approx. 32 GPM {Remediation system)	0.2 MGD (200,000 GPD)	0.2 MGD (200,000 GPD)
Outfall Flow Rate	16 MGD (average flow)	16 MGD (average flow)	16 MGD (average flow)
Treatment System Temperature	55 deg F (Remediation system), 50 - 110 deg F <WWTP temp)	Approx. 230 Deg F (Treatment System), 50 - 110 deg F (WWTP)	Approx. 230 Deg F (Treatment System), 50 - 110 deg F (WWTP)
Treatment System pH	6.5-8.5 (Remediation system), 7.0-9.0 (WWTP oH)	Approx. 9.0 - 11.0 (Treatment System), 7.0 - 9.0 (WWTP)	Approx. 9.0 - 11.0 (Treatment System), 7.0 - 9.0 (WWTP)
Toxicity Data	Toxicity results for this additive provided below.	Toxicity results for this additive provided below	Toxicity results for this additive provided below
Brown Shrimp 96h/LC50	1275 mg/L		

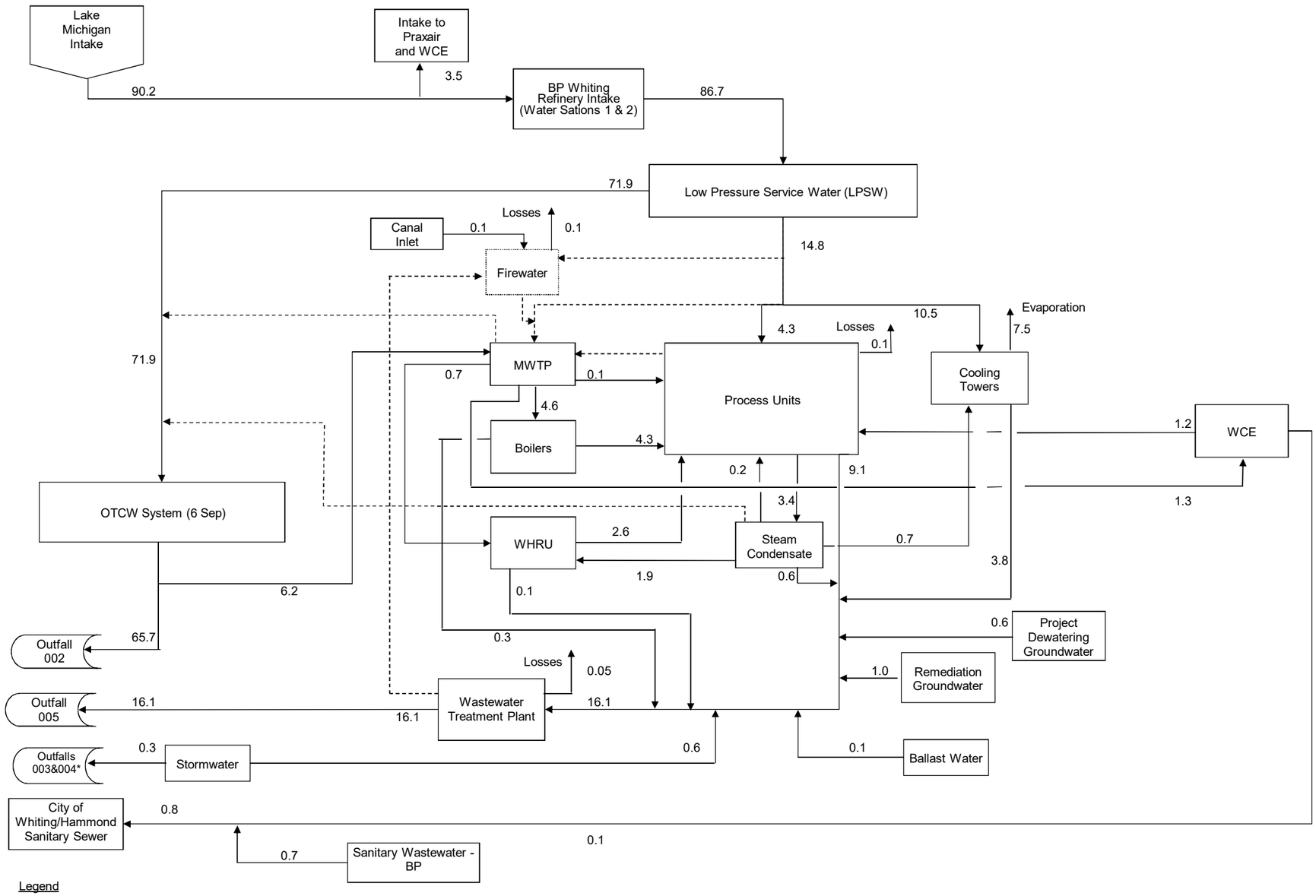
Additive Name	Redux-620	DOLOMITIC HYDRATED LIME TYPE N	DOLOMITIC HYDRATED LIME TYPE S
Danio rerio 96 h/ LC50			
Fathead Minnow 96h/LC50			
Fathead Minnow 96h/NOEC			
Fathead Minnow 7 days/NOEC			
Fathead Minnow 96h/LOEC			
Fathead Minnow 24h/LC50			
Fathead Minnow 48h/LC50		200.00 mg/L	273.2 mg/L
Fathead Minnow 72h/LC50			
Fathead Minnow 96h/LC50		175.30 mg/L	263.90 mg/L
Fathead Minnow 24h/EC50			
Fathead Minnow 48h/EC50		141.40 mg/L	273.20 mg/L
Fathead Minnow 72h/EC50			
Fathead Minnow 96h/EC50		138.90 mg/L	263.90 mg/L
Fathead Minnow 7 days/EC25/IC25			
Fathead Minnow 7 days/LOEC			
Crangon crangon (shrimp) 96h/LC50			
Ceriodaphnia 48h/LC50		113.60 mg/L	57.43 mg/L
Ceriodaphnia 48h/EC50		73.34 mg/L	35.36 mg/L
Ceriodaphnia 24h/LC50			
Ceriodaphnia 24h/EC50			
Ceriodaphnia 48h/NOEC			
Ceriodaphnia 7 days/NOEC			
Ceriodaphnia 48h/LOEC			
Ceriodaphnia 7 days/LOEC			
Ceriodaphnia 7 days/EC25/IC25			
Cyprinus Carpius 96h/LC50			
Cyprinodon variegatus (sheepshead minnow) 96h/LC50	270 mg/L		
Cyprinodon variegatus (sheepshead minnow) 96h/NOEC			
Daphnia Magna 24h/LC 50			
Daphnia Magna 48h/LC 50			
Daphnia Magna 24h/EC50			
Daphnia Magna 48h/EC50	70 mg/L		
Daphnia Magna 48h/NOEC			
Daphnia Magna 48h/LOEC			
Daphnia Magna 24h/LC00			
Daphnia Magna 96h/LC00			
Daphnia Magna 96h/LC50			
Daphnia Magna 96h/NOEC			
Daphnia Magna 21day/NOEC			
Daphnia Magna-juvenile (21 day/NOEC			
Juvenile Plaice 96h/LC50	320 mg/L		
Inland Silverside 48h/LC50			
Inland Silverside 96h/LC50			
Inland Silverside 96h/NOEC			
Rainbow Trout 96h/LC50	450 mg/L		
Rainbow Trout 96h/NOEC			
Rainbow Trout 48h/LC50			
Bluegill Sunfish 96h/LC50	350 mg/L		
Lepomis macrochrius 48 hr/LC50			
Lepomis macrochrius 96 hr/LC50			
Lepomis macrochrius 96hr/NOEC			
LitopenaeusVannamei 48hr/LC50 (White Shrimp)			
Marine Algae (Skeletonema costatum) 72h/EC50			
Acartia tonsa 48h/LC50			
Striped Bass (fingerling) 24H/LC50			
Striped Bass (larvae) 24H/LC51			
Pimephales promelas 48h/LC50			
Pimephales promelas 96h/LC50; 180 mg/l CaCO3			
Pimephales promelas 96h/LC50; 100 mg/l CaCO3			
Pimephales promelas 96h/NOEC			
Pseudokirchnerella subcapitata 72h/IC0			
Tetrahymena pyriformis 48h/EC50			
Threespone stickleback 96h/LC50			

