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 the Sycamore Creek Wastewater Treatment Plant

Public Notice No.: 15-02-001
Public Notice Date: February 2, 2015
Comment Period Ends: March 4, 2015

OEPA Permit No.: 1PK00005*LD
Application No.: OH0025488

Name and Address of Applicant:

Board of County Commissioners of Hamilton County
138 East Court Street, Room 603
Cincinnati, Ohio 45202

Name and Address of Facility Where Discharge Occurs:

Sycamore Creek Wastewater Treatment Plant
9273 Old Remington Road
Cincinnati, Ohio

Receiving Water: Sycamore Creek

Subsequent Stream Network: Little Miami River, Ohio River

Introduction

Development of a Fact Sheet for NPDES permits is mandated by Title 40 of the Code of Federal Regulations, 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, 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 and Ohio Water Pollution Control Law (ORC 6111). Decisions to award variances to Water Quality Standards 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 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 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 wasteload allocation for a pollutant to a measure of the effluent quality. The measure of effluent quality is called PEQ - Projected Effluent Quality. 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/or monitoring requirements for the following parameters are the same as in the current permit, although some monitoring frequencies might be different: temperature, dissolved oxygen, total suspended solids, oil and grease, ammonia-nitrogen, total Kjeldahl nitrogen, nitrate+nitrite-nitrogen, total phosphorus, free cyanide, nickel, zinc, cadmium, lead, total chromium, dissolved hexavalent chromium, Escherichia coli, flow, mercury, pH, total filterable residue (dissolved solids) and $CBOD_5$.

Current permit limits for copper, thallium and silver are being removed because effluent data show that they no longer have the reasonable potential to contribute to exceedances of water quality standards. Monitoring is proposed to continue for these parameters.

This permit no longer authorizes the use of method 4500 CN-I from Standard Methods for free cyanide testing. As soon as possible, the permittee must begin using either ASTM D7237-10 or OIA-1677-09 both of which are approved methods for free cyanide listed in 40 CFR 136.

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.

A new monitoring station is proposed. Station 602 is the influent to the high rate treatment unit. Monitoring for total suspended solids is proposed at this station. The permit provides 36 months for MSDGC to identify a location that will provide a representative sample and to obtain and install the necessary equipment. A special condition in Part II requires the periodic submittal of progress reports on establishing this sampling station.

In Part II of the permit, special conditions are included that address operator certification, minimum staffing and operator of record; whole effluent toxicity testing; 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 and Compliance Section
P.O. Box 1049
Columbus, Ohio 43216-1049

The OEPA 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 Gary Stuhlfauth, (614) 644-2026, gary.stuhlfauth@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

The Sycamore Creek wastewater treatment plant discharges to Sycamore Creek at River Mile (RM) 0.26. Sycamore Creek joins the Little Miami River at RM 19.22. Figure 1 shows the approximate location of the facility.

This segment of the Sycamore Creek is described by Ohio EPA River Code: 11-007, U.S. EPA River Reach #: 05090202-013, County: Hamilton, Ecoregion: Interior Plateau. Sycamore Creek is designated for the following uses under Ohio's Water Quality Standards (OAC 3745-1-18): Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Class B Primary Contact Recreation (PCR).

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 Class A Primary Contact Recreation (PCR).

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 water quality standards 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 Clean Water Act. Ohio WQS also include aquatic life use designations for waterbodies which can not meet the Clean Water Act goals because of human-caused conditions that can not 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 agricultural and industrial water supply.

Facility Description

The Sycamore Creek wastewater plant is operated by the Metropolitan Sewer District of Greater Cincinnati (MSDGC). The plant has an average daily design flow of 9.0 MGD (million gallons per day). The biological system has a peak process flow of 18 MGD. Wet stream processes are fine screening, grit removal, influent pumping, primary clarification, activated sludge aeration with biological phosphorus removal, secondary clarification and disc filtration.

The plant has a chemically enhanced high rate treatment (CEHRT) unit for peak flows greater than 18 MGD up to a peak instantaneous flow of 50 MGD. The Sewer District constructed this treatment unit, which came on line in 2008, as required in Section VI of the *Consent Decree on Combined Sewer Overflows, Wastewater Treatment Plants and Implementation of Capacity Assurance Program Plan for Sanitary Sewer Overflows* (Civil Action No. C-1-02-107, United States District Court of the Southern District of Ohio Western Division).

Flows from the CEHRT (station 604) are regulated as a bypass and are subject to the provisions of 40 CFR 122.41(m). They combine with the fully-treated effluent from the biological system, are disinfected (ultra violet) and pass through post aeration prior to discharging through station 003. Effluent pumping is available, if necessary. Figure 2 is a flow diagram for the wet stream processes at the Sycamore Creek plant.

The plant has two other bypasses that are included in the NPDES permit. Station 004 is an emergency plant bypass that goes directly to Sycamore Creek through a storm sewer and the station 003 outfall structure. Station 606 is the main plant bypass that recombines with treated effluent prior to disinfection. Discharges through these stations are subject to bypass prohibition regulations, 40 CFR 122.41(m). Since August 2010, MSDGC has not reported any discharges through these two bypass stations.

Sludge from the Sycamore Creek plant is gravity thickened and hauled to another MSDGC plant for incineration.

The Sycamore Creek plant is served by a separate sanitary sewer system. The plant treats wastewater for a population of approximately 23,800 in the Blue Ash and Kenwood-Montgomery sub-basins.

Abatement of sanitary sewer overflows in the Sycamore Creek service area is addressed under the same consent decree referenced above. The complete decree and accompanying exhibits are available at the following Ohio

EPA Web page: http://epa.ohio.gov/dsw/enforcement/enf.aspx#126267106-federal-and-state-consent-agreements-judicial-orders-and-judgments-2001---2014---alphabetical-order [scroll down to "Hamilton County, Board of County Commissioners and City of Cincinnati (CSO)"].

The Sewer District implements an Ohio EPA approved industrial pretreatment program at the Sycamore Creek plant. Two categorical industrial users and one significant noncategorical industrial user discharge approximately 0.174 MGD to the plant based on information in the 2014 NPDES renewal application.

Description of Existing Discharge

Table 1 presents chemical specific data compiled from annual pretreatment reports and data collected by Ohio EPA.

Table 2 presents a summary of unaltered Discharge Monitoring Report (DMR) data for outfalls 1PK00005003. Data are presented for the period January 2009 through January 2014. Current permit limits are provided for comparison.

Tables 3 summarizes the chemical specific data for outfall 003 by presenting the average and maximum Projected Effluent Quality (PEQ) values.

Table 4 summarizes the results of acute and chronic whole effluent toxicity tests of the final effluent.

Table 5 summarizes data for station 604, which is effluent from the high rate treatment unit.

The Sewer District reports any SSOs that occur in the Sycamore Creek service area under the terms of the consent decree.

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 Agency.

