National Pollutant Discharge Elimination System (NPDES) Permit Program

FACT SHEET

Regarding an NPDES Permit to Discharge to Waters of the State of Ohio
for Western Regional Water Reclamation Facility (WRF)

Public Notice No.: 21-09-010
Public Notice Date: September 10, 2021
Comment Period Ends: October 10, 2021

Ohio EPA Permit No.: 1PL00002*PD
Application No.: OH0026638

<u>Name and Address of Applicant:</u>
Montgomery County Board of Commissioners
451 West Third Street
Dayton, OH 45422

Name and Address of Facility Where
<u>Discharge Occurs:</u>
Western Regional Water Reclamation Facility
4111 Hydraulic Road
West Carrolton, OH 45449
Montgomery County

Receiving Water: Great Miami River
Subsequent Stream Network: 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 (Ohio Revised Code [ORC] 6111). 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.

No antidegradation review was necessary.

Effluent limits based on available treatment technologies are required by Section 301(b) of the CWA. 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/or monitoring requirements proposed for the following parameters are the same as in the current permit, although some monitoring frequencies may have changed: water temperature, dissolved oxygen, total suspended solids, oil & grease, ammonia, total Kjeldahl nitrogen, nitrate plus nitrite, total phosphorus, orthophosphate, nickel, zinc, cadmium, lead, chromium, copper, dissolved hexavalent chromium, flow rate, chlorine, free cyanide, pH, total filterable residue, and 5-day carbonaceous biochemical oxygen demand.

New monitoring is proposed for selenium due to the reasonable potential analysis placement in Group 4.

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 Ohio Administrative Code (OAC) 3754-33-07(B)(11) and will adequately characterize toxicity in the plant's effluent.

Monitoring for *E. coli* at upstream station 801 and downstream station 901 is proposed to change from summer to June-August and from monthly to once per two weeks.

New monitoring for total Kjeldahl nitrogen is proposed at stations 801 and 901.

Monitoring for cyanide at influent station 601 is proposed to be changed from "free" to "total" cyanide to identify the magnitude of all cyanide received at the facility.

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; whole effluent toxicity (WET) testing; storm water compliance; pretreatment program requirements; phosphorus limit compliance; and outfall signage.

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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 David Brumbaugh at (614) 644-2138 or david.brumbaugh@epa.ohio.gov.

INFORMATION REGARDING CERTAIN WATER QUALITY BASED EFFLUENT LIMITS

This draft permit may contain proposed water-quality-based effluent limits (WQBELs) 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 ORC 6111.03(J)(3), the Director established these WQBELs 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 NPDES 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, a written request 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 WQBELs 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 WQS used to develop the proposed effluent limitation in accordance with the terms and conditions set forth in OAC 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 WQS pursuant to OAC 3745-1-39. The permittee shall submit written notification regarding their intent to develop site specific WQS 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

Western Regional WRF discharges to Great Miami River at River Mile 71.48. Figure 1 shows the approximate location of the facility.

This segment of the Great Miami River is described by Ohio EPA River Code: 14-001, Hydrologic Unit Code: 05080002-90-01, County: Montgomery, Ecoregion: Eastern Corn Belt Plains. The Great Miami River is designated for the following uses under Ohio's WQS (OAC 3745-1-21): Warmwater Habitat, Agricultural Water Supply, Industrial Water Supply, Primary Contact Recreation.

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 Recreation) and wading only (Secondary Contact which are 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 water supply and industrial water supply.

FACILITY DESCRIPTION

Western Regional WRF was constructed in 1978 and last upgraded in 2015. The average design flow is 20 million gallons per day (MGD). The plant provides service to all or part of Moraine, West Carrollton, Kettering, Miamisburg, Centerville, Miami Township, Washington Township, Jefferson Township, Trotwood, and Springboro. Western Regional WRF has the following treatment processes which are shown in Figure 2:

- Influent pumping
- Bar screen
- Grit removal
- Activated sludge aeration
- Ferric chloride addition
- Final clarification
- Tertiary filtration
- Chlorination/dechlorination

The Western Regional plant has an internal bypass of its tertiary filters. The bypass is activated manually by plant operators when necessary to route high flows around the filters. Flows that bypass the tertiary filters are monitored at station 602 and then blended with the tertiary filtrate prior to monitoring at station 001. The bypass flows receive full biological treatment and are therefore not subject to 40 CFR 122.41(m) and Part III, Item 11.C.1 of the permit. The service area has 100% separated sewers.

Montgomery County has an approved pretreatment program. One categorical user discharges 0.096 MGD of flow and five significant non-categorical users discharge 0.474 MGD of flow.

The service area's potable water comes from groundwater via the City of Dayton's municipal water supply.

Western Regional WRF utilizes the following sewage sludge treatment processes (Figure 2):

- Gravity thickening
- Aerobic digestion
- Filter press dewatering

Table 1 shows the last five years of sludge removed from Western Regional WRF. Treated sludge is disposed of via land application or landfill. Station 588 was added to facilitate transfer to another NPDES permit holder.

DESCRIPTION OF EXISTING DISCHARGE

Table 2 presents effluent violations reported by Western Regional WRF in the last five years. These violations are often associated with wet weather events when the facility is receiving peak influent flow rates.

Table 3 presents average annual effluent flow rate for Western Regional WRF for the previous five years. There is an estimated infiltration/inflow (I/I) rate to the collection system of 5.0 MGD. Western Regional WRF performs the following activities to minimize I/I: sewer inspection, cleaning, and repair, as well as manhole lining when needed.

Table 4 presents the number of SSOs recorded by Western Regional WRF, which reports SSOs at station 300.

Table 5 presents data characterizing bypasses at Western Regional WRF, which reports bypasses a station 602.

Table 6 presents data characterizing seasonal discharge of total phosphorus from Western Regional WRF.

Table 7 presents chemical specific data compiled from data reported in annual pretreatment reports and collected by Ohio EPA. 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 Ohio EPA effluent testing conducted.

Table 8 presents a summary of unaltered Discharge Monitoring Report (DMR). Data are presented for the period January 2015 through September 2020, and current permit limits are provided for comparison.

Table 9 summarizes the chemical specific data for outfall 001 by presenting the average and maximum PEQ values. For more information, see Modeling Guidance #1 at:
https://www.epa.ohio.gov/portals/35/guidance/model1.pdf

Table 10 summarizes the results of acute and chronic WET tests of the final effluent.

ASSESSMENT OF IMPACT ON RECEIVING WATERS

The Opossum Creek-Great Miami River watershed assessment unit, which includes the Great Miami River in the vicinity of Western Regional WRF, is listed as impaired for recreational use on Ohio's 303(d) list.

The attainment status of Opossum Creek-Great Miami River is reported in the final *Ohio 2020 Integrated Water Quality Monitoring and Assessment Report*. 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 7-1). 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 and modified Index of Well-Being, which indicate the response of the fish community, and the Invertebrate Community Index, 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 11) 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, and comments and observations for each sampling location.

The most recent data available for the Great Miami River in the vicinity of Western Regional WWTP is from 2010 and presented in the *Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries, 2012*. Sites immediately up- and downstream of the facility are in full attainment of the aquatic life designated use. However, Addendum 1 to this fact sheet provides additional information on the water quality impacts of nutrient loads from major municipal wastewater treatment plants on the lower Great Miami River.

In 2020, Western Regional WRF completed installation of phosphorus removal treatment (ferric chloride) to attain compliance with the total phosphorus seasonal loading limit of 39.70 kg. In the first season following installation, the facility discharged 25.82 kg/day, a reduction of 68.4% from the seasonal average for the preceding four years (81.82 kg/day).

At this time, a TMDL study is in progress for the lower portion of the Great Miami River from RM 83.0 to its confluence with the Ohio River. The TMDL report will address impairments identified through results of the 2009-10 field sampling. Implementation plans in these reports may include recommendations for load reductions through additional permit limits on industrial and municipal dischargers. Information about the TMDL report is available through the Ohio EPA, Division of Surface Water website at: https://epa.ohio.gov/dsw/tmdl/GreatMiamiRiver

Downstream water bodies have also shown signs of nutrient related water quality issues. The Ohio River had harmful algal blooms (HABs) documented in 2015 and 2019 that resulted in recreation advisories being posted in some locations. The Ohio River Valley Sanitation Commission (ORSANCO) does biennial reporting for water body use impairments on the Ohio River, the most recent report is here: http://www.orsanco.org/wp-content/uploads/2020/06/ORSANCO_2020_305b_Report.pdf. ORSANCO has not identified a recreation impairment for the Ohio River due to algal toxins but has instituted additional monitoring and action plans to manage blooms in coordination with member states. Ohio EPA is considering including a recreation use evaluation due to algal toxins in the states 2022 Integrated Report.

The full 2020 Integrated Report is available through the Ohio EPA, Division of Surface Water website at: https://www.epa.ohio.gov/dsw/tmdl/ohiointegratedreport

The *Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries, 2012* is available through the Ohio EPA, Division of Surface Water website at: https://www.epa.ohio.gov/dsw/document_index/psdindx

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 Western Regional WRF were 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 2015 through September 2020
Pretreatment data	2016-2019
Ohio EPA compliance sampling data	2019

Statistical Outliers and Other Non-representative Data

The data were examined, and the following values were removed from the evaluation as non-representative data:

- Total Filterable Residue – one value of 1120 mg/l, nearly twice the average.
- Nickle – one value of 1.43 µg/L, nearly six times less than the average.
- Zinc – one value of 5.87 µg/L, nearly six times less than the average.
- Free Cyanide – five values of 5-9 µg/l, more than ten times less than the average; and 24 µg/L, nearly nine times more than the average

This data is evaluated statistically, and PEQ values are calculated for each pollutant. Average PEQ (PEQ_{avg}) values represent the 95th percentile of monthly average data, and maximum PEQ (PEQ_{max}) values represent the 95th percentile of all data points (see Table 9).

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).

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 break down in the receiving water. For free flowing streams, 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 Great Miami River were considered interactive (see Figure 3):

AK Steel - Middletown
Butler Co. LeSourdsville WWTP
Dayton WWTP
Fairfield WWTP
Fernald Environmental Management
Franklin Regional WWTP
Hamilton Co. Taylor Creek WWTP
Hamilton Muni. Power Plant
Hamilton WWTP
Magellan Aerospace
Miamisburg WRF
Miller-Coors Breweries East
Western Regional WRF
New Miami WWTP
PCS Phosphates
Rip Rap Road WTP
Ruetgers-Nease Corp
Taylor Creek WWTP
Tri-Cities N. Reg. WWTP
Wausau Paper
Wausau Paper and Tissue
West Carrollton WWTP

These outfalls were allocated together for most parameters due to the size of the plant discharges, the flows of Great Miami River and tributaries, and the relatively proximity of the discharge points. The exception was the wasteload allocations (WLAs) for ammonia toxicity, which were evaluated separately for each facility because ammonia is considered a non-conservative parameter.

