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1988

# Beaver Slough Survey Clinton, Iowa

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July 1988

Report No. 88 — 4

Prepared under Cooperative Agreement SOO730401 for the

## Environmental Protection Agency Region VII

by the

### Hygienic Laboratory

The University of Iowa



John G. Miller, III  
Limnologist

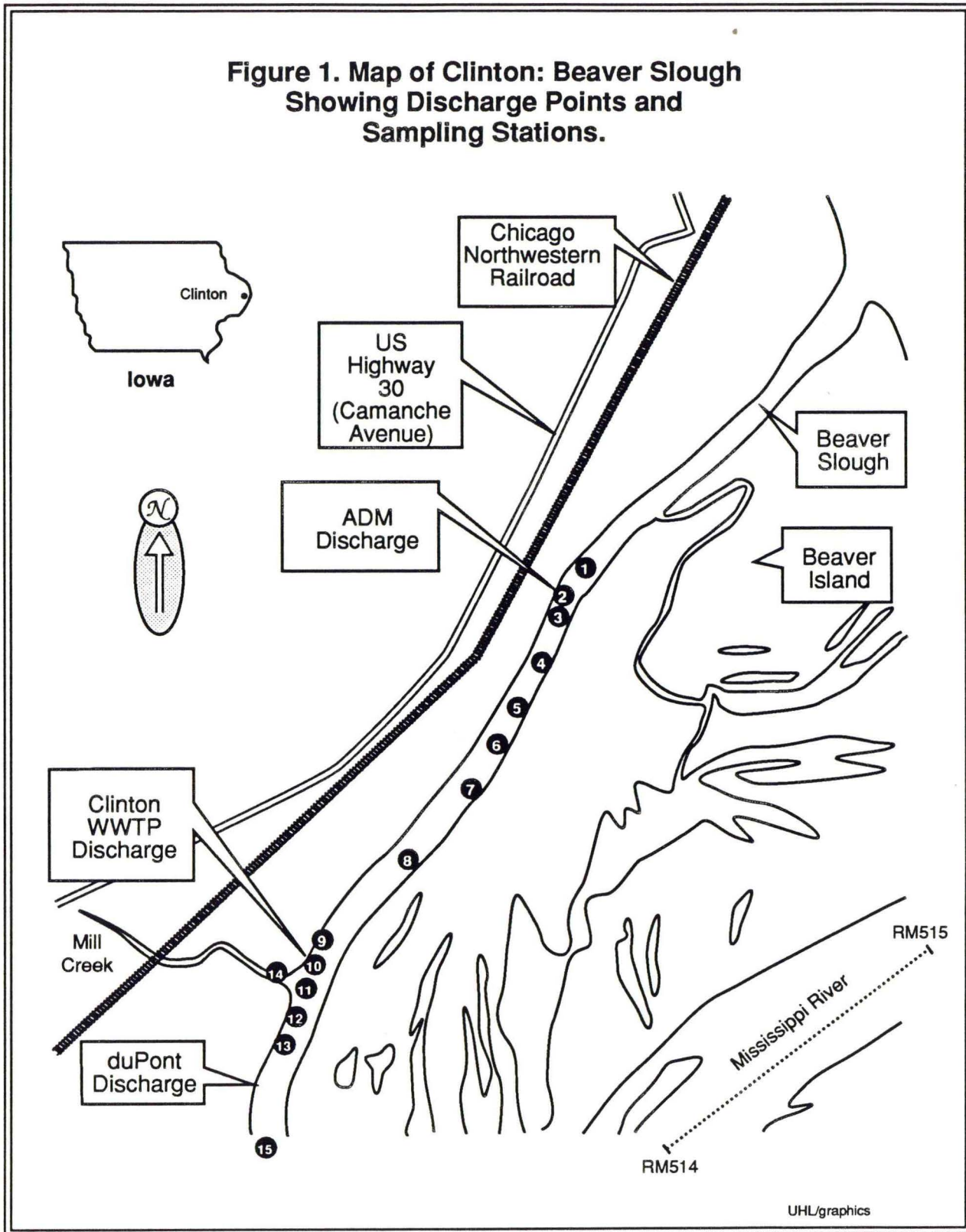
Jack O. Kennedy, Head  
Limnology Section

## Abstract

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A water quality survey of a side channel of the Mississippi River (Beaver Slough) near Clinton, Iowa was performed during July 1988. The purpose of the study was to evaluate the wastewater discharge effects from a corn wet-milling plant (ADM), a metal plating industry (Collis Industries) and a municipal wastewater treatment plant (Clinton, Iowa) on Beaver Slough water quality. Results of the study indicated the ADM waste discharge was rapidly mixed and dispersed in Beaver Slough with only a minimal effect on water quality. The ADM effluent quality was relatively consistent throughout the twenty-four hour sampling period and no NPDES permit limitations were exceeded. Limited sampling indicated the Collis Industries discharge did not have any significant effect on Beaver Slough water quality. The Clinton wastewater treatment plant effluent plume, while not readily dispersing, had only a minor effect on Beaver Slough water chemistry. Final effluent quality was poor with NPDES permit maximum limitation values for BOD and total suspended solids being exceeded. As a result of the ADM and Clinton effluent plume dispersion displayed during this study, there does not appear to be any additive or synergistic effects of the discharges. Although determination of the biological community integrity in Beaver Slough was limited by available habitat, a relatively large number of pollution-tolerant dipterans was collected downstream from the Clinton Wastewater Treatment Plant. In addition to the water quality study, a composite sediment sample was collected downstream from the duPont industrial discharge and analyzed for polynuclear aromatic hydrocarbons. No polynuclear aromatic hydrocarbons (PAHs) were found in the sediment sample.

**Figure 1. Map of Clinton: Beaver Slough Showing Discharge Points and Sampling Stations.**



# Introduction

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Beaver Slough is a side channel of the Mississippi River located adjacent to Clinton, Iowa, at River Miles 513 to 517 (Figure 1). The Slough receives wastewater from numerous industrial and domestic discharges. Because of the numerous wastewater facilities, it is important to understand the impact of each individual discharge and the accumulative impact of the discharges on Beaver Slough water quality. The major dischargers of interest for this study were ADM, Collis Manufacturing and the Clinton Municipal Wastewater Treatment Plant (WWTP). ADM is a corn wet-milling plant producing corn sweeteners and starches. Collis Manufacturing is a metal plating industry. The Clinton Municipal Wastewater Treatment Plant treats both domestic and industrial wastes. In addition to these dischargers, E.I. duPont deNemours and Company presently discharges non-contact cooling water to Beaver Slough. Historically duPont's discharge included process wastewater but since January 1985 it has only been cooling water. The water quality study of Beaver Slough was performed to fulfill the following objectives:

1. Determine the environmental effects of the industrial dischargers (ADM and Collis Industries) and the Clinton WWTP on Beaver Slough considering:
  - a. effluent characterization of the industrial discharges,
  - b. the time of travel and synergistic effects of the discharges in Beaver Slough,
  - c. the lateral, longitudinal and vertical dispersion within Beaver Slough of each discharge,
2. Determine the biological community integrity above and below the dischargers in Beaver Slough,
3. Assess the presence of polynuclear aromatic hydrocarbons (PAHs) in sediment downstream from the E.I. duPont discharge.

