

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Indianapolis

OFFICE MEMORANDUM

DATE : May 5, 1988

TO : Joseph C. Krieger
Permits Section

THRU : *G. Senolhe fd*
Gus Jumawan

T.P. Chang *TPC*

J.C. Stallsmith *CS*

FROM : Mustafa Ak *MA*
Modeling and Engineering Services Section

SUBJECT : Updating the January 1987 Berne STP WLA Report
(Continuous and Controlled Discharge Analysis)

Reference : Memo dated March 8, 88 from Randy K. Jones.

At the request of Randy K. Jones of Facility Plans Section, a wasteload allocation study has been performed for the above facility due to change in the design flow from 0.6 mgd to 0.75 mgd and proposed discharge location to Wabash River for the existing plant. These evaluations are based on the Q₇₋₁₀ flow reduction due to mixing zone policies / guidelines, and acute / chronic water quality criteria for both existing and proposed water quality standards Rule 327 IAC 2-1. The alternative outfall locations on the respective receiving streams are as follows :

Site	Stream	Q _{7,10} Flow
1	Habegger Ditch / St. Mary River	0.1 cfs
2	Wabash River	5.6 cfs

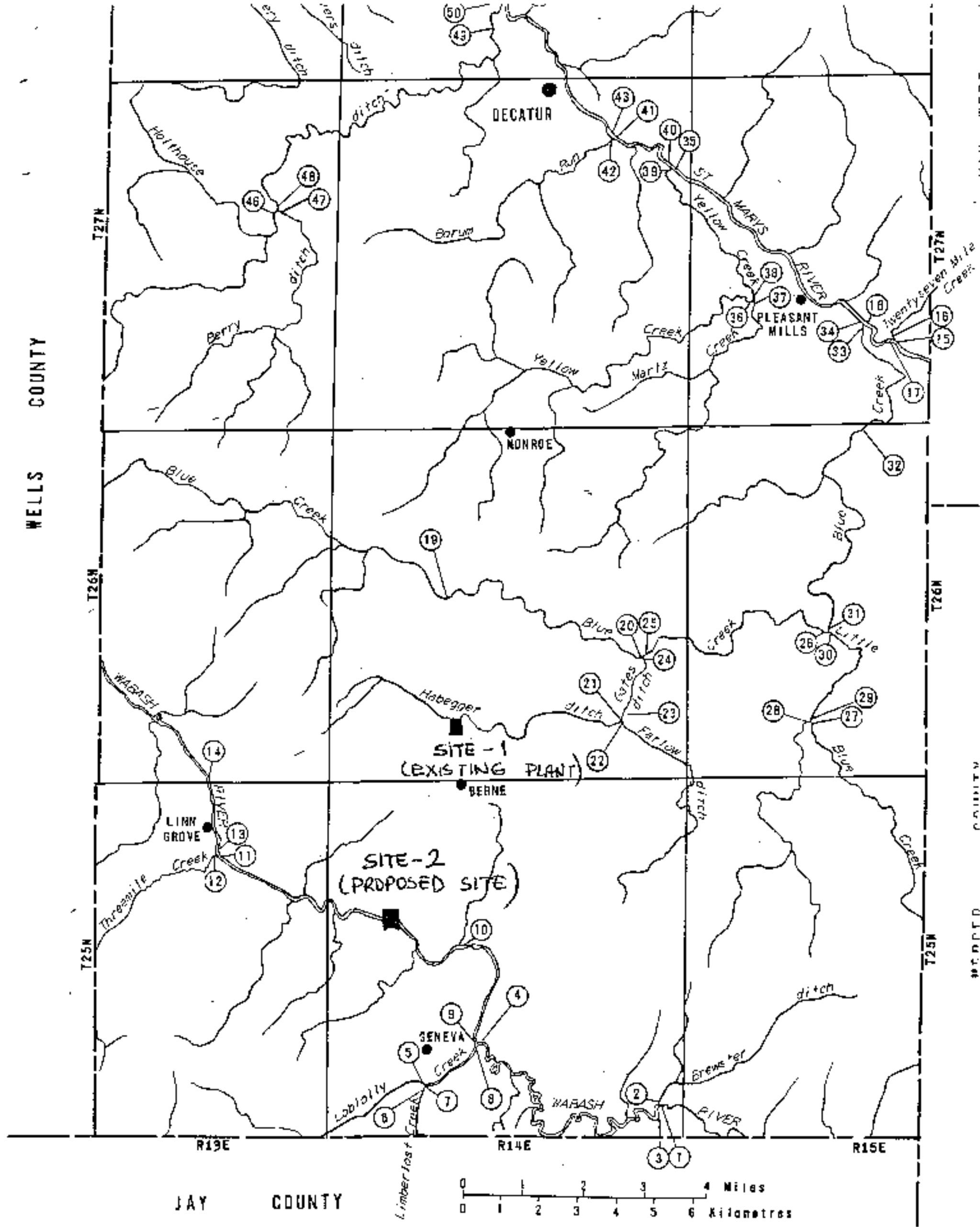
The effluent limitations for a continuous discharge option for both sites are controlled by the chronic ammonia toxicity as well as instream dissolved oxygen maintenance. For a waste stabilization pond system, Site - 2 is feasible but not Site - 1. If Site - 2 is selected, then required holding volume/period (4.57 MGAL/9.0 DAYS) can/will be incorporated into the treatment pond(s) to have secondary treatment levels. For both continuous and controlled discharge options, the results of the analyses are summarized in the attached Tables.

Results of this WLA analyses will be an addendum to the January 1987 Berne STP Wasteload Allocation report.

CC : Tom Keesling
Randy K. Jones

Attachments

SITE - 1	Tables 1 - 2	Toxic Ammonia-N Analysis.
	Tables 3 - 4	Instream WQ Simulation.
	Table 5	CD Analysis.
SITE - 2	Tables 6 - 7	Toxic Ammonia-N Analysis.
	Tables 8 - 9	Instream WQ Simulation.
	Table 10	CD Analysis.
	Map	Site Locations.



