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Indiana Michigan Power
One Cook Place
Bridgman, MI 49106
IndianaMichiganPower.com

April 30, 2010

AEP-NRC-2010-37
DPR-58/74 Appendix B 5.4.1

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Donald C. Cook Nuclear Plant Units 1 and 2
ANNUAL ENVIRONMENTAL OPERATING REPORT

Enclosed is the Donald C. Cook Nuclear Plant Annual Environmental Operating Report. This report covers the period from January 1, 2009, through December 31, 2009, and was prepared in accordance with the requirements of Environmental Technical Specification 5.4.1.

This letter contains no new or modified regulatory commitments. Should you have any questions, please contact Mr. James M. Petro, Jr., Regulatory Affairs Manager, at (269) 466-2489.

Sincerely,

Lawrence J. Weber
Site Vice President

RSP/jen

Enclosure: Donald C. Cook Nuclear Plant Annual Environmental Operating Report

c: T. A. Beltz, NRC Washington, DC
J. T. King, MPSC, w/o enclosure
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IE25
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ENCLOSURE TO AEP-NRC-2010-37

ANNUAL ENVIRONMENTAL OPERATING REPORT

Donald C. Cook Nuclear Plant Units 1 & 2

Annual Environmental Operating Report

January 1 2009, through
December 31, 2009

Indiana Michigan Power Company
Bridgman, Michigan

Docket Nos. 50-315 & 50-316

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I. INTRODUCTION

Technical Specifications Appendix B, Part II, Section 5.4.1, requires that an Annual Environmental Operating Report be produced and include summaries and analyses of the results of the environmental protection activities required by Section 4.2 of the Environmental Protection Plan for the report period. The Annual Environmental Operating Report shall include a comparison with preoperational studies, operational controls (as appropriate), previous non-radiological environmental monitoring reports, and an assessment of the observed impacts of the plant operation on the environment.

This report serves to fulfill these requirements and represents the Annual Environmental Operating Report for Units 1 and 2 of the Donald C. Cook Nuclear Plant (CNP) for the operating period from January 1, 2009, through December 31, 2009.

The following table summarizes the pertinent data concerning CNP's operation during the period from January 1, 2009, through December 31, 2009.

Parameter	**Unit 1**	**Unit 2**
Gross Electrical Generation (megawatt hours)	273,792	8,317,992
Unit Service Factor (%)	3.30	84.9
Unit Capacity Factor – Maximum Dependable Capacity Net (%)	2.92	85.5

II. CHANGES TO THE ENVIRONMENTAL TECHNICAL SPECIFICATIONS

There were no changes to Environmental Technical Specifications in 2009.

III. NON-RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

A. Non-Routine Reports

A summary of the 2009 non-routine events is located in Appendix I of this Report. No long-term, adverse environmental effects were noted.

B. Environmental Protection Plan

There were no instances of noncompliance with the Environmental Protection Plan in 2009.

C. Plant Design and Operation

During 2009, there were no changes in station design, operations, tests, or experiments that involved a potentially significant unreviewed environmental issue. There were no environmental evaluations performed during the reporting period.

D. Environmental Monitoring – Herbicide Application

Technical Specification Appendix B, Part II Section 4.2, requires the use of herbicides to conform to the approved use of selected herbicides as registered by the EPA and approved by State authorities. There were no preoperational herbicide studies to which comparisons could be made. Herbicide applications are managed by plant procedure PMP-2160-HER-001, Guidelines for the Application of Approved Herbicides.

A summary of the 2009 herbicide application is contained in Appendix II of this report. Based on observations, there were no negative impacts or evidence of trends toward irreversible change to the environment as a result of the herbicide applications. Based on our review of application records and field observations, the applications conformed to Environmental Protection Agency and State requirements for the approved use of herbicide.

E. Mollusc Biofouling Monitoring Program

Macrofouling monitoring and control activities during 2009 are discussed in Appendix III of this report.

F. NPDES Applications

Groundwater

MI DEQ issued a draft for comment on CNP's Groundwater Discharge Permit GW1810102 on October 16, 2009. The Plant responded with comments in a letter on October 28, 2009. The new Groundwater Permit was issued by the MI DEQ on December 15, 2009 (received at the plant on January 15, 2010) to take effect on January 1, 2010. The New Groundwater Permit was submitted to the NRC on January 29, 2010 via AEP-NRC-2010-10.

Surface Water

On September 30, 2009, the Michigan Department of Environmental Quality issued renewed National Pollutant Discharge Elimination System (NPDES) permit number MI0005827 to Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2. The permit took effect on January 1, 2010 and supersedes the NPDES permit number MI0005827, which had an expiration date of October 1, 2008. The new NPDES permit was submitted to the NRC on October 29, 2009 via AEP-NRC-2009-77.

Copies of the above documents are included in Appendix IV of this report.

G. Special Reports

On June 26, 2009, a report was sent to the Michigan Department of Environmental Quality (MI DEQ) in follow-up to questions posed by the state toxicologist at a meeting with company and vendor representatives on November 20, 2008. The Plant had previously evaluated the product, Mexel, in a pilot study "Mexel Efficiency Study, D. C. Cook Nuclear Plant, Bridgman, Michigan, February 2008" (2008 Annual Environmental Operating Report) and found it effective in the control of zebra mussels. The plant was requesting permission to use the product in a full-scale application at the plant. The questions posed by the state toxicologist were on Mexel demand and degradation within the plant and the mixing zone. The questions were answered in a report sent to the MI DEQ titled "Explanation of the Need for and Rationale for a Mixing Zone Defined as the edge of the 1 ft/s Isopleth". The report concluded that when the product is applied at 4 mg/l for 40 minutes per day, it would be effective in controlling zebra mussels and the discharge would not be harmful to aquatic life assuming a 4:1 mixing zone at the 1 ft/sec velocity isopleth in the discharge plume. On August 3, 2009 the Plant received approval to apply Mexel at 4 mg/l for 40 minutes per day on a full scale basis. A copy of this approval letter is included with this report.

Copies of the June 26, 2009 and August 3, 2009 reports are included in Appendix V of this report.

APPENDIX I

NON-ROUTINE REPORTS

2009

2009 Non-Routine Reports

April 20, 2009 – Notice was made to the MI DEQ retracting a previous notice made to the MI DEQ on May 20, 2008 regarding exceeding the maximum daily concentration of 100 mg/l for total suspended solids for Outfall 00H, Turbine Room Sump Emergency Overflow. A review of the data and Part II, Section A, of CNP's NPDES permit determined that the daily concentration of total suspended solids was 95.3 mg/l and did not exceed 100 mg/l as originally reported in our written notification dated May 20, 2008.

August 3, 2009 – Notice was made to the MI DEQ that on July 29, 2009, at 1230 hours, a plume was observed from Outfall 001A. The plume was approximately 300' x 300' in size in Lake Michigan. The turbidity diminished over time and disappeared by 1430 hours the same day.

The plume was the result of starting the Unit 1 circulating water (CW) system. The system had not been operated since April 2009. Sand had accumulated in the tunnels due to natural lake action, and when the Unit 1 CW pump was placed in service, the sand was discharged to Lake Michigan.

Due to the nature of the CW system, there is very little that can be done to reduce this type of turbidity. The event lasted for approximately two hours, and there was minimal environmental impact from the plume.

November 2, 2009 – Notice was made to the MI DEQ that for the weeks ending October 10 and October 24, 2009, Cook Nuclear Plant (CNP) failed to obtain a Reverse Osmosis System Reject (Outfall 00G) weekly sample for Total Suspended Solids during a discharge period, defined as Sunday through Saturday in CNP's NPDES permit.

Approximately 0.186 million gallons of reject water was discharged between Sunday October 4 and Monday October 5, 2009, prior to the system being shut down for maintenance early on Monday October 5, 2009. Although Monday is the normally scheduled sample day, the system had been taken out of service prior to obtaining a sample for that discharge period.

Approximately 0.231 million gallons of reject water was discharged between Friday October 23 and Saturday October 24, during startup of the system following maintenance. Reverse Osmosis System Reject flow Total Suspended Solids was <4.0 parts per million from samples taken on Sunday, October 25, 2009, which was not the normally scheduled sample day. CNP's procedure defines the discharge period as Monday through Sunday; therefore, it was considered that the Sunday sample would satisfy the requirements for the week of October 19, 2009. The delay in sampling does not pose a threat to the environment, public health, or safety. CNP has identified a procedure revision which will provide reasonable assurance this sample requirement will be met in the future. This event was entered into CNP's corrective action system.

December 1, 2009 - A letter was sent to provide documentation of a phone conversation between the plant Environmental Manager and the MI DEQ District Supervisor regarding Outfall 001A turbidity. On July 29, 2009, at 1230 hours, a plume was observed from Outfall 001A. The MI DEQ was notified of this condition in a letter dated August 3, 2009 (see above). The source of the plume was from starting up the Unit 1 Circulating Water System. The plant is working on strategies to prevent recurrence. Upon discussion it was concluded that accumulated sand and silt is not considered "unnatural turbidity" and that a courtesy notification to the MI DEQ office prior to equipment startup would suffice. This type of discharge would not require written notification of the narrative standard from the Plant's NPDES permit, and no further actions would be required.

APPENDIX II

HERBICIDE APPLICATION REPORT

2009

INDIANA MICHIGAN POWER®
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Date April 15, 2010

Subject **2009 Herbicide Spray Report - Cook Nuclear Plant**

From Richard Hedgepeth

To Jon Harner, Environmental Manager

The following herbicides were applied per manufacturers' direction by certified Michigan licensed applicators on Cook Nuclear Plant property during 2009:

Via Contractor	Via AEP Personnel
Landmark/Dupont	Round–Up Pro/Monsanto
Karmex/Dupont(Griffin)	Speed Zone/PBI Gordon
Razor/Riverdal	Treflan 500/Knox
Krovar T/Dupont	
Tordon 101/Dow	
Tordon K/Dow	
Garlon 3A/Dow	
Escort XP/Dupont	
Spret/Helena	
Invade 90/Townsend	
Trail Lite/Townsend	
Mistrol/Townsend	

Townsend Tree Service:
Townsend Tree service; a Michigan licensed herbicide applicator on contract to AEP Energy Delivery and Customer Relations performed the applications (Lance C Sherrick).

On July 22 and 23, 2009 a mixture of Karmex, Landmark, Krovar T, Razor, Invade 90, Trail Lite and Mistrol were used for total plant control in the 69 KV, the 345 KV and the 765 KV switch yards. A total of 168 lbs of Karmex, 42 oz. of Landmark, 42 lbs. of Krovar T, 31.5 qt. of Razor, 672 oz. of Invade 90, 168 oz. of Trail Lite and 168 oz. Mistrol were used for the application and spread over about 21 acres in accordance with the manufacturers' labels. All drainage ditches, storm sewers and any other bodies of water were identified within the application areas. These areas were checked for water and the spray pattern was decreased in these areas.

Product Name	Quantity Used		Quantity Used/Acre		Quantity Allowed/Acre	
Karmex	168	lbs	8.0	lbs	5-8	lbs
Landmark	42	oz	2.0	oz	4.5	oz
Krovar T	42	lbs	2.0	lbs	5-7	lbs
Razor	31.5	qt	1.5	qt	2-10	qt
Invade 90	672	oz	32	oz	64	oz
Trail Lite	168	oz	8.0	oz	8.0	oz
Mistrol	168	oz	8.0	oz	12	oz

American Tree:

American Tree; a Michigan licensed herbicide applicator on contract to the Cook Plant Engineering Systems and Electrical Department performed the applications (David Jones).

On August 31 and September 1, of 2009, a mixture of Tordon 101, Garlon 3A, Escort XP, Spret and Tordon K, were used for total plant control in the following locations:

- The Owner Controlled Area (OCA) east of the 345 KV yard, along the 345 KV power lines to Thorton Rd.

- Under the 345 KV lines east of the 345 switch yard near the Kelly Buildings.

A total of 14 qt. of Tordon 101, 14 qt. Garlon 3A, 7 oz. of Escort XP, 14 qt. of Spret and 4 qt. of Tordon K were used for the application and spread over 30 acres in accordance with the manufacturers' labels. All drainage ditches, storm sewers or any other bodies of water were identified within the application area. These areas were checked for water and the spray pattern was decreased in these areas.
Equipment failure greatly reduced the scope of this application project and limited application to only 30 acres.

Product Name	Quantity Used		Quantity Used/Acre		Quantity Allowed/Acre	
Tordon 101	14	qt	0.5	qt	2	qt
Garlon 3A	14	qt	0.5	qt	2	qt
Escort XP	7	oz	0.2	oz	1	oz
Spret	14	qt	0.5	qt	2	qt
Tordon K	4	qt	0.1	qt	1	qt

Maintenance Building and Grounds:
Round-Up Pro, Speed Zone and Treflan 500 was mixed with water in a sprayer and applied to Owner Controlled Areas by licensed applicators from the Maintenance Building and Grounds crew (Todd Brooks).

During the growing season of 2009, 19-19-19 Fertilizer was applied to all grass and lawn areas 13.9 acres) on plant property by Facilities/Maintenance.

Weeds were sprayed in all gravel areas East and South of the Protected Area (no Refueling Water Storage Tank Yards), inside the Protected Area on gravel areas around lawn and fence, North Access, Sidewalks, roadways and ½ microwave zone, on the railroad tracks & gravel areas from North Access to Training Center, the Railroad tracks & gravel areas from the Training Center to Red Arrow Highway, and the gravel area along the Technical Support Operations Center parking lots (length of building x 10' wide) and road way. A total of 6.0 oz of Round-Up Pro were used for spraying in 2009. According to the product label, spraying should contain a maximum of 2 % solution and a total permitted concentration of 1 oz per 15,000 sq. ft. A total of 6 gallons of solution was used to treat about 2 acres (total of 6 gallons of 1 % mixed solution used).

On May 11th and 12th of 2009, Speed Zone was applied to all the grass/ lawn areas of the Protected and Owner Controlled areas of the Plant. According to the product label, spraying should contain a 1 % solution and a total permitted concentration of 1 gallon per 1,000 sq. ft. A total of 220 gallons of solution was used to treat 6.0 acres (total of 220 gallons of 1 % mixed solution used).

On May 13th 2009, Treflan 500 was applied to all flower beds, under mulch, North, East and South of the Training Center, East North and West of the visitor center and East and West of the Red Arrow Highway main entrance. According to the product label, the Treflan 500 granules were applied at a rate of 1.8 lbs. per 1000 sq. ft. A total of 80 lbs of product was used to treat approximately 1.5 acres.

The following table details the application rates used for weed control in the grass and garden beds compared to the allowable application rates.

Product Name	Quantity Used	Concentration Used	Concentration Allowed
Round-Up Pro	6.0 oz	1.0 % solution – 6.0 oz of solution for 6 gallons used.	10.6 qt/acre per year
Speed Zone	2.5 gal	1.0% solution – 2.5 gallons of solution for 220 gallons used.	1 gal. per 1000 sq. ft., 6 acres treated, 262,360 sq. ft.
Treflan 500	80 lbs.	Granules applied at a rate of 1.8 lbs. per 1000 sq. ft.	1.8 lbs. 1000 sq. ft., 1.5 acres treated, 65, 340 sq. ft.

Mortality Inspection:
The 2009 herbicide survey was performed per PMP-2160-HER-001 on October 26, 29, 30 and November 2, 2009. There was no evidence of spillage, overspray or excessive application; no adverse environmental effects were noted during the inspection.

Herbicides were applied in accordance with manufacturer's label instructions and Federal and State requirements by Michigan-licensed applicators. Preparation and application descriptions were documented on PMP-2160-HER-001 Data Sheet 1, Herbicide Request. Herbicides applied by Townsend Tree Service were Riverdale Razor, DuPont Karmex DF, Landmark II MP, Krovar I DF, Alenza 90, Invade 90, Mist-Trol 336 and Trail Lite 264. American Tree Company applied Dow Turdon 101, Turdon K, Garlon 3A, DuPont Escort XP and Spret. Additionally, Roundup Pro, Treflan 500, and Speed Zone broadleaf herbicide were applied by Sun Technical Services' licensed applicator.

Townsend Tree Service treated the 69 kV, 345 kV and 765 kV SwitchYards; also the loop feed enclosure east of the "blowdown" parking lot.

American Tree Company treated areas under the 345 kV lines eastward from the 345 kV SwitchYard to Thornton Road until equipment failure ended the job.

Sun Technical Services treated the following areas: stone-covered sections and lawns of the Protected Area, flower beds, parking lot perimeters, the Visitor Center and the main plant entrance area by Red Arrow Highway.

The overall effectiveness of the application was good. There is some vegetation growing on the north side of the 69 kV Yard. Also, grasses in the AB EDG fuel oil unloading area, U2 RWST Yard and the stone areas between the U2 Main Transformers.

Summary:
In summary, based upon our review of the application records, manufacturer specifications, material safety data sheets (MSDSs) and observations of the treated areas, the herbicides were applied according to the manufacturer's labeled instructions and according to Federal and State requirements. All personnel performing herbicide applications were licensed by the State of Michigan. A detailed map and application records are filed in accordance with PMP-2160-HER-001, Guidelines for the Application of Approved Herbicides. No signs of over spray or spillage were observed. No adverse environmental effects occurred.

APPENDIX III

MOLLUSC BIOFOULING MONITORING PROGRAM REPORT

2009

Mollusc Biofouling Monitoring Program 2009

Performed at Donald C. Cook Nuclear Plant

Performed and Submitted
By
Cook Plant Environmental

Prepared for:

American Electric Power
Donald C. Cook Nuclear Plant
One Cook Place
Bridgman, Michigan

MOLLUSC BIOFOULING MONITORING PROGRAM
2009

April 2010

Cook Nuclear Plant
Environmental Section

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List of Tables and Figures

Executive Summary

Biofouling studies have been conducted at the Donald C. Cook Nuclear Plant since 1983. In 1991, monitoring of zebra mussels in the circulating water, essential service water (ESW), nonessential service water (NESW), and miscellaneous sealing and cooling water (MSCW) systems was added to the program. The objectives of this monitoring program are to detect the presence and determine the density of zebra mussel veligers in the Circulating Water System and postveliger settlement and growth rate in the forebay and service water systems, and to determine the effectiveness of oxidizing and non-oxidizing biocides in the plant systems by comparing densities and sizes of settled zebra mussels when applicable.

Veligers were present in the forebay from 23 April through 3 December 2009. Peak densities occurred on 25 June, 2 July, and 9 July 2009, with 9 July 2009, being the largest peak (733,500 veligers/m^3) during the 2009 sampling season. Historical data supports that zebra mussel density is independent of the volume of water entering the plant, as the concentration of veligers in the water remains the same regardless of the flow rate through the plant. Historical data collected for the past eighteen years suggests that the zebra mussel population is highly variable and future populations of zebra mussels prove difficult to accurately predict.

Cumulative settlement was monitored in the forebay by using a six-inch PVC pipe as an artificial substrate. As in 2008, the time period of collection was made to more accurately coincide with the annual fall intake crib cleaning to estimate the size and density of mussels the divers might encounter at the time of cleaning. The PVC pipe was deployed on 4 December 2008 and was retrieved on 12 November 2009. The settlement density and average size of postveligers for the 12-month period was

703,701 individuals/m^2 and 2,120 µm (2.1 mm). As a comparison, the substrate sample collected during the 2008 sampling had a density of 272,026 individuals/m^2 and an average size of 2,526 µm (2.5 mm). Higher numbers of individuals encountered during the 2009 sampling could possibly be attributed to much higher than average veliger numbers during early July 2009.

Service Water Systems and Miscellaneous Sealing and Cooling Water

The return sides (after systems' use) of the ESW and NESW systems and the MSCW system were monitored in the 2009 Mollusc Biofouling Monitoring Program. The results indicate that the chlorination system was effective in preventing growth and prolonged settlement of postveligers in the service water systems. The results showed despite ESW pump chlorine sparger design deficiencies, or when the system was taken out of service for short periods of time for system maintenance, or when system total residual chlorine (TRC) levels fell below their target band of 0.02-0.6 ppm, settlement control was quickly re-established.

Biocide Treatment

There were no biocide treatments in 2009.

Chapter 1

Introduction

1.1 Past History

American Electric Power Company (AEP) has been conducting zebra mussel monitoring studies at the Donald C. Cook Nuclear Plant since 1991. The purpose of these studies is to monitor zebra mussel veliger and postveliger settlement densities in the Circulating Water, Essential Service Water (ESW), Nonessential Service Water (NESW), and Miscellaneous Sealing and Cooling Water (MSCW) systems to help determine the effectiveness of the zebra mussel control program.

Numerous private consulting firms had been involved in the past (1991-2004) to aid in the performance and analysis of the program. However, in 2004 the program was made the responsibility of the Donald C. Cook Plant's Environmental staff who conducted the monitoring programs designed to detect the timing of spawning and settling of zebra mussels at the Cook Nuclear Plant. The program also determines densities for: 1) whole water samples for planktonic veligers; and 2) artificial substrates set within the ESW, NESW, and MSCW systems for cumulative postveliger settlement. In the Circulating Water System, a section of PVC piping is utilized as an artificial substrate to determine the cumulative settlement in the intake forebay.

1.2 Objectives

Specific objectives for the 2009 Mollusc Biofouling Monitoring Program were as follows:

- Conduct whole-water sampling of the Circulating Water System weekly (July-September), bimonthly (May, June, October & November), and monthly (April and December) to determine the presence and density of larval zebra mussels.

- Deploy artificial substrates (microscope slides in test tube racks) in the service water systems to determine cumulative settlement of postveligers. Collect samples monthly from May through December.

- Deploy a PVC piping section, also as an artificial substrate, in the intake forebay to determine cumulative settlement for approximately one year.

Chapter 2

Methods

2.1 Whole-Water Sampling

Whole-water sampling of the Circulating Water System was conducted from 23 April to 3 December 2009 (Table 2-1). Samples were collected from mid-depth in the intake forebay by pumping lake water through an in-line flowmeter into a plankton net. The sampling location was consistent with that of previous studies. Two replicates (2,000 liters each) were collected during each sampling date.

A Myers Model 2JF-51-8 pump or equivalent was connected to an in-line flowmeter assembly (Signet Model #P58640) and pumped water into a plankton net for approximately one hour. To minimize organism abrasion, measured flow was directed into a No. 20 plankton net that was suspended in a partially filled 55-gallon plastic barrel.

Samples were transferred to a one-liter plastic container by rinsing the plankton net with filtered Circulating Water System water. Filtered water was added to the container to ensure that a full liter was analyzed. The samples were stored under refrigeration and transferred to PhycoTech, Inc. within 24 hours of sampling for analysis.

Samples were mixed thoroughly then transferred to a calibrated 1ml Sedgewick-Rafter cell for counting. An Olympus BX51 research-grade compound microscope with Nemarski optics (10-100x) equipped with cross-polarizing filters was used to visually identify and enumerate individual viable veligers.

TABLE 2-1

SAMPLING SCHEDULE FOR ZEBRA MUSSEL MONITORING AT THE D.C. COOK NUCLEAR PLANT IN 2009

Date		Whole Water	Artificial Substrates
April	23	X	
	30		(1)
May	7	X	
	21	X	X
June	4	X	
	25	X	X
July	2	X	
	9	X	
	16	X	X
	23	X	
	30	X	
August	5	X	
	13	X	X
	19	X	
	27	X	
September	3	X	
	10	X	X
	17	X	
	24	X	
October	8	X	X
	22	X	
November	5	X	X
	12		(2)
	19	X	
December	3	X	X (3)

(1). Deploy slide racks.
(2). Retrieve PVC pipe section. Read & clean.
(3). Re-deploy PVC pipe section.

Ten aliquots were counted and the average was extrapolated to determine the number of individuals per cubic meter. The density was calculated as follows:

Density (#/m^3)=(average #*DF)/0.001L*1L/2000L*1000L/m^3

DF- Dilution Factor

This process was repeated for a second replicate and the mean of the two values was calculated to yield a final density value. Size measurements were recorded for up to 50 organisms from each sample. Veliger size was measured using an ocular micrometer that was calibrated to a stage micrometer.

2.2 Artificial Substrates

To determine zebra mussel settlement in the Circulating Water, a section of PVC pipe was deployed in the intake forebay, upstream of the trash racks. Bio-box side-stream samplers were installed on the return sides of both service water systems (ESW and NESW) and on the Miscellaneous Sealing and Cooling Water System (MSCW) to determine settlement in these systems. The side-stream samplers consisted of modified test-tube racks designed to hold microscope slides and placed in bio-boxes for cumulative sampling.

2.2.1 Intake Forebay

On 12 November 2009 the PVC pipe, utilized as an artificial substrate, was retrieved from the forebay. The pipe, which had been installed on 4 December 2008,

measured 6 inches in length and had an inside diameter of 3.5 inches. The pipe had been cut in half lengthwise, rejoined using hose clamps, attached to a rope weighted by a stainless steel pipe section, and suspended at mid-depth in the intake forebay. The PVC sampler was analyzed for densities and shell sizes by analyzing scrapings from two separate one-inch square sections of the PVC sampler. The PVC sampler was designed to provide information on zebra mussel accumulated infestation and sizes occurring over a 1-year period.

2.2.2 Service Water Systems

Side-stream bio-boxes were placed on the return side of the service water systems (1 ESW, 2 ESW, NESW) and the Miscellaneous Sealing and Cooling (MSCW) Water System. Each bio-box contained two modified test tube racks containing a total of 80 microscope slides. The racks held the slides above the bio-box base that allowed silt and sediment to fall out before they could affect the slide settlement. The bio-boxes were covered with a plant-approved fireproof fabric to limit light exposure. Plant personnel inspected the bio-boxes to ensure that flow was constant and unimpeded. Adjustments were made when necessary. Ten slides from each location were collected monthly and were analyzed for postveliger density and shell size.

2.2.3 Artificial Substrate Cumulative Sample Analysis

An Olympus BX51 research-grade compound microscope with Nemarski optics (10-100x) equipped with cross-polarizing filters was used to visually identify and enumerate individual viable veligers.

Slide preparation consisted of scraping clean one side of the slide allowing for direct placement on the microscope stage. The remaining postveligers could then be directly counted from the other side of the slide. When the 25mm x 75mm slide surfaces became heavily infested, the following sub-sampling technique was used:

- Growth on slides was divided into either 2 or 4 equal subsections (depending on density of growth) and then a subsection was counted and the findings were extrapolated to give a number for the whole slide. Counts were then proportionally extrapolated to one square meter.

Settlement rates were calculated by taking the average number of mussels from the ten slides and multiplying this value by 533.33 to obtain the density of zebra mussels per square meter. (One postveliger/microscope slide equals 533.33 post veligers per square meter.) [(1,000,000 mm^2 /25mm x 75mm = 1875mm^2 surface area of slide)]

Greatest Axial Linear Dimension (GALD) shell measurements were taken for up to 50 random individuals to obtain maximum, minimum and mean sizes. Dimensions were measured using an ocular micrometer calibrated to a stage micrometer at 100x.

Chapter 3

Results and Discussion

The zebra mussel monitoring system provided representative numbers for whole-water veliger and artificial substrate postveliger settlement densities. The whole-water sampling for free-swimming veligers coupled with monitoring postveliger settlement on artificial substrates provided sample results that could be compared with previous years' data.

Appendix Table 1 shows the chlorination values for the ESW and NESW systems. A 0.02-0.6 ppm total residual chlorine (TRC) was the target band for the control of zebra mussel settlement. Chlorination levels were relatively consistent, with the exception of U-1 ESW [Cl2] East throughout August, late September and the majority of November 2009. Inconsistencies were also observed in U-2 ESW [Cl2] West in mid-August, late September and throughout November 2009 (Appendix Table 1). The MSCW system, which was cross-connected to the NESW system, was chlorinated on all of the dates that the NESW system was chlorinated. Ramifications of sub-target chlorine levels will be discussed further.

3.1 Whole-Water Sampling

Sampling of planktonic veligers in the circulating water system was initiated 23 April 2009 and was completed on 3 December 2009. Results are presented in Table 3-1 and in Figure 3-1. Veligers were present in all samples throughout the monitoring season. Heaviest spawning activity occurred in early to mid-July (733,500 ind./m^3) followed by the period from late-June to early-July (51,750 ind./m^3 and 36,900 ind./m^3). The overall

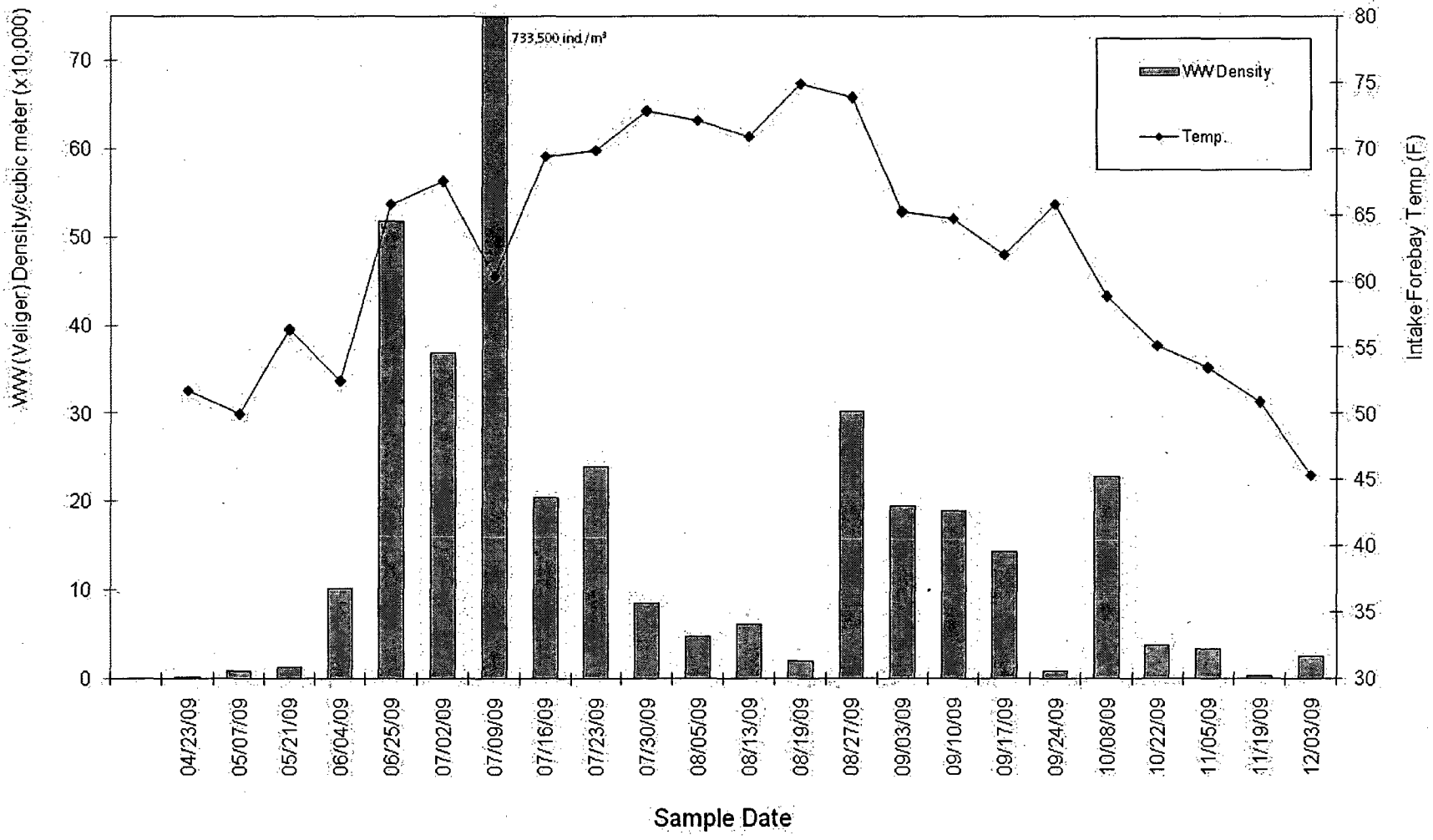
peak number of individual veligers occurred on 9 July (733,500 ind./m^3). This coincided with the highest numbers of the 2009 season which ran from 25 June through to 23 July and was closer to the timing of other peak events in recent history. The total number of individuals recorded was more than double that of 2008 (335,000 ind./m^3), and nearly double that of recent historical highs recorded in 2003 and 2005 of 450,000 ind./m^3 and 455,000 ind./m^3, respectively.

TABLE 3-1

Whole-Water Sampling Program Zebra Mussel Veligers Per Cubic Meter, Veliger Size Range, and Mean Veliger Size (*u*m)

Date	Density (No./m^3)	Size Range (*u*m)	Mean Size (*u*m)
4/23/09	125	100	173
5/07/09	800	110-170	148
5/21/09	1225	110-160	132
6/04/09	10075	110-280	138
6/25/09	51750	130-280	158
7/02/09	36900	130-300	150
7/09/09	733500	140-350	209
7/16/09	20350	140-350	218
7/23/09	23850	130-310	192
7/30/09	8400	140-320	192
8/05/09	4700	130-310	160
8/13/09	6700	130-400	177
8/19/09	1800	150-320	220
8/27/09	36500	120-300	167
9/03/09	24800	130-240	172
9/10/09	22600	140-250	175
9/17/09	18200	140-320	195
9/24/09	900	170-250	210
10/08/09	26000	130-300	150
10/22/09	3600	120-350	170
11/05/09	4300	120-250	164
11/19/09	200	120-240	180
12/03/09	2450	140-380	248

Fig 3-1
2009 D.C. Cook Plant- Whole-Water Zebra Mussel Veliger Density and Water Column Temperature in Intake Forebay



Whole water veliger densities declined dramatically following their peak on 9 July 2009. Water temperatures remained constant, gradually rising, with no abrupt changes throughout the year with a season high of 74.9 degrees on 19 August 2009. Temperatures declined predictably at this point to a recorded season low of 45.3 degrees on 3 December 2009. Veligers were present in the whole water samples through the December sampling further reinforcing the need for chlorination in service water systems throughout the end of the year.

