DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Indianapolis

OFFICE MEMORANDUM

DATE : May 5,1988

TO : Joseph C. Krieger
Permits Section

THRU : Gus Jumawan
T.P.Chang
J.C. Stallsmith

FROM : Mustafa Ak
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 Q_{7-10} 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.

WELLS COUNTY

DECATUR

MONROE

PLEASANT MILLS

BERNE

LINN GROVE

GENEVA

SITE - 1
(EXISTING PLANT)

SITE - 2
(PROPOSED SITE)

Habegger

Holthouse ditch

Berry ditch

Barum ditch

Yellow Creek

Blue Creek

Marks ditch

Cates ditch

Farlow ditch

Little Blue Creek

Twenty-seven Mile Creek

Threemile Creek

Lobdilly Creek

Limberlost Creek

Brewster ditch

ST MARYS RIVER

WABASH RIVER

T27N

T26N

T25N

R13E

R14E

R15E

0 1 2 3 4 Miles
0 1 2 3 4 5 6 Kilometres

JAY COUNTY

ADAMS COUNTY

State Form 4336

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

INDIANAPOLIS

OFFICE MEMORANDUM

TO: ~~Gus~~ ~~Sumawan~~ MA 3/8

DATE: 3/8/88

THRU: TK Tom Kielling

FROM: Randy K. Jones

SUBJECT: Wasteload Allocation for Berne, IL.

Please review the wastload allocation for Berne dated April 10, 1987 for facilities planning purposes. Does another allocation study need to be done for the new design flow of .75 MGD for Habegger Ditch.

Also request that a wasteload allocation for a design flow of .75 MGD be run for the Wabash River, and controlled discharge for both locations.

PAGE : 1   TOXIC AMMONIA-N LOAD ALLOCATION ANALYSIS

FACILITY : BERNE STP

RECEIVING STREAM(s) : HORFAGER DITCH/ST.MARY'S RIVER
Stream Designation : GEN USE STREAM
Analysis Basis : Analysis Performed for WARMWATER SPECIES HABITAT

TREATMENT PLANT DESIGN FLOW : 1.162 cfs
Headwater Q7,10 FLOW : 0.10 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
UPSTREAM Data	Temperature	25.00 C	15.00 C
	pH	7.80	7.00
EFFLUENT DATA	Temperature	25.00 C	15.00 C0
	pH	7.50	7.50

	Season	Standard	Un-ionized NH3-N	Instream NH3 #	Effluent Ammonia-N	
1.	SUMMER	Ex 327 IAC 2-1 Acute (1)	0.411 (W)		15.52	Monthly Ave
	WINTER		0.411 (W)		31.97	Monthly Ave
2.	SUMMER	327 IAC 2-1 Acute (2)	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 (W)	1.187 (W)	0.81	Monthly Ave
	WINTER		0.041 (W)	2.424 (W)	1.67	Monthly Ave
4.	SUMMER	327 IAC 2-1 Chronic (2)	0.034 (M)	1.593 (W)	1.09	Monthly Ave
	WINTER		0.026 (M)	2.301 (W)	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.

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 AAC 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 Concen. : 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 : 2 RESULTS OF EFFLUENT LIMITATION ANALYSIS

FACILITY : DERAL STP

RECEIVING STREAM(S) : MANEGER DITCH/ST.MARY'S RIVER
Stream Designation : OLN USE 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 (May Thr. November)		Winter (December Thr. April)	
FLOW	0.7500	mgd	0.7500	mgd
cBOD5	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
(Stream Based)	7.71	mg/l	16.16	mg/l
[(b) Chronic (Stream Based)	0.8174	mg/l *	1.6770	mg/l *]
[Treatability Limits	1.5000	mg/l	3.0000	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	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	12.29	mg/l
(Stream Based)	7.80	mg/l	7.97	mg/l
[(b) Chronic (Stream Based)	1.0992	mg/l *	1.5918	mg/l *]
[Treatability Limits	1.5000	mg/l	3.0000	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 Systems Option [Controlled Discharge]

	Summer (May Thr. November)		Winter (December Thr. April)		
FLOW	0.750	mgd	0.750	mgd	
cBOD5	25.00	mg/l	25.00	mg/l	[Monthly]
TSS	70.00	mg/l	70.00	mg/l	[Monthly]