Additive Name	Redux-620	DOLOMITIC HYDRATED LIME TYPE N	DOLOMITIC HYDRATED LIME TYPE S
Threespone stickleback 96h/LC50 (aerated)			
Zebra Danio 96h/LC50			
Zebra-fish (Brachydanio rerio) 96h/LC50			
Flannelmouth sucker 96h/LC50			
Coho salmon 96 h/LC50			
Chinook salmon 96h/LC50			
Chinook salmon 216h/LC00			
Bobwhite quail LD50			
Mosquito Fish 24h/LC50			
Mysid Shrimp (Mysidopsis bahia) 96h/LC50			
Mysid Shrimp (Mysidopsis bahia) 96h/NOEC			
Mysid Shrimp (Mysidopsis bahia) 96h/EC50			
Mysid Shrimp (Mysidopsis bahia) 48h/EC50			
Mysid Shrimp (M. litoralis)) 96h/LC50			
Scenedesmus subspicatus 96h/EC50			
Mallard Duck LD50			
Freshwater Invertebrates & Fish Acute EC50/LC50			
Freshwater Invertebrates Static Acute 48h/LC50			
Freshwater Algae Static Acute EC50			
Freshwater Fish Static Acute 96h/LC50			
Freshwater Fish Acute 96h/LC50			
Limanda punctatissima-pre-larvae 96h/LC50			
Moina irrasa-neonate 48h/LC50			
Lemna aequinoctialis 96h/EC50			
Oncorhynchus mykiss 30 day/NOEC			
Oncorhynchus mykiss 96h/LC0			
Oncorhynchus mykiss 28day/NOEC			
Algae 48h/EC50			
Algae 72h/EC50			
Algae 96h/EC50			
Algae 96h/NOEC			
Algae 72h/IC50			
Crustaceans-Procambarus clarkii-intermolt 21day/NOEC			
Crustaceans-Procambarus clarkii-intermolt 48h/LC50			
Bacteria			
Freshwater Biodegradability 28 Day OECD 301D			
Freshwater Biodegradability 5 Day/2.0mg/l			
Freshwater Biodegradability 5 Day/3.8mg/l			
Relationship of toxicity to pH			
Relationship of toxicity to water hardness			
N Octanol-Water Partition Coefficient			
Bioconcentration Factor (if available)			
Product Resistence in the Environment (if available)			
Product Decay Rate (attach source of data)			