The available assimilative capacity was distributed among them using the conservative substance wasteload allocation (CONSWLA) water quality model for conservative parameters. CONSWLA is the model Ohio EPA typically uses in multiple discharger situations. CONSWLA model inputs for flow are fixed at their critical low levels and inputs for effluent flow are fixed at their design or 50th percentile levels. Background concentrations are fixed at a representative value (generally a 50th percentile) using available ambient stream data from upstream sampling stations. A mass balancing method is then used to allocate effluent concentrations that maintain WQS under these conditions. This technique is appropriate when data bases are unavailable to generate statistical distributions for inputs and if the parameters modeled are conservative.

For those parameters that require a wasteload allocation (WLA), the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. 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-N	Average	Summer/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 13, and allocations cannot exceed the Inside Mixing Zone Maximum (IMZM) criteria. The data used in the WLA are listed in Table 12 and Table 13. The WLA results to maintain all applicable criteria are presented in Table 14.

Whole Effluent Toxicity Wasteload Allocation

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 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). 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 Western Regional WRF, the WLA values are 1.0 TU_a and 13.66 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the estimate of the effluent concentration which causes a 25% reduction in growth or reproduction of test organisms (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):

$$TU_c = 100/\text{geometric mean of No Observed Effect Concentration and Lowest Observed Effect Concentration}$$

The acute toxicity unit (TU_a) is defined as 100 divided by the concentration in water having 50% chance of causing death to aquatic life (LC_{50}) for the most sensitive test species:

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

This equation applies outside the mixing zone for all designated waters.

REASONABLE POTENTIAL/EFFLUENT LIMITS/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 14. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 11, 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 15.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 16 presents the final effluent limits and monitoring requirements proposed for Western

Regional WRF outfall 001 and the basis for their recommendation. Unless otherwise indicated, the monitoring frequencies proposed in the permit are continued from the existing permit.

Ammonia, CBOD5, Dissolved Oxygen, and Total Suspended Solids
The limits for ammonia, 5-day carbonaceous biochemical oxygen demand (CBOD5), dissolved oxygen, and total suspended solids are based upon the treatment technology associated with the plant design of Western Regional WWTP. The loading limits are based upon the plant design flow of 20.0 MGD. Ammonia limits were evaluated and are protective of water quality standards for ammonia toxicity. The TSS and CBOD5 limits are more stringent than the Secondary Treatment Standards in 40 CFR Part 133.

***E. coli*, pH, and Oil & Grease**
Limits proposed for *Escherichia coli,* pH, oil and grease are based on WQS (OAC 3745-1-35 and 37). Primary contact recreation *E. coli* standards apply to the Great Miami River.

Chlorine
The daily effluent limit for total residual chlorine is proposed to continue from the existing permit as a plant design value. Effluent limits are necessary to protect the inside mixing zone maximum (IMZM) and outside mixing zone maximum (OMZM) standards. The IMZM is a value calculated to avoid rapidly lethal conditions within the immediate effluent mixing zone. The OMZM is the WQS value calculated to avoid lethal conditions outside the effluent mixing zone. The most stringent daily maximum criterion is applied; this criterion is to be met anytime chlorine is being utilized for effluent disinfection. The effluent limit for chlorine is less than the quantification level of 0.050 mg/L.

Selenium
The Ohio EPA risk assessment (Table 15) places selenium in group 4. This placement, as well as the data in Tables 8 and 9, support that this parameter does not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. New monitoring for Group 4 pollutants (where PEQ exceeds 50 percent of the WLA) is required by OAC 3745-33-07(A)(2).

Cadmium, Chromium, Copper, Dissolved Hexavalent Chromium, Free Cyanide, Lead, Mercury, Nickel, Total Filterable Residue, and Zinc
The Ohio EPA risk assessment (Table 15) places these parameters in groups 2 and 3. This placement, as well as the data in Tables 8 and 9, support 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 the same frequency is proposed to document that these pollutants continue to remain at low levels.

Arsenic, Barium, 1,4-Dichlorobenzene, Iron, Methyl Bromide, Methyl Ethyl Ketone, Methyl Tertiary Butyl Ether, Molybdenum, Silver, Strontium, and Toluene
The Ohio EPA risk assessment (Table 15) places these parameters in groups 2 and 3. This placement, as well as the data in Tables 8 and 9, support that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. No new monitoring is proposed. Priority pollutant scans submitted through the permittee's annual pretreatment reports will provided data for most of these parameters for future reasonable potential analyses.

Flow Rate and Water Temperature
Monitoring for flow rate and water temperature is proposed to continue in order to evaluate the performance of the treatment plant.

Total Phosphorus
A final effluent limit for total phosphorus is proposed to continue from the previous permit. The proposed limit is a seasonal aggregate loading limit that applies for the period July through October. The limit is based on an

effluent concentration of 1.0 mg/L and the facility's median daily flow during July through October of the years 2010 through 2014. To determine compliance, the facility's median total phosphorus effluent concentration and median daily plant flow for the period July through October will be used to calculate a loading value that will be compared to the limit. The permittee will make this calculation each year and report the value on its December DMR. Addendum 1 to this fact sheet provides additional information regarding the total phosphorus limit.

The phosphorus reduction implemented by Western Regional WRF to attain compliance with the seasonal load limit is the first step in a process to return the lower Great Miami River to full attainment of its aquatic life water quality standards. The next NPDES permit renewal may be informed by an Ohio EPA-approved integrated management plan prepared by the lower GMR dischargers and/or an approved TMDL prepared by Ohio EPA. If supported by these reports, the permittee may propose using alternate reduction strategies to achieve future phosphorus reductions. The strategies could include point source-nonpoint source trading, point source-point source trading, habitat restoration offsets, physical watershed alterations and other approved nutrient management/reduction strategies.

Dissolved Orthophosphate
Monitoring for dissolved orthophosphate (as P) is required by ORC 6111.03. Monitoring for orthophosphate will further develop nutrient datasets for dissolved reactive phosphorus that are used in stream and watershed assessments and studies. Because Ohio EPA monitoring, as well as other in-stream monitoring, is taken by grab sample, grab samples are proposed for orthophosphate to maintain consistent data. The grab samples must be filtered within 15 minutes of collection using a 0.45-micron filter. The filtered sample must be analyzed within 48 hours.

Nitrate plus Nitrite and Total Kjeldahl Nitrogen
Monitoring for nitrate plus nitrite and total Kjeldahl nitrogen is proposed based on best technical judgment, consistent with Ohio EPA Permit Guidance 1. The purpose of the monitoring is to maintain a data set tracking nutrient levels in the Great Miami river basin.

Whole Effluent Toxicity Reasonable Potential
Based on evaluating the WET data presented in Table 12 and other pertinent data under the provisions of OAC 3745-33-07(B), the Western Regional WRF 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). Annual chronic toxicity monitoring with the determination of acute endpoints.

Additional Monitoring Requirements
Monitoring for *E. coli* at upstream monitoring station 801 and downstream monitoring station 901 is proposed to increase in frequency to once per two weeks for the months of June to August. This change will facilitate evaluation of designated use attainment.

New monitoring for total Kjeldahl nitrogen is proposed at stations 801 and 901 in accordance with Ohio EPA Permit Guidance #1.

Monitoring for cyanide at influent station 601 is proposed to be changed from "free" to "total" in accordance with Ohio EPA Permit Guidance 1. Through various oxidation processes during wastewater treatment, all forms of cyanide are converted to the free form, therefore monitoring should identify the magnitude of all cyanide received at the facility.

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.

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 or removal to sanitary landfill. Station 588 was added to facilitate transfer to another NPDES permit holder.

OTHER REQUIREMENTS

Compliance Schedule
Pretreatment Local Limits Review - A 6-month compliance schedule is proposed for the County 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, the County must also submit a pretreatment program modification request. Details are in Part I.C of the permit.

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 and Operator of Record
Operator certification requirements have been included in Part II of the permit in accordance with rules effective on August 15, 2018 (OAC 3745-7). These rules require the Western Regional WRF to have a Class IV wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 001. These rules also require the permittee to designate one or more operator of record to oversee the technical operation of the treatment works and sewerage system.

Low-Level Free Cyanide Testing
Currently there are three approved methods for free cyanide listed in 40 CFR 136 that have a quantification level lower than water quality-based effluent limits:

- ASTM D7237-10, OIA-1677-09, and ASTM D4282-02. (Note: The use of ASTM D4282-02 requires supporting documentation that it meets the requirement of a "sufficiently sensitive" test procedure as defined in 40 CFR 122.44(i)(1)(iv)).

These methods will allow Ohio EPA to 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.

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

Part III
Part III of the permit details standard conditions that include monitoring, reporting requirements, compliance responsibilities, and general requirements.

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, the Western Regional WRF may seek permit coverage under the general permit for industrial storm water (permit # OHR000006) or submit a "No Exposure Certification." Parts IV, V, and VI will be removed from the final permit if: 1) the Western Regional WRF 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.

