National Pollutant Discharge Elimination System (NPDES) Permit Program

F A C T S H E E T

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for Mason Water Reclamation Plant (WRP)

Public Notice No.: 15-05-005
Public Notice Date: May 15, 2015
Comment Period Ends: June 15, 2015

Ohio EPA Permit No.: 1PC00004*LD
Application No.: OH0020494

Name and Address of Applicant:

City of Mason
6000 Mason Montgomery Road
Mason, Ohio 45040

Name and Address of Facility Where Discharge Occurs:

Mason Water Reclamation Plant
3200 Mason Morrow Millgrove Road
Warren County, Mason, Ohio

Receiving Water: Muddy Creek

Subsequent Stream Network: Little Miami River to Ohio River

Introduction

Development of a fact sheet for NPDES permits is mandated by Title 40 of the Code of Federal Regulations (CFR), Section 124.8 and 124.56. This document fulfills the requirements established in those regulations by providing the information necessary to inform the public of actions proposed by the Ohio Environmental Protection Agency (Ohio EPA), as well as the methods by which the public can participate in the process of finalizing those actions.

This fact sheet is prepared in order to document the technical basis and risk management decisions that are considered in the determination of water quality based NPDES permit effluent limitations. The technical basis for the fact sheet may consist of evaluations of promulgated effluent guidelines, existing effluent quality, instream biological, chemical and physical conditions, and the relative risk of alternative effluent limitations. This fact sheet details the discretionary decision-making process empowered to the Director by the Clean Water Act (CWA) and Ohio Water Pollution Control Law, Chapter 6111 of the Ohio Revised Code (ORC). Decisions to award variances to water quality standards (WQS) or promulgated effluent guidelines for economic or technological reasons will also be justified in the fact sheet where necessary.

Effluent limits based on available treatment technologies are required by Section 301(b) of the Clean Water Act. Many of these have already been established by the United States Environmental Protection Agency (U.S. EPA) in the effluent guideline regulations (a.k.a. categorical regulations) for industry categories in 40 CFR Parts 405-499. Technology-based regulations for publicly-owned treatment works are listed in the secondary treatment regulations (40 CFR Part 133). If regulations have not been established for a category of dischargers, the director may establish technology-based limits based on best professional judgment (BPJ).

Ohio EPA reviews the need for water-quality-based limits on a pollutant-by-pollutant basis. Wasteload allocations (WLAs) are used to develop these limits based on the pollutants that have been detected in the discharge, and the receiving water's assimilative capacity. The assimilative capacity depends on the flow in the water receiving the discharge, and the concentration of the pollutant upstream. The greater the upstream flow, and the lower the upstream concentration, the greater the assimilative capacity is. Assimilative capacity may represent dilution (as in allocations for metals), or it may also incorporate the break-down of pollutants in the receiving water (as in allocations for oxygen-demanding materials).

The need for water-quality-based limits is determined by comparing the WLA for a pollutant to a measure of the effluent quality. The measure of effluent quality is called Projected Effluent Quality (PEQ). This is a statistical measure of the average and maximum effluent values for a pollutant. As with any statistical method, the more data that exists for a given pollutant, the more likely that PEQ will match the actual observed data. If there is a small data set for a given pollutant, the highest measured value is multiplied by a statistical factor to obtain a PEQ; for example if only one sample exists, the factor is 6.2, for two samples - 3.8, for three samples - 3.0. The factors continue to decline as samples sizes increase. These factors are intended to account for effluent variability, but if the pollutant concentrations are fairly constant, these factors may make PEQ appear larger than it would be shown to be if more sample results existed.

Summary of Permit Conditions

The effluent limits and monitoring requirements proposed for the following parameters are the same as in the current permit, although some monitoring frequencies have changed: flow, temperature, dissolved oxygen, 5-day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), ammonia-nitrogen, total phosphorus, nitrite+nitrate-nitrogen, total Kjeldahl nitrogen, oil and grease, pH, cadmium, chromium, dissolved hexavalent chromium, copper, lead, mercury, nickel, and zinc.

New monitoring and limits are proposed for benzo(a)fluoranthene, bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, and ideno(1,2,3-c,d)pyrene. Because these parameters are carcinogens, they require the evaluation of the additive effect of these pollutants based on OAC 3745-33-07(A)(8). A schedule of compliance is outlined in Part I.C of the permit where Mason WRP can test the effluent for these parameters and develop a plan to remove carcinogens from plant effluent. Also, Part II, Item AB outlines the procedure that the permittee shall use when calculating additivity of carcinogens.

New monitoring requirements are proposed for barium. This parameter was placed into Group 4 of the Parameter Assessment (Table 12). Monitoring for Group 4 pollutants is required by OAC 3745-33-07(A)(2).

New monitoring requirements are proposed for dissolved hexavalent chromium. The current method detection limit (MDL), the minimum concentration at which one can be confident that the effluent concentrations are greater than zero, for this parameter is too high to accurately evaluate concentrations of this parameter in the receiving water and a new MDL is proposed.

Annual chronic toxicity monitoring with the determination of acute endpoints is proposed for the life of the permit. This satisfies the minimum testing requirements of rule 3745-33-07(B)(11) of the Ohio Administrative Code (OAC) and will adequately characterize toxicity in the plant's effluent.

In Part II of the permit, special conditions are included that address sanitary sewer overflow (SSO) reporting; operator certification, minimum staffing and operator of record; outfall signage; and pretreatment program requirements.

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Procedures for Participation in the Formulation of Final Determinations

The draft action shall be issued as a final action unless the Director revises the draft after consideration of the record of a public meeting or written comments, or upon disapproval by the Administrator of the U.S. Environmental Protection Agency.

Within thirty days of the date of the Public Notice, any person may request or petition for a public meeting for presentation of evidence, statements or opinions. The purpose of the public meeting is to obtain additional evidence. Statements concerning the issues raised by the party requesting the meeting are invited. Evidence may be presented by the applicant, the state, and other parties, and following presentation of such evidence other interested persons may present testimony of facts or statements of opinion.

Requests for public meetings shall be in writing and shall state the action of the Director objected to, the questions to be considered, and the reasons the action is contested. Such requests should be addressed to:

Legal Records Section
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, Ohio 43216-1049

Interested persons are invited to submit written comments upon the discharge permit. Comments should be submitted in person or by mail no later than 30 days after the date of this Public Notice. Deliver or mail all comments to:

Ohio Environmental Protection Agency
Attention: Division of Surface Water
Permits Processing Unit
P.O. Box 1049
Columbus, Ohio 43216-1049

The Ohio EPA permit number and Public Notice numbers should appear on each page of any submitted comments. All comments received no later than 30 days after the date of the Public Notice will be considered.

Citizens may conduct file reviews regarding specific companies or sites. Appointments are necessary to conduct file reviews, because requests to review files have increased dramatically in recent years. The first 250 pages copied are free. For requests to copy more than 250 pages, there is a five-cent charge for each page copied. Payment is required by check or money order, made payable to Treasurer State of Ohio.

For additional information about this fact sheet or the draft permit, contact Ned Sarle (937)285-6096, ned.sarle@epa.ohio.gov; or Andy Bachman, (614)644-3075, andrew.bachman@epa.ohio.gov.

Information Regarding Certain Water Quality Based Effluent Limits

This draft permit may contain proposed water quality based effluent limitations for parameters that **are not** priority pollutants. (See the following link for a list of the priority pollutants: http://epa.ohio.gov/portals/35/pretreatment/Pretreatment_Program_Priority_Pollutant_Detection_Limits.pdf). In accordance with Ohio Revised Code Section 6111.03(J)(3), the Director established these water quality based effluent limits after considering, to the extent consistent with the Federal Water Pollution Control Act, evidence relating to the technical feasibility and economic reasonableness of removing the polluting properties from those wastes and to evidence relating to conditions calculated to result from that action and their relation to benefits to the people of the state and to accomplishment of the purposes of this chapter. This determination was made based on data and information available at the time the permit was drafted, which included the contents of the timely submitted National Pollutant Discharge Elimination System (NDPES) permit renewal application, along with any and all pertinent information available to the Director.

This public notice allows the permittee to provide to the Director for consideration during this public comment period additional site-specific pertinent and factual information with respect to the technical feasibility and economic reasonableness for achieving compliance with the proposed final effluent limitations for these parameters. The permittee shall deliver or mail this information to:

Ohio Environmental Protection Agency
Attention: Division of Surface Water
Permits Processing Unit
P.O. Box 1049
Columbus, Ohio 43216-1049

Should the applicant need additional time to review, obtain or develop site-specific pertinent and factual information with respect to the technical feasibility and economic reasonableness of achieving compliance with these limitations, written notification for any additional time shall be sent to the above address no later than 30 days after the Public Notice Date on Page 1.

Should the applicant determine that compliance with the proposed water quality based effluent limitations for parameters other than the priority pollutants is technically and/or economically unattainable, the permittee may submit an application for a variance to the applicable water quality standard(s) used to develop the proposed effluent limitation in accordance with the terms and conditions set forth in Ohio Administrative Code (OAC) Rule 3745-33-07(D). The permittee shall submit this application to the above address no later than 30 days after the Public Notice Date.