# Sampling and Analytical Methodology

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A comprehensive Work/Quality Assurance project plan for the Beaver Slough study was written by personnel from the Iowa Department of Natural Resources (IDNR) and University Hygienic Laboratory (UHL). Quality assurance for field and laboratory activities was followed as outlined in the project plan. All data presented in this report meet the quality assurance objectives specified in the Work/QA plan. A brief discussion of the field and laboratory activities follows. For more details of these activities, see the *Quality Assurance/Work Plan for: Beaver Slough Survey-Clinton, Iowa* (1). Copies of the study plan are available from the IDNR or UHL.

The first activity performed was to determine the time of travel from the point of discharge through the study reach. Sampling sites were identified and time of travel between sampling sites was measured using a water-soluble dye. The dye was introduced into Beaver Slough at the ADM discharge point and followed visually downstream. The time needed to travel between each sampling point was recorded. A similar procedure was used to identify the discharge plume from the Clinton Municipal WWTP. Collis Manufacturing discharges into a small tributary that joins Mill Creek. The Mill Creek sample, (Site 14), therefore was selected to reflect the Collis Manufacturing discharge and any other wastes discharged to Mill Creek.

Sampling was initiated by collecting four, six-hour composite effluent samples from the ADM and Clinton WWTP discharges. The mid-point in time of one six-hour composite was selected as the plug flow start time, and this midpoint was used to calculate the time at which the downstream samples would be collected. Sample collection times were determined by adding the time of travel to those stations from the discharge to the start time. The stream sampling procedure utilized “plug flow” sampling. That is, the same plug of water was followed and sampled at each station as it flowed downstream.

Procedures used in sample collection, preservation and analysis are described in *Standard Methods* (2), *Handbook for Sampling and Sample Preservation of Water and Wastewater* (3), and the *Manual of Methods for Chemical Analysis of Water and Wastes* (4). Subsurface grab samples were collected directly into the sample containers. Stream flow measurements for the Mississippi River at Lock and Dam 13 were obtained from the U.S. Army Corps of Engineers. Benthic samples were collected using a ponar dredge.

## Results and Discussion

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### *ADM*

The Beaver Slough sampling sites and travel times from the ADM discharge are shown in Figure 2. The time of travel study using the water-soluble dye was performed on 5 July 1988 with the plug flow sampling conducted on 6 July 1988. The Mississippi River flow at Lock and Dam 13 (upstream from Beaver Slough) was 14,200 cfs on 5 July 1988 and 12,300 cfs on 6 July 1988. It was not possible to estimate river flow through Beaver Slough.

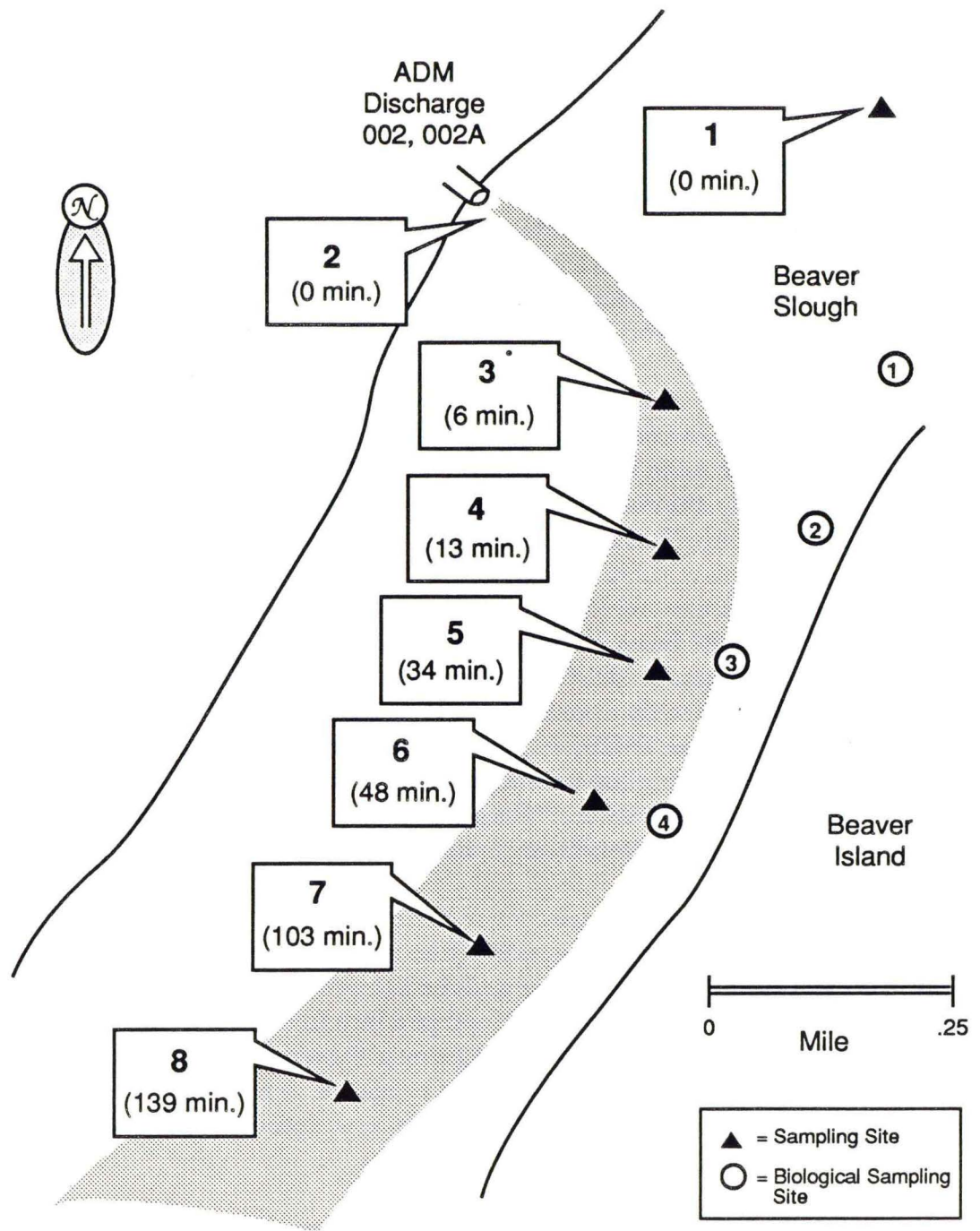
ADM has several cooling water discharges to Beaver Slough with one main combined discharge (002, 002A) containing wastewater from ADM's treatment plant. The velocity of 002 discharge was so great that the effluent plume as shown by the dye tracing (Figure 2) was forced out into Beaver Slough almost to the other side of the channel. The ADM effluent plume remained on the far side of the channel throughout the dye tracing study.