Figure 1. Location of Western Regional WRF

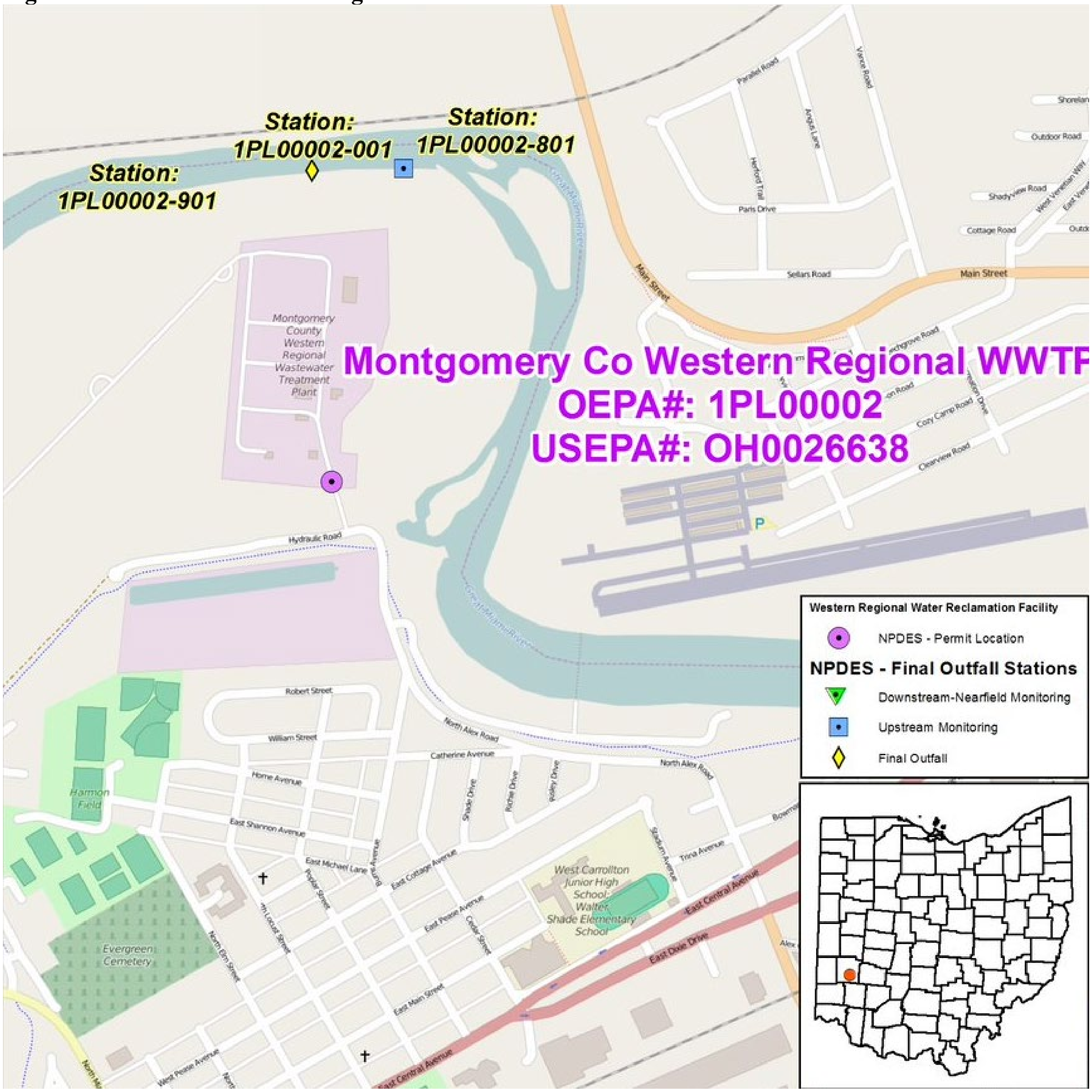


Figure 2. Diagram of Wastewater Treatment System

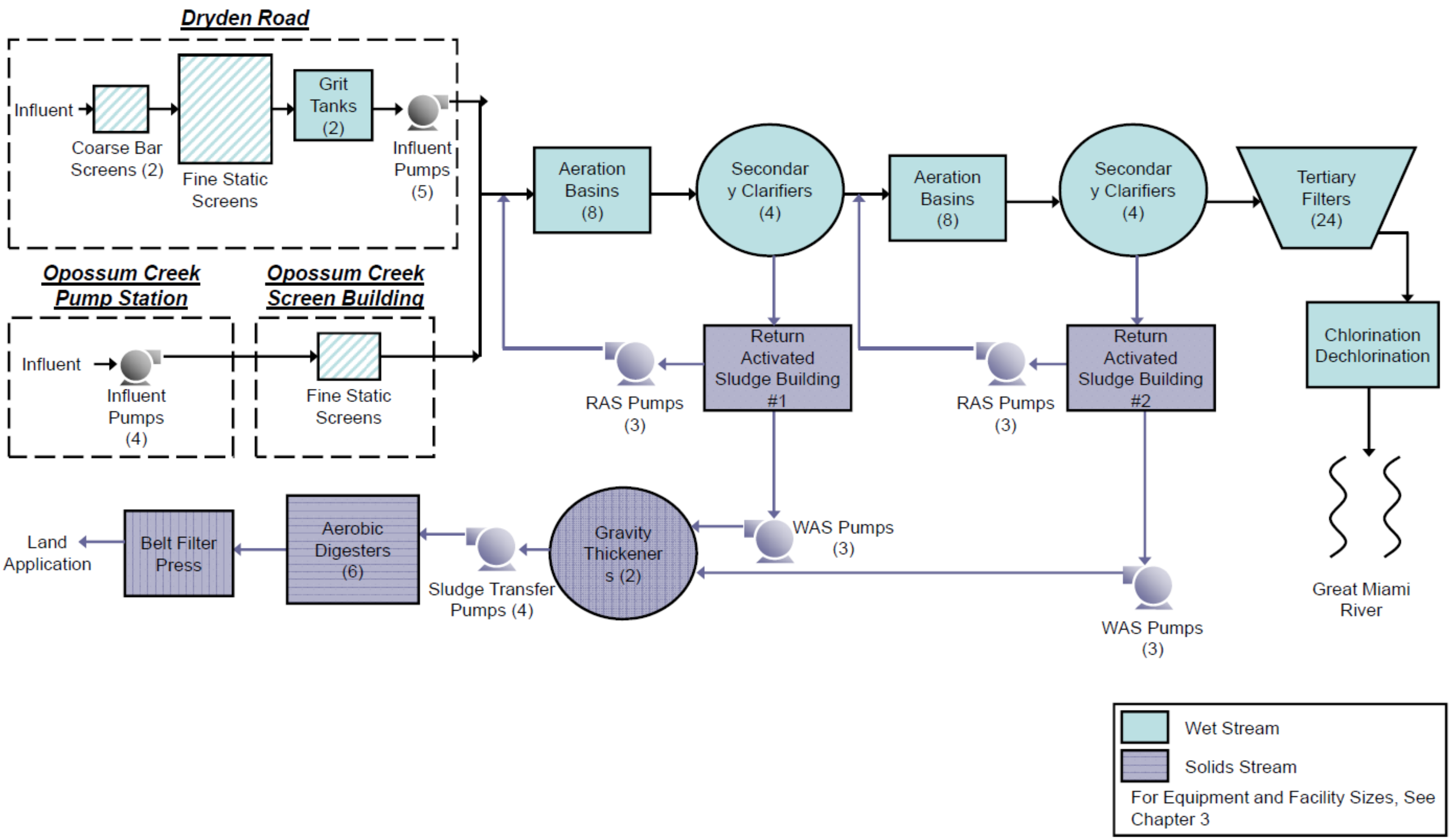
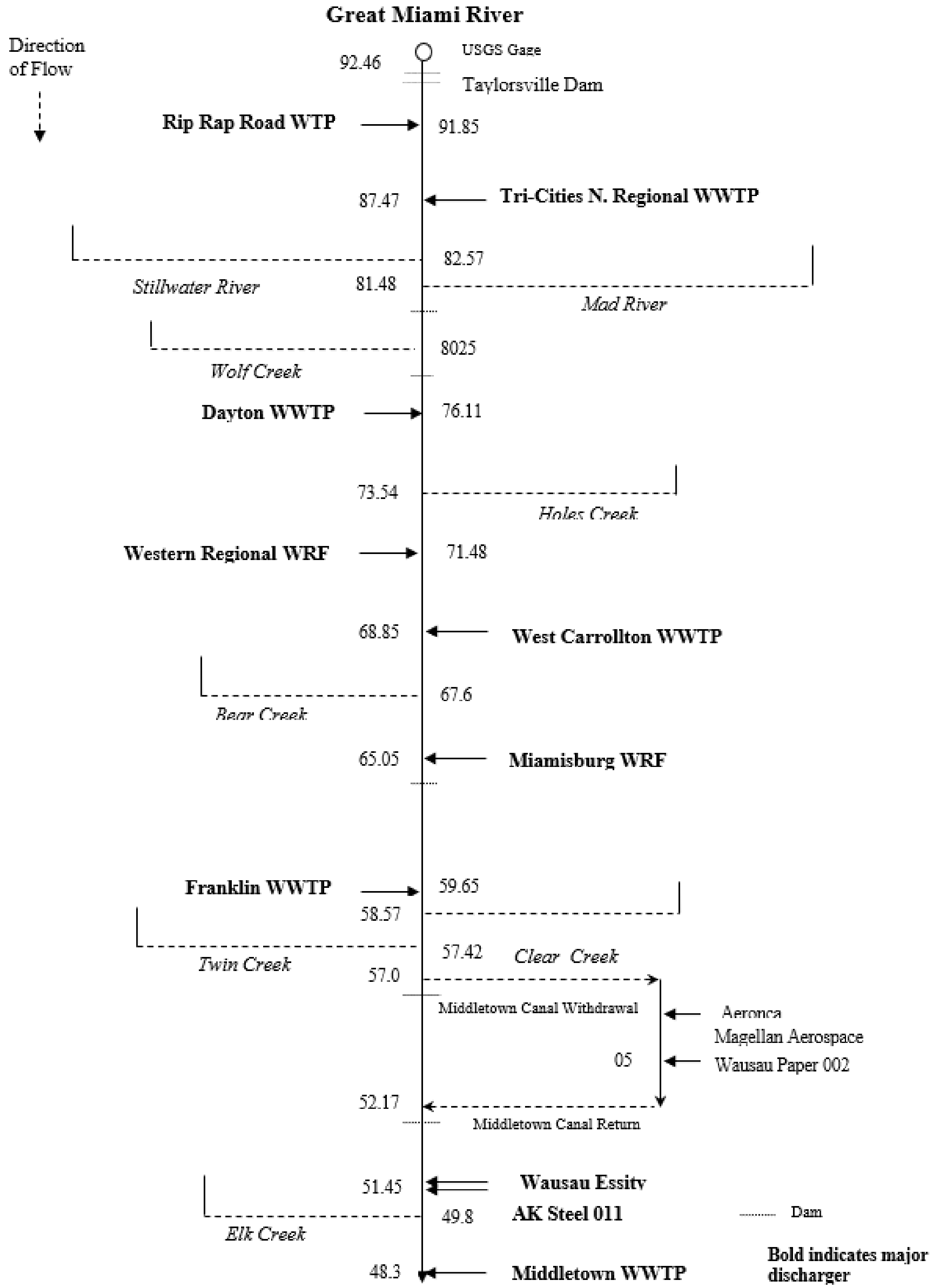