Alternately, the applicant may propose the development of site-specific water quality standard(s) pursuant to OAC Rule 3745-1-35. The permittee shall submit written notification regarding their intent to develop site specific water quality standards for parameters that are not priority pollutants to the above address no later than 30 days after the Public Notice Date.

Location of Discharge/Receiving Water Use Classification

Mason WRP discharges to Muddy Creek at river mile (RM) 2.23. Muddy Creek joins the Little Miami River at RM 31.95. Figure 1 shows the approximate location of the facility.

This segment of the Muddy Creek is described by Ohio EPA River Code: 11-020, U.S. EPA River Reach #: 05090202-062, County: Warren, Ecoregion: Eastern Corn Belt Plains. The Muddy Creek is designated for the following uses under Ohio's WQS (OAC 3745-1-18): Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Primary Contact Recreation (PCR) Class B.

The Little Miami River is designated for the following uses under Ohio's Water Quality Standards (OAC 3745-1-18): Exceptional Warmwater Habitat (EWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Primary Contact Recreation (PCR) Class A.

Use designations define the goals and expectations of a waterbody. These goals are set for aquatic life protection, recreation use and water supply use, and are defined in the Ohio WQS (OAC 3745-1-07). The use designations for individual waterbodies are listed in rules -08 through -32 of the Ohio WQS. Once the goals are set, numeric WQS are developed to protect these uses. Different uses have different water quality criteria.

Use designations for aquatic life protection include habitats for coldwater fish and macroinvertebrates, warmwater aquatic life and waters with exceptional communities of warmwater organisms. These uses all meet the goals of the federal CWA. Ohio WQS also include aquatic life use designations for waterbodies which cannot meet the CWA goals because of human-caused conditions that cannot be remedied without causing fundamental changes to land use and widespread economic impact. The dredging and clearing of some small streams to support agricultural or urban drainage is the most common of these conditions. These streams are given Modified Warmwater or Limited Resource Water designations.

Recreation uses are defined by the depth of the waterbody and the potential for wading or swimming. Uses are defined for bathing waters, swimming/canoeing (Primary Contact) and wading only (Secondary Contact - generally waters too shallow for swimming or canoeing).

Water supply uses are defined by the actual or potential use of the waterbody. Public Water Supply designations apply near existing water intakes so that waters are safe to drink with standard treatment. Most other waters are designated for AWS and IWS.

Facility Description

The Mason WRP was originally constructed in 2006. The Mason WRP facility is an advanced treatment facility with an average design flow of 13.0 million gallons per day (MGD). The treatment plant includes the following equipment and/or wet processes:

- Influent Pumping
- Bar Screens
- Grit Removal
- Activated Sludge – Extended Aeration
- Biological Nitrification
- Biological Denitrification
- Biological Phosphorus Removal
- Ferric Chloride Addition
- Ultraviolet Disinfection (outfall 001)
- Chlorination (outfall 002)

Table 1: Sludge Removed 9/1/14-7/31/14

Year	Tons of Sludge
2009	383.87
2010	469.14
2011	678.51
2012	700.94
2013	633.87
2014	362.85

Solid stream processes are gravity thickening, dewatering using centrifuges, heat treatment and air drying. Final sludge disposal is by the distribution and marketing of Class A (exceptional quality) biosolids. Table 1 shows the total tons of sludge removed from Mason WRP from 2009 through 2014, based upon discharge monitoring reports (DMR) data. During this timeframe, all sludge was recorded as Class A biosolids.

The plant serves the City of Mason. The total population served is estimated to be 33,000. The collection system for Mason WRP is 100 percent separate sanitary sewers. The inflow/infiltration rate for the collection system is estimated to be 0.075 MGD. The City implements on Ohio EPA approved industrial pretreatment program. Based on information in the 2014 NPDES renewal application, there are 13 significant industrial users

responsible for 0.21 MGD of daily flow into the plant. Seven of these facilities are categorical, accounting for 0.118 MGD of flow and six are non-categorical accounting for 0.091 MGD of flow.

Description of Existing Discharge

From May to October, Mason WRP has the ability to discharge effluent through outfall 1PC00004002 that goes to a golf course pond and a sports park where it is used for irrigation. Discharges to Muddy Creek are via outfall 1PC00004001. Table 2 shows the annual effluent flow rates at outfall 1PC00004001 for the Mason WRP based upon DMR data. The flow rates have been consistent across this period. Heavy rains in 2011 contributed to increased flow rates.

Table 2: Effluent Flow Rates for Outfall 1PC00004001
9/1/14-7/31/14

Year	Annual Flow in MGD		
	50th Percentile	95th Percentile	Maximum
2009	5.11	7.08	9.82
2010	5.04	8.02	12.66
2011	5.71	12.04	22.25
2012	5.20	7.82	15.08
2013	5.65	8.63	15.95
2014	5.54	9.07	14.27

Table 3 shows the annual effluent flow rates at outfall 1PC00004002 for the Mason WRP based upon DMR data. The flow rates have been consistent but the number of days the facility discharges to the golf course thought outfall 1PC00004002 have varied over the past five years.

Table 3: Effluent Flow Rates for Outfall 1PC00004002
9/1/14-7/31/14

Year	# of Days Discharged	Annual Flow in MGD		
		50th Percentile	95th Percentile	Maximum
2009	11	0.58	0.61	0.62
2010	109	0.38	0.64	0.67
2011	53	0.59	0.68	0.82
2012	96	0.57	0.68	0.80
2013	27	0.59	0.65	0.66
2014	9	0.58	0.64	0.65

Table 4 shows a summary of the aquatic life use attainment status of Little Miami River near where the Mason WRP discharges.

Table 5 presents chemical specific data compiled from data reported in annual pretreatment reports.

Table 6a presents a summary of unaltered DMR data for outfall 1PC00004001. Table 6b presents a summary of unaltered DMR data for outfall 1PC00004002. Data are presented for the period from January, 2009 through December 2013, and current permit limits are provided for comparison.

Table 7 summarizes the chemical specific data for outfall 1PC00004001 by presenting the average and maximum PEQ values.

Table 8 summarizes the results of acute and chronic WET tests of the final effluent.

Mason WRP reports SSO occurrences under station 300 in its NPDES permit. There were no overflow occurrences in 2009, 3 in 2010, 4 in 2011, 6 in 2012 and 2 in 2013.

Under the provisions of 40 CFR 122.21(j), the Director has waived the requirement for submittal of expanded effluent testing data as part of the NPDES renewal application. Ohio EPA has access to substantially identical information through the submission of annual pretreatment program reports and/or from effluent testing conducted by the Ohio EPA.

Assessment of Impact on Receiving Waters

Both the Little Miami River and Muddy Creek have been identified as a priority impaired waters on Ohio's 303(d) list.

An assessment of the impact of a permitted point source on the immediate receiving waters includes an evaluation of the available chemical/physical, biological, and habitat data which have been collected by Ohio EPA pursuant to the Five-Year Basin Approach for Monitoring and NPDES Reissuance. Other data may be used provided it was collected in accordance with Ohio EPA methods and protocols as specified by the Ohio WQS and Ohio EPA guidance documents. Other information which may be evaluated includes, but is not limited to: NPDES permittee self-monitoring data; effluent and mixing zone bioassays conducted by Ohio EPA, the permittee, or U.S. EPA.

In evaluating this data, Ohio EPA attempts to link environmental stresses and measured pollutant exposure to the health and diversity of biological communities. Stresses can include pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. Indicators of exposure to these stresses include whole effluent toxicity tests, fish tissue chemical data, and fish health biomarkers (for example, fish blood tests).

Use attainment is a term which describes the degree to which environmental indicators are either above or below criteria specified by the Ohio WQS (OAC 3745-1). Assessing use attainment status for aquatic life uses primarily relies on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These criteria apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on measuring several characteristics of the fish and macroinvertebrate communities; these characteristics are combined into multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), which indicate the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Numerical criteria are broken down by ecoregion, use designation, and stream or river size. Ohio has five ecoregions defined by common topography, land use, potential vegetation and soil type.

Three attainment status results are possible at each sampling location -full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails meet the biocriteria. Nonattainment means that either none of the applicable indices meet the biocriteria or one of the organism groups indicates poor or very poor performance. An aquatic life use attainment table (see Table 4) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (i.e., full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI), and comments and observations for each sampling location.

In March 2011, U.S. EPA approved the Ohio EPA report *Total Maximum Daily Loads for the Lower Little Miami River Watershed*, which was based on data from 2007 assessments. The March 24, 2015, Supreme Court of Ohio decision *Fairfield Cty. Bd. of Commrs. v. Nally, Slip Opinion No. 2015-Ohio-991* vacated all previously approved TMDLs. As of April 21, 2015, this TMDL is considered a technical guidance document pending final TMDL approval. The complete report is available at the following internet site: http://www.epa.state.oh.us/portals/35/tmdl/Lower%20LMR_TMDL%20Report_FINAL_FINAL_Nov11.pdf

The following table is a summary of the designation status of Little Miami River. Cause and sources for reasoning for non-attainment are also listed.