ADAMS COUNTY

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

INDIANAPOLIS

OFFICE MEMORANDUMTO: GUS SUMMERS *3/8*DATE: *3/8/88*THRU: *Tom Freeling*FROM: *Randy K. Jones*SUBJECT: *Wasteload Allocation for BERNE, IL.*

Please review the wasteload allocation for BERNE dated April 10, 1987 for facilitation planning purposes. Does another allocation study need to be done for the new design flow of 175 MGD for Habegger Ditch.

Also request that a wasteload allocation for a design flow of 25-MGD be run for the Wabash River, and controlled discharge for both locations.

PROJECT : BERMUDA

RECEIVING STREAM(S) : HERRING RIVER, ST. MARY'S RIVER

Receiving Stream : HERRING RIVER

Analysis Basis : Analysis performed for WASTEWATER EFFLUENT

TREATMENT PLANT DESIGN FLOW : 1.162 cfs
 Headwater Q/10 FLOW : 0.10 cfs
 NH3-N Toxic Analysis done at : 50.00 % Dilution

Upstream Ammonia-N Conc. mg/L (Weekly)	UPSTREAM DATA	Summer		Winter	
		Conc. mg/L	Temp. C	Conc. mg/L	Temp. C
		0.300	25.00	0.100	15.00
		7.00	7.00	7.00	7.00

EFFLUENT DATA	Temperature	Summer		Winter	
		Temp. C	pH	Temp. C	pH
		25.00	7.50	15.00	7.50

Season	Standard	Un-ionized NH3-N	Instrument #	Effluent Ammonia-N
1. SUMMER Lx 327 IAC 2-1 Acute (1)	0.411 (M)	0.411 (M)		15.52 Monthly Ave
WINTER		0.411 (M)		31.97 Monthly Ave
2. SUMMER 327 IAC 2-1 Acute (2)	0.210 (D)	0.210 (D)		11.91 Monthly Ave
WINTER		0.105 (D)		12.29 Monthly Ave
3. SUMMER Ex 327 IAC 2-1 Chronic (1)	0.041 (M)	0.041 (M)	1.187 (M)	0.81 Monthly Ave
WINTER		0.041 (M)	2.424 (M)	1.67 Monthly Ave
4. SUMMER 327 IAC 2-1 Chronic (2)	0.036 (M)	0.036 (M)	1.523 (M)	1.09 Monthly Ave
WINTER		0.026 (M)	2.301 (M)	1.59 Monthly Ave

(D) : 1-hour max. average concentration as Maximum Daily Average.
 (M) : 4-day average concentration as Maximum Monthly Average
 (W) : Weekly Average Concentration as per Existing Rule 327 IAC 2-1.

- Existing Rule 327 IAC 2-1 Acute Aquatic Limit. : the 0.5 mg/l un-ionized ammonia criterion is taken to be weekly average ammonia limit at the end of effluent pipe
- Proposed Rule 327 IAC 2-1 Acute Aquatic Criteria : the 0.05 mg/l of the proposed Rule are taken to be monthly average final acute ammonia-N limits at the end of effluent pipe.
- Existing Rule 327 IAC 2-1 Continuous Criterion Concentration : the 0.05 mg/l un-ionized ammonia criterion is taken to be weekly average instream ammonia limitations.
- Proposed Rule 327 IAC 2-1 Continuous Criterion Concentration : the 0.05 mg/l of the proposed Rule are taken to be monthly average instream ammonia N limitations.

TABLE 2 REGIONAL EFFLUENT LIMITATION ANALYSIS

FACILITY : BERNAL SIP

RECYCLING STATION : HUNTERGATE DITCH/ST. JAMES'S RIVER
 Stream Designation : CUM TYPE STREAM
 Analysis Basis : Analysis Performed for WARMWATER SPECIES HABITAT

Case I : Existing STDs (Rule 330 IAC 1-1 Recodified as 327 IAC 2-1)

	Summer		Winter	
	(May Thru November)		(December Thru April)	
FLOW	0.7500	mgd	0.7500	mgd
BOD5	10.00	mg/l	20.00	mg/l
D.O.	6.0	mg/l	5.0	mg/l
Phosphorus	1 mg/l or 80 % Removal			

AMMONIA-N				
(a) Acute (Effluent Based)	15.52	mg/l	31.97	mg/l
(b) Chronic (Stream Based)	7.71	mg/l	16.16	mg/l
(c) Chronic (Stream Based)	0.8174	mg/l *	1.6770	mg/l *
(d) Treatability Limits	1.5000	mg/l	3.0000	mg/l

(Based : Respective pH and Temperature data were used in the computations.)
 NH3-N and BOD5 are on monthly average basis, whereas, D.O. is on Daily Ave.

Case II : Proposed Standards Rule 327 IAC 2-1

	Summer		Winter	
	(May Thru November)		(December Thru April)	
FLOW	0.7500	mgd	0.7500	mgd
BOD5	10.00	mg/l	20.00	mg/l
D.O.	6.0	mg/l	5.0	mg/l
Phosphorus	1 mg/l or 80 % Removal			

AMMONIA-N				
(a) Acute (Effluent Based)	11.91	mg/l	12.24	mg/l
(b) Chronic (Stream Based)	7.80	mg/l	7.97	mg/l
(c) Chronic (Stream Based)	1.0992	mg/l *	1.5918	mg/l *
(d) Treatability Limits	1.5000	mg/l	3.0000	mg/l

(Based : Respective pH and Temperature data were used in the computations.)
 NH3-N and BOD5 are on monthly average basis, whereas, D.O. is on Daily Ave.

Case III : Waste Stabilization Pond Systems Option (Controlled Discharge)

	Summer		Winter	
	(May Thru November)		(December Thru April)	
FLOW	0.7500	mgd	0.7500	mgd
BOD5	25.00	mg/l	25.00	mg/l
TSS	70.00	mg/l	70.00	mg/l
Controlled Pond(s) Volume Required	362.50 mgal			
Retaining Period	704.00 days			

WASTE STABILIZATION POND SYSTEM IS NOT FEASIBLE FOR THE EXISTING
 DISCHARGE LOCATION.