Figure 3. Lower Great Miami River Study Area



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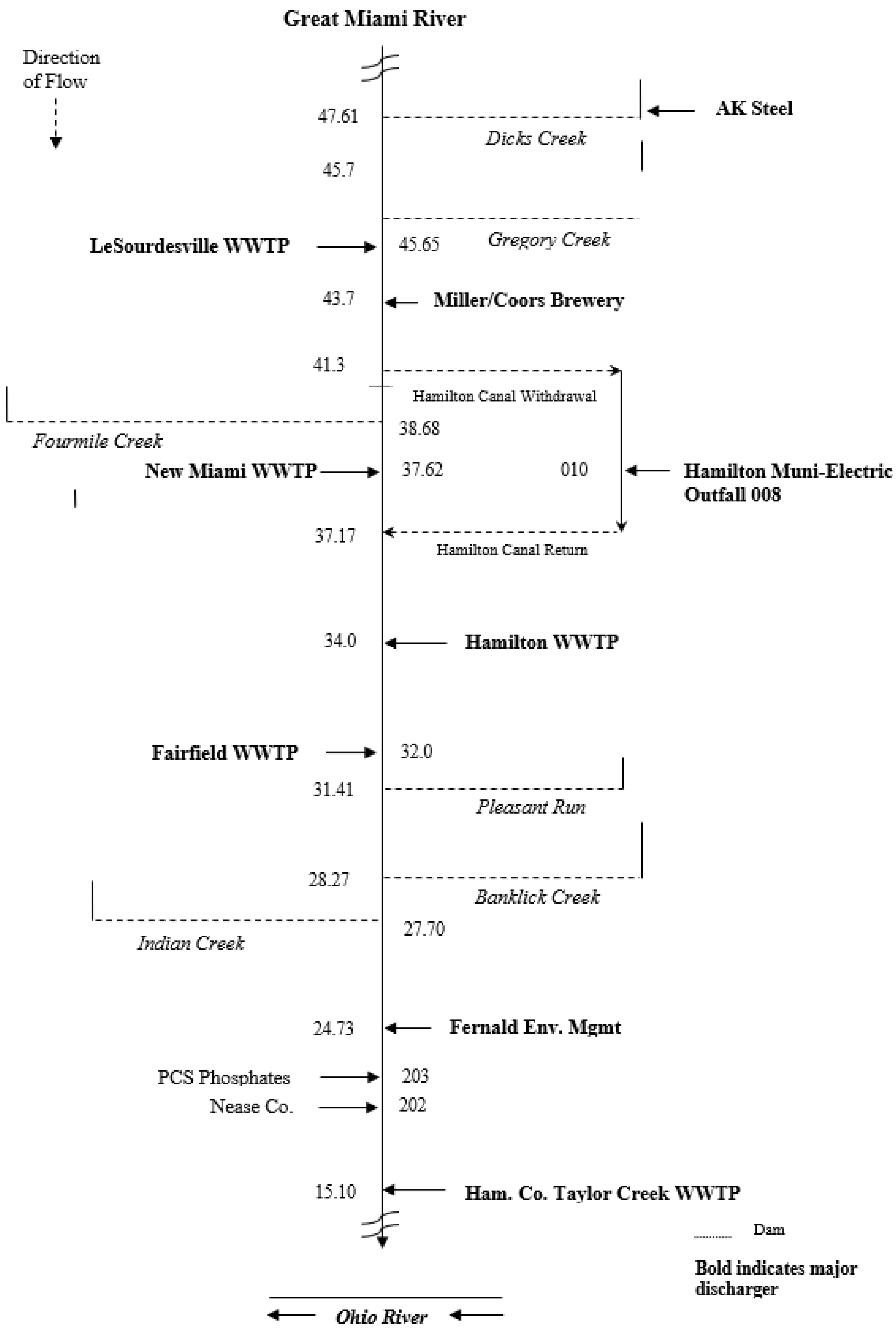
Great Miami River
Direction of Flow
47.61
AK Steel
Dicks Creek
45.7
LeSourdesville WWTP
45.65
Gregory Creek
43.7
Miller/Coors Brewery
41.3
Hamilton Canal Withdrawal
Fourmile Creek
38.68
New Miami WWTP
37.62
010
Hamilton Muni-Electric Outfall 008
37.17
Hamilton Canal Return
34.0
Hamilton WWTP
Fairfield WWTP
32.0
31.41
Pleasant Run
28.27
Banklick Creek
Indian Creek
27.70
24.73
Fernald Env. Mgmt
PCS Phosphates
203
Nease Co.
202
15.10
Ham. Co. Taylor Creek WWTP
Dam
Bold indicates major discharger
Ohio River

Table 1. Sewage Sludge Removal

Year	Dry Tons Removed
2015	1850
2016	1630
2017	1340
2018	1690
2019	3640
2020[a]	682

[a] January to September only

Table 2. Effluent Violations for Outfall 001

Parameter	2015	2016	2017	2018	2019	2020 [a]	**Total**
CBOD5	1	0	0	2	0	1	**4**
Dissolved Oxygen	0	0	0	0	2	0	**2**
E. coli	0	0	0	0	0	1	**1**
Total Suspended Solids	1	0	0	1	1	0	**3**
Fecal Coliform (in sludge)	0	0	0	0	1	0	**1**
Total	**2**	**0**	**0**	**3**	**4**	**2**	**11**

[a] January to September only

Table 3. Average Annual Effluent Flow Rates

	Annual Flow in MGD		
Year	50th Percentile	95th Percentile	Maximum
2015	14.06	26.08	45.90
2016	12.80	20.73	32.62
2017	14.04	22.48	36.36
2018	14.10	27.65	52.53
2019	14.71	27.76	47.91
2020[a]	13.57	23.72	51.26

[a] January to September only
MGD = million gallons per day.

Table 4. Sanitary Sewer Overflows Discharges

Year	Number
2015	36
2016	17
2017	27
2018	98
2019	53
2020[a]	30

[a] January to September only

Table 5. Tertiary Filter Bypass Data

Year	Days with bypass	Total Volume (MG)
2015	0	0
2016	5	30.39
2017	0	0
2018	6	111.35
2019	25	222.52
2020[a]	13	197.82

[a] January to September only

Table 6. Calculated Seasonal Phosphorus Load

Year	Concentration (mg/L)	Flow Rate (MGD)	Load (kg/day)
2015	2.14	13.41	108.35
2016	2.60	11.23	110.49
2017	1.79	11.70	79.02
2018	1.22	11.60	53.34
2019	1.39	11.04	57.87
2020	0.84	8.14	25.82

Seasonal is defined as July through October
MGD = million gallons per day

Table 7. Effluent Characterization Using Pretreatment Data and Ohio EPA data

Parameter	Units	Ohio EPA 11/5/2019	PT 4/18/2016	PT 3/29/2017	PT 4/18/2018	PT 11/20/2019
Acetone	µg/L	1.54	NT	NT	NT	NT
Aluminum	µg/L	35.7	NT	NT	NT	NT
Ammonia	mg/L	0.0681	NT	NT	NT	NT
Antimony	µg/L	0.674	AA (2.06)	AA (2.06)	AA (10)	AA (2.17)
Arsenic	µg/L	2.07	AA (1.89)	AA (1.89)	AA (10)	1.94
Barium	µg/L	40	NT	NT	NT	NT
Cadmium	µg/L	AA (0.03)	0.17	0.221	AA (5)	AA (.17)
Chromium	µg/L	0.713	AA (2.05)	AA (2.05)	AA (5)	0.97
Copper	µg/L	2.76	3.41	1.84	AA (5)	3.08
1,4-dichlorobenzene	µg/L	0.489	AA (0.22)	AA (0.22)	AA (5)	AA (2.9)
Iron	µg/L	125	NT	NT	NT	NT
Lead	µg/L	0.222	2.93	0.78	AA (5)	AA (1.23)
Manganese	µg/L	27	NT	NT	NT	NT
Mercury	ng/L	NT	AA (1)	AA (1.06)	AA (5)	AA (0.64)
Methyl bromide	µg/L	AA (0.47)	AA (1)	AA (1)	AA (1)	0.37
Methyl ethyl ketone	µg/L	0.88	NT	NT	NT	NT
Methyl tertiary butyl ether	µg/L	1.28	NT	NT	NT	NT
Molybdenum	µg/L	NT	8.89	6.15	6.87	11.1
Nickel	µg/L	5.31	4.86	2.51	AA (5)	16.2
Nitrate plus nitrite	mg/L	14	NT	NT	NT	NT
Selenium	µg/L	1.01	AA (2.91)	AA (2.91)	AA (10)	AA (2.4)
Silver	µg/L	AA (0.23)	AA (.41)	0.59	AA (20)	AA (0.57)
Strontium	µg/L	399	NT	NT	NT	NT
Toluene	µg/L	AA (0.28)	0.78	0.46	AA (1)	AA (0.23)
Total Filterable Residue	mg/L	584	NT	NT	NT	NT
Zinc	µg/L	41.1	22.2	18.5	AA (20)	49.3