Table 4. Little Miami River Use Designation Status and Causes and Sources.

Location	**RM**	**AL Use Desig.**	**Attain. Status**	**Causes of Impairment**	**Sources of Impairment**
LMR at US 48	32.9	EWH	FULL		
LMR at King's Mill Rd.	30.9	EWH	(FULL)		
LMR dst. Simpson Creek	27.9	EWH	FULL		
LMR upst. O'Bannon Creek	24.1	EWH	FULL		
LMR at Loveland-Kemper Rd	22.3	EWH	FULL		
LMR adj. Lake Isabella	20.6	EWH	FULL		
LMR at SR 126	17.7	EWH	FULL		
LMR at Newtown Rd.	8.1	EWH	FULL		
Muddy Creek upst. Mason WRP	2.5	WWH	PARTIAL	Natural Conditions (Flow)	Natural
Muddy Creek dst. Mason WRP	0.54	WWH	PARTIAL	Sedimentation/Siltation, Nutrient/Organic, Enrichment(Sewage) Biological Indicators	Municipal point source discharges
O'Bannon Creek at Gibson Rd.	4.37	WWH	PARTIAL	Natural Conditions (Flow)	Natural
O'Bannon Creek at SR 48.	0.26	WWH	FULL		
Sycamore Creek dst. N. Fk. Sycamore Creek.	0.50	WWH	FULL		
Sycamore Creek dst. Sycamore Creek WRP	0.10	WWH	FULL		

* WWH=Warm Water Habitat, PARTIAL=Partial-Attainment, RM = river mile, dst=downstream, upst=upstream, WRP = water reclamation plant/wastewater treatment plant

As can be seen in the table above, Muddy Creek is in partial attainment of WWH status both upstream and downstream of the Mason WRP discharge. Upstream impairment is caused by natural flow conditions and downstream of the Mason WRP impairments are caused by sedimentation and siltation and nutrient enrichment.

Development of Water-Quality-Based Effluent Limits

Determining appropriate effluent concentrations is a multiple-step process in which parameters are identified as likely to be discharged by a facility, evaluated with respect to Ohio water quality criteria, and examined to determine the likelihood that the existing effluent could violate the calculated limits.

Parameter Selection

Effluent data for Mason WRP was used to determine what parameters should undergo WLA. The parameters discharged are identified by the data available to Ohio EPA - DMR data submitted by the permittee, compliance sampling data collected by Ohio EPA, and any other data submitted by the permittee, such as priority pollutant scans required by the NPDES application or by pretreatment, or other special conditions in the NPDES permit. The sources of effluent data used in this evaluation are as follows:

Self-monitoring data (DMR)	January 2009 through December 2013
Pretreatment data	6/19/09, 7/29/10, 7/13/11, and 7/12/12
Ohio EPA Bioassay Studies	12/11/12 and 3/27/13

This data is evaluated statistically, and PEQ values are calculated for each pollutant. Average PEQ (PEQ_{avg}) values represent the 95^{th} percentile of monthly average data, and maximum PEQ (PEQ_{max}) values represent the 95^{th} percentile of all data points. The average and maximum PEQ values are presented in Table 7.

The effluent data were checked for outliers and the following values were removed: one value for mercury of 56.2 ng/L.

The PEQ values are used according to Ohio rules to compare to applicable WQS and allowable WLA values for each pollutant evaluated. Initially, PEQ values are compared to the applicable average and maximum WQS. If both PEQ values are less than 25 percent of the applicable WQS, the pollutant does not have the reasonable potential to cause or contribute to exceedances of WQS, and no WLA is done for that parameter. If either PEQ_{avg} or PEQ_{max} is greater than 25 percent of the applicable WQS, a WLA is conducted to determine whether the parameter exhibits reasonable potential and needs to have a limit or if monitoring is required. See Table 12 for a summary of the screening results

Wasteload Allocation

For those parameters that require a WLA, the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. Dischargers are allocated pollutant loadings/concentrations based on the Ohio WQS (OAC 3745-1). Most pollutants are allocated by a mass-balance method because they do not degrade in the receiving water. WLAs using this method are done using the following general equation: Discharger WLA = (downstream flow x WQS) - (upstream flow x background concentration). Discharger WLAs are divided by the discharge flow so that the allocations are expressed as concentrations.

The following dischargers in the lower Little Miami River segment were considered interactive:

- Lebanon Regional WWTP
- Warren County Lower Little Miami WWTP
- Clermont County O'Bannon Creek WWTP

- Hamilton County Polk Run WWTP
- Hamilton County Sycamore Creek WWTP
- Clermont County Wards Corner Regional WWTP

The available assimilative capacity was distributed among them using the Conservative Substance Wasteload Allocation Program (CONSWLA) water quality model for conservative parameters. For exact locations of these facilities see Figure 2.

The applicable waterbody uses for this facility's discharge and the associated stream design flows are as follows:

Aquatic life (WWH and EWH)		
Toxics (metals, organics, etc.)	Average	Annual 7Q10
	Maximum	Annual 1Q10
Ammonia	Average	Summer 30Q10
		Winter 30Q10
Agricultural Water Supply		Harmonic mean flow
Human Health (nondrinking)		Harmonic mean flow

Allocations are developed using a percentage of stream design flow as specified in Table 10, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

Ohio's WQS implementation rules [OAC 3745-2-05(A)(2)(d)(iv)] required a phase out of mixing zones for bioaccumulative chemicals of concern (BCCs) as of November 15, 2010. This rule applied statewide. Mercury is a BCC. The mixing zone phase-out means that as of November 15, 2010 all dischargers requiring mercury limits in their NPDES permit must meet WQS at the end-of-pipe, which are 12 ng/L (average) and 1700 ng/L (maximum) in the Ohio River basin.

The data used in the WLA are listed in Table 9 and Table 10. The WLA results to maintain all applicable criteria are presented in Table 11. Current ammonia limits were found to be protective of aquatic life.

Whole Effluent Toxicity WLA

WET is the total toxic effect of an effluent on aquatic life measured directly with a toxicity test. Acute WET measures short term effects of the effluent while chronic WET measures longer term and potentially more subtle effects of the effluent.

WQS for WET are expressed in Ohio's narrative "free from" WQS [OAC 3745-1-04(D)]. These "free froms" are translated into toxicity units (TUs) by the associated WQS Implementation (OAC 3745-2-09). WLAs can then be calculated using TUs as if they were water quality criteria.

The WLA calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Mason WRP, the WLA values are 0.3 TU_a and 1.0 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the concentration of effluent which has an inhibitory effect on 25% of the test organisms for the monitored effect, as compared to the control (IC_{25}):

$$TU_c = 100/IC_{25}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations except when the following equation is more restrictive (*Ceriodaphnia dubia* only):

$$TU_c = 100/\text{geometric mean of NOEC and LOEC}$$

Where NOEC is No Observable Effect Concentration and LOEC is Lowest Observable Effect Concentration

The acute toxicity unit (TU_a) is defined as 100 divided by the concentration of effluent that is lethal to 50 percent of the exposed organisms (LC_{50}) for the most sensitive test species:

$$TU_a = 100/LC_{50}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations.

When the acute WLA is less than 1.0 TU_a, it may be defined as:

Dilution Ratio (downstream flow to discharger flow)	Wasteload Allocation (percent effects in 100% effluent)
up to 2 to 1	30
greater than 2 to 1 but less than 2.7 to 1	40
2.7 to 1 to 3.3 to 1	50

The acute WLA for Mason WRP is 30 percent mortality in 100 percent effluent based on the dilution ratio of 1.0 to 1.

Reasonable Potential/ Effluent Limits/Hazard Management Decisions

After appropriate effluent limits are calculated, the reasonable potential of the discharger to violate the WQS must be determined. Each parameter is examined and placed in a defined "group". Parameters that do not have a WQS or do not require a WLA based on the initial screening are assigned to either group 1 or 2. For the allocated parameters, the preliminary effluent limits (PEL) based on the most restrictive average and maximum WLAs are selected from Table 11. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 7, and the PEL_{max} is compared to the PEQ_{max}. Based on the calculated percentage of the allocated value [($PEQ_{avg} \div PEL_{avg}$) X 100, or ($PEQ_{max} \div PEL_{max}$) X 100)], the parameters are assigned to group 3, 4, or 5. The groupings are listed in Table 12.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 13 presents the final effluent limits and monitoring requirements proposed for Mason WRP outfall 1PC00004001 and the basis for their recommendation.

Outfall 001

Oil and Grease, and pH

Limits proposed for oil and grease, pH, and dissolved oxygen are based on WQS (OAC 3745-1), and are a continuation of existing permit limits.