Assessment of Impact on Receiving Waters

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 Water Quality Standards 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 Water Quality Standards (WQS; Ohio Administrative Code 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 meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (see Table 6) 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.

The following information is taken from the report, *Biological and Water Quality Study of the Lower Little Miami River and Selected Tributaries, 2007, Including the Todd Fork subwatershed,* (TSD; October 27, 2009; Ohio EPA). The complete report is available at the following Ohio EPA Internet site: http://www.epa.ohio.gov/dsw/document_index/psdindx.aspx .

Chemical Water Quality in Sycamore Creek (TSD Page 88)
Sycamore Creek, a high gradient stream, drains 23.3 mi^2 and enters the Little Miami River at RM 19.22. It is the receiving stream for the Sycamore Creek wastewater treatment plant discharge at RM 0.26. Additionally, this predominately urban watershed has five designated sanitary sewer overflows (MSD 2009). Three sites were sampled in Sycamore Creek in 2007. (2014 update: MSDGC has eliminated the known SSOs in the Sycamore Creek sewershed.)

Dissolved oxygen remained generally stable longitudinally with daytime grab median saturations approaching 100 percent. Dissolved oxygen concentrations fell below water quality criteria in the headwaters (RM 1.10) on one occasion (September 4), which reflected the interstitial flow conditions at the site on this date. Organic enrichment was also apparent at the site. In late May (prior to actual sampling), field crews observed extensive algal mats blanketing the stream. Given the significant infiltration and inflow problems of the Sycamore Creek plant's collection system, it is possible that deterioration in the collection system near and under Sycamore Creek and its tributaries may be impacting the stream in this area by leaching waste to the stream.

The median concentrations observed for total phosphorus and total suspended solids were 0.10 mg/l and 26 mg/l, respectively. These concentrations were above Ohio EPA's target values, which are instream concentrations associated with healthy fish and macroinvertebrate communities. Nutrients were also elevated well above target levels near the mouth (RM 0.05) downstream of the Sycamore Creek plant with respective nitrate+nitrite-nitrogen and total phosphorus medians of 4.00 mg/l and 0.88 mg/l.

Sycamore Creek was in full attainment of the Class B Primary Contact Recreation use at both sites in 2007.

Fish Sampling (TSD Page 119)
The fish community in Sycamore Creek was characterized as "Exceptional" at RM 0.10, "Very Good" at RM 0.50 and "Good" at RM 1.10 based on sampling conducted during July – October 2007.

Macroinvertebrate Sampling - Lower Little Miami River Tributaries (excluding Todd Fork subwatershed) (TSD Pages 130-131)
Nine direct and indirect tributaries to the Lower Little Miami River watershed were sampled for macroinvertebrates in 2007. Sites on Turtle Creek, Little Muddy Creek, Dry Run, Muddy Creek, O'Bannon Creek, Sycamore Creek, East Fork Little Miami River, Duck Creek and Clough Creek accounted for 22 sampling stations that were located in mostly urbanized landscapes.

Overall, there was a 50/50 split between sites that did achieve attainment of applicable biocriteria and those that did not. Turtle Creek at RMs 6.23, 4.85, and 0.52, Little Muddy Creek at RM 1.02, O'Bannon Creek at RMs 1.84 and 0.26, and Sycamore Creek at RMs 0.5 and 0.1 were within WWH criteria. Narrative scores for these sites ranged from very good to marginally good. Exceptional ICIs on East Fork Little Miami River at both RMs 2.3 and 1.2 met EWH criteria.

The eleven sites that were not meeting applicable biocriteria received scores that were in the fair to very poor range. Five of these sites, located on O'Bannon Creek, Turtle Creek, and Muddy Creek, were interstitial or near interstitial when sampled and were considered impaired due to the absence of riffle habitat.

The six remaining sites were primarily impaired by causes associated with urbanization.

Sites on Sycamore Creek, Duck Creek and Clough Creek were affected by either urban runoff or CSO-related effects. The Sycamore Creek and Clough Creek sites seemed to be only moderately impaired from the effects of urban runoff and combined sewer overflows (CSOs), respectively, with fair-range numbers of both EPT and sensitive taxa. However, both sites on Duck Creek were profoundly impacted by CSOs.

Total Maximum Daily Loads (TMDL)
The *Total Maximum Daily Loads for the Lower Little Miami River Watershed* was approved by U.S. EPA on March 28, 2011. The study calculated TMDLs for *E. coli* bacteria, total phosphorus, chemical oxygen demand, total suspended solids, and sedimentation and habitat.

Recommendations included point source controls on the Wilmington wastewater treatment plant, the Wilmington airpark, MSDGC's combined sewer system, and the Blanchester wastewater treatment plant. Nonpoint source actions included improving home septic systems and implementing conventional management practices that are designed to abate pollutant loading from cropland and urban landscapes. The report did not recommend pollutant reductions for the Sycamore Creek plant.

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 the Sycamore Creek wastewater plant were used to determine what parameters should undergo wasteload allocation. The parameters discharged are identified by the data available to Ohio EPA - Discharge Monitoring Report (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 – January 2014
Pretreatment data	2009 through 2012
Ohio EPA compliance sampling data	April 2013

The data were examined, and the following values were removed from the evaluation to give a more reliable projection of effluent quality: one value for chromium of 725. µg/l; one value for nickel of 1570. µg/l; and one value for iron of 6610. µg/l.

This data is evaluated statistically, and Projected Effluent Quality (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 95th percentile of all data points. The average and maximum PEQ values are presented in Table 3.

The PEQ values are used according to Ohio rules to compare to applicable water quality standards (WQS) and allowable wasteload allocation (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 wasteload allocation is done for that parameter. If either PEQ_{avg} or PEQ_{max} is greater than 25 percent of the applicable WQS, a wasteload allocation is conducted to determine whether the parameter exhibits reasonable potential and needs to have a limit or if monitoring is required. See Table 10 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 Water Quality Standards (OAC 3745-1). Most pollutants are allocated by a mass-balance method because they do not degrade in the receiving water. Wasteload allocations 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.

This facility is considered to be interactive with the following dischargers (all municipal wastewater treatment plants) to the Little Miami River and tributaries: Lebanon Regional, Warren County Lower Little Miami, MSDGC Polk Run, and Clermont County O'Bannon Creek Regional, Miami Trails, Wards Corner Regional and Arrowhead Park wastewater plants. For conservative parameters, the CONSWLA (conservative substance wasteload allocation model) was used to distribute effluent loadings between these entities. The lower Little Miami River study area is shown in Figure 3.

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

Aquatic life (WWH)		
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 8, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

Ohio's water quality standard 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 all dischargers requiring mercury limits in their NPDES permit must meet water quality standards 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 Tables 7 and 8. The wasteload allocation results to maintain all applicable criteria are presented in Table 9. Results of ammonia toxicity mass balances indicate that the existing permit limits of 1.2 mg/l (summer) and 2.9 mg/l (winter) are not protective of criteria in Sycamore Creek. However, the reasonable potential evaluation places ammonia-Nitrogen in group 3 for both summer and winter.