AA = not detected (analytical method detection limit)
PT = pretreatment

Table 8. Effluent Characterization Using Self-Monitoring Data

Parameter	Units	Current Limits 30 day	Current Limits Daily	Obs.	Percentile 50th	Percentile 95th	Data Range
Water Temperature	°C	-------Monitor-------		2070	18	24	10 - 25.8
Dissolved Oxygen	mg/L	--	6.0[m]	2066	7.3	6.39**	4.4 - 9.7
Residue, Total Dissolved	mg/L	-------Monitor-------		13	614	714	390 - 738
TSS – (2015-16)	kg/day	909	1363[w]	270	< 106	301	0 - 4120
TSS (2016-20)	kg/day	909	1370[w]	879	< 105	426	0 - 3510
Total Suspended Solids	mg/L	12	18[w]	1149	< 2.5	6	0 - 34
Oil and Grease	mg/L	--	10	135	< 5	< 5	0 - 6.02
Nitrogen (summer)	kg/day	152	265[w]	725	< 10.1	93.5	0 - 335
Nitrogen (summer)	mg/L	2.0	3.5[w]	725	< .25	1.92	0 - 4.41
Nitrogen (winter)	mg/L	-------Monitor-------		701	.353	3.11	0 - 7.22
Total Kjeldahl Nitrogen	mg/L	-------Monitor-------		68	2.06	4.94	.918 - 6.64
Nitrite Plus Nitrate	mg/L	-------Monitor-------		68	6.17	15.7	2.21 - 18.1
Phosphorus	mg/L	-------Monitor-------		671	1.28	3	0 - 6.81
Orthophosphate	mg/L	-------Monitor-------		48	1.38	3.42	.132 - 4.08
Free Cyanide	mg/L	-------Monitor-------		13	< .005	.0272	0 - .038
Barium	µg/L	-------Monitor-------		13	72.6	79.5	56.9 - 81.7
Nickel	µg/L	-------Monitor-------		74	< 5	10.4	0 - 21.8
Zinc	µg/L	-------Monitor-------		74	26.8	54.9	0 - 129
Cadmium	µg/L	-------Monitor-------		74	--	--	< 5
Lead	µg/L	-------Monitor-------		74	< 5	< 5	0 - 3.01
Chromium	µg/L	-------Monitor-------		74	--	--	< 5
Copper	µg/L	-------Monitor-------		74	< 5	6.19	0 - 14.5
Dissolved Hexavalent Chromium	µg/L	-------Monitor-------		68	--	--	< 10
E. coli (2015)	#/100 mL	126	189[w]	98	3.6	110	0 - 13000

Parameter	Units	Current Limits 30 day	Daily	Obs.	Percentile 50th	95th	Data Range
E. coli (2016-20)	#/100 mL	126	284[w]	461	4	265	0 - 13000
Flow Rate	MGD	-------Monitor-------		2070	13.9	25.3	3.81 - 52.5
Chlorine, Total Residual	mg/L	--	0.038	1043	.02	.03	0 - .04
Mercury, Total	ng/L	-------Monitor-------		62	--	--	< 5
Cyanide, Free (Low-Level)	µg/L	-------Monitor-------		49	< .005	3.12	0 - 24
Phosphorus, Total (Seasonal)	mg/L	-------Monitor-------		20	1100000	1100000	1010000 - 1100000
Acute Toxicity, Ceriodaphnia dubia	TUa	-------Monitor-------		5	--	--	< .2
Chronic Toxicity, Ceriodaphnia dubia	TUc	-------Monitor-------		5	--	--	< 1
Acute Toxicity, Pimephales promelas	TUa	-------Monitor-------		5	--	--	< .2
Chronic Toxicity, Pimephales promelas	TUc	-------Monitor-------		5	--	--	< 1
pH, Maximum	S.U.	--	9.0	2070	7.3	7.8	6.7 - 8.9
pH, Minimum	S.U.	--	6.5[m]	2070	7.2	6.8*	6.3 - 8.1
Residue, Total Filterable	mg/L	-------Monitor-------		56	610	681	472 - 1120
CBOD 5 day	kg/day	757	1136[w]	1114	182	677	0 - 3400
CBOD 5 day	mg/L	10	15[w]	1114	3.8	11	0 - 21

* = For minimum pH, 5th percentile shown in place of 50th percentile.
** = For dissolved oxygen, 5th percentile shown in place of 95th percentile.
[m] = minimum limit
[w] = weekly average.

Table 9. Projected Effluent Quality for Outfall 001

Parameter	Units	Number of Samples	Number > MDL	PEQ Average	PEQ Maximum
Acetone [A]	µg/L	1	1	6.97	9.55
Aluminum [A]	µg/L	1	1	162	221
Ammonia (summer)	mg/L	490	197	0.89	2.06
Ammonia (winter)	mg/L	340	219	2.79	5.08
Antimony [A]	µg/L	1	1	3.05	4.18
Arsenic [A]	µg/L	4	2	3.93	5.38
Barium [P]	µg/L	14	14	89.5	123
Cadmium [A P]	µg/L	4	2	0.42	0.58
Chlorine	mg/L	1027	1027	0.02	0.04
Chromium [A P]	µg/L	2	2	2.69	3.69
Dissolved hexavalent chromium	µg/L	68	0	--	--
Copper [P]	µg/L	79	13	6.23	8.88
1,4-Dichlorobenzene [A]	µg/L	3	1	1.07	1.47
Free cyanide	µg/L	43	8	2.47	3.62
Iron	µg/L	1	1	566	775
Lead [P]	µg/L	37	4	2.42	3.31
Manganese	µg/L	1	1	122	167
Mercury (BCC) [P]	ng/L	66	0	--	--
Methyl bromide [A]	µg/L	2	1	1.30	1.79
Methyl ethyl ketone	µg/L	1	1	3.98	5.46
Methyl tert-butyl ether	µg/L	1	1	5.79	7.94
Molybdenum	µg/L	4	4	21.1	28.9
Nickel	µg/L	73	14	9.34	14.2
Nitrate + Nitrite [P]	mg/L	69	69	12.3	17.8
Phosphorus	mg/L	671	656	2.08	3.75
Selenium [A]	µg/L	1	1	4.57	6.26
Silver [A]	µg/L	4	1	1.12	1.53
Strontium	µg/L	1	1	1806	2474
Toluene [A]	µg/L	4	2	1.48	2.03
Total Filterable Residue [P]	mg/L	69	69	662	725
Zinc [P]	µg/L	78	54	47.6	68.2

MDL = analytical method detection limit
PEQ = projected effluent quality
[A] = For results calculated using Method A in Modeling Guidance 1, the number of samples and number > MDL correspond to the limiting data subset.
[P] = Ohio EPA and Pre-treatment data combined with DMR data

Table 10. Summary of Acute and Chronic Toxicity Results

Date	*Ceriodaphnia Dubia*		*Pimephales promelas*	
	TU_a	TU_c	TU_a	TU_a
Outfall 001				
8/8/2016	AA	AA	AA	AA
8/8/2017	AA	AA	AA	AA
8/8/2018	AA	AA	AA	AA
8/18/2019	AA	AA	AA	AA
8/1/2020	AA	AA	AA	AA

AA = non-detection; analytical method detection limit of 0.2 TU_a, 1.0 TU_c
TU_a = acute toxicity unit, TU_c = chronic toxicity unit

Table 11. Use Attainment Table

Location	River Mile	STORET	Use	Status	Causes	Sources
GMR upstream of Western Regional WWTP	71.7	H09K15	WWH	Full		
GMR at Farmersville-West Carrollton Road	69.9	600070	WWH	Full		
GMR downstream of West Carrollton WWTP	68.7	H09K21	WWH	Full		
GMR downstream of DP&L Hutchings	64.1	H09K11	WWH	PARTIAL	Temperature	Industrial Thermal Discharge (DP&L)
GMR further downstream of DP&L to downstream of Franklin WWTP	62.6 - 58.2	multiple	WWH	Full		
GMR near Middletown at Central Avenue	52.6	600040	WWH	PARTIAL	Nutrients	Livestock, crop production Municipal point sources

GMR = Great Miami River
WWTP = wastewater treatment plant
WWH = warmwater habitat

Table 12. Water Quality Criteria in the Study Area

		Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
Parameter	Units	Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Acetone	µg/L	--	--	--	--	--
Aluminum	µg/L	--	--	--	--	--
Ammonia (summer)	mg/L	--	--	0.7	--	--
Ammonia (winter)	mg/L	--	--	1.4	--	--
Antimony	µg/L					
Arsenic [D]	µg/L	--	100	150	340	680
Barium [D]	µg/L	--	--	220	2000	4000
Cadmium [D]	µg/L	--	50	5.9	16	32
Chlorine [D]	mg/L	--	--	0.011	0.019	0.038
Chromium [D]	µg/L	--	100	210	4500	8900
Dissolved hexavalent chromium [D]	µg/L	--	--	11	16	31
Copper [D]	µg/L	1300	500	24	40	80
1,4-Dichlorobenzene [D]	µg/L	900 [B]	--	9.4	57	110
Free cyanide [D]	µg/L	400 [B]	--	12	46	92
Iron [D]	µg/L	--	5000	--	--	--
Lead [D]	µg/L	--	100	26	500	1000
Manganese	µg/L	--	--	--	--	--
Mercury (BCC)	ng/L	12	10000	910	1700	3400
Methyl bromide [D]	µg/L	10000 [B]	--	16	38	75
Methyl ethyl ketone	µg/L	--	--	22000	200000	400000
Methyl tert-butyl ether	µg/L	--	--	730	6500	13000
Molybdenum [D]	µg/L	--	--	20000	190000	370000
Nickel [D]	µg/L	4600	200	130	1200	2400
Nitrate + Nitrite [D]	mg/L	--	100	--	--	--
Selenium [D]	µg/L	4200 [B]	50	5	62	120
Silver [D]	µg/L	--	--	1.3	11	22
Strontium [D]	µg/L	--	--	21000	40000	81000
Toluene [D]	µg/L	520 [B]	--	62	560	1100
Total Filterable Residue [D]	mg/L	--	--	1500	--	--
Zinc [D]	µg/L	26000 [B]	25000	310	310	610

[B] Human Health criteria updated 10/20/20 (3745-1-34)
[C] Carcinogen
[D] This parameter was found in the effluent of another discharger in this interactive segment.