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER POLLUTION

SEWAGE TREATMENT PLANT = BERNE STP
CITY = ADAMS COUNTY
SUMMER WASTEWATER QUALITY ANALYSIS BASED ON USEPA SIMPLIFIED MODEL
RECEIVING STREAM = HABEGGER DITCH
DATE = 06/02/88
SIMULATED BY = M. AK
RIVER STREAM = ST. MARY'S RIVER

EXISTING DISCHARGE LOCATION HAS BEEN ANALYSED

SUMMER WASTE QUALITY STANDARDS

INSTREAM DISSOLVED OXYGEN = 5.0 MG/L Un-limited NH₃-N is based on Acute or Chronic Criteria as per RULE 327 (M, 2-1)

HABEGGER AND EFFLUENT WATER QUALITY TEST DATA REACH NUMBER 1

	FLOW CFS	BOD (ULTIMATE) MG/L	NHOD MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE CG
MINIMUM WATER QUALITY	0.100	2.300	0.300	7.362	25.00
PERMITTING WATER QUALITY	1.162	20.000	6.900	6.000	25.00
STREAM NO. 1 OF STP	1.262	21.360	6.377	6.107	25.00

HYDRAULIC CHARACTERISTICS OF STREAM BELOW TREATMENT PLANT OR JUNCTION

VELOCITY IN FT/SEC = 0.240 HYDRAULIC DEPTH IN FT = 0.4000 STREAM BED SLOPE IN FT/MILE = 3.80 MANNING'S COEFF = 0.035
REACH HABEGGER DITCH MILES FROM 6.000 TO 0.000 COMPUTATIONAL ELEMENT 0.25000 MILE

REACTION AND REAERATION RATES

	AT 20 CG	AT INSTREAM TEMP F5.00 CG	REMARK
REAERATION RATE [1/DAY]	6.10867	6.96782	LANGHLEN-DEURUM EQ.
BOD DEGRAY RATE [1/DAY]	0.40000	0.50326	
NHOD DEGRAY RATE [1/DAY]	0.40000	0.518773	
SEDIMENTATION RATE [1/DAY]	0.00000	0.00000	" SUSPENSION " SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEFICIT	0.90000	1.23307	14 CM/ML/DAY AT 20 CG

STRUCTURE LOGS FOR WATER QUALITY MONITORING ON R. SAGINAW RIVER OR BELOW JUNCTION

TIME DAYS	DISTANCE BELOW REACH MILE	WATER TEMPERATURE FROM SURFACE	DISSOLVED OXYGEN MG/L	BOD (5 DAY TEST) MG/L	PH
0.00	MILE = 6.00	MILE = 6.00	6.107	21.360	4.377
0.06	MILE = 5.75	MILE = 6.25	5.598	20.686	4.143
0.12	MILE = 5.50	MILE = 6.50	5.295	20.034	5.217
0.19	MILE = 5.25	MILE = 6.75	5.423	19.403	5.700
0.25	MILE = 5.00	MILE = 7.00	5.036	18.771	5.490
0.31	MILE = 4.75	MILE = 7.25	5.062	18.198	5.289
0.38	MILE = 4.50	MILE = 7.50	5.001	17.675	5.091
0.44	MILE = 4.25	MILE = 7.75	5.020	17.069	4.907
0.50	MILE = 4.00	MILE = 8.00	5.053	16.511	4.727
0.57	MILE = 3.75	MILE = 8.25	5.082	16.009	4.554
0.63	MILE = 3.50	MILE = 8.50	5.136	15.505	4.386
0.70	MILE = 3.25	MILE = 8.75	5.182	15.016	4.225
0.76	MILE = 3.00	MILE = 9.00	5.232	14.542	4.070
0.82	MILE = 2.75	MILE = 9.25	5.276	14.084	3.921
0.89	MILE = 2.50	MILE = 9.50	5.312	13.640	3.777
0.95	MILE = 2.25	MILE = 9.75	5.367	13.210	3.638
1.01	MILE = 2.00	MILE = 10.00	5.411	12.793	3.504
1.08	MILE = 1.75	MILE = 10.25	5.453	12.390	3.376
1.14	MILE = 1.50	MILE = 10.50	5.495	11.999	3.252
1.20	MILE = 1.25	MILE = 10.75	5.536	11.621	3.132
1.27	MILE = 1.00	MILE = 11.00	5.574	11.255	3.017
1.33	MILE = 0.75	MILE = 11.25	5.612	10.900	2.906
1.40	MILE = 0.50	MILE = 11.50	5.649	10.556	2.800
1.46	MILE = 0.25	MILE = 11.75	5.684	10.223	2.697
1.52	MILE = 0.00	MILE = 12.00	5.712	9.901	2.598

MINIMUM DISSOLVED OXYGEN 4.993 MG/L OCCURS AT 0.351 DOW AND 1.3804 MILES
FROM JUNCTION OR JUNCTION

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER POLLUTION

SEWAGE TREATMENT PLANT = BERNE STP
COUNTY = COUSHATTS COUNTY
RECEIVING STRION = HADDEGGER DITCH
WATER WASTELAND IN LOCATION AND THIS NAGED IN UNION STAMP LITED MINEFL
MAIN STREAM = ST. MARY'S RIVER
DATE = 05/07/88
SIMULATED BY = M. J. K.

