National Pollutant Discharge Elimination System (NPDES) Permit Program

FACT SHEET

Regarding an NPDES Permit to Discharge to Waters of the State of Ohio
for Piqua Wastewater Treatment Plant (WWTP)

Public Notice No.: 22-006-011
Public Notice Date: June 21, 2022
Comment Period Ends: July 28, 2022

Ohio EPA Permit No.: 1PD00008*WD
Application No.: OH0027049

Name and Address of Applicant:
City of Piqua
201 West Water Street
Piqua, OH 45356

Name and Address of Facility Where Discharge Occurs:
Piqua Wastewater Treatment Plant
121 Bridge Street
Piqua, OH 45356
Miami 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

Removed monitoring for arsenic, and bis(2-ethylhexyl)phthalate monitoring due to low reasonable potential to cause or contribute to water quality exceedances. Reduced monitoring for mercury to once per quarter.

Monitoring for E. coli at upstream station 801 and downstream station 901 is proposed to increase to once per two weeks for June to August.

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.

Water Temperature, Dissolved Oxygen and pH monitoring are being removed from upstream monitoring station 801 because monitoring for these parameters are no longer needed at this station. Dissolved Oxygen is being removed from downstream monitoring station 901 because monitoring for this parameter is no longer needed at this station. Added TKN monitoring to both up and downstream monitoring station for instream nutrient monitoring.

A schedule of compliance for Pretreatment local limits evaluation is included in Part I.C of the permit.

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; 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 Mary Osika, (937) 285-6446, mary.osika@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: https://epa.ohio.gov/static/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

The Piqua wastewater treatment plant (WWTP) discharges to the Great Miami River at River Mile 114.3. 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: 05080001-20-05, Large River Assessment Unit: 05080001-90-01, County: Miami, Ecoregion: Eastern Corn Belt Plains. This reach of the Great Miami River is designated for the following uses under Ohio's WQS (OAC 3745-1-21): Exceptional Warmwater Habitat (EWH), Agricultural Water Supply, Industrial Water Supply, and Primary Contact Recreation and Public Water Supply.

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

The Piqua WWTP was constructed in 1958 and last upgraded in 2020. The average design flow is 8.7 million gallons per day (MGD) with a peak hydraulic capacity of 22.5 MGD. Piqua WWTP serves the city of Piqua and the village of Fletcher, a total population of approximately 21,000. Piqua WWTP has the following treatment processes which are shown on Figure 2:

- Flow equalization
- Influent pumping
- Screening
- Grit removal
- Anaerobic zone
- Oxidation ditch
- Secondary clarification
- Ultraviolet disinfection
- Post aeration
- Effluent pumping

The collection system is 100% separate sanitary sewers.

The City of Piqua has an approved pretreatment program. Forty-one, industrial users discharge approximately 0.134 MGD average daily flow into the sanitary sewer system. As part of this flow rate, three, categorical industrial users discharge 0.032 MGD average daily flow.

The City's potable water comes from the Great Miami River; the intake is at RM 118.5.

Piqua WWTP utilizes the following sewage sludge treatment processes:

- Rotating drum thickener
- Aerobic digestion
- Dewatering using a centrifuge

Treated sludge is disposed by land application at agronomic rates. The City also has the option to dispose by hauling to a landfill. Table 1 shows the last five years of sludge removed from Piqua WWTP.

DESCRIPTION OF EXISTING DISCHARGE

Effluent violations from the Piqua WWTP for the past five years are shown on Table 2. These violations were caused by the following conditions: maintenance issues, construction issues, high flows, and process control issues. With the completion of the WWTP upgrade in 2020, violations have significantly decreased.

Piqua WWTP has an estimated infiltration/inflow (I/I) rate of 1.0 MGD. The City has an I/I program to identify areas for pipe relining. Piqua WWTP reports SSOs at station 300. The SSOs reported at this station are shown in Table 3. Following completion of the WWTP upgrade in 2020, the West InterceptorSewer SSO was eliminated.

The average annual effluent flow rate for Piqua WWTP for the previous five years is presented on Table 4.

Table 5 presents data characterizing the seasonal total phosphorus load from Piqua WWTP during the previous five years.

Table 6 presents chemical specific data compiled from data reported in annual pretreatment reports. 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 7 presents chemical specific data compiled from data collected by Ohio EPA.

Table 8 presents a summary of unaltered Discharge Monitoring Report (DMR). Data are presented for the period January 2016 through August 2021, 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.

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

ASSESSMENT OF IMPACT ON RECEIVING WATERS

The Great Miami River Mainstem (Tawawa Creek to Mad River) large river assessment unit (LRAU), which includes the Great Miami River in the vicinity of Piqua WWTP, is listed as impaired for Aquatic Life Use, Recreational Use, and Human Health on Ohio's 303(d) list.