Table 13. Instream Conditions and Discharger Flow

Parameter	Units	Season	Value	Basis
GMR at Taylorsville				
7Q10	cfs	annual	58.4	USGS gage #03263000, 1970-2012 data
1Q10	cfs	annual	42.0	USGS gage #03263000, 1970-2012 data
30Q10	cfs	summer	73.0	USGS gage #03263000, 1970-2012 data
	cfs	winter	180.3	USGS gage #03263000, 1970-2012 data
Harmonic Mean Flow	cfs	annual	299.9	USGS gage #03263000, 1970-2012 data
Mixing Assumption	%	average	100	Stream-to-discharge ratio
(GMR & Tribs.)	%	maximum	100	Stream-to-discharge ratio
Stillwater River at Mouth				
7Q10	cfs	annual	24.2	USGS gage #03266000, 1970-2012 data
1Q10	cfs	annual	204	USGS gage #03266000, 1970-2012 data
30Q10	cfs	summer	29.8	USGS gage #03266000, 1970-2012 data
	cfs	winter	79.4	USGS gage #03266000, 1970-2012 data
Harmonic Mean Flow	cfs	annual	143.3	USGS gage #03266000, 1970-2012 data
Mad River at Mouth				
7Q10	cfs	annual	177.8	USGS gage #03270000, 1970-2012 data
1Q10	cfs	annual	166.9	USGS gage #03270000, 1970-2012 data
30Q10	cfs	summer	210.0	USGS gage #03270000, 1970-2012 data
	cfs	winter	264.7	USGS gage #03270000, 1970-2012 data
Harmonic Mean Flow	cfs	annual	482.7	USGS gage #03270000, 1970-2012 data
Wolf Creek at Mouth				
7Q10	cfs	annual	5.13	USGS gage #03271000, 1986-2012 data
1Q10	cfs	annual	4.18	USGS gage #03271000, 1986-2012 data
30Q10	cfs	summer	5.77	USGS gage #03271000, 1986-2012 data
	cfs	winter	14.1	USGS gage #03271000, 1986-2012 data
Harmonic Mean Flow	cfs	annual	23.3	USGS gage #03271000, 1986-2012 data
Twin Creek at Mouth				
7Q10	cfs	annual	5.04	USGS gage #03272000, 1970-2012 data
1Q10	cfs	annual	4.50	USGS gage #03272000, 1970-2012 data
30Q10	cfs	summer	7.26	USGS gage #03272000, 1970-2012 data
	cfs	winter	32.4	USGS gage #03272000, 1970-2012 data
Harmonic Mean Flow	cfs	annual	44.9	USGS gage #03272000, 1970-2012 data
Four Mile Creek at Mouth				
7Q10	cfs	annual	6.67	USGS gage #03272700, 1970-2012 data
1Q10	cfs	annual	5.84	USGS gage #03272700, 1970-2012 data
30Q10	cfs	summer	8.90	USGS gage #03272700, 1970-2012 data
	cfs	winter	24.6	USGS gage #03272700, 1970-2012 data
Harmonic Mean Flow	cfs	annual	50.2	USGS gage #03272700, 1970-2012 data
Holes Creek at Mouth				
7Q10	cfs	annual	1.16	USGS gage #03271300, 2002-2012 data
1Q10	cfs	annual	1.13	USGS gage #03271300, 2002-2012 data
30Q10	cfs	summer	3.54	USGS gage #03271300, 2002-2012 data
	cfs	winter	11.9	USGS gage #03271300, 2002-2012 data
Harmonic Mean Flow	cfs	annual	9.07	USGS gage #03272000, 2002-2012 data

Indian Creek at Mouth				
7Q10	cfs	annual	0.2	USGS gage #03274200, 1961-69 data
1Q10	cfs	annual	0.2	USGS gage #03274200, 1961-69 data
30Q10	cfs	summer	0.3	USGS gage #03274200, 1961-69 data
	cfs	winter	0.8	USGS gage #03274200, 1961-69 data
Harmonic Mean Flow	cfs	annual	1.17	USGS gage #03272800, 1960-72 data
Clear Creek at Mouth				
7Q10	cfs	annual	0.4	USGS gage #03271700, 1959-69 data
1Q10	cfs	annual	0.4	USGS gage #03271700, 1959-69 data
30Q10	cfs	summer	0.6	USGS gage #03271700, 1959-69 data
	cfs	winter	2.5	USGS gage #03271700, 1959-69 data
Harmonic Mean Flow	cfs	annual	3.0	USGS gage #03272000, 1970-2012 data
Elk Creek at Mouth				
7Q10	cfs	annual	0.4	USGS gage #03272200, 1960-67 data
1Q10	cfs	annual	0.4	USGS gage #03272200, 1960-67 data
30Q10	cfs	summer	0.6	USGS gage #03272200, 1960-67 data
	cfs	winter	2.1	USGS gage #03272200, 1960-67 data
Harmonic Mean Flow	cfs	annual	3.0	USGS gage #03272000, 1970-2012 data
Bear Creek at Mouth				
7Q10	cfs	annual	0.85	USGS gage #03272000, 1970-2012 data
1Q10	cfs	annual	0.76	USGS gage #03272000, 1970-2012 data
30Q10	cfs	summer	1.23	USGS gage #03272000, 1970-2012 data
	cfs	winter	5.48	USGS gage #03272000, 1970-2012 data
Harmonic Mean Flow	cfs	annual	7.59	USGS gage #03272000, 1970-2012 data
Gregory Creek at Mouth				
7Q10	cfs	annual	0.26	USGS gage #03272200, 1960-67 data
1Q10	cfs	annual	0.26	USGS gage #03272200, 1960-67 data
30Q10	cfs	summer	0.39	USGS gage #03272200, 1960-67 data
	cfs	winter	1.35	USGS gage #03272200, 1960-67 data
Harmonic Mean Flow	cfs	annual	1.93	USGS gage #03272000, 1970-2012 data
Pleasant Run at Mouth				
7Q10	cfs	annual	0.04	USGS gage #03274200, 1961-69 data
1Q10	cfs	annual	0.04	USGS gage #03274200, 1961-69 data
30Q10	cfs	summer	0.06	USGS gage #03274200, 1961-69 data
	cfs	winter	0.16	USGS gage #03274200, 1961-69 data
Harmonic Mean Flow	cfs	annual	0.23	USGS gage #03272800, 1960-72 data
Banklick Creek at Mouth				
7Q10	cfs	annual	0.01	USGS gage #03274200, 1961-69 data
1Q10	cfs	annual	0.01	USGS gage #03274200, 1961-69 data
30Q10	cfs	summer	0.02	USGS gage #03274200, 1961-69 data
	cfs	winter	0.05	USGS gage #03274200, 1961-69 data
Harmonic Mean Flow	cfs	annual	0.07	USGS gage #03272800, 1960-72 data
Western Regional WRF	cfs (MGD)	design	30.95 (20)	NPDES Application Form 2A
Instream hardness	mg/L	annual	303	STORET/DMRs; 768 values, 2010-2020

Parameter	Units	Season	Value	Basis
Background Water Quality for the Great Miami River				
Acrylonitrile	µg/L	annual	0	No representative data available.
Antimony	µg/L	annual	0	No representative data available.
Arsenic	µg/L	annual	1	STORET; 18 values,10 <MDL, 2009-10
Barium	µg/L	annual	92	STORET; 18 values, 0 <MDL, 2009-10
Benzo(a)anthracene	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Benzo(a)pyrene	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Bis(2-ethylhexyl) phthalate	µg/L	annual	0.66	STORET; 5 values, 3 <MDL, 2009
Boron	µg/L	annual	0	No representative data available.
Bromodichloromethane	µg/L	annual	0	STORET; 6 values, 6 <MDL, 2009
Cadmium	µg/L	annual	0	STORET; 18 values,18 <MDL, 2009-10
Chlorine	µg/L	annual	0	No representative data available.
Chorodibromomethane	µg/L	annual	0	No representative data available.
Chloroform	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Dissolved hexavalent chromium	µg/L	annual	0	No representative data available.
Chromium, total	µg/L	annual	1	STORET; 18 values,17<MDL, 2009-10
Copper	µg/L	annual	2.1	STORET; 18 values, 5<MDL, 2009-10
Free cyanide	µg/L	annual	0	No representative data available.
Dibenzo(a,h) anthracene	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
1,4-Dichlorobenzene	µg/L	annual	0	STORET; 6 values, 6 <MDL, 2009
1,2-Dichloroethane	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Diethyl Phthalate	µg/L	annual	3.47	STORET; 3 values, 2 <MDL, 2009
Di-n-butyl phthalate	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Ethylbenzene	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Fluoride	µg/L	annual	0	No representative data available.
Heptachlor	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Indeno(1,2,3-c,d) pyrene	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Iron	µg/L	annual	468	STORET; 18 values, 0<MDL, 2009-10
Lead	µg/L	annual	1	STORET; 18 values, 17<MDL, 2009-10
Mercury	µg/L	annual	0	No representative data available.
Methyl Bromide	µg/L	annual	0	No representative data available.
Methyl Ethyl Ketone	µg/L	annual	0	No representative data available.
Methyl tert-butyl ether	µg/L	annual	0	No representative data available.
Methylene Chloride	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Molybdenum	µg/L	annual	0	No representative data available.
Nickel	µg/L	annual	2.95	STORET; 18 values, 0<MDL, 2009-10
Nitrate + Nitrite	mg/L	annual	1.26	STORET; 26 values, 2<MDL, 2009-10
Phenols	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Selenium	µg/L	annual	0	STORET; 18 values,18 <MDL, 2009-10
Silver	µg/L	annual	0	No representative data available.
Strontium	µg/L	annual	1485	STORET; 18 values, 0 <MDL, 2009-10
Total Filterable Residue	mg/L	annual	412	STORET; 26 values, 0<MDL, 2009-10
Thallium	µg/L	annual	0	No representative data available.
Toluene	µg/L	annual	0	STORET; 3 values, 3 <MDL, 2009
Zinc	µg/L	annual	5	STORET; 18 values, 13<MDL, 2009-10

MDL = analytical method detection limit
n = number of samples
NPDES = National Pollutant Discharge Elimination System
WWTP = wastewater treatment plant

Table 14. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

		Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
Parameter	Units	Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Ammonia (summer)	mg/L	--	--	10.8	--	--
Ammonia (winter)	mg/L	--	--	31.9	--	--
Antimony [B]	µg/L	4989 [A]	--	1479	6655 [A]	1800
Arsenic [B]	µg/L	--	430	296	638	680
Barium	µg/L	--	--	334	3650	4000
Cadmium [B]	µg/L	--	206 [A]	11	28	32
Chlorine	mg/L	--	--	0.045 [A]	0.074 [A]	0.038
Chromium [B]	µg/L	--	396	383	7815	8900
Dissolved hexavalent chromium [B]	µg/L	--	--	22	31	31
Copper - TR	µg/L	--	1965 [A]	42	67	80
Free cyanide [B]	µg/L	720 [A]	--	22	79	92
1,4-dichlorobenzene [B]	µg/L	12457 [A]	--	130	730 [A]	110
Iron [B]	µg/L	--	50844	--	--	--
Lead [B]	µg/L	--	398	47	868	1000
Mercury [C]	ng/L	12	10000 [A]	910	1700	3400
Methyl Bromide [B]	µg/L	80982 [A]	--	129 [A]	289 [A]	75
Methyl Ethyl Ketone [B]	µg/L	--	--	304503	2562000 [A]	400000
Methyl tert-butyl ether [B]	µg/L	--	--	101104 [A]	83250 [A]	13000
Molybdenum [B]	µg/L	--	--	41509	374217 [A]	370000
Nickel [B]	µg/L	8416 [A]	790	235	2082	2400
Nitrate + Nitrite [B]	mg/L	--	1193	--	--	--
Selenium	µg/L	7481 [A]	195 [A]	8.9	105	120
Silver	µg/L	--	--	2.7	21	22
Strontium [B]	µg/L	--	--	103913 [A]	194877 [A]	81000
Toluene [B]	µg/L	7197	--	858	7172	
Total Filterable Residue	mg/L	--	--	2324	--	--
Zinc [B]	µg/L	47582 [A]	100104 [A]	561	516	610

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

[B] Parameter would not require a WLA based on reasonable potential procedures, but allocation requested by Permits Group.