Escherichia Coli (E. Coli)

E. coli limits of 284 (weekly) and 126 (monthly) colonies per 100 mL are proposed to continue. These limits are typically required of PCR Class A streams. Although Muddy Creek is a Class B stream, more restrictive *E. coli* limits are appropriate because the Muddy Creek drains into the Little Miami River, which is designated PCR Class A, and the 2011 *Total Maximum Daily Loads for the Lower Little Miami River Watershed* recommends these continued limits.

TSS, Ammonia, Dissolved Oxygen, and $CBOD_5$

The limits for TSS, ammonia, dissolved oxygen, and $CBOD_5$ that were approved for the treatment plant under the existing permit are proposed to continue. The concentration limits for these parameters are based upon the treatment technology associated with the plant design of Mason WRP. The loading limits are based upon the plant's average design flow of 13 MGD.

Total Phosphorus

The current conditions in the permit associated with total phosphorus are proposed to continue. There is nutrient related impairment immediately downstream of the Mason WRP and continued summer phosphorus limits are therefore justified based on best technical judgment.

Nitrate+Nitrite

The continuation of monitoring for nitrate+nitrite is proposed based on best technical judgment. Monitoring nitrate+nitrite at the upstream and downstream stations is also proposed. The purpose of the monitoring is to maintain a data set tracking nutrient levels in the upper Muddy Creek basin.

Barium and Total Filterable Residue

Barium and total filterable residue were placed in Group 4 of the Parameter Assessment (Table 12). Monitoring for Group 4 pollutants is required by OAC 3745-33-07(A)(2). Continued monitoring for total filterable residue and new monitoring for barium is therefore proposed.

Cadmium, Chromium, Copper, Free Cyanide, Lead, Mercury, Nickel, and Zinc

Ohio EPA risk assessment (Table 12) places cadmium, chromium, copper, free cyanide, lead, mercury, nickel, and zinc in group 2. This placement as well as the data in Tables 5, 6, and 7 supports that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. Monitoring at a continued frequency is proposed to document that these pollutants continue to remain at low levels.

Currently there are two approved methods for free cyanide listed in 40 CFR 136.3 that have quantification levels lower than any water quality-based effluent limits:

- ASTM D7237-10 and OIA-1677-09 - Flow injection followed by gas diffusion amperometry

These methods will allow Ohio EPA make more reliable water quality-related decisions regarding free cyanide. Because the quantification levels are lower than any water quality-based effluent limits, it will also be possible to directly evaluate compliance with free cyanide limits.

New NPDES permits no longer authorize the use of method 4500 CN-I from Standard Methods for free cyanide testing. The new permits require permittees to begin using one of these approved methods as soon as possible. If a permittee must use method 4500 CN-I during the transition to an approved method, they are instructed to report the results on their DMR and enter "Method 4500 CN-I" in the remarks section.

Arsenic, Dieldrin, Hexachlorobenzene, Heptachlor Epoxide, Iron, Molybdenum, Phenol, Selenium, Strontium, and Thallium

Ohio EPA risk assessment (Table 12) places arsenic, dieldrin, hexachlorobenzene, heptachlor epoxide, iron, molybdenum, phenol, selenium, strontium, and thallium in group 2. This placement as well as the data in Tables 5, 6, and 7 supports that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. No additional monitoring is proposed for these parameters.

Dissolved Hexavalent Chromium and Silver

The Ohio EPA risk assessment (Table 12) places dissolved hexavalent chromium and silver in group 5, which recommends limits to protect water quality. Using the discretion allowed the Director under OAC 3745-33-07(A)(5), we are proposing monitoring, rather than limits, for these pollutants.

For dissolved hexavalent chromium, there were two detections in 34 samples. Both detections were 10 µg/L, slightly less than the monthly WLA of 11 µg/L. However, according to the DMR the method detection limit (MDL) for this parameter is 10 µg/L, so anytime the effluent had a concentration of less than 10 µg/L, the results would be a non-detect. The MDL is too close to the WLA to perform appropriate statistical calculations for dissolved hexavalent chromium. To ensure that data is obtained that allows Ohio EPA to make water quality-related decisions regarding dissolved hexavalent chromium; a special condition is proposed in Part II, Item AA of the permit that provides guidance on the MDLs the permittee should use in analyzing this contaminant.

The PEQ values calculated for silver (Table 7) may not be representative of its actual levels in the plant effluent as they were based on one detection in four data points. The sole detection of silver was approximately half of the average WLA. The purpose of the proposed monitoring for silver is to collect additional data on the frequency of occurrence and variability of these pollutants in the plant's effluent.

Benzo(a)pyrene, Benzo(b)fluoranthene, Bis(2-ethylhexyl) Phthalate Dibenzo(a,h)anthracene, and Ideno(1,2,3-c,d)pyrene and Additivity of Carcinogens

The Ohio EPA risk assessment (Table 12) places benzo(a)pyrene, benzo(a)fluoranthene, bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, and ideno(1,2,3-c,d)pyrene in group 5, which recommends limits to protect water quality. Using the discretion allowed the Director under OAC 3745-33-07(A)(5), we are proposing monitoring, rather than limits, for these **individual** pollutants. Quarterly monitoring is proposed for these parameters. The new monitoring requirements will allow for additional data to document whether these pollutants continue to remain in the plant effluent.

Benzo(a)pyrene, benzo(a)fluoranthene, bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, and ideno(1,2,3-c,d)pyrene are carcinogens, which require the evaluation of the additive effect of these pollutants. OAC 3745-33-07(A)(8) states that the additivity equation in Table 12 must be included in the permit and used to determine compliance unless certain conditions are met. One of the conditions in the rule referenced above states that a pollutant may be removed from the consideration of additivity if the preliminary effluent limit (PEL) for the pollutant is less than the quantification level for that pollutant. The quantification levels for benzo(a)pyrene, benzo(a)fluoranthene, bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, and ideno(1,2,3-c,d)pyrene are all below PEL and thus the compliance equation in Table 12 is still required to be included in the permit under OAC 3745-33-07(A)(8)(a)(ii) where additivity of carcinogens must be less than equal to 1.0.

A schedule of compliance is outlined in Part I.C of the permit where Mason WRP can test the effluent for these parameters and develop a plan to remove carcinogens from plant effluent. Additivity limits, using calculations detailed in Part II, Item AB will become effective 54 months after the permit becomes effective. There will also

be a reopener included as part of the schedule of compliance that will allow the permittee to request a modification where monitoring frequency may decrease and limits may be removed if eight subsequent tests show non-detection for benzo(a)fluoranthene, bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, and ideno(1,2,3-c,d)pyrene resulting in a carcinogen additivity of zero.

Also, Part II, Item AB outlines how sampling for bis(2-ethylhexyl)phthalate should be conducted.

Whole Effluent Toxicity Reasonable Potential

Based on evaluating the WET data presented in Table 8 and other pertinent data under the provisions of OAC 3745-33-07(B), Mason WRP is placed in Category 4 with respect to WET. While this indicates that the plant's effluent does not currently pose a toxicity problem, annual toxicity testing is proposed consistent with the minimum monitoring requirements at OAC 3754-33-07(B)(11). The proposed monitoring will adequately characterize toxicity in the plant's effluent.

Sludge

Limits and monitoring requirements proposed for the disposal of sewage sludge by the following management practices are based on OAC 3745-40: land application, removal to sanitary landfill or transfer to another facility with an NPDES permit.

Additional monitoring requirements proposed at the final effluent, influent, and upstream/downstream stations are included for all facilities in Ohio and vary according to the type and size of the discharge. In addition to permit compliance, this data is used to assist in the evaluation of effluent quality and treatment plant performance and for designing plant improvements and conducting future stream studies.

Outfall 002

The wastewater plant discharges effluent through outfall 002 that goes to a golf course pond and a sports park where it is used for irrigation. The limits and monitoring requirements proposed for this outfall are based on OAC 3745-42-13, Ohio EPA's rule for land application systems.

Other Requirements

Additional Compliance Schedule

A six month compliance schedule is proposed for Mason WRP to submit a technical justification for either revising its local industrial user limits or retaining its existing local limits. If revisions to local limits are required, Mason WRP must also submit a pretreatment program modification request.

Sanitary Sewer Overflow Reporting

Provisions for reporting SSOs are again proposed in this permit. These provisions include: the reporting of the system-wide number of SSO occurrences on monthly operating reports; telephone notification of Ohio EPA and the local health department, and 5-day follow up written reports for certain high risk SSOs; and preparation of an annual report that is submitted to Ohio EPA and made available to the public. Many of these provisions were already required under the "Noncompliance Notification", "Records Retention", and "Facility Operation and Quality Control" general conditions in Part III of Ohio NPDES permits.

Operator Certification

Operator certification requirements have been included in Part II, Item A of the permit in accordance with rules adopted in December 2006. These rules require Mason WRP to have a Class IV wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 1PC00004001.