The attainment status of the Great Miami River Mainstem (Tawawa Creek to Mad 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 watershed is from 2009-2010 and 2016. The Great Miami River is listed in full attainment (see Table 11) up and downstream of Piqua until RM 85.8 From this point the river is impaired for ammonia toxicity (aquatic life) due to the local major wastewater treatment plant discharge. At this time, a TMDL study is in progress to address the impairments identified in this portion of the Great Miami River. Implementation plans in these reports may include recommendations for load reductions through additional NPDES permit limits. Information about the TMDL reports is available through the Ohio EPA, Division of Surface Water website at:

https://epa.ohio.gov/wps/portal/gov/epa/divisions-and-offices/surface-water/reports-data/great-miami-river-watershed

More information can be found in the following technical support document: *"Biological and Water Quality Study of the Middle Great Miami River and Principal Tributaries"*, OEPA, 2013. It is available through the Ohio EPA, Division of Surface Water website at:
https://epa.ohio.gov/static/Portals/35/documents/MGMR_TSD_2010.pdf

The 2020 *Ohio Integrated Water Quality Monitoring and Assessment Report* is available through the Ohio EPA, Division of Surface Water website at:
https://epa.ohio.gov/wps/portal/gov/epa/divisions-and-offices/surface-water/reports-data/ohio-integrated-water-quality-monitoring-and-assessment-report

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 Piqua WWTP 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 2016 through August 2021
Pretreatment data	2016-2019
Ohio EPA compliance sampling data	November 20, 2019

Statistical Outliers and Other Non-representative Data

The data were examined, and no data were removed from the evaluation as non-representative data.

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 15).

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 this segment of the Great Miami River were considered interactive (see Figure 3):

- Sidney WWTP
- Piqua WWTP
- Troy WWTP

These outfalls were allocated together for most parameters due to the size of the plant discharges, the flows of Great Miami River and the relatively proximity of the three 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). 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.

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

Aquatic life (Warmwater Habitat)		
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 13, and allocations cannot exceed the Inside Mixing Zone Maximum (IMZM) criteria.

The data used in the WLA are listed in Table 9 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 Piqua WWTP, the WLA values are 0.73 TU_a and 2.78 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/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.

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

Downstream Dilution Ratio (downstream flow to discharger flow)	Allowable Effluent Toxicity (percent effects in 100% effluent)
up to 2	30
greater than 2 but less than 2.7	40
2.7 to 3.3	50

$$\text{Downstream Dilution Ratio} = \frac{1Q10 + [\text{WWTP flow rate}]}{[\text{WWTP flow rate}]} = \frac{39.96 \text{ cfs} + 13.46 \text{ cfs}}{13.46 \text{ cfs}} = 2.9$$

The acute WLA for City of Piqua WWTP is 50 percent mortality in 100 percent effluent based on the dilution ratio of 2.9.

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

Total Suspended Solids, Ammonia, CBOD5
The limits proposed for total suspended solids, ammonia and 5-day carbonaceous biochemical oxygen demand (CBOD5) are all based on plant design criteria from the 2020 upgrade and expansion; PTI no. 1115900. These limits are protective of WQS. The TSS and CBOD5 limits are more stringent than the Secondary Treatment Standards in 40 CFR Part 133. The current ammonia limits have been evaluated using the WLA procedures and are protective of WQS for ammonia toxicity. The past ammonia data placed this parameter under the Ohio risk assessment (Table 14) in group 4 (winter) and 5 (summer). The plant design limits are more protective than the WLA and the plant design limits are effective in this permit renewal.

Chlorine Residual
Past chlorine data placed this parameter in group 4 under the Ohio EPA risk assessment (Table 15). Chlorine is no longer used for disinfection with the plant upgrade of 2020 and therefore is not present in the discharge.

Dissolved Oxygen
The current limit for dissolved oxygen is based on WQS. The Great Miami River is an exceptional warmwater habitat (EWH) in the area of the Piqua wastewater treatment plant's discharge. The WQS (OAC 3745-1-35) for dissolved oxygen in this segment is 6.0 mg/L.

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

Nickel, Zinc, Cadmium, Chromium, Copper, Hexavalent chromium, Lead, Mercury, Molybdenum, Silver, Selenium, Cyanide-free, Total filterable residue
The Ohio EPA risk assessment (Table 15) places these parameters in groups 2 and 3. This placement, as well as the data in Table 9 and Table 14, 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 a low frequency is proposed to document that these pollutants continue to remain at low levels or monitoring is needed for pretreatment removal efficiencies.

Antimony, Arsenic, Barium, Beryllium, Bis(2-ethylhexyl) phthalate, Toluene, Strontium, Iron, Thallium
The Ohio EPA risk assessment (Table 15) places these parameters in groups 2 and 3. This placement, as well as the data in Table 9 and Table 14, 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. Arsenic and Bis(2-ethylhexyl) phthalate are proposed to be removed from monitoring. Annual pretreatment program priority pollutant scans will continue to provide data for future reasonable potential analysis.

Water Temperature, Flow Rate
Monitoring for these parameters is proposed to continue in order to evaluate the performance of the treatment plant.

Nitrate+Nitrite, Total Kjeldahl Nitrogen
Municipal WWTPs discharge a nutrient load to the river, therefore monitoring for nitrate + nitrite and total Kjeldahl nitrogen (TKN) is proposed based on best technical judgment. Monitoring for TKN and nitrate +

nitrite at the upstream and downstream stations also is proposed. The purpose of the monitoring is to maintain a nutrient data set for use in the future nutrient studies.

Dissolved Orthophosphate and Total Phosphorus
Monitoring for dissolved orthophosphate (as P) and total phosphorus 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.

Whole Effluent Toxicity Reasonable Potential
Based on evaluating the WET data presented in Table 9 and other pertinent data (Attachment 1) under the provisions of OAC 3745-33-07(B), the Piqua WWTP is placed in Category 4 for both *P. promelas* and *C. dubia* 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). Included in the permit is annual chronic toxicity monitoring with the determination of acute endpoints.