Whole Effluent Toxicity WLA Whole effluent toxicity (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.

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

The wasteload allocation 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 Sycamore Creek, the wasteload allocation values are 0.3 TU_a and 1.0 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the 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):

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

The acute toxicity unit (TU_a) is defined as 100 divided by the 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 wasteload allocation is less than 1.0 TU_a, it may be defined as:

Dilution Ratio (downstream flow to discharger flow)	Allowable Effluent Toxicity (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 wasteload allocation for Sycamore Creek 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 water quality standards must be determined. Each parameter is examined and placed in a defined "group". Parameters that do not have a water quality standard or do not require a wasteload allocation 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 wasteload allocations are selected from Table 9. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 3, 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 10.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations.

Outfall 003 – Final Effluent (Tertiary Treatment Effluent + High Rate Treatment Effluent)
Table 11 presents the final effluent limits and monitoring requirements proposed for Sycamore Creek outfall 1PK00005003 and the basis for their recommendation.

Based on best engineering judgment, it is proposed that the existing limits for dissolved oxygen, total suspended solids, summer total phosphorus and $CBOD_5$ (5-day carbonaceous biochemical oxygen demand) be continued. Considering that summer and winter ammonia-N were placed in Group 3 based on reasonable potential (Table 10) and that downstream of the plant outfall Sycamore Creek is in full attainment of its Warmwater Habitat designated use, it is proposed that the current limits for ammonia-N be continued. Most of these limits were design criteria for the plant.

Limits proposed for oil and grease, pH, and *Escherichia coli* are based on Water Quality Standards (OAC 3745-1-07). Sycamore Creek is designated as Class B Primary Contact Recreation, but the proposed limits are based on the Class A standards that apply to the Little Miami River, which is 0.26 miles downstream.

Based on best engineering judgment, the draft permit proposes to continue year-round monitoring for nitrate+nitrite-nitrogen and total Kjeldahl nitrogen and for total phosphorus during the winter months. The purpose of the monitoring is to maintain a data set for tracking nutrient loads discharged by point sources in the lower Little Miami River basin.

Ohio EPA risk assessment (Table 10) places total filterable residue (total dissolved solids) in group 4. This placement as well as supporting data indicate that this parameter does not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. Monitoring for Group 4 pollutants (where PEQ exceeds 50 percent of the WLA) is required by OAC Rule 3745-33-07(A)(2).

Ohio EPA risk assessment (Table 10) places free cyanide, selenium, thallium, nickel, silver, zinc, cadmium, lead, total chromium, copper, dissolved hexavalent chromium and mercury in groups 2 and 3. This placement as well as the supporting data indicate that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. Monitoring is proposed to document that these pollutants continue to remain at low levels.

Free Cyanide Test Method
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.

****

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.

Station 604 – High Rate Treatment Effluent
Table 12 presents the monitoring requirements proposed for Sycamore Creek station 1PK00005604.

Because the Sycamore Creek plant is impacted by wet weather flows, continued monitoring for total precipitation is proposed based on best engineering judgment. The monitoring proposed for ammonia-N and $CBOD_5$, the reporting of flow, occurrences and duration, and provisions for utilizing the high rate treatment unit are a continuation of existing permit conditions.

Station 602 (Proposed) – High Rate Treatment Influent
A new station is proposed for monitoring total suspended solids in the influent for the high rate treatment unit. Together with the effluent data, this new monitoring data will be used to evaluate the CEHRT's performance under a variety of conditions and to determine if an appropriate percent removal performance criteria can be established for the treatment unit. The permit provides 36 months for MSDGC to identify a location that will provide a representative sample and to obtain and install the necessary equipment. A special condition in Part II requires the periodic submittal of progress reports on establishing this sampling station.

Sludge Monitoring
The monitoring requirements proposed for the disposal of sewage sludge by transfer to another facility with an NPDES permit are based on OAC 3745-40.

Whole Effluent Toxicity Reasonable Potential
Based on best engineering judgment, annual chronic toxicity testing with the determination of acute endpoints using both fathead minnows and *Ceriodaphnia dubia* is proposed for the life of the permit. Evaluating the whole effluent toxicity data presented in Table 4 and other pertinent data under the provisions of OAC 3745-33-07(B) placed the Sycamore Creek wastewater plant in Category 4 with respect to whole effluent toxicity.

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.

<u>Other Requirements</u>

Schedule of Compliance
A 6 month compliance schedule is proposed for MSDGC to submit a technical justification for either revising its local industrial user limits or retaining its existing local limits as necessary. If revisions to local limits are required, the Sewer District must also submit a pretreatment program modification request.

Certification and Minimum Staffing Reduction
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 MSD to have a Class IV wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 003.

In accordance with rule 3745-7-04 of the Ohio Administrative Code (OAC), MSD of Greater Cincinnati requested a 30 hour reduction in the minimum staffing requirements for the Sycamore Creek treatment plant. Ohio EPA reviewed the request and determined that the reduced staffing plan should be granted. Any change in the criteria under which the reduced staffing plan was approved (such as enforcement status, history of compliance, or provisions included in the plan) will require that the treatment works immediately return to the

minimum staffing requirements included in paragraph (C)(1) of rule 3745-7-04 of the Ohio Administrative Code.

Operator of Record
In December 2006, Ohio Administrative Code rule revisions became effective which 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 rule 3745-7-02 of the Ohio Administrative Code (OAC). 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, MSD may seek permit coverage under the general permit for industrial storm water (permit # OHR000004) or submit a "No Exposure Certification." Parts IV, V, and VI will be removed from the final permit if: 1) MSD 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 signs to be placed at each outfall to Sycamore Creek providing information about the discharge. Signage at outfalls is required pursuant to Ohio Administrative Code 3745-33-08(A).