Operator of Record

In December 2006, rule revisions became effective that affect the requirements for certified operators for sewage collection systems and treatment works regulated under NPDES permits. Part II, Item A of this NPDES permit is included to implement OAC 3745-7-02. It requires the permittee to designate one or more operator of record to oversee the technical operation of the treatment works.

Storm Water Compliance

Parts IV, V, and VI have been included with the draft permit to ensure that any storm water flows from the facility site are properly regulated and managed. As an alternative to complying with Parts IV, V, and VI, Mason WRP may seek permit coverage under the general permit for industrial storm water (permit # OHR000005) or submit a "No Exposure Certification." Parts IV, V, and VI will be removed from the final permit if: 1) the Mason WRP submits a Notice of Intent (NOI) for coverage under the general permit for industrial storm water or submits a No Exposure Certification, 2) Ohio EPA determines that the facility is eligible for coverage under the general permit or meets the requirements for a No Exposure Certification, and 3) the determination by Ohio EPA can be made prior to the issuance of the final permit.

Outfall Signage

Part II of the permit includes requirements for the permittee to place a sign at each outfall to the Muddy Creek providing information about the discharge. Signage at outfalls is required pursuant to OAC 3745-33-08(A).

Figure 1. Location of Mason WRP

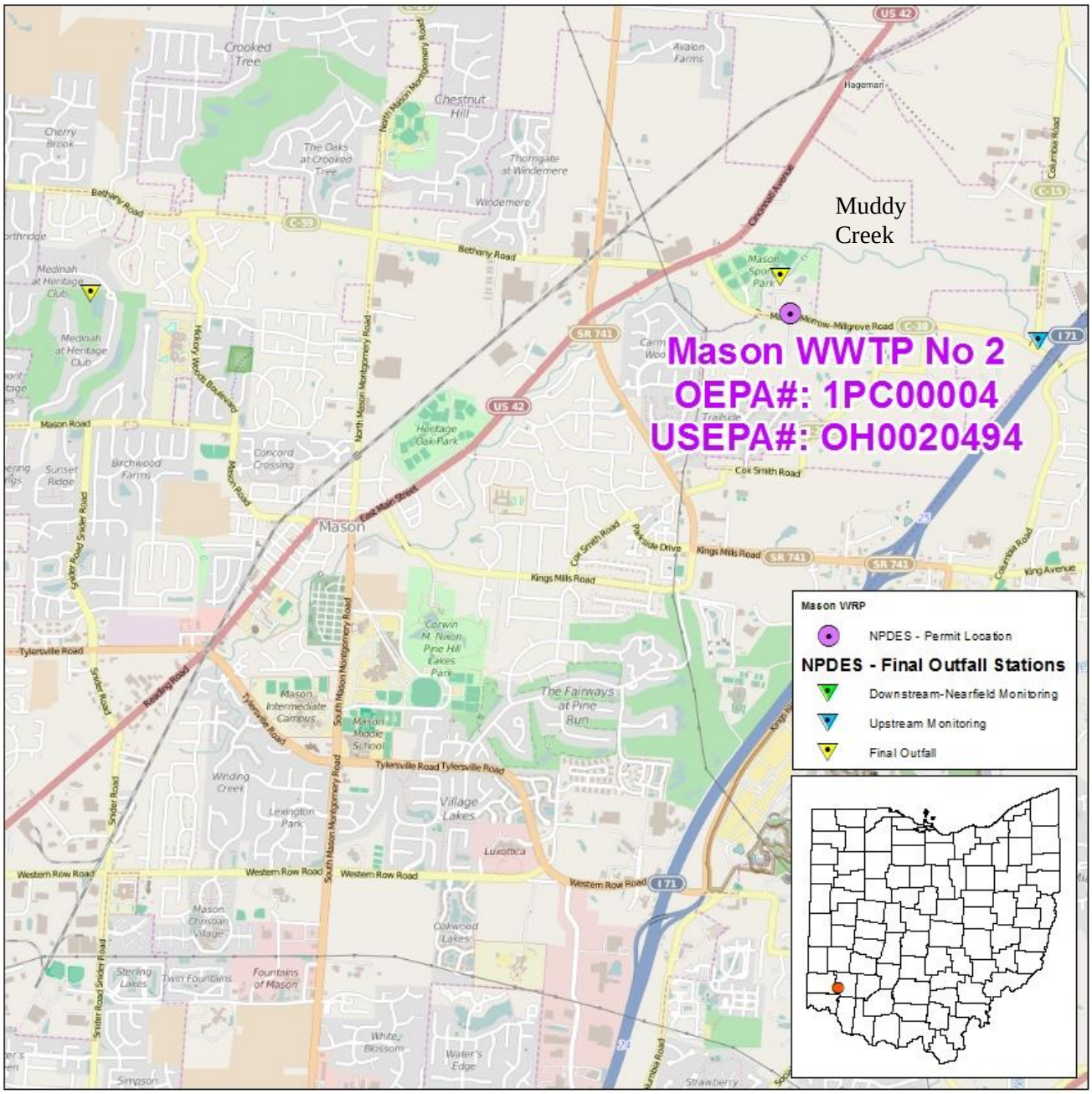

Figure 2. Little Miami River Study Area

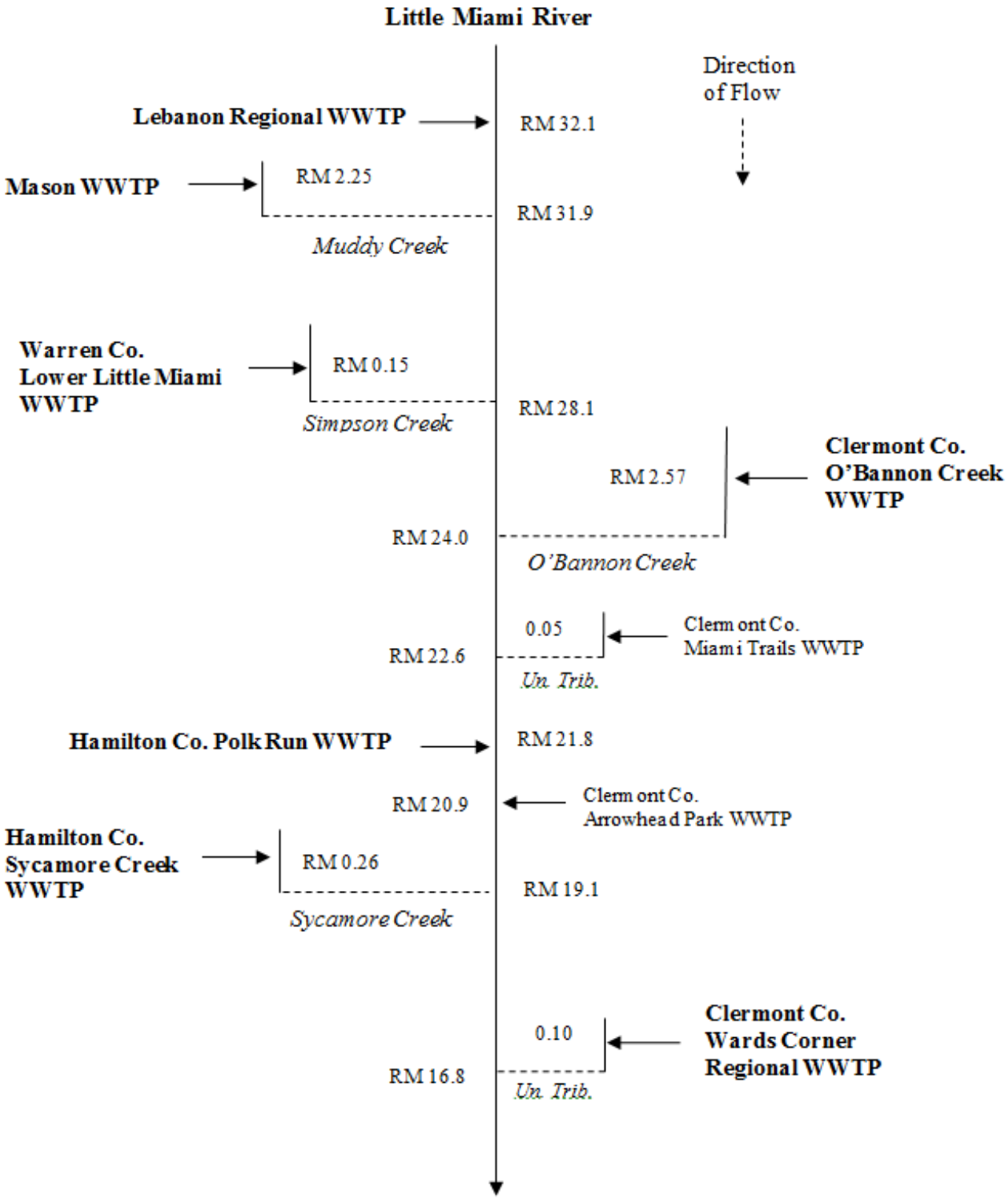

Table 5. Effluent Characterization Using Ohio EPA and Pretreatment Data

Summary of analytical results for Mason WRP outfall 1PC00004001. Units µg/L unless otherwise noted; PT = data from pretreatment program reports; ND = not detected (detection limit).