Historical whole-water densities have shown a rising trend in the numbers of veligers documented in the November/ December sampling events. Records during 1993 through 1995 for November and December showed a trend with sampling events reaching less than 1,000 ind. /m^3, however, data from 2007-2009 shows at least one November/December sampling event with veliger numbers exceeding 1,000 ind. /m^3 individuals per event. Veliger numbers as a whole have increased in the period from 2007 – 2009. Although many parameters may be responsible for this trend, a noticeable factor in recent history is that lake temperatures are remaining warmer into the fall season than in the past, therefore allowing for spawning to occur late into the fall. Another potential contributing factor is an increase in the overall numbers of zebra mussels occurring in Lake Michigan, and potential changes in food supply as productivity and planktivorous fish populations fluctuate. Because of the late fall spawning in recent years, chlorination needs to continue into the late fall months to prevent mussel settlement and growth in plant service water systems. Let it be noted that higher peak numbers could potentially be partially attributed to the introduction of Quagga mussels into Lake Michigan. Quagga mussel veligers are indistinguishable from those of zebra mussels and a combination of the two may be responsible for elevated numbers of veligers especially during periods of lower water temperatures.

The 2003 report concluded that yearly results in peak abundances make it difficult to predict when the peak abundance will occur each season other than estimating some time between July and October. Elevated levels in late June 2009 (51,750 ind. /m^3) have justified extending the peak season to include the month of June where high levels of veligers could possibly be encountered.

In summary, zebra mussel veligers were present in the water column on all sampling dates from 23 April through 3 December. Spawning commenced in early May and continued through the end of the sampling program. Peak veliger densities occurred at a maximum level of 733,500 ind./m^3 on 9 July 2009 with the second highest recorded level occurring on 25 June 2009 (51,750 ind. /m^3).

3.2 Artificial Substrate Sampling, Biocide Treatment, and Mechanical Cleaning

3.2.1 Circulating Water System Artificial Substrate Sampling

Cumulative settlement was monitored in the intake forebay using a six-inch PVC pipe with a 3.5 inch inside diameter. The PVC pipe was set in the forebay on 4 December 2008 and retrieved on 12 November 2009 to determine the average density and size range for 12 months. The density on the substrate was 703,701 ind./m^2. Individuals ranged from 120 µm-10,100 µm (0.12 mm –10.1 mm) and the mean size of fifty randomly selected individuals was 2,100 µm (2.1 mm). As in 2008, the time period of collection was designed to coincide with the annual fall intake crib cleaning to estimate the size and density of mussels the divers might encounter at the time of cleaning. For comparison, the sample substrate that was pulled in 2008 had a density of 272,026 individuals/m^2 and an average

size of 2,526 µm (2.5 mm). An explanation for this difference could be attributed to a large peak veliger density (733,500 ind./m^3) occurring in early July of 2009 that was more than twice the peak veliger density occurring in the fall of 2008. Smaller shell size and their ability to stack once a base layer of mussels is in place, could also account for increased numbers over 2008 results.

3.2.2 Service Water Systems and Miscellaneous Sealing and Cooling Water System Artificial Substrate Sampling

The return sides (after systems' use) of the ESW and NESW systems and the MSCW system were monitored in the 2009 Mollusc Biofouling Monitoring Program. Chlorine is injected beneath each ESW pump suction. The ESW trains are typically cross-tied downstream of the chlorine injection point so that both ESW trains are served. A separate chlorine injection point, which is in the suction header, serves the NESW system and subsequently the MSCW system.

The plant's Zebra Mussel Monitoring & Control Program calls for continuous chlorination at 0.02-0.6 ppm total residual chlorine (TRC) of the service water and MSCW systems from May through November to correspond with the zebra mussel spawning season.

Cumulative settlement sampling and analysis was performed on a monthly basis in 2009. Artificial substrate slides were installed on 30 April and ten slides per month were examined and not replaced. Results are shown in Table 3-2 and Figure 3-2. Chlorination levels remained relatively consistent throughout the season with three noticeable exceptions. Levels dropped significantly and fluctuated in both U-1 ESW [Cl2]

East and U-2 ESW [Cl2] West through most of August. Levels in the same two systems were low as well in late October. Chlorine levels were once again below target levels for these two systems through much of November. Peak levels of veligers did not necessarily coincide with low chlorine levels. Chlorination was suspended from 29 September to 2 October when the plant experienced a large amount of lake debris influx from stormy lake conditions. This necessitated taking the Unit 1 circulating water pumps off line so that the debris could be removed from the traveling screens. The pumps were secured, so that chlorine residuals could remain in compliance with the Plant's discharge permit. This interruption in chlorination most likely caused the large spike seen on the U-2 ESW slides on 8 October when counts rose to 9,546 postveligers/m^2.

As mentioned in the 2008 report, the variability in ESW TRC was attributable to inadequacies in the liquid sodium hypochlorite injection design. The chlorine feed diffusers beneath the ESW pump bells were originally designed to feed gaseous chlorine. The permanent liquid sodium hypochlorite feed system installed in 2005 was tied into these original gaseous chlorine diffusers. It is believed that varying currents in the Plant's intake forebay affect the delivery of liquid sodium hypochlorite from the diffusers located below the ESW pump bells. This is most apparent when hypochlorite delivery is aligned to the west ESW pumps that are closer to the flow patterns in the intake forebay. The plant is in the process of raising the ESW pump bell heights to minimize sediment entrainment, and also plumbing the hypochlorite feed lines directly into the pump bells.

An explanation for low chlorine levels in the Unit 1 East ESW Pump header could be due to a missing end-plug in the chlorine sparger that runs beneath the Unit 1 East ESW Pump bell. This was discovered in a diving inspection of the Unit 1 ESW pump bay during the Unit 1 C22 Refueling Outage. This finding was documented in AR 2010-0656. This was

resolved during the 2010 Unit 1 C23 Refueling Outage when on 15 March 2010 the divers inserted an expandable plug in the end of the chlorine sparger per Temporary Modification 1- TM-10-13-R0.

The Unit 1 West ESW Pump bell height was raised with new chlorine plumbing installed on 3 August 2009 on Engineering Change EC-49340. The Unit 2 West ESW Pump bell height was raised with new chlorine plumbing installed on 27 January 2010 (EC-49339). The Unit 1 East (EC-49341) and Unit 2 East (EC-48566) ESW Pump bells remain to be modified. These engineering changes should greatly improve chlorine delivery to the ESW system.

In summary, data indicated that peak levels were noted on 16 July 2009 for all locations. Chlorine levels were within target levels, however, these high numbers were following the peak whole water levels, (733,500) on 9 July 2009. It is likely that the unusually high numbers of veligers present in the whole water system raised the numbers of veligers that settled out in subsequent weeks. It should be noted that the August sampling event had far fewer numbers than those immediately following the season high peak on 9 July 2009. Low chlorine levels may have been responsible for elevated levels of veligers during the 13 August sampling in ESW-1. Chlorine levels had been below target ranges leading up to this sampling with numbers only elevated in ESW- 1 and the remaining sampling locations greatly reduced from the previous sampling event. Chlorination has proven effective in the historical data as well as in the 2008 sampling event. It appears that insufficient chlorine may have been present to combat the sheer numbers present during the 9 July 2009 peak, and high numbers in the subsequent weeks may be due to carry-over from the high number of veligers present at that time. As stated earlier, chlorine appears to have a direct correlation on the number of individuals observed in the water systems. When operating

properly the chlorination of system water appears to be an effective mechanism for the control of the zebra mussel veliger.

Table 3-2

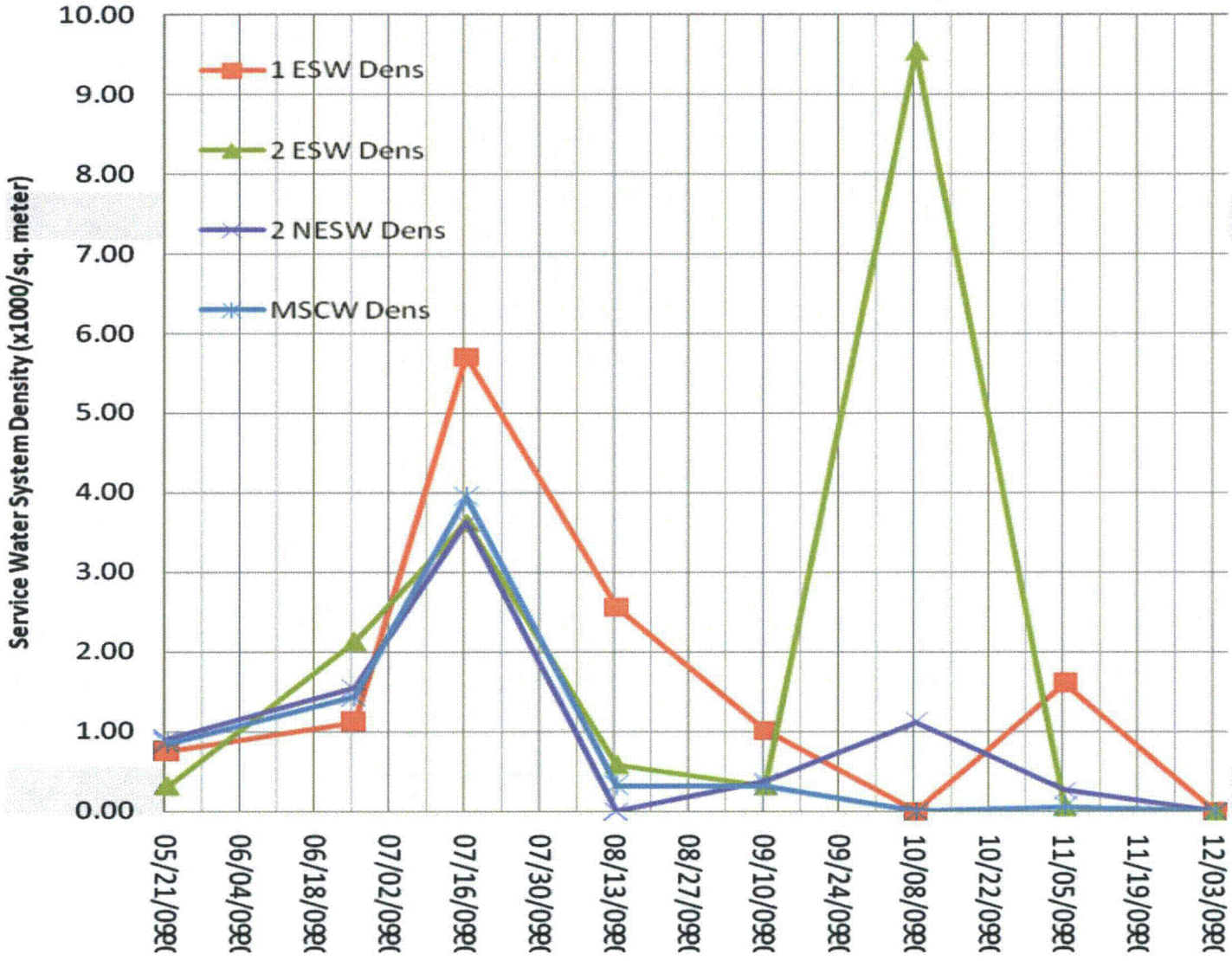
Density, Average Size, and Size Range of Settled Zebra Mussel Postveligers Collected on Cumulative Artificial Substrates Placed in the Forebay, in the Service Water Systems and Miscellaneous Sealing and Cooling Water System in the D.C. Cook Nuclear Plant in 2009.

Cumulative Samples															
	Forebay			NESW			MSCW			1 ESW			2 ESW		
Date	Density (no/m2)	Avg. Size (um)	Range (um)	Density (no/m2)	Avg. Size (um)	Range (um)	Density (no/m2)	Avg. Size (um)	Range (um)	Density (no/m2)	Avg. Size (um)	Range (um)	Density (no/m2)	Avg. Size (um)	Range (um)
5/21/2009	-	-	-	906	132	120-160	853	133	120-160	746	130	110-150	320	130	130-150
6/25/2009	-	-	-	1547	151	100-261	1440	152	100-225	1,120	150	110-232	2,133	126	100-250
7/16/2009	-	-	-	3,626	220	140-350	3,946	215	140-310	5,706	249	140-430	3,626	260	140-420
8/13/2009	-	-	-	0	0	0	320	278	150-400	2,560	254	130-900	587	222	120-310
9/10/2009	-	-	-	373	195	150-240	320	194	140-260	1,013	192	140-300	587	163	140-200
10/8/2009				1,120	427	130-1210	0	0	0	0	0	0	9,546	523	280-1600
11/5/2009	-	-	-	266	748	480-1200	53	400	400	160	213	190-240	53	240	240
11/12/2009	703,701	2100	120-10100	-	-	-	-	-	-	-	-	-	-	-	-
12/3/2009	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0

Fig 3-2

2009 D.C. Cook Plant- Zebra Mussel Postveliger

Cumulative Settlement in the Service Water Systems



3.2.3 Biocide Treatment

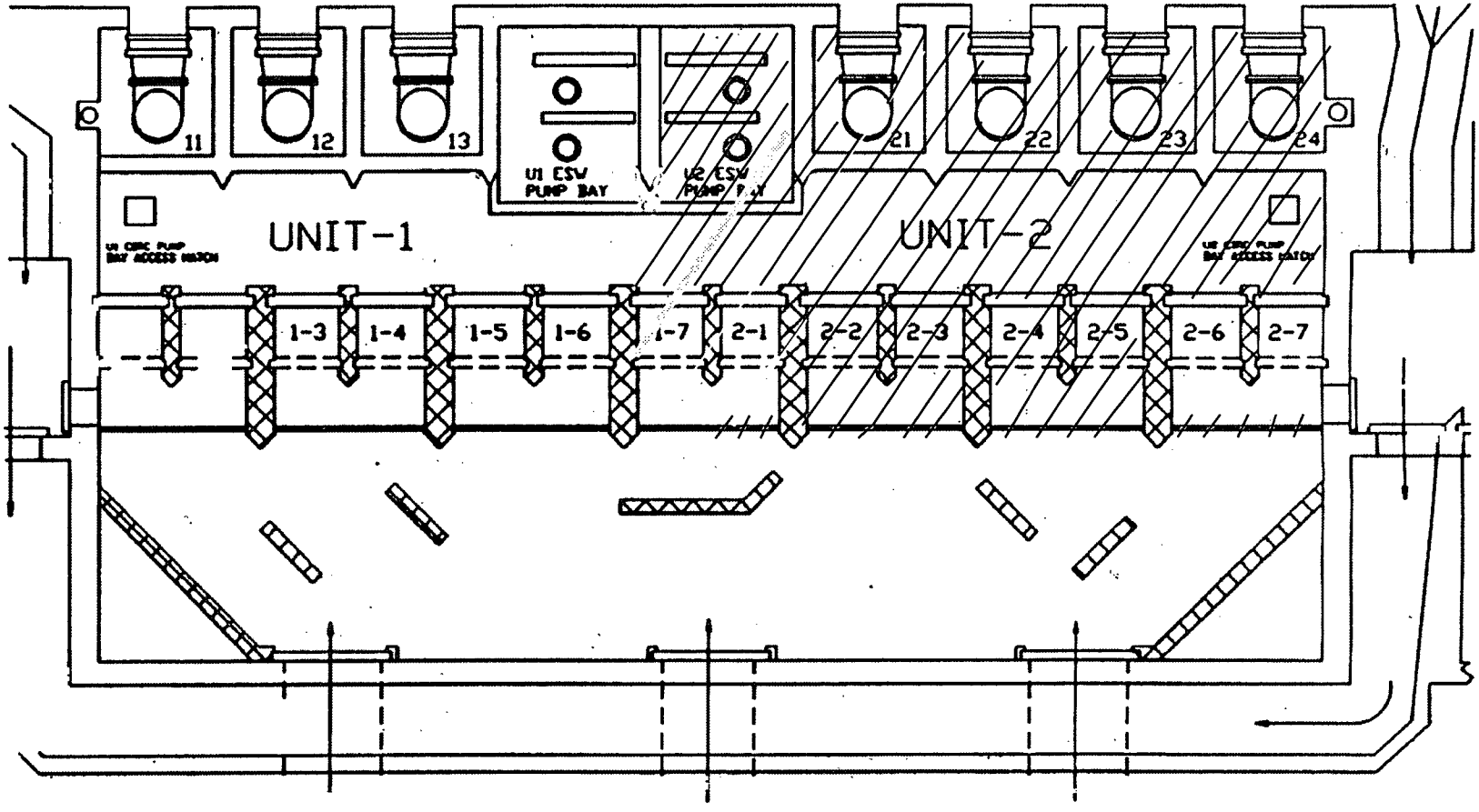
There were no biocide treatments in 2009.

3.2.4 Mechanical Cleaning

During the Unit 2 C18 (March-April) refueling outage, divers were employed to mechanically clean sand, zebra mussels, and debris from the walls and floors of the Unit 2 Circulating Water Intake Forebay and Unit 2 Condenser Inlet Tunnel. The Unit 2 Condenser Inlet Tunnel was cleaned in its entirety. The Unit 2 Intake Forebay was cleaned on the east (pump) side of the traveling screens (Figure 3-3). This included areas of the Unit 2 Circulating Water Pump and Unit 2 ESW Pump bays. The west side (lakeside) of traveling screen bays 2-2 and 2-3 and 2-4 and 2-5 were cleaned in their entirety to the trash racks. The trash racks in front of traveling screen bays 2-1 thru 2-7 were cleaned. The area further west of the trash racks extending to the west wall of the intake forebay was not cleaned as well as the west sides of traveling screen bays 1-7 and 2-1, and 2-6 and 2-7 to the trash racks.

In the Fall of 2009, the divers cleaned the intake crib velocity caps, ice guards, and trash racks of zebra mussels to remove the food source that attracts wild ducks to the intake cribs.

Figure 3-3
Screenhouse Intake Forebay



Note: Lined out areas were cleaned during the U2C18 Refueling Outage.

Chapter 4

Summary and Recommendations

4.1 Summary

The 2009 Mollusc Biofouling Monitoring Program was initiated on 23 April and continued through to 3 December 2009. Heaviest spawning activity started in late June and continued through mid-July. The most pronounced spawning peak occurred on 9 July 2009 with numbers peaking at 733,500 ind./m^3. Whole water veliger densities declined to levels less than thirty times that (20,350 ind./m^3) on the subsequent sampling date of 16 July 2009. Levels dropped off significantly throughout the month of August. A slight secondary peak occurred in late August and early September with levels ranging from 30,200 ind./m^3 to 14,250 ind./m^3 spanning a 3-week time period. Veligers were observed through the end of the year 3 December 2009 sampling. The whole water densities show that there are substantial numbers of veligers in the forebay, from early May and through into December, indicating the need for effective and closely monitored chlorination in the service water systems throughout the reproductive season. Based on historical data, veligers have been present in system water from the April sampling through the end of December and it is still difficult to predict when peak abundance levels will occur each season. The 2003 report concluded that yearly results in peak abundances make it difficult to predict when the peak abundance will occur each season other than estimating sometime between July and October, however, with the significant numbers of veligers present in early June 2009, the peak season should be extended to include the entire month of June and possibly the very end of May. Therefore it is recommended that the current chlorination and monitoring program remain in place. Continued whole-water monitoring during the veliger spawning season will detect when these peak abundances occur.

The intake forebay PVC sampler, collected on 12 November 2009, zebra mussel density was 703,701 ind./m^2. Individuals ranged from 120µm-10,100µm (0.120 mm – 10.10 mm) and the mean size of fifty randomly selected individuals was 2,100µm *(2.1* mm). As in 2008, the time period of collection was designed to coincide with the annual fall intake crib cleaning to estimate the size and density of mussels the divers might encounter at the time of cleaning. For comparison, the sample substrate that was pulled in 2008 had a density of 272,026 individuals/m^2 and an average size of 2,526µm (2.5 mm).

The data indicates that the chlorination system, when operating correctly, was effective in preventing growth and prolonged settlement of postveligers in the service water systems. The excessive number of whole water veligers documented on 9 July 2009, may have created a carry-over situation where such numbers could not be sufficiently controlled with the given levels of chlorine and subsequently may have resulted in higher numbers than otherwise collected on the 16 July cumulative artificial substrate slides. The effects of continuous chlorination eventually took their toll as witnessed by the gradual monthly decline in numbers of postveligers on the slides into December 2009.

Reports of visual heat exchanger inspections performed during the Unit 2 C18 Refueling Outage revealed no live mussel colonies growing within the heat exchangers.

4.2 Recommendations

Based on observations made during the course of this program and on previous historical data, it is recommended that:

- Whole-Water sampling should continue to be initiated in April to determine the presence of veligers in the water column, as currently implemented. The whole-water sampling frequency in 2005 was reduced from weekly to twice monthly in the months of June, October, and November to lessen the sampling burden and better target sampling based on previous years' spawning data. This sampling frequency reduction proved to be effective from 2005 through 2009 as the major spawning peaks were still able to be captured, but with less sampling and analysis effort. This reduced sampling schedule should be continued as currently implemented.
- Studies of cumulative postveliger settlement should continue to be conducted from May through December, as currently implemented.
- Continuous chlorination maintained in the 0.02 -0.6 ppm target band should continue to run throughout the spawning season, as currently implemented. Zebra mussel sampling and analysis in 2009 confirmed the efficacy of this target band.
- Chlorination system outages should be kept to a minimum and the chlorination system continued to be checked on a frequent basis to assure that target levels are being maintained.
- Chlorine levels should be checked in the system water to verify chlorine levels.
- Maintain daily bio-box flow checks to ensure bio-box conditions are representative of system conditions.

- Chlorination data from all water systems (ESW, NESW, and MSCW) and temperature data should continue to be made available to allow meaningful interpretation of results.

References

Lawler, Matusky, & Skelly Engineers LLP. 1995. Mollusc biofouling monitoring during 1994, Donald C. Cook Nuclear Plant: Final Report.

Great Lakes Environmental Center. 1996. A Zebra Mussel (Dreissena) Monitoring Survey for the Donald C. Cook Plant April-December 1995: Final Report

Lawler, Matusky,& Skelly Engineers LLP. 1997. Mollusc biofouling monitoring during 1996, Donald C. Cook Nuclear Plant: Final Report.

Lawler, Matusky,& Skelly Engineers LLP. 1998. Mollusc biofouling monitoring during 1997, Donald C. Cook Nuclear Plant: Final Report.

Lawler, Matusky, & Skelly Engineers LLP. 1999. Mollusc biofouling monitoring during 1998, Donald C. Cook Nuclear Plant: Final Report.

Grand Analysis. 1999. Zebra Mussel Monitoring Project for 1999. Performed at Donald C. Cook Nuclear Plant. Final Report.

Grand Analysis. 2000. Mollusc Biofouling Monitoring Project for 2000. Performed at Donald C. Cook Nuclear Plant. Final Report.

Grand Analysis. 2001. Mollusc Biofouling Monitoring Program for 2001. Performed at Donald C. Cook Nuclear Plant. Final Report.

Grand Analysis. 2002. Mollusc Biofouling Monitoring Program for 2002. Performed at Donald C. Cook Nuclear Plant. Final Report.

Grand Analysis. 2003. Mollusc Biofouling Monitoring Program for 2003. Performed at Donald C. Cook Nuclear Plant. Final Report.

Cook Nuclear Plant Environmental. 2004. Mollusc Biofouling Monitoring Program for 2004. Performed at Donald C. Cook Nuclear Plant. Final Report.

Cook Nuclear Plant Environmental. 2005. Mollusc Biofouling Monitoring Program for 2005. Performed at Donald C. Cook Nuclear Plant. Final Report.

Cook Nuclear Plant Environmental. 2006. Mollusc Biofouling Monitoring Program for 2006. Performed at Donald C. Cook Nuclear Plant. Final Report.

Cook Nuclear Plant Environmental. 2007. Mollusc Biofouling Monitoring Program for 2007. Performed at Donald C. Cook Nuclear Plant. Final Report.

Cook Nuclear Plant Environmental. 2008. Mollusc Biofouling Monitoring Program for 2008. Performed at Donald C. Cook Nuclear Plant. Final Report.

Appendix Table 1

SWS Chlorination Values for 2009 Zebra Mussel Monitoring Program

Date	U-1 ESW [Cl2] East ppm	U-1 ESW [Cl2] West ppm	U-2 ESW [Cl2] East ppm	U-2 ESW [Cl2] West ppm	U-1 NESW [Cl2] ppm	U-2 NESW [Cl2] ppm
5/1/2009	0.10	0.24	0.24	0.08	0.19	0.26
5/4/2009	0.05	0.08	0.11	0.05	0.15	0.21
5/6/2009	0.11	0.37	0.40	0.08	0.12	0.15
5/8/2009	0.02	0.18	0.23	0.05	0.09	0.12
5/11/2009	0.11	0.11	0.17	0.09	0.07	0.19
5/13/2009	0.07	0.22	0.25	0.07	0.07	0.15
5/15/2009	0.04	0.08	0.08	0.04	0.05	0.05
5/15/2009	0.35	0.16	0.43	0.15	0.38	0.50
5/18/2009	0.11	0.29	0.34	0.09	0.24	0.15
5/22/2009	0.16	0.08	0.25	0.09	0.20	0.27
5/25/2009	0.15	0.23	0.25	0.15	0.28	0.35
5/27/2009	0.12	0.26	0.36	0.10	0.32	0.35
5/29/2009	0.10	0.32	0.44	0.02	0.22	0.25
6/1/2009	0.09	0.35	0.36	0.04	0.19	0.23
6/3/2009	0.10	0.40	0.31	0.08	0.27	0.34
6/5/2009	0.35	0.13	0.30	0.11	0.25	0.29
6/8/2009	0.13	0.35	0.35	0.12	0.28	0.32
6/10/2009	0.15	0.34	0.27	0.15	0.29	0.32
6/11/2009	0.12	0.50	0.34	0.16	0.37	0.39
6/15/2009	0.08	0.38	0.30	0.07	0.26	0.27
6/15/2009	0.15	0.19	0.19	0.13		
6/19/2009	0.10	0.19	0.28	0.12	0.24	0.27
6/22/2009	0.10	0.24	0.19	0.08	0.22	0.22
6/24/2009	0.13	0.30	0.10	0.38	0.25	0.15
6/24/2009	0.12	0.22	0.34	0.11		0.29
6/26/2009	0.15	0.21	0.18	0.15	0.24	0.34
6/29/2009	0.15	0.20	0.19	0.15	0.21	0.27

Appendix Table 1

SWS Chlorination Values for 2009 Zebra Mussel Monitoring Program

Date	U-1 ESW [Cl2] East ppm	U-1 ESW [Cl2] West ppm	U-2 ESW [Cl2] East ppm	U-2 ESW [Cl2] West ppm	U-1 NESW [Cl2] ppm	U-2 NESW [Cl2] ppm
7/8/2009	0.12	0.31	0.31	0.08	PSC	0.17
7/10/2009	0.12	0.52	0.50	0.12	0.30	0.42
7/13/2009	0.15	0.21	0.19	0.19	0.31	0.41
7/15/2009	0.13	0.20	0.27	0.25	0.29	0.40
7/17/2009	0.13	0.32	0.29	0.14	0.23	0.30
7/20/2009	0.15	0.34	0.40	0.12	0.23	0.30
7/22/2009	0.18	0.34	0.29	0.17		0.21
7/24/2009	0.14	0.28	0.38	0.13	0.21	0.24
7/27/2009	0.13	0.37	0.47	Cl2 OFF	0.07	0.08
7/29/2009	Cl2 OFF	Cl2 OFF	Cl2 OFF	Cl2 OFF	Cl2 OFF	Cl2 OFF
7/31/2009	0.11	0.26	0.39	0.09	0.25	0.35
8/3/2009	0.08	0.37	0.41	0.04	0.32	0.37
8/5/2009	0.03	0.16	0.07	0.04	0.28	0.31
8/7/2009	< 0.02	0.20	0.16	< 0.02	0.26	0.13
8/10/2009	< 0.02	0.22	0.20	< 0.02	PSC	0.37
8/12/2009	< 0.02	0.21	0.24	< 0.02	0.31	0.30
8/12/2009	< 0.02	0.38	0.38	< 0.02		
8/14/2009	0.10	0.36	0.49	0.04	0.42	0.47
8/17/2009	0.02	0.20	0.19	0.02	0.39	0.41
8/19/2009	0.05	0.15	0.17	0.03	0.27	0.23
8/21/2009	0.54	0.50	0.55	0.29	0.33	0.36
8/24/2009	0.20	0.38	0.05	0.16	0.40	0.44
8/26/2009	0.15	0.84	0.48	0.12	0.34	0.38
8/28/2009	0.48	0.51	0.71	0.39	0.39	0.44
8/31/2009	0.15	0.29	0.20	0.14	0.25	0.19

Appendix Table 1

SWS Chlorination Values for 2009 Zebra Mussel Monitoring Program

Date	U-1 ESW [Cl2] East ppm	U-1 ESW [Cl2] West ppm	U-2 ESW [Cl2] East ppm	U-2 ESW [Cl2] West ppm	U-1 NESW [Cl2] ppm	U-2 NESW [Cl2] ppm
9/9/2009	0.07	0.49	0.38	0.10	0.23	0.30
9/11/2009	1.07	0.27	0.19	0.12	0.23	0.27
9/14/2009	0.15	0.09	0.12	0.30	0.21	0.25
9/16/2009	0.12	0.26	0.33	0.08	0.15	0.12
9/18/2009	0.27	0.13	0.23	0.14	0.20	0.28
9/21/2009	0.10	0.16	0.16	0.11	0.15	0.12
9/23/2009	0.13	0.19	0.22	0.11	0.23	0.26
9/25/2009	0.18	0.23	0.19	0.18	0.15	< 0.02
9/28/2009	0.13	0.18	0.17	0.11	0.28	0.32
9/30/2009	PSC	PSC	PSC	PSC	PSC	PSC
10/5/2009	0.19	0.30	0.28	PSC	0.30	0.31
10/7/2009	0.04	0.13	0.12	0.03	0.12	0.10
10/14/2009	0.15	0.24	0.24	0.18	0.27	0.34
10/16/2009	0.15	0.25	0.24	0.09	0.38	0.28
10/19/2009	0.13	0.24	0.17	0.02	0.26	0.07
10/21/2009	0.08	0.39	0.16	0.18	0.34	0.34
10/23/2009	0.23	0.27	0.16	0.27	0.35	0.38
10/23/2009	0.14	< 0.02	0.14	0.47	0.23	0.25
10/26/2009	0.05	0.15	0.14	0.02	0.37	0.34
10/28/2009	< 0.02	0.08	0.08	< 0.02	0.24	0.26
10/30/2009	< 0.02	0.10	0.08	< 0.02	0.20	0.22
10/30/2009	< 0.02			< 0.02		

Appendix Table 1

SWS Chlorination Values for 2009 Zebra Mussel Monitoring Program

Date	U-1 ESW [Cl2] East ppm	U-1 ESW [Cl2] West ppm	U-2 ESW [Cl2] East ppm	U-2 ESW [Cl2] West ppm	U-1 NESW [Cl2] ppm	U-2 NESW [Cl2] ppm
11/4/2009		0.32	0.24			
11/6/2009	0.08	0.33	0.32	0.02	0.30	0.32
11/9/2009	0.03	0.14	0.19	0.02	0.19	0.02
11/11/2009	0.05	0.21	0.16	0.05	0.11	0.11
11/13/2009	0.31	0.03	0.31	0.03	0.28	0.28
11/16/2009	0.09	0.55	0.53	0.12	0.28	0.28
11/18/2009	0.03	0.14	0.12	0.03	0.31	0.36
11/20/2009	0.05	0.12	0.10	0.03	0.28	0.32
11/23/2009	0.03	0.16	0.11	< 0.02	0.20	0.20
11/25/2009	0.75	0.20	0.11	0.91	0.36	0.36
11/27/2009	0.05	0.28	0.31	0.02	0.41	0.40
11/30/2009	0.02	0.13	0.12	0.03	0.32	0.31

Cl2 – Chlorine
PSC – Plant Specific Condition

APPENDIX IV

NPDES APPLICATIONS

2009

Draft Groundwater Permit
No. GW1810102
October 16, 2009

DRAFT

PERMIT NO. GW1810102

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

GROUNDWATER DISCHARGE PERMIT

In compliance with the provisions of Michigan's Natural Resources and Environmental Protection Act, 1994 P.A. 451, as amended (NREPA), Part 31, Water Resources Protection, and Part 41, Sewerage Systems,

Donald C. Cook Nuclear Plant
Indiana Michigan Power
American Electric Power
One Cook Place, Mail Zone 5A
Bridgman, Michigan 49106

is authorized to discharge **60,000 gallons per day, 21,900,000 gallons per year of sanitary sewage** and **2,400,000 gallons per day, 876,000,000 gallons per year of Process Wastewater** from the **Donald C. Cook Nuclear Plant,** located at

One Cook Place
Bridgman, Michigan 49106

designated as **Donald C. Cook Nuclear Plant**

to the groundwater of the State of Michigan in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

Rule Authorization:	**2218**
Wastewater Type:	**Sanitary Sewage and Process Wastewater**
Wastewater Treatment Method:	**Sanitary Sewage: Sequencing Batch Reactor**
	Process Wastewater: Reverse Osmosis, Filtration, Neutralization
Wastewater Disposal Method:	**Sanitary Sewage: Rapid Infiltration Basins**
	Process Wastewater: Seepage Ponds

The issuance of this permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Michigan Department of Environmental Quality (Department) permits, or approvals from other units of government as may be required by law.

This permit is based on a complete application submitted on December 1, 2008.