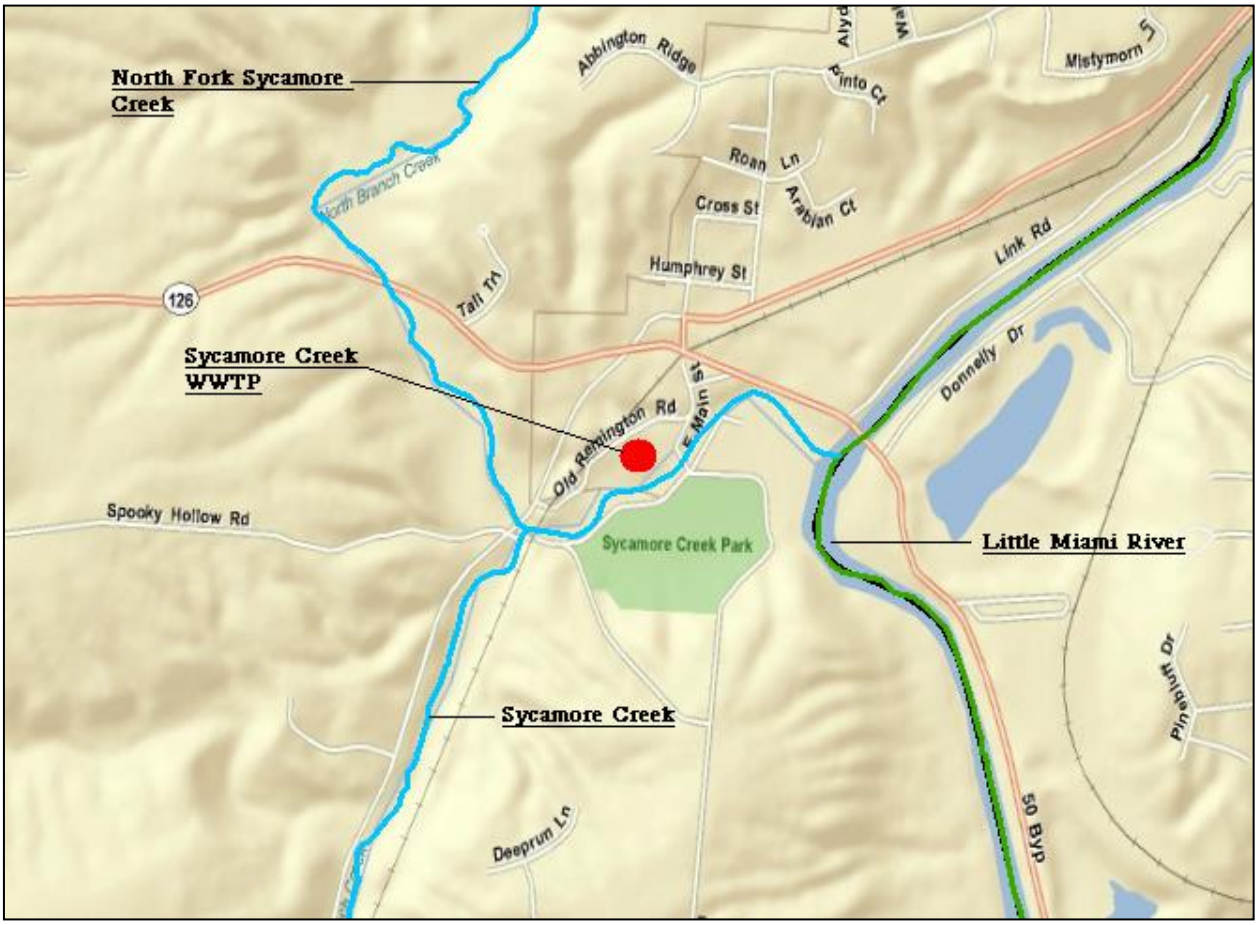

Figure 1. Location of Sycamore Creek wastewater treatment plant.

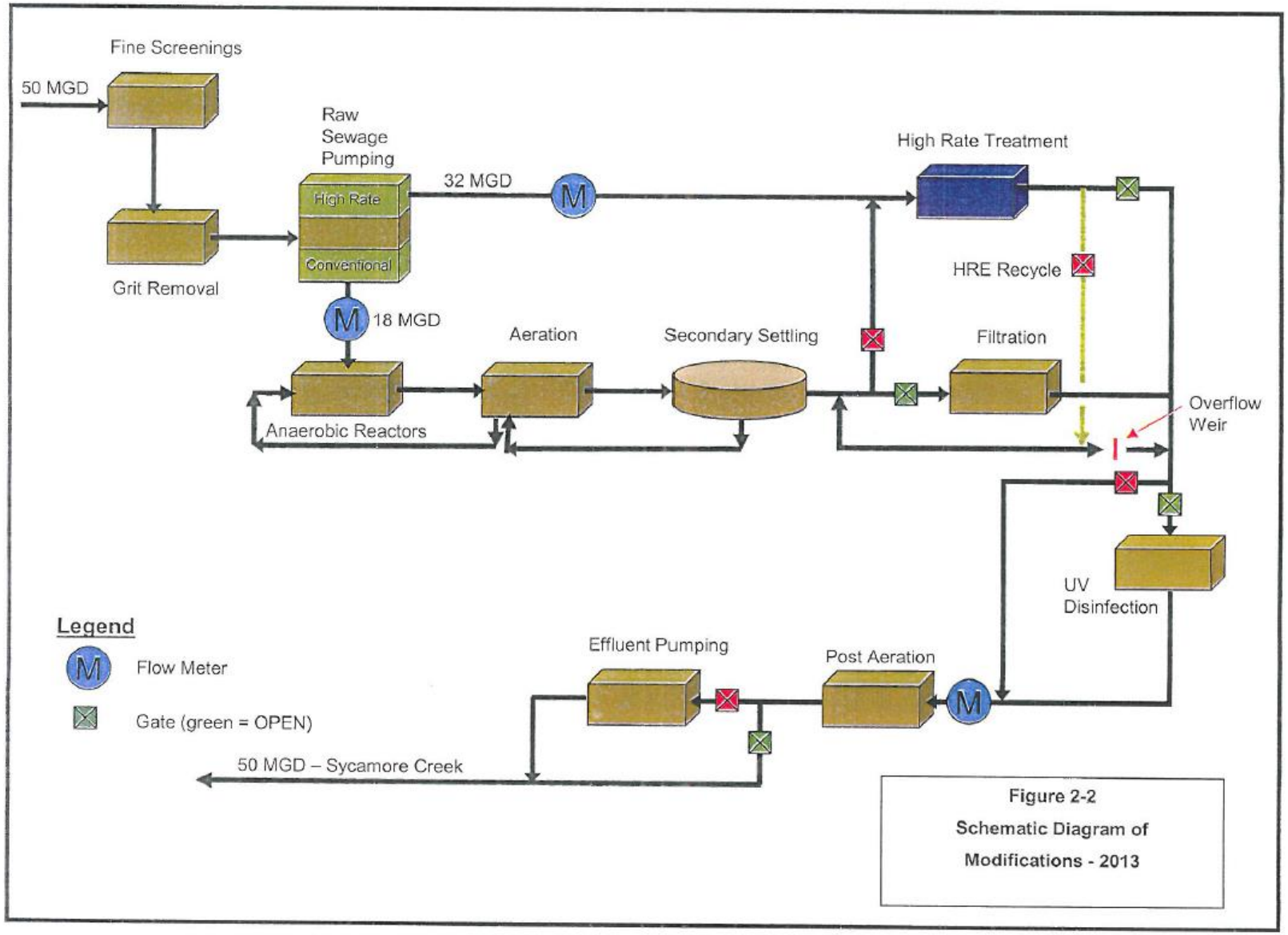

Figure 2. Flow diagram for Sycamore Creek wastewater treatment plant.