DISCHARGE LOCATION HAS BEEN ANALYZED

SEWAGE WATER QUALITY STANDARDS

UPSTREAM DISSOLVED OXYGEN = 5.0 MG/L. Un-ionized NH₃-N is based on limits on Chronic Criteria as per RLLF 3P2 Unit 11-1

UNIONIZED NH₃-N QUALITY INPUT LOGS REACH NUMBER 1

	PARAMETER	UNIT	VALUE	UNIT	VALUE	UNIT	VALUE	
HEADWATER WATER QUALITY	BOD (ULTIMATE)	MG/L	0.300	DO (ULTIMATE)	MG/L	13.700	TEMPERATURE	°C
	DO (ULTRAPURE)	MG/L	12.638					
EFFLUENT WATER QUALITY	BOD (ULTIMATE)	MG/L	1.162	DO (ULTIMATE)	MG/L	5.000	TEMPERATURE	°C
	DO (ULTRAPURE)	MG/L	42.538					
STREAM NO. OF STP	BOD (ULTIMATE)	MG/L	0.100	DO (ULTIMATE)	MG/L	7.362	TEMPERATURE	°C
	DO (ULTRAPURE)	MG/L	12.638					

HYDRAULIC CHARACTERISTICS OF STREAM ULTIMATE RESIDENT FLOW IN JUNCTION

VELOCITY IN FT/SEC = 0.240
HYDRAULIC DEPTH IN FT = 0.4000
STREAM BED SLOPE IN FT/MILE = 3.80
MINIMUM'S CRIET = 0.035
REACH HADDEGGER DITCH
MILES FROM 6.000 TO 0.000
COMPUTATIONAL ELEMENT 0.25000 MILE

REACTION AND REGRESSION RATES

PARAMETER	UNIT	VALUE	UNIT	VALUE	REMARK
REACTOR RATE	1/DAY	6.18867		5.49664	LANGRITZ-DUNN EQ.
REACTOR RATE	1/DAY	0.40000		0.31792	
REACTOR RATE	1/DAY	0.40000		0.27223	
REACTOR RATE	1/DAY	0.40000		0.00000	"-SUSPENSION" + SEDIMENTATION
REACTOR RATE	1/DAY	0.40000		0.45689	IN GM/SEC/M/DAV AT 20 DE

STIMULATED INSITUATED WATER QUALITY COMPARISON LA 8 FISHKILLER OR FLOW JUNCTION

TIME HRS	DISTANCE DOWN MILE	RELATIVE FROM MILE	DISCHARGE FROM MILE	DISCHARGE DAY MILE	END (MILE) MILE	START (MILE) MILE
0.00	MILE = 0.00	MILE = 0.00	MILE = 0.00	5.187	42.638	12.678
0.04	MILE = 0.04	MILE = 0.04	MILE = 0.04	5.428	41.686	12.421
0.12	MILE = 0.12	MILE = 0.12	MILE = 0.12	5.615	40.851	12.208
0.19	MILE = 0.19	MILE = 0.19	MILE = 0.19	5.764	40.032	11.998
0.25	MILE = 0.25	MILE = 0.25	MILE = 0.25	5.886	39.270	11.792
0.31	MILE = 0.31	MILE = 0.31	MILE = 0.31	5.989	38.444	11.589
0.38	MILE = 0.38	MILE = 0.38	MILE = 0.38	6.078	37.674	11.390
0.44	MILE = 0.44	MILE = 0.44	MILE = 0.44	6.156	36.919	11.194
0.50	MILE = 0.50	MILE = 0.50	MILE = 0.50	6.227	36.179	11.002
0.57	MILE = 0.57	MILE = 0.57	MILE = 0.57	6.292	35.455	10.813
0.63	MILE = 0.63	MILE = 0.63	MILE = 0.63	6.353	34.744	10.627
0.70	MILE = 0.70	MILE = 0.70	MILE = 0.70	6.410	34.040	10.445
0.76	MILE = 0.76	MILE = 0.76	MILE = 0.76	6.465	33.346	10.265
0.82	MILE = 0.82	MILE = 0.82	MILE = 0.82	6.518	32.667	10.089
0.87	MILE = 0.87	MILE = 0.87	MILE = 0.87	6.569	32.042	9.915
0.93	MILE = 0.93	MILE = 0.93	MILE = 0.93	6.619	31.400	9.745
1.01	MILE = 1.01	MILE = 1.01	MILE = 1.01	6.667	30.771	9.578
1.08	MILE = 1.08	MILE = 1.08	MILE = 1.08	6.714	30.155	9.413
1.14	MILE = 1.14	MILE = 1.14	MILE = 1.14	6.760	29.551	9.251
1.20	MILE = 1.20	MILE = 1.20	MILE = 1.20	6.805	28.959	9.092
1.27	MILE = 1.27	MILE = 1.27	MILE = 1.27	6.849	28.378	8.936
1.33	MILE = 1.33	MILE = 1.33	MILE = 1.33	6.892	27.810	8.783
1.40	MILE = 1.40	MILE = 1.40	MILE = 1.40	6.934	27.253	8.632
1.46	MILE = 1.46	MILE = 1.46	MILE = 1.46	6.976	26.707	8.487
1.52	MILE = 1.52	MILE = 1.52	MILE = 1.52	7.016	26.172	8.338

MINIMUM DISCHARGE OXYGEN 5.187 MILE OCCURS AT 0.000 DAY END 0.0000 MILES
 RELATIVE DISCHARGE FOR JUNCTION

QWERTY = 41.1%

DATE : 05/27/15

Camp of Facility : 8ERNE STP ADAMS COUNTY.