Water chemistry data for the ADM-Beaver Slough samples may be found in Table 1. As indicated on the map, Site 1 was located upstream from the ADM discharge and reflects background water quality. Sampling Site 2 was a grab sample collected directly from the ADM discharge pipe. A review of the data in Table 1 indicates conductivity, phosphorus and CBOD<sub>5</sub> were much greater in concentration in the ADM discharge than at Site 1. By the time the waste slug had reached Site 3, sufficient mixing had occurred to lower all analyte values to near background concentrations (Site 1). The analyte values remained relatively constant at downstream Sites 4-8 indicating the ADM discharge had little impact on Beaver Slough that particular day.

Data for the ADM 002-002A discharge may be found in Table 2. Because of an automatic sampler malfunction, only two and a part of the third of four six-hour composites were collected. To complete the 24-hour period, samples collected by ADM were split and provided for analysis. Except for the late night (2100 hrs) to early morning (0500 hrs) time period, the effluent quality was consistent. The lower values for organic nitrogen and CBOD in evening and early morning composite samples may be related to reduced production during those times. Plant flow during the 24-hour period was estimated from plant records at 22.4 MGD for the combined 002 and 002A discharges.

Based on a comparison of NPDES permit values versus values obtained on 6 and 7 July 1988 given below, the ADM 002-002A discharge was well within NPDES limits. The permit value for flow is somewhat misleading in that the value is for all discharges combined. Although ADM has several cooling water discharges, only 002-002A is supposed to have BOD and solids loading.

**Figure 2. Map of Beaver Slough Showing ADM Effluent Dye Plume, Sampling Sites and Time of Travel from Discharge.**



UHL/graphics

Parameter	ADM Permit Values	Values for 6 & 7 July 1988
Flow (MGD)	95/143 Ave./Max.	22.4 MGD
BOD <sub>5</sub> (lbs./day)	11,180/33,830 Ave./Max.	1460 lbs./day
TSS (lbs./day)	15,610/62,460 Ave./Max.	4440 lbs./day

**Table 1. Water Chemistry Data for Sampling Sites 1-8, Beaver Slough — Clinton, Iowa, 6 July 1988**  
(all values in mg/L unless designated otherwise)

Sampling Sites	Temperature <sup>1</sup>	Dis-solved Oxygen	pH <sup>2</sup>	Specific Conduc-tance <sup>3</sup>	Total Residual Chlorine	Orga-nic	Nitrogen Ammo-nia	Nitrate
1	28	7.7	8.6	250	<0.005	1.1	<0.1	<0.1
2	33.5	6.2	8.2	460	<0.005	1.4	<0.1	0.2
(ADM Outfall 002-002A)								
3	28	7.4	8.6	340	<0.005	1.4	<0.1	<0.1
4	29	7.7	8.6	340	<0.005	1.1	<0.1	<0.1
5	29	7.9	8.6	320	<0.005	1.0	<0.1	0.1
6	29	8.1	8.8	380	<0.005	1.0	<0.1	<0.1
7	30	8.8	8.8	300	<0.005	1.0	<0.1	<0.1
8	30	9.0	8.9	290	<0.005	0.9	0.2	<0.1

Sampling Sites	Phosphorus		Carbonaceous		Chlorophyll <sup>4</sup>	Corrected <sup>4</sup>
	Ortho	Total	BOD <sub>5</sub>	BOD <sub>20</sub>	a	a
1	0.1	0.2	4	10	62	59
2	0.9	1.0	16	25	48	48
(ADM Outfall 002-002A)						
3	0.3	0.4	6	9	64	64
4	0.3	0.4	5	9	59	57
5	0.2	0.3	5	9	59	57
6	0.2	0.3	5	9	57	50
7	0.2	0.2	5	8	72	72
8	0.2	0.2	4	8	46	37

1. Degrees Centigrade    2. pH Units    3. Micromhos    4. µg/L

**Table 2. Water Chemistry Data for the ADM 002-002A Discharge, 6 and 7 July 1988**  
(All values in mg/L unless designated otherwise)

Time	pH <sup>1</sup>	Specific Conduc-tance <sup>2</sup>	Organic	Nitrogen Ammo-nia		Non-filtrable Residue	Phosphorus		C BOD <sup>3</sup>	
				Nitrate			Ortho	Total	5	20
0850-1450	8.0	750	1.5	<0.1	<0.1	28	1.0	1.4	12	20
1450-2050	8.2	770	1.5	<0.1	<0.1	29	0.9	1.2	13	20
2050-2350	8.3	730	1.4	<0.1	<0.1	21	0.9	1.1	6	8
2100-0500*	—	640	0.1	0.3	<0.1	—	0.6	0.8	3	6
0500-0930*	7.7	640	1.1	<0.1	0.1	17	0.7	0.8	5	9

\* Collected by ADM

1. pH Units    2. Micromhos    3. Carbonaceous BOD



# Clinton WWTP

Sampling sites and travel times for the Clinton WWTP are shown in Figure 3. The dye plume for the municipal plant was much different than the ADM discharge plume. Lower effluent flow and velocity allowed the municipal discharge to remain close to the near shore. Mill Creek had little effect on the discharge plume dispersion. Although the Power Company docking facility pushed the plume out farther into Beaver Slough, it remained relatively close to the shoreline throughout the dye study.

Water chemistry data for Beaver Slough in the area of the Clinton WWTP may be found in Table 3. The sample collected at Site 9 represents an upstream control sample for this study segment. Site 10 was a grab sample of the Clinton WWTP final effluent reflecting a typical municipal waste, i.e., specific conductance 1,300 umhos, total residual chlorine 1.56 mg/L, ammonia nitrogen 15 mg/L, total phosphorus 7.3 mg/L and CBOD<sub>5</sub> 22 mg/L. Values at Site 11 (just downstream from the effluent) indicated only minor changes for most of the parameters as a result of the discharge. Carbonaceous BOD<sub>5</sub> was greatest at Site 11 and declined to background levels by Sites 12 and 13. These data indicate the Clinton Municipal discharge had only a minor effect on Beaver Slough water quality on 6 July 1988.