Appendix 2

Revised Refinery Water Flow Diagram

Refinery Water Flow Diagram
BP Products North America Inc. - Whiting Refinery
(Average Flows in Million Gallons per Day)
June 2020



Legend

-----	Line available, but not normally used.
LPSW	Low Pressure Service Water
MWTP	Main Water Treatment Plant
OTCW	Once-Through Cooling Water
WCE	Whiting Clean Energy
WHRU	Waste Heat Recovery Unit

Note: Flows given as yearly average

November 23, 2020

IDEM/OWQ/NPDES/PS
100 North Senate Avenue
Mail Code 65/42PS
Indianapolis, Indiana 46204

Via twissel@idem.in.gov and First Class Mail Postage Prepaid

RE: BP Products North America, Inc. –Whiting Refinery No. IN0000108-D

Dear Sir or Madam:

Set forth below are my concerns regarding the above-referenced permit. They are essentially the same as those made regarding the original permit.

Not all outfalls are listed.

The proposed permit lists only two outfalls for the J & L Site. (Outfalls 003 and 004). These outfalls discharge rain water and drain the J & L Site. There does not appear to be any active discharge of process water from this site. If this is the case, then the permit would appear to be deficient in that it falls to note all discharges from the J & L Site. The J & L Site contains many more outfalls, or more specifically point sources, that must be regulated under the Clean Water Act. In fact, because the J & L Site actually sits on a former lake bed, I submit that the entire site is a "point source" of pollution.

The subject permit is issued pursuant to the "National Pollutant Discharge Elimination System" or NPDES program as set forth by the federal Clean Water Act 33 U.S.C. §1251 et seq. It is the federal Clean Water Act that provides Indiana with its authority to issue these "national" permits. The federal Clean Water Act makes clear that water permits regulate the "discharge" of pollutants from point sources into navigable waters. Section 502 of the Clean Water Act defines point source as follows:

> (14) The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture.

An offsite review of the J & L Site would indicate that there are a number of such point sources along the western side of the property. The northernmost portion of the property drains along 129th Street to the intersection of this street with Calumet Avenue. Following times of wet weather or a high water table, there is a continuous discharge flowing from the east to the intersection of this street with Calumet Avenue.

The permit should better address any potential contamination resulting from the use of firefighting foam at the J & L Site.

I had noted a concern regarding the use and disposal of synthetic firefighting foam nearly two years ago. The environmental dangers associated with the fate of these substances are well established. Chemicals contained in the foam including per- and polyfluoroalky substances. Studies have associated these chemicals with a host of health problems, including kidney, testicular, bladder, and prostate cancer, as well as immune, reproductive, and hormonal dysfunction. Synthetic firefighting foams are toxic groundwater contaminants. Some chemicals associated with these foams are persistent and bio accumulative.

It is without question that firefighting foam has been used extensively at the J &L Site. Requesting a study one year from now fails to protect human health and the environment. More importantly, the amended permit only looks forward regarding ongoing use of such foam. It fails to note that firefighting foam has been used for years at this site and this material has possibly contaminated a wide area.

While the proposed amendments may be an improvement, they are far from protection of our health and our environment.

I am requesting that the Indiana Department of Environmental Management hold a Public Hearing on this matter before it issues any final permit.

Sincerely,

/s/

David Dabertin
5246 Hohman Avenue Suite 302
Hammond, Indiana 46320
(219) 659-2819