Controlled Pond(s) Volume Required 369.50 mgal
Holding Period 704.00 days

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

TABLE : 3

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER MANAGEMENT

SEWAGE TREATMENT PLANT = BERNE STP SUMMER WASTELOAD ALLOCATION ANALYSIS BASED ON USEPA SIMPLIFIED MODEL DATE = 05/02/98

COUNTY = ADAMS COUNTY RECEIVING STREAM = HABEGGER DITCH MAIN STREAM = ST.MARY'S RIVER SIMULATED BY = M.AK

EXISTING DISCHARGE LOCATION HAS BEEN ANALYSED

STREAM WATER QUALITY STANDARDS

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

HEADWATER AND EFFLUENT WATER QUALITY INPUT DATA REACH NUMBER 1

	FLOW CFS	BOD (ULTIMATE) MG/L	NBOD MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE CG
HEADWATER WATER QUALITY	0.100	2.300	0.300	7.362	25.00
EFFLUENT WATER QUALITY	1.162	20.000	6.900	6.000	25.00
STREAM WQ U/S 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 25.00 CG	REMARK
REAERATION RATE	[1/DAY]	6.10867	6.96782	(ANGWIEN-DURUM ED).
BOD DECAY RATE	[1/DAY]	0.40000	0.50326	
NBOD DECAY RATE	[1/DAY]	0.40000	0.50373	
SEDIMENTATION RATE	[1/DAY]	0.00000	0.00000	" "SUSPENSION "+" SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEMAND		0.90000	1.23307	IN GM/SQ.M/DAY AT (X) CG

SIMULATED INSTREAM WATER QUALITY DOWNSTREAM OF DISCHARGER OR JUNCTION

TIME DAYS	DISTANCE BELOW DISCHARGER REACH MILE	FROM DIRECT	DISSOLVED OXYGEN MG/L	BOD (ULTIMATE) MG/L	NH3N MG/L
0.00	MILE = 6.00	MILE = 0.00	6.107	21.360	6.377
0.06	MILE = 5.75	MILE = 0.25	5.598	20.686	6.143
0.12	MILE = 5.50	MILE = 0.50	5.295	20.034	5.917
0.19	MILE = 5.25	MILE = 0.75	5.123	19.403	5.700
0.25	MILE = 5.00	MILE = 1.00	5.036	18.791	5.490
0.31	MILE = 4.75	MILE = 1.25	5.002	18.198	5.289
0.38	MILE = 4.50	MILE = 1.50	5.001	17.625	5.094
0.44	MILE = 4.25	MILE = 1.75	5.020	17.069	4.907
0.50	MILE = 4.00	MILE = 2.00	5.053	16.531	4.727
0.57	MILE = 3.75	MILE = 2.25	5.097	16.009	4.554
0.63	MILE = 3.50	MILE = 2.50	5.136	15.505	4.386
0.70	MILE = 3.25	MILE = 2.75	5.162	15.016	4.225
0.76	MILE = 3.00	MILE = 3.00	5.169	14.542	4.070
0.82	MILE = 2.75	MILE = 3.25	5.156	14.084	3.921
0.89	MILE = 2.50	MILE = 3.50	5.123	13.640	3.777
0.95	MILE = 2.25	MILE = 3.75	5.067	13.210	3.638
1.01	MILE = 2.00	MILE = 4.00	5.011	12.793	3.504
1.08	MILE = 1.75	MILE = 4.25	5.453	12.390	3.376
1.14	MILE = 1.50	MILE = 4.50	5.495	11.999	3.252
1.20	MILE = 1.25	MILE = 4.75	5.535	11.621	3.132
1.27	MILE = 1.00	MILE = 5.00	5.574	11.255	3.017
1.33	MILE = 0.75	MILE = 5.25	5.612	10.900	2.906
1.40	MILE = 0.50	MILE = 5.50	5.649	10.556	2.800
1.46	MILE = 0.25	MILE = 5.75	5.684	10.223	2.697
1.52	MILE = 0.00	MILE = 6.00	5.718	9.901	2.598

MINIMUM DISSOLVED OXYGEN 4.998 MG/L OCCURS AT 0.351 DAY AND 1.3804 MILES
BELOW DISCHARGER OR JUNCTION

TABLE : 4 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER MANAGEMENT

SEWAGE TREATMENT PLANT = BERNE STP WASTELOAD ALLOCATION AND CALCULATIONS BASED ON QUAL2E SIMPLIFIED MODEL DATE = 05/02/88

FACILITY DOANES COUNTY RECEIVING STREAM = HABEGGER DITCH MAIN STREAM = ST.MARY'S RIVER SIMULATED BY = M.AK

EXISTING DISCHARGE LOCATION HAS BEEN ANALYSED

STREAM WATER QUALITY STANDARDS

UPSTREAM DISSOLVED OXYGEN = 5.0 MG/L. Un-ionized NH3-N is based on Acute or Chronic Criteria as per RULE 392 (a) (1-1