	Ohio EPA	Ohio EPA	PT	PT	PT	PT
PARAMETER	**3/27/2013**	**12/11/2012**	**7/12/2012**	**7/13/2011**	**7/29/2010**	**6/19/2009**
Barium	44	18	--	--	--	--
Copper	2.6	5.7	6.37	ND (5)	ND (5)	ND (5)
Iron	ND (50)	212	--	--	--	--
Magnesium (mg/L)	23	18	--	--	--	--
Nickel	2.3	3.2	ND (5)	ND (5)	ND (5)	ND (5)
Strontium	357	347	--	--	--	--
Zinc	22	59	40	33.4	33	27.1
Bis(2-ethylhexyl)phthalate	ND (10.5)	12.9	ND (6)	16.2	ND (6)	ND (6)
Potassium	6	14	--	--	--	--
Sodium	95	139	--	--	--	--
Chloride	139	169	--	--	--	--
Nitrire+Nitrate (mg/L)	5.68	8.89	--	--	--	--
Total Filterable Residue (mg/L)	608	640	--	--	--	--
Total Kjeldahl Nitrogen	0.65	1.53	--	--	--	--
Phosphorus	1.27	3.35	--	--	--	--
Phenol	ND (2.1)	4.2	ND (10)	ND (10)	--	ND (10)
Silver	NA	NA	ND (2)	0.64	ND (0.5)	ND (0.5)
Benzo (b) Flouranthene	ND (2.1)	ND (2.2)	ND (1.7)	ND (1.7)	1.21	ND (1.7)
Dibenzo (A,H) Anthracene	ND (2.1)	ND (2.2)	ND (0.2)	ND (0.2)	2.47	ND (0.2)
Indeno (1,2,3-CD) Pyrene	ND (2.1)	ND (2.2)	ND (0.22)	ND (0.22)	3.22	ND (0.22)

Table 6a. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered discharge monitoring report data for Mason WRP outfall 1PC00004001 (January 2009 - December 2013). All values are based on annual records unless otherwise indicated. * = For minimum pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; a = weekly average.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50th	95th	
Outfall 001								
Water Temperature	Annual	ºC	- - - Monitor Only - - -		1253	19	26	9-27
Dissolved Oxygen	Annual	mg/L	Not Less than 5.5		1253	9.0	10.0	7-88
Total Dissolved Residue	Annual	mg/L	- - - Monitor Only - - -		83	641	861	1-1720
Total Suspended Solids	Annual	mg/L	12	18[a]	733	3.6	7.7	0-20.2
Oil and Grease	Annual	mg/L	Not Greater than 10.0		60	0	2.78	0-2.93
Nitrogen, Ammonia	Summer	mg/L	0.45	0.60[a]	360	0	0.249	0-1.72
Nitrogen, Ammonia	Winter	mg/L	1.3	2.0[a]	359	0	0.173	0-1.43
Total Kjeldahl Nitrogen	Annual	mg/L	- - - Monitor Only - - -		60	0.923	3.33	0-6.08
Nitrate+Nitrite	Annual	mg/L	- - - Monitor Only - - -		61	4.93	7.48	2.52-9.81
Phosphorus	Annual	mg/L	1.0	1.5[a]	152	0.433	2.03	0-3.25
Free Cyanide	Annual	mg/L	- - - Monitor Only - - -		20	0	0	0-0
Thallium	Annual	µg/L	- - - Monitor Only - - -		39	0	0.000871	0-0.0352
Nickel	Annual	µg/L	- - - Monitor Only - - -		47	0	0	0-0
Zinc	Annual	µg/L	- - - Monitor Only - - -		60	32.4	44.4	0.0281-55.4
Cadmium	Annual	µg/L	- - - Monitor Only - - -		20	0	0	0-0
Lead	Annual	µg/L	- - - Monitor Only - - -		33	0	0	0-0
Chromium	Annual	µg/L	- - - Monitor Only - - -		20	0	0	0-0
Copper	Annual	µg/L	- - - Monitor Only - - -		60	0	5.68	0-6.89
Dissolved Hexavalent Chromium	Annual	µg/L	- - - Monitor Only - - -		34	0	3.5	0-10
E. coli	Annual	#/100 ml	126	284[a]	447	6.4	41	0-248
Bis(2-ethylhexyl) Phthalate	Annual	µg/L	- - - Monitor Only - - -		14	0	0	0-0
Dieldrin	Annual	µg/L	- - - Monitor Only - - -		6	0	0	0-0
Heptachlor Epoxide	Annual	µg/L	- - - Monitor Only - - -		6	0	0	0-0
Hexachlorobenzene	Annual	µg/L	- - - Monitor Only - - -		6	0	0	0-0
Flow Rate	Annual	MGD	- - - Monitor Only - - -		1805	5.41	8.96	2.95-22.2
Mercury	Annual	ng/L	- - - Monitor Only - - -		47	0.64	2.51	0-56.2
Acute Toxicity, Ceriodaphnia dubia	Annual	TU_a	- - - Monitor Only - - -		4	0	0	0-0
Chronic Toxicity, Ceriodaphnia dubia	Annual	TU_c	- - - Monitor Only - - -		4	0	0	0-0
Acute Toxicity, Pimephales promelas	Annual	TU_a	- - - Monitor Only - - -		4	0	0	0-0
Chronic Toxicity, Pimephales promelas	Annual	TU_c	- - - Monitor Only - - -		4	0	0	0-0
pH, Maximum	Annual	S.U.	Not Greater than 9.0		1254	7.5	7.8	7-8.7
pH, Minimum	Annual	S.U.	Not Less than 6.5		1255	7.4	7.7	6.5-11.5
$CBOD_5$[A]	Annual	mg/L	8.0	12[a]	714	1.08	3.44	0-10.5

[A] $CBOD_5$ = 5-day carbonaceous biochemical oxygen demand

Table 6b. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered discharge monitoring report data for Mason WRP outfall 1PC00004002 (January 2009 - December 2013). All values are based on annual records unless otherwise indicated. * = For minimum pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; a = weekly average.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50th	95th	
Outfall 002								
pH	Annual	S.U.	Between 6.0 and 9.0		253	7.4	7.7	6.8-8
Total Suspended Solids	Annual	mg/L	12	--	96	3.3	4.93	1.4-6.2
Oil and Grease	Annual	mg/L	Not Greater than 10		19	0	0.293	0-2.93
Total Inorganic Nitrogen	Annual	mg/L	10	--	117	4.65	8.38	0-15.7
Fluoride	Annual	mg/L	--	1.0	5	0.84	0.904	0.5-0.91
Arsenic	Annual	µg/L	--	100	5	0	0	0-0
Beryllium	Annual	µg/L	--	100	5	0	0	0-0
Boron	Annual	µg/L	--	750	5	276	329	0.24-342
Cadmium	Annual	µg/L	--	10	5	0	0	0-0
Chromium	Annual	µg/L	--	100	5	0	0	0-0
Cobalt	Annual	µg/L	--	50	5	0	0	0-0
Copper	Annual	µg/L	--	200	5	5.5	14.9	0-15.7
Iron	Annual	µg/L	--	5000	5	302	362	0.277-375
Lead	Annual	µg/L	--	1500	5	0	0	0-0
Manganese	Annual	µg/L	--	200	5	19.2	36.4	0.467-39.6
Molybdenum	Annual	µg/L	--	10	5	0	10	0-10.1
Nickel	Annual	µg/L	--	200	5	0.00549	6.01	0-6.11
Vanadium	Annual	µg/L	--	100	5	0	0	0-0
Zinc	Annual	µg/L	--	2000	5	32.3	63.8	0.0639-64.5
Aluminum	Annual	µg/L	--	5000	5	0	0	0-0
Lithium	Annual	µg/L	--	2500	5	7.99	9.94	0-10.2
Selenium	Annual	µg/L	--	20	5	0	0	0-0
E. coli	Annual	#/100 ml	--	2.0	144	0	1	0-3
Flow Rate	Annual	MGD	- - Monitor Only - -		325	0.573	0.661	0.0059-0.822
Total Residual Chlorine	Annual	mg/L	Between 1.0 and 10		323	3.8	8.8	1-8.8
$CBOD_5$[A]	Annual	mg/L	10	--	94	0	2.52	0-10.5