Additional Monitoring Requirements

Monitoring for *E. coli* at upstream station 801 and downstream station 901 is proposed to be increased to once per two weeks for June to August. The increased frequency will facilitate assessment of recreation use impairments.

Water Temperature, Dissolved Oxygen and pH monitoring are being removed from upstream monitoring station 801 because monitoring for these parameters and no longer needed at this station. Dissolved Oxygen is being removed from downstream monitoring station 901 because monitoring for this parameter is no longer needed at this station. Added TKN monitoring to both up and downstream monitoring station for instream nutrient monitoring.

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, landfill.

OTHER REQUIREMENTS

Compliance Schedule
Pretreatment Local Limits Review - A 6 month compliance schedule is proposed for the permittee 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 permittee 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 Piqua WWTP 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).

Method Detection Limits
Part II of the permit includes requirements for the permittee to use analytical procedures approved under 40 CFR 136 with MDLs at a specified low level to detect the parameter dissolved hexavalent chromium in order to comply with the water quality based permit limits.

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

Storm Water Compliance
To comply with industrial storm water regulations, the permittee submitted a form for "No Exposure Certification" which was signed on July 27, 2021. The certification number is 1GRN00992*AG. Compliance with the industrial storm water regulations must be re-affirmed every five years. No later than July 12, 2026, the permittee must submit a new form for "No Exposure Certification" or make other provisions to comply with the industrial storm water regulations.