HEADWATER AND EFFLUENT WATER QUALITY INPUT DATA REACH NUMBER 1

	FLOW CFS	BOD (ULTIMATE) MG/L	NBOD MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE CG
HEADWATER WATER QUALITY	0.100	2.300	0.300	7.362	15.00
EFFLUENT WATER QUALITY	1.162	46.000	13.700	5.000	15.00
STREAM WQ D/S OF STP	1.262	42.538	12.638	5.107	15.00

HYDRAULIC CHARACTERISTICS OF STREAM FLOW TREATMENT PLANT OUTFALL 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 15.00 CG	REMARK
REAERATION RATE	[1/DAY]	6.18867	5.49664	LANGBIEN-DUYUM EQ.
BOD DECAY RATE	[1/DAY]	0.40000	0.31792	
NBOD DECAY RATE	[1/DAY]	0.40000	0.27929	
SEDIMENTATION RATE	[1/DAY]	0.00000	0.00000	"-"SUSPENSION "+" SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEMAND		0.90000	0.45689	IN GM/SQ.M/DAY AT 20 CG

SIMULATED INSTREAM WATER QUALITY DOWNSTREAM OF A DISCHARGER OR BELOW JUNCTION

TIME (DAYS)	DISTANCE BELOW DISCHARGER OR JUNCTION		DISSOLVED OXYGEN MG/L	BOD (ULTIMATE) MG/L	AMMONIA MG/L
	FROM MILE	FROM OUTFALL			
0.00	MILE = 6.00	MILE = 0.00	5.187	42.538	12.678
0.04	MILE = 5.75	MILE = 0.25	5.428	41.686	12.421
0.12	MILE = 5.50	MILE = 0.50	5.615	40.851	12.208
0.19	MILE = 5.25	MILE = 0.75	5.764	40.032	11.998
0.25	MILE = 5.00	MILE = 1.00	5.886	39.230	11.792
0.31	MILE = 4.75	MILE = 1.25	5.989	38.444	11.589
0.38	MILE = 4.50	MILE = 1.50	6.078	37.674	11.390
0.44	MILE = 4.25	MILE = 1.75	6.156	36.919	11.194
0.50	MILE = 4.00	MILE = 2.00	6.227	36.179	11.002
0.57	MILE = 3.75	MILE = 2.25	6.292	35.455	10.813
0.63	MILE = 3.50	MILE = 2.50	6.353	34.744	10.627
0.70	MILE = 3.25	MILE = 2.75	6.410	34.048	10.445
0.76	MILE = 3.00	MILE = 3.00	6.465	33.366	10.265
0.82	MILE = 2.75	MILE = 3.25	6.518	32.697	10.089
0.87	MILE = 2.50	MILE = 3.50	6.569	32.042	9.915
0.95	MILE = 2.25	MILE = 3.75	6.619	31.400	9.745
1.01	MILE = 2.00	MILE = 4.00	6.667	30.771	9.578
1.08	MILE = 1.75	MILE = 4.25	6.714	30.155	9.413
1.14	MILE = 1.50	MILE = 4.50	6.760	29.551	9.251
1.20	MILE = 1.25	MILE = 4.75	6.805	28.959	9.092
1.27	MILE = 1.00	MILE = 5.00	6.849	28.378	8.936
1.33	MILE = 0.75	MILE = 5.25	6.892	27.810	8.783
1.40	MILE = 0.50	MILE = 5.50	6.934	27.253	8.632
1.46	MILE = 0.25	MILE = 5.75	6.976	26.707	8.483
1.52	MILE = 0.00	MILE = 6.00	7.016	26.172	8.338

MINIMUM DISSOLVED OXYGEN 5.187 MG/L OCCURS AT 0.000 DAY AND 0.0000 MILES
BELOW DISCHARGER OR JUNCTION

WATER MANAGEMENT
MODELING and ENGINEERING SERVICES

ANALYST : KLOK

TABLE : 5 WASTE STABILIZATION LAGOON CONTROLLED DISCHARGE ANALYSIS DATE : 04/27/05

Name of Facility : BERNE STP,ADAMS COUNTY.
[Flow Correction Factor for DO Analysis : 70.00 %
Receiving Stream : HARENGER DITCH/BLUE CREEK
Gaging Station : WABASH RIVER @ LIMA GROVE,ADAMS COUNTY.