[A] $CBOD_5$ = 5-day carbonaceous biochemical oxygen demand

Table 7. Effluent Data for the Mason WRP- Projected Effluent Quality Values

Parameter	Units	# of Samples	# > MDL	Average PEQ	Maximum PEQ
Self-Monitoring (DMR) Data					
Total Filterable Residue [A]	mg/L	61	61	870.5	1030.
Ammonia-Summer	mg/L	239	87	0.275	0.298
Ammonia-Winter	mg/L	190	56	0.835	1.144
Nitrate+Nitrite [A]	mg/L	64	64	6.757	8.651
Phosphorus [A]	mg/L	155	151	1.476	2.245
Free Cyanide	µg/L	20	0	--	--
Thallium	µg/L	15	2	0.039	0.053
Nickel [A]	µg/L	54	2	3.65	5.0
Zinc [A]	µg/L	67	67	45.22	55.92
Cadmium	µg/L	20	0	--	--
Lead	µg/L	33	0	--	--
Chromium	µg/L	20	0	--	--
Copper [A]	µg/L	67	9	5.03	6.89
Dissolved Hexavalent Chromium	µg/L	34	2	8.76	12.0
Bis(2-ethylhexyl)phthalate [A C]	µg/L	20	2	16.56	22.68
Dieldrin	µg/L	6	0	--	--
Heptachlor Epoxide	µg/L	6	0	--	--
Hexachlorobenzene	µg/L	6	0	--	--
Mercury	ng/L	47	30	1.622	2.582
Combined Other Data [B]					
Barium	µg/L	2	2	122.1	167.2
Iron	µg/L	2	1	588.1	805.6
Magnesium	mg/L	2	2	63.80	87.40
Strontium	µg/L	2	2	990.3	1357.
Potassium	mg/L	2	2	38.84	53.20
Sodium	mg/L	2	2	385.6	528.2
Chloride	mg/L	2	2	468.8	642.2
Phenol	µg/L	5	1	11.65	15.96
Silver	µg/L	4	1	1.402	1.92
Benzo(b) Fluoranthene [C]	µg/L	6	1	3.227	4.42
Dibenzo(A,H) Anthracene [C]	µg/L	6	1	3.787	5.187
Indeno(1,2,3-CD) Pyrene [C]	µg/L	6	1	4.936	6.762

[A.] OEPA and Pretreatment data were combined with the DMR data.
[B.] See Table 5 for data used from Ohio EPA and pretreatment monitoring.
[C.] Carcinogen
* MDL = Method Detection Level; PEQ = Projected Effluent Quality; DMR = Discharge Monitoring Report.

Table 8. Summary of Acute and Chronic Toxicity Test Results for Mason WRP

Test Date	*Ceriodaphnia dubia 48 hours*	*Fathead Minnows 96*	*Ceriodaphnia dubia 7 days*	*Fathead Minnows 7 days*
	TUa[a]	TUa[a]	TUc[a]	TUc[a]
9/1/2010	BD	BD	BD	BD
9/1/2011	BD	BD	BD	BD
9/1/2012	BD	BD	BD	BD
9/1/2013	BD	BD	BD	BD
9/1/2014	BD	BD	BD	BD

[a] TU_a = acute toxicity units, TU_c = chronic toxicity units
BD = Below Detection

Table 9. Water Quality Criteria in the Muddy Creek Study Area

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Average: Agri-culture	Average: Aquatic Life	Maximum Aquatic Life	Inside Mixing Zone Maximum
All Streams						
Arsenic	µg/L	--	100.	150.	340.	680.
Barium	µg/L	--	--	220.	2000.	4000.
Benzo(b)fluoranthene [C]	µg/L	0.49	--	--	--	--
Bis(2-ethylhexyl)phthalate [C]	µg/L	59.	--	8.4	1100.	2100.
Bromomethane	µg/L	4000.	--	16.	38.	75.
Total Residual Chlorine	µg/L	--	--	11.	19.	38.
Chloroform [C]	µg/L	4700.	--	140.	1300.	2600.
Dissolved Hexavalent Chromium	µg/L	--	--	11.	16.	31.
Free Cyanide	µg/L	220000.	--	12.	46.	92.
Dibenzo(a,h)anthracene [C]	µg/L	0.49	--	--	--	--
Ideno(1,2,3-c,d)pyrene [C]	µg/L	0.49	--	--	--	--
Iron	µg/L	--	5000.	--	--	--
Mercury [B]	ng/L	12.	10000.	910.	1700.	3400.
Molybdenum	µg/L	--	--	20000.	190000.	370000.
Nitrate+Nitrite	mg/L	--	100.	--	--	--
Selenium	µg/L	11000.	50.	5.0	--	--
Strontium	µg/L	--	--	21000.	40000.	81000.
Thallium	µg/L	6.3	--	17.	79.	160.
Toluene	µg/L	200000.	--	62.	560.	1100.
Total Filterable Residue	mg/L	--	--	1500.	--	--
Muddy Creek; Hardness = 250. mg/L						
Cadmium	µg/L	--	50.	5.1	13.	25.
Chromium, tot.	µg/L	--	100.	180.	3800.	7600.
Copper	µg/L	1300.	500.	20.	33.	66.
Lead	µg/L	--	100.	21.	390.	790.
Nickel	µg/L	4600.	200.	110.	1000.	2000.
Silver	µg/L	--	--	1.3	7.7	15.
Zinc	µg/L	69000.	25000.	260.	260.	520.

B. Bioaccumulative Chemical of Concern (BCC)
C. Based on a carcinogenic endpoint.
D. Criteria based on applicable dissolved metal translator.

Table 10. Instream Conditions and Discharger Flow

Note USGS= United States Geological Survey, RM=River Mile, cfs=cubic feet per second, STORET= EPA STOrage and RETrieval data management system, LMR=Little Miami River, MDL=Method Detection Limit

		Value				
Parameter	Units	Little Miami	Muddy Creek	Simpson Creek	O'Bannon Creek	Sycamore Creek
$_{7}Q_{10}$ annual	cfs	58.8 [A]	0.0 [B]	0.0 [B]	0.0 [B]	0.0 [B]
$_{1}Q_{10}$ annual	cfs	46.9 [A]	0.0 [B]	0.0 [B]	0.0 [B]	0.0 [B]
$_{30}Q_{10}$ summer	cfs	78.9 [A]	0.0 [B]	0.0 [B]	0.02 [B]	0.01 [B]
winter	cfs	224. [A]	0.62 [B]	0.06 [B]	2.61 [B]	1.46 [B]
Q_{HM} annual	cfs	377. [A]	0.12 [B]	0.0 [B]	0.49 [B]	0.27 [B]
Mixing Assumption	% average	100	100	100	100	100
	% max	100	100	100	100	100
Instream Hardness	mg/L	298. [C D]	250. [C D]	298. [C D]	220. [C D]	286. [C D]
Background Water Quality	µg/L					
Arsenic		1.0 [C]	3.1 [C]	2.6 [C]	1.2 [C]	1.0 [C]
Barium		84. [C]	64.7 [C]	40. [C]	47.8 [C]	40. [C]
Benzo(b)fluoranthene		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Bis(2-ethylhexyl)phthalate		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Cadmium		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Total Residual Chlorine		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Dissolved Hexavalent Chromium		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Chromium		15. [C]	0.0 [F]	0.0 [F]	0.0 [F]	0.0 [F]
Copper		5.0 [C]	0.0 [F]	4.5 [C]	6.2 [C]	5.0 [C]
Free Cyanide		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Dibenzo(a,h)anthracene		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Ideno(1,2,3-c,d)pyrene		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Iron		453. [C]	198. [C]	258. [C]	330. [C]	248. [C]
Lead		1.0 [C]	0.0 [F]	0.0 [F]	1.7 [C]	1.0 [C]
Molybdenum		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Nickel		20. [C]	0.0 [F]	0.0 [F]	0.0 [F]	0.0 [F]
Nitrate+Nitrite (mg/L)		2.63 [C]	0.07 [C]	0.65 [C]	0.28 [C]	0.1 [C]
Selenium		0.0 [F]	0.0 [F]	0.0 [F]	0.0 [F]	0.0 [F]
Silver		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Thallium		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Total Filterable Residue (mg/L)		414. [C]	630. [C]	450. [C]	297. [C]	360. [C]
Zinc		5.0 [C]	0.0 [F]	8.7 [C]	7.0 [C]	5.0 [C]

[A.] Based on USGS gage #03245500, LMR at Milford data (10/1/1975 - 9/30/2013)
[B.] Based on USGS gage #03246500, East Fork LMR at Williamsburg data (1949-53; 1960-74)
[C.] STORET data (1997-2008); [D.] DMR 901 data (2009-2014)
[E.] No representative data available.
[F.] All site specific data is less than detection.