This permit takes effect on _____. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules.

This permit and the authorization to discharge shall expire at midnight,_____, 2014. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department by _____, 2014.

Issued _____

_____
James R. Janiczek, Chief
Groundwater Permits Unit
Permits Section, Water Bureau

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3122 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each December 15th the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by March 1st for notices mailed by January 15th. The fee is due no later than 45 days after receiving the notice for notices mailed after January 15th.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Michigan Department of Environmental Quality (the "Department") required by this permit shall be made to the Kalamazoo District Supervisor of the Water Bureau. The Kalamazoo District Office is located at 7953 Adobe Road, Kalamazoo, Michigan 49009-5026, Telephone: 269-567-3500, Fax: 269-567-9440.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the Office of Administrative Hearings of the Michigan Department of Labor and Economic Growth, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Labor and Economic Growth may reject any petition filed more than 60 days after issuance as being untimely.

PART I

1. Effluent Limitations: Process Wastewater (Turbine Room Sump, Outfall OOD)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 2,400,000 gallons per day, 876,000,000 gallons per year, of process wastewater from the monitoring points listed below to the groundwater in the SW ¼ of the SE ¼, Section 6, T6S, R19W, Lake Township, Berrien County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
EFFLUENT				
Monitoring Point **EQ-1**				
Flow	2,400,000	GPD	Daily	Report Total
Flow	876,000,000	GPY	Annually	Calculation
Total Inorganic Nitrogen	Report	mg/l	Daily	Calculation
Ammonia Nitrogen	Report	mg/l	Daily	Grab
Nitrate Nitrogen	Report	mg/l	Daily	Grab
Nitrite Nitrogen	Report	mg/l	Daily	Grab
pH (Minimum)	6.5	S.U.	Daily	Grab
pH (Maximum)	9.5	S.U.	Daily	Grab
Ethanolamine	Report	S.U.	Daily	Grab
Hydrazine	Report	mg/l	Daily	Grab
Biochemical Oxygen Demand (BOD5)	Report	mg/l	Daily	Grab
Dissolved Oxygen	Report	mg/l	Daily	Grab
Chloride	Report	mg/l	Daily	Grab
Sodium	Report	mg/l	Daily	Grab
Total Phosphorus	Report	mg/l	Daily	Grab
LAND APPLICATION				
Monitoring Point **LA-1: Process Wastewater (Turbine Room Sump, Outfall OOD**				
Application Rate	26	gal/day/ft2	Daily	Calculation

a) Total Inorganic Nitrogen
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

b) Sampling Locations
Effluent flow and land application rate shall be measured in accordance with the approved sampling plan. The location and method of collecting and analyzing effluent quality and soil samples shall be in accordance with the approved sampling plan. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

PART I

2. Effluent Limitations: Sanitary Sewage (Outfall OOE)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 60,000 gallons per day, 21,900,000 gallons per year, of from the monitoring points listed below to the groundwater in the SW ¼ of the SE ¼, Section 6, T6S, R19W, Lake Township, Berrien County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
EFFLUENT				
Monitoring Point **EQ-2**				
Flow	60,000	GPD	Daily	Report Total
Flow	21,900,000	GPY	Annually	Calculation
Total Inorganic Nitrogen	Report	mg/l	Daily	Calculation
Ammonia Nitrogen	Report	mg/l	Daily	Grab
Nitrate Nitrogen	Report	mg/l	Daily	Grab
Nitrite Nitrogen	Report	mg/l	Daily	Grab
pH (Minimum)	6.5	S.U.	Daily	Grab
pH (Maximum)	9.5	S.U.	Daily	Grab
Biochemical Oxygen Demand (BOD5)	35	mg/l	Daily	Grab
Dissolved Oxygen	Report	mg/l	Daily	Grab
Chloride	Report	mg/l	Daily	Grab
Sodium	Report	mg/l	Daily	Grab
Total Phosphorus	15	mg/l	Daily	Grab
LAND APPLICATION				
Monitoring Point **LA-2, Sanitary Sewage (Outfall 00E)**				
Application Rates:				
Basin A	7.5	gal/day/ft2	Daily	Calculation
Monitoring Point **LA-3, Sanitary Sewage (Outfall 00E)**				
Basin B	17.8	gal/day/ft2	Daily	Calculation

a) Total Inorganic Nitrogen
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

b) Sampling Locations
Effluent flow and land application rate shall be measured in accordance with the approved sampling plan. The location and method of collecting and analyzing effluent quality and soil samples shall be in accordance with the approved sampling plan. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

PART I

3. Groundwater Monitoring and Limitations (Upgradient)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from the hydraulically upgradient groundwater monitor wells EW-8 and EW-16 as described below:

Parameter	Limit	Units	Frequency of Analysis	Sample Type
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH	Report	S.U.	Quarterly	Grab
Specific Conductance	(report)	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	(report)	mg/l	Quarterly	Calculation
Ammonia Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrate Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrite Nitrogen	(report)	mg/l	Quarterly	Grab
Chloride	(report)	mg/l	Quarterly	Grab
Sodium	(report)	mg/l	Quarterly	Grab
Total Phosphorus	(report)	mg/l	Quarterly	Grab
Arsenic	(report)	ug/l	Quarterly	Grab
Calcium	(report)	mg/l	Quarterly	Grab
Iron	(report)	ug/l	Quarterly	Grab
Magnesium	(report)	mg/l	Quarterly	Grab
Manganese	(report)	ug/l	Quarterly	Grab
Potassium	(report)	mg/l	Quarterly	Grab
Dissolved Oxygen	(report)	mg/l	Quarterly	Grab
Bicarbonate	(report)	mg/l	Quarterly	Grab
Sulfate	(report)	mg/l	Quarterly	Grab
Total Dissolved Solids	(report)	mg/l	Quarterly	Grab
Total Alkalinity	(report)	mg/l	Annually	Grab
Total Organic Carbon	(report)	mg/l	Annually	Grab
Phenols	(report)	mg/l	Annually	Grab
Ethanolamine	(report)	mg/l	Annually	Grab
Aluminum	(report)	ug/l	Annually	Grab
Barium	(report)	ug/l	Annually	Grab
Boron	(report)	ug/l	Annually	Grab
Cadmium	(report)	ug/l	Annually	Grab
Chromium	(report)	ug/l	Annually	Grab
Copper	(report)	ug/l	Annually	Grab
Lead	(report)	ug/l	Annually	Grab
Inorganic Mercury	(report)	ug/l	Annually	Grab
Nickel	(report)	ug/l	Annually	Grab
Selenium	(report)	ug/l	Annually	Grab
Silver	(report)	ug/l	Annually	Grab
Zinc	(report)	ug/l	Annually	Grab
Hydrazine	(report)	ug/l	Annually	Grab

a) Sampling Locations
Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of February, May, August and November. Annual sampling shall be in August. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

b) Total Inorganic Nitrogen at Groundwater Monitoring Points
The value for total inorganic nitrogen shall be reported as the sum of the values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

PART I

4. Groundwater Monitoring and Limitations (Downgradient)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from hydraulically downgradient groundwater monitor wells. The discharge of treated wastewater shall not cause the groundwater in monitor wells EW-1A, EW-12, EW13 and EW-19 to exceed the limitations below.

Parameter	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH (Minimum)	6.5	S.U.	Quarterly	Grab
pH (Maximum)	9.5	S.U.	Quarterly	Grab
Specific Conductance	Report	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	5	mg/l	Quarterly	Calculation
Ammonia Nitrogen	Report	mg/l	Quarterly	Grab
Nitrate Nitrogen	Report	mg/l	Quarterly	Grab
Nitrite Nitrogen	0.5	mg/l	Quarterly	Grab
Chloride	250	mg/l	Quarterly	Grab
Sodium	120	mg/l	Quarterly	Grab
Total Phosphorus	1	mg/l	Quarterly	Grab
Arsenic	Report	ug/l	Quarterly	Grab
Calcium	Report)	mg/l	Quarterly	Grab
Iron	Report	ug/l	Quarterly	Grab
Magnesium	200	mg/l	Quarterly	Grab
Manganese	530	ug/l	Quarterly	Grab
Potassium	(report)	mg/l	Quarterly	Grab
Dissolved Oxygen	(report)	mg/l	Quarterly	Grab
Bicarbonate	(report)	mg/l	Quarterly	Grab
Sulfate	250	mg/l	Quarterly	Grab
Total Dissolved Solids	(report)	mg/l	Quarterly	Grab
Total Alkalinity	(report)	mg/l	Annually	Grab
Total Organic Carbon	(report)	mg/l	Annually	Grab
Phenols	(report)	mg/l	Annually	Grab
Ethanolamine	2	mg/l	Annually	Grab
Aluminum	150	ug/l	Annually	Grab
Barium	440	ug/l	Annually	Grab
Boron	1900	ug/l	Annually	Grab
Cadmium	2.2	ug/l	Annually	Grab
Chromium	11	ug/l	Annually	Grab
Copper	9	ug/l	Annually	Grab
Lead	10	ug/l	Annually	Grab
Inorganic Mercury	0.0013	ug/l	Annually	Grab
Nickel	52	ug/l	Annually	Grab
Selenium	5	ug/l	Annually	Grab
Silver	0.2	ug/l	Annually	Grab
Zinc	120	ug/l	Annually	Grab
Hydrazine	10	ug/l	Annually	Grab

a) Sampling Locations
Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of February, May, August and November. Annual sampling shall be in August. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

b) Total Inorganic Nitrogen at Groundwater Monitoring Points
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

PART I

5. Schedule of Compliance

The permittee shall comply with the following schedule. Submittals shall comply with Rule 323.2218 which may be obtained via the Internet at http://www.deq.state.mi.us/documents/deq-wmd-gwp-part22.pdf. All submittals shall be to the Department.

a) On or before **60 days after permit issuance,** the permittee shall submit for review and approval an updated Discharge Management Plan pursuant to Rules 2218(2)(c)(iii) and 2233-2236.

b) On or before **60 days after permit issuance**, the permittee shall submit an Operations and Maintenance Manual pursuant to Rule 2218(4)(b). A guidance document is available via the Internet at: http://www.deq.state.mi.us/documents/deq-wmd-gwp-Part22GuidshtVI.pdf

c) On or before **60 days after permit issuance**, the permittee shall submit for review and approval the Sampling and Analysis Plan that includes both effluent and groundwater sampling requirements pursuant to Rule 2223.

6. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the NREPA.

7. Submittal Requirements for Self-Monitoring Data

The permittee shall submit self-monitoring data monthly on the Department's Compliance Monitoring Report (CMR) for each calendar month of the authorized discharge period to:

NMS-CMR-Data Entry-Groundwater, Water Bureau, Michigan Department of Environmental Quality
P.O. Box 30273, Lansing, Michigan, 48909-7773.

AND

Kalamazoo District Office, Water Bureau, Michigan Department of Environmental Quality, 7953 Adobe Road, Kalamazoo, Michigan 49009-5026

The forms shall be postmarked no later than the 15th day of the month following each month of the authorized discharge period(s).

Alternative Daily Discharge Monitoring Report formats may be used if they provide equivalent reporting details and are approved by the Department.

8. Facility Operation and Maintenance

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall comply with the inspection, operation and maintenance program requirements specified below.

Location	Condition	Measurement Frequency	Sample Type
Seepage Pond	Freeboard -2 foot minimum	Weekly	Visual Observation
	Control Structures	Weekly	Visual Observation
	Dike Integrity	Weekly	Visual Observation
	Vegetation Control	Weekly	Visual Observation
	Nuisance Animals	Weekly	Visual Observation
	Odors	Weekly	Olfactory Observation
Rapid Infiltration Beds	Vegetation Control	Weekly	Visual Observation

PART I

a) Pond Inspection
These inspections shall include:
(1) the pond dikes for vegetative growth, erosion, slumping, animal burrowing or breakthrough;
(2) the pond for growth of aquatic plants, offensive odors, insect infestations, scum, floating sludge, and septic conditions;
(3) the depth of the water in each cell and the freeboard with a minimum two (2) feet of freeboard being maintained at all times;
(4) the control structures and pump stations to assure that valves, gates and alarms are set correctly and properly functioning;
(5) the lagoon security fence and warning signs.

b) Facility (Pond) Maintenance
The permittee shall implement a Facility Maintenance Program that incorporates the following management practices unless otherwise authorized by the Department.
(1) To allow for ease of access, with the exception of occasional trees, vegetation shall be maintained at a height not more than six (6) inches above the ground around the perimeter of the pond.
(2) Not more than 10 percent of the water surface shall be covered by floating vegetation and not more than 10 percent of the water perimeter may have emergent rooted aquatic plants.
(3) Dike damage caused by erosion, slumping or animal burrowing shall be corrected immediately and steps taken to prevent occurrences in the future.
(4) The occurrence of scum, offensive odors, insect infestations, and septic conditions shall be minimized.
(6) A schedule for the inspection and maintenance of the collection system, lift stations, mechanical and electrical systems, transfer stations, and control structures shall be developed and implemented.

9. General Conditions

a) The discharge shall not be, or not be likely to become, injurious to the protected uses of the waters of the state.

b) The discharge shall not cause runoff to, ponding on, or flooding of adjacent property, shall not cause erosion, and shall not cause nuisance conditions.

c) The point of discharge shall be located not less than 100 feet inside the boundary of the property where the discharge occurs, unless a lesser distance is specifically authorized in writing by the Department.

d) The discharge shall not create a facility as defined in Part 201, Environmental Response, of the NREPA.

10. Other Conditions

a) At the time of application for permit reissuance, the permittee shall submit chemical analysis of 4 samples of the effluent process water and sanitary sewage for the list of parameters in Attachment I and II.
b) Basis of Design – The discharge shall be treated in accordance with the approved basis of design pursuant to Rule 2218(2).
c) Wastewater Characterization - The wastewater being treated shall be of the same chemical, biological, and physical characteristics as described in the characterization required pursuant to Rule 2220.
d) Land Application: Rapid Infiltration
(1) The system shall consist of two (2) or more cells or absorption areas that can be alternately loaded and rested or consist of one (1) cell or absorption area preceded by an effluent storage or stabilization pond system. If only one (1) cell or absorption area is provided, then the storage or stabilization pond shall be operated on a fill and draw basis and have sufficient capacity to allow intermittent loading of the cell or absorption area.
(2) For a system that has more than one (1) cell or absorption area, an individual cell or absorption area of the system shall be capable of being taken out of service without disrupting application to other cells or absorption areas of the system.
(3) An appropriate hydraulic loading cycle shall be developed and implemented to maximize long-term infiltration rates and allow for periodic maintenance.

PART I

11 Discharge Management Plan (DMP)

a) A land treatment system shall be designed, constructed, and operated as follows:
   (1) The system shall be designed and constructed to prevent surface runoff from either entering or exiting the system.
   (2) The system shall be designed and constructed to provide even distribution of wastewater during application. A header ditch, where used, shall be designed and constructed to allow for complete drainage after each wastewater loading or shall be lined to prevent seepage.
   (3) If vegetative cover is utilized and is considered part of the overall treatment system, then the design and construction of the system shall allow for the mechanical harvesting of vegetative cover.
   (4) The system shall be designed, constructed, and operated to allow an appropriate loading cycle. An appropriate loading cycle allows time between loadings for all of the following:
      (a) Soil organisms to biologically decompose organic constituents in the wastewater.
      (b) Organic solids on the soil surface to decompose.
      (c) The soil to become aerated.
      (d) Vegetative cover to utilize available nutrients provided through the application of the wastewater.
      (e) Soil conditions to become unsaturated and aerobic.
      (f) Harvesting operations to occur at appropriate times.

b) The design hydraulic loading or application rate, whether daily, monthly, or annual, shall not be more than one of the following:
   (1) Three percent of the permeability of the most restrictive soil layer within the solum over the area of the discharge when determined by either the cylinder infiltration method or air entry permeameter test method.
   (2) Seven percent of the permeability of the most restrictive soil layer within the solum over the area of the discharge as determined by the saturated hydraulic conductivity method.
   (3) Twelve percent of the permeability of the most restrictive soil layer within the solum over the area of the discharge as determined by the basin infiltration method.
   (4) If published information is utilized, the discharger shall determine the methodology used to measure the reported hydraulic conductivity. If the hydraulic conductivity is given as a range of expected values, then a discharger shall use the minimum value given the most restrictive soil layer within the solum when calculating the hydraulic loading or application rate.

c) The system shall be designed, constructed, and operated so as to prevent the development of sodic conditions within the solum of the discharge area. Sodic conditions are considered to exist in the solum when the exchangeable sodium percentage, which is the percentage of the cation exchange capacity of a soil occupied by sodium, is more than 15 percent.

d) If phosphorus adsorption within the solum or unsaturated soil column is part of the overall treatment process, then the system shall be designed as follows:
   (1) The available phosphorus adsorptive capacity of the solum or unsaturated soil column from within the discharge area shall be sufficient to provide the necessary treatment to ensure that the applicable limit established in the permit is not exceeded for the duration of the permit.
   (2) The loading cycle shall be designed so as to provide the necessary contact time within the solum or unsaturated soil column required for phosphorus to be removed from the applied wastewater through adsorption processes.
   (3) The available phosphorus adsorptive capacity of the discharge area shall be determined through either of the following methods:
      (a) By subtracting phosphorus levels of the unsaturated soil column, determined through on-site Bray-P1 analysis, from published phosphorus adsorption capacity data for the solum found within the discharge area.
      (b) By subtracting phosphorus levels of the unsaturated soil column, as determined through on-site Bray-P1 analysis, from the phosphorus adsorption maximum as determined through Langmuir isotherm analysis of on site soils, after adjustments for the concentration of phosphorus in the effluent and fraction of utilization within the solum are made.

e) All of the following operation and maintenance requirements shall be met:
   (1) Portions of the wastewater distribution system shall be capable of being taken out of service for maintenance and other operational activities and to provide rest to portions of the irrigation area without disrupting applications to other areas of the system.
   (2) All areas within a system shall be accessible for maintenance equipment.

PART I

(3) For slow rate and overland flow treatment systems, the pH of the plow layer within the discharge area shall be maintained between 6.0 and 7.5 standard units.

f) The discharge to a land treatment system shall be limited so that the discharge volume combined with the precipitation from a 10-year frequency, 24-hour duration rainfall event does not overflow the designed discharge area.

g) If any modifications are made to the management practices or specifications for the land application of wastewater, including but not limited to changes in crops grown, yield goal for those crops, or supplemental fertilization provided by the permittee or a third party, the permittee shall submit a revised DMP on or before November 30 of the year prior to making the proposed change. Based on this submittal, the Department may modify this permit in accordance with applicable rules and laws.

12. Compliance Requirements

Compliance with all applicable requirements set forth in Parts 31 and 41 of the NREPA, and related regulations and rules is required. All instances of noncompliance with concentration limitations of effluent or groundwater shall be reported as follows.

a) If the facility is in a wellhead protection area, within 48 hours from the time the permittee becomes aware of the noncompliance, the permittee shall report noncompliance to the public water supply manager.

b) Within seven (7) days from the time the permittee becomes aware of the noncompliance, the permittee shall report, in writing, all instances of noncompliance. Written reporting shall include all of the following: 1) the name of the substance(s) for which a limit was exceeded; 2) the concentration at which the substance was found; and 3) the location(s) at which the limit was exceeded.

c) Within 14 days from the time the permittee becomes aware of the noncompliance, the permittee shall resample the monitoring point at which the limit was exceeded for the substance for which a limit was exceeded.

d) Within 60 days from the time the permittee becomes aware of the noncompliance, the permittee shall submit a written report that shall include all of the following: 1) the results of the confirmation sampling; 2) an evaluation of the cause for the limit being exceeded and the impact of that event to the groundwater; and 3) a proposal detailing steps taken or to be taken to prevent recurrence.

e) In accordance with applicable rules, the Department may require additional activities including, but not limited, to the following:
   (1) Change the monitoring program, including increasing the frequency of effluent monitoring or groundwater sampling, or both.
   (2) Develop and implement a groundwater monitoring program if one is not in place.
   (3) If the discharge is in a designated wellhead protection area, assess the affects of the discharge on the public water supply system.
   (4) Review the operational or treatment procedures, or both, at the facility.
   (5) Define the extent to which groundwater quality exceeds the applicable criteria that would designate the site as a facility under Part 201.
   (6) Revise the operational procedures at the facility.
   (7) Change the design or construction of the wastewater operations at the facility.
   (8) Initiate an alternative method of waste treatment or disposal.
   (9) Remediate contamination to comply with the terms of Part 201, if applicable.

f) If the Department determines there is a change in groundwater quality from a normal operating baseline that indicates the concentration of a substance in groundwater may exceed an applicable limit, then the discharger shall take the following actions if required by the Department:
   (1) Change the monitoring program, including increasing the frequency of effluent sampling or groundwater sampling, or both.
   (2) Review the operational or treatment procedures, or both, at the facility.

PART I

13. Request for Discharge of Water Treatment Additives

In the event a permittee proposes to discharge water treatment additives (WTAs) to groundwater, the permittee shall submit a request to discharge WTAs to the Department for approval. Such requests shall be sent to the Surface Water Assessment Section, Water Bureau, Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan 48909, with a copy to the Department contact listed on the cover page of this permit. Instructions to submit a request electronically may be obtained via the Internet (http://www.michigan.gov/deq and on the left side of the screen click on Water, Water Quality Monitoring, and Assessment of Michigan Waters; then click on the Water Treatment Additive List which is under the Information banner). Written approval from the Department to discharge such WTAs at specified levels shall be obtained prior to discharge by the permittee. Failure to obtain approval prior to discharging any WTA is a violation of this permit. Additional monitoring and reporting may be required as a condition for the approval to discharge the WTA. WTAs include such chemicals as herbicides used to kill weeds and grasses as part of lagoon maintenance.

A request to discharge WTAs to groundwater shall include all of the following:

a) product Information:
   (1) name of the product;
   (2) Material Safety Data Sheet;
   (3) product function (i.e. microbiocide, flocculants, etc.);
   (4) specific gravity if the product is a liquid; and
   (5) annual product use rate (liquids in gallons per year and solids in pounds per year);

b) ingredient information:
   (1) name of each ingredient;
   (2) CAS number for each ingredient; and
   (3) fractional content by weight for each product;

c) the monitoring point from which the WTA is to be discharged;

d) the proposed WTA discharge concentration;

e) the discharge frequency (i.e., number of hours per day and number of days per year);

f) the type of removal treatment, if any, that the WTA receives prior to discharge;

g) relevant mammalian toxicity studies for the product or all of its constituents (if product toxicity data are submitted, the applicant shall provide information showing that the product tested has the same composition as the product listed under Item "a" above. Preferred studies are subchronic or chronic in duration, use the oral route of exposure, examine a wide array of endpoints and identify a no-observable-adverse-effect-level. Applicants are strongly encouraged to provide the preferred data. If preferred data are not available, then the minimum information needed is an oral rat LD50 study. In addition, an environmental fate analysis that predicts the mobility of the product/ingredients and their potential to migrate to groundwater may be provided.

h) If the discharge of the WTA to groundwater is within 1,000 feet of a surface water body, the following information shall also be provided:
   (1) a 48-hour LC50 or EC50 for a North American freshwater planktonic crustacean (either Ceriodaphnia sp., Daphnia sp., or Simocephalus sp.); and
   (2) the results of a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of Rule 323.1057(2) of the Water Quality Standards.

Prior to submitting the request, the permittee may contact the Surface Water Assessment Section by telephone at 517-335-1180 or via the Internet at the address given above to determine if the Department has the product toxicity data required by Item "g" above. If the Department has the data, the permittee will not need to submit product toxicity data.

PART II

Definitions

This list of definitions may include terms not applicable to this permit.

Annual frequency of analysis refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

By-Pass means any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit.

Class B Biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Daily concentration is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration.
For pH, report the maximum value of any individual sample taken during the month and the minimum value of any individual sample taken during the month.

Department means the Michigan Department of Environmental Quality.

Detection Level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

Flow Proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

Furrow stream is the volume, in gallons per unit time, usually per minute, of wastewater discharged into the furrow.

GPD means gallons per day.

GPY means gallons per year.

Grab sample is a single sample taken at neither a set time nor flow.

MGD means million gallons per day.

Mg/l is a unit of measurement and means milligrams per liter.

Monthly frequency of analysis refers to a calendar month. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

POTW is a publicly owned treatment works.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

PART II

Quarterly frequency of analysis refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Report means there is no limit associated with the individual substance for the medium that is being sampled, that the permittee must only report the result of the laboratory analysis.

Weekly frequency of analysis refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

24-Hour Composite sample is a flow proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period.

PART II

1. Start-up Notification

If the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

2. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

3. Notification of Changes in Discharge, Treatment or Facility Operations

If proposing to modify the quantity or effluent characteristics of the discharge or the treatment process for the discharge, the permittee shall notify the Department of the proposed modification prior to its occurrence. Significant modifications require the permittee to submit an application. A permit modification shall be processed in accordance with applicable rules and laws prior to implementation of the modification.

4. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittee and the new permittee containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

5. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Guidance on how to collect representative samples is contained in Guidesheet III, "Characterization of Wastewater", which is available via the Internet at http://www.deq.state.mi.us/documents/deq-wmd-gwp-P22GuidshtIII.pdf.

6. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to either SW-846, 3rd edition, September 1986, "Test Methods for the Evaluation of Solid Waste, Physical-Chemical Methods", or Section 304(h) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq), 40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants, unless specified otherwise in this permit. Requests to use test procedures not defined here shall be submitted to the Department for review and approval. The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

7. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

8. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

PART II

9. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Department.

10. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the NREPA or Rule 35 of the Mobile Home Park Commission Act (1987 PA 96) for assurance of proper facility operation shall be submitted as required by the Department.

11. Permit Monitoring Requirements

Pursuant to Rule 2223(1), the Department may modify the effluent or groundwater monitoring parameters or frequency requirements of this permit. The permittee may request a modification of the parameters of frequency of monitoring of this permit with adequate supporting documentation.

12. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwater of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the first page of this permit, or if the notice is provided after regular working hours call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660).

Within ten (10) days of the release, the permittee shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventative measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

13. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24-hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

a) that an upset occurred and that the permittee can identify the specific cause(s) of the upset;

b) that the permitted wastewater treatment facility was, at the time, being properly operated; and

c) that the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

PART II

14. Bypass Prohibition and Notification

a) Bypass Prohibition - Bypass is prohibited unless:
   (1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

   (2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and

   (3) the permittee submitted notices as required under 14.b. or 14.c. below.

b) Notice of Anticipated Bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 14.a. above.

c) Notice of Unanticipated Bypass - The permittee shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the first page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittee becomes aware of the circumstances.

d) Written Report of Bypass - A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.

e) Bypass Not Exceeding Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of 14.a., 14.b., 14.c., and 14.d., above. This provision does not relieve the permittee of any notification responsibilities under Part II, Section 12 of this permit.

f) Definitions
   (1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

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

15. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

16. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

a) provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or
b) upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

PART II

17. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the NREPA.

18. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit or other pollutants) removed from or resulting from treatment or control of wastewaters, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the NREPA, Part 31, Water Resources Protection; Part 55, Air Pollution Control; Part 111, Hazardous Waste Management; Part 115, Solid Waste Management; Part 121, Liquid Industrial Wastes; Part 301, Inland Lakes and Streams; and Part 303, Wetland Protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwater of the state.

19. Treatment System Closure

a) In the event that discharges from a treatment system are planned to be eliminated, the permittee shall do the following:
   (1) Eliminate all physical threats associated with discharge related facilities not later than five (5) days after use of the facility has ceased.
   (2) Not less than 75 days before cessation of discharge related activities, characterize any wastewater, sediments and sludges related to the discharge, pursuant to Rule 2226(4)(a)(i-iii).

b) Within 30 days of completing the characterization, the discharger shall submit a closure plan to the Department for review and approval that describes how the wastewater, sediments and sludges associated with the discharge will be handled in accordance with Part 31, Part 115, Part 111, or Part 201, as appropriate.

c) Closure activities must be initiated within 30 days of Department approval of the Closure Plan, and must be completed within one (1) year of approval of the Closure Plan.

d) If the groundwater exceeds a standard established by the Department that would result in the site qualifying as a facility under Part 201, then the discharger shall comply with the requirements of Part 201.

e) The Department may require post closure monitoring activities to evaluate the effectiveness of the closure activities. Any wastewater or residual disposal inconsistent with the approved plan shall be considered a violation of this permit. After proper closure of the treatment system, this permit may be terminated.

f) The discharger must certify completion of the approved closure plan. Certification shall be by a qualified person described as follows:
   (1) An engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, being §339.101 et seq. Of the Michigan Compiled Laws, and known as the occupational code.
   (2) A professional geologist certified by the American Institute of Professional Geologists, 7828 Vance Drive, Suite 103, Arvada, Colorado 80003.
   (3) A professional hydrologist certified by the American Institute of Hydrology, 2499 Rice Street, Suite 135, St. Paul, Minnesota 55113.
   (4) A groundwater professional certified by the National Ground Water Association, Association of Groundwater Scientists and Engineers Division, 601 Dempsey Road, Westerville, Ohio 43081.
   (5) Another groundwater professional certified by an organization approved by the Department.

20. Right of Entry

The permittee shall allow the Department or any agent appointed by the Department, upon the presentation of credentials:

a) to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b) at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any effluent discharge, discharge of pollutants, and groundwater monitoring wells and soils associated with the discharge.

PART II

21. Untreated or Partially Treated Sewage Discharge Requirements

In accordance with Section 324.3112a of the Michigan Act, if untreated sewage, including sanitary sewer overflows (SSO) and combined sewer overflows (CSO), or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the entity responsible for the sewer system shall immediately, but not more than 24 hours after the discharge begins, notify, by telephone, the Department, local health departments, a daily newspaper of general circulation in the county in which the permittee is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located that the discharge is occurring.

At the conclusion of the discharge, written notification shall be submitted in accordance with and on the "CSO/SSO Reporting Form" available via the internet at: http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3715---,00.html, or, alternatively for combined sewer overflow discharges, in accordance with notification procedures approved by the Department.

In addition, in accordance with Section 324.3112a of the Michigan Act, each time a discharge of untreated sewage or partially treated sewage occurs, the permittee shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The testing shall be done at locations specified by each affected local county health department but shall not exceed 10 tests for each separate discharge event. The affected local county health department may waive this testing requirement, if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event. The results of this testing shall be submitted with the written notification required above, or, if the results are not yet available, submit them as soon as they become available. This testing is not required, if the testing has been waived by the local health department, or if the discharge(s) did not affect surface waters.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

22. Availability of Reports

Except for data determined to be confidential under Rule 323.2128 of the Michigan Administrative Code, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Sections 3112, 3115, 4106 and 4110 of the NREPA.

23. Construction Certification

On or before 30 days following completion of construction of any new wastewater treatment facilities after issuance of this permit, pursuant to Rule 2218(4)(a), the permittee shall submit a certification that a quality control and quality assurance program was utilized and the facilities constructed were built consistent with standard construction practices to comply with the permit and the NREPA. This certification shall be by an engineer licensed under Act 299 of the Public Acts of 1980.

PART III
DISCHARGE PROHIBITIONS

1. Discharge to the Surface Waters

This permit does not authorize any discharge to the surface waters. The permittee is responsible for obtaining any permits required by federal or state laws or local ordinances.

2. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation.

3. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits or approvals as may be required by law.

4. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Conditions, or terms of this permit constitutes a violation of the NREPA and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

5. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.

ATTACHMENT I

Table I
Volatile Organics
EPA Method 8260 Plus

Parameter	Detection Limits (ug/l)	Groundwater Limit Rule 2227**	Groundwater Limit Rule 2228**
Acrylonitrile	1		1
Benzene	1		1
Bromochloromethane	1		1
Bromodichloromethane	1		1
Bromoform	1		1
Bromomethane	5		5
2-Butanone (MEK)	(5)	450	
Carbon Disulfide	5		5
Carbon Tetrachloride	1		1
Chlorobenzene	1		1
Chloroethane	5		5
Chloroform	1		1
Chloromethane	5		5
Dibromochloromethane	1		1
1,2-Dibromo-3-chloropropane	5		5
Dibromomethane	1		1
1,2-Dibromoethane	1		1
1,2-Dichlorobenzene	1	25	
1,3-Dichlorobenzene	1	25	
1,4-Dichlorobenzene	1	15	
1,4-Dichloro-2 butene (trans)	1		1
Dichlorodifluoromethane	5		40
1,1-Dichloroethane	1		1
1,2-Dichloroethane	1		1
1,1-Dichloroethylene	1		1
1,2-Dichloroethene (cis)	1	5	
1,2-Dichloroethene (trans)	1	5	
1,2-Dichloropropane	1		1
1,3-Dichloroproprene (cis)	1		1
1,3-Dichloroproprene (trans)	1		1
Diethyl ether	10		10
Ethylbenzene	1	25	
Hexachloroethane	1	25	

ATTACHMENT I

Table I (continued)
Volatile Organics
EPA Method 8260 Plus

Parameter	Detection Limits (ug/l)	Groundwater Limit Rule 2227**	Groundwater Limit Rule 2228**
2-Hexanone	5		5
Isopropylbenzene	1		1
Methyl Iodide	1		1
Methylene Chloride	(5)		(5)
2-Methylnaphthalene	5		5
4-Methyl-2 propanone (MIBK)	5		5
Methyl Tertiary Butyl Ether (MTBE)	5		5
Naphthalene	5	15	
2-Propanone (acetone)	25		25
n-Propylbenzene	1		1
Styrene	1	20	
1,1,1,2-Tetrachloroethane	1		1
1,1,2,2-Tetrachloroethane	1		1
Tetrachloroethylene	1		1
Toluene	1	35	
1,1,1-Trichloroethane	1	15	
1,2,4-Trichlorobenzene	5	15	
1,1,2-Trichloroethane	1		1
Trichloroethylene	1		1
Trichlorofluoromethane	5		5
1,2,3-Trichloropropane	1		1
1,2,4-Trimethylbenzene	1		1
1,3,5-Trimethylbenzene	1		1
Vinyl Chloride	1		1
o-Xylene	1	35	
M & p-Xylene	2	35	

( ) = Detection limit dependent upon laboratory background level

* The total of all Trihalomethanes, **Bromodichloromethane, Bromoform, Chloroform and Dibromochloromethane** must be less than 20 ug/l.