Facility Design Flow : 0.750 mgd 1.162 cfs

Course for FACILITY Flow used in the Analysis: 0.520, used 0.8437, used

$$J_{1419} + 1700 = 0.10 \text{ c Fq}$$

Corrected Flow Rate : 0.12

Month	Daying Station cfs-day	Adjusted Flow u/s GTP (Qs)	cfs-day	Dilution Ratio (R)	Allowable Discharge cfs-day (Q0=Qs/R)	STP Flow cfs-day (Q1)	Cumulative Flow Q0-out Q1-in	Deficiency cfs-day (Q1-Q0)	Accumulation Sum(Q1-Q0)
DEC	471.60	4.1642	0.4164	10	25.2262	25.2262	0.4164	25.2262	204.4965
JAN	337.39	2.9783	0.2978	10	24.4188	24.4188	0.7142	49.6387	228.6112
FEB	286.90	2.5331	0.2533	10	25.2262	25.2262	0.9675	74.8650	251.5091
MAR	192.00	1.6953	0.1695	10	25.2262	25.2262	1.1371	100.0912	278.6409
APR	47024.00	106.2163	10.6216	10	24.7850	24.7850	11.7587	122.8762	290.8042
MAY	17277.00	152.5567	15.2556	10	25.2262	25.2262	27.0143	148.1025	300.7740
JUN	6231.00	55.0198	5.5019	10	20.4125	20.4125	32.5163	172.5150	319.4897
JUL	3822.00	33.7483	3.3748	10	25.2262	25.2262	35.0912	197.7412	341.5367
AUG	594.00	5.2910	0.5245	10	24.4125	24.4125	36.4157	222.1537	365.4247
SEP	966.10	8.5306	0.8530	10	25.2262	25.2262	37.2687	247.3800	382.7979
OCT	764.80	6.7532	0.6753	10	24.757	24.757	37.9441	272.6062	414.3488
NOV	2591.30	22.8913	2.2898	10	24.4125	24.4125	40.2339	297.0187	436.4714

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*** DUE TO MAXIMUM ACCUMULATION = 523.70 g / day    CONTAINED WASTEWATER USE = 369,4899 Mgal    HOLDING PERIOD = 201.78 Days    ***
REMARK (4) : EXISTING DISCHARGE LIMITATION HAS BEEN ANALYZED.

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10/11/17 : 81 RM CUP

RECEIVING STREAM(S) : WARASH RIVER
 Stream Designation : RFP USE STREAM

Analysis Basis : Analysis Performed for MAXIMUMLY SPECIFIED HABITAT

TREATMENT PLANT DESIGN FLOW : 1.162 cfs
 Maximum 12/10 FLOW : 5.60 cfs
 NH3-N Toxic Analysis done at : 50.00 % Dilution

	Summer	Winter
Upstream Ammonia-N Conc. mg/L (Weekly)	0.300 MG/L	0.300 MG/L
Temperature	25.00 C	15.00 C
pH	7.50	7.80

EFFLUENT DATA	Temperature	pH	DO
	25.00 C	7.50	15.00
			7.50

Season	Standard	un-ionized NH3-N	Instream NH3-N	Effluent Ammonia-N
1. SUMMER Ex 1/7 IAC 2-1 Acute (1)	0.411 (M)	0.411 (M)		15.52 Monthly Ave
WINTER		0.411 (M)		31.97 Monthly Ave
2. SAMPLE 327 IAC 2-1 Acute (2)	0.210 (D)	0.210 (D)	*	11.91 Monthly Ave
WINTER		0.105 (D)	*	12.09 Monthly Ave
3. SUMMER Ex 1/7 IAC 2-1 Chronic (1)	0.041 (M)	0.041 (M)	1.107 (M)	2.21 Monthly Ave
WINTER		0.041 (M)	2.494 (M)	5.02 Monthly Ave
4. SUMMER 1/7 IAC 2-1 Chronic (2)	0.036 (M)	0.036 (M)	1.593 (M)	3.13 Monthly Ave
WINTER		0.026 (M)	2.301 (M)	4.74 Monthly Ave

- (D) : 1-hour max. average concentration as Maximum Daily Average.
 (M) : 4-day average concentration as Maximum Monthly Average.
 (W) : Weekly Average Concentration as per Existing Rule 327 IAC P.1.
 1. Existing RULE 327 IAC 2-1 Acute Aquatic Crit. : the 0.5 mg/l un-ionized ammonia criterion is taken to be weekly average ammonia limit at the end of effluent pipe

2. Proposed Rule 327 IAC 2-1 Acute Aquatic Criteria : the AOC values of the proposed Rule are taken to be monthly average final acute ammonia-N limits at the end of effluent pipe.
 3. Existing RULE 327 IAC 2-1 Continuous Criterion Concent. : the 0.05 mg/l un-ionized ammonia criterion is taken to be weekly average instream ammonia limitations.
 4. Proposed Rule 327 IAC 2-1 Continuous Criterion Concentration : the CCC values of the proposed Rule are taken to be monthly average instream ammonia N limitations.

TABLE : 7 RESULTS OF EFFLUENT LIMITATION ANALYSIS

FACILITY : RENE STP

RECEIVING STREAM(s) : WASHNET RIVER

Stream Designation : GEN USE STREAM

Analysis Basis : Analysis Performed for WATERWAY SPECIFIC LIMITS

Case I : Existing STDs Rule 330 (b) (1) Recodified as 327 IAC 2-1.1

	Summer		Winter	
	(May thr. November)		(December thr. April)	
FLOW	0.7500	mgd	0.7500	mgd
CBOD5	25.00	mg/l	25.00	mg/l
D.O.	5.0	mg/l	4.0	mg/l
Phosphorus	1 mg/l or 80 % Removal			
AMMONIA-N				
(a) Acute (Effluent Based)	15.62	mg/l	31.97	mg/l
(Stream Based)	7.91	mg/l	16.16	mg/l
(b) Chronic (Stream Based)	2.21	mg/l	5.02	mg/l

(Based : Respective pH and Temperature data were used in the computations.)
 NH3-N and CBOD5 are on monthly average basis, whereas, D.O. is on Daily Ave.

Case II : Proposed Standards

Rule 327 IAC 2.1

	Summer (May thr. November)		Winter (December thr. April)	
FLOW	0.7500	mgd	0.7500	mgd
CBOD5	25.00	mg/l	25.00	mg/l
D.O.	5.0	mg/l	4.0	mg/l
Phosphorus	1 mg/l or 80 % Removal			
AMMONIA-N				
(a) Acute (Effluent Based)	11.91	mg/l	12.29	mg/l
(Stream Based)	7.80	mg/l	7.97	mg/l
(b) Chronic (Stream Based)	3.13	mg/l	4.74	mg/l

(Based : Respective pH and Temperature data were used in the computations.)
 NH3-N and CBOD5 are on monthly average basis, whereas, D.O. is on Daily Ave.