Table 11. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

Parameter	Units	Average		Maximum		Inside Mixing Zone Maximum
		Human Health	Agri Supply	Aquatic Life	Aquatic Life	
Arsenic [B]	µg/L	--	101.	150.	340.	680.
Barium	µg/L	--	--	220.	2000.	4000.
Benzo(b)fluoranthene	µg/L	0.49	--	--	--	--
Bis(2-ethylhexyl)phthalate	µg/L	59.	--	8.4	1100.	2100.
Cadmium [B]	µg/L	--	50. [A]	5.1	13.	25.
Chromium [B]	µg/L	--	101.	180.	3800.	7600.
Dissolved Hexavalent Chromium	µg/L	--	--	11.	16.	31.
Copper [B]	µg/L	1308. [A]	503. [A]	20.	33.	66.
Free Cyanide [B]	µg/L	221300. [A]	--	12.	46.	92.
Dibenzo(a,h)anthracene	µg/L	0.49	--	--	--	--
Ideno(1,2,3-c,d)pyrene	µg/L	0.49	--	--	--	--
Lead [B]	µg/L	--	101.	21.	390.	790.
Mercury [B C]	ng/L	12.	10000. [A]	910.	1700.	3400.
Molybdenum [B]	µg/L	--	--	20000.	190000.	370000.
Nickel [B]	µg/L	4627. [A]	201.	110.	1000.	2000.
Selenium [B]	µg/L	11070.	50.	5.0	--	--
Silver	µg/L	--	--	1.3	7.7	15.
Total Filterable Residue	mg/L	--	--	1500.	--	--
Zinc [B]	µg/L	69410. [A]	25150. [A]	260.	260.	520.

[A] Allocation must not exceed the Inside Mixing Zone Maximum.

[B] This parameter would not require a WLA based on reasonable potential procedures, but allocation requested by for use in pretreatment program.

[C] Bioaccumulative Chemical of Concern (BCC); no mixing zone allowed after 11/15/2010, WQS must be met at end-of-pipe, unless requirements for an exception are met as listed in 3745-2-08(L).

Table 12. Parameter Assessment

Group 1: Due to a lack of numeric criteria, the following parameters were not evaluated at this time.

Chloride	Magnesium	Phosphorus
Potassium	Sodium	

Group 2: PEQ < 25% of WQS or all data below minimum detection limit; WLA not required. No limit recommended, monitoring optional.

Arsenic	Cadmium	Chromium
Copper	Free Cyanide	Dieldrin
Hexachlorobenzene	Heptachlor Epoxide	Iron
Lead	Mercury	Molybdenum
Nickel	Nitrate+Nitrite	Phenol
Selenium	Strontium	Thallium
Zinc		

Group 3: PEQ_{max} < 50% of maximum PEL and PEQ_{avg} < 50% of average PEL. No limit recommended, monitoring optional.

Ammonia-Summer	Ammonia-Winter

Group 4: $PEQ_{max} \geq$ 50% but <100% of the maximum PEL or $PEQ_{avg} \geq$ 50% but < 100% of the average PEL. Monitoring is appropriate.

Barium	Total Filterable Residue

Group 5: Maximum PEQ ≥ 100% of the maximum PEL or average PEQ ≥ 100% of the average PEL,or either the average or maximum PEQ is between 75 and 100% of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria:

Parameter	Units	Applicable Period	Recommended Effluent Limits Average	Maximum
Benzo(b)fluoranthene	µg/L	annual	0.49	--
Benzo(a)pyrene	µg/L	annual	0.49	--
Bis(2-ethylhexyl)phthalate	µg/L	annual	8.4	1100.
Dissolved Hexavalent Chromium	µg/L	annual	11	16
Dibenzo(a,h)anthracene	µg/L	annual	0.49	--
Ideno(1,2,3-c,d)pyrene	µg/L	annual	0.49	--
Silver	µg/L	annual	1.3	7.7

[A] Additivity of carcinogens. Following are the human health limits for the carcinogens:

Substance	Parameter	Limits for Human Health (µg/L)
A	Benzo(b)fluoranthene	0.49
B	Bis(2-ethylhexyl)phthalate	59.
C	Dibenzo(a,h)anthracene	0.49
D	Ideno(1,2,3-c,d)pyrene	0.49
E	Benzo(a)pyrene	0.49

The following equation will be used to calculate the additivity factor:

$$\frac{MAC_A}{0.49\ \mu g/L} + \frac{MAC_B}{59\ \mu g/L} + \frac{MAC_C}{0.49\ \mu g/L} + \frac{MAC_D}{0.49\ \mu g/L} + \frac{MAC_E}{0.49\ \mu g/L} \leq 1.0$$

where MAC = average concentration of all samples collected within the month.

Table 13. Final Effluent Limits and Monitoring Requirements - Outfall 001

		Effluent Limitations				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Basis[b]
Temperature	°C	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Dissolved Oxygen	mg/L					
Summer		- - - - - - - - - - Not less than 5.5 - - - - - - - - -				PD, EP
Winter		- - - - - - - - - - Not less than 5.5 - - - - - - - - -				PD, EP
Total Suspended Solids	mg/L	12	18	591	886	PD, EP
Oil and Grease	mg/L	--	10	--	--	WQS, EP
Ammonia	mg/L					
Summer		0.45	0.60[c]	22.2	29.6[c]	PD, EP
Winter		1.3	2.0[c]	64	98.5[c]	PD, EP
Total Kjeldahl Nitrogen	mg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Nitrite + Nitrate	mg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Phosphorus	mg/L					
Winter		- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Summer		1.0	1.5[c]	49.3	73.9[c]	M, EP, BTJ
Free Cyanide	mg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Nickel	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Total Filterable Residue	mg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
Barium	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
Silver	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
Zinc	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Cadmium	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Lead	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Chromium	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Copper	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Benzo(a)pyrene	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Benzo(k)Fluoranthene	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Indeno(123-cd)pyrene	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Dibenzo(AH)Anthracene	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Bis (2-ethylhexyl) phthalate	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Carcinogen Additivity Factor						
Initial		- - - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
Final		--	1.0	--	--	RP
Dissolved Hexavalent Chromium	µg/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
E. coli						
Summer Only	#/100ml	126	284[c]	--	--	WQS, ABS
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Mercury	ng/L	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Whole Effluent Toxicity – *C. dubia* and *P. promelas*						
Acute	TUa	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
Chronic	TUc	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
pH	S.U.	- - - - - - - - - - - - 6.5 to 9.0 - - - - - - - - - - - -				WQS, EP
$CBOD_5^D$	mg/L	8.0	12	394	591	PD, EP

[A] Effluent loadings based on average design discharge flow of 13.0 MGD.

[B] Definitions: ABS = Antibacksliding Rule [OAC 3745-33-05(F) and 40 CFR Part 122.44(l)];
BTJ = Best Technical Judgment;
EP = Existing Permit;
M = BTJ of Permit Guidance 1: Monitoring Frequency Requirements for Sanitary Discharges;
PD = Plant Design Criteria;
PT = Phosphorus treatment required under OAC 3745-33-06(C)
RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits [OAC 3745-33-07(A)];
WET = Minimum testing requirements for whole effluent toxicity [OAC 3745-33-07(B)(11)]
WQS = Ohio Water Quality Standards (OAC 3745-1-07).

[C] Weekly average limit.

[D] $CBOD_5$ = 5-day carbonaceous biochemical oxygen demand

Table 14. Final Effluent Limits and Monitoring Requirements – Outfall 002

		Effluent Limitations				
		Concentration		Loading (kg/day)		
Parameter	Units	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Basis
pH	S.U.	- - - - - - - - - - 6.0 to 9.0 - - - - - - - - - -				OAC 3745-42-13
Suspended Solids	mg/L	12	--	--	--	OAC 3745-42-13
Oil and Grease	mg/L	--	10	--	--	OAC 3745-42-13
Inorganic Nitrogen, T.	mg/L	10	--	--	--	OAC 3745-42-13
Fluoride, T.	mg/L	--	1.0	--	--	OAC 3745-42-13
Arsenic, T.	µg/L	--	100	--	--	OAC 3745-42-13
Beryllium, T.	µg/L	--	100	--	--	OAC 3745-42-13
Boron, T.	µg/L	--	750	--	--	OAC 3745-42-13
Cadmium, T.	µg/L	--	10	--	--	OAC 3745-42-13
Chromium, T.	µg/L	--	100	--	--	OAC 3745-42-13
Cobalt, T.	µg/L	--	50	--	--	OAC 3745-42-13
Copper, T.	µg/L	--	200	--	--	OAC 3745-42-13
Iron, T.	µg/L	--	5000	--	--	OAC 3745-42-13
Lead, T.	µg/L	--	1500	--	--	OAC 3745-42-13
Manganese, T.	µg/L	--	200	--	--	OAC 3745-42-13
Molybdenum, T.	µg/L	--	10	--	--	OAC 3745-42-13
Nickel, T.	µg/L	--	200	--	--	OAC 3745-42-13
Vanadium, T.	µg/L	--	100	--	--	OAC 3745-42-13
Zinc, T.	µg/L	--	2000	--	--	OAC 3745-42-13
Aluminum, T.	µg/L	--	5000	--	--	OAC 3745-42-13
Lithium, T.	µg/L	--	2500	--	--	OAC 3745-42-13
Selenium, T.	µg/L	--	20	--	--	OAC 3745-42-13
E. coli	#/100ml	--	2.0	--	--	OAC 3745-42-13
Flow Rate	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				OAC 3745-42-13
Chlorine, Total Residual	mg/L	- - - - - - - - - - - 1.0 to 10 - - - - - - - - - - - -				OAC 3745-42-13
$CBOD_5$	mg/L	10	--	--	--	OAC 3745-42-13