Compared to Beaver Slough, Mill Creek (Site 14) specific conductance (860 umhos) and nitrate (3.4 mg/L) values were higher. The higher conductivity may be the result of a combination of natural background levels and the Collis Manufacturing discharge. The Mill Creek nitrate level is probably due to the lack of an algal population utilizing the nitrate as a nutrient source. The low algal population is also indicated by the low chlorophyll values. Mill Creek had no observable effect on the water quality of Beaver Slough.

Water chemistry data from the Clinton Wastewater Treatment Plant (6 and 7 July) may be found in Table 4. Values for several parameters (pH, conductivity, ammonia nitrogen, nitrate nitrogen and phosphorus) were relatively consistent throughout the 24-hour period. Three parameters, i.e., organic nitrogen, nonfilterable residue and carbonaceous BOD, had values that were more variable. Because these parameters are solids related, as one parameter increases or decreases frequently so does the others. Effluent flow from the Clinton municipal plant was approximately 4.16 million gallons for the 24-hour sampling period.

A comparison of NPDES permit values and values obtained on 6 & 7 July is given below.

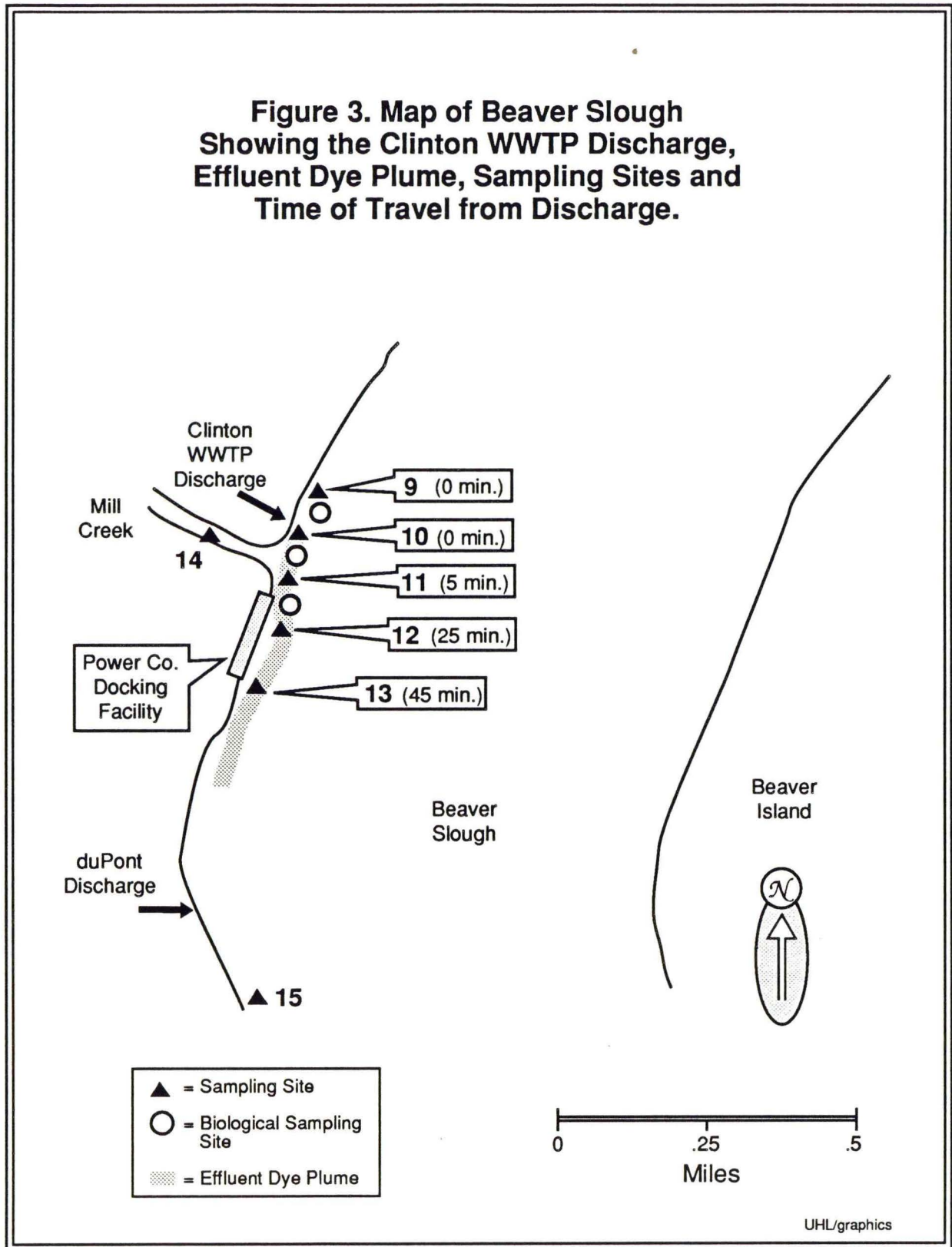
Parameter	Clinton WWTP Permit Values	Values for 6 & 7 July 1988
Flow (MGD)	7.5/24 Ave./Max.	4.16 MGD
BOD <sub>5</sub> * (mg/L)	30/45 Ave./Max.	71** mg/L
TSS (mg/L)	30/45 Ave./Max.	154** mg/L

\* Permit is for BOD<sub>5</sub>, value reported is CBOD<sub>5</sub> which is less than BOD<sub>5</sub>.

\*\* Average of four six hour composites.

Although the Clinton WWTP exceeded the average values on 6 & 7 July, the permit values are based on a 30-day average and may not have been out of compliance when the total 30 days are taken into account. However, the maximum values are one-day values and they were exceeded on 6 and 7 July 1988.

**Figure 3. Map of Beaver Slough Showing the Clinton WWTP Discharge, Effluent Dye Plume, Sampling Sites and Time of Travel from Discharge.**



**Table 3. Water Chemistry Data for Sampling Sites 9-14, Beaver Slough — Clinton, Iowa  
6 July 1988**

(all values in mg/L unless designated otherwise)

Sam- pling Sites	Temper- ature <sup>1</sup>	Dis- solved Oxygen	pH <sup>2</sup>	Specific Conduc- tance <sup>3</sup>	Total Residual Chlorine	Organic	Nitrogen Ammonia	Nitrate
9	28	7.9	8.4	300	<0.005	1.3	0.1	<0.1
10	25.5	7.5	7.3	1300	1.56	11	15	0.1
(Clinton WWTP Discharge)								
11	27.5	7.7	8.5	400	<0.005	1.1	0.2	0.1
12	28	7.9	8.4	460	<0.005	1.3	0.6	0.1
13	28.5	7.8	8.6	420	<0.005	1.1	0.1	0.1
14	26	6.6	7.7	860	<0.005	0.6	0.2	3.4
(Mill Creek)								