Case III : Waste Stabilization Pond System Option (Controlled Discharge)

	Summer		Winter	
	(May thr. November)		(December thr. April)	
FLOW	0.750	mgd	0.750	mgd
CBOD5	25.00	mg/l	25.00	mg/l (Monthly)
ISS	70.00	mg/l	70.00	mg/l (Monthly)
Controlled Pond(s)	Volume Required		4.57	
	Holding Period		9.00	
			days	

WASTE STABILIZATION POND SYSTEM (2) EFFLUENT WHEN EFFLUENT IS DISCHARGE
 DIRECTLY TO WASHNET RIVER.

TABLE 1

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER MANAGEMENT

SEWAGE TREATMENT PLANT = BERNE STP
 COUNTY = GARRETT COUNTY
 RECEIVING STREAM = WABASH RIVER
 MAIN STREAM = WABASH RIVER
 SIMULATED BY = M. R. K.
 DATE = 04/79

EFFLUENT DISCHARGE POINT WILL BE CONTAINED TO WABASH RIVER

STREAM WATER QUALITY STANDARDS

INSTREAM DISSOLVED OXYGEN = 5.0 MG/L Un-ionized NH₃-N is based on finite or Chronic Criteria as per RULE 327 IAC 2-1

HEADWATER AND EFFLUENT WATER QUALITY INPUT DATA REACH NUMBER 1

	FLOW CFS	BOD (5% 11HOUR) MG/L	NH ₃ -N MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE °C
HEADWATER WATER QUALITY	5.400	2.300	0.300	7.362	75.00
EFFLUENT WATER QUALITY	1.162	57.500	14.300	5.000	25.00
STREAM WQ D/S OF STP	6.762	11.717	2.704	6.255	25.00

HYDRAULIC CHARACTERISTICS OF STREAMS BELOW TREATMENT PLANT OR JUNCTION

VELOCITY IN FT/SEC = 0.480 HYDRAULIC DEPTH IN FT = 1.150 STREAM BED SLOPE IN FT/MILE = 1.100 MANNING'S COEFF = 0.035

REACH	WABASH RIVER	AXLES	FROM	TO	0.000	COMPUTATIONAL ELEMENT	0.25000 MILE
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REGULATION AND REGRESSION RATES

	AT 20 CFS	AT INSTREAM 10CFS 25.00 CFS	REMARK
PERFIRMATION RATE	11/1000	3.03835	1.00000-0.00000 EQ.
BOD DECAY RATE	11/1000	0.40000	0.50326
NH ₃ DECAY RATE	11/1000	0.40000	0.50326
SEDIMENTATION RATE	11/1000	0.00000	"..." SUSPENSION "..." SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEMAND	0.00000	1.23367	IN GM/SQ.M/DAY AT 20 CFS

SIMULATED INSTREAM WATER QUALITY DOWNSIDE OF A DISCHARGE CR. BELOW JUNCTION

TIME DAY	DISTANCE DOWN MILE	DISCHARGE FROM MILE	DISSOLVED OXYGEN MG/L	PH (MILLITE) MG/L	PH MIL
0.00	MILE = 6.00	MILE = 0.00	6.755	11.784	2.706
0.02	MILE = 5.75	MILE = 0.25	6.751	11.601	2.756
0.06	MILE = 5.50	MILE = 0.50	6.521	11.417	2.607
0.09	MILE = 5.25	MILE = 0.75	6.413	11.235	2.518
0.12	MILE = 5.00	MILE = 1.00	6.275	11.057	2.511
0.15	MILE = 4.75	MILE = 1.25	6.155	10.881	2.464
0.19	MILE = 4.50	MILE = 1.50	6.041	10.704	2.419
0.22	MILE = 4.25	MILE = 1.75	5.961	10.535	2.374
0.25	MILE = 4.00	MILE = 2.00	5.883	10.371	2.310
0.29	MILE = 3.75	MILE = 2.25	5.817	10.206	2.237
0.31	MILE = 3.50	MILE = 2.50	5.761	10.044	2.144
0.35	MILE = 3.25	MILE = 2.75	5.714	9.884	2.203
0.38	MILE = 3.00	MILE = 3.00	5.674	9.727	2.142
0.41	MILE = 2.75	MILE = 3.25	5.642	9.572	2.122
0.44	MILE = 2.50	MILE = 3.50	5.617	9.419	2.083
0.47	MILE = 2.25	MILE = 3.75	5.597	9.271	2.044
0.50	MILE = 2.00	MILE = 4.00	5.582	9.123	2.006
0.54	MILE = 1.75	MILE = 4.25	5.571	8.974	1.969
0.57	MILE = 1.50	MILE = 4.50	5.564	8.826	1.932
0.60	MILE = 1.25	MILE = 4.75	5.561	8.678	1.897
0.63	MILE = 1.00	MILE = 5.00	5.561	8.537	1.861
0.66	MILE = 0.75	MILE = 5.25	5.563	8.401	1.827
0.70	MILE = 0.50	MILE = 5.50	5.568	8.267	1.793
0.73	MILE = 0.25	MILE = 5.75	5.575	8.136	1.760
0.76	MILE = 0.00	MILE = 6.00	5.584	8.006	1.727

MINIMUM DISSOLVED OXYGEN 5.561 MG/L OCCURS AT 0.622 DAY (M) 4.8894 MILES
BELOW DISCHARGE IN JUNCTION

TABLE: 4

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER MANAGEMENT

SEWAGE TREATMENT PLANT :: ULARNE STP WINTER WASTEWATER ALLOCATION AND YIELDS BASED ON USEPA SIMPLIFIED MODEL DATE = 04/29/88
 COUNTY = ADAMS COUNTY RECEIVING STREAM = WABASH RIVER MAIN STREAM = WABASH RIVER SIMULATED BY = H.AK