Facility Design Flow : 0.750 mgd 1.1625 cfs
Corrected FACILITY Flow used in the Analysis : 0.525 mgd 0.8137 cfs
Drainage area upstream of STP's Outfall Location : 4.0 Sq.mi 7Q10 Flow : 0.10 cfs
Drainage area ustream of Referenced Gaging Station : 453.0 Sq.mi Corrected Flow Ratio : 0.12

WR 1976 Month	Gaging Station cfs-day	Adjusted Flow cfs-day u/s STP [Qs]	Dilution Ratio [R]	Allowable Discharge cfs-day [QO=Qs/R]	STP Flow cfs-day [Qi]	Cummulative Flow cfs-day Qo-out	Qi-in	Deficiency cfs-day[Qi-QO]	Accumulation cfs-day Sum[Qi-QO]
OCT	3526.00	31.1346	10	3.1134	25.2262	3.1134	25.2262	22.1127	22.1127
NOV	1796.00	15.8587	10	1.5858	24.4125	4.6993	49.6387	22.8266	44.9394
DEC	14420.00	127.3209	10	12.7320	25.2262	17.4322	74.8650	12.4933	57.4327
JAN	28341.00	250.2516	10	25.0251	25.2262	42.4573	100.0912	0.2010	57.6338
FEB	49790.00	439.6467	10	43.9646	22.7850	86.4220	122.8762	21.1796	36.4541
MAR	22984.00	202.9492	10	20.2949	25.2262	106.7169	148.1025	4.9313	41.3855
APR	2153.00	19.0110	10	1.9011	24.4125	108.6181	172.5150	22.5113	63.8968
MAY	1567.00	13.8366	10	1.3836	25.0262	110.0017	197.7412	21.8425	85.7394
JUN	5133.00	45.3245	10	4.5324	24.4125	114.5342	222.1537	19.8800	105.6195
JUL	2106.00	18.5960	10	1.8596	25.2262	116.3938	247.3800	21.3666	130.9861
AUG	694.00	6.1280	10	0.6128	25.2262	117.0066	272.6062	24.6134	155.5996
SEP	368.50	3.2538	10	0.3253	24.4125	117.3320	297.0187	24.0871	179.6867

WR 1977 Month	Gaging Station cfs-day	Adjusted Flow cfs-day u/s STP [Qs]	Dilution Ratio [R]	Allowable Discharge cfs-day [QO=Qs/R]	STP Flow cfs-day [Qi]	Cummulative Flow cfs-day Qo-out	Qi-in	Deficiency cfs-day[Qi-QO]	Accumulation cfs-day Sum[Qi-QO]
OCT	471.60	4.1642	10	0.4164	25.2262	0.4164	25.2262	24.8098	204.4965
NOV	337.30	2.9783	10	0.2978	24.4125	0.7142	49.6387	24.1146	228.6112
DEC	286.90	2.5333	10	0.2533	25.2262	0.9675	74.8650	24.9729	253.5841
JAN	192.00	1.6953	10	0.1695	25.2262	1.1371	100.0912	25.0567	278.6408
FEB	47029.00	106.2163	10	10.6216	22.7850	11.7587	122.8762	12.1633	290.8042
MAR	17277.00	152.5562	10	15.2556	25.2262	27.0143	148.1025	9.9706	300.7748
APR	6231.00	55.0198	10	5.5019	24.4125	32.5163	172.5150	18.9105	319.6853
MAY	3822.00	33.7483	10	3.3748	25.2262	35.8912	197.7412	21.8514	341.5367
JUN	594.00	5.2460	10	0.5245	24.4125	36.4157	222.1537	23.8879	365.4247
JUL	966.10	8.5306	10	0.8530	25.2262	37.2687	247.3800	24.3731	389.7979
AUG	764.80	6.7532	10	0.6753	25.2262	37.9441	272.6062	24.6509	414.3488
SEP	2591.30	22.8918	10	2.2892	24.4125	40.2333	297.0187	22.1226	436.4714

WR 1978 Month	Gaging Station cfs-day	Adjusted Flow cfs-day u/s STP [Qs]	Dilution Ratio [R]	Allowable Discharge cfs-day [QO=Qs/R]	STP Flow cfs-day [Qi]	Cummulative Flow cfs-day Qo-out	Qi-in	Deficiency cfs-day[Qi-QO]	Accumulation cfs-day Sum[Qi-QO]
OCT	2146.00	18.9603	10	1.8960	25.2262	1.8960	25.2262	23.3302	459.8037
NOV	1174.00	10.3841	10	1.0384	24.4125	2.9324	49.6387	23.3740	483.1777
DEC	35504.00	313.5011	10	31.3501	25.2262	34.2825	74.8650	-6.1238	477.0539
JAN	5628.00	49.6953	10	4.9695	25.2262	39.2520	100.0912	20.2567	497.3106
FEB	2403.00	21.2626	10	2.1262	22.7850	41.3783	122.8762	20.6587	517.9693
MAR	74308.00	656.1412	10	65.6141	25.2262	106.9924	148.1025	-40.3862	477.5831
APR	37847.00	334.1456	10	33.4145	24.4125	140.4070	172.5150	-9.0080	468.5794
MAY	12693.00	112.1238	10	11.2123	25.2262	151.6194	197.7412	14.0138	482.5933
JUN	2332.00	20.5916	10	2.0591	24.4125	153.6785	222.1537	22.3533	504.9466
JUL	6298.00	55.6114	10	5.5611	25.2262	159.2397	247.3800	19.6651	524.6117
AUG	1284.00	11.3377	10	1.1337	25.2262	160.3735	272.6062	24.0924	548.7042
SEP	462.70	4.0856	10	0.4085	24.4125	160.7820	297.0187	24.0939	572.7981