Table 1. Effluent Characterization Using Ohio EPA and Pretreatment Data

Summary of analytical results for Sycamore Creek final effluent. Units ug/l unless otherwise noted; OEPA = data from analyses by Ohio EPA; PT = data from pretreatment program reports; NA = not analyzed; ND = not detected (detection limit).

PARAMETER	OEPA 04/30/13	PT 09/21/12	PT 03/09/12	PT 08/05/11	PT 04/01/11	PT 07/23/10	PT 03/05/10	PT 09/25/09	PT 03/03/09
Arsenic	ND(2.0)	ND(12)	ND(5)	ND(5)	ND(5)	26	26	26	35.2
Barium	22	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	725*	ND(6)	ND(6)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)
Copper	20.3	10.9	7.79	6.97	ND(2)	9	9	9	3.69
Dissolved solids, total (mg/l)	700	NA	NA	NA	NA	NA	NA	NA	NA
Iron	6610*	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1570*	4.16	ND(3)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Nitrate+nitrite	4.39	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, T	0.102	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	ND(2.0)	18.9	18.1	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
Strontium	354	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23	58.2	24.1	38.5	46.1	109	109	109	64.8

* = Values are not representative of typical plant discharge

Table 2. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered discharge monitoring report data for Sycamore Creek outfall 1PK00005003 (January 2009 – January 2014). 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; S = summer; a = weekly average.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50th	95th	
Water Temperature	Annual	C	Monitor		1461	17	25	10-25
Total Precipitation	Annual	Inches	Monitor		181	0	0.64	0-2.42
Dissolved Oxygen	Summer	mg/l		6.0 min	736	8.3	9.9	2.8-10.5
Dissolved Oxygen	Winter	mg/l		6.0 min	725	9.3	10.4	5-11.6
Residue, Total Dissolved	Annual	mg/l	Monitor		42	605	1260	250-1380
Total Suspended Solids	Annual	mg/l	13	20[a]	1266	3	11	1-96
Oil and Grease, Hexane Method	Annual	mg/l		10	79	0	0	0-7
Nitrogen, Ammonia (NH3)	Summer	mg/l	1.2	1.8[a]	631	0	1	0-2.9
Nitrogen, Ammonia (NH3)	Winter	mg/l	2.9	4.4[a]	634	0	1.7	0-6.1
Nitrogen Kjeldahl, Total	Annual	mg/l	Monitor		1133	1.3	3.2	0-13.6
Nitrite Plus Nitrate, Total	Annual	mg/l	Monitor		1133	4	7.32	0-24.6
Phosphorus, Total (P)	Annual	mg/l	1.0 (S)	1.5[a] (S)	1171	0	1.45	0-4
Cyanide, Free	Annual	mg/l	Monitor		58	0	0	0-0
Selenium, Total Recoverable	Annual	ug/l	Monitor		117	0	2	0-11
Thallium, Total Recoverable	Annual	ug/l	6.4	79	127	0	0	0-26
Nickel, Total Recoverable	Annual	ug/l	Monitor		124	0	4	0-5
Silver, Total Recoverable	Annual	ug/l	1.3	6.2	124	0	1	0-1
Zinc, Total Recoverable	Annual	ug/l	Monitor		124	34	66.3	10-187
Cadmium, Total Recoverable	Annual	ug/l	Monitor		124	0	0	0-0
Lead, Total Recoverable	Annual	ug/l	Monitor		124	0	0	0-6
Chromium, Total Recoverable	Annual	ug/l	Monitor		124	0	0	0-0
Copper, Total Recoverable	Annual	ug/l	24	39	127	4	10	0-20
Chromium, Dissolved Hexavalent	Annual	ug/l	Monitor		55	0	0	0-0
Fecal Coliform	Annual	#/100 ml	--	--	51	30	575	1-1800
E. coli	Annual	#/100 ml	126	284[a]	346	30.5	444	1-2380
Flow Rate	Summer	MGD	Monitor		736	5.46	13.8	2.75-36.3
Flow Rate	Winter	MGD	Monitor		725	7.22	17.3	3.11-32.6
Flow Rate	Annual	MGD	Monitor		1461	6.17	16	2.75-36.3
Mercury, Total (Low Level)	Annual	ng/l	Monitor		82	1.33	4.09	0-8.19
pH, Maximum	Annual	S.U.		9.0	1461	7.8	8.2	7-8.7
pH, Minimum	Annual	S.U.		6.5	1461	7.3	7.7	4.4-8
CBOD 5 day	Summer	mg/l	10	15[a]	619	2	4	1-12
CBOD 5 day	Winter	mg/l	10	15[a]	575	2	4	1-16

Table 3. Projected Effluent Quality Values

Parameter	Units	# of Samples	# > MDL	Average PEQ	Maximum PEQ
Self-Monitoring (DMR) Data					
Total Diss. Solids (TDS) [A]	mg/l	43	43	889.8	1186.
Ammonia-S	mg/l	419	51	0.391	0.960
Ammonia-W	mg/l	326	107	0766	1.798
NO_3+NO_2 [A]	mg/l	1134	1126	4.955	8.006
Phosphorus [A]	mg/l	1172	409	0.715	1.497
Cyanide, free	µg/l	58	0	--	--
Selenium – TR	µg/l	93*	22	1.314	1.8
Thallium – TR	µg/l	72[#]	0	--	--
Nickel - TR [A]	µg/l	132	15	2.93	4.092
Silver – TR	µg/l	124	13	0.584	0.80
Zinc [A]	µg/l	133	133	60.08	84.24
Cadmium - TR	µg/l	124	0	--	--
Lead - TR	µg/l	124	5	3.504	4.8
Chromium - TR	µg/l	124	0	--	--
Copper - TR [A]	µg/l	136	74	9.031	12.76
$Chromium^{+6}$, diss.	µg/l	55	0	--	--
Mercury - TR	ng/l	82	51	3.506	5.427
Combined Other Data [B]					
Arsenic	µg/l	9	4	46.25	63.36
Barium	µg/l	1	1	99.57	136.4
Strontium	µg/l	1	1	1602.	2195.

[A] DMR data combined with Ohio EPA data and/or pretreatment program data.
[B] Combined other data sources include pretreatment program data and Ohio EPA data.
* DMR data, 8/1/2011 – 1/15/2014, MDL = 1.0 ug/l.
[#] DMR data, 1/1/2012 – 1/15/2014, MDL = 1.0 ug/l.