Sampling Sites	Phosphorus		Carbonaceous		Chloro- phyll <sup>4</sup> a	Corrected <sup>4</sup> a
	Ortho	Total	BOD <sub>5</sub>	BOD <sub>20</sub>		
9	0.2	0.3	5	15	68	59
10	5	7.3	22	40	<1	<1
(Clinton WWTP Discharge)						
11	0.2	0.3	24	40	59	52
12	0.5	0.5	6	35	58	49
13	0.2	0.3	5	9	54	46
14	0.1	0.1	1	5	18	9
(Mill Creek)						

1. Degrees Centigrade    2. pH Units    3. Micromhos    4. µg/L

**Table 4. Water Chemistry Data for the Clinton Wastewater Treatment Plant Final Effluent (Pre-chlorination)  
6 and 7 July 1988**

(All values in mg/L unless designated otherwise)

Time	pH <sup>1</sup>	Specific Conduc- tance <sup>2</sup>	Organic	Ammo- nia	Nitro- gen Nitrate	Non- filtrable Residue	Phosphorus		C BOD	
							Ortho	Total	5	20
0600-1200	8.1	1300	5.3	16	<0.1	15	6.9	7.4	10	23
1200-1800	8.1	1300	23	17	<0.1	190	5.0	9.0	95	200
1800-2400	8.2	1400	13	16	<0.1	92	4.2	7.1	60	120
2400-0600	8.0	1500	33	20	<0.1	320	4.1	9.8	120	210

1. pH Units    2. Micromhos

A composite sediment sample was collected at Site 15 to determine if any polynuclear aromatic hydrocarbons (PAHs) had been deposited in the sediments downstream from duPont industrial waste discharge. The sediment sample was comprised of five separate samples composited together and analyzed for 16 polynuclear aromatic hydrocarbons. All of the 16 values reported were less than the quantitation limit for each compound (no PAHs were found). Results for the PAH analysis may be found in the Appendix.

## *Biological Sampling*

Biological samples were collected at the sites identified in Figures 2 and 3 by two methods. One method was use of a ponar dredge to collect sediment samples. The sediment was rinsed through a number 30-mesh screen and all organisms retained were preserved in 80% ethyl alcohol.

Most of the sediment in Beaver Slough consisted of sand and small gravel. The heavy boat traffic (barges and recreational boating) in Beaver Slough may keep the fine material in suspension, and, as a result, the fine material may be carried out of the slough. The sand and gravel material provides very little suitable habitat for benthic organisms. The organisms collected with the ponar dredge are listed in Table 5. With few numbers

**Table 5. Biological Data from Ponar Dredge Samples - Beaver Slough, 6 July 1988**

Taxa	Sampling Sites						
	1*	2*	3*	4*	9	10	11
Mollusca							
Gastropoda							
Physidae							
<i>Physa</i> sp.					1		
Lymnaeidae							
<i>Lymnaca</i>		1	4	1			
Plecypoda							
Unionidae							
<i>Quadrula pustulosa</i>				1			
<i>Fusconaia flava</i>			1	1			
<i>Leptodea fragilis</i>					1		
<i>Amblema plicata</i>						1	
Insecta							
Diptera							
Chironomidae							
<i>Chironomus</i> sp.	5	6	2	4	5	5	1
<i>Cryptochironomus</i> sp.	1	1					
<i>Parachironomus</i> sp.						1	
Total No. of Organisms	6	8	7	7	7	7	1
Total No. of Taxa	2	3	3	4	3	3	1

\* Sites 1-4 do not correspond with water chemistry sites (See Figure 2); Sites 9-11 do correspond to the water chemistry sites (See Figure 3).

and taxa it is not possible or prudent to draw any conclusions from this benthic data other than habitat is very limited in Beaver Slough.

The other method of collecting biological organisms involved skimming floating material from the water surface and passing it through a number 30-mesh screen. The purpose of this method is to collect the floating pupal exuvia of emerging insects. Obviously, this method is selective only for certain organisms.

Pupal exuvia samples were collected at biological Sites 1, 2, 4, 9 and 11. The numbers and taxa of the pupal exuvia obtained at each site are given below.

Taxa	Sampling Sites				
	1	2	4	9	11
Insecta					
Ephemeroptera					
Ephemeridae					
<i>Hexagenia</i>	12	4	1		
Diptera					
Chironomidae					
<i>Cryptochironomus</i>	2				
<i>Glyptotendipes</i>		1	1	9	1
Genus 15*					1
Tanypodinae					
<i>Procladius</i>	1				
Orthocladiinae					
<i>Cricotopus</i>					23
Unidentifiable Organisms**		1	3	4	
Total Number of Organisms	15	6	5	13	25
Total Number of Taxa	3	3	3	2	3

\* cf. reference number 5

\*\* structures missing making identification difficult

As with the dredge sample, not many organisms were collected. Except for *Cryptochironomus*, the pupal exuvia collected represented organisms different than those found in the dredge samples. The large number (23) of *Cricotopus* downstream from the Clinton WWTP may reflect the impact of that discharge on Beaver Slough. *Cricotopus*, especially *C. bicinctus*, has been known to be a dominant organism downstream of organic waste discharges (personal communication: Dr. Leonard Ferrington, Kansas Biological Survey).

# Summary and Conclusions

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Results of the Beaver Slough - Clinton, Iowa Study indicate:

- The ADM waste discharge was rapidly mixed and dispersed in Beaver Slough with only a minimal effect on water quality. The ADM effluent quality was relatively consistent throughout the twenty-four hour sampling period and no NPDES permit limitations were exceeded.
- Limited sampling indicated the Collis Industries discharge did not have any significant effect on Beaver Slough water quality.
- The Clinton Wastewater Treatment Plant effluent plume, while not readily dispersing, had only a minor effect on Beaver Slough water chemistry. Final effluent quality was poor with NPDES permit maximum limitation values for BOD and total suspended solids being exceeded.
- As a result of the effluent plumes' dispersion displayed during this study, there does not appear to be any additive or synergistic effects of the discharges.
- Although determination of the biological community integrity in Beaver Slough was limited by available habitat, a relatively large number of pollution-tolerant dipterans was collected downstream from the Clinton WWTP.
- No polynuclear aromatic hydrocarbons (PAHs) were found in the sediment sample collected downstream from the duPont industrial discharge.

## Literature Cited

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1. Iowa Department of Natural Resources. 1988. Work/Quality Assurance Plan for Beaver Slough Survey-Clinton, Iowa. Des Moines, Iowa.
2. American Public Health Association. 1985. Standard Methods for the examination of Water and Wastewater. 16th Edition. American Public Health Association, Inc. Washington, D.C.
3. U.S. Environmental Protection Agency. 1982. Handbook for Sampling and Sample Preservation of Water and Wastewater. EPA-600/4-82-029. Cincinnati, Ohio.
4. U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. Cincinnati, Ohio.
5. Merrit R.W. and Cummins, K.W. 1984. An Introduction to the Aquatic Insects of North America. Second Edition. Kendall/Hunt Publishing Company. Dubuque, Iowa.