[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 OAC 3745-2-05(A)(2)(e)(ii)

Table 15. Parameter Assessment

Group 1:	Due to a lack of numeric criteria, the following parameters could not be evaluated at this time.		
	Acetone	Aluminum	Manganese
Group 2:	PEQ < 25 percent of WQS or all data below minimum detection limit. WLA not required. No limit recommended; monitoring optional.		
	Antimony	Arsenic	Cadmium
	Chromium	Dissolved hexavalent chromium	Free cyanide
	1,4-Dichlorobenzene	Iron	Lead
	Mercury	Methyl bromide	Methyl ethyl ketone
	Methyl tert-butyl ether	Molybdenum	Nickel
	Nitrate + Nitrite	Strontium	Toluene
	Zinc		
Group 3:	PEQ_{max} < 50 percent of maximum PEL and PEQ_{avg} < 50 percent of average PEL. No limit recommended; monitoring optional.		
	Ammonia (summer)	Ammonia (winter)	Barium
	Copper	Silver	Total Filterable Residue
Group 4:	PEQ_{max} ≥ 50 percent, but < 100 percent of the maximum PEL or PEQ_{avg} ≥ 50 percent, but < 100 percent of the average PEL. Monitoring is appropriate.		
	Chlorine	Selenium	
Group 5:	Maximum PEQ ≥ 100 percent of the maximum PEL or average PEQ ≥ 100 percent of the average PEL, or either the average or maximum PEQ is between 75 and 100 percent 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	Period	Recommended Effluent Limits Average	Recommended Effluent Limits Maximum

No parameters meet the criteria of this group.

PEL = preliminary effluent limit
PEQ = projected effluent quality
WLA = wasteload allocation
WQS = water quality standard

Table 16. Final Effluent Limits for Outfall 001

		Concentration		Loading (kg/day)[a]		
		30 Day	Daily	30 Day	Daily	
Parameter	Units	Average	Maximum	Average	Maximum	Basis[b]
Water Temperature	°C	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M[c]
Dissolved Oxygen	mg/L	--	6.0[m]	--	--	PD
Total Suspended Solids	mg/L	12	18[d]	909	1370[d]	PD
Oil & Grease	mg/L	--	10	--	--	WQS
Ammonia (summer)	mg/L	2.0	3.5[d]	152	265[d]	PD
Ammonia (winter)	mg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Total Kjeldahl Nitrogen	mg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				BTJ
Nitrate+Nitrite	mg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Phosphorus	mg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				SB1
Orthophosphate	mg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				SB1
Selenium	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				RP
Nickel	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Zinc	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Cadmium	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Lead	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Chromium	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Copper	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Dissolved Hexavalent Chromium	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
E. coli	#/100 mL	126	284[d]	--	--	WQS
Flow Rate	MGD	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M[c]
Chlorine, Total Residual	mg/L	--	0.038	--	--	PD/BTJ
Mercury	ng/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Free Cyanide	µg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Phosphorus	kg	--	39.70	--	--	BTJ
Acute Toxicity *Ceriodaphnia dubia*	TUa	- - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
Chronic Toxicity *Ceriodaphnia dubia*	TUc	- - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
Acute Toxicity *Pimephales promelas*	TUa	- - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
Chronic Toxicity *Pimephales promelas*	TUc	- - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
pH	S.U.	--	6.5-9.0	--	--	WQS
Total Filterable Residue	mg/L	- - - - - - - - - - - Monitor - - - - - - - - - - - -				M
CBOD5	mg/L	10	15[d]	757	1136[d]	PD

[a] Effluent loadings based on average design discharge flow of 20.0 MGD.

[b] Definitions:
BTJ = Best Technical Judgment
CFR = Code of Federal Regulations
M = Division of Surface Water NPDES Permit Guidance 1: Monitoring frequency requirements for Sanitary

Discharges
PD = Plant Design (OAC 3745-33-05(E))
RP = Reasonable Potential for requiring monitoring requirements in permits (OAC 3745-33-07(A))
SB1 = Implementation of Senate Bill 1 (ORC 6111.03)
WET = Minimum testing requirements for whole effluent toxicity [OAC 3745-33-07(B)(11)]
WLA/IMZM = Wasteload Allocation limited by Inside Mixing Zone Maximum
WQS = Ohio Water Quality Standards (OAC 3745-1)

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

[d] 7 day average limit.
[m] minimum limit

Attachment 1. Total Phosphorus and Eutrophication in the Lower Great Miami River

The lower Great Miami River (GMR) was assessed for its aquatic life beneficial use in 2010. The study area started at the confluence with the Mad River at river mile (RM) 81.48 and ended at the Ohio River (RM 0). Two GMR large river assessment units (05080002-90-01 and 05080002-90-02) were included in this assessment. Assessment sites within both units indicated that 14.4 river miles were directly impaired due to nutrient enrichment, though data showed that excessive nutrient enrichment occurred throughout most of the lower GMR. The over-enriched condition began downstream of the Dayton wastewater treatment plant (WWTP) (RM 76.11) and continued downstream to just upstream of the confluence with the Whitewater River (RM 6.45). In addition to the biological data collected in 2010, chemical and algal data were collected from 2010 through 2012, the results of which were reported in the *Biological and Water Quality Study of the Lower Great Miami River and Select Tributaries, 2010*. The linkage between the nutrient enrichment and the point source dischargers was discussed at length in an addendum to the current fact sheet (1PL00002*OD) for Montgomery County Western Regional WRF.

Adaptive Implementation of Phosphorus Control

In situations where biological impairment is the driver for necessary nutrient reductions, Ohio EPA follows an adaptive implementation approach, where initial reductions are made and then the environmental response is evaluated. In the case of the lower GMR, the biological and water quality data showed that the City of Dayton WRF and Montgomery County Western Regional WWTP were primary contributors to the over-enrichment. Therefore, the first step in Ohio EPA's adaptive approach was the issuance of NPDES permits to these two facilities with compliance schedules to meet seasonal (July through October) phosphorus aggregate loading limits equivalent to 1 mg/L. Since that time, Montgomery County has achieved the necessary phosphorus reductions to comply with the limits in the summer of 2020. The compliance schedule for Dayton continued through the effective permit period and reductions should be achieved in 2022.

The segment of the GMR that was impaired by nutrient enrichment was the subject of a statewide survey to evaluate the impact of nutrients on large rivers in 2016. The results from the upstream portion monitored at that time (05080002-90-01, RM 81.48 to 38.38) were reported in Ohio EPA's 2018 Integrated Water Quality Monitoring and Assessment Report. The results were also included in the data evaluated for a peer reviewed research paper that tested the impacts of nutrients on response variables in Ohio's large rivers (Miltner, 2018).

In addition to the 2016 survey data collected by Ohio EPA, most of the major wastewater treatment plants collect nutrient data at monitoring stations up- and downstream of their final outfalls. This is typically once per month sampling and provides a continuous link to evaluate the impact of the major facilities on stream nutrient concentrations. Also, near continuous nutrient monitoring has continued at the site monitored by the National Center for Water Quality Research (NCWQR) at Heidelberg University. The NCWQR data was evaluated for the current effective NPDES permit factsheet but was not reevaluated for the proposed renewal permit.

Evaluation of Recent Data Collection

Site selection for the 2016 survey was focused on generating an unbiased dataset to evaluate the stressor gradient from eutrophication across Ohio's large rivers. The sites selected were not targeted to evaluate the impact of any specific discharger. However, chlorophyll-a (Figure 1) and dissolved oxygen (Figure 2) data collected during the survey show enrichment indicators of similar magnitude to those observed in 2010.

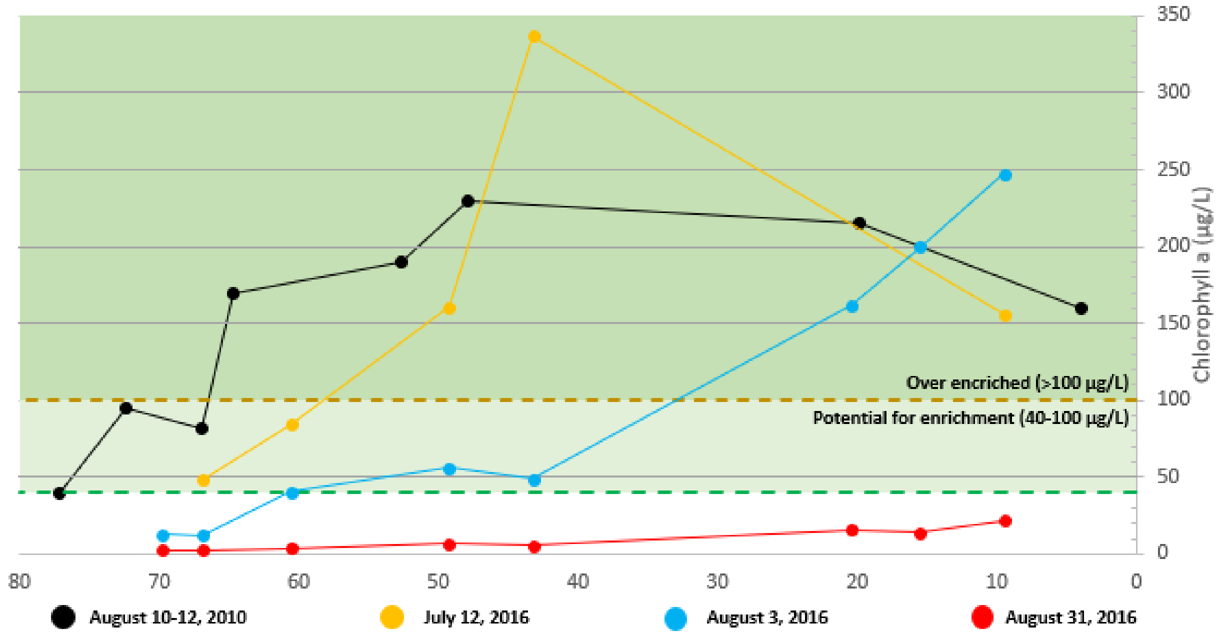

Figure 1. Sestonic chlorophyll concentrations in the lower GMR. The x-axes are river miles, from upstream to downstream (left to right).