EFFLUENT DISCHARGE POINTS WHILE BE CHARGED TO WABASH RIVER

STREAM WATER QUALITY STANDARDS

INSTANTANEOUS DISSOLVED OXYGEN = 5.0 MG/L Un-ionized NH₃-N is based on Acute or Chronic Criteria as per RULE 327 THU 2-1

GROUNDWATER, SOIL, EFFLUENT WATER QUALITY, IMPACT DATA REACH NUMBER 1

	FLOW CFS	BOD (ULTIMATE) MG/L	PHOSPHORUS MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE CG
INFILTRATE WATER QUALITY	6.600	2.300	0.300	7.360	15.00
EFFLUENT WATER QUALITY	1.162	57.500	21.700	9.000	15.00
STREAM WQ D/S OF STP	6.762	11.789	3.978	6.784	15.00

HYDRAULIC CHARACTERISTICS OF SECTION BELOW TREATMENT PLANT OR JUNCTION

VELOCITY IN FT/SEC = 0.480 HYDRAULIC DEPTH IN FT = 1.1500 STREAM BED SLOPE IN FT/MILE = 3.80 MANNING'S COEFF = 0.035
 REACH WABASH RIVER MILES FROM 6.000 TO 0.000 COMPUTATIONAL ELEMENT 0.25000 MILE

REGULON AND DEGRADATION RATES

	AT 20 CG	AT 10 CG	TEMP CG	REMARK
REGENERATION RATE	1.1/DAY	3.03000	1.695840	LAMBERT-MANN EQ.
BOD DEGRADATION RATE	1.1/DAY	0.40000	0.31792	
NOD DEGRADATION RATE	1.1/DAY	0.40000	0.27700	
SEDIMENTATION RATE	1.1/DAY	0.00000	0.00000	"A" SUSPENSION "A" SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEMAND		0.90000	0.65689	IN EX/SQ.M/DAY AT 20 CG

CIRCULATED UNDERGROUND WATER QUALITY MONITORING RECORD OF DISCHARGE IN KILMUR JUNCTION

TIME DAYS	DISTANCE FROM RECEIVING POINT	DISCHARGE FROM DITCH	DISSOLVED OXYGEN MG/L	PH	TEMPERATURE °C	PHOSPHORUS MG/L
0.00	MILE = 0.00	MILE = 0.00	6.784	11.709	3.978	3.978
0.03	MILE = 5.75	MILE = 0.25	6.408	11.670	3.944	3.944
0.06	MILE = 5.50	MILE = 0.50	6.908	11.552	3.910	3.910
0.09	MILE = 5.25	MILE = 0.75	6.945	11.476	3.876	3.876
0.12	MILE = 5.00	MILE = 1.00	7.018	11.381	3.843	3.843
0.15	MILE = 4.75	MILE = 1.25	7.048	11.302	3.810	3.810
0.19	MILE = 4.50	MILE = 1.50	7.116	11.094	3.777	3.777
0.22	MILE = 4.25	MILE = 1.75	7.141	10.982	3.744	3.744
0.25	MILE = 4.00	MILE = 2.00	7.204	10.872	3.712	3.712
0.28	MILE = 3.75	MILE = 2.25	7.244	10.762	3.680	3.680
0.31	MILE = 3.50	MILE = 2.50	7.283	10.654	3.648	3.648
0.35	MILE = 3.25	MILE = 2.75	7.319	10.547	3.617	3.617
0.38	MILE = 3.00	MILE = 3.00	7.354	10.441	3.585	3.585
0.41	MILE = 2.75	MILE = 3.25	7.388	10.335	3.554	3.554
0.44	MILE = 2.50	MILE = 3.50	7.420	10.231	3.524	3.524
0.47	MILE = 2.25	MILE = 3.75	7.450	10.128	3.493	3.493
0.50	MILE = 2.00	MILE = 4.00	7.479	10.026	3.463	3.463
0.54	MILE = 1.75	MILE = 4.25	7.507	9.925	3.433	3.433
0.57	MILE = 1.50	MILE = 4.50	7.534	9.825	3.404	3.404
0.60	MILE = 1.25	MILE = 4.75	7.560	9.717	3.374	3.374
0.63	MILE = 1.00	MILE = 5.00	7.585	9.629	3.345	3.345
0.66	MILE = 0.75	MILE = 5.25	7.609	9.532	3.316	3.316
0.70	MILE = 0.50	MILE = 5.50	7.637	9.436	3.288	3.288
0.73	MILE = 0.25	MILE = 5.75	7.655	9.341	3.259	3.259
0.76	MILE = 0.00	MILE = 6.00	7.677	9.247	3.231	3.231

MINIMUM DISSOLVED OXYGEN 6.784 MG/L OCCURS AT 0.000 DAY AND 0.0000 MILES
BELOW DISCHARGE IN KILMUR JUNCTION

WATER QUALITY MONITORING
MODELING and ENGINEERING SERVICES

INVEST : Hink

DATE : 04/25/88

WASTE STABILIZATION TANKS (CONTROLLED DISCHARGE) ANALYSIS

Name of Facility : HERNE STP, ADAMS COUNTY

Facility Design Flow : 0.250 mgd 1.1475 cfs

Flow Correction Factor for CD Analysis : 70.00 %

Corrected FACILITY Flow used in the Analysis : 0.525 mgd 0.8137 cfs

Receiving Stream : WABASH RIVER

Drainage area upstream of SFP's Outfall Location : 428.0 Sq.mi 7.010 Flow : 5.60 cfs

Gaging Station : WABASH RIVER @ LINA MINE, ADAMS COUNTY

Drainage area upstream of Referenced Gaging Station : 453.0 Sq.mi Corrected Flow Ratio : 6.88