# Appendix

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UNIVERSITY OF IOWA - HYGIENIC LABORATORY

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 Analytical Report for Sample Number 8857428

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H.A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/06/88 10:30.00  
 Collected By: LDA/JOK

Sample Description: WATER  
 Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE #1  
 N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK
DISSOLVED OXYGEN	7.7 MG/L		JOK
FIELD pH	8.6 pH UNITS		JOK
TEMPERATURE	28 DEGREES C		JOK
SPEC. CONDUCTANCE	250 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.1 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.1 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.2 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	4 MG/L	SM 16-507	JAG
CHLOROPHYLL A	62 UG/L	SM161002G1	PK
CORRECTED CHLOR A	59 UG/L	SM161002G1	PK
INHIBITED BOD-20	10 MG/L	SM 16-507	JAG

Verified: *LDA*

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857429

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900<sup>th</sup> East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 10:30:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE 1D=SITE #2  
N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK
DISSOLVED OXYGEN	6.2 MG/L		JOK
FIELD pH	8.2 pH UNITS		JOK
TEMPERATURE	33.5 DEGREES C		JOK
SPEC. CONDUCTANCE	460 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	0.2 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.4 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.9 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	1.0 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	16 MG/L	SM 16-507	JAG
CHLOROPHYLL A	48 UG/L	SM161002G1	PK
CORRECTED CHLOR A	48 UG/L	SM161002G1	PK
INHIBITED BOD-20	25 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million  
PPB - Parts/Billion  
< - Less than

MG/L - Milligrams/Liter  
uG/L - Micrograms/Liter  
> - Greater than

MG/KG - Milligrams/Kilogram  
uG/KG - Micrograms/Kilogram  
pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857430

Iowa City Laboratory  
Oakdale Hall  
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Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 10:42:00  
Collected By: LDA/JOX

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE#3  
N-SERIES, P-SERIES, BOI\_I(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK
DISSOLVED OXYGEN	7.4 MG/L		JOK
FIELD pH	8.6 pH UNITS		JOK
TEMPERATURE	28.0 DEGREES C		JOK
SPEC. CONDUCTANCE	340 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.4 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.3 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.4 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	6 MG/L	SM 16-507	JAG
CHLOROPHYLL A	64 UG/L	SM161002G1	PK
CORRECTED CHLOR A	64 UG/L	SM161002G1	PK
INHIBITED BOD-20	9 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857431

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900<sup>th</sup> East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON BEAVER SLOUGH Sample Description: WATER  
Date Collected: 07/06/88 10:52:00 Client Reference:  
Collected By: LDA/JOK

Comments:

BEAVER SLOUGH, SAMPLE SITE ID=SITE#4  
N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK
DISSOLVED OXYGEN	7.7 MG/L		JOK
FIELD pH	8.6 pH UNITS		JOK
TEMPERATURE	29 DEGREES C		LDA
SPEC. CONDUCTANCE	340 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.1 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.3 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.4 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	JAG
CHLOROPHYLL A	59 UG/L	SM161002G1	PK
CORRECTED CHLOR A	57 UG/L	SM161002G1	PK
INHIBITED BOD-20	9 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

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 Analytical Report for Sample Number 8887432

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H. A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/06/88 11:12:00  
 Collected By: LDA/JOK

Sample Description: WATER  
 Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE #5  
 N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK, LDA
DISSOLVED OXYGEN	7.9 MG/L		JOK, LDA
FIELD pH	8.6 pH UNITS		JOK, LDA
TEMPERATURE	29 DEGREES C		JOK, LDA
SPEC. CONDUCTANCE	320 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.0 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.3 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	JAG
CHLOROPHYLL A	59 UG/L	SM161002G1	PK
CORRECTED CHLOR A	57 UG/L	SM161002G1	PK
INHIBITED BOD-20	9 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million    MG/L - Milligrams/Liter    MG/KG - Milligrams/Kilogram  
 PBB - Parts/Billion    uG/L - Micrograms/Liter    uG/KG - Micrograms/Kilogram  
 < - Less than            > - Greater than            pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857434

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900<sup>th</sup> East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 11:30:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE#6  
N-SERIES, P-SERIES, BOI\_(15&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	8.1 MG/L		JOK LDA
FIELD pH	8.8 pH UNITS		JOK LDA
TEMPERATURE	29 DEGREES C		JOK LDA
SPEC. CONDUCTANCE	380 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.0 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.3 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	JAG
CHLOROPHYLL A	57 UG/L	SM161002G1	PK
CORRECTED CHLOR A	50 UG/L	SM161002G1	PK
INHIBITED BOD-20	9 MG/L	SM 16-507	JAG

Verified: *LDA*

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857435

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900<sup>th</sup> East Grand  
 H.A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/06/88 12:30:00  
 Collected By: LDA/JOK

Sample Description: WATER  
 Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE #7  
 N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	8.8 MG/L		JOK LDA
FIELD pH	8.8 pH UNITS		JOK LDA
TEMPERATURE	30 DEGREES C		JOK LDA
SPEC. CONDUCTANCE	300 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.0 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.2 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	JAG
CHLOROPHYLL A	72 UG/L	SM161002G1	PK
CORRECTED CHLOR A	72 UG/L	SM161002G1	PK
INHIBITED BOD-20	8 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MC/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857436

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 13:06:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE #8  
N-SERIES, P-SERIES, BOI\_I(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	9.0 MG/L		LDA
FIELD pH	8.9 pH UNITS		LDA
TEMPERATURE	30 DEGREES C		LDA
SPEC. CONDUCTANCE	290 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.2 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	0.9 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.2 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	4 MG/L	SM 16-507	JAG
CHLOROPHYLL A	46 UG/L	SM161002G1	PK
CORRECTED CHLOR A	37 UG/L	SM161002G1	PK
INHIBITED BOD-20	8 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter



UNIVERSITY OF IOWA - HYGIENIC LABORATORY

-----  
 Analytical Report for Sample Number 8857584

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H.A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: URL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON                      Sample Description: WATER  
 Date Collected: 07/06/88 14:50:00          Client Reference:  
 Collected By: LDA/JOK

Comments

ADM DISCHARGE, OUTFALL 002, 002A. 8HR COMPOSITE  
 N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S\_ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.0      pH UNITS		JOK LDA
TEMPERATURE	27      DEGREES C		JOK LDA
SPEC. CONDUCTANCE	750      uMHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	28      MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	<0.1      MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1      MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.5      MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	1.0      MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	1.4      MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	12      MG/L	SM 16-507	JAG
INHIBITED BOD-20	20      MG/L	SM 16-507	JAG

Comments

BOD '0' IS INHIBITED 20 DAY BOD.