** Rule 2227 and Rule 2228 deal with compliance actions that must be followed in the event a permit limit is exceeded in either the effluent or the groundwater.

Currently there are no Part 201 Residential Criteria for this substance.

ATTACHMENT II

Table II
Metals

Groundwater parameters and detection limits

Parameter	Groundwater Detection Limits (ug/l)	Parameter	Groundwater Detection Limits (ug/l)
Aluminum	50	Lithium	8
Antimony	1	Manganese	5
Arsenic	1	Mercury	0.2
Barium	5	Molybdenum	25
Beryllium	1	Nickel	2
Boron	20	Selenium	1
Cadmium	0.2	Silver	0.5
Chromium	1	Strontium	5
Chromium VI	5	Titanium	10
Cobalt	2	Thallium	2
Copper	1	Vanadium	10
Lead	1	Zinc	4

Table III
Inorganics

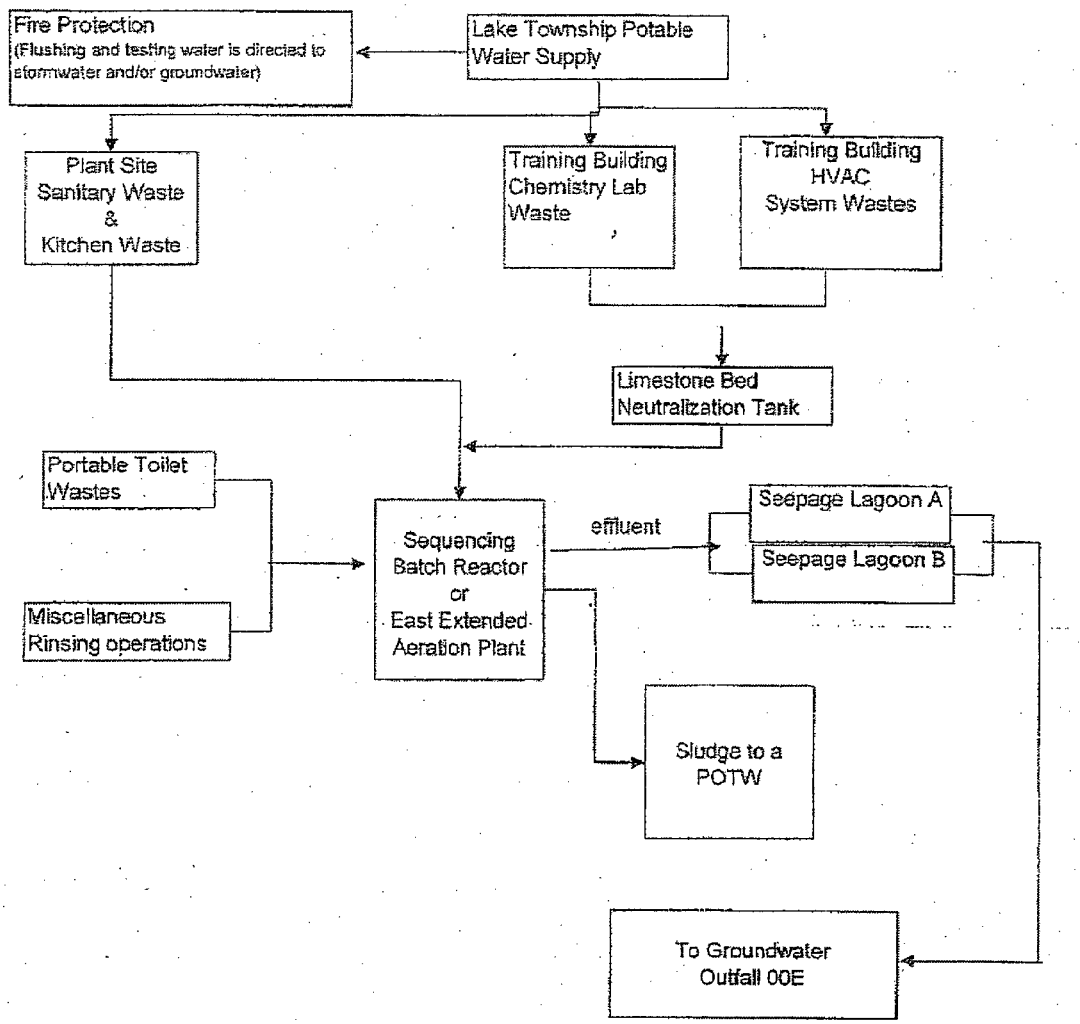
Groundwater parameters and detection limits

Parameter	Groundwater Detection Limits (ug/l)
Nitrate as N	10
Nitrite as N	10
Ammonia as N	10
Chloride	1000
Sodium	1000
Total Phosphorus	10

ATTACHMENT III

DONALD C. COOK NUCLEAR PLANT
SANITARY SEWAGE FLOW DIAGRAM

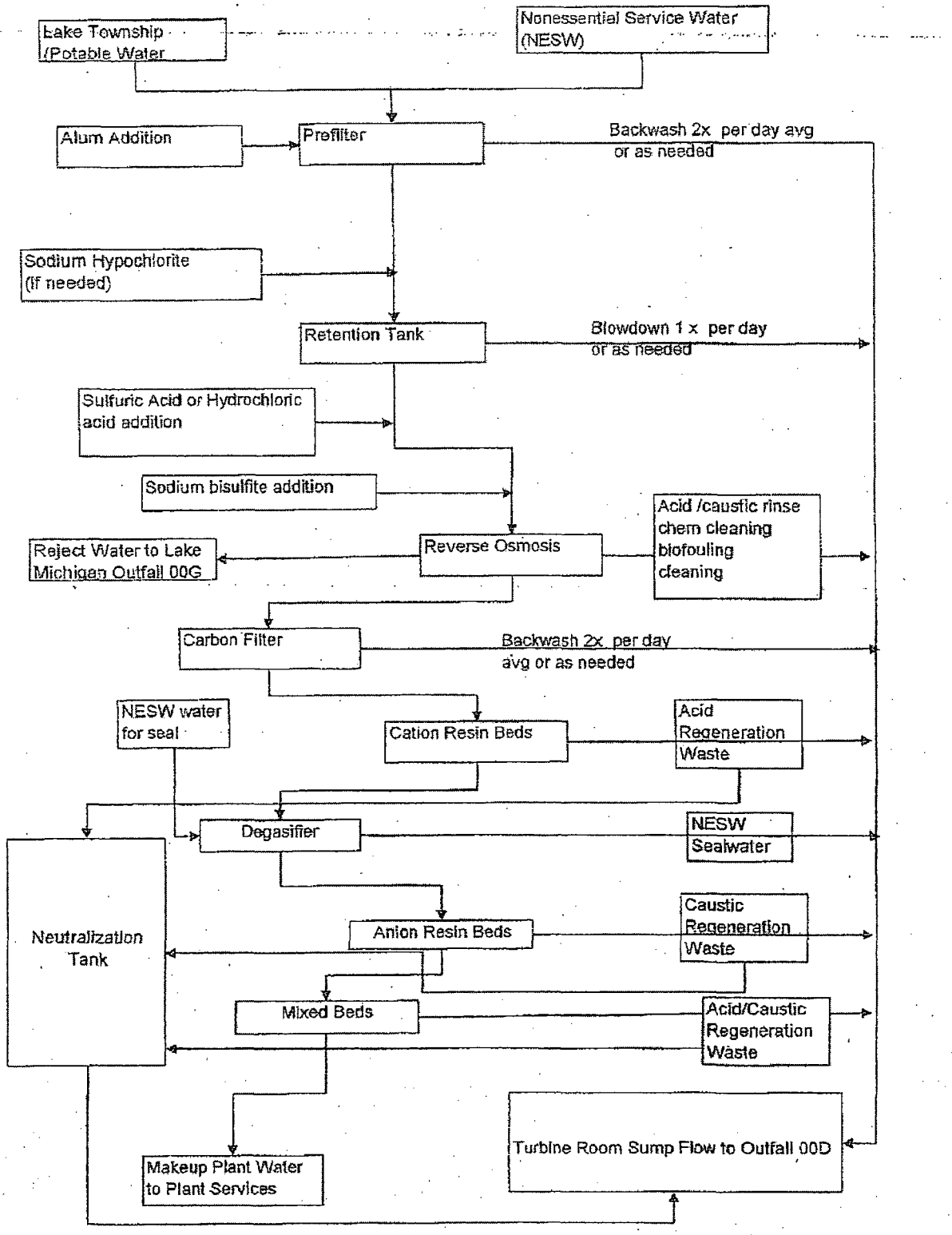
GW1810102



ATTACHMENT IV

DONALD C. COOK NUCLEAR PLANT
PROCESS WASTEWATER FLOW DIAGRAM

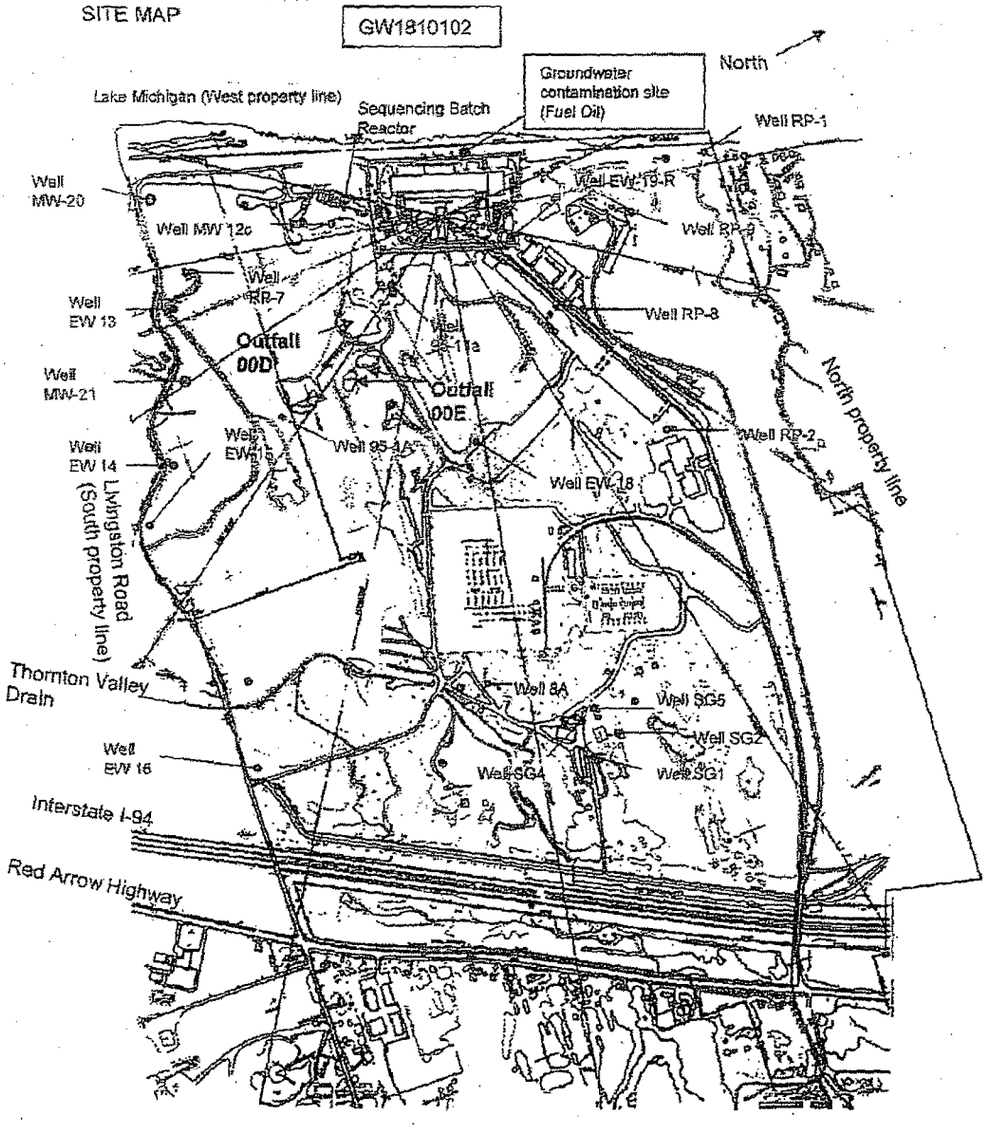
GW1810102



ATTACHMENT V

DONALD C. COOK NUCLEAR PLANT
SITE MAP

GW1810102



Distance from discharge 00D	Distance from discharge 00E	Cook Nuclear Plant
South property line: 1200'	South property line: 1300'	Berrien County
Lake Michigan: 1000'	Lake Michigan: 1500'	Lake Township
East property line: 3600'	East property line: 3400'	Scale: 1" = 1000'
North property line: 2600'	North property line: 2600'	

INDIANA MICHIGAN POWER

Indiana Michigan
Power Company
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106

Ms. Jeanette Bailey
Michigan Department of Environmental Quality
Groundwater Permits Unit
P. O. Box 30273
Lansing, Michigan 48909-7773

October 28, 2009

Dear Ms. Bailey:

Subject: Donald C. Cook Nuclear Plant
Groundwater Permit GW 1810102

Thank-you for the advanced copy of the Cook Nuclear Plant's Groundwater Discharge Permit GW1810102. Cook plant realizes the importance of having an understandable permit where the conditions are very clear to us. Therefore we offer these comments that we think will clarify conditions. We have reviewed the document and have the following comments:

Part I.1, Effluent Limitations: Process wastewater (Turbine Room Sump , Outfall 00D)

- Total inorganic nitrogen, ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen are currently analyzed on a monthly basis; the draft permit has increased the frequency to "daily." Maximum TIN for 2009 was 3.8 mg/l. We feel that this parameter is below the level of concern to warrant a daily analysis. We request that these analyses be returned to "Monthly."
- pH minimum, and pH maximum required a frequency of "daily". This is acceptable to us; however we have the capability to monitor the stream continuously with our on-line pH meter. In the event that the pH meter is out of service, we isolate the discharge and batch release the contents.
- Ethanolamine and Hydrazine are currently analyzed on "weekdays", due to staffing issues; we would be forced to bring in qualified staff to sample on weekends if the parameters were increased to "daily". We request that Ethanolamine and hydrazine be analyzed "weekdays."
- Biochemical Oxygen demand and dissolved oxygen are not analyzed in our current permit. We see no reason to check these parameters on a daily basis. The data from the permit application showed no abnormalities to increase sampling, or add these parameters. The data showed that BOD was 2.6 mg/l and DO was 7.4 mg/l. We request that these parameters be removed from the draft permit.
- Chloride is analyzed weekly in the current permit, we request that this parameter remain as a weekly requirement instead of "daily".
- Sodium is currently analyzed twice per month, (once during regeneration waste discharge, and once during non-regeneration periods). We request that Sodium analysis be changed from daily to 2x/month.
- Total Phosphorus is not analyzed in our current permit. There are no phosphorus containing systems, or treatments that discharge to this outfall.

Existing data from our surface water application shows that Phosphorus is 0.028 mg/l. We request that this parameter be removed from the draft permit.

- We have noted that sulfate has been removed from the current permit. If this was intentional, we have no issues with this change.
- pH (max) changed from 9.5 to 9.0.
- Ethanolamine reporting units are listed as "su" instead of mg/l.
- Hydrazine limits have been changed from ug/l to mg/l.

Part I.2, Effluent limitations: sanitary Sewage (Outfall 00E)

- Total inorganic nitrogen, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, pH, Biochemical Oxygen Demand, DO, Chloride, Sodium, and total phosphorus are currently analyzed on a Weekly basis; the draft permit has increased the frequency to "daily." Due to resource issues, we request that these analyses be returned to "weekly."
- pH minimum is now 6.5, the previous permit was 6.0. Is this correct?
- pH maximum is now 9.5, the previous permit was 9.0. Is this a correct?

Part I.3, Groundwater Monitoring and Limitations (Upgradient), and Part I.4, Groundwater Monitoring and Limitations (Downgradient),

- Arsenic is included in the draft permit; we do not discharge arsenic or arsenic containing compounds. Outfall 00D arsenic grab sample showed <1.5 ug/l. We request that this parameter be removed from the permit.
- Calcium, iron, magnesium, manganese, potassium, dissolved oxygen, and bicarbonate parameters are analyzed annually in the current permit. The draft permit has increased the frequency to quarterly. Our data for these parameters shows no adverse trends. We request that these analysis frequencies be returned to annually.
- A) Sampling locations: In our current permit, groundwater samples are scheduled in Jan, April, July, and October. The draft permit moves the schedule out to Feb, Mar, Aug. and Nov. We currently sample groundwater wells for other compliance programs in Jan. April, July and Oct. and due to scheduling and staffing issues we request that the sampling schedule remain as Jan. April, July and Oct.
- The metals are no longer described as "dissolved metals" does this mean that the samples are no longer required to be filtered prior to preservation?
- Iron reporting limit was changed from mg/l to ug/l.

Part I.5, Schedule of compliance

- a) The draft permit requires the submittal of an updated Discharge Management Plan. Correspondences dated 1/29/09 requested updated information to be used in the plan, and that this would satisfy the requirement to update the Plan. We believe that the Discharge Management Plan is current, and request that this item be deleted.
- b) The draft permit requires the submittal of an Operations and Maintenance Manual. We currently have an Operations and Maintenance Manual for both Outfalls 00D and 00E. We request that this item be deleted.
- c) The draft permit requires the submittal of a Sampling and Analysis Plan. We currently have a Sampling and Analysis Plan. Low flow sampling methods are not included in the Sampling and Analysis Plan at the present time. We request that this item be changed to an "Updated" Plan.

PartI.8, Facility Operation and Maintenance

- Seepage pond maintenance requires Freeboard measurement - this observation is meaningless since the pond is constantly flowing to the east pond.
- Seepage pond maintenance requires vegetation control - this observation has little merit since there is no vegetation in the pond due to the poor nutrient value of the wastewater, and the sandy soils. The water is up to 80% Lake Michigan from non-contact cooling. We request that this requirement be deleted.
- Pond inspection: (1) vegetative growth, (3) water depth and (4) Control structures do not fit with the type of pond that is at the site. The pond

has only one dike since it is situated within a sand dune structure on 3 sides, so vegetation control would create undesired erosion of the sand dunes into the pond. The single dike is inspected for erosion and burrowing animals weekly currently. Water depth in the pond would require use of a boat, and the water depth is constant since the pond drains to an overflow area. There are no control structures at the pond with the exception of a drain tube. We request that this section be modified to reflect our pond design.

- Pond Maintenance: (1) maintain vegetation height <6" three of the sides of the pond are sand dunes, any vegetation maintenance could jeopardize the dune and cause erosion. (6) System inspection schedule would not be required here since there are no electrical systems, lift stations or other control structures. We request that this section be deleted.
- Rapid infiltration basins have vegetation control, and dike inspections. However, they are dry for a majority of the time. We request that this section be modified by removing (1) and (6) to reflect our pond design.
- Fence requirements are not applicable as this is a nuclear power site and access is strictly controlled 24/7 by an armed security force.

Part I.10, Other Conditions.

- Part b) Basis of Design - this data was submitted in previous applications. We are unsure what is required in this statement/requirement.
- Part c) Wastewater Characterization - We understand that any change of process or deviation from our permit application will trigger us into the reapplication and approval process for a new or revised permit.

Part I.11, Discharge Management Plan (DMP)

- All seepage ponds and infiltration beds are an existing use. Future expansion is not being considered at this time, basis of design was submitted in the previous permit application (dated November 1994) so additional design criteria is not required. This information seems excessive, and does not apply to our site and should be removed.

Attachment I Table I Volatile Organics.

- Please add CAS numbers in an additional column; this will prevent confusion when requesting laboratories to analyze for these parameters. Detection limits on some parameters may not be achievable due to matrix interferences.

Attachment II Table II metals.

- Detection limits on some parameters may not be achievable due to matrix interferences. In addition, Mercury limits of 0.2 ug/l are 400 times greater than current low level mercury reporting limits. The limit of 0.0013 ug/l is published in the permit, however the detection limit is 0.2 ug/l.

Documents not included:

- Restrictive covenant Dated October 26, 2000.

Should you have any questions regarding this response, please contact me at (269) 465-5901, ext. 2102.

Sincerely,

for J Harner

Jon H. Harner
Environmental Manager

INDIANA MICHIGAN POWER®
A unit of American Electric Power

Indiana Michigan Power
One Cook Place
Bridgman, MI 49106
IndianaMichiganPower.com

January 29, 2010

AEP-NRC-2010-10

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Donald C. Cook Nuclear Plant Units 1 and 2
SUBMITTAL OF RENEWED GROUNDWATER
DISCHARGE PERMIT GW1810102

On December 15, 2009, the Michigan Department of Environmental Quality issued renewed Groundwater Discharge Permit GW1810102 to Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2. This permit was effective on January 1, 2010, and superseded Groundwater Discharge Permit GW1810102, which had an expiration date of June 1, 2009. In order for that permit to remain in effect beyond the original expiration date, I&M was required to submit the application for renewal and the application fee by December 3, 2008. The application and fee were submitted on November 21, 2008.

Section 3.2 of Part II of Appendix B of the Environmental Technical Specifications for CNP requires that the Nuclear Regulatory Commission be notified of any changes and additions to the National Pollutant Discharge Elimination System permit or the State certification within 30 days following the date the change is approved. The renewed permit was received by I&M on January 15, 2010, which was beyond the 30-day submittal requirement. The late submittal of the renewed permit has been entered into CNP's Corrective Action Program. The enclosure to this letter provides a copy of the renewed Groundwater Discharge Permit.

This letter contains no new commitments. Should you have any questions or concerns regarding this submittal, please contact Mr. Jon H. Harner, Environmental Manager, at (269) 465-5901, extension 2102.

Sincerely,

James M. Petro, Jr.
Regulatory Affairs Manager

JEN/rdw

Enclosure

C 001
NRR

c: T. A. Beltz, NRC Washington DC
J. T. King, MPSC, w/o enclosure
S. M. Krawec, AEP Ft. Wayne, w/o enclosure
MDEQ – WHMD/RPS, w/o enclosure
NRC Resident Inspector
M. A. Satorius, NRC Region III

ENCLOSURE TO AEP-NRC-2010-10

RENEWED GROUNDWATER DISCHARGE PERMIT GW1810102

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

December 15, 2009

RECEIVED
JAN 15 2010

Mr. Jon Harner
Indiana Michigan Power
One Cook Place, Mail Zone 5A
Bridgman, Michigan 49106

Dear Mr. Harner:

Enclosed is the Authorization to Discharge, GW1810102, issued by the Department of Environmental Quality (DEQ) on December 15, 2009. The Authorization provides for the discharge by American Electric Power Company, Donald C. Cook Nuclear Plant, of a maximum of 60,000 gallons per day (21,900,000 gallons per year) of sanitary sewage and 2,400,000 gallons per day (876,000,000 gallons per year) of process wastewater.

The issuance of this permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environmental Quality permits, or approvals from other units of government as may be required by law.

Please review carefully the conditions of the Authorization. In particular, please notice that any change in the discharge will require a new Authorization by the DEQ.

Also enclosed are Compliance Monitoring Report (CMR) forms for your facility. Please forward this information to the person responsible for your compliance monitoring.

Questions concerning this Authorization can be directed to the Ground Water Permits Unit, Permits Section, Water Bureau, DEQ, telephone: 517-373-8148, or the Water Bureau, Kalamazoo District Office, telephone: 269-567-3500.

Sincerely,

James R. Janiczek, Chief
Groundwater Permits Unit
Permits Section
Water Bureau

Enclosure

cc: Mr. Blair Zordell
Berrien County Health Department
Mr. Greg Danneffel, DEQ - Kalamazoo

PERMIT NO. GW1810102

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

GROUNDWATER DISCHARGE PERMIT

In compliance with the provisions of Michigan's Natural Resources and Environmental Protection Act, 1994 P.A. 451, as amended (NREPA), Part 31, Water Resources Protection, and Part 41, Sewerage Systems,

Donald C. Cook Nuclear Plant
Indiana Michigan Power
American Electric Power
One Cook Place, Mail Zone 5A
Bridgman, Michigan 49106

is authorized to discharge **60,000 gallons per day, 21,900,000 gallons per year of sanitary sewage** and **2,400,000 gallons per day, 876,000,000 gallons per year of process wastewater** from the **Donald C. Cook Nuclear Plant,** located at

One Cook Place
Bridgman, Michigan 49106

designated as **Donald C. Cook Nuclear Plant**

to the groundwater of the State of Michigan in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

Rule Authorization:	**2218**
Wastewater Type:	**Sanitary Sewage and Process Wastewater**
Wastewater Treatment Method:	**Sanitary Sewage: Sequencing Batch Reactor** **Process Wastewater: Reverse Osmosis, Filtration, Neutralization**
Wastewater Disposal Method:	**Sanitary Sewage: Rapid Infiltration Basins** **Process Wastewater: Seepage Ponds**

The issuance of this permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Michigan Department of Environmental Quality (Department) permits, or approvals from other units of government as may be required by law.

This permit is based on a complete application submitted on December 1, 2008.

This permit takes effect on January 1, 2010. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules.

This permit and the authorization to discharge shall expire at midnight, January 1, 2014. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department by July 5, 2013.

Issued December 15, 2009

James R. Janiczek, Chief
Groundwater Permits Unit
Permits Section, Water Bureau

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3122 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each December 15th the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by March 1st for notices mailed by January 15th. The fee is due no later than 45 days after receiving the notice for notices mailed after January 15th.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Michigan Department of Environmental Quality (the "Department") required by this permit shall be made to the Kalamazoo District Supervisor of the Water Bureau. The Kalamazoo District Office is located at 7953 Adobe Road, Kalamazoo, Michigan 49009-5026, Telephone: 269-567-3500, Fax: 269-567-9440.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the Office of Administrative Hearings of the Michigan Department of Labor and Economic Growth, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Labor and Economic Growth may reject any petition filed more than 60 days after issuance as being untimely.

PART I

1. Effluent Limitations: Process Wastewater (Turbine Room Sump, Outfall OOD)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 2,400,000 gallons per day, 876,000,000 gallons per year, of process wastewater from the monitoring points listed below to the groundwater in the SW ¼ of the SE ¼, Section 6, T6S, R19W, Lake Township, Berrien County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
EFFLUENT Monitoring Point **EQ-1** Flow	2,400,000	GPD	Daily	Report Total
Flow	876,000,000	GPY	Annually	Calculation
Total Inorganic Nitrogen	Report	mg/l	2x/week	Calculation
Ammonia Nitrogen	Report	mg/l	2x/week	Grab
Nitrate Nitrogen	Report	mg/l	2x/week	Grab
Nitrite Nitrogen	Report	mg/l	2x/week	Grab
pH (Minimum)	6.5	S.U.	5x/week	Grab
pH (Maximum)	9.5	S.U.	5x/week	Grab
Ethanolamine	Report	mg/l	2x/week	Grab
Hydrazine	Report	ug/l	2x/week	Grab
Dissolved Oxygen	Report	mg/l	2x/week	Grab
Chloride	Report	mg/l	2x/week	Grab
Sodium	Report	mg/l	2x/week	Grab
Total Phosphorus	Report	mg/l	2x/month	Grab
LAND APPLICATION Monitoring Point **LA-1: Process Wastewater (Turbine Room Sump, Outfall OOD**				
Application Rate	26	gal/day/ft2	Daily	Calculation

a) Total Inorganic Nitrogen
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

b) Sampling Locations
Effluent flow and land application rate shall be measured in accordance with the approved sampling plan. The location and method of collecting and analyzing effluent quality and soil samples shall be in accordance with the approved sampling plan. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

PART I

2. Effluent Limitations: Sanitary Sewage (Outfall OOE)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 60,000 gallons per day, 21,900,000 gallons per year, of sanitary sewage from the monitoring points listed below to the groundwater in the SW ¼ of the SE ¼, Section 6, T6S, R19W, Lake Township, Berrien County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
EFFLUENT				
Monitoring Point EQ-2				
Flow	60,000	GPD	Daily	Report Total
Flow	21,900,000	GPY	Annually	Calculation
Total Inorganic Nitrogen	Report	mg/l	Weekly	Calculation
Ammonia Nitrogen	Report	mg/l	Weekly	Grab
Nitrate Nitrogen	Report	mg/l	Weekly	Grab
Nitrite Nitrogen	Report	mg/l	Weekly	Grab
pH (Minimum)	6.5	S.U.	Weekly	Grab
pH (Maximum)	9.5	S.U.	Weekly	Grab
Biochemical Oxygen Demand (BOD5)	35	mg/l	Weekly	Grab
Dissolved Oxygen	Report	mg/l	Weekly	Grab
Chloride	Report	mg/l	Weekly	Grab
Sodium	Report	mg/l	Weekly	Grab
Total Phosphorus	15	mg/l	Weekly	Grab
LAND APPLICATION				
Monitoring Point **LA-2, Sanitary Sewage (Outfall 00E)**				
Application Rates:				
Basin A	7.5	gal/day/ft2	Daily	Calculation
Monitoring Point **LA-3, Sanitary Sewage (Outfall 00E)**				
Basin B	17.8	gal/day/ft2	Daily	Calculation

a) Total Inorganic Nitrogen
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

b) Sampling Locations
Effluent flow and land application rate shall be measured in accordance with the approved sampling plan. The location and method of collecting and analyzing effluent quality and soil samples shall be in accordance with the approved sampling plan. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

PART I

3. Groundwater Monitoring and Limitations (Upgradient)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from the hydraulically upgradient groundwater monitor wells EW-8 and EW-16 as described below:

Parameter	Limit	Units	Frequency of Analysis	Sample Type
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH	(report)	S.U.	Quarterly	Grab
Specific Conductance	(report)	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	(report)	mg/l	Quarterly	Calculation
Ammonia Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrate Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrite Nitrogen	(report)	mg/l	Quarterly	Grab
Chloride	(report)	mg/l	Quarterly	Grab
Sodium	(report)	mg/l	Quarterly	Grab
Total Phosphorus	(report)	mg/l	Quarterly	Grab
Calcium	(report)	mg/l	Annually	Grab
Iron	(report)	mg/l	Annually	Grab
Magnesium	(report)	mg/l	Annually	Grab
Manganese	(report)	ug/l	Annually	Grab
Potassium	(report)	mg/l	Annually	Grab
Dissolved Oxygen	(report)	mg/l	Annually	Grab
Bicarbonate	(report)	mg/l	Annually	Grab
Sulfate	(report)	mg/l	Quarterly	Grab
Total Dissolved Solids	(report)	mg/l	Quarterly	Grab
Total Alkalinity	(report)	mg/l	Annually	Grab
Total Organic Carbon	(report)	mg/l	Annually	Grab
Phenols	(report)	mg/l	Annually	Grab
Ethanolamine	(report)	mg/l	Annually	Grab
Aluminum	(report)	ug/l	Annually	Grab
Barium	(report)	ug/l	Annually	Grab
Boron	(report)	ug/l	Annually	Grab
Cadmium	(report)	ug/l	Annually	Grab
Chromium	(report)	ug/l	Annually	Grab
Copper	(report)	ug/l	Annually	Grab
Lead	(report)	ug/l	Annually	Grab
Inorganic Mercury	(report)	ug/l	Annually	Grab
Nickel	(report)	ug/l	Annually	Grab
Selenium	(report)	ug/l	Annually	Grab
Silver	(report)	ug/l	Annually	Grab
Zinc	(report)	ug/l	Annually	Grab
Hydrazine	(report)	ug/l	Annually	Grab

a) Sampling Locations
Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of January, April, July and October. Annual sampling shall be in July. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

b) Total Inorganic Nitrogen at Groundwater Monitoring Points
The value for total inorganic nitrogen shall be reported as the sum of the values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

PART I

4. Groundwater Monitoring and Limitations (Downgradient)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from hydraulically downgradient groundwater monitor wells. The discharge of treated wastewater shall not cause the groundwater in monitor wells EW-1A, EW-12, EW13 and EW-19 to exceed the limitations below.

Parameter	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH (Minimum)	6.5	S.U.	Quarterly	Grab
pH (Maximum)	9.5	S.U.	Quarterly	Grab
Specific Conductance	(report)	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	5	mg/l	Quarterly	Calculation
Ammonia Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrate Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrite Nitrogen	0.5	mg/l	Quarterly	Grab
Chloride	250	mg/l	Quarterly	Grab
Sodium	120	mg/l	Quarterly	Grab
Total Phosphorus	1	mg/l	Quarterly	Grab
Calcium	(report)	mg/l	Annually	Grab
Iron	(report)	mg/l	Annually	Grab
Magnesium	200	mg/	lAnnually	Grab
Manganese	530	ug/l	Annually	Grab
Potassium	(report)	mg/l	Annually	Grab
Dissolved Oxygen	(report)	mg/l	Annually	Grab
Bicarbonate	(report)	mg/l	Annually	Grab
Sulfate	250	mg/l	Quarterly	Grab
Total Dissolved Solids	(report)	mg/l	Quarterly	Grab
Total Alkalinity	(report)	mg/l	Annually	Grab
Total Organic Carbon	(report)	mg/l	Annually	Grab
Phenols	(report)	mg/l	Annually	Grab
Ethanolamine	2	mg/l	Annually	Grab
Aluminum	150	ug/l	Annually	Grab
Barium	440	ug/l	Annually	Grab
Boron	1900	ug/l	Annually	Grab
Cadmium	2.2	ug/l	Annually	Grab
Chromium	11	ug/l	Annually	Grab
Copper	9	ug/l	Annually	Grab
Lead	10	ug/l	Annually	Grab
Inorganic Mercury	0.0013	ug/l	Annually	Grab
Nickel	52	ug/l	Annually	Grab
Selenium	5	ug/l	Annually	Grab
Silver	0.2	ug/l	Annually	Grab
Zinc	120	ug/l	Annually	Grab
Hydrazine	10	ug/l	Annually	Grab

a) Sampling Locations
Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of January, April, July and October. Annual sampling shall be in July. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

b) Total Inorganic Nitrogen at Groundwater Monitoring Points
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

PART I

5. Schedule of Compliance

The permittee shall comply with the following schedule. Submittals shall comply with Rule 323.2218 which may be obtained via the Internet at http://www.deq.state.mi.us/documents/deq-wmd-gwp-part22.pdf. All submittals shall be to the Department.

a) On or before **60 days after permit issuance**, the permittee shall submit for review and approval, an updated Sampling and Analysis Plan that includes both effluent and groundwater sampling requirements pursuant to Rule 2223.

6. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the NREPA.

7. Submittal Requirements for Self-Monitoring Data

The permittee shall submit self-monitoring data monthly on the Department's Compliance Monitoring Report (CMR) for each calendar month of the authorized discharge period to:

NMS-CMR-Data Entry-Groundwater, Water Bureau, Michigan Department of Environmental Quality
P.O. Box 30273, Lansing, Michigan, 48909-7773.

AND

Kalamazoo District Office, Water Bureau, Michigan Department of Environmental Quality, 7953 Adobe Road, Kalamazoo, Michigan 49009-5026

The forms shall be postmarked no later than the 15th day of the month following each month of the authorized discharge period(s).

Alternative Daily Discharge Monitoring Report formats may be used if they provide equivalent reporting details and are approved by the Department.

8. Facility Operation and Maintenance

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall comply with the inspection, operation and maintenance program requirements specified below.

Location	Condition	Measurement Frequency	Sample Type
Seepage Pond			
	Dike Integrity	Weekly	Visual Observation
	Vegetation Control	Weekly	Visual Observation
	Nuisance Animals	Weekly	Visual Observation
	Odors	Weekly	Olfactory Observation
Rapid Infiltration Beds	Vegetation Control	Weekly	Visual Observation

a) **Pond Inspection**
These inspections shall include:
(1) the pond dikes for vegetative growth, erosion, slumping, animal burrowing or breakthrough;
(2) the pond for growth of aquatic plants, offensive odors, insect infestations, scum, floating sludge, and septic conditions;
(3) pond warning signs.

PART I

b) **Pond Maintenance**
The permittee shall implement a Facility Maintenance Program that incorporates the following management practices unless otherwise authorized by the Department.
(1) To allow for ease of access for inspections, with the exception of occasional trees, vegetation shall be maintained at a height not more than 24 inches above the ground around the perimeter of the pond.
(2) Not-more-than 10 percent of the water surface shall be covered by floating vegetation and not more than 10 percent of the water perimeter may have emergent rooted aquatic plants.
(3) Dike damage caused by erosion, slumping or animal burrowing shall be corrected immediately and steps taken to prevent occurrences in the future.
(4) The occurrence of scum, offensive odors, insect infestations, and septic conditions shall be minimized.

9. General Conditions

a) The discharge shall not be, or not be likely to become, injurious to the protected uses of the waters of the state.

b) The discharge shall not cause runoff to, ponding on, or flooding of adjacent property, shall not cause erosion, and shall not cause nuisance conditions.

c) The point of discharge shall be located not less than 100 feet inside the boundary of the property where the discharge occurs, unless a lesser distance is specifically authorized in writing by the Department.

d) The discharge shall not create a facility as defined in Part 201, Environmental Response, of the NREPA.

10. Other Conditions

a) At the time of application for permit reissuance, the permittee shall submit chemical analysis of 4 samples of the effluent process water and sanitary sewage for the list of parameters in Attachment I and II.
b) Basis of Design – The discharge shall be treated in accordance with the approved basis of design pursuant to Rule 2218(2).
c) Wastewater Characterization - The wastewater being treated shall be of the same chemical, biological, and physical characteristics as described in the characterization required pursuant to Rule 2220.
d) Land Application: Rapid Infiltration
(1) The system shall consist of two (2) or more cells or absorption areas that can be alternately loaded and rested or consist of one (1) cell or absorption area preceded by an effluent storage or stabilization pond system. If only one (1) cell or absorption area is provided, then the storage or stabilization pond shall be operated on a fill and draw basis and have sufficient capacity to allow intermittent loading of the cell or absorption area.
(2) For a system that has more than one (1) cell or absorption area, an individual cell or absorption area of the system shall be capable of being taken out of service without disrupting application to other cells or absorption areas of the system.
(3) An appropriate hydraulic loading cycle shall be developed and implemented to maximize long-term infiltration rates and allow for periodic maintenance.

11. Compliance Requirements

Compliance with all applicable requirements set forth in Parts 31 and 41 of the NREPA, and related regulations and rules is required. All instances of noncompliance with concentration limitations of effluent or groundwater shall be reported as follows.

a) If the facility is in a wellhead protection area, within 48 hours from the time the permittee becomes aware of the noncompliance, the permittee shall report noncompliance to the public water supply manager.

b) Within seven (7) days from the time the permittee becomes aware of the noncompliance, the permittee shall report, in writing, all instances of noncompliance. Written reporting shall include all of the following: 1) the name of the substance(s) for which a limit was exceeded; 2) the concentration at which the substance was found; and 3) the location(s) at which the limit was exceeded.

PART I

c) Within 14 days from the time the permittee becomes aware of the noncompliance, the permittee shall resample the monitoring point at which the limit was exceeded for the substance for which a limit was exceeded.

d) Within 60 days from the time the permittee becomes aware of the noncompliance, the permittee shall submit a written report that shall include all of the following: 1) the results of the confirmation sampling; 2) an evaluation of the cause for the limit being exceeded and the impact of that event to the groundwater; and 3) a proposal detailing steps taken or to be taken to prevent recurrence.

e) In accordance with applicable rules, the Department may require additional activities including, but not limited, to the following:
   (1) Change the monitoring program, including increasing the frequency of effluent monitoring or groundwater sampling, or both.
   (2) Develop and implement a groundwater monitoring program if one is not in place.
   (3) If the discharge is in a designated wellhead protection area, assess the affects of the discharge on the public water supply system.
   (4) Review the operational or treatment procedures, or both, at the facility.
   (5) Define the extent to which groundwater quality exceeds the applicable criteria that would designate the site as a facility under Part 201.
   (6) Revise the operational procedures at the facility.
   (7) Change the design or construction of the wastewater operations at the facility.
   (8) Initiate an alternative method of waste treatment or disposal.
   (9) Remediate contamination to comply with the terms of Part 201, if applicable.

f) If the Department determines there is a change in groundwater quality from a normal operating baseline that indicates the concentration of a substance in groundwater may exceed an applicable limit, then the discharger shall take the following actions if required by the Department:
   (1) Change the monitoring program, including increasing the frequency of effluent sampling or groundwater sampling, or both.
   (2) Review the operational or treatment procedures, or both, at the facility.

12. Request for Discharge of Water Treatment Additives

In the event a permittee proposes to discharge water treatment additives (WTAs) to groundwater, the permittee shall submit a request to discharge WTAs to the Department for approval. Such requests shall be sent to the Surface Water Assessment Section, Water Bureau, Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan 48909, with a copy to the Department contact listed on the cover page of this permit. Instructions to submit a request electronically may be obtained via the Internet (http://www.michigan.gov/deq and on the left side of the screen click on Water, Water Quality Monitoring, and Assessment of Michigan Waters; then click on the Water Treatment Additive List which is under the Information banner). Written approval from the Department to discharge such WTAs at specified levels shall be obtained prior to discharge by the permittee. Failure to obtain approval prior to discharging any WTA is a violation of this permit. Additional monitoring and reporting may be required as a condition for the approval to discharge the WTA. WTAs include such chemicals as herbicides used to kill weeds and grasses as part of lagoon maintenance.

A request to discharge WTAs to groundwater shall include all of the following:

a) product Information:
   (1) name of the product;
   (2) Material Safety Data Sheet;
   (3) product function (i.e. microbiocide, flocculants, etc.);
   (4) specific gravity if the product is a liquid; and
   (5) annual product use rate (liquids in gallons per year and solids in pounds per year);

b) ingredient information:
   (1) name of each ingredient;
   (2) CAS number for each ingredient; and
   (3) fractional content by weight for each product;

c) the monitoring point from which the WTA is to be discharged;

PART I

d) the proposed WTA discharge concentration;

e) the discharge frequency (i.e., number of hours per day and number of days per year);

f) the type of removal treatment, if any, that the WTA receives prior to discharge;

g) relevant mammalian toxicity studies for the product or all of its constituents (if product toxicity data are submitted, the applicant shall provide information showing that the product tested has the same composition as the product listed under Item "a" above. Preferred studies are subchronic or chronic in duration, use the oral route of exposure, examine a wide array of endpoints and identify a no-observable-adverse-effect-level. Applicants are strongly encouraged to provide the preferred data. If preferred data are not available, then the minimum information needed is an oral rat LD50 study. In addition, an environmental fate analysis that predicts the mobility of the product/ingredients and their potential to migrate to groundwater may be provided.

h) If the discharge of the WTA to groundwater is within 1,000 feet of a surface water body, the following information shall also be provided:
   (1) a 48-hour LC50 or EC50 for a North American freshwater planktonic crustacean (either Ceriodaphnia sp., Daphnia sp., or Simocephalus sp.); and
   (2) the results of a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of Rule 323.1057(2) of the Water Quality Standards.

Prior to submitting the request, the permittee may contact the Surface Water Assessment Section by telephone at 517-335-1180 or via the Internet at the address given above to determine if the Department has the product toxicity data required by Item "g" above. If the Department has the data, the permittee will not need to submit product toxicity data.

PART II

Definitions

This list of definitions may include terms not applicable to this permit.

Annual frequency of analysis refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

By-Pass means any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit.

Class B Biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Daily concentration is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration.
For pH, report the maximum value of any individual sample taken during the month and the minimum value of any individual sample taken during the month.

Department means the Michigan Department of Environmental Quality.

Detection Level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

Flow Proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

Furrow stream is the volume, in gallons per unit time, usually per minute, of wastewater discharged into the furrow.

GPD means gallons per day.

GPY means gallons per year.

Grab sample is a single sample taken at neither a set time nor flow.

MGD means million gallons per day.

Mg/l is a unit of measurement and means milligrams per liter.

Monthly frequency of analysis refers to a calendar month. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

POTW is a publicly owned treatment works.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

PART II

Quarterly frequency of analysis refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Report means there is no limit associated with the individual substance for the medium that is being sampled, that the permittee must only report the result of the laboratory analysis.

Weekly frequency of analysis refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

24-Hour Composite sample is a flow proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period.

PART II

1. Start-up Notification

If the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

2. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

3. Notification of Changes in Discharge, Treatment or Facility Operations

If proposing to modify the quantity or effluent characteristics of the discharge or the treatment process for the discharge, the permittee shall notify the Department of the proposed modification prior to its occurrence. Significant modifications require the permittee to submit an application. A permit modification shall be processed in accordance with applicable rules and laws prior to implementation of the modification.

4. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittee and the new permittee containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

5. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Guidance on how to collect representative samples is contained in Guidesheet III, "Characterization of Wastewater", which is available via the Internet at http://www.deq.state.mi.us/documents/deq-wmd-gwp-P22GuidshtIII.pdf.

6. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to either SW-846, 3rd edition, September 1986, "Test Methods for the Evaluation of Solid Waste, Physical-Chemical Methods", or Section 304(h) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq), 40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants, unless specified otherwise in this permit. Requests to use test procedures not defined here shall be submitted to the Department for review and approval. The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

7. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

8. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

PART II

9. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Department.

10. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the NREPA or Rule 35 of the Mobile Home Park Commission Act (1987 PA 96) for assurance of proper facility operation shall be submitted as required by the Department.

11. Permit Monitoring Requirements

Pursuant to Rule 2223(1), the Department may modify the effluent or groundwater monitoring parameters or frequency requirements of this permit. The permittee may request a modification of the parameters of frequency of monitoring of this permit with adequate supporting documentation.

12. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwater of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the first page of this permit, or if the notice is provided after regular working hours call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660).

Within ten (10) days of the release, the permittee shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventative measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

13. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24-hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

a) that an upset occurred and that the permittee can identify the specific cause(s) of the upset;

b) that the permitted wastewater treatment facility was, at the time, being properly operated; and

c) that the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

PART II

14. Bypass Prohibition and Notification

a) Bypass Prohibition - Bypass is prohibited unless:
(1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and

(3) the permittee submitted notices as required under 14.b. or 14.c. below.

b) Notice of Anticipated Bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 14.a. above.

c) Notice of Unanticipated Bypass - The permittee shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the first page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittee becomes aware of the circumstances.

d) Written Report of Bypass - A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.

e) Bypass Not Exceeding Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of 14.a., 14.b., 14.c., and 14.d., above. This provision does not relieve the permittee of any notification responsibilities under Part II, Section 12 of this permit.

f) Definitions
(1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

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

15. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

16. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

a) provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or

b) upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

PART II

17. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the NREPA.

18. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit or other pollutants) removed from or resulting from treatment or control of wastewaters, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the NREPA, Part 31, Water Resources Protection; Part 55, Air Pollution Control; Part 111, Hazardous Waste Management; Part 115, Solid Waste Management; Part 121, Liquid Industrial Wastes; Part 301, Inland Lakes and Streams; and Part 303, Wetland Protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwater of the state.

19. Treatment System Closure

a) In the event that discharges from a treatment system are planned to be eliminated, the permittee shall do the following:
   (1) Eliminate all physical threats associated with discharge related facilities not later than five (5) days after use of the facility has ceased.
   (2) Not less than 75 days before cessation of discharge related activities, characterize any wastewater, sediments and sludges related to the discharge, pursuant to Rule 2226(4)(a)(i-iii).

b) Within 30 days of completing the characterization, the discharger shall submit a closure plan to the Department for review and approval that describes how the wastewater, sediments and sludges associated with the discharge will be handled in accordance with Part 31, Part 115, Part 111, or Part 201, as appropriate.

c) Closure activities must be initiated within 30 days of Department approval of the Closure Plan, and must be completed within one (1) year of approval of the Closure Plan.

d) If the groundwater exceeds a standard established by the Department that would result in the site qualifying as a facility under Part 201, then the discharger shall comply with the requirements of Part 201.

e) The Department may require post closure monitoring activities to evaluate the effectiveness of the closure activities. Any wastewater or residual disposal inconsistent with the approved plan shall be considered a violation of this permit. After proper closure of the treatment system, this permit may be terminated.

f) The discharger must certify completion of the approved closure plan. Certification shall be by a qualified person described as follows:
   (1) An engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, being §339.101 et seq. Of the Michigan Compiled Laws, and known as the occupational code.
   (2) A professional geologist certified by the American Institute of Professional Geologists, 7828 Vance Drive, Suite 103, Arvada, Colorado 80003.
   (3) A professional hydrologist certified by the American Institute of Hydrology, 2499 Rice Street, Suite 135, St. Paul, Minnesota 55113.
   (4) A groundwater professional certified by the National Ground Water Association, Association of Groundwater Scientists and Engineers Division, 601 Dempsey Road, Westerville, Ohio 43081.
   (5) Another groundwater professional certified by an organization approved by the Department.

20. Right of Entry

The permittee shall allow the Department or any agent appointed by the Department, upon the presentation of credentials:

a) to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b) at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any effluent discharge, discharge of pollutants, and groundwater monitoring wells and soils associated with the discharge.

PART II

21. Untreated or Partially Treated Sewage Discharge Requirements

In accordance with Section 324.3112a of the Michigan Act, if untreated sewage, including sanitary sewer overflows (SSO) and combined sewer overflows (CSO), or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the entity responsible for the sewer system shall immediately, but not more than 24 hours after the discharge begins, notify, by telephone, the Department, local health departments, a daily newspaper of general circulation in the county in which the permittee is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located that the discharge is occurring.

At the conclusion of the discharge, written notification shall be submitted in accordance with and on the "CSO/SSO Reporting Form" available via the internet at: http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3715---,00.html, or, alternatively for combined sewer overflow discharges, in accordance with notification procedures approved by the Department.

In addition, in accordance with Section 324.3112a of the Michigan Act, each time a discharge of untreated sewage or partially treated sewage occurs, the permittee shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The testing shall be done at locations specified by each affected local county health department but shall not exceed 10 tests for each separate discharge event. The affected local county health department may waive this testing requirement, if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event. The results of this testing shall be submitted with the written notification required above, or, if the results are not yet available, submit them as soon as they become available. This testing is not required, if the testing has been waived by the local health department, or if the discharge(s) did not affect surface waters.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

22. Availability of Reports

Except for data determined to be confidential under Rule 323.2128 of the Michigan Administrative Code, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Sections 3112, 3115, 4106 and 4110 of the NREPA.

23. Construction Certification

On or before 30 days following completion of construction of any new wastewater treatment facilities after issuance of this permit, pursuant to Rule 2218(4)(a), the permittee shall submit a certification that a quality control and quality assurance program was utilized and the facilities constructed were built consistent with standard construction practices to comply with the permit and the NREPA. This certification shall be by an engineer licensed under Act 299 of the Public Acts of 1980.

PART III
DISCHARGE PROHIBITIONS

1. Discharge to the Surface Waters

This permit does not authorize any discharge to the surface waters. The permittee is responsible for obtaining any permits required by federal or state laws or local ordinances.

2. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation.

3. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits or approvals as may be required by law.

4. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Conditions, or terms of this permit constitutes a violation of the NREPA and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

5. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.

ATTACHMENT I

Table I
Volatile Organics
EPA Method 8260 Plus

Parameters	Reporting Levels (µg/l)	Groundwater Limit Rule 2227* (µg/l)	Groundwater Limit Rule 2228* (µg/l)	CAS #
Acrylonitrile	1		1	107131
Benzene	1		1	71432
Bromochloromethane	1		1	
Bromodichloromethane	1		1	75274
Bromoform	1		1	75252
Bromomethane	5		5	74839
2-Butanone (MEK)	(5)	450		78933
Carbon Disulfide	5		5	75150
Carbon Tetrachloride	1		1	56235
Chlorobenzene	1	15	1	108907
Chloroethane	5		5	75003
Chloroform	1		1	67663
Chloromethane	5		5	74873
Dibromochloromethane	1		1	124481
1,2-Dibromo-3-chloropropane	5		5	
Dibromomethane	1		1	74953
1,2-Dibromoethane	1		1	
1,2-Dichlorobenzene	1	25		95501
1,3-Dichlorobenzene	1	F		541731
1,4-Dichlorobenzene	1	15		106467
1,4-Dichloro-2 butene (trans)	1		1	
Dichlorodifluoromethane	5	40	40	75718
1,1-Dichloroethane	1		1	75343
1,2-Dichloroethane	1		1	107062
1,1-Dichloroethylene	1		1	75354
1,2-Dichloroethene (cis)	1	5		
1,2-Dichloroethene (trans)	1	5		
1,2-Dichloropropane	1		1	78875
1,3-Dichloroproprene (total = cis+trans)	1		1	542756
Diethyl ether	10		10	60297
Ethylbenzene	1	25		100414
Hexachloroethane	1	F		67721
2-Hexanone	5		5	591786
Isopropylbenzene	1		1	98828
Methyl Iodine	1		1	
Methylene Chloride	(5)		(5)	75092
2-Methylnaphthalene	5		5	91576

ATTACHMENT I

Table I (continued)
Volatile Organics
EPA Method 8260 Plus

Parameters	Reporting Levels (µg/l)	Groundwater Limit Rule 2227* (µg/l)	Groundwater Limit Rule 2228* (µg/l)	CAS #
4-Methyl-2 pentanone (MIBK)	5		5	108101
Methyl Tertiary Butyl Ether (MTBE)	5		5	1634044
Naphthalene	5	15		91203
2-Propanone (acetone)	25		25	
n-Propylbenzene	1		1	103651
Styrene	1	20		100425
1,1,1,2-Tetrachloroethane	1		1	630206
1,1,2,2-Tetrachloroethane	1		1	79345
Tetrachloroethylene	1		1	127184
Toluene	1	35		108883
1,2,4-Trichlorobenzene	5	15		120821
1,1,1-Trichloroethane	1	15		71556
1,1,2-Trichloroethane	1		1	79005
Trichloroethylene	1		1	79016
Trichlorofluoromethane	5		5	75694
1,2,3-Trichloropropane	1		1	96184
1,2,4-Trimethylbenzene	1		1	95636
1,3,5-Trimethylbenzene	1		1	108678
Vinyl Chloride	1		1	75014
Xylene (total = o+m+p)	2	35		1330207

( ) = Detection limit dependent upon laboratory background level

* The total of all Trihalomethanes, **Bromodichloromethane, Bromoform, Chloroform and Dibromochloromethane** must be less than 20 ug/l.

** Rule 2227 and Rule 2228 deal with compliance actions that must be followed in the event a permit limit is exceeded in either the effluent or the groundwater.

Currently there are no Part 201 Residential Criteria for this substance.

ATTACHMENT II

Table II
Metals

Groundwater parameters and detection limits

Parameter	Groundwater Detection Limits (ug/l)	Parameter	Groundwater Detection Limits (ug/l)
Aluminum	50	Lithium	8
Antimony	1	Manganese	5
Arsenic	1	Mercury	0.2
Barium	5	Molybdenum	25
Beryllium	1	Nickel	2
Boron	20	Selenium	1
Cadmium	0.2	Silver	0.5
Chromium	1	Strontium	5
Chromium VI	5	Titanium	10
Cobalt	2	Thallium	2
Copper	1	Vanadium	10
Lead	1	Zinc	4

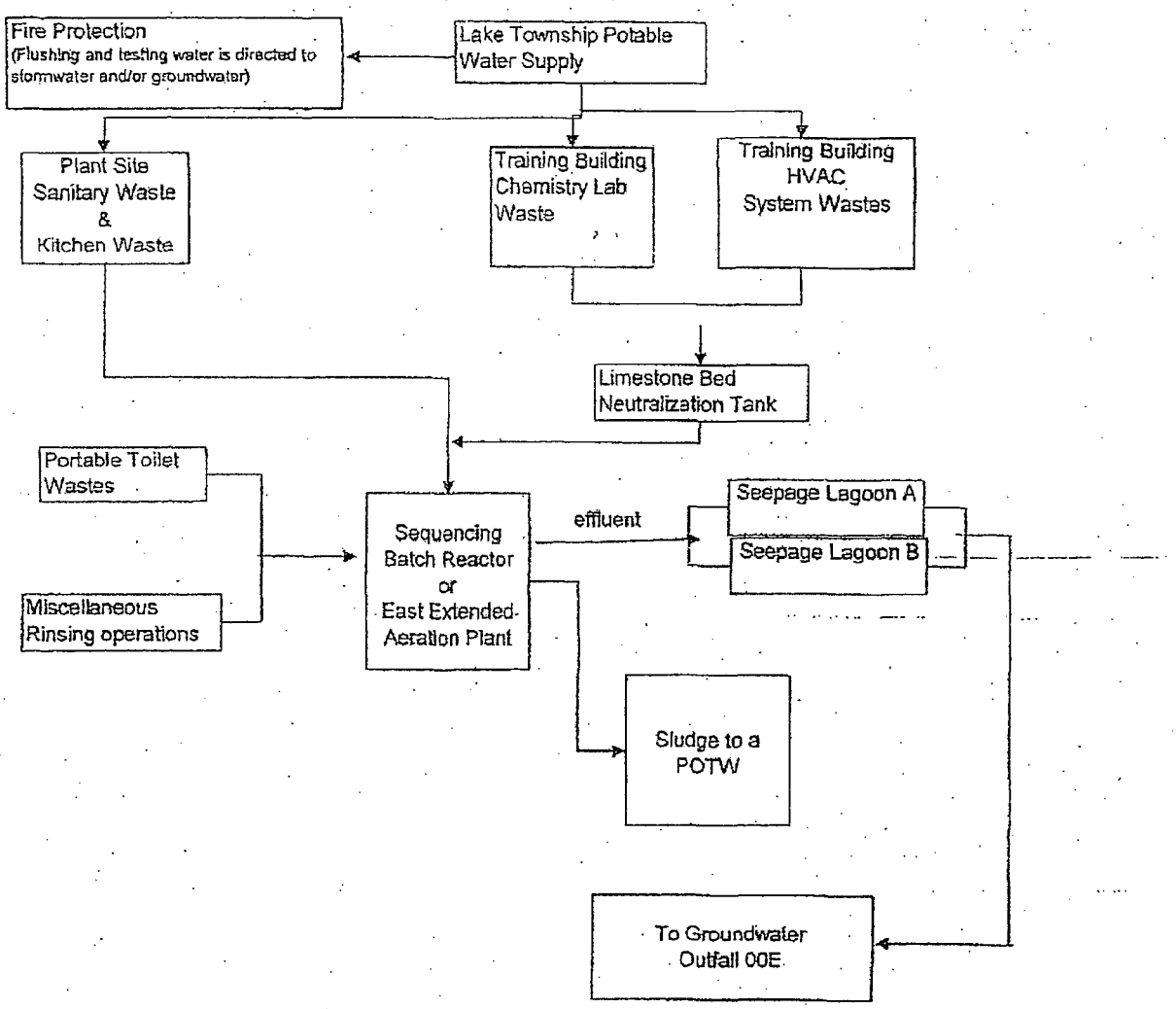
Table III
Inorganics

Groundwater parameters and detection limits

Parameter	Groundwater Detection Limits (ug/l)
Nitrate as N	10
Nitrite as N	10
Ammonia as N	10
Chloride	1000
Sodium	1000
Total Phosphorus	10

ATTACHMENT III

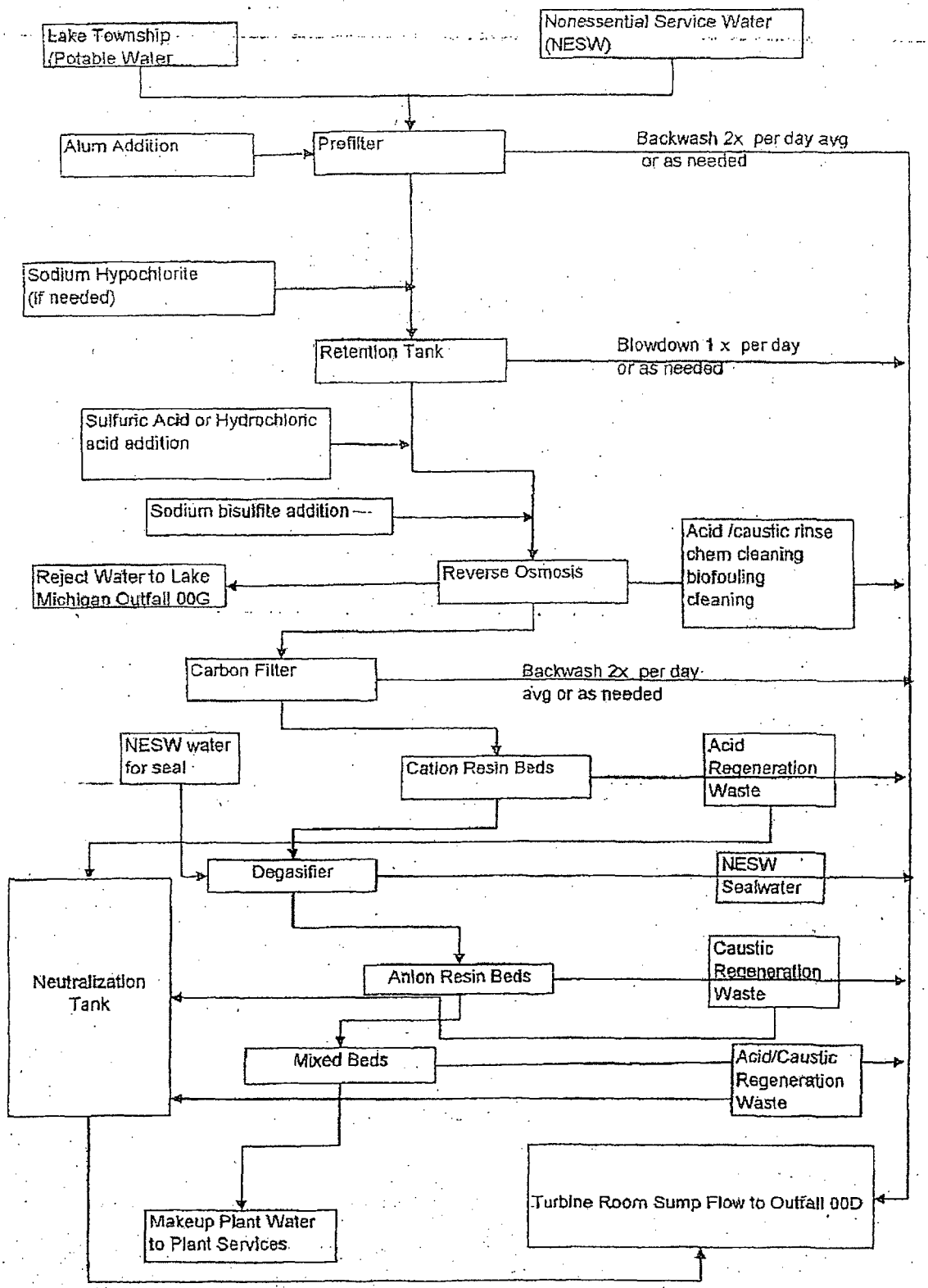
DONALD C. COOK NUCLEAR PLANT
SANITARY SEWAGE FLOW DIAGRAM GW1810102



ATTACHMENT IV

DONALD C. COOK NUCLEAR PLANT
PROCESS WASTEWATER FLOW DIAGRAM

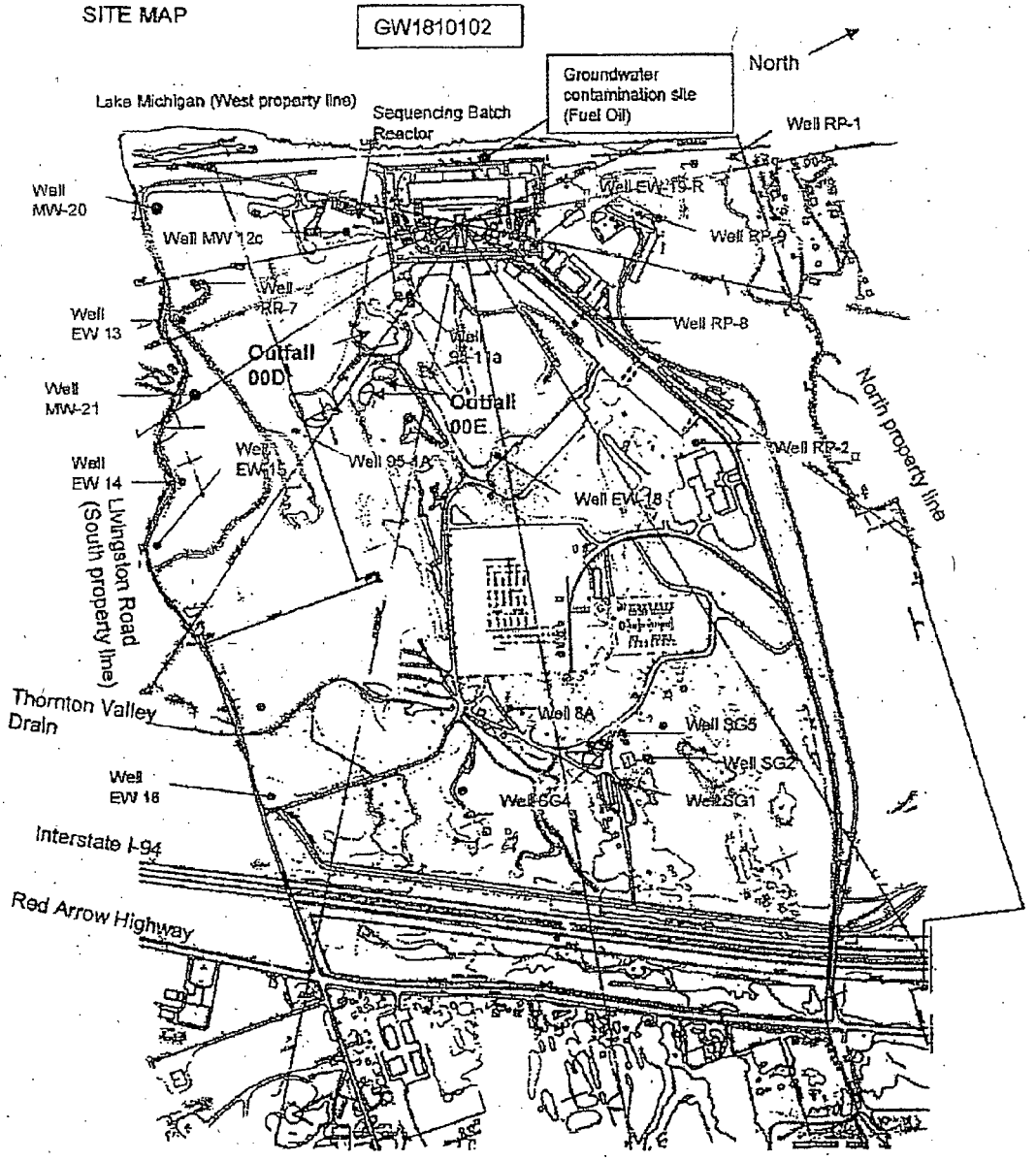
GW1810102



ATTACHMENT V

DONALD C. COOK NUCLEAR PLANT
SITE MAP

GW1810102



Distance from discharge 00D	Distance from discharge 00E	Cook Nuclear Plant
South property line: 1200'	South property line: 1300'	Berrien County
Lake Michigan: 1000'	Lake Michigan: 1500'	Lake Township
East property line: 3600'	East property line: 3400'	Scale: 1" = 1000'
North property line: 2600'	North property line: 2600'	

INDIANA MICHIGAN POWER
A unit of American Electric Power

Indiana Michigan Power
One Cook Place
Bridgman, MI 49106
IndianaMichiganPower.com

October 29, 2009

AEP-NRC-2009-77

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Donald C. Cook Nuclear Plant Units 1 and 2
SUBMITTAL OF RENEWED NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT, MI0005827

On September 30, 2009, the Michigan Department of Environmental Quality issued renewed National Pollutant Discharge Elimination System (NPDES) permit number MI0005827 to Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2. This permit takes effect on January 1, 2010, and will supersede NPDES permit number MI0005827, which had an expiration date of October 1, 2008. In order for that permit to remain in effect beyond the original expiration date, I&M was required to submit the application for renewal and the application fee by April 4, 2008. The application and fee were submitted on April 2, 2008.