Figure 1. Location of Piqua WWTP

Figure 2. Diagram of Wastewater Treatment System

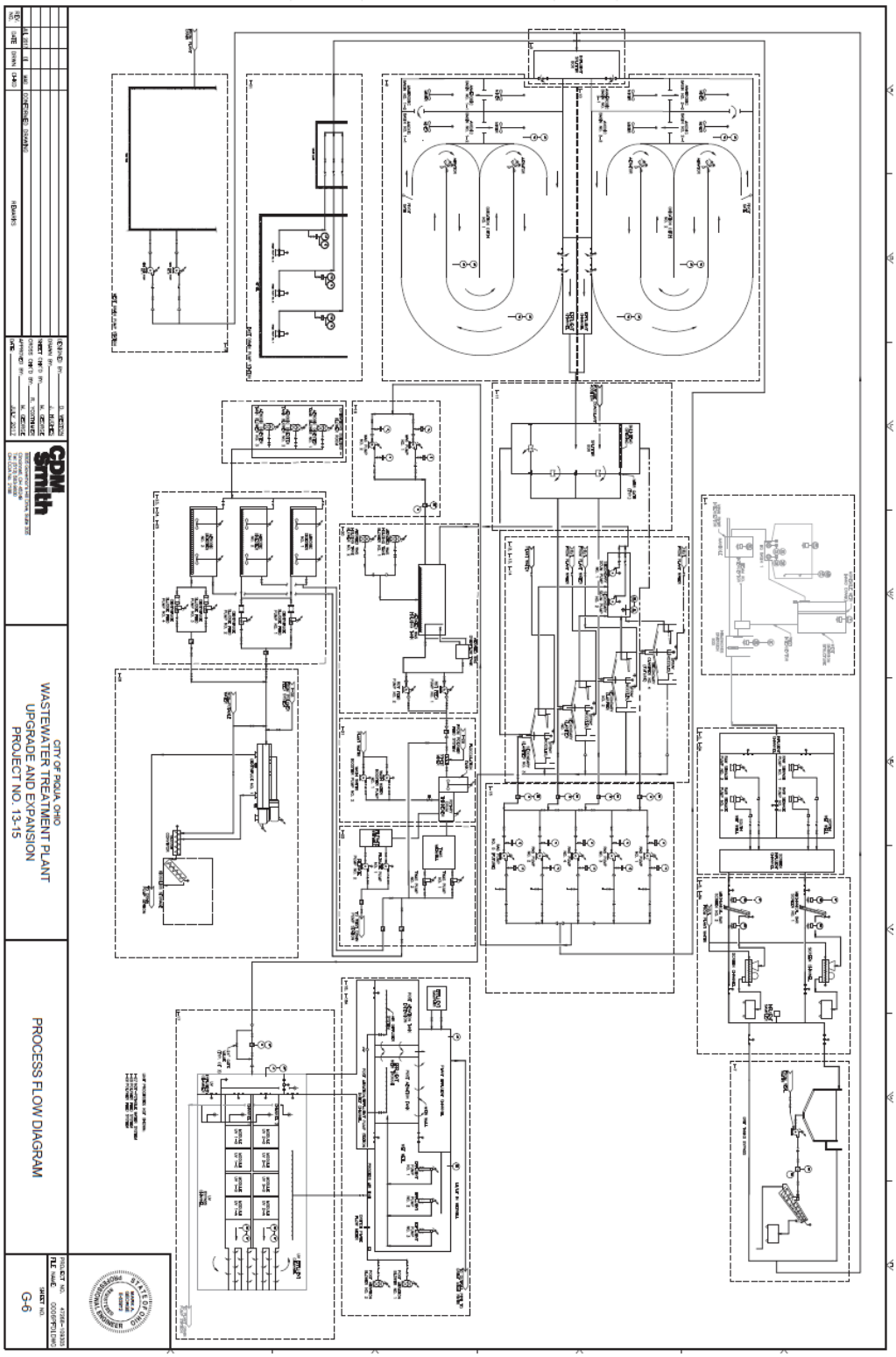
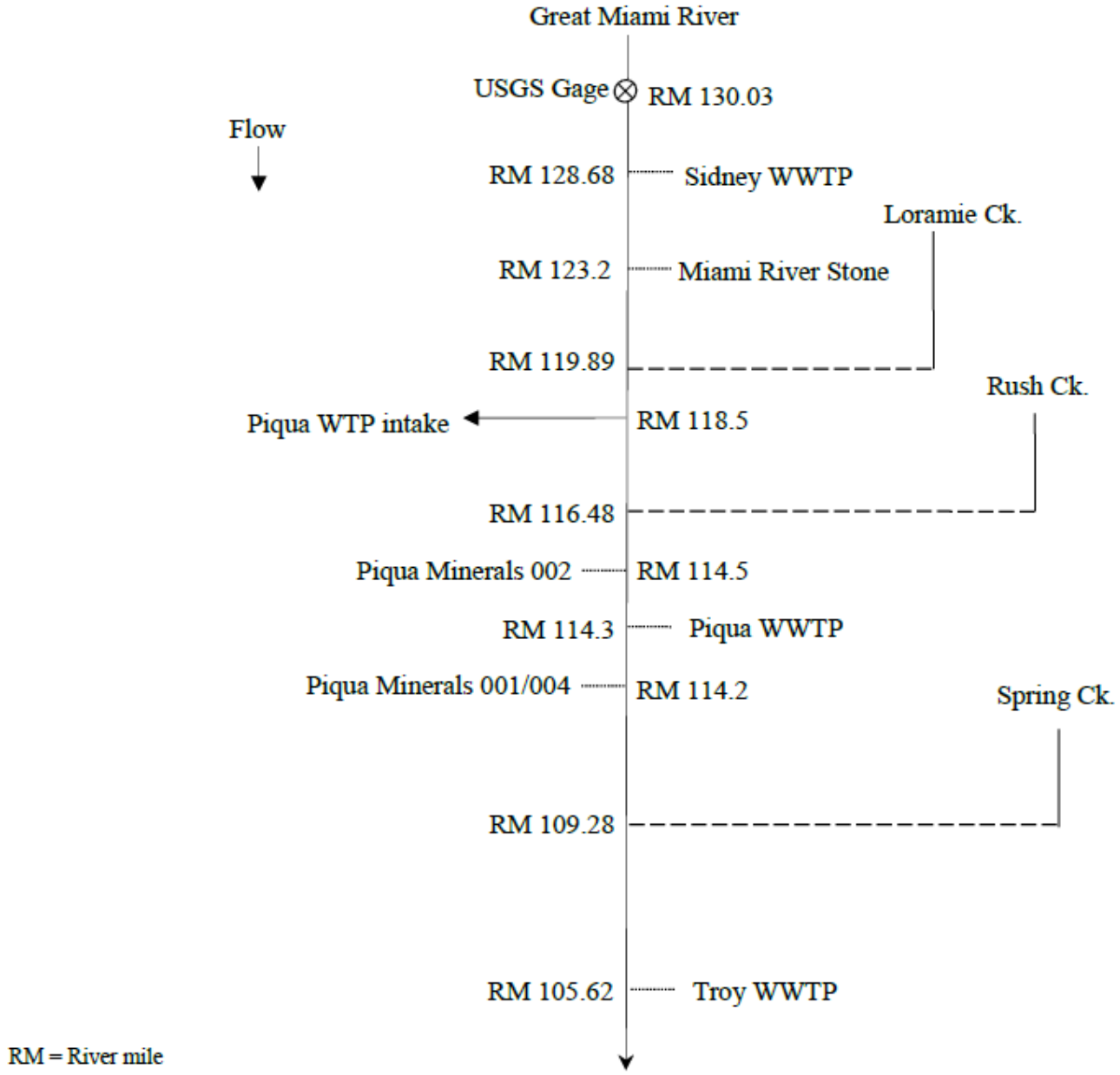


Figure 3. Great Miami River Study Area



RM = River mile
WTP = Water Treatment Plant
WWTP = Waste Water Treatment Plant
USGS = United States Geological Service

Table 1. Sewage Sludge Removal (2016 -2020)

Year	Dry Tons Removed Land application	Dry Tons Removed Landfill
2016	221	0
2017	182	0
2018	175	51
2019	179	4
2020	0	140

Table 2. Effluent Violations for Outfall 001 (Jan. 2016 through August 2021)

Parameter	2016	2017	2018	2019	2020	2021
Dissolved Oxygen	0	1	0	3	7	0
Nitrogen, Ammonia (NH3-N)	0	1	9	5	2	0
Total suspended solids	0	0	6	1	2	0
Chlorine, total residual	0	0	0	11	0	0
E. coli	4	1	13	2	0	0
CBOD 5 day	0	0	1	0	0	0
pH, Minimum	0	0	0	2	0	0
Total	4	3	29	24	11	0

Table 3. Sanitary Sewer Overflows (Jan. 2016 through August 2021)

Year	Number of SSOs
2016	10
2017	11
2018	37
2019	46
2020	0
2021	1

Table 4. Average Annual Effluent Flow Rates (Jan. 2016 through August 2021)