Verified: *LDA*

FPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857585

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900<sup>th</sup> East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 20:50:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

ADM DISCHARGE, OUTFALL 002, 002A. 6HR COMPOSITE.  
N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S-ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.2 pH UNITS		JOK LDA
TEMPERATURE	27 DEGREES C		JOK LDA
SPEC. CONDUCTANCE	770 uMHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	29 MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.5 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.9 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	1.2 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	13 MG/L	SM 16-507	JAG
INHIBITED BOD-20	20 MG/L	SM 16-507	JAG

Verified:

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
< - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

-----  
 Analytical Report for Sample Number 8857586

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H.A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/06/88 23:50:00  
 Collected By: LDA/JOK

Sample Description: WATER  
 Client Reference:

Comments

ADM DISCHARGE, OUTFALL 002, 002A. 3HR COMPOSITE  
 N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S\_ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.3 pH UNITS		JOK LDA
TEMPERATURE	29 DEGREES C		JOK LDA
SPEC CONDUCTANCE	730 uMHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	21 MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.4 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.9 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	1.1 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	6 MG/L	SM 16-507	JAG
INHIBITED BOD-20	8 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPE - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857587

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900<sup>th</sup> East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/07/88 05:00:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

ADM DISCHARGE, OUTFALL 002, 002A. 8RR COMPOSITE (7-6/7)  
N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S\_ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
SPEC. CONDUCTANCE	640 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.3 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	0.1 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.6 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.8 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	3 MG/L	SM 16-507	JAG
INHIBITED BOD-20	6 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
< - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

-----  
 Analytical Report for Sample Number 8857588

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H. A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/07/88 09:30:00  
 Collected By: LEA/JOK

Sample Description: WATER  
 Client Reference:

Comments

ADM DISCHARGE, OUTFALL 002, 002A. 4 1/2 HR COMPOSITE  
 N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S\_ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	7.7 pH UNITS		JOK LDA
TEMPERATURE	25 DEGREES C		JOK LDA
SPEC CONDUCTANCE	640 uMHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	17 MG/L @103 C	EPA 160.2	JH
AMMONIA (AS N)	<0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.1 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.7 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.8 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	JAG
INHIBITED BOD-20	9 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857437

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 08:13:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE#9  
N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	< 0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	7.9 MG/L		JOK LDA
FIELD pH	8.4 pH UNITS		JOK LDA
TEMPERATURE	28 DEGREES C		JOK LDA
SPEC. CONDUCTANCE	300 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	< 0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.3 MG/L	TIM #786-86	VD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.3 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	
CHLOROPHYLL A	68 UG/L	SM161002G1	PK
CORRECTED CHLOR A	59 UG/L	SM161002G1	PK
INHIBITED BOD-20	15 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857438

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 09:00:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE#10  
N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	1.56 MG/L	EPA 330.1	JOK
DISSOLVED OXYGEN	7.5 MG/L	EPA 360.1	LDA
FIELD pH	7.3 pH UNITS	EPA 150.1	LDA
TEMPERATURE	25.5 DEGREES C	EPA 170.1	LDA
SPEC. CONDUCTANCE	1300 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	15 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	11 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	5.0 MG/L	TIM #781-86	RWW
TOTAL PHOSPHORUS (P)	7.3 MG/L	TIM #787-86	RVD
SEEDED/INHIBITED BOD	22 MG/L	SM 16-507	JAG
SEEDED/INHIB BOD-20	40 MG/L	SM 16-507	JAG
CHLOROPHYLL A	<1 UG/L	SM 16 1002G	PK
CORRECTED CHLOR A	<1 UG/L	SM 16 1002G	PK

Comments

Verified: *LDT*

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
< - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857439

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 09:07:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE#11  
N-SERIES, P-SERIES, BOI\_1 (5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	< 0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	7.7 MG/L		JOK LDA
FIELD pH	8.5 pH UNITS		JOK LDA
TEMPERATURE	27.5 DEGREES C		JOK LDA
SPEC. CONDUCTANCE	400 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.2 MG/L	TIM #780-86	RWV
NO2+NO3 AS NO3-N	0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.1 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.3 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	24 MG/L	SM 16-507	JAG
CHLOROPHYLL A	59 UG/L	SM161002G1	PK
CORRECTED CHLOR A	52 UG/L	SM161002G1	PK
INHIBITED BOD-20	40 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter



UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857440

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H. A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 09:20:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE #12  
N-SERIES, P-SERIES, BOI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	7.9 MG/L		JOK LDA
FIELD pH	8.4 pH UNITS		JOK LDA
TEMPERATURE	28 DEGREES C		JOK LDA
SPEC CONDUCTANCE	460 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.6 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	0.1 MG/L	EPA 353.2	
ORGANIC NITROGEN (N)	1.3 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.5 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.5 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	6 MG/L	SM 16-507	JAG
CHLOROPHYLL A	58 UG/L	SM161002G1	PK
CORRECTED CHLOR A	49 UG/L	SM161002G1	PK
INHIBITED BOD-20	35 MG/L	SM 16-507	JAG

Verified: *ADA*

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PBB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857441

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 09:30:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

BEAVER SLOUGH, SAMPLE SITE ID=SITE #13  
N-SERIES, P-SERIES, BOI\_1 (5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	7.8 MG/L		JOK LDA
FIELD pH	8.6 pH UNITS		JOK LDA
TEMPERATURE	28.5 DEGREES C		JOK LDA
SPEC CONDUCTANCE	420 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.1 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	1.1 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.3 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	5 MG/L	SM 16-507	JAG
CHLOROPHYLL A	54 UG/L	SM161002G1	PK
CORRECTED CHLOR A	46 UG/L	SM161002G1	PK
INHIBITED BOD-20	9 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million    MG/L - Milligrams/Liter    MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion    uG/L - Micrograms/Liter    uG/KG - Micrograms/Kilogram  
 < - Less than            > - Greater than            pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

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 Analytical Report for Sample Number 8857442

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H.A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/08/88

Date of Report: 11/16/88

Submitter: UHJ LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/06/88 09:40:00  
 Collected By: LDA/JOK

Sample Description: WATER  
 Client Reference:

Comments

MILL CREEK SAMPLE SITE ID= SITE #14  
 N-SERIES, P-SERIES, BUI\_1(5&20), CHLA, COND.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
TOTAL RESIDUAL CL	<0.005 MG/L	EPA 330.1	JOK LDA
DISSOLVED OXYGEN	6.6 MG/L		JOK LDA
FIELD pH	7.7 pH UNITS		JOK LDA
TEMPERATURE	26 DEGREES C		JOK LDA
SPEC. CONDUCTANCE	860 uMHOS @ 25 C	EPA 120.1	SMM
AMMONIA (AS N)	0.2 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	3.4 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	0.6 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	0.1 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	0.1 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	1 MG/L	SM 16-507	JAG
CHLOROPHYLL A	18 UG/L	SM161002G1	PK
CORRECTED CHLOR A	9 UG/L	SM161002G1	PK
INHIBITED BOD-20	5 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 ( - Less than              ) - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857589