*** OVERALL >>> Maximum ACCUMULATION : 572.70 cfs - day CONTROLLED WASTEWATER VOLUME : 369.4891 Mgal HOLDING PERIOD : 701.78 Days]]] ***
Remark (s) : EXISTING DISCHARGE LOCATION HAS BEEN ANALYZED.

FACILITY : BURNS CITY

RECEIVING STREAM(s) : WABASH RIVER
Stream Designation : MED USE STREAM
Analysis Basis : Analysis Performed for WARMWATER SPECIES HABITAT

TREATMENT PLANT DESIGN FLOW : 1.162 cfs
Headwater Q7,10 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
INSTREAM Data	Temperature	25.00 C	15.00 C
	pH	7.90	7.80
EFFLUENT DATA	Temperature	25.00 C	15.00 CO
	pH	7.50	7.50

	Season	Standard	un-ionized NH3-N		Instream NH3-N		Effluent Ammonia-N	
1.	SUMMER	Ex 327 IAC 2-1 Acute (1)	0.411	(W)			15.52	Monthly Ave
	WINTER		0.411	(W)			31.97	Monthly Ave
2.	SUMMER	327 IAC 2-1 Acute (2)	0.210	(D)		*	11.91	Monthly Ave
	WINTER		0.105	(D)		*	12.09	Monthly Ave
3.	SUMMER	Ex 327 IAC 2-1 Chronic (1)	0.041	(W)	1.107	(W)	2.21	Monthly Ave
	WINTER		0.041	(W)	2.404	(W)	5.02	Monthly Ave
4.	SUMMER	327 IAC 2-1 Chronic (2)	0.036	(M)	1.593	(W)	3.13	Monthly Ave
	WINTER		0.026	(M)	2.301	(W)	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 2-1.

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 AAC 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 Concen. : 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 : BERNE STP

RECEIVING STREAM(s) : WABASH RIVER
Stream Designation : GEN USE STREAM
Analysis Basis : Analysis Performed for WARMWATER SPECIES HABITAT

Case I : Existing STDs [Rule 330 IAC ?] Recodified As 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)	15.52	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 ? 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 (May Thr. November)		Winter (December Thr. April)		
FLOW	0.750	mgd	0.750	mgd	
cBOD5	25.00	mg/l	25.00	mg/l	[Monthly]
TSS	70.00	mg/l	70.00	mg/l	[Monthly]

Controlled Pond(s) Volume Required 4.57 mgal
Holding Period 9.00 days

WASTE STABILIZATION POND SYSTEM IS FEASIBLE WHEN EFFLUENT IS DISCHARGE DIRECTLY TO WABASH RIVER.

TABLE : E

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER MANAGEMENT

SEWAGE TREATMENT PLANT = BERNE STP SUMMER WASTELOAD ALLOCATION ANALYSIS BASED ON USEPA SIMPLIFIED MODEL DATE = 04/29

COUNTY = ADAMS COUNTY RECEIVING STREAM = WABASH RIVER MAIN STREAM WABASH RIVER SIMULATED BY = M.AK

EFFLUENT DISCHARGE POINT WILL BE CHANGED TO WABASH RIVER

STREAM WATER QUALITY STANDARDS

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

HEADWATER AND EFFLUENT WATER QUALITY INPUT DATA REACH NUMBER 1

	FLOW CFS	BOD (ULTIMATE) MG/L	NBOD MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE CG
HEADWATER WATER QUALITY	5.600	2.300	0.300	7.362	25.00
EFFLUENT WATER QUALITY	1.162	57.500	14.300	5.000	25.00
STREAM WQ D/S OF STP	6.762	11.789	2.704	6.955	25.00