Flow Rate (Million Gallons per Day)						
Outfall	Year	# obs	Average	Median	95th Percentile	Maximum
001	2016	366	3.520191	3.11	5.94	7.09
001	2017	365	3.751616	3.5	5.63	6.7
001	2018	363	3.959614	3.67	6.178	7.11
001	2019	365	3.672904	3.4	6.318	7.26
001	2020	366	3.887923	3.7	6.295	12.73
001	2021	243	3.944156	3.54	6.713	12.19

Table 5. Calculated Seasonal Phosphorus Loadings (Jan. 2016 through August 2021)

For Months May - October					
Outfall	Year	Obs.	Median Phosphorus (mg/L)	Median Flow (MGD)	Median Loading (kg/day)
001	2016	26	2.82	2.905	29.3
001	2017	24	2.1	3.37	27.8
001	2018	26	2.295	3.12	28.9
001	2019	27	2.59	2.34	22.7
001	2020	26	2.2	3.135	27.6
001	2021	18	2.05	3.315	23.9

MGD = million gallons per day

Table 6. Effluent Characterization Using Pretreatment Data

Parameter*	2/3/2016	3/1/2017	3/1/2018	2/20/2019	4/11/2019
Antimony	AA(5)	AA(5)	AA(5)	AA(5)	AA(5)
Arsenic	AA(5)	AA(5)	AA(5)	AA(5)	AA(5)
Beryllium	AA(0.5)	AA(3)	AA(3)	AA(3)	AA(3)
Cadmium	AA(2)	AA(3)	AA(3)	AA(3)	AA(0.33)
Chromium	AA(5)	AA(7)	AA(7)	AA(7)	AA(7)
Copper	AA(5)	AA(8)	AA(8)	13	AA(8)
Lead	AA(5)	AA(10)	AA(10)	AA(10)	AA(10)
Nickel	AA(5)	AA(8)	AA(8)	AA(8)	AA(8)
Selenium	AA(10)	AA(4)	AA(4)	AA(4)	AA(4)
Silver	AA(2)	AA(5)	AA(5)	AA(5)	AA(5)
Thallium	AA(1)	AA(5)	AA(5)	AA(5)	AA(5)
Zinc	47.3	38	22	29	26
Mercury	AA(0.2)	0.0011	NT	0.005	0.0008
Bis (2-ethylhexyl) Phthalate	5.27	AA(5)	AA(5)	AA(5)	AA(5)
Toluene	AA(5)	AA(5)	AA(5)	AA(5)	AA(5)

* values in µg/L unless indicated

AA = not-detected (analytical method detection limit)

NT = not tested

Table 7. Effluent Characterization Using Ohio EPA data

Parameter	Units	11/20/2019
Total Filterable Residue	mg/L	534
Antimony	µg/L	402
Arsenic	µg/L	AA(2)
Beryllium	µg/L	AA(0.037)
Cadmium	µg/L	0.0497
Chromium	µg/L	0.713
Copper	µg/L	2.33
Lead	µg/L	0.355
Nickel	µg/L	3.63
Selenium	µg/L	0.787
Silver	µg/L	AA(0.023)
Thallium	µg/L	AA(0.089)
Aluminum	µg/L	28.9
Barium	µg/L	55.7
Iron	µg/L	77.8
Manganese	µg/L	45.2
Strontium	µg/L	803
Zinc	µg/L	32.6
Ammonia	mg/L	0.133
Chloride	mg/L	123
Nitrate+Nitrite	mg/L	4.75
Cyanide, free	µg/L	4.4
Bis (2-ethylhexyl) phthalate	µg/L	AA(2.19)
Toluene	µg/L	3.39

AA = not detected (analytical method detection limit)

Table 8. Effluent Characterization Using Self-Monitoring Data (Jan. 2016 – Aug. 2021)

		Current Limits			Percentiles		
Parameter	**Unit**	**30 Day**	**Daily**	**# Obs**	**50th**	**95th**	**Data Range**
Water Temperature	°C	Monitoring Only		2068	16.4	22.9	9.85 - 29.4
Dissolved Oxygen - 2016-2016	mg/L	--	5.0[m]	330	8.42	6.07*	5.26 - 13.5
Dissolved Oxygen - 2016-2021	mg/L	--	6.0[m]	1675	7.7	6.22*	2.54 - 13
Total Suspended Solids - All	kg/day	396	593[w]	724	43.5	231	0 - 4380
Total Suspended Solids - All	mg/L	12	18[w]	724	3.2	12.7	0 - 196
Total Suspended Solids - Summer	kg/day	341	512[w]	378	34.9	108	0 - 429
Total Suspended Solids - Summer	mg/L	20	30[w]	378	3	7.03	0 - 35.5
Total Suspended Solids - Winter	kg/day	512	768[w]	350	77.9	577	2.92 - 4380
Total Suspended Solids - Winter	mg/L	30	45[w]	350	5.1	29.5	.3 - 196
Oil and Grease	mg/L	--	10	68	< 5	< 5	0 - 7.3
Nitrogen, Ammonia - Dec. - Feb.	kg/day	255	383[w]	175	35.5	170	.629 - 260
Nitrogen, Ammonia - Dec. - Feb.	mg/L	15	22.5[w]	175	2.47	8.47	.06 - 12.4
Nitrogen, Ammonia - Fall/Spring	kg/day	153	230[w]	175	33.2	128	0 - 187
Nitrogen, Ammonia - Fall/Spring	mg/L	9.0	13.5[w]	175	2.07	7.61	0 - 8.55
Nitrogen, Ammonia - Summer - 2020-2021	kg/day	33	49.4[w]	65	.672	1.86	0 - 8.5
Nitrogen, Ammonia - Summer - 2016-2020	kg/day	49.4	74.9[w]	396	19	61.9	0 - 116
Nitrogen, Ammonia - Summer - 2020-2021	mg/L	1.0	1.5[w]	65	.05	.182	0 - .64
Nitrogen, Ammonia - Summer - 2016-2020	mg/L	2.9	4.4[w]	396	1.69	4.94	0 - 8.71
Nitrogen, Ammonia - Winter	kg/day	98.8	149[w]	360	29	148	0 - 260