Table 4. Summary of acute and chronic toxicity test results

Test Date(a)	*Ceriodaphnia dubia 48 hours*	*Fathead Minnows 96 hours*	*Ceriodaphnia dubia 7 days*	*Fathead Minnows 7 days*
	TUa[b]	TUa[b]	TUc[b]	TUc[b]
6/6/10(E)	BD	--	BD	--
6/5/11(E)	BD	BD	BD	BD
6/3/12(E)	BD	BD	BD	BD
6/2/13(E)	BD	BD	1.0	BD
6/8/14(E)	BD	BD	BD	BD
4/30/13(O)*[@]	BD	BD	--	--
5/1/13(O)*[#]	BD	BD	--	--
5/1/13(O)*[%]	100% mortality[&]	BD	--	--

[a] O = EPA test; E = entity test
[b] TUa = acute toxicity units, TUc = chronic toxicity units
* = 48 hour screening test
BD = below detection
[@] = Day 1 grab
[#] = Day 2 grab
[%] = Day 1 – Day 2 composite
[&] = sample had several atypical metal concentrations; nickel concentration > acute water quality standard

Table 5. Discharge data for station 604, the chemically enhanced high rate treatment unit.

Season	Year	# of Obs.	# Below Detection	Minimum	Percentiles 5th	25th	50th	75th	95th	99th	Maximum	Mean
Monitoring Station	**604;**	**Reporting Code:**		**00530;**		**Parameter Name:**		**Total Suspended Solids (mg/l)**				
Annual	2009	79	0	2	6.9	12.5	16	20	37.9	59.54	65	18.582
Annual	2010	21	0	5	6	10	14	19	102	142	152	26.952
Annual	2011	49	0	2	5	7	13	26	1388	4764	6900	298.55
Annual	2012	27	0	3	3.3	10	19	106	383	950.2	1140	110.96
Annual	2013	23	0	6	8	12	32	140	460.6	694.88	760	124.17
Annual	2014	2	0	50	50.5	52.5	55	57.5	59.5	59.9	60	55
Annual Overall	2009-2014	201	0	2	5	10	16	28	430	1840	6900	112.56
Monitoring Station	**604;**	**Reporting Code:**		**00610;**		**Parameter Name:**		**Nitrogen, Ammonia (NH3) (mg/l)**				
Annual	2009	79	12	0	0	2	4	7	9	11	11	4.2278
Annual	2010	21	3	0	0	1	2	3	5	5.8	6	2.2381
Annual	2011	49	1	0	1	2	2	3	8.8	10.52	11	2.8571
Annual	2012	27	1	0	1	3	4	5	6	6.74	7	3.8519
Annual	2013	22	1	0	2	2	3.5	5	6.95	11.74	13	3.9545
Annual	2014	2	1	0	0.15	0.75	1.5	2.25	2.85	2.97	3	1.5
Annual Overall	2009-2014	200	19	0	0	2	3	5	8.05	11	13	3.575
Monitoring Station	**604;**	**Reporting Code:**		**50050;**		**Parameter Name:**		**Flow Rate (MGD)**				
Annual	2009	84	0	0.025	0.05875	0.22	0.7255	1.9733	5.9658	9.5029	10.298	1.5735
Annual	2010	32	0	0.014	0.0238	0.099	0.345	2.1293	5.3687	5.8321	5.856	1.4198
Annual	2011	53	0	0.08	0.1876	0.61	1.79	6.098	9.6474	12.188	12.88	3.3323
Annual	2012	30	0	0.09	0.2025	0.3775	0.91	1.7	6.511	7.0312	7.24	1.7763
Annual	2013	31	0	0.02	0.09	0.32	1.11	3.155	6.45	9.247	10.21	2.0219
Annual	2014	3	0	0.05	0.092	0.26	0.47	0.765	1.001	1.0482	1.06	0.52667
Annual Overall	2009-2014	233	0	0.014	0.0604	0.31	0.903	2.598	7.5192	10.941	12.88	2.0248
Monitoring Station	**604;**	**Reporting Code:**		**80082;**		**Parameter Name:**		**CBOD 5 day (mg/l)**				
Annual	2009	47	0	2	4	9.5	14	19.5	32.4	43.94	49	15.872
Annual	2010	17	0	2	2	4	10	19	49	84.2	93	17.706
Annual	2011	49	0	3	4	5	9	18	194	806.16	1146	54.776
Annual	2012	27	0	3	4.3	10	13	27.5	98.2	129.76	136	25.741
Annual	2013	22	0	3	4.15	10.25	13.5	45.25	96.9	192.8	218	35.409
Annual	2014	2	0	8	8.45	10.25	12.5	14.75	16.55	16.91	17	12.5
Annual Overall	2009-2014	164	0	2	4	7	13	21	97.25	303.18	1146	31.89
Monitoring Station	**604;**	**Reporting Code:**		**82517;**		**Parameter Name:**		**Duration of Discharge (Hours)**				
Annual	2009	84	0	0.1	0.3	1	3.25	7.225	20.225	24	24	5.5774
Annual	2010	32	0	0.1	0.1	0.375	0.95	9.15	14.345	14.469	14.5	4.2125
Annual	2011	53	0	0.7	0.9	2.3	8	19	24	24	24	10.213
Annual	2012	30	0	0.6	1.09	1.65	3.35	7.325	18.09	21.669	22.8	5.8167
Annual	2013	31	0	0.1	0.65	2	4.1	9.45	17.95	18.07	18.1	6.3613
Annual	2014	3	0	0.3	0.4	0.8	1.3	2.85	4.09	4.338	4.4	2
Annual Overall	2009-2014	233	0	0.1	0.3	1.3	3.9	9.9	21.56	24	24	6.5335

Table 6. Biological Survey Results and Biocriteria Aquatic life use attainment status for stations sampled in the Little Miami River basin based on data collected July-October 2007. The Index of Biotic Integrity (IBI), Modified Index of well being (MIwb), and Invertebrate Community Index (ICI) are scores based on the performance of the biotic community. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biotic community. White fill indicates sites in the Interior Plateau ecoregion.

Location	STORET (RM)	Drain. (mi^2)	IBI	MIwb[a]	ICI[b]	QHEI	Status[c]	Causes	Sources
Little Miami River (11-001)									
Little Miami River dst. Peter's Cartridge	M05W24 (29.0)	1059.0 [B]	54	11.0	54	85.0	FULL [EWH]		
Little Miami River dst. Simpson Creek	M05S07 (27.9)	1069.0 [B]	54	11.3	54	91.0	FULL [EWH]		
Little Miami River ust. O'Bannon Creek	M05W34 (24.10)	1085.0 [B]	50	10.2	48	81.0	FULL [EWH]		
Little Miami River adj. Loveland-Kemper Road	M05S39 (22.30)	1150.0 [B]	53	9.8	54	79.5	FULL [EWH]		
Little Miami River @ Polk Run WWTP mixing zone	300364 (21.7)	1150.0 [B]	--	--	14*	--	Mix Zone		
Little Miami River @ Branch Hill New Guinea Road	600540 (21.5)	1161.0 [B]	50	11.2	--	89.5	(FULL) [EWH]		
Little Miami River adj. Lake Isabella	M05S05 (20.6)	1161.0 [B]	56	10.4	52	88.5	FULL [EWH]		
Little Miami River @ canoe access area dst. SR 126	M05W47 (17.7)	1187.0 [B]	52	11.2	E	86.5	FULL [EWH]		
Little Miami River @ Wooster Pike Milford gage	M05P11 (13.07)	1203.0 [B]	51	10.2	52	90.5	FULL [EWH]		
Little Miami River @ Newtown Road	M05P12 (8.14)	1713.0 [B]	52	10.2	50	85.5	FULL [EWH]		
Little Miami River @ Beechmont Road	600580 (3.5)	1744.0 [B]	36*	9.7	VG[ns]	73.5	**PART.[EWH]**	Sedimentation/Siltation	Combined sewer overflows