HYDRAULIC CHARACTERISTICS OF STREAM BELOW TREATMENT PLANT OR JUNCTION

VELOCITY IN FT/SEC = 0.480 HYDRAULIC DEPTH IN FT = 1.1500 STREAM BED SLOPE IN FT/MILE = 3.00 MANNING'S COEFF = 0.035

REACH WABASH RIVER MILES FROM 6.000 TO 0.000 COMPUTATIONAL ELEMENT 0.25000 MILE

REACTION AND REAERATION RATES

		AT 20 CG	AT INSTREAM TEMP 25.00 CG	REMARK
REAERATION RATE	[1/DAY]	3.03835	3.42008	LANGBIEN-DURUM EQ.
BOD DECAY RATE	[1/DAY]	0.40000	0.50326	
NBOD DECAY RATE	[1/DAY]	0.40000	0.50773	
SEDIMENTATION RATE	[1/DAY]	0.00000	0.00000	"-"SUSPENSION "+" SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEMAND		0.70000	1.23307	IN GM/SQ.M/DAY AT 20 CG

SIMULATED INSTREAM WATER QUALITY DOWNSTREAM OF A DISCHARGER OR BELOW JUNCTION

TIME DAY	DISTANCE BELOW REACH MILE	DISCHARGER FROM OUTFALL	DISSOLVED OXYGEN MG/L	BOD (ULTIMATE) MG/L	NBOD MG/L
0.00	MILE = 6.00	MILE = 0.00	6.955	11.789	2.706
0.02	MILE = 5.75	MILE = 0.25	6.751	11.601	2.656
0.06	MILE = 5.50	MILE = 0.50	6.571	11.417	2.607
0.09	MILE = 5.25	MILE = 0.75	6.413	11.235	2.558
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	6.051	10.708	2.419
0.22	MILE = 4.25	MILE = 1.75	5.961	10.538	2.374
0.25	MILE = 4.00	MILE = 2.00	5.883	10.371	2.330
0.28	MILE = 3.75	MILE = 2.25	5.817	10.206	2.287
0.31	MILE = 3.50	MILE = 2.50	5.761	10.044	2.244
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	2.162
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	8.978	1.969
0.57	MILE = 1.50	MILE = 4.50	5.564	8.836	1.932
0.60	MILE = 1.25	MILE = 4.75	5.561	8.696	1.897
0.63	MILE = 1.00	MILE = 5.00	5.561	8.557	1.861
0.66	MILE = 0.75	MILE = 5.25	5.563	8.421	1.827
0.70	MILE = 0.50	MILE = 5.50	5.568	8.287	1.793
0.73	MILE = 0.25	MILE = 5.75	5.575	8.156	1.760
0.74	MILE = 0.00	MILE = 6.00	5.584	8.026	1.727

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

TABLE: 9

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER MANAGMENT

SEWAGE TREATMENT PLANT = BLUFFTON STP — WINTER WASTELOAD ALLOCATION ANALYSIS BASED ON USEPA SIMPLIFIED MODEL. — DATE = 04/29/88

COUNTY = ADAMS COUNTY — RECEIVING STREAM = WABASH RIVER — MAIN STREAM = WABASH RIVER — SIMULATED BY = M.AK

EFFLUENT DISCHARGE POINT WILL BE CHANGED TO WABASH RIVER

STREAM WATER QUALITY STANDARDS

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

HEADWATER AND EFFLUENT WATER QUALITY INPUT DATA — REACH NUMBER 1

	FLOW CFS	BOD (ULTIMATE) MG/L	AMMO MG/L	DISSOLVED OXYGEN MG/L	TEMPERATURE CG
HEADWATER WATER QUALITY	5.600	2.300	0.300	7.360	15.00
EFFLUENT WATER QUALITY	1.162	57.500	21.700	4.000	15.00
STREAM WQ D/S OF STP	6.762	11.789	3.978	6.784	15.00

HYDRAULIC CHARACTERISTICS OF STATION 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

REDUCTION AND RE-AERATION RATES

		AT 20 CG	AT INSTREAM TEMP 15.00 CG	REMARK
REAERATION RATE	[1/DAY]	3.03835	2.69840	LANGBIEN-NUNN EQ.
BOD DECAY RATE	[1/DAY]	0.40000	0.31792	
NBOD DECAY RATE	[1/DAY]	0.40000	0.27293	
SEDIMENTATION RATE	[1/DAY]	0.00000	0.00000	"-" SUSPENSION "+" SEDIMENTATION
SEDIMENT (BENTHIC) OXYGEN DEMAND		0.90000	0.65689	IN GM/SQ.M/DAY AT 20 CG