Table 8. Effluent Characterization Using Self-Monitoring Data (Jan. 2016 – Aug. 2021) Continued.

		Current Limits			Percentiles		
Parameter	**Unit**	**30 Day**	**Daily**	**# Obs**	**50th**	**95th**	**Data Range**
Nitrogen, Ammonia - Winter	mg/L	3.0	4.5[w]	360	1.76	7.84	0 - 12.4
Nitrogen Kjeldahl, Total	mg/L	Monitoring Only		68	2.09	7.73	0 - 13.4
Nitrite Plus Nitrate, Total	mg/L	Monitoring Only		68	5.5	11.9	0 - 17.6
Phosphorus, Total	mg/L	Monitoring Only		292	1.87	3.77	0 - 7.2
Orthophosphate, Dissolved	mg/L	Monitoring Only		57	1.53	3.89	0 - 5.6
Cyanide, Free	mg/L	Monitoring Only		3	--	--	< .01
Arsenic, TR	µg/L	Monitoring Only		20	--	--	< 5
Selenium, TR	µg/L	Monitoring Only		20	--	--	< 4
Barium, TR	µg/L	Monitoring Only		3	69.4	73.6	64.7 - 74.1
Nickel, TR	µg/L	Monitoring Only		23	--	--	<8
Silver, TR	µg/L	Monitoring Only		23	--	--	< 0.5
Zinc, TR	µg/L	Monitoring Only		23	33.9	42.3	0 - 48
Cadmium, TR	µg/L	Monitoring Only		23	--	--	< 3
Lead, TR	µg/L	Monitoring Only		23	--	--	< 10
Chromium, TR	µg/L	Monitoring Only		23	--	--	< 7
Copper, TR	µg/L	Monitoring Only		31	<8	5.93	0 - 9.6
Molybdenum, TR	µg/L	Monitoring Only		20	--	--	< 10
Chromium, Dissolved Hexavalent	µg/L	Monitoring Only		23	--	--	< 3
E. coli	#/100 mL	126	284[w]	508	34	853	1 - 2420

Table 8. Effluent Characterization Using Self-Monitoring Data (Jan. 2016 – Aug. 2021) Continued.

		Current Limits			Percentiles		
Parameter	**Unit**	**30 Day**	**Daily**	**# Obs**	**50th**	**95th**	**Data Range**
Bis(2-ethylhexyl) Phthalate	µg/L	Monitoring Only		20	< 5	.0745	0 - 1.49
Flow Rate	MGD	Monitoring Only		2068	3.5	6.18	0.46 - 12.7
Chlorine, Total Residual	mg/L	--	0.035	736	< .0064	0.02	0 - 0.54
Mercury, Total	ng/L	Monitoring Only		68	1.34	4.04	0 - 9.19
Cyanide, Free (Low-Level)	µg/L	Monitoring Only		20	< 3	0.275	0 - 5.5
Acute Toxicity, Ceriodaphnia dubia	TUa	Monitoring Only		4	< 0.2	0.017	0 - .02
Chronic Toxicity, Ceriodaphnia dubia	TUc	Monitoring Only		4	--	--	< 1
Acute Toxicity, Pimephales promelas	TUa	Monitoring Only		4	--	--	< .2
Chronic Toxicity, Pimephales promelas	TUc	Monitoring Only		4	< 1	1.62	0 - 1.9
pH, Maximum	S.U.	--	9.0	2058	7.4	7.9	6.8 - 8.9
pH, Minimum	S.U.	--	6.5[m]	2047	7.3	7*	6 - 8.1
Residue, Total Filterable	mg/L	Monitoring Only		23	506	585	326 - 598
CBOD 5 day - All	kg/day	330	494[w]	662	30	99.1	6.16 - 1780
CBOD 5 day - All	mg/L	10	15[w]	662	2.23	5.21	.6 - 79.4
CBOD 5 day - Summer	kg/day	256	392[w]	357	26.5	53.8	7.56 - 110
CBOD 5 day - Summer	mg/L	15	23[w]	357	2.26	3.85	1.01 - 5.86
CBOD 5 day - Winter	kg/day	392	682[w]	333	44.1	193	11.7 - 1780
CBOD 5 day - Winter	mg/L	23	40[w]	333	2.77	9.44	1.16 - 79.4

* = for minimus pH, 5th percentile shown in place of 50th percentile. w = weekly average.