Location	STORET (RM)	Drain. (mi²)	IBI	MIwb[a]	ICI[b]	QHEI	Status[c]	Causes	Sources
Scamore Creek (11-007) – Tributary to Little Miami River at RM 19.22									
Sycamore Creek adj. Loveland Rd, dst. tributary	M05P17 (1.10)	10.4[H]	40	N/A	F*	63.5	**PART.**[WWH]	Organic Enrichment (Sewage) Biological Indicators	Urban Runoff/Storm Sewers
Sycamore Creek dst. North Fork Sycamore Creek	M05S41 (0.50)	20.7[W]	54	8.9	44	69.5	FULL [WWH]		
Sycamore Creek at mouth, dst. Sycamore Creek WWTP	M05S37 (0.1)	23.3[W]	54	9.4	32	76.5	FULL [WWH]		

a - MIwb is not applicable to headwater streams with drainage areas $\leq$ 20 mi^2.

b - A narrative evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to current velocities less than 0.3 fps flowing over the artificial substrates. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional

c - Attainment is given for the proposed status when a change is recommended. Aquatic life use in superscript.

ns - Nonsignificant departure from biocriteria ($\leq$4 IBI or ICI units, or $\leq$0.5 MIwb units).

* - Indicates significant departure from applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units). Underlined scores are in the Poor or Very Poor range.

Biological Criteria

	Eastern Corn Belt Plains			Interior Plateau			
Index – Site Type	**EWH**	**WWH**	**MWH**	**EWH**	**WWH**	**MWH**	**LRW**
IBI – Headwaters	50	40	24	50	40	24	18
IBI – Wading	50	40	24	50	40	24	18
IBI – Boat	48	42	24	48	38	24	16
MIwb – Wading	9.4	8.3	6.2	9.4	8.1	6.2	4.5
MIwb – Boat	9.6	8.5	5.8	9.6	8.7	5.8	5.0
ICI	46	36	22	46	30	22	8

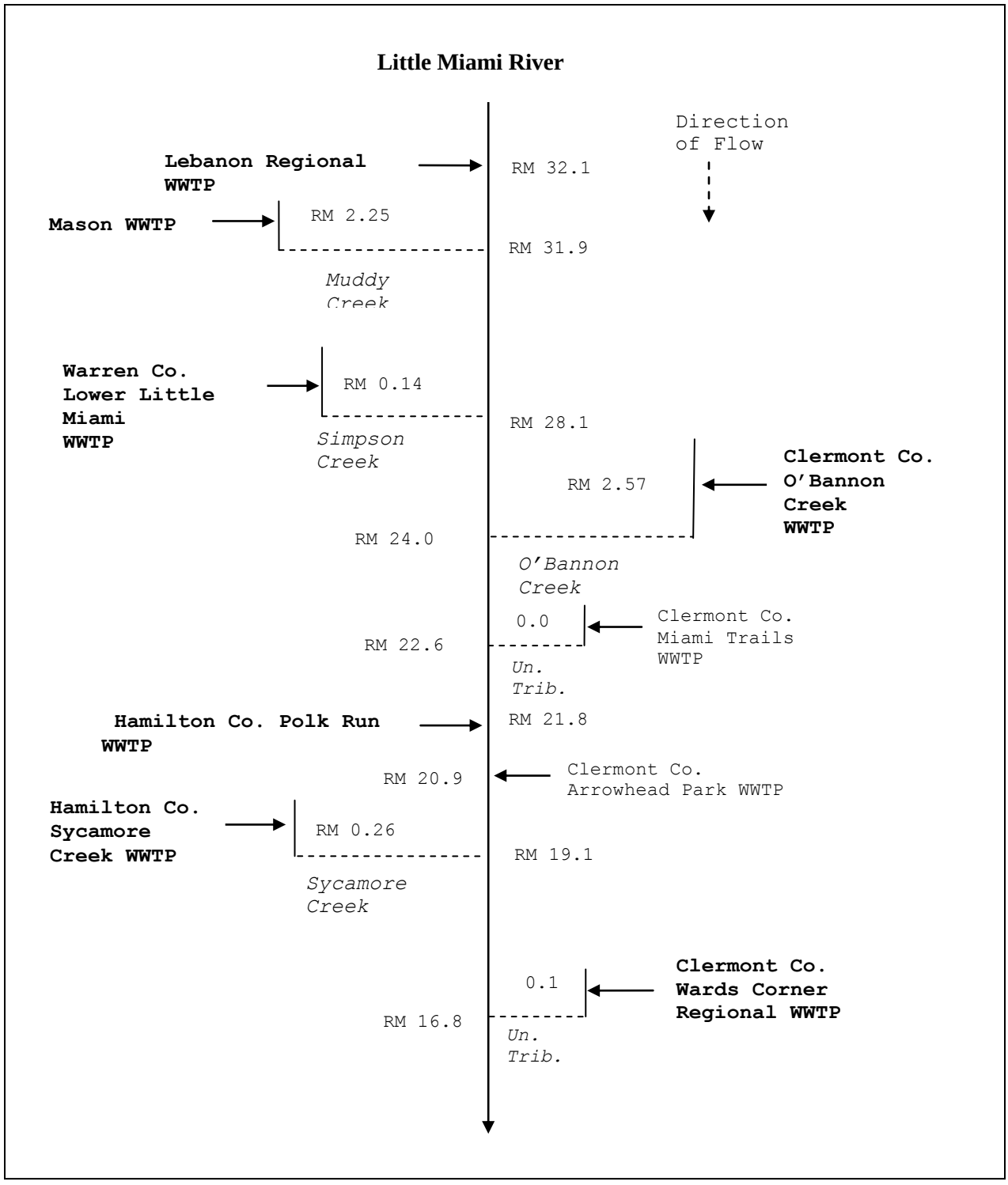

Figure 3. Little Miami River Study Area (not to scale). Major dischargers are in **bold.**