DISSOLVED OXYGEN WATER QUALITY DOWNSTREAM OF A DISCHARGE OR ALLOW JUNCTION

TIME DAYS	DISTANCE BELOW REACH MILE	DISCHARGER FROM JUNCTION	DISSOLVED OXYGEN MG/L	BOD (ULTIMATE) MG/L	BOD MG/L
0.00	MILE = 6.00	MILE = 0.00	6.784	11.709	3.978
0.03	MILE = 5.75	MILE = 0.25	6.1018	11.670	3.944
0.06	MILE = 5.50	MILE = 0.50	6.908[illegible]	11.552	3.910
0.09	MILE = 5.25	MILE = 0.75	6.945	11.476	3.876
0.12	MILE = 5.00	MILE = 1.00	7.018[illegible]	11.397	3.843
0.15	MILE = 4.75	MILE = 1.25	7.068[illegible]	11.292	3.810
0.19	MILE = 4.50	MILE = 1.50	7.116	11.094	3.777
0.22	MILE = 4.25	MILE = 1.75	7.161	10.982	3.744
0.25	MILE = 4.00	MILE = 2.00	7.204	10.872	3.712
0.28	MILE = 3.75	MILE = 2.25	7.244	10.762	3.680
0.31	MILE = 3.50	MILE = 2.50	7.283	10.654	3.648
0.35	MILE = 3.25	MILE = 2.75	7.319	10.547	3.617
0.38	MILE = 3.00	MILE = 3.00	7.354	10.441	3.585
0.41	MILE = 2.75	MILE = 3.25	7.388	10.335	3.554
0.44	MILE = 2.50	MILE = 3.50	7.420	10.231	3.524
0.47	MILE = 2.25	MILE = 3.75	7.450	10.128	3.493
0.50	MILE = 2.00	MILE = 4.00	7.479	10.026	3.463
0.54	MILE = 1.75	MILE = 4.25	7.507	9.925	3.433
0.57	MILE = 1.50	MILE = 4.50	7.534	9.825	3.404
0.60	MILE = 1.25	MILE = 4.75	7.560	9.727	3.374
0.63	MILE = 1.00	MILE = 5.00	7.585	9.629	3.345
0.66	MILE = 0.75	MILE = 5.25	7.609	9.532	3.316
0.70	MILE = 0.50	MILE = 5.50	7.633	9.436	3.288
0.73	MILE = 0.25	MILE = 5.75	7.655	9.341	3.259
0.76	MILE = 0.00	MILE = 6.00	7.677	9.247	3.231

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

WATER MANAGEMENT
MODELING and ENGINEERING SERVICES

ANALYST : M.Ok

TABLE . 10 WASTE STABILIZATION LAGOON CONTROLLED DISCHARGE ANALYSIS DATE : 04/25/88

Name of Facility : HERNE STP,ADAMS COUNTY
Flow Correction Factor for CD Analysis : 70.00 %
Receiving Stream : WABASH RIVER
Gaging Station : WABASH RIVER @ LINN DRIVE,ADAMS COUNTY

Facility Design Flow : 0.750 mgd 1.1605 cfs
Corrected FACILITY Flow used in the Analysis : 0.525 mgd 0.8123 cfs
Drainage area upstream of STP's Outfall Location : 428.0 Sq.mi 7Q10 Flow : 5.60 cfs
Drainage area ustream of Referenced Gaging Station : 453.0 Sq.mi Corrected Flow Ratio : 6.88

WR 1976 Month	Gaging Station cfs-day	Adjusted Flow cfs-day u/s STP [Qs]	Dilution Ratio [R]	Allowable Discharge cfs-day [Q0=Qs/R]	STP Flow cfs-day [Qi]	Cummulative Flow cfs-day Qo-out	Qi-in	Deficiency cfs-day[Qi-Q0]	Accumulation cfs-day Sum[Qi-Q0]
OCT	3504.00	3331.4083	10	333.1408	25.2262	333.1408	25.2262	-307.9145	0.0000
NOV	1796.00	1696.8830	10	169.6883	24.4125	502.8291	49.6387	-145.2758	0.0000
DEC	14420.00	13624.1948	10	1362.4194	25.2262	1865.2485	74.8650	-1337.1931	0.0000
JAN	28341.00	26776.9271	10	2677.6927	25.2262	4542.9412	100.0912	-2652.4664	0.0000
FEB	49790.00	47042.8075	10	4704.2207	22.7850	9247.1620	172.8762	-4481.4307	0.0000
MAR	22984.00	21715.5673	10	2171.5567	25.2262	11418.7187	198.1025	-2146.3304	0.0000
APR	2153.00	2034.1010	10	203.4101	24.4125	11622.1288	172.5150	-179.0056	0.0000
MAY	1567.00	1480.5209	10	148.0520	25.2262	11770.1809	197.7412	-122.8258	0.0000
JUN	5133.00	4849.7218	10	484.9721	24.4125	12255.1611	222.1537	-460.5596	0.0000
JUL	2106.00	1989.7748	10	198.9774	25.2262	12454.1386	247.3800	-173.7512	0.0000
AUG	694.00	655.6997	10	65.5699	25.2262	12519.7086	272.6062	-40.3037	0.0000
SEP	368.50	348.1633	10	34.8163	24.4125	12554.5249	297.0187	-10.4038	0.0000