**=for dissolved oxygen, 5th percentile shown in place of 95th percentile.

Table 9. Projected Effluent Quality (PEQ) for Outfall 001

Parameter	Units	No. of Samples	Number > MDL	PEQ Average	PEQ Maximum
Self-Monitoring (DMR) Data					
Ammonia (Summer)	mg/L	305	302	7.455	12.32
Ammonia (Winter)	mg/L	211	208	15.90	24.06
Arsenic - TR	µg/L	19	1	5.110	7
Bis(2-ethylhexyl) phthalate	µg/L	26	2	5	6.851
Cadmium - TR	µg/L	1	1	0.225	0.308
Chromium - TR	µg/L	1	1	3.227	4.421
Chromium VI - Diss	µg/L	23	0	--	--
Copper - TR	µg/L	37	7	8.426	12.98
Cyanide - free	µg/L	21	2	5.22	7.15
Total Filterable Residue	mg/L	24	24	577	658
Lead - TR	µg/L	1	1	1.607	2.2
Mercury - TR (BCC)	ng/L	68	61	3.294	5.094
Molybdenum	µg/L	20	0	--	--
Nickel - TR	µg/L	13	1	5.84	8
Nitrate-N + Nitrite-N	mg/L	69	68	12.23	18.86
Phosphorus	mg/L	292	291	4.022	5.972
Selenium - TR	µg/L	1	1	3.562	4.879
Silver	µg/L	29	0	--	--
TKN	mg/L	68	65	6.584	10.38
Zinc - TR	µg/L	29	28	42.26	54.4
(Pretreatment Program Reports and Ohio EPA data)					
Aluminum	µg/L	1	1	130.8	179.2
Antimony	µg/L	6	1	0.62	0.84
Barium	µg/L	4	4	140.6	192.7
Chlorides	mg/L	1	1	556.7	762.6
Chlorine - TRes	mg/L	736	76	0.02	0.02
Iron - TR	µg/L	1	1	352	482
Manganese - TR	µg/L	1	1	204.6	280.2
Strontium	µg/L	1	1	3634	4979
Toluene	µg/L	6	1	5.20	7.12

BCC= Bioaccumalative Chemical of Concern
DMR= Discharge Monitoring Report
MDL=analytical method detection limit
TR=total recoverable

Table 10. Summary of Acute and Chronic Toxicity Results

	Ceriodaphnia Dubia		*Pimephales Promelas*	
Date	**Acute (Tu_a)**	**Chronic (Tu_c)**	**Acute (Tu_a)**	**Chronic (Tu_c)**
9/1/2016	AA (0.2)	AA (1.0)	AA (0.2)	AA (1.0)
9/18/2017	AA (0.2)	AA (1.0)	AA (0.2)	AA (1.0)
9/21/2018	AA (0.2)	AA (1.0)	AA (0.2)	1.9
9/1/2019	AE	AE	AE	AE
11/20/2019*	AA(0.2)	AA(5.0)	AA(0.2)	AA(5.0)
12/5/2019	AA (0.2)	AA (1.0)	AA (0.2)	AA (1.0)
9/21/2020	0.02	AA (1.0)	AA (0.2)	AA (1.0)

*Ohio EPA bioassay

AA = non-detection; (analytical method detection limit)

AE= analytical data not valid, retest 12/5/2019

TU_a = acute toxicity unit

TU_c = chronic toxicity unit

Table 11. Use Attainment Table

Location	**River Mile**	**Use Designation**	**Attainment Status**	**Causes of Impairment**	**Sources of Impairment**
Great Miami River at SR 47, North St.	130.0	EWH	Full		
Great Miami River Dst Sidney WWTP	127.7	EWH	Full		
Great Miami River Dst. Piqua WWTP	114.0	EWH	Full		
Great Miami River from Dst. Troy WWTP to Ust. of Tri-Cities WWTP	104.7-87.0	EWH	Full		
Great Miami River dst. Tri-Cities WWTP	85.9	EWH	Partial	Ammonia	Major WWTP

EWH = exceptional warmwater habitat

SR=State Route

Dst=downstream

Ust=upstream

Table 12. Water Quality Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria					Inside Mixing Maximum
		Average				Maximum Aquatic Life	
		Human Health Drinking[A]	Human Health Non-Drink[A]	Agri-culture	Aquatic Life		
Aluminum	µg/L	--	--	--	--	--	--
Ammonia (Summer)	mg/L	--	--	--	1	--	--
Ammonia (Winter)	mg/L	--	--	--	3	--	--
Antimony	µg/L	6	4300	--	190	900	1800
Arsenic - TR [B]	µg/L	10	--	100	150	340	680
Barium [B]	µg/L	2000	--	--	220	2000	4000
Bis(2-ethylhexyl)	µg/L	6	59	--	8.4	1100	2100
Cadmium - TR [B]	µg/L	5	--	50	5.7	15	30
Chloride [B]	mg/L	250000	--	--	--	--	--
Chlorine - TRes [B]	mg/L	4	--	--	0.011	0.019	0.038
Chromium - TR [B]	µg/L	100	--	100	210	4300	8700
Chromium VI - Diss [B]	µg/L	--	--	--	11	16	31
Copper - TR [B]	µg/L	--	1300	500	23	38	77
Cyanide - free [B]	µg/L	200	22000	--	12	46	92
Iron - TR [B]	µg/L	--	--	5000	--	--	--
Lead - TR [B]	µg/L	--	--	100	25	480	960
Manganese - TR	µg/L	--	--	--	--	--	--
Mercury - TR (BCC)	ng/L	12	12	10000	910	1700	--
Molybdenum [B]	µg/L	--	--	--	20000	190000	370000
Nickel - TR [B]	µg/L	610	4600	200	130	1200	2300
Nitrate-N + Nitrite-N	mg/L	10	--	100	--	--	--
Phosphorus	mg/L	--	--	--	--	--	--
Selenium - TR [B]	µg/L	50	11000	50	5	62	120
Silver [B]	µg/L	50	--	--	1.3	10	20
Strontium [B]	µg/L	--	--	--	21000	40000	81000
TKN	mg/L	--	--	--	--	--	--
Toluene	µg/L	1000	200000	--	62	560	1100
Total Filterable Residue [B]	mg/L	--	--	--	1500	--	--
Zinc - TR [B]	µg/L	9100	69000	25000	300	300	590