Table 7. Water Quality Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Outside Mixing Zone Criteria: Average: Agri-culture	Outside Mixing Zone Criteria: Average: Aquatic Life	Outside Mixing Zone Criteria: 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.
Chlorine, tot. res.	µg/l	--	--	11.	19.	38.
Chloroform [C]	µg/l	4700.	--	140.	1300.	2600.
Chromium^{+6}, diss.	µg/l	--	--	11.	16.	31.
Cyanide, free	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 Dissolved Solids (TDS)	mg/l	--	--	1500.	--	--
Little Miami River & Simpson Creek; Hardness = 298. mg/l						
Cadmium	µg/l	--	50.	5.8	15.	31.
Chromium, tot.	µg/l	--	100.	210.	4400.	8800.
Copper	µg/l	1300.	500.	24.	39.	78.
Lead	µg/l	--	100.	26.	490.	980.
Nickel	µg/l	4600.	200.	130.	1200.	2400.
Silver	µg/l	--	--	1.3	10.	21.
Zinc	µg/l	69000.	25000.	300.	300.	600.
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] Carcinogen

Table 7. (Continued)_ Hardness-Based Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Outside Mixing Zone Criteria: Average: Agri-culture	Outside Mixing Zone Criteria: Average: Aquatic Life	Outside Mixing Zone Criteria: Maximum Aquatic Life	Inside Mixing Zone Maximum
O'Bannon Creek; Hardness = 220. mg/l						
Cadmium	µg/l	--	50.	4.6	11.	22.
Chromium, tot.	µg/l	--	100.	160.	3400.	6900.
Copper	µg/l	1300.	500.	18.	29.	59.
Lead	µg/l	--	100.	18.	330.	670.
Nickel	µg/l	4600.	200.	100.	910.	1800.
Silver	µg/l	--	--	1.3	6.2	12.
Zinc	µg/l	69000.	25000.	230.	230.	470.
Sycamore Creek; Hardness = 286. mg/l						
Cadmium	µg/l	--	50.	5.6	15.	30.
Chromium, tot.	µg/l	--	100.	200.	4300.	8500.
Copper	µg/l	1300.	500.	23.	38.	75.
Lead	µg/l	--	100.	24.	470.	930.
Nickel	µg/l	4600.	200.	130.	1100.	2300.
Silver	µg/l	--	--	1.3	9.7	19.
Zinc	µg/l	69000.	25000.	290.	290.	580.

Table 8. Instream Conditions for the Little Miami River and Selected Tributaries.

Parameter	Units	Value				
		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
	% maximum	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(2EHP)		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]
Chlorine, tot. res.		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Chromium^{+6}, diss.		0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]	0.0 [E]
Chromium, tot.		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]
Cyanide, free		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]
TDS (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 @ Milford data (10/1/1975 - 9/30/2013)
B. Based on USGS gage #03246500, East Fork LMR @ 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 9. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

Parameter	Units	Average			Maximum	Inside
		Human Health	Agri Supply	Aquatic Life	Aquatic Life	Mixing Zone Maximum
Ammonia – S	mg/l	--	--	1.0	--	--
Ammonia – W	mg/l	--	--	1.8	--	--
Arsenic	µg/l	--	107.	150.	340.	680.
Barium	µg/l	--	--	220.	2000.	4000.
Cadmium [B]	µg/l	--	54. [A]	5.6	15.	30.
Chromium, total [B]	µg/l	--	107.	200.	4300.	8500.
Chromium^{+6}, diss. [B]	µg/l	--	--	11.	16.	31.
Copper	µg/l	1325. [A]	536. [A]	23.	38.	75.
Cyanide, free [B]	µg/l	224300. [A]	--	12.	46.	92.
Lead [B]	µg/l	--	107.	24.	470.	930.
Mercury [C]	ng/l	12.	10000. [A]	910.	1700.	3400.
Nickel [B]	µg/l	4689. [A]	214.	130.	1100.	2300.
Selenium	µg/l	11210.	51.	5.0	--	--
Silver	µg/l	--	--	1.3	9.7	19.
TDSmg/l	--	--	1500.	--	--	
Thallium	µg/l	6.4	--	17.	79.	160.
Zinc	µg/l	70340. [A]	26800. [A]	290.	290.	580.

[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 10. Parameter Assessment

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

Phosphorus

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

Cadmium	Chromium^{+6}, diss.	Chromium, tot.
Cyanide, free	Lead	Nickel
Nitrate+Nitrite	Selenium	Strontium
Thallium		

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

Ammonia-S&W	Arsenic	Barium
Copper	Mercury	Silver
Zinc		

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.

Total Dissolved Solids

Group 5: Maximum PEQ $\geq$ 100% of the maximum PEL or average PEQ $\geq$ 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.

No parameters in this group.

Table 11. Final Effluent Limits and Monitoring Requirements – Station 003

		Effluent Limitations				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Basis[b]
Temperature	°C	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Dissolved Oxygen	mg/l	6.0 minimum		--	--	BEJ, PD, EP
Suspended Solids	mg/l	13	20[c]	443	682[c]	BEJ, PD, EP
Oil and Grease	mg/l	--	10	--	--	WQS, EP
Ammonia-N	mg/l					
Summer		1.2	1.8[c]	40.9	61.4[c]	BEJ, EP
Winter		2.9	4.4[c]	98.8	150[c]	BEJ, EP
Total Kjeldahl-N	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				BEJ, EP
Nitrate(N) + Nitrite(N)	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				BEJ, EP
Phosphorus, Total	mg/l					
Summer		1.0	1.5[c]	34.1	51.1[c]	BEJ, PD, EP
Winter		- - - - - - - - - - - - Monitor - - - - - - - - - - - -				BEJ, EP
Cyanide, Free	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Selenium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Thallium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Nickel, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Silver, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Zinc, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Cadmium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Lead, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Chromium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Copper, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Hex. Chromium (Dissolved)	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
E. coli						
Summer Only	#/100ml	126	284[c]	--	--	WQS, EP
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Mercury, T.	ng/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Whole Effluent Toxicity						
Acute	TUa	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
Chronic	TUc	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
pH	S.U.	- - - - - - - - - - - - 6.5 to 9.0 - - - - - - - - - - - -				WQS, EP
Total Filterable Residue (Dissolved Solids)	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
$CBOD_5$	mg/l	10	15[c]	341	511[c]	BEJ, PD, EP

Table 11. (Continued)

[a] Effluent loadings based on average design discharge flow of 9.0 MGD.

[b] Definitions: BEJ = Best Engineering Judgment; EP = Existing Permit; M = BEJ of Permit Guidance 1: Monitoring Frequency Requirements for Sanitary Discharges; PD = Plant Design Criteria; 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.

Table 12. Monitoring Requirements – Station 604

		Effluent Limitations				
		Concentration		**Loading (kg/day)**		
Parameter	**Units**	**Monthly Average**	**Daily Maximum**	**Monthly Average**	**Daily Maximum**	**Basis[a]**
Precipitation, Total	Inches	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP
Suspended Solids	mg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP
Ammonia-N	mg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP
Flow	MGD	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP
Bypass Occurrence	#/Month	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP
Duration of Discharge	Hours	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP
$CBOD_5$	mg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - -		BEJ, EP

[a] Definitions: BEJ = Best Engineering Judgment; EP = Existing Permit;