WR 1977 Month	Gaging Station cfs-day	Adjusted Flow cfs-day u/s STP [Qs]	Dilution Ratio [R]	Allowable Discharge cfs-day [Q0=Qs/R]	STP Flow cfs-day [Qi]	Cummulative Flow cfs-day Qo-out	Qi-in	Deficiency cfs-day[Qi-Q0]	Accumulation cfs-day Sum[Qi-Q0]
OCT	471.60	445.5735	10	44.5573	25.2262	44.5573	25.2262	-19.3311	0.0000
NOV	337.10	318.6852	10	31.8685	24.4125	76.4258	49.6387	-7.4560	0.0000
DEC	286.90	271.0666	10	27.1066	25.2262	103.5325	74.8650	-1.8804	0.0000
JAN	191.00	181.4039	10	18.1403	25.2262	121.6729	100.0912	7.0858	7.0858
FEB	12029.40	11365.5258	10	1136.5525	22.7850	1258.2255	122.8762	-1113.7675	0.0000
MAR	17077.00	16133.9031	10	1632.3523	25.2262	2090.5778	148.1025	-1607.1260	0.0000
APR	6231.00	5887.1258	10	588.7125	24.4125	3479.2904	172.5150	-564.3000	0.0000
MAY	3822.00	3611.0728	10	361.1072	25.2262	3840.3977	197.7412	-335.8810	0.0000
JUN	594.00	561.2105	10	56.1218	24.4125	3896.5195	222.1537	-31.7093	0.0000
JUL	966.10	912.7032	10	91.2783	25.2262	3987.7978	247.3800	-66.0520	0.0000
AUG	764.80	722.5924	10	72.2592	25.2262	4060.0571	272.6062	-47.0379	0.0000
SEP	2593.30	2450.1811	10	245.0181	24.4125	4305.0753	297.0187	-220.6056	0.0000

WR 1978 Month	Gaging Station cfs-day	Adjusted Flow cfs-day u/s STP [Qs]	Dilution Ratio [R]	Allowable Discharge cfs-day [Q0=Qs/R]	STP Flow cfs-day [Qs]	Cummulative Flow cfs-day Qo-out	Qi-in	Deficiency cfs-day[Qi-Q0]	Accumulation cfs-day Sum[Qi-Q0]
OCT	2145.00	2026.6225	10	202.6622	25.2262	202.6622	25.2262	-177.4360	0.0000
NOV	1176.00	1111.0993	10	111.1099	24.4125	313.7721	49.6387	-86.4974	0.0000
DEC	35604.00	33644.6181	10	3364.4618	25.2262	3678.2339	74.8650	-3329.2355	0.0000
JAN	5628.00	5317.4039	10	531.7404	25.2262	4199.9743	100.0912	-506.5141	0.0000
FEB	24081.00	22751.0081	10	2275.1008	22.7850	4427.4852	122.8762	-204.7258	0.0000
MAR	74408.00	70287.1169	10	7028.7116	25.2262	11400.1969	148.1025	-6995.4854	0.0000
APR	37842.00	35753.5894	10	3575.3589	24.4125	15003.5558	172.5150	-3550.9464	0.0000
MAY	12698.00	11997.2273	10	1199.7227	25.2262	16223.2785	197.7412	-1174.4964	0.0000
JUN	2332.00	2203.3024	10	220.3302	24.4125	16443.6088	222.1537	-195.9177	0.0000
JUL	6294.00	5950.4292	10	595.0429	25.2262	17038.6516	247.3800	-569.8165	0.0000
AUG	1284.00	1213.1390	10	121.3139	25.2262	17159.9655	272.6062	-96.0876	0.0000
SEP	462.70	437.1646	10	43.7164	24.4125	17203.6820	297.0187	-19.3039	0.0000

*** OVERALL *** Maximum ACCUMULATION : 7.08 cfs - day CONTROLLED WASTEWATER VOLUME : 4.5715 Mgal HOLDING PERIOD : 8.70 Days !!! ***
Remark (s) : EFFLUENT WILL BE DIRECTLY DISCHARGED TO WABASH RIVER