Section 3.2 of Part II of Appendix B of the Environmental Technical Specifications for CNP requires that the Nuclear Regulatory Commission be notified of any changes and additions to the NPDES permit within 30 days following the date the change is approved. The enclosure to this letter provides a copy of the renewed NPDES permit.

This letter contains no new commitments. Should you have any questions or concerns regarding this submittal, please contact Mr. Jon H. Harner, Environmental Manager, at (269) 465-5901, extension 2102.

Sincerely,

James M. Petro, Jr.
Regulatory Affairs Manager

JEN/rdw

Enclosure

C001

NRR

c: T. A. Beltz, NRC Washington DC
J. T. King, MPSC, w/o enclosure
S. M. Krawec, AEP Ft. Wayne, w/o enclosure
MDEQ – WHMD/RPS, w/o enclosure
NRC Resident Inspector
M. A. Satorius, NRC Region III

ENCLOSURE TO AEP-NRC-2009-77

RENEWED NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM PERMIT NUMBER MI0005827

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

October 8, 2009

Indiana Michigan Power Company
One Cook Place
Bridgman, Michigan 49106

Dear Sir or Madam:

SUBJECT: National Pollutant Discharge Elimination System (NPDES); Permit No. MI0005827
Designated Name: American Elec Power-Cook Plt

Your NPDES Permit has been processed in accordance with the appropriate state and federal regulations. It contains the requirements necessary for you to comply with state and federal water pollution control laws.

The issuance of this permit does not authorize the violation of any federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environmental Quality (DEQ) permits, or approvals from other units of government as may be required by law.

REVIEW THE PERMIT EFFLUENT LIMITS AND COMPLIANCE SCHEDULES CAREFULLY. These are subject to the criminal and civil enforcement provisions of both state and federal law. Permit violations are audited by the DEQ and the United States Environmental Protection Agency (USEPA), and may appear in a published quarterly noncompliance report made available to agencies and the public.

Your monitoring and reporting responsibilities must be complied with in accordance with this permit. If required by the permit, self-monitoring data shall be reported via the Michigan DEQ Electronic Environmental Discharge Monitoring Reporting (e2-DMR) system. Other reports, notifications, or questions regarding the enclosed permit or the NPDES program should be directed to the following address:

Mr. Gregory Danneffel, District Supervisor
Kalamazoo District Office, Water Bureau, DEQ
7953 Adobe Road
Kalamazoo, Michigan 49009-5026
Telephone: 269-567-3500, Fax: 269-567-9440

Sincerely,

Daniel Dell, Chief
Permits Section
Water Bureau
517-241-1346

dd/sea

Enclosure: Permit No. MI0005827
cc/enc: USEPA-Region 5
Mr. Jon Harner, Environmental Manager, American Electric Power Company
Mr. Blair Zordell, Senior Environmental Specialist, Donald C. Cook Nuclear Plant
Mr. Gregory Danneffel, Kalamazoo District Supervisor, Water Bureau (electronic)
PCS Unit, Water Bureau
File

PERMIT NO. MI0005827

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 *et seq.*) (the "Federal Act"), Michigan Act 451, Public Acts of 1994, as amended (the "Michigan Act"), Parts 31 and 41, and Michigan Executive Orders 1991-31, 1995-4, and 1995-18,

Indiana Michigan Power Company
One Cook Place
Bridgman, Michigan 49106

is authorized to discharge from the **American Electric Power Company, Donald C. Cook Nuclear Plant,** located at

One Cook Place
Bridgman, Michigan 49106

designated as **American Elec Power-Cook Plt**

to the receiving water named Lake Michigan, in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit.

This permit is based on a complete application submitted on April 4, 2008, and amended through June 5, 2009.

This permit takes effect on January 1, 2010. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date this permit shall supersede NPDES Permit No. MI0005827, expiring October 1, 2008.

This permit and the authorization to discharge shall expire at midnight, **October 1, 2013.** In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department by **April 4, 2013.**

Issued September 30, 2009.

Daniel Dell

Daniel Dell, Chief
Permits Section
Water Bureau

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the Michigan Act, the permittee shall make payment of an annual permit fee to the Michigan Department of Environmental Quality (Department) for each October 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by January 15 for notices mailed by December 1. The fee is due no later than 45 days after receiving the notice for notices mailed after December 1.

Annual Permit Fee Classification: Industrial-Commercial Major

In accordance with Section 324.3118 of the Michigan Act, the permittee shall make payment of an annual storm water fee to the Department for each January 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by March 15 for notices mailed by February 1. The fee is due no later than 45 days after receiving the notice for notices mailed after February 1.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Department required by this permit shall be made to the Kalamazoo District Supervisor of the Water Bureau. The Kalamazoo District Office is located at 7953 Adobe Road, Kalamazoo, Michigan 49009-5026, Telephone: 269-567-3500, Fax: 269-567-9440.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the State Office of Administrative Hearings and Rules of the Michigan Department of Energy, Labor, and Economic Growth, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Energy, Labor, and Economic Growth may reject any petition filed more than 60 days after issuance as being untimely.

PART I

Section A. Limitations and Monitoring Requirements

1. Final Effluent Limitations, Monitoring Points 001A and 002A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 1500 MGD of noncontact condenser cooling water, miscellaneous low volume waters, intake screen wash water, and storm water runoff from Monitoring Point 001A through Outfall 001; and a maximum of 1820 MGD of noncontact condenser cooling water, miscellaneous low volume waters, intake screen wash water, and storm water runoff from Monitoring Point 002A through Outfall 002. Outfalls 001 and 002 discharge to Lake Michigan. Such discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Limits for Quantity or Loading Monthly	Daily	Units	Maximum Limits for Quality or Concentration Monthly	Daily	Units	Frequency of Analysis	Sample Type
Flow	(report)	(report)	MGD	—	—	—	Daily	Report Total Daily Flow
Total Residual Oxidant (TRO)								
During Chlorination - No Bromine Use								
Discharge Mode								
Continuous (greater than 160 min/day)	—	—		—	38	µg/l	5×Weekly	Grab
Intermittent (less than/equal to 160 min/day)		—		—	200	µg/l	5×Weekly	Grab
During Bromine Use - the discharge of bromine shall not exceed 120 min/day								
Intermittent (less than/equal to 120 min/day)		—		—	50	µg/l	5×Weekly	Grab
TRO Discharge Time	—	—	—	—	(report)	min/day	5×Weekly	Report Total Discharge Time
Temperature								
Intake	—	—	—	—	(report)	°F	Daily	Reading
Discharge	—	—	—	—	(report)	°F	Daily	Reading
Heat Addition	—	17,300	MBTU/hr	—	—	—	Daily	Calculation
Outfall Observation	(report)	—	—	—	—	—	Daily	Visual
Total Mercury								
Intake	(report)	—	lbs/day	(report)	—	ng/l	Quarterly	Grab
Discharge	(report)	—	lbs/day	(report)	—	ng/l	Quarterly	Grab
	12-Month Rolling Average			12-Month Rolling Average				
Total Mercury	—	—	—	7.0	—	ng/l	Monthly	Calculation
				Minimum Daily	Maximum Daily			
pH	—	—	—	6.5	9.0	S.U.	Daily	Grab

a. Narrative Standard
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.

PART I

Section A. Limitations and Monitoring Requirements

b. Monitoring Location
Samples, measurements, and observations taken in compliance with the monitoring requirements above shall be taken prior to discharge to Lake Michigan.

c. Outfall Observation
Any unusual characteristics of the discharge (i.e., unnatural turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits) shall be reported within 24 hours to the Department followed with a written report within five (5) days detailing the findings of the investigation and the steps taken to correct the condition.

d. Water Treatment Additives
This permit does not authorize the discharge of water additives without approval from the Department. Approval of water additives is authorized under separate correspondence. Water additives include any material that is added to water used at the facility or to a wastewater generated by the facility to condition or treat the water. In the event a permittee proposes to discharge water additives, including an increased discharge concentration of a previously approved water additive, the permittee shall submit a request to the Department for approval. See Part I.A.6. for information on requesting water treatment additive use.

e. Final Effluent Limitation for Total Mercury
The final limit for total mercury is the Discharge Specific Level Currently Achievable (LCA) based on a multiple discharger variance from the water quality-based effluent limit of 1.3 ng/l, pursuant to Rule 323.1103(9) of the Water Quality Standards. Compliance with the LCA shall be determined as a 12-month rolling average. The 12-month rolling average shall be determined by adding the present monthly average result to the preceding 11 monthly average results then dividing the sum by 12. For facilities without sufficient data needed to calculate the 12-Month Rolling Average, enter '*E' on your monthly Discharge Monitoring Report (DMR) form until 12 months, or the equivalent of 12 months, of monthly monitoring data have been obtained, then begin reporting the calculated 12-Month Rolling Average as required. For facilities with quarterly monitoring requirements for total mercury, quarterly monitoring shall be equivalent to 3 months of monitoring in calculating the 12-month rolling average. Facilities that monitor more frequently than monthly for total mercury must determine the monthly average result, which is the sum of the results of all data obtained in a given month divided by the total number of samples taken, in order to calculate the 12-month rolling average. If the 12-month rolling average for any quarter is less than or equal to the LCA, the permittee will be considered to be in compliance for total mercury for that quarter, provided the permittee is also in full compliance with the Pollutant Minimization Program for Total Mercury, set forth in Part I.A.7.

f. Total Mercury Testing Requirements
The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry". The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The use of clean technique sampling procedures is required unless the permittee can demonstrate to the Department that an alternative sampling procedure is representative of the discharge. Guidance for clean technique sampling is contained in: EPA Method 1669, *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance)*, EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

PART I

Section A. Limitations and Monitoring Requirements

g. TRO (Chlorine and Bromine) Requirements

Total Residual Oxidant (TRO) shall be analyzed by Amperometric Titration using either Standard Method 4500-Cl D, Standard Method 4500-Cl E or Orion Electrode Model 97-70 (other analytical methods specified in 40 CFR 136 may be used upon approval of the Department). TRO monitoring is only required during periods of chlorine or bromine use and subsequent discharge. Limitations for the intermittent discharge of chlorine apply only when the discharge of chlorine is less than or equal to 160 minutes per day, otherwise the limitations for continuous discharge of chlorine apply. Authorization to discharge bromine with or without chlorine is limited to 120 minutes per day at the limitations specified above with the additional requirement that any discharge of chlorine is restricted to a concurrent discharge with bromine (no additional discharge of chlorine is authorized for that day).

During the intermittent discharge of chlorine without bromine ("During Chlorination - No Bromine Use" limitations given above), the daily concentration value reported for TRO shall be the average of a minimum of three (3) equally spaced grab samples taken during a chlorine discharge event, with the additional limitation that no single sample may exceed 300 µg/l.

During the intermittent discharge of bromine with or without chlorine ("During Bromine Use" limitations given above), the daily concentration value reported for TRO shall be the maximum of at least three (3) equally spaced grab samples taken during a bromine discharge event (no single sample may exceed 50 µg/l).

The permittee shall enter "*G" on the Discharge Monitoring Report for the TRO discharge modes not being used.

The permittee may use dehalogenation techniques to achieve the applicable TRO limitations, using sodium thiosulfate, sodium sulfite, sodium bisulfite, or other dehalogenating reagents approved by the Department. The quantity of reagent(s) used shall be limited to 1.5 times the stoichiometric amount of applied chlorine/bromine oxidant.

h. Power Plants - PCB Prohibition

The permittee shall not discharge any polychlorinated biphenyls to the receiving waters of the State of Michigan as a result of plant operations, other than due to the presence of such compounds in the intake water.

i. Chemical Metal Cleaning Wastes

The permittee shall not discharge chemical metal cleaning wastes to the receiving waters of the State of Michigan as a result of plant operations.

j. Heat Addition

The daily maximum limit of 17,300 MBTU/hr is for the total power plant discharge. The permittee shall report the total heat loads discharged through Outfalls 001 and 002 under Outfall 001, in addition to reporting the heat loads discharged individually for the Outfalls 001 and 002 in the discharge monitoring reports.

k. Intake Screen Wash Water

The permittee shall collect and remove debris accumulated on intake trash bars and dispose of such material on land in an appropriate manner.

PART I

Section A. Limitations and Monitoring Requirements

2. Final Effluent Limitations, Monitoring Point 00A (Unit 1 Steam Generator Blowdown) and Monitoring Point 00B (Unit 2 Steam Generator Blowdown)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 1 MGD of steam generator blowdown from Monitoring Point 00A through Outfalls 001 and 002; and 1 MGD of steam generator blowdown from Monitoring Point 00B through Outfalls 001 and 002. Such discharge shall be limited and monitored by the permittee as specified below.

	Maximum Limits for Quantity or Loading			Maximum Limits for Quality or Concentration			Frequency	Sample
arameter	Monthly	Daily	Units	Monthly	Daily	Units	of Analysis	Type
low	(report)	(report)	MGD	—	—	—	Daily	Report Total Daily Flow
utfall Observation	(report)	—	—	—	—	—	Daily	Visual

a. Monitoring Location
Samples, measurements, and observations taken in compliance with the monitoring requirements above shall be taken at Monitoring Points 00A and 00B prior to discharge to the intake forebay and thence to Outfalls 001 or 002.

3. Final Effluent Limitations, Monitoring Point 00C (Plant Heating Boiler Blowdown)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 0.043 MGD of heating boiler blowdown from Monitoring Point 00C through Outfalls 001 and 002. Such discharge shall be limited and monitored by the permittee as specified below.

	Maximum Limits for Quantity or Loading			Maximum Limits for Quality or Concentration			Frequency	Sample
arameter	Monthly	Daily	Units	Monthly	Daily	Units	of Analysis	Type
low	(report)	(report)	MGD	—	—	—	Daily	Report Total Daily Flow
otal Suspended Solids	—	—	—	30	100	mg/l	See Part I.A.3.b	Grab
il and Grease	—	—	—	15	20	mg/l	Annually	Grab

a. Monitoring Location
Samples and measurements taken in compliance with the monitoring requirements above shall be taken at Monitoring Point 00C prior to discharge to the intake forebay and thence to Outfalls 001 or 002.

b. Total Suspended Solids
Total Suspended Solids are to be monitored daily per occurrence or weekly if the heating boiler is operated continuously for periods greater than one week.

PART I

Section A. Limitations and Monitoring Requirements

4. Final Effluent Limitations, Monitoring Point 00G (Reverse Osmosis System Reject)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 0.366 MGD of reverse osmosis system reject wastewater from Monitoring Point 00G through Outfalls 001 and 002. Such discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Limits for Quantity or Loading			Maximum Limits for Quality or Concentration			Frequency of Analysis	Sample Type
	Monthly	Daily	Units	Monthly	Daily	Units		
Flow	(report)	(report)	MGD	---	---	---	Daily	Report Total Daily Flow
Total Suspended Solids	---	---	---	30	100	mg/l	Weekly	Grab
Oil and Grease	---	---	---	15	20	mg/l	Annually	Grab

a. Monitoring Location
Samples and measurements taken in compliance with the monitoring requirements above shall be taken at Monitoring Point 00G prior to discharge to the intake forebay and thence to Outfalls 001 and 002.

5. Final Effluent Limitations, Monitoring Point 00H (Turbine Room Sump Emergency Overflow)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge a maximum of 2.6 MGD of turbine room sump emergency overflow from Monitoring Point 00H through Outfalls 001 and 002. Such discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Limits for Quantity or Loading			Maximum Limits for Quality or Concentration			Frequency of Analysis	Sample Type
	Monthly	Daily	Units	Monthly	Daily	Units		
Flow	(report)	(report)	MGD	---	---	---	Daily Per Occurrence	Report Total Daily Flow (by Estimation)
Total Suspended Solids	---	---	---	30	100	mg/l	2×Monthly Per Occurrence	Grab
Oil and Grease	---	---	---	15	20	mg/l	2×Monthly Per Occurrence	Grab

a. Monitoring Location
Samples and measurements taken in compliance with the monitoring requirements above shall be taken at Monitoring Point 00H prior to discharge to the intake forebay and thence to Outfalls 001 and 002.

b. Frequency of Analysis
Samples and measurements shall be taken during discharge only.

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Section A. Limitations and Monitoring Requirements

6. Request for Discharge of Water Treatment Additives

In the event a permittee proposes to discharge water additives, the permittee shall submit a request to discharge water additives to the Department for approval. Such requests shall be sent to the Surface Water Assessment Section, Water Bureau, Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan 48909, with a copy to the Department contact listed on the cover page of this permit. Instructions to submit a request electronically may be obtained via the Internet (http://www.michigan.gov/deq and on the left side of the screen click on Water, Water Quality Monitoring, and Assessment of Michigan Waters; then click on the Water Treatment Additive List which is under the Information banner). Written approval from the Department to discharge such additives at specified levels shall be obtained prior to discharge by the permittee. Additional monitoring and reporting may be required as a condition for the approval to discharge the additive.

A request to discharge water additives shall include all of the following water additive usage and discharge information:

a. Material Safety Data Sheet;

b. the proposed water additive discharge concentration;

c. the discharge frequency (i.e., number of hours per day and number of days per year);

d. the monitoring point from which the product is to be discharged;

e. the type of removal treatment, if any, that the water additive receives prior to discharge;

f. product function (i.e. microbiocide, flocculant, etc.);

g. a 48-hour LC_{50} or EC_{50} for a North American freshwater planktonic crustacean (either *Ceriodaphnia sp., Daphnia sp., or Simocephalus sp.*); and

h. the results of a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of Rule 323.1057(2) of the Water Quality Standards.

Prior to submitting the request, the permittee may contact the Surface Water Assessment Section by telephone at 517-335-1180 or via the Internet at the address given above to determine if the Department has the product toxicity data required by items g. and h. above. If the Department has the data, the permittee will not need to submit product toxicity data.

7. Pollutant Minimization Program for Total Mercury

The goal of the Pollutant Minimization Program is to maintain the effluent concentration of total mercury at or below 1.3 ng/l. The permittee shall develop and implement a Pollutant Minimization Program in accordance with the following schedule.

On or before October 1, 2010, the permittee shall submit to the Department an approvable Pollutant Minimization Program for mercury designed to proceed toward the goal. The Pollutant Minimization Program shall include the following:

a. an annual review and semi-annual monitoring of potential sources of mercury entering the wastewater collection system;

b. a program for quarterly monitoring of influent for mercury; and

PART I

Section A. Limitations and Monitoring Requirements

c. implementation of reasonable cost-effective control measures when sources of mercury are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

The Pollutant Minimization Program shall be implemented upon approval by the Department.

On or before March 31 of each year following approval of the Pollutant Minimization Program, the permittee shall submit a status report for the previous calendar year to the Department that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or to demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification), including a reduction in the frequency of the requirements under items a. & b.

This permit may be modified in accordance with applicable laws and rules to include additional mercury conditions and/or limitations as necessary.

8. Deicing Discharge Authorization, Outfall 003

The permittee is authorized to discharge a portion of the flow from outfalls 001 or 002 through intake structure outfall 003 to prevent ice buildup. The permittee is not required to provide any additional monitoring of this discharge because the effluent limitations and monitoring requirements specified for outfalls 001 and 002 will determine compliance with applicable water quality standards and any other requirements.

9. Storm Water Pollution Prevention Plan

The permittee is authorized to discharge storm water associated with industrial activities as defined in 40 CFR 122.26(b)(14). These storm water discharges shall be controlled in accordance with the requirements of this special condition. The permittee has developed and implemented a Storm Water Pollution Prevention Plan (plan). The permittee shall continue implementation of the plan for maximum control of significant materials (as defined in Part II.A.) so that storm water discharges will not cause a violation of the Water Quality Standards. The plan shall be routinely reviewed and updated in accordance with the requirements of this section.

a. Source Identification

To identify potential sources of significant materials that can enter storm water and subsequently be discharged from the facility, the plan shall, at a minimum, include the following:

1) A site map identifying the following: buildings and other permanent structures; storage or disposal areas for significant materials; secondary containment structures; storm water discharge outfalls (numbered for reference); location of storm water inlets contributing to each outfall; location of NPDES permitted discharges other than storm water; outlines of the drainage areas contributing to each outfall; structural runoff controls or storm water treatment facilities; areas of vegetation; areas of exposed and/or erodible soils; impervious surfaces (roofs, asphalt, concrete); name and location of receiving water(s); and areas of known or suspected impacts on surface waters as designated under Part 201 (Environmental Response) of the Michigan Act.

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Section A. Limitations and Monitoring Requirements

2) A list of all significant materials that could enter storm water. For each material listed, the plan shall include the following descriptions:

a) ways in which each type of material has been or has reasonable potential to become exposed to storm water (e.g., spillage during handling; leaks from pipes, pumps, and vessels; contact with storage piles; waste handling and disposal; deposits from dust or overspray, etc.);

b) identification of the outfall or outfalls through which the material may be discharged if released;

c) a listing of spills and leaks of polluting materials in quantities reportable under the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code) that occurred at areas that are exposed to precipitation or that otherwise discharge to a point source at the facility. The listing shall include spills and leaks that occurred over the three (3) years prior to the completion of the plan or latest update of the plan; the date, volume and exact location of release; and the action taken to clean up the material and/or prevent exposure to storm water runoff or contamination of surface waters of the state. Any release that occurs after the plan has been developed shall be controlled in accordance with the plan and is cause for the plan to be updated as appropriate within 14 calendar days of obtaining knowledge of the spill or loss; and

d) If there is a Total Maximum Daily Load (TMDL) established by the Department for the receiving waters, which restricts the discharge of any of the identified significant materials or constituents of those materials, then the SWPPP shall identify the level of control for those materials necessary to comply with the TMDL, and an estimate of the current annual load of those materials via storm water discharges to the receiving stream.

3) An evaluation of the reasonable potential for contribution of significant materials to runoff from at least the following areas or activities: loading, unloading, and other material handling operations; outdoor storage, including secondary containment structures; outdoor manufacturing or processing activities; significant dust or particulate generating processes; discharge from vents, stacks and air emission controls; on-site waste disposal practices; maintenance and cleaning of vehicles, machines and equipment; sites of exposed and/or erodible soil; sites of environmental contamination listed under Part 201 (Environmental Response) of the Michigan Act; areas of significant material residue; and other areas where storm water may contact significant materials.

4) a summary of existing storm water discharge sampling data (if available) describing pollutants in storm water discharges associated with industrial activity at the facility. This summary shall be accompanied by a description of the suspected source(s) of the pollutants detected.

b. Preventive Measures and Source Controls, Non-Structural
To prevent significant materials from contacting storm water at the source, the plan shall, at a minimum, include the following non-structural controls:

1) Description of a program for routine preventive maintenance which includes requirements for inspection and maintenance of storm water management and control devices (e.g., cleaning of oil/water separators and catch basins) as well as inspecting and testing plant equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters. A log of the inspection and corrective actions shall be maintained on file by the permittee, and shall be retained in accordance with Record Keeping, below.

2) A schedule for comprehensive site inspection to include visual inspection of equipment, plant areas, and structural pollution prevention and treatment controls to be performed at least once every six (6) months. A report of the results of the comprehensive site inspection shall be prepared and retained in accordance with Record Keeping, below. The report shall identify any incidents of non-compliance with the plan. If there are no reportable incidents of non-compliance, the report shall contain a certification that the facility is in compliance with this plan.

PART I

Section A. Limitations and Monitoring Requirements

3) A description of good housekeeping procedures to maintain a clean, orderly facility.

4) A description of material handling procedures and storage requirements for significant materials. Equipment and procedures for cleaning up spills shall be identified in the plan and made available to the appropriate personnel. The procedures shall identify measures to prevent the spilled materials or material residues on the outside of containers from being discharged into storm water. The plan may include, by reference, requirements of either a Pollution Incident Prevention Plan (PIPP) prepared in accordance with the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code); a Hazardous Waste Contingency Plan prepared in accordance with 40 CFR 264 and 265 Subpart D, as required by Part 111 of the Michigan Act; or a Spill Prevention Control and Countermeasure (SPCC) plan prepared in accordance with 40 CFR 112.

5) Identification of areas that, due to topography, activities, or other factors, have a high potential for significant soil erosion. The plan shall also identify measures used to control soil erosion and sedimentation.

6) A description of employee training programs which will be implemented to inform appropriate personnel at all levels of responsibility of the components and goals of the plan. The plan shall identify periodic dates for such training.

7) Identification of actions to limit the discharge of significant materials in order to comply with TMDL requirements.

8) Identification of significant materials expected to be present in storm water discharges following implementation of non-structural preventative measures and source controls.

c. Structural Controls for Prevention and Treatment
Where implementation of the measures required by Preventive Measures and Source Controls, Non-Structural; above; does not control storm water discharges in accordance with Water Quality Standards, below, the plan shall provide a description of the location, function, and design criteria of structural controls for prevention and treatment. Structural controls may be necessary:

1) to prevent uncontaminated storm water from contacting or being contacted by significant materials, and/or

2) if preventive measures are not feasible or are inadequate to keep significant materials at the site from contaminating storm water. Structural controls shall be used to treat, divert, isolate, recycle, reuse or otherwise manage storm water in a manner that reduces the level of significant materials in the storm water and provides compliance with the Water Quality Standards, below.

d. Keeping Plans Current
1) The permittee shall review the plan on or before November 4th of each year, and maintain written summaries of the reviews. Based on the review, the permittee shall amend the plan as needed to ensure continued compliance with the terms and conditions of this permit.

2) The plan shall also be updated or amended whenever changes or spills at the facility increase or have the potential to increase the exposure of significant materials to storm water, or when the plan is determined by the permittee or the Department to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with industrial activity. Updates based on increased activity at the facility shall include a description of how the permittee intends to control any new sources of significant materials or respond to and prevent spills in accordance with the requirements of Source Identification; Preventive Measures and Source Controls, Non-Structural; and Structural Controls for Prevention and Treatment; above.

PART I

Section A. Limitations and Monitoring Requirements

3) The Department or authorized representative may notify the permittee at any time that the plan does not meet minimum requirements. Such notification shall identify why the plan does not meet minimum requirements. The permittee shall make the required changes to the plan within 30 days after such notification from the Department or authorized representative, and shall submit to the Department a written certification that the requested changes have been made.

e. Certified Storm Water Operator Update
If the certified operator has changed or an additional certified storm water operator is added, the permittee shall provide the name and certification number of the new operator to the Department. The new operator shall review and sign the plan.

f. Signature and Plan Review
1) The plan shall be signed by the certified storm water operator and by either the permittee or an authorized representative in accordance with 40 CFR 122.22. The plan shall be retained on site of the facility that generates the storm water discharge.

2) The permittee shall make plans, reports, log books, runoff quality data, and supporting documents available upon request to the Department or authorized representative.

g. Record Keeping
The permittee shall maintain records of all inspection and maintenance activities. Records shall also be kept describing incidents such as spills or other discharges that can affect the quality of storm water runoff. All such records shall be retained for three (3) years.

h. Water Quality Standards
At the time of discharge, there shall be no violation of the Water Quality Standards in the receiving waters as a result of this discharge. This requirement includes, but is not limited to, the following conditions:

1) In accordance with Rule 323.1050 of the Water Quality Standards, the receiving waters shall not have any of the following unnatural physical properties in quantities which are or may become injurious to any designated use: unnatural turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits as a result of this discharge.

2) Any unusual characteristics of the discharge (i.e., unnatural turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits) shall be reported within 24 hours to the Department followed with a written report within five (5) days detailing the findings of the investigation and the steps taken to correct the condition.

3) Any pollutant for which a level of control is specified to meet a Total Maximum Daily Load (TMDL) established by the Department shall be controlled at the facility so that its discharge is reduced by the amount specified in the waste load allocation of the TMDL. Any reduction achieved through implementation of the non-structural controls or structural controls in accordance with Preventive Measures and Source Controls, Non-Structural; and Structural Controls for Prevention and Treatment; above; shall count toward compliance with the TMDL.

PART I

Section A. Limitations and Monitoring Requirements

i. Prohibition of Non-storm Water Discharges
Discharges of material other than storm water shall be in compliance with an NPDES permit issued for the discharge. Storm water shall be defined to include the following non-storm water discharges provided pollution prevention controls for the non-storm water component are identified in the plan: discharges from fire hydrant flushing, potable water sources including water line flushing, fire system test water, irrigation drainage, lawn watering, routine building wash down which does not use detergents or other compounds, pavement wash water where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material have been removed) and where detergents are not used, air conditioning condensate, springs, uncontaminated groundwater, and foundation or footing drains where flows are not contaminated with process materials such as solvents. Discharges from fire fighting activities are authorized by this permit, but do not have to be identified in the plan.

10. Cooling Water Intake Structures

This condition establishes the program necessary for proceeding towards compliance with Section 316(b) of the Clean Water Act (CWA). The purpose is to establish the best technology available for minimizing adverse environmental impact associated with the use of cooling water intake structures.

The permittee submitted the Proposal for Information Collection on June 13, 2005. On April 3, 2009, the Department received submitted information regarding Source Water Physical Data, Cooling Water Intake Structure Data, Cooling Water System Data, and Impingement Mortality and/or Entrainment Characterization Study report, from the permittee. The permittee shall also submit additional information upon notification by the Department. When notifying the permittee, the Department will allow the permittee reasonable amount of time in order to complete the necessary tasks.

Based on the review of the above information and/or finalization of regulations under Section 316(b) of the CWA by the United States Environmental Protection Agency, the Department will determine the appropriate requirements and conditions to be included in the permit, either by modification or reissuance of the permit.

11. Facility Contact

The "Facility Contact" was specified in the application. The permittee may replace the facility contact at any time, and shall notify the Department in writing within 10 days after replacement (including the name, address and telephone number of the new facility contact).

a. The facility contact shall be (or a duly authorized representative of this person):
- for a corporation, a principal executive officer of at least the level of vice president, or a designated representative, if the representative is responsible for the overall operation of the facility from which the discharge described in the permit application or other NPDES form originates,
- for a partnership, a general partner,
- for a sole proprietorship, the proprietor, or
- for a municipal, state, or other public facility, either a principal executive officer, the mayor, village president, city or village manager or other duly authorized employee.

b. A person is a duly authorized representative only if:
- the authorization is made in writing to the Department by a person described in paragraph a. of this section; and
- the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the facility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

Nothing in this section obviates the permittee from properly submitting reports and forms as required by law.

PART II

Section A. Definitions

This list of definitions may include terms not applicable to this permit.

Acute toxic unit (TU_A) means $100/LC_{50}$ where the LC_{50} is determined from a whole effluent toxicity (WET) test which produces a result that is statistically or graphically estimated to be lethal to 50% of the test organisms.

Bioaccumulative chemical of concern (BCC) means a chemical which, upon entering the surface waters, by itself or as its toxic transformation product, accumulates in aquatic organisms by a human health bioaccumulation factor of more than 1000 after considering metabolism and other physiochemical properties that might enhance or inhibit bioaccumulation. The human health bioaccumulation factor shall be derived according to R 323.1057(5). Chemicals with half-lives of less than 8 weeks in the water column, sediment, and biota are not BCCs. The minimum bioaccumulation concentration factor (BAF) information needed to define an organic chemical as a BCC is either a field-measured BAF or a BAF derived using the biota-sediment accumulation factor (BSAF) methodology. The minimum BAF information needed to define an inorganic chemical as a BCC, including an organometal, is either a field-measured BAF or a laboratory-measured bioconcentration factor (BCF). The BCCs to which these rules apply are identified in Table 5 of R 323.1057 of the Water Quality Standards.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

Chronic toxic unit (TU_C) means 100/MATC or $100/IC_{25}$, where the maximum acceptable toxicant concentration (MATC) and IC_{25} are expressed as a percent effluent in the test medium.

Class B Biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Daily concentration is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations (except for pH and dissolved oxygen). When required by the permit, report the maximum calculated daily concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the Discharge Monitoring Reports (DMRs).

For pH, report the maximum value of any individual sample taken during the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs and the minimum value of any individual sample taken during the month in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. For dissolved oxygen, report the minimum concentration of any individual sample in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Daily loading is the total discharge by weight of a parameter discharged during any calendar day. This value is calculated by multiplying the daily concentration by the total daily flow and by the appropriate conversion factor. The daily loading will be used to determine compliance with any maximum daily loading limitations. When required by the permit, report the maximum calculated daily loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Department means the Michigan Department of Environmental Quality.

Detection Level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

PART II

Section A. Definitions

EC_{50} means a statistically or graphically estimated concentration that is expected to cause 1 or more specified effects in 50% of a group of organisms under specified conditions.

Fecal coliform bacteria monthly is the geometric mean of the samples collected in a calendar month (or 30 consecutive days). The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMRs.