Month	Gaging Station cfs-day	Adjusted Flow u/s STP (Qs)	Dilution Ratio (R)	Allowable Discharge cfs-day (Q0=Qs/R)	STP Flow cfs-day (Qi)	Cumulative Flow Qo-out	Qi-in	cfs-day (Qi-Q0)	Deficiency	Accumulation Sum(Qi-Q0)
OCT	3574.00	3331.4083	10	333.1408	25.2262	333.1408	25.2262	-307.9145	0.0000	0.0000
NOV	1796.00	1676.8830	10	167.6883	24.4125	501.8291	49.6387	-145.2758	0.0000	0.0000
DEC	1420.00	1362.4194	10	136.2419	25.2262	1865.2485	74.8650	-1337.1911	0.0000	0.0000
JAN	2834.00	2677.6927	10	267.7692	25.2262	4542.9412	100.0912	-2652.4664	0.0000	0.0000
FEB	4970.00	4704.2207	10	470.4220	22.7850	9247.1620	172.8762	-4481.4117	0.0000	0.0000
MAR	22934.00	21715.5573	10	2171.5557	25.2262	11418.7187	140.1025	-2146.3304	0.0000	0.0000
APR	2153.00	2034.1810	10	203.4181	24.4125	11622.1168	172.5150	-179.0036	0.0000	0.0000
MAY	1567.00	1480.5209	10	148.0520	25.2262	11770.1889	197.7412	-122.8258	0.0000	0.0000
JUN	5133.00	4849.7218	10	484.9721	24.4125	12255.1611	222.1537	-460.5596	0.0000	0.0000
JUL	2106.00	1989.7748	10	198.9774	24.4125	12454.1386	247.3800	-173.7512	0.0000	0.0000
AUG	694.00	655.6997	10	65.5699	25.2262	12519.7086	272.6062	-40.1417	0.0000	0.0000
SEP	368.50	348.1633	10	34.8163	24.4125	12554.5249	297.0187	-10.4038	0.0000	0.0000

Month	Gaging Station cfs-day	Adjusted Flow u/s STP (Qs)	Dilution Ratio (R)	Allowable Discharge cfs-day (Q0=Qs/R)	STP Flow cfs-day (Qi)	Cumulative Flow Qo-out	Qi-in	cfs-day (Qi-Q0)	Deficiency	Accumulation Sum(Qi-Q0)
OCT	471.60	445.5735	10	44.5573	25.2262	44.5573	25.2262	-19.3311	0.0000	0.0000
NOV	337.10	318.6857	10	31.8685	24.4125	76.4258	49.6387	-7.4560	0.0000	0.0000
DEC	246.90	271.0666	10	27.1066	25.2262	103.5325	74.8650	-1.8804	0.0000	0.0000
JAN	191.00	181.4039	10	18.1403	25.2262	121.6719	100.0912	7.0858	7.0858	7.0858
FEB	12029.40	11365.5258	10	1136.5525	22.7850	1258.2255	172.8762	-1113.7675	0.0000	0.0000
MAR	1277.00	12423.5211	10	1242.3523	25.2262	2090.5778	148.1025	-1607.1260	0.0000	0.0000
APR	6231.00	5887.1958	10	588.7125	24.4125	3479.2904	172.5150	-564.3000	0.0000	0.0000
MAY	3022.00	2611.0728	10	261.1072	25.2262	3840.3977	197.7412	-335.8810	0.0000	0.0000
JUN	594.00	561.2105	10	56.1218	24.4125	3096.5195	222.1537	-31.7093	0.0000	0.0000
JUL	966.10	918.7832	10	91.8783	25.2262	3987.7978	247.3800	-66.0520	0.0000	0.0000
AUG	764.80	742.1924	10	72.2592	25.2262	4060.0571	272.6062	-47.0319	0.0000	0.0000
SEP	2523.30	2450.1811	10	245.0181	24.4125	4305.0753	297.0187	-220.6056	0.0000	0.0000

Month	Gaging Station cfs-day	Adjusted Flow u/s STP (Qs)	Dilution Ratio (R)	Allowable Discharge cfs-day (Q0=Qs/R)	STP Flow cfs-day (Qi)	Cumulative Flow Qo-out	Qi-in	cfs-day (Qi-Q0)	Deficiency	Accumulation Sum(Qi-Q0)
OCT	2145.00	2026.6225	10	202.6622	25.2262	202.6622	25.2262	-177.4360	0.0000	0.0000
NOV	1176.00	1111.0993	10	111.1099	24.4125	313.7721	49.6387	-86.6974	0.0000	0.0000
DEC	34504.00	33544.6181	10	3354.4618	25.2262	3663.2339	74.8650	-3329.2355	0.0000	0.0000
JAN	1678.00	5317.4039	10	531.7403	25.2262	4199.9743	100.0912	-406.5141	0.0000	0.0000
FEB	2408.00	2275.1081	10	227.5108	22.7850	4427.4852	122.8762	-204.7258	0.0000	0.0000
MAR	74408.00	70207.1169	10	7020.7116	25.2262	11409.1969	148.1025	-6995.4854	0.0000	0.0000
APR	37842.00	35753.5894	10	3575.3589	24.4125	15023.1658	172.5150	-3550.9464	0.0000	0.0000
MAY	12698.00	11977.2273	10	1197.7227	25.2262	16223.7215	197.7412	-1174.4964	0.0000	0.0000
JUN	2332.00	2203.3024	10	220.3302	24.4125	16441.6088	222.1537	-195.9177	0.0000	0.0000
JUL	6294.00	5950.4287	10	595.0428	25.2262	17038.6516	247.3800	-569.8165	0.0000	0.0000
AUG	1284.00	1213.1390	10	121.3139	25.2262	17159.9656	272.6062	-96.0876	0.0000	0.0000
SEP	462.70	437.1646	10	43.7164	24.4125	17203.6820	297.0187	-19.3039	0.0000	0.0000

*** OVERALL *** Maximum Accumulation : 7.08 cfs-day 7.08 cfs-day 8.70 Day 111 Day
 Remark (s) : EFFLUENT WILL BE DIRECTLY DISCHARGED TO WABASH RIVER