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 12:00:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

CLINTON WWTP FINAL EFFL (PRE CHLORINATION) 6HR COMPOSITE  
N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S-ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.1 pH UNITS		JOK LDA
SPEC. CONDUCTANCE	1300 $\mu$ MHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	15 MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	16 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	5.3 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	6.9 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	7.4 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	10 MG/L	SM 16-507	JAG
INHIBITED BOD-20	23 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
PPE - Parts/Billion       $\mu$ G/L - Micrograms/Liter       $\mu$ G/KG - Micrograms/Kilogram  
< - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857590

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900 East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 18:00:00  
Collected By: LDA/JOX

Sample Description: WATER  
Client Reference:

Comments

CLINTON WWTP FINAL EFFL (PRE CHLORINATION) 6HR COMPOSITE  
N-SERIES, P-SERIES, BOD-1(5&20 DAY), COND, S-ST.

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.1 pH UNITS		JOK LDA
SPEC. CONDUCTANCE	1300 uMHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	190 MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	17 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	23 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	5.0 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	9.0 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	95 MG/L	SM 16-507	JAG
INHIBITED BOD-20	200 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
 PPB - Parts/Billion      uG/L - Micrograms/Liter      uG/KG - Micrograms/Kilogram  
 < - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

Analytical Report for Sample Number 8857591

Iowa City Laboratory  
Oakdale Hall  
Iowa City, IA 52242  
(319) 335-4500

Des Moines Branch  
900<sup>th</sup> East Grand  
H.A. Wallace Building  
Des Moines, IA 50319  
(515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
Address: OAKDALE CAMPUS  
City: IOWA CITY, IA 52240

Sample Location: CLINTON  
Date Collected: 07/06/88 12:00:00  
Collected By: LDA/JOK

Sample Description: WATER  
Client Reference:

Comments

CLINTON WWTP FINAL EFFL (PRE CHLORINATION) 6HR COMPOSITE  
N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S\_ST. (18:00-24:00)

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.2 pH UNITS		JOK LDA
SPEC. CONDUCTANCE	1400 $\mu$ MHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	92 MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	16 MG/L	TIM #780-86	RWW
NO <sub>2</sub> +NO <sub>3</sub> AS NO <sub>3</sub> -N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	13 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	4.2 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	7.1 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	60 MG/L	SM 16-507	JAG
INHIBITED BOD-20	120 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million      MG/L - Milligrams/Liter      MG/KG - Milligrams/Kilogram  
PPE - Parts/Billion       $\mu$ G/L - Micrograms/Liter       $\mu$ G/KG - Micrograms/Kilogram  
< - Less than              > - Greater than              pCi/L - pico Curies/Liter

UNIVERSITY OF IOWA - HYGIENIC LABORATORY

-----  
 Analytical Report for Sample Number 8857592

Iowa City Laboratory  
 Oakdale Hall  
 Iowa City, IA 52242  
 (319) 335-4500

Des Moines Branch  
 900 East Grand  
 H.A. Wallace Building  
 Des Moines, IA 50319  
 (515) 281-5371

Date Received: 07/11/88

Date of Report: 11/16/88

Submitter: UHL LIMNOLOGY  
 Address: OAKDALE CAMPUS  
 City: IOWA CITY, IA 52240

Sample Location: CLINTON  
 Date Collected: 07/07/88 06:00:00  
 Collected By LDA/JOK

Sample Description: WATER  
 Client Reference:

Comments

CLINTON WWTP FINAL EFFL (PRE CHLORINATION) 6HR COMPOSITE  
 N-SERIES, P-SERIES, BOD-1 (5&20 DAY), COND, S-ST. (24:00-06:00)

--- Listing of Analyses Performed and Results ---

Analyte	Concentration	Method Used	Analyst
FIELD pH	8.0 pH UNITS		JOK LDA
SPEC. CONDUCTANCE	1500 uMHOS @ 25 C	EPA 120.1	SMM
SUSPENDED SOLIDS	320 MG/L @103 C	EPA 160.2	JJH
AMMONIA (AS N)	20 MG/L	TIM #780-86	RWW
NO2+NO3 AS NO3-N	<0.1 MG/L	EPA 353.2	JAG
ORGANIC NITROGEN (N)	33 MG/L	TIM #786-86	RVD
ORTHO PHOSPHORUS (P)	4.1 MG/L	TIM #781-86	RVD
TOTAL PHOSPHORUS (P)	9.8 MG/L	TIM #787-86	RVD
INHIBITED 5 DAY BOD	120 MG/L	SM 16-507	JAG
INHIBITED BOD-20	210 MG/L	SM 16-507	JAG

Verified: LDA

PPM - Parts/Million    MG/L - Milligrams/Liter    MG/KG - Milligrams/Kilogram  
 PPS - Parts/Billion    uG/L - Micrograms/Liter    uG/KG - Micrograms/Kilogram  
 < - Less than            > - Greater than            pCi/L - pico Curies/Liter

UNIVERSITY HYGIENIC LABORATORY  
Analytical Report  
HP 1000

Client: University Hygienic Lab Attn: Jack Kennedy  
Client Address: Wallace Building  
Des Moines, Iowa


Client Sample Identification: 400 yds. downstream from Dupont discharge  
Date Sample Collected: 7/6/88  
Date Sample Received: 7/12/88

ANALYTICAL RESULTS

UHL Lab No. 8807553

<u>ANALYTE</u>	<u>CONCENTRATION (ug/Kg)</u>	<u>QUANTITATION LIMIT (ug/Kg)</u>
NAPHTHALENE	<67	67
ACENAPHTHYLENE	<67	67
ACENAPHTHENE	<67	67
FLUORENE	<67	67
PHENANTHRENE	<67	67
ANTHRACENE	<67	67
FLUORANTHENE	<130	130
PYRENE	<130	130
BENZO(A)ANTHRACENE	<67	67
CHRYSENE	<67	67
BENZO(B)FLUORANTHENE	<130	130
BENZO(K)FLUORANTHENE	<130	130
BENZO(A)PYRENE	<67	67
INDENO(1,2,3-CD)PYRENE	<100	100
DIBENZ(A,H)ANTHRACENE	<100	100
BENZO(G,H,I)PERYLENE	<100	100

Analytical Method: EPA Method 8270

Analyst: T. Cain  
Verified:   
Date Reported: 7/22/88



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