Fecal coliform bacteria 7-day is the geometric mean of the samples collected in any 7-day period. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Flow Proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

Grab sample is a single sample taken at neither a set time nor flow.

IC_{25} means the toxicant concentration that would cause a 25% reduction in a nonquantal biological measurement for the test population.

Interference is a discharge which, alone or in conjunction with a discharge or discharges from other sources, both: 1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and 2) therefore, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or, of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act. [This definition does not apply to sample matrix interference.]

Land Application means spraying or spreading biosolids or a biosolids derivative onto the land surface, injecting below the land surface, or incorporating into the soil so that the biosolids or biosolids derivative can either condition the soil or fertilize crops or vegetation grown in the soil.

LC_{50} means a statistically or graphically estimated concentration that is expected to be lethal to 50% of a group of organisms under specified conditions.

Maximum acceptable toxicant concentration (MATC) means the concentration obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test. A lower chronic limit is the highest tested concentration that did not cause the occurrence of a specific adverse effect. An upper chronic limit is the lowest tested concentration which did cause the occurrence of a specific adverse effect and above which all tested concentrations caused such an occurrence.

MGD means million gallons per day.

Monthly frequency of analysis refers to a calendar month. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Monthly concentration is the sum of the daily concentrations determined during a reporting month (or 30 consecutive days) divided by the number of daily concentrations determined. The calculated monthly concentration will be used to determine compliance with any maximum monthly concentration limitations. When required by the permit, report the calculated monthly concentration in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMRs.

PART II

Section A. Definitions

For minimum percent removal requirements, the monthly influent concentration and the monthly effluent concentration shall be determined. The calculated monthly percent removal, which is equal to 100 times the quantity [1 minus the quantity (monthly effluent concentration divided by the monthly influent concentration)], shall be reported in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Monthly loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined in the reporting month (or 30 consecutive days). The calculated monthly loading will be used to determine compliance with any maximum monthly loading limitations. When required by the permit, report the calculated monthly loading in the "AVERAGE" column under "QUANTITY OR LOADING" on the DMRs.

National Pretreatment Standards are the regulations promulgated by or to be promulgated by the Federal Environmental Protection Agency pursuant to Section 307(b) and (c) of the Federal Act. The standards establish nationwide limits for specific industrial categories for discharge to a POTW.

No observed adverse effect level (NOAEL) means the highest tested dose or concentration of a substance which results in no observed adverse effect in exposed test organisms where higher doses or concentrations result in an adverse effect.

Noncontact Cooling Water is water used for cooling which does not come into direct contact with any raw material, intermediate product, by-product, waste product or finished product.

Nondomestic user is any discharger to a POTW that discharges wastes other than or in addition to water-carried wastes from toilet, kitchen, laundry, bathing or other facilities used for household purposes.

Partially treated sewage is any sewage, sewage and storm water, or sewage and wastewater, from domestic or industrial sources that is treated to a level less than that required by the permittee's National Pollutant Discharge Elimination System permit, or that is not treated to national secondary treatment standards for wastewater, including discharges to surface waters from retention treatment facilities.

Pretreatment is reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties to a less harmful state prior to discharge into a public sewer. The reduction or alteration can be by physical, chemical, or biological processes, process changes, or by other means. Dilution is not considered pretreatment unless expressly authorized by an applicable National Pretreatment Standard for a particular industrial category.

POTW is a publicly owned treatment works.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

Quarterly frequency of analysis refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson Blvd., Chicago, Illinois 60604.

Significant industrial user is a nondomestic user that: 1) is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or 2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process ~~waste~~stream which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the permittee as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's treatment plant operation or violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

PART II

Section A. Definitions

Significant Materials Significant Materials means any material which could degrade or impair water quality, including but not limited to: raw materials; fuels; solvents, detergents, and plastic pellets; finished materials such as metallic products; hazardous substances designated under Section 101(14) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (see 40 CFR 372.65); any chemical the facility is required to report pursuant to Section 313 of Emergency Planning and Community Right-to-Know Act (EPCRA); polluting materials as identified under the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code); Hazardous Wastes as defined in Part 111 of the Michigan Act; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Tier I value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier I toxicity database.

Tier II value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier II toxicity database.

Total Maximum Daily Loads (TMDLs) are required by the Federal Act for waterbodies that do not meet Water Quality Standards. TMDLs represent the maximum daily load of a pollutant that a waterbody can assimilate and meet Water Quality Standards and an allocation of that load among point sources, nonpoint sources, and a margin of safety.

Toxicity Reduction Evaluation (TRE) means a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Water Quality Standards means the Part 4 Water Quality Standards promulgated pursuant to Part 31 of Act No. 451 of the Public Acts of 1994, as amended, being Rules 323.1041 through 323.1117 of the Michigan Administrative Code..

Weekly frequency of analysis refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

Yearly frequency of analysis refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

24-Hour Composite sample is a flow proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period.

3-Portion Composite sample is a sample consisting of three equal volume grab samples collected at equal intervals over an 8-hour period.

7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days in a reporting month divided by the number of daily concentrations determined. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations. When required by the permit, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

7-day loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined during any 7 consecutive days in a reporting month. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations. When required by the permit, report the maximum calculated 7-day loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

PART II

Section B. Monitoring Procedures

1. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the Federal Act (40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants), unless specified otherwise in this permit. Requests to use test procedures not promulgated under 40 CFR Part 136 for pollutant monitoring required by this permit shall be made in accordance with the Alternate Test Procedures regulations specified in 40 CFR 136.4. These requests shall be submitted to the Chief of the Permits Section, Water Bureau, Michigan Department of Environmental Quality, P.O. Box 30273, Lansing, Michigan, 48909-7773. The permittee may use such procedures upon approval.

The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

3. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Department.

PART II

Section C. Reporting Requirements

1. Start-up Notification

If the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

2. Submittal Requirements for Self-Monitoring Data

Part 31 of Act 451 of 1994, as amended, specifically Section 324.3110(3) and Rule 323.2155(2) of Part 21 allows the department to specify the forms to be utilized for reporting the required self-monitoring data. Unless instructed on the effluent limitations page to conduct "Retained Self Monitoring" the permittee shall submit self-monitoring data via the Michigan DEQ Electronic Environmental Discharge Monitoring Reporting (e2-DMR) system.

The permittee shall utilize the information provided on the e2-Reporting website @ **https://secure1.state.mi.us/e2rs/** to access and submit the electronic forms. Both monthly summary and daily data shall be submitted to the department no later than the **20th day of the month** following each month of the authorized discharge period(s).

3. Retained Self-Monitoring Requirements

If instructed on the effluent limits page to conduct retained self-monitoring, the permittee shall maintain a year-to-date log of retained self-monitoring results and, upon request, provide such log for inspection to the staff of the Water Bureau, Michigan Department of Environmental Quality. Retained self-monitoring results are public information and shall be promptly provided to the public upon request.

The permittee shall certify, in writing, to the Department, on or before January 10th of each year, that: 1) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained; and 2) the application on which this permit is based still accurately describes the discharge. With this annual certification, the permittee shall submit a summary of the previous years monitoring data. The summary shall include maximum values for samples to be reported as daily maximums and/or monthly maximums and minimum values for any daily minimum samples.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the Michigan Act or Rule 35 of the Mobile Home Park Commission Act (Act 96 of the Public Acts of 1987) for assurance of proper facility operation shall be submitted as required by the Department.

5. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

PART II

Section C. Reporting Requirements

6. Noncompliance Notification

Compliance with all applicable requirements set forth in the Federal Act, Parts 31 and 41 of the Michigan Act, and related regulations and rules is required. All instances of noncompliance shall be reported as follows:

a. 24-hour reporting - Any noncompliance which may endanger health or the environment (including maximum daily concentration discharge limitation exceedances) shall be reported, verbally, within 24 hours from the time the permittee becomes aware of the noncompliance. A written submission shall also be provided within five (5) days.

b. other reporting - The permittee shall report, in writing, all other instances of noncompliance not described in a. above at the time monitoring reports are submitted; or, in the case of retained self-monitoring, within five (5) days from the time the permittee becomes aware of the noncompliance.

Written reporting shall include: 1) a description of the discharge and cause of noncompliance; and 2) the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and the steps taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwaters of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the second page of this permit, or if the notice is provided after regular working hours call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660).

Within ten (10) days of the release, the permittee shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventative measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

8. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24-hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

a. that an upset occurred and that the permittee can identify the specific cause(s) of the upset;

b. that the permitted wastewater treatment facility was, at the time, being properly operated; and

c. that the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

PART II

Section C. Reporting Requirements

9. Bypass Prohibition and Notification

a. Bypass Prohibition - Bypass is prohibited unless:

1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and

3) the permittee submitted notices as required under 9.b. or 9.c. below.

b. Notice of Anticipated Bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 9.a. above.

c. Notice of Unanticipated Bypass - The permittee shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the first page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittee becomes aware of the circumstances.

d. Written Report of Bypass - A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.

e. Bypass Not Exceeding Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of 9.a., 9.b., 9.c., and 9.d., above. This provision does not relieve the permittee of any notification responsibilities under Part II.C.10. of this permit.

f. Definitions

1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

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

PART II

Section C. Reporting Requirements

10. Notification of Changes in Discharge

The permittee shall notify the Department, in writing, within 10 days of knowing, or having reason to believe, that any activity or change has occurred or will occur which would result in the discharge of: 1) detectable levels of chemicals on the current Michigan Critical Materials Register, priority pollutants or hazardous substances set forth in 40 CFR 122.21, Appendix D, or the Pollutants of Initial Focus in the Great Lakes Water Quality Initiative specified in 40 CFR 132.6, Table 6, which were not acknowledged in the application or listed in the application at less than detectable levels; 2) detectable levels of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information; or 3) any chemical at levels greater than five times the average level reported in the complete application (see the first page of this permit for the date(s) the complete application was submitted). Any other monitoring results obtained as a requirement of this permit shall be reported in accordance with the compliance schedules.

11. Changes in Facility Operations

Any anticipated action or activity, including but not limited to facility expansion, production increases, or process modification, which will result in new or increased loadings of pollutants to the receiving waters must be reported to the Department by a) submission of an increased use request (application) and all information required under Rule 323.1098 (Antidegradation) of the Water Quality Standards or b) by notice if the following conditions are met: 1) the action or activity will not result in a change in the types of wastewater discharged or result in a greater quantity of wastewater than currently authorized by this permit; 2) the action or activity will not result in violations of the effluent limitations specified in this permit; 3) the action or activity is not prohibited by the requirements of Part II.C.12.; and 4) the action or activity will not require notification pursuant to Part II.C.10. Following such notice, the permit may be modified according to applicable laws and rules to specify and limit any pollutant not previously limited.

12. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of Rules 323.1098 and 323.1215 of the Michigan Administrative Code, the permittee is prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

13. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittee and the new permittee containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

PART II

Section D. Management Responsibilities

1. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this permit constitutes a violation of the Michigan Act and/or the Federal Act and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

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

2. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the Michigan Act. Permittees authorized to discharge storm water shall have the storm water treatment and/or control measures under direct supervision of a storm water operator certified by the Department, as required by Section 3110 of the Michigan Act.

3. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

4. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

a. provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or

b. upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the surface waters or groundwaters of the state resulting from noncompliance with any effluent limitation specified in this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

PART II

Section D. Management Responsibilities

6. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the Michigan Act.

7. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit, or other pollutants or wastes) removed from or resulting from treatment or control of wastewaters, including those that are generated during treatment or left over after treatment or control has ceased, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the Michigan Act, Part 31 for protection of water resources, Part 55 for air pollution control, Part 111 for hazardous waste management, Part 115 for solid waste management, Part 121 for liquid industrial wastes, Part 301 for protection of inland lakes and streams, and Part 303 for wetlands protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwaters of the state.

8. Right of Entry

The permittee shall allow the Department, any agent appointed by the Department or the Regional Administrator, upon the presentation of credentials:

a. to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any discharge of pollutants.

9. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Act and Rule 2128 (Rule 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department and the Regional Administrator. As required by the Federal Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Act and Sections 3112, 3115, 4106 and 4110 of the Michigan Act.

PART II

Section E. Activities Not Authorized by This Permit

1. Discharge to the Groundwaters

This permit does not authorize any discharge to the groundwaters. Such discharge may be authorized by a groundwater discharge permit issued pursuant to the Michigan Act.

2. Facility Construction

This permit does not authorize or approve the construction or modification of any physical structures or facilities. Approval for such construction for a POTW must be by permit issued under Part 41 of the Michigan Act. Approval for such construction for a mobile home park, campground or marina shall be from the Water Bureau, Michigan Department of Environmental Quality. Approval for such construction for a hospital, nursing home or extended care facility shall be from the Division of Health Facilities and Services, Michigan Department of Consumer and Industry Services upon request.

3. Civil and Criminal Liability

Except as provided in permit conditions on "Bypass" (Part II.C.9. pursuant to 40 CFR 122.41(m)), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.

4. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under Section 311 of the Federal Act except as are exempted by federal regulations.

5. State Laws

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

6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environmental Quality permits, or approvals from other units of government as may be required by law.

APPENDIX V

SPECIAL REPORTS

2009

INDIANA MICHIGAN POWER
A unit of American Electric Power

Indiana Michigan Power
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
IndianaMichiganPower.com

Ms. Sylvia Heaton
MDEQ Water Bureau
Constitution Hall
P.O. Box 30273
Lansing, MI 48909

Re: Donald C. Cook Nuclear Plant
NPDES Permit No. MI0005827
Follow-up to Full Scale Mexel Molluscicide Use Request (H-O-H Formula A-432)
Request letter of 7/1/08 and Meeting of 11/20/08
Rationale for a Mixing Zone at the 1 fps Isopleth
Updated Mexel MSDS and Product Information

June 26, 2009

Dear Ms. Heaton:

This letter is in follow-up to our Mexel water treatment additive request letter of July 1, 2008 and meeting of November 20, 2008. The information herein provides answers to your questions on Mexel demand and degradation posed at this meeting.

The attached document presents a rationale and set of calculations that show Mexel can be fed into the circulating water system at the intake cribs out in Lake Michigan and through chemical and thermal degradation and dilution in a reasonable mixing zone, the concentration of Mexel at the edge of the mixing zone will meet the FAV calculated from the toxicity data.

Initially, we presumed there would be sufficient chemical demand within the plant to reduce the Mexel concentration to a level that would be low enough to discharge with only a small mixing zone. After a careful review of the chemical degradation of Mexel at other facilities, AEP and the chemical supplier decided to not use the in-plant degradation in the calculation. The reason for this decision is that as the biological film that is on all water systems is removed by Mexel, the amount of in-plant chemical degradation declines and in some cases becomes immeasurable.

The degradations of Mexel within the mixing zone that were used in the rationale are all consistent and reproducible. Therefore, we feel confident these calculations represent the most reliable estimate that can be given for the concentration of Mexel at the edge of the mixing zone. The mixing zone we suggested to you during the November 20, 2008, meeting at the Cook Nuclear Plant is the mixing zone that we are relying upon for meeting the FAV.

24 35 6/6/09

We believe the mixing zone defined as the edge of the 1 ft/sec velocity isopleth will be protective of aquatic life in Lake Michigan. The small fish that are the most sensitive to Mexel will not be able to maintain position in the plume and it is not in the behavior of the fish species that will most likely be in the vicinity of plume to remain in one location for the time period it would take to be exposed to a toxic amount of Mexel.

Attached please also find updated Mexel MSDS and product information provided to us by HOH Water Technology, Inc.

This information should allow you to complete your review of our request for a full scale application of Mexel for preventing mussel infestation in the Cook Nuclear Plant. If you have any questions or require further information, please feel free to contact me at telephone (269) 465-5901 extension 2102.

Sincerely,

Jon Harner

Jon Harner
Environmental Manager
AEP, DC Cook Nuclear Plant

Attachments 3

cc: Ms. Brenda Sayles
MDEQ Water Bureau
Constitution Hall
P.O. Box 30273
Lansing, MI 48909

Mr. Greg Danneffel
MDEQ, Kalamazoo District Office
7953 Adobe Rd.
Kalamazoo, MI 49009

Explanation of the Need for and Rationale for a Mixing Zone Defined as the edge of the 1 ft/s Isopleth

Introduction

The Cook Nuclear Plant withdraws about 1.67 million gallons/min of water for non-contact cooling and service water. Water enters the plant through three 16-ft diameter corrugated galvanized metal tunnels that are 2,250 feet long. An introduced species, zebra mussels, attach and grow on the inside of the tunnels. Uncontrolled, the zebra mussels cause serious operational problems for the plant. Other chemicals have been tried and all have proven either ineffective or have created severe, short term operating problems.

Mexel has been used in Europe and Asia to control biofouling including zebra mussels in water intakes. Several facilities in the US have experimented with Mexel to control biofouling:

- **KeySpan's Long Island Power Plant**
- **TVA's Kingston Plant**
- **Baltimore Gas & Electric Calvert Cliffs Plant**
- **Alabama Power & Light Gorgas Plant**

Cook Nuclear Plant has funded toxicity testing to determine the toxicity of Mexel to non-target species. Toxicity data reports previously submitted to the MDEQ were performed by Lake Superior Research Center 1997 and Great Lakes Environmental Center 2006 & 2007. From this toxicity data the Michigan Department of Environmental Quality calculated an FAV of 0.1 mg/l for Mexel.

Cook Nuclear Plant has funded experiments with Mexel to determine its effectiveness at the plant (HOH Chemicals 2008). HOH concluded the feed concentration of Mexel at the intake cribs should be 4.0 mg/l to control the accumulation of mussels in the tunnels. If the chemical demand of Lake Michigan water for Mexel is the only cause of a reduction in the concentration of Mexel in the cooling water, then the concentration of Mexel in the intake fore bay should be 2.5 mg/l.

Testing at a power plant in France showed Mexel concentrations were reduced by a mean of 36% at the main condenser outlet compared with the inlet concentration. There is a heat-induced degradation of Mexel. Concentrations of Mexel entering and exiting the main heat exchanger were measured on six different days in August and September, 1996, five to eight times a day on each test day for a total of 41 measurements.

Cook Nuclear Plant recently funded testing to determine if Mexel concentrations decrease in Lake Michigan water upon heating similarly to the cooling water as it passes through the main steam condensers and to determine if there is a chemical demand on Mexel with each volume to volume dilution in the discharge mixing zone.

Explanation of the Need for and Rationale for a Mixing Zone Defined as the edge of the 1 ft/s Isopleth

This document presents the rationale and calculations for using Mexel at the Cook Nuclear Plant in a way that will control zebra mussels and the discharge will meet the 0.1 mg/l FAV at the edge of the mixing zone. In the Discussion section that follows, the calculations for estimating the concentration of Mexel at the NPDES Permit outfalls, the calculations of the Mexel concentration at the edge of a 4:1 mixing zone, and the rationale for a 4:1 mixing zone are presented. The 4:1 mixing zone is at the 1 ft/s velocity isopleth in the discharge plume.

Discussion

The Mexel Efficiency Study report (HOH, 2008), in part concluded, zebra mussel accumulation on the surface of the intake tunnels would be controlled using by feeding a Mexel concentration of 4.0 mg/l into the intake cribs. This study also demonstrated Lake Michigan water had a consistent chemical demand for Mexel of 38%, that is, the measured concentration of Mexel was 38% lower than the calculated concentration based on simple dilution.

A study was conducted by HOH using lake water collected from the Cook Nuclear Plant intake to see if Mexel in Lake Michigan water would chemically degrade due to heating as it passed through the condensers. Lake Michigan water containing Mexel was heated rapidly by 15 F° to simulate the plant ΔT. The study results are reported in Appendix A. Table 1 in Appendix A shows the results of the condenser passage simulation. Mexel was degraded by an average of 29% in five tests. The results were very consistent with a low of 25% and a high of 35%.

The fate of Mexel added to the cooling water at the intake cribs was calculated using the Lake Michigan water chemical demand data for Mexel and the heat induced degradation data. The 4 mg/l of Mexel in the water at the intake crib will be reduced in concentration by the chemical demand of the water and by the heat added by the main steam condenser. The equation is 4.0 mg/l feed conc. * 0.62 chemical demand of Lake Michigan water * 0.71 demand at the condenser = 1.7608 mg/l or about 2.0 mg/l Mexel.

A study was also conducted to determine if each volume to volume dilution of the discharged water containing Mexel with Lake Michigan water would exhibit a chemical demand. Table 2 in Appendix A shows the results of these tests and these tests showed a reduction in Mexel concentrations resulting from dilution and chemical demand. The reductions in concentration for the dilution ratios tested are 63% for the 2:1 dilution, 86% for 3:1, 95% for 4:1 and 99% for 5:1. A 4:1 dilution of the discharge with new lake water will reduce the concentration at the edge of the mixing zone to 0.1 mg/l (2.0 mg/l * 0.05 =0.1 mg/l). The 4:1 mixing zone as determined by the modeling done by Alden Labs as reported in the report prepared by GLEC (McCauley, D. J. and D. Endicott, 2006) is where the discharge plume velocity is about 1 ft/s.

Explanation of the Need for and Rationale for a Mixing Zone Defined as the edge of the 1 ft/s Isopleth

Table 1 in McCauley and Endicott (2006) showed a dilution factor of between 2.4 and 7.1 were results from the modeling. The predicted dilution was determined by the units discharging and the ambient water current in the lake; the lower the ambient current, the higher the dilution factor. The report selected a very conservative 3:1 dilution for the mixing zone.

A higher dilution factor than a 3:1 mixing zone is environmentally acceptable. based on the potential for fish to be exposed to lethal or even chronic exposures to Mexel. To be exposed to toxic concentrations of Mexel, a fish would need to swim into the current produced by the jet discharge. Two key factors will determine where any individual fish will be positioned in the discharge plume, the swimming capability of the fish and the motivation of the fish to reside in fast moving water. Fish swimming capability varies with species, fish size, ambient water turbulence, and water temperature.

Fish must be motivated by environmental stimuli or behavioral characteristics (or both) to enter and exit the moving water of the discharge plume. Fleeing predators, pursuing food, or a preference for moving water or the water temperature are the factors most likely to cause fish to be in the discharge plume. Species that are typically lake residents will most likely avoid all except the extreme edge of the moving water from the Cook Nuclear Plant discharge nozzles. Fish that tend to reside in rivers for all or part of their life cycle will have a higher tendency to enter the plume as would fish that have tendencies to move around in the lake. The introduced trout and salmon, redhorse suckers, white sucker, walleye, and alewife are among the more active species in Lake Michigan.

Fish evading capture or pursuing food are not compelled to reside in the discharge plume for long periods. Fish that prefer moving water or the warm water of the plume will reside in the discharge plume for varying time periods. Where the fish are located in the plume depends on their swimming ability. Methods for determining fish swimming speed have not been standardized.

Most laboratory test results can be classified as burst speed (maximum or near maximum speeds that can be maintained for only a few seconds before fatigue), critical speed (intermediate speeds that can be maintained for a limited time before fatigue, tests for critical speed usually run for 10 to 200 minutes), and continuous or sustained speeds (speeds that can be maintained indefinitely without fatigue).

Burst and critical swim speeds tend to be of the most interest to fish biologists. These speeds relate to prey capture and avoidance and to understanding fish migration or the ability to avoid man-made hazards such as water intakes. Sustained swim speeds are less frequently determined. The following citations illustrate the literature references that are available on the sustained swimming speed of freshwater fish.

1. Juvenile shovelnose and pallid sturgeon would rest on the bottom of the test chamber 18% of the time or more when the test water velocity was over 15 cm/s (0.5 ft/s) in tests to determine the critical speed for 30 minute durations. The critical speed was about1.2 ft/s for both species in 20 degree C water (Adams *et al.*, 2003).

2. Rainbow trout that swam at one body length per second for three to four weeks had the highest growth weight (Geer, Walker and Emerson, 1978). Rainbow trout in Lake Michigan are 0.5- to over two-feet long. (Salmonids would avoid plume temperatures above about 68° F as a mater of thermal preference and thus not be exposed to Mexel unless ambient water temperatures were below 45° to 50° F.)

3. Feed largemouth bass larvae swam at 4.0 cm/sec (0.13 ft/s) (Laurence, 1972).

4. A number of trout were kept swimming for twelve months at 25 cm/s (0.82 ft/s) (Bainbridge, 1962). The forced swimming was not a test of the maximum sustained swimming speed. It does show the fish can swim indefinitely at this speed.

5. The 50% fatigue level in 200 minutes of swimming for 13–16 cm *Carassius carassius* (L.) acclimated to 9.5±0.6°C was estimated to be 3.35 lengths/sec (Johnston and Goldspink, 1973). These fish swam at between 1.42 and 1.75 ft/s for 200 minutes. Their sustained swimming speed would be lower.

6. In a summary of fish swimming performance Wlosinski and Surprenant, (2001) compiled a table of critical swim speeds (which the authors called the prolonged swim speed) for a number of fish species in the Upper Mississippi River, many of which are also in Lake Michigan. The swim speeds ranged from 1 to 4 ft/s. Sustained swim speeds for these species would be lower.

These swimming speed data show that the smaller fish will not likely be residents of the plume in areas with velocities above 1 ft/s. Larger fish may reside in the plume in areas with velocities higher than 1 ft/s. Adult and juvenile fish (in fact fish in general) are much more tolerant of Mexel than are zooplankton. It is very unlikely fish will be harmed by the concentrations of Mexel they will encounter in the plume.

Explanation of the Need for and Rationale for a Mixing Zone Defined as the edge of the 1 ft/s Isopleth

Conclusion

These are the germane facts, data points, and calculations that affect the determination of a safe discharge concentration from Cook Nuclear Plant and the establishment of a NPDES Permit limit that will protect Lake Michigan biota.

1. Based upon continuous exposure toxicity tests DEQ has calculated a FAV for Mexel 432 of 0.1 mg/l.

2. There is a chemical demand for Mexel in Lake Michigan water and the demand value is consistent. Thirty-eight percent of the added chemical is used by the demand.

3. Tests conducted by HOH showed Mexel concentrations in water heated similarly to water passing through the main heat exchanger at Cook Nuclear Plant consistently fell by an average of 29%.

4. Non-motile organisms will reside in the effluent plume for about a half hour or less.

5. Based on the swimming performance and the likely behavior of fish, the edge of the mixing zone as defined by the area where fish would maintain position is at the 1 ft/s isopleth. The plume from the plant has been diluted to a ratio of 4:1 at the 1 ft/s isopleth.

6. The toxicity tests used for calculating the FAV exposed the test organisms for 48 to 96 hours continuously. Several tests were conducted using intermittent exposures and the results showed Mexel to be two to three times less toxic under these exposure conditions.

7. The half-life of Mexel is less than 24 hours. This means Mexel will not bioaccumulate and Mexel will degrade to less than half the discharge concentration through bacterial and chemical degradation in half the time of the toxicity tests used to determine the FAV.

8. The discharge of Mexel from Cook Nuclear Plant, when used at the proposed feed rate of 4 mg/l, will not harm the aquatic life in Lake Michigan based on the following calculation:

(4 mg/l feed rate)*(0.62 chemical demand)*(0.71 loss through the condenser)*(0.05 chemical loss in mixing zone = 0.09 mg/l).

Exhibits Page 1

Transactions of the American Fisheries Society
Article: pp. 392–397 | Abstract | PDF (65K)

Critical Swimming Speed and Behavior of Juvenile Shovelnose Sturgeon and Pallid Sturgeon

S. Reid Adams [a], Ginny L. Adams [a], and Glenn R. Parsons [b]

[a] U.S. Army Engineer Waterways Experiment Station, *ER-A*, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180, USA; [b] Department of Biology, University of Mississippi, University, Mississippi 38677, USA

Abstract — The swimming performance of hatchery-reared juvenile shovelnose sturgeon *Scaphirhynchus platorynchus* and pallid sturgeon *S. albus* was studied in a laboratory swim tunnel at 20°C and 10°C. The mean 30-min critical swimming speed was not significantly different between species at either temperature (36.9 cm/s for shovelnose sturgeon and 35.9 cm/s for pallid sturgeon at 20°C; 19.4 cm/s for shovelnose sturgeon and 15.0 cm/s for pallid sturgeon at 10°C). Free swimming (swimming without contact with the substrate) was observed less than 18% of the time at speeds greater than 15 cm/s. As speed increased, pallid sturgeon swam significantly less in the water column at 20°C; however, speed had no effect on percent free swimming among shovelnose sturgeon at 20°C. The results of this study indicate that, over the temperature and size range tested, shovelnose sturgeon and pallid sturgeon probably do not segregate in rivers due to different swimming or station holding abilities.

Received: February 7, 2001; Accepted: September 9, 2002;

DOI: 10.1577/1548-8659(2003)132<0392:CSSABO>2.0.CO;2
Transactions of the American Fisheries Society 2003;132:392–397

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Exhibits Page 2

Sustained swimming speeds and myotomal muscle function in the trout, *Salmo gairdneri*

M. GREER WALKER [1] L. EMERSON [1]
[1] MAFF Fisheries Laboratory, Lowestof, NR33 0HT, England

ABSTRACT

Rainbow trout were trained for 3–4 weeks in a flume at swimming speeds of 1, 2 and 3 l s^{-1}. For each experiment, growth rates were estimated, and by measuring the hypertrophy of red and mosaic skeletal muscle fibers, their function was described at particular swimming speeds and compared with earlier experiments on coalfish using the same technique.

Maximum growth, compared with controls in still water, occurred at swimming speeds of 1 l s^{-1}. At this speed the trout mosaic muscle fibers hypertrophied by 40% but the red muscle fibers showed only a 25% hypertrophy. It is suggested that natural swimming speeds are close to 1Ls^{-1} and the trout mosaic fibers are better adapted for use at this speed in comparison with coalfish white muscle fibers.

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Comparative swimming abilities of fed and starved larval largemouth bass (*Micropterus salmoides*)[†]

GEOFFREY C. LAURENCE [1] *
[1] *Department of Conservation, Cornell University, Ithaca, New York 14850, U.S.A.*

[†] A contribution of the New York Cooperative Fishery Unit, Cornell University, New York State Department of Environmental Conservation, and the Bureau of Sport Fisheries and Wildlife cooperating.

*National Marine Fisheries Service, Narragansett Sport Fisheries Marine Laboratory, Narragansett, R. I. 02882, U.S.A.

Exhibits Page 3

ABSTRACT

Sustained swimming abilities of fed and starved larval largemouth bass (*Micropterus salmoides* L.) were compared in the first week after swimming initiation. Fed larvae improved to a sustained velocity of 4.0 cm/sec while starved larvae attained a velocity of only 1.5 cm/sec. Swimming behavior for fed and starved larvae was quantified for number of moves, average distance/move, and total distance for all moves in 1 min intervals. Fed larvae were always more active than starved larvae, although real differences did not appear until the 4th day after swimming initiation.

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Journal of Experimental Biology 39,537-555 (1962)
Published by Company of Biologists 1962

Training, Speed and Stamina in Trout

RICHARD BAINBRIDGE [1]

[1] The Zoological Laboratory, University of Cambridge

1. A number of trout (*Salmo irideus*) were kept continuously swimming for a period of 12 months in experimental tanks in which the water was made to rotate at a mean speed of 25 cm./sec.

2. These fish become available for study in the 'Fish Wheel' and measurements were made of the maximum speed they sustained for periods of swimming of different duration.

3. For bursts of swimming of up to 20 sec. duration the mean accomplishments of these fish were identical with those of the unexercised trout studied previously.

4. Considerable variability was found amongst the specimens tested and the best of the present exercised fish were appreciably better than the best of the previous unexercised ones. The biggest improvement was 36 % at the 10 sec. period of swimming; the mean percentage improvement for all periods was 11

Exhibits Page 4

5. Some specimens were found better at swimming for short periods and others at swimming for longer.

6. In the absence of comparable figures for the earlier fish, the measurements of cruising speeds sustained for periods up to 1½ hr. were compared with other figures in the literature and found to be about half some of these for wild fish.

7. The implications of the results are considered and two interpretations stressed. First, it is assumed that there is a real identity of accomplishment for short periods of swimming, values being determined perhaps solely by gross mass of muscle; while for longer periods of swimming differences dependent upon respiratory rate etc. may well occur. Secondly, for such longer periods the discrepancies reported here may well be accounted for by differing degrees of stimulus and behavioural response under varied experimental conditions.

Submitted on May 26, 1962

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A study of the swimming performance of the Crucian carp *Carassius carassius* (L.) in relation to the effects of exercise and recovery on biochemical changes in the myotomal muscles and liver

I. A. JOHNSTON [1] G. GOLDSPINK [1]
[1] Muscle Research Laboratory, Department of Zoology, University of Hull, Hull, Yorkshire, England

ABSTRACT

A study has been made of the maximum sustained swimming speed of Crucian carp *Carassius carassius* (L.) using a fixed velocity technique. The data obtained from swimming tests on 214 carp have been analyzed using the method of probit analysis. The 50% fatigue level for 13–16 cm fish acclimated to 9.5±0.6°C has been estimated to be 3.35 lengths/sec. Biochemical measurements have been made on the red and white myotomal muscles and liver of fish subjected to both varying intensities of sustained swimming and short periods of vigorous swimming. Free creatine was found to increase only during high speed swimming in the white muscle. Elevated lactate concentrations occurred at both low and high sustained swimming speeds in the red superficial muscle but not during short periods of strenuous exercise. Glycogen depletion from the red musculature also only took place at the sustained swimming speeds investigated. The reverse situation was operative in the white muscle, significant glycogen depletion

Exhibits Page 5

occurring only at the highest swimming speed studied. Lactate levels were only significantly different from non-exercised fish in the fish swimming at the higher velocities. The effects of periods of recovery following 200 min of sustained swimming were also investigated. White muscle lactate was at a higher level than non-exercise fish 5 h post-exercise, while both red muscle glycogen and lactate rapidly returned to pre-exercise concentrations. Biochemical measurements on the myotomal muscle types have been discussed in relation to the swimming performance of the fish and the division of labor between red and white fibers.