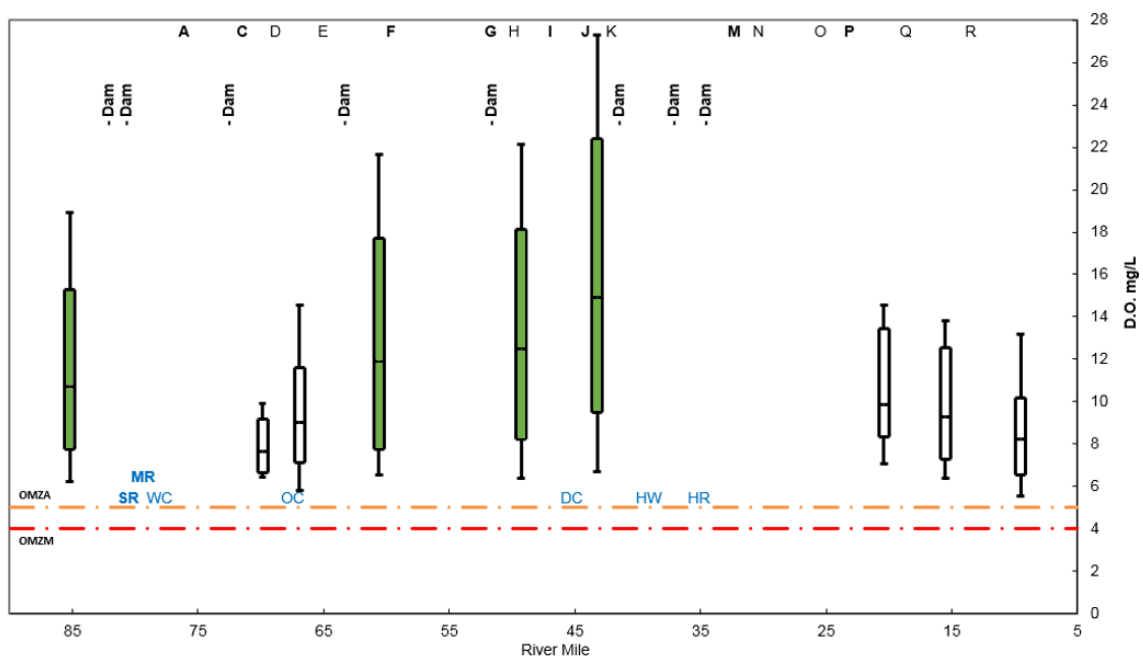

Figure 2. 24-hour dissolved oxygen boxplots during July 12-14, 2016 from upstream to downstream in the lower third of the lower Great Miami River. Sites filled with green exceed 9 mg/L dissolved oxygen in the 24-hour period. See table below for label references.

Label	RM	Facility	Label	RM	Facility	Label	RM	Tributary
A	76.1	Dayton WRF	J	45.7	LeSourdsville WWTP	SR	82.6	Stillwater River
C	71.5	Western Regional WRF	K	43.7	Molson Coors	MR	81.5	Mad River
D	68.9	W. Carrollton WWTP	M	34.0	Hamilton WWTP	WC	80.3	Wolf Creek
E	65.1	Miamisburg WWTP	N	32.0	Fairfield WWTP	OC	69.6	Owl Creek
F	59.7	Franklin WWTP	P	24.7	Fernald	DC	47.6	Dicks Creek
G	51.7	Essity/Wausau 001	Q	20.3	PCS Phosphates	HW	41.3	Ham. Canal withdrawal
H	51.5	AK Steel 011	R	15.1	Taylor Creek WWTP	HR	37.2	Hamilton Canal return
I	48.3	Middletown WWTP						

Upstream and downstream monitoring in individual NPDES permits provides an ongoing accounting of stream nutrient concentrations. Figure 3 shows boxplots of five years of TP concentrations monitored at final outfalls (in blue), as well as the upstream and downstream monitoring stations. All data presented was collected during the July - October timeframe, the critical period for eutrophication of flowing streams.

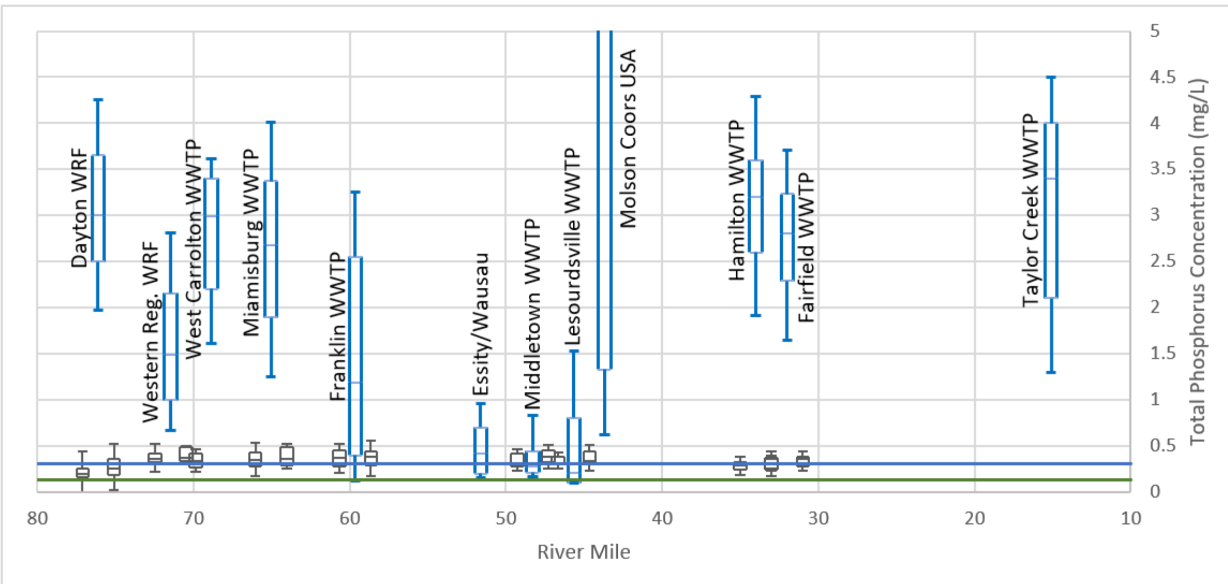

Figure 3. Box plots of total phosphorus concentrations collected at NPDES permit final outfalls (blue) and upstream/downstream monitoring stations (black). Whiskers were drawn to the 90th-percentile value rather than plotting outlier values. The blue line at 0.3 mg/L and the green line at 0.13 mg/L, identify concentrations associated with phosphorus-related enrichment from Ohio EPA studies.

The recent reductions at the Western Regional WRF and future reductions expected from the Dayton WRF have not yet been captured in this dataset. Stream TP concentrations are comparable to those in the years preceding this evaluation. In particular, the in-stream concentrations show a familiar trend: TP notably increases after the Dayton WWTP discharge and remains elevated throughout the reach. Previous analysis of the stream phosphorus concentrations used a 0.3 mg/L target value based on an earlier analysis by the agency (Ohio EPA, 1999). More recent work has shown that sites with even moderately enriched conditions averaged lower concentrations, at 0.13 mg/L (Miltner, 2018). The lower GMR continues to show elevated phosphorus concentrations against both measures. The impact of reduced total phosphorus inputs is best measured by the response variables. Implementation actions that result in changing stream phosphorus concentrations should be followed by a reevaluation of all response variables and a new stressor analysis for impaired sites.

Future Steps for Adaptive Implementation

The data presented above suggest that conditions for impairment due to nutrient enrichment persist in the lower GMR, therefore Ohio EPA proposes to continue the adaptive implementation approach toward mitigation of the impairment. The first stage of adaptive implementation is still underway as Dayton WRF continues to work toward the required reductions. Surveys and data collection are ongoing to assess the environmental response to the implemented measures. Portions of the lower GMR were resampled in 2020 as part of a larger effort to survey all of Ohio's Large River Assessment Units; the results of that survey are currently under review. Additional and more targeted monitoring on the lower GMR will be conducted after the TP control measures have been implemented and the river has had some time to react to the load reductions. The collected data will be evaluated and Ohio EPA will develop a Total Maximum Daily Load (TMDL) for any pollutant found to be causing an aquatic life use impairment. Ohio EPA's 'TMDL process' has several opportunities for stakeholder input. A factsheet identifying those steps and how to get involved is available through Ohio EPA's website: https://epa.ohio.gov/Portals/35/tmdl/TMDL_Fact_Sheet_Feb_2020.pdf?ver=2020-02-03-142916-353

Literature Cited

Miltner, Robert J. (2018). Eutrophication endpoints for large rivers in Ohio, USA. Environmental Monitoring and Assessment, 190(55), https://doi.org/10.1007/s10661-017-6422-4

Ohio EPA (1999) Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams. Ohio Environmental Protection Agency Technical Bulletin. MAS/1999-1-1. Columbus, OH. http://epa.ohio.gov/portals/35/guidance/assoc_load.pdf

Addendum 1. Acronyms

ABS	Anti-backsliding
BPJ	Best professional judgment
CFR	Code of Federal Regulations
CMOM	Capacity Management, Operation, and Maintenance
CONSWLA	Conservative substance wasteload allocation
CSO	Combined sewer overflow
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DMT	Dissolved metal translator
IMZM	Inside mixing zone maximum
LTCP	Long-term Control Plan
MDL	Analytical method detection limit
MGD	Million gallons per day
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
Ohio EPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
ORSANCO	Ohio River Valley Water Sanitation Commission
PEL	Preliminary effluent limit
PEQ	Projected effluent quality
PMP	Pollution Minimization Program
PPE	Plant performance evaluation
SSO	Sanitary sewer overflow
TMDL	Total Daily Maximum Load
TRE	Toxicity reduction evaluation
TU	Toxicity unit
U.S. EPA	United States Environmental Protection Agency
WET	Whole effluent toxicity
WLA	Wasteload allocation
WPCF	Water Pollution Control Facility
WQBEL	Water-quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater Treatment Plant