I. A. Johnston, G. Goldspink. 1973. A study of the swimming performance of the Crucian carp Carassius carassius (L.) in relation to the effects of exercise and recovery on biochemical changes in the myotomal muscles and liver. Journal of Fish Biology 5(2): 249-260. http://dx.doi.org/10.1111/j.1095-8649.1973.tb04454.x

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Fish Passage Through Dams on the Upper Mississippi River

By: Joseph H. Wlosinski
U.S. Geological Survey
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603
Chuck Surprenant
U.S. Fish and Wildlife Service
Carterville Fishery Resources Office
9053 Route 148
Marion, Illinois 62959

January 2001

Prepared for

U.S. Fish and Wildlife Service
4469 48th Avenue, Court

Rock Island, Illinois 61201

Exhibits Page 6

FISH SWIMMING SPEEDS

Blaxter (1969) defined three fish swimming speeds: burst, prolonged, and sustained. Fish can only maintain burst speeds for about 15 seconds. Burst speeds may be 3 or 4 times as fast as prolonged speed. Prolonged speed can be maintained for up to 200 minutes. Sustained speed can be maintained for longer than 200 minutes. We used Blaxter's definitions in this appendix. However, the US Army Corps of Engineers (1991) also defined three swimming speeds in their fisheries handbook: cruising, defined as being maintained for hours; sustained, which can be maintained for minutes; and darting, which is not sustainable. The US Army Corps of Engineers indicated that the cruising speed of a fish may be about 18% of its darting speed.

Many factors influence the swimming performance of fishes: species, body length, form, physiological condition, conditioning to currents, motivation and behavior, water temperature, concentration of dissolved gasses, turbidity, and light (Gray 1957, Bainbridge 1960, Farlinger and Beamish 1977, McPhee and Watts 1975, Hocutt 1973, Dahlberg et al. 1968). There have been relatively few investigations of the swimming performance of UMRS fishes, in contrast to the considerable testing done with salmonids and marine species. Bainbridge (1960) found that the critical velocity to length relationship varied considerably within and among species. Jones et al. (1974) and Tunink (1975) subjected individuals of various coolwater fish species and sizes to performance trials in test chambers to determine a critical velocity for prolonged swimming activity, sustainable for 10 minutes. Both Jones et al. and Tunink modeled the critical velocity to length relationship for each species they tested. The reliability of these critical velocity models and their applicability to UMR fishes is limited by the species tested, sizes and numbers of test fish, water temperatures used during the swimming performance tests, and statistical results of the swimming performance trials. We used the lesser swimming speed of male or females for fishes with different lengths at maturity. Surrogate models from morphologically similar species were used for fishes lacking information on swimming performance. We used prolonged swimming speeds in our models partly because the US Army Corps of Engineers (1991) recommended that velocities in fish passage facilities must be kept well below fish darting speeds, and partly because fish must swim through at least 50 feet of elevated velocities near the gates. Because of the assumptions inherent in fish swimming speed models, results should only be treated as estimates. Prolonged swimming speeds for UMR fishes ranged from approximately 1 to 4 feet/sec (Table 5).

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Table 5. Prolonged swimming speeds of Upper Mississippi River fish.

feet/sec.	Species
3–4	lake sturgeon, paddlefish, blue catfish, flathead catfish, white bass, largemouth bass, walleye
2–3	freshwater drum, sauger, smallmouth bass, shovelnose sturgeon, blue sucker, channel catfish, yellow bass
1–2	bigmouth buffalo, smallmouth buffalo, white sucker, spotted sucker, northern pike, goldeye, mooneye, alabama shad, skipjack herring

Appendix A

Cook Nuclear Plant Laboratory Mexel Demand Modeling

Experimental Design, Methods, and Procedures for Determining the Loss of Mexel (H-O-H Formula A-432) from Lake Michigan Water
March 2009

Introduction

The Donald C. Cook Nuclear Plant (CNP) is infested with zebra mussels and must control the infestation for safe plant operation. Previously, treatment was intended to eliminate the accumulated mussels at the end of the breeding and growing season. The large influx of mussel debris following treatments created problems for plant operators. Mexel 432 was investigated as a treatment to maintain the zebra mussel infestation at a level below that which would create problems from mussels shell debris. The advantages of Mexel over oxidizing biocides and other proprietary chemicals is that there is no need for a chemical to detoxify the residual Mexel in the cooling water before discharging to Lake Michigan.

The Cook Nuclear Plant has applied to the Michigan Department of Environmental Quality (DEQ) to discharge Mexel. DEQ informed the plant that the concentration of Mexel would need to be at or below the Final Acute Value (FAV) of 0.1 ppm at the edge of the mixing zone. Calculating the concentration of Mexel at the edge of the mixing zone requires several pieces of data that are available for power plants in Europe only. The Cook Nuclear Plant needed data on the effect of added heat on Mexel concentrations and the rate of demand for Mexel in Lake Michigan water once the treated cooling water began mixing with lake water.

This study was designed to determine the demand for Mexel when the treated cooling water is discharged to Lake Michigan. In addition the effect of heat was evaluated to observe Mexel thermal demand and model cooling water heated rapidly as it passes through the plants main steam condensers.

Experimental Materials and Methods

Lake Water Source and Handling Procedures

Lake Michigan water was obtained from CNP's intake forebay. A 20-liter container was filled and immediately transported to the H-O-H Laboratory in Palatine, IL. Water temperatures were allowed to equilibrate to the ambient conditions. The water was stored in the dark until used. Testing began within 24 hours of sample collection.

Degradation of Mexel in the Steam Condenser

The test to determine the degradation of Mexel in the steam condenser began by preparing a stock solution of a known Mexel concentration. The initial concentration of Mexel in the stock solution was verified using the spectrophotometric method (Exhibit A).

Two 100 mL samples of the stock solution were prepared. One was used as a control and the second sample was heated to evaluate thermal degradation. The control sample remained idle while the test sample was heated rapidly by 15°. Once the desired temperature was achieved, both samples were analyzed simultaneously to determine if Mexel illustrated thermal degradation as indicated by a decrease in the concentration of the test sample compared to the control.

Dilution and Chemical Demand Test

The dilution and demand tests were performed with a 30.4 ppm prepared solution of Mexel and DI water. This solution was analyzed using the spectrophotometric method and checked against a calibration curve to confirm the Mexel concentration.

This procedure was designed to model the progressive dilution of Mexel treated cooling water with Lake Michigan water at the discharge plume. A stock solution was progressively diluted to simulate a 2:1, 3:1, 4:1, and 5:1 dilution of the discharge. For each progressive dilution, 100 mL of Lake Michigan water was added to 100 mL of the Mexel treated stock solution and analyzed. Each progressive dilution sample was stirred for 10 minutes with a laboratory mixer prior to analyses.

A second dilution model using a straight 3:1 dilution was prepared by adding 100 mL of Mexel directly to 200 mL of Lake Michigan water. The straight 3:1 dilution sample was stirred for 10 minutes with a laboratory mixer prior to analyses.

Progressive Dilutions

Two 100 mL samples were measured from the prepared 30 ppm Mexel stock solution. Each sample was diluted with 100 mL of Lake Michigan water. One sample was used as a control; the second sample was used as a test specimen. The control sample was analyzed after all dilution testing time had elapsed to evaluate Mexel loss as a result of time only. The control sample received no mixing.

100 mL of the test sample solution was collected and added to 100 mL of untreated Lake Michigan water to model the dilution of Mexel treated cooling water with fresh Lake Michigan water. This dilution was stirred with a laboratory mixer prior to analysis. The same process was repeated for a 3rd, 4th, and 5th dilution. Each dilution was mixed for 10 minutes prior to analyses.

Straight 3:1 Dilution

100 mL of the 30 ppm stock solution was collected and mixed with 200 mL of Lake Michigan water to model a straight 3:1 dilution by volume, bypassing the 2:1 dilution step. This sample was stirred for 10 minutes using a laboratory mixer and analyzed.

Once all trials, progressive and straight dilutions, were complete the elapsed time was recorded and the control sample was analyzed. To minimize the influence of time degradation, the dilutions were conducted from start to finish in approximately 74 minutes.

Results and Discussion

Degradation of Mexel in the Steam Condenser

The results indicate that thermal degradation of Mexel does occur when rapidly heated. The concentration of Mexel in the treated samples decreased on average 1.078 ppm when compared with the control sample. The average percent change observed was a 29% decrease in concentration from the control to the treatment concentration.

Table 1 – Mexel Thermal Degradation Data

Trial	Control Sample Absorbance, %	Heated Sample Absorbance, %	Mexel Concentration Control Sample, ppm	Mexel Concentration Heated Sample, ppm	Concentration Delta, ppm	Percent, % Reduction
1	0.390	0.302	3.7	2.8	0.9	25%
2	0.387	0.279	3.7	2.5	1.1	31%
3	0.383	0.288	3.6	2.6	1.0	28%
4	0.389	0.267	3.7	2.4	1.3	35%
5	0.385	0.290	3.7	2.7	1.0	28%

Trial Parameters	
Sample Size, mL	100
Heating Time, seconds	30
Temperature Difference, °F	15
Initial Mexel Abs, %	0.395
Initial Mexel Conc., ppm	3.8

Dilution and Chemical Demand Test

The results indicate that a Mexel demand for each dilution with fresh lake water was observed. The percent demand reduction increases with each dilution and as the concentration of Mexel is lowered. Table 2 illustrates a Mexel demand reduction of 82% was observed by the 4th dilution. The straight 3:1 dilution exhibited a 76.2% total reduction from the initial concentration. By the 3rd progressive dilution over 86% of the original Mexel concentration was consumed. The control sample illustrated a residence time demand of approximately 0.6 ppm per hour without mixing.

Table 2 - Dilution & Chemical Demand Study Data

Sample	Absorbance, % @ 414 nm	Mexel Concentration, (ppm)	Mexel Concentration calculated from dilution ratio only	Percent Reduction from demand only	Percent Reduction of Mexel (dilution and demand combined)
Initial Stock Solution	2.222	30.4	30.4	0%	0.0%
2:1 Dilution	0.995	11.3	15.2	26%	63%
3:1 Dilution	0.428	4.1	10.1	59%	86%
4:1 Dilution	0.168	1.4	7.6	82%	95%
5:1 Dilution	0.058	0.4	6.1	93%	99%
Straight 3:1 Dilution	0.689	7.2	10.1	29%	76%
2:1 Dilution Control - Initial	1.110	12.9	15.2	15%	58%
2:1 Dilution Control - Final	1.059	12.2	15.2	20%	60%

Study Parameters	
Sample Mix Time, (min)	10
Trial Time Period, (min)	74
Time Demand, (ppm / min)	0.01
Demand for 40 Minutes, (ppm)	0.4

Chemical Analytical Method (Exhibit A)

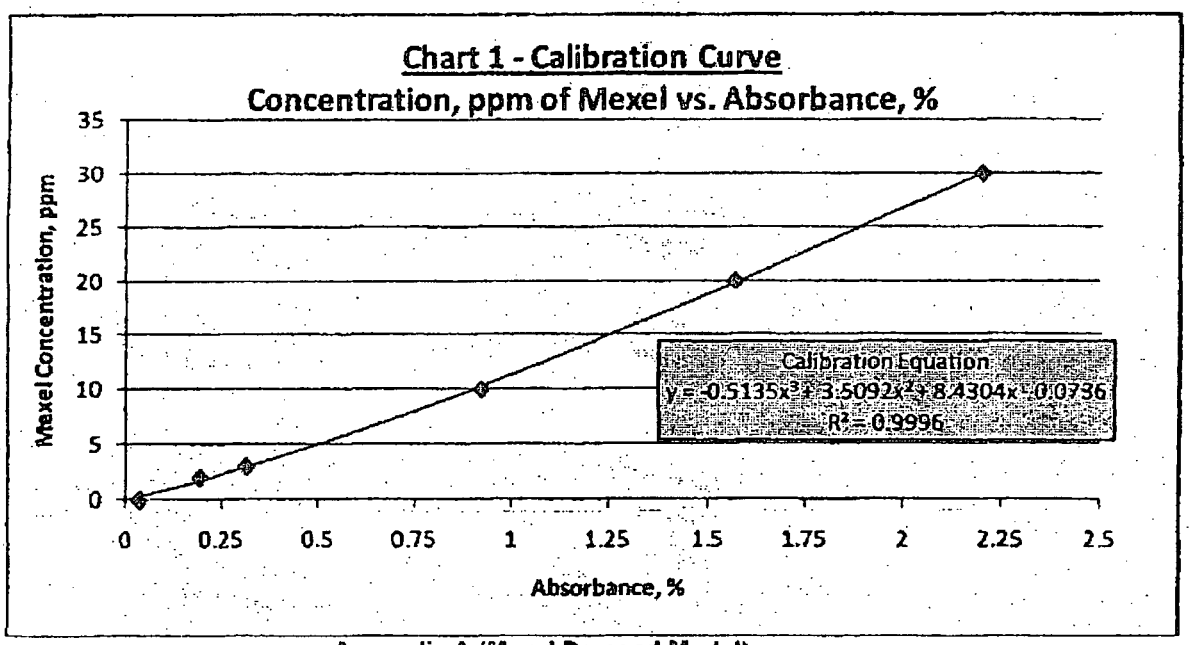
Spectrophotometer Analytical Procedure of Mexel 432

Calibration Curve

The first step in the analysis is to develop a calibration curve based on known quantities of Mexel in DI water. Stock solutions were prepared by weight and analyzed using the Mexel spectrophotometer method (attached) to determine the Absorbance for known Mexel values. The data was plotted and fitted by a curve to develop an equation for determining measuring unknown quantities of Mexel in samples with expected residuals in the 0 ppm to 30 ppm range. This curve was used to determine the concentration of Mexel in the dilution and thermal demand studies. (See Table 1 and Chart 1)

Table A1 - Mexel Calibration Curve Data

Mexel Stock Solutions Concentration (ppm)	Absorbance, %T @ 414 nm
0	0.039
2	0.194
3	0.314
10	0.921
20	1.571
30	2.203



Equation for Determining Mexel Concentration

$$y = -.5135(x^3) + 3.5092(x^2) + 8.4304(x) - 0.0736$$

Where: x = *Absorbance, %*
y = *Mexel Concentration, ppm*

EQUIPMENT

- Visible/UV Spectrophotometer
- Matched cuvettes, 2 cm path length
- Test tubes
- Volumetric flasks
- Class A pipets
- Brown glass bottles
- Mechanical shaker
- Teflon separatory funnels

REAGENTS

- Chloroform
- 0.1% (w/v) methyl orange solution
- 10% nitric acid
- Acetone
- Potassium chloride
- Buffer solution, pH = 3.75
  - 125 g potassium chloride
  - 70 g sodium acetate, anhydrous
  - 300 mL glacial acetic acid
  - Deionized water (1 liter)

PROCEDURE

GLASSWARE CLEANING:

- Two rinses with acetone
- One rinse with 10% nitric acid
- Three rinses with deionized water

1. Prepare calibration standards in 100 mL volumetric flasks at concentrations that bracket the estimated concentrations of the samples to be tested. A minimum of four standards plus a blank should be prepared. The matrix of the standards should be closely matched to the concentration of the samples for best results.

2. Add 4 mL buffer solution and 100 mL of test sample to a 200 mL brown glass bottle.

3. Add 2.5 mL methyl orange solution to brown glass bottle.

4. Add 10 mL chloroform to brown glass bottle via a class A pipet.

5 Using mechanical shaker with setting on "high" (100 oscillations/minute, displacement = 3 cm), agitate for 15 minutes.

6. Immediately transfer the solution from the glass bottles to the separatory funnels. Separate, and fill the cuvette from the lower (chloroform) layer.

7. Calibrate the spectrophotometer for 100% transmittance at 414 nm using a cuvette containing pure chloroform.

8. Measure absorbance, and compare the curve generated by the standards.

NOTES ON PROCEDURE

1. The volume of sample to be tested may be different from 100 mL, but always use the same volume for standards as the volume of sample.

2. If the volume of sample is more than 100 mL, do not change the volume of chloroform; if the volume of sample is less than 100 mL, decrease the volume of chloroform proportionately but not below the minimum volume needed for effective separation and filling a cuvette.

3. If volume varies from 100 mL, adjust all other reagents proportionately.

4. In waters with high content of organic matter, a layer of emulsion at the interface of the aqueous and non-aqueous phases may interfere with the separation in step 6. To minimize this, adjust procedure by adding 7.0 g of potassium chloride after step 4.

MATERIAL SAFETY DATA SHEET

QUICK REFERENCE: A-432/0

H-O-H Water Technology
500 SOUTH VERMONT STREET
PALATINE, ILLINOIS 60067

EMERGENCY PHONE No.'s
847-358-7400 (H-O-H BUSINESS Hrs.)
800-424-9300 (CHEMTREC - 24 Hrs.)

HMIS:

4 = EXTREME
3 = SEVERE
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT

HEALTH	2
FLAMMABILITY	0
REACTIVITY	0

D.O.T.:

HAZARD LABELING

IN D.O.T. LISTED POLYETHYLENE CONTAINERS

PRODUCT IDENTIFICATION

PRODUCT NAME	CHEMICAL FAMILY	DATE	REV. No.	SUPERSEDES	E.P.A. I.P.C.	GY
A-432/0	CATIONIC BIO-DISPERSANT	7-1-08	4	1-1-03	NA	

HAZARDOUS COMPONENTS

CHEMICAL NAME	COMMON NAME	C.A.S. No.	PERCENT	OSHA PEL	ACGIH TLV	OTHER
(Alkyl amino)-3 Aminopropane		61791-63-7	1.7	NA	NA	NOT APPLICABLE

COMMENTS

1. THIS PESTICIDE IS TOXIC TO FISH. KEEP OUT OF LAKES, STREAMS, PONDS. PERMITS MAY BE REQUIRED FOR DISCHARGES CONTAINING THIS PESTICIDE INTO LAKES, STREAMS, PONDS, OR PUBLIC WATER. FOR GUIDANCE, CONTACT THE REGIONAL OFFICE OF THE E.P.A.
2. THIS PRODUCT IS A REGISTERED PESTICIDE UNDER THE FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT. THE ENVIRONMENTAL PROTECTION AGENCY REGISTRATION NUMBER FOR THIS PRODUCT IS 84034-1-12479.
3. THE D.O.T. SHIPPING DESCRIPTION FOR THIS PRODUCT IS: POLYAMINES, LIQUID, CORROSIVE, N.O.S. (ALKYL PROPYLENEDIAMINE), 8, UN2735, PGIII.

PHYSICAL DATA

BOILING POINT (Degrees Fahrenheit)	UNKNOWN	SOLUBILITY (in water) %	COMPLETE	EVAPORATION RATE (water = 1.0)	< 1.0
VAPOR PRESSURE (in millimeters of Mercury)	Not Determined	SPECIFIC GRAVITY (water = 1.0)	.985	pH	11.0
VAPOR DENSITY (air = 1.0)	Not Determined	PERCENT (%) VOLATILE (by volume)	NA		
APPEARANCE and ODOR	OFF-WHITE TO MILKY LIQUID				

FIRE AND EXPLOSION

FLASH POINT (Degrees Fahrenheit)	METHOD	FLAMMABLE LIMITS	LOWER EXPLOSIVE LIMIT	UPPER EXPLOSIVE LIMIT
GREATER THAN 212°F.			NOT DETERMINED	NOT DETERMINED

EXTINGUISHING MEDIA	SPECIAL FIRE FIGHTING PROCEDURES	UNUSUAL FIRE AND EXPLOSION HAZARDS
WATER WATER FOG, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. COOL CONTAINERS TO PREVENT RUPTURE. THIS PRODUCT PRESENTS NO FIRE HAZARD.	NONE	NONE

REACTIVITY DATA

STABILITY STABLE [X] UNSTABLE [ ]	CONDITIONS TO AVOID	NOT APPLICABLE
INCOMPATIBILITY (Materials to Avoid)		NONE KNOWN.
HAZARDOUS DECOMPOSITION PRODUCTS		NONE UNDER NORMAL CONDITIONS.
HAZARDOUS POLYMERIZATION MAY WILL OCCUR [ ] WON'T OCCUR [X]	CONDITIONS TO AVOID	NOT APPLICABLE

SPECIAL PRECAUTIONS

STORAGE AND HANDLING	OTHER
1. PROTECT CONTAINERS AGAINST PHYSICAL DAMAGE. 2. STORE IN A COOL, DARK, WELL-VENTILATED LOCATION AWAY FROM DIRECT SUNLIGHT AND OTHER SOURCES OF RADIANT HEAT. 3. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE. NEVER MOVE AN OPEN OR LOOSELY CLOSED CHEMICAL CONTAINER. 4. WEAR HAND AND FOOT PROTECTION WHEN MOVING HEAVY CONTAINERS. 5. KEEP FROM FREEZING AND TEMPERATURES ABOVE 140°F.	1. NOT TO BE TAKEN INTERNALLY. 2. NOT TO BE USED FOR OTHER THAN SPECIFIED PURPOSE. 3. KEEP AWAY FROM CHILDREN. 4. NEVER MIX THIS MATERIAL WITH ANY OTHER CHEMICAL UNLESS AT THE SPECIFIC DIRECTION OF H-O-H PERSONNEL. 5. TRIPLE RINSE EMPTY CONTAINERS BEFORE OFFERING FOR DISPOSAL OR SALVAGE. NEVER REUSE EMPTY CONTAINERS.

2/10/09

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HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: NONE ESTABLISHED.

A-432/0

ACUTE HEALTH HAZARDS	CHRONIC HEALTH HAZARDS
IRRITANT *Eye Contact:* Possible eye irritant. *Skin Contact:* Slightly irritating to the skin. *Ingestion:* No data is available on human ingestion. Based on animal studies, no adverse effects are expected.	**NONE KNOWN** THE EFFECTS FROM CHRONIC EXPOSURE TO THE ACTIVE INGREDIENT IN THIS PRODUCT HAVE NOT BEEN FULLY EVALUATED. TESTS IN BOTH ANIMAL AND HUMAN SENSITIZATION HAVE PROVED NEGATIVE. IN VITRO MUTAGENICITY TESTS HAVE BEEN NAGATIVE. BIRTH DEFECTS ARE UNLIKELY.

EFFECTS OF EXPOSURE

	SKIN AND EYES / TARGET ORGAN	INHALATION	INGESTION
	TISSUE IRRITATION MAY CAUSE EYE IRRITATION WITH REDNESS. THE DEGREE OF IRRITATION WILL DEPEND ON EXPOSURE TIME, CONCENTRATION, AND FIRST AID. PROLONGED DERMAL CONTACT MAY PRODUCE ITCHING, DRY SKIN, OR POSSIBLE MILD IRRITATION.	**VERY SLIGHTLY VOLATILE COMPONENT** IF A MIST OR SPRAY IS DRAWN INTO THE BREATHING TRACT, IRRITATION OF BRONCHIAL TISSUE AND LUNGS MAY OCCUR. PROLONGED EXPOSURE COULD PRODUCE NASAL OR MUCOUS TISSUE SORES. PROLONGED BREATHING OF PRODUCT VAPORS MAY CAUSE HEADACHE.	**IRRITANT** MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT.
CONDITIONS AGGRAVATED	DERMATITIS, BLISTERS, BURNS, OR ANY PRE-EXISTING SKIN IRRITATION IF CONTACT OCCURS.	IN NORMAL USE, NO EFFECT SHOULD BE NOTED.	IF INGESTION OCCURS, STOMACH ULCERS OR OTHER PRE-EXISTING DIGESTIVE CONDITIONS.

EMERGENCY PROCEDURES

SKIN AND EYES	INHALATION	INGESTION
EYES FLUSH EYES WITH WATER FOR 15 MINUTES. GET PROMPT MEDICAL ATTENTION. **SKIN** FLUSH WITH WATER AND WASH WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING AND WASH WELL BEFORE REUSE. IF IRRITATION DEVELOPS, SEEK MEDICAL ADVICE.	**VERY SLIGHTLY VOLATILE COMPONENT** IF LIQUID OR CONCENTRATED SPRAY OR MIST IS INHALED, REMOVE SUBJECT TO FRESH AIR. HAVE THE SUBJECT COUGH AND ATTEMPT TO CLEAR ANY LIQUIDS FROM THE BREATHING TRACT. IF BREATHING BECOMES DIFFICULT, GET PROMPT MEDICAL ATTENTION. IF DROWSINESS OR HEADACHE DEVELOP DUE TO BREATHING VAPORS IN A CONFINED SPACE, REMOVE SUBJECT TO FRESH AIR AND MONITOR FOR RESPIRATORY DISTRESS, BRONCHITIS, OR PNEUMONIA.	**DO NOT INDUCE VOMITING** RINSE MOUTH WITH COPIOUS AMOUNTS OF WATER OR MILK FIRST. IF CONSCIOUS, IRRIGATE ESOPHAGUS. DILUTE INGESTED MATERIAL WITH 2 OR MORE GLASSES OF WATER OR MILK. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS SUBJECT. OBTAIN PROMPT MEDICAL ATTENTION.

CARCINOGEN LISTING

NATIONAL TOXICOLOGY PROGRAM (NTP)	I.A.R.C. MONOGRAPHS	OSHA REGULATED
NO	NO	NO

SPILL OR LEAK PROCEDURES

SPILLS AND RELEASES	WASTE DISPOSAL METHODS
CONTAIN SPILLED MATERIAL AND COLLECT INTO SUITABLE CONTAINER FOR DISPOSAL IN ACCORDANCE WITH THE INSTRUCTIONS GIVEN ON THE PRODUCT LABEL. IF SPILL IS WELL CONTAINED AND PRODUCT IS NOT CONTAMINATED, CONSULT H-O-H CHEMICALS FOR INSTRUCTIONS FOR POSSIBLE USE OF COLLECTED MATERIAL.	CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS PERTAINING TO WASTE DISPOSAL.

CONTROL MEASURES

EYE PROTECTION	SAFETY GLASSES WITH SIDE SHIELDS OR A FACE MASK.		
RESPIRATORY PROTECTION	NOT REQUIRED FOR ORDINARY USE. DURING EMERGENCY CONDITIONS OR IF A SERIOUS SPILL OCCURS, AN AIR PURIFING RESPIRATOR DESIGNED TO ABSORB FINE DUST, SMOKE, AND ACIDIC VAPORS SHOULD BE USED.		
OTHER PROTECTIVE EQUIPMENT	NOT REQUIRED FOR NORMAL USE.		
LOCAL EXHAUST	YES	SPECIAL VENTILATION	NOT REQUIRED FOR NORMAL USE.
MECHANICAL VENTILATION	NOT REQUIRED FOR NORMAL USE.	OTHER VENTILATION	NOT REQUIRED FOR NORMAL USE.
PROTECTIVE GLOVES	NON-SLIP VINYL OR RUBBER GLOVES.	PROTECTIVE CLOTHING	WATER REPELLENT APRON OR COVERALLS

REFERENCES

1. *Threshold Limit Values For Chemical Substances And Physical Agents In The Work Environment;* ACGIH, 1989.
2. *OSHA Safety and Health Standards:* 29CFR 1900 to 1910, July 1, 1988
3. *Fifth Annual Report on Carcinogens;* U. S. Dept. of Health and Human Services, National Toxicology Program, 1989 (Summary).
4. M. Sittig, *Handbook of Toxic & Hazardous Chemicals,* (Noyes Publications; Park Ridge, N. J., 1981)
5. *Community Right-To-Know Manual,* (Thompson Publishing Group, Washington, D.C., 1990).
6. *Right-To-Know/Chemical Manual* (ILLINOIS MANUFACTURES ASSOCIATION; Rooks, Pitts, and Poust, 1990).
7. *Toxic and Hazardous Industrial Chemicals Safety Manual* (THE INTERNATIONAL TECHNICAL INFORMATION INSTITUTE, 1975).
8. M. J. Lefevre, S. A. Conibear, *First Aid Manual for Chemical Accidents, 2nd ed.* (Van Nostrand Reinhold, New York, 1989).
9. *Hazardous Materials Guide; Shipping, Materials Handling and Transportation* (J. J. KELLER & ASSOCIATES, Inc., Neenah, Wisconsin, Dec. 1990)
10. *Hazard Communication Guide; Federal & State Right to Know Standards* (J. J. KELLER & ASSOCIATES, Inc., Neenah, Wisconsin, Dec. 1990)

REPORTABLE QUANTITY

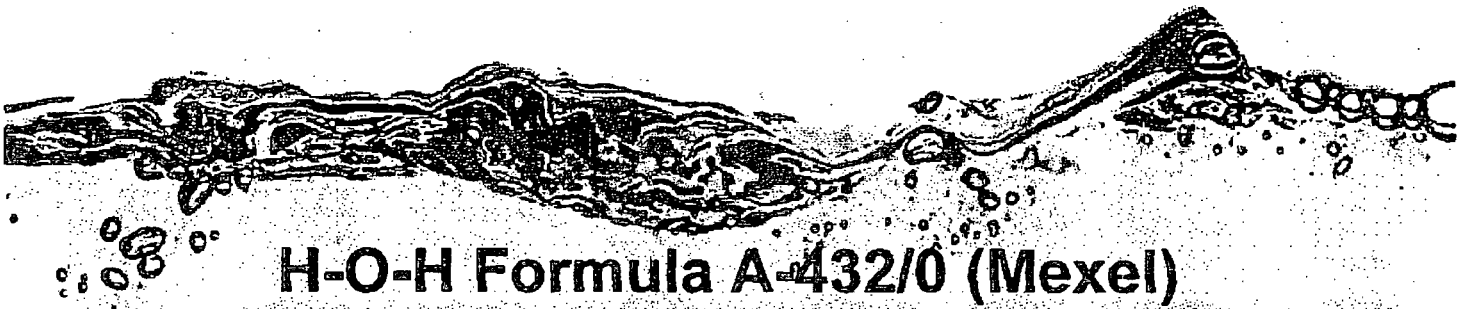
IF MORE THAN THE INDICATED QUANTITY IS DISCHARGED TO DRAINAGE (Sewer/surface water), AIR, OR SOIL, IMMEDIATELY REPORT AS INDICATED.

	CERCLA OR EPA (Extremely Hazardous) NATIONAL RESPONSE CENTER (800-424-8802)	STATE EMERGENCY RELEASE NOTIFICATION ILLINOIS (Only) 800-782-7860 (Consult for others)	LOCAL EMERGENCY RESPONSE AUTHORITY Record Telephone No. of Local Response Authority
WRITTEN REPORT MUST FOLLOW	NA	NA	NA

H-O-H Water Technology, Inc.

500 South Vermont Street
Palatine, Illinois 60067

Phone: 847/358-7400
www.hohwatertechnology.com



H-O-H Formula A-432/0 (Mexel)

Product Data Sheet

Description

H-O-H Formula A-432/0 is a film forming, non ionic bio-dispersant for controlling clams, barnacles, and mollusks such as Zebra Mussels in once-through cooling and process water systems. A-432/0 contains (alkyl-amino)-3 aminopropane in a water/surfactant emulsion. The U.S. EPA recognizes A-432/0 as a molluscicide in once-through water systems, EPA REG. No. 84034-1-12479.

Benefits

- ✓ EPA Registered for use in once-through systems
- ✓ Controls Macro-fouling species, and Microbiologically influenced corrosion
- ✓ Treats surfaces vs. water column
- ✓ High efficiency- low dosage requirements
- ✓ Improves safety and minimizes operator handling
- ✓ Does not require de-toxification

Properties

Appearance ..... Off white milky liquid
Viscosity ..... 420 cp
Density ..... 0.985 9m/ml or 8.2 lbs/gal
Flash Point ..... Non-Flammable
Freeze Point ..... 34 °F
Miscibility ..... Complete
COD ..... 0.458 lbs O_2/lb

Environmental

Apply this product only as specified on the label. Treated effluent should not be discharged to surface waters unless in accordance with a NPDES permit. A-432/0 is non-explosive, non-flammable, and non-volatile. A-432/0 is non-hazardous by DOT or OSHA standards.

Dosage

Typical dosage is 3 to 5ppm for 30 minutes per day. Consult your H-O-H representative for site specific recommendations.

"Caretakers of the world's most precious resource"

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STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

August 3, 2009

Mr. Jon Harner, Environmental Manager
American Electric Power Company
Donald C. Cook Nuclear Plant
One Cook Place
Bridgman, Michigan 49106

Dear Mr. Harner:

We have reviewed the final information and mixing zone rational dated June 26, 2009, that was submitted as follow-up to your request dated July 1, 2008, to use and discharge the molluscicide, Mexel A-432, at the Donald C. Cook Nuclear Plant (hereafter called Cook), located in Bridgeman, Michigan. The use of this product was piloted during a year-long study (2007) in a continuous flow research facility constructed at Cook, which was built to model the plant's flow and operational conditions. The pilot project was conducted to test the effectiveness of Mexel under realistic conditions using local zebra mussel populations, and to determine if the Water Quality-Based Effluent Limit calculated for the discharge of Mexel could be met by the facility if the product was used in a wide-scale treatment.

Based on a review of the toxicological and demand information for Mexel A-432, the mixing zone evaluation conducted for the Cook discharge to determine the dilution from the facility's high velocity diffuser, and the proposed final discharge concentration of 0.090 milligrams per liter (after mix), we approve the discharge of Mexel A-432 at the Cook facility. If for any reason, the discharge scenario changes, the facility must submit a revised request to the Department of Environmental Quality (DEQ) for evaluation.

Please feel free to contact me if you have any questions.

Sincerely,

B Sayles for SH

Sylvia Heaton
Lake Michigan Unit
Water Bureau
517-373-1320

cc: Mr. Greg Danneffel, Kalamazoo District Supervisor, DEQ
Ms. Brenda Sayles/Facility File/DEQ

10/21