[A] Human health drinking water criteria (dual-route exposure) apply within 500 yards of the Piqua WTP intake at RM 118. Non-drinking (single route exposure) criteria apply elsewhere.

[B] This parameter was found in the effluent of another discharger in this segment and was modeled interactively.

[C] Carcinogen

TR = Total Recoverable

BCC = Bioaccumulative Chemical of Concern

Table 13. Instream Conditions and Discharger Flow

Parameter	Units		Value	Basis
GMR above Sidney				
1Q10	cfs	annual	19.4	USGS gage #03261500, 1927-2021 data
7Q10	cfs	annual	24.0	USGS gage #03261500, 1927-2021 data
30Q10	cfs	summer	29.0	USGS gage #03261500, 1927-2020 data
	cfs	winter	67.2	USGS gage #03261500, 1927-2021 data
Harmonic Mean Flow	cfs	annual	119.2	USGS gage #03261500, 1927-2021 data
Mixing Assumption (GMR and Tributaries)	%	average	100	Stream-to-discharge ratio
	%	maximum	100	Stream-to-discharge ratio
Loramie Creek at Mouth				
1Q10	cfs	annual	2.71	USGS gage #03262000, 1916-2020 data
7Q10	cfs	annual	3.43	USGS gage #03262000, 1916-2020 data
30Q10	cfs	summer	4.29	USGS gage #03262000, 1916-2020 data
	cfs	winter	8.34	USGS gage #03262000, 1915-2020 data
Harmonic Mean Flow	cfs	annual	21.76	USGS gage #03262000, 1916-2020 data
Rush Creek at mouth				
1Q10	cfs	annual	0.66	USGS gage #03261500, 1927-2021 data
7Q10	cfs	annual	0.82	USGS gage #03261500, 1927-2021 data
30Q10	cfs	summer	0.99	USGS gage #03261500, 1927-2020 data
	cfs	winter	2.28	USGS gage #03261500, 1927-2021 data
Harmonic Mean Flow	cfs	annual	4.05	USGS gage #03261500, 1927-2021 data
Sidney WWTP				
Outfall 001 flow rate	cfs (MGD)	design	10.83 (7.0)	NPDES permit application
Miami River Stone				
Outfall 001 flow rate	cfs (MGD)	average	1.53 (0.99)	Annual average
Piqua Minerals				
Outfall 002 flow rate	cfs (MGD)	average	4.83 (3.12)	Annual average
Piqua WWTP				
Outfall 001 flow rate	cfs (MGD)	design	13.46 (8.7)	NPDES permit application
Piqua Minerals				
Outfall 001/4 flow rate	cfs (MGD)	average	4.93 (3.19)	Annual average
Troy WWTP				
Outfall 001 flow rate	cfs (MGD)	design	10.83 (7.0)	NPDES permit application
Piqua WTP				
Intake flow rate	cfs (MGD)		10.44 (6.75)	Annual average
Instream Hardness	mg/l	annual	292	DMR (Troy 901); 67 values, 2016-2021

Table 13. Instream Conditions and Discharger Flow – Continued.

Parameter	Units		Value	Basis
Background Water Quality for the Great Miami River:				
Ammonia	mg/L	summer	0.06	DMR; 23 values, 0<MDL, 2016-2021
Ammonia	mg/L	winter	0.09	DMR; 17 values, 0<MDL, 2016-2021
Arsenic	µg/L	annual	1	STORET; 30 values, 16<MDL, 2007-20
Barium	µg/L	annual	98	STORET; 30 values, 0<MDL, 2007-20
Bis(2-ethylhexyl) phthalate	µg/L	annual	5.13	STORET; 10 values, 7<MDL, 2008-20
Cadmium	µg/L	annual	0	STORET; 30 values, 30<MDL, 2007-20
Chlorine, Total Residual	mg/L	annual	0	No representative data available.
Chlorides	mg/L	annual	38.4	STORET; 40 values, 0<MDL, 2007-20
Chromium	µg/L	annual	1	STORET; 30 values, 29<MDL, 2007-20
Chromium VI - Diss	µg/L	annual	0	No representative data available.
Copper	µg/L	annual	1	STORET; 30 values,19<MDL, 2007-20
Cyanide, free	µg/L	annual	0	No representative data available.
Dibenz(a,h)anthracene	µg/L	annual	0	No representative data available.
Iron	µg/L	annual	639	STORET; 29 values, 0<MDL, 2007-20
Lead	µg/L	annual	1	STORET; 30 values, 23<MDL, 2007-20
Molybdenum	µg/L	annual	0	No representative data available.
Nickel	µg/L	annual	3.25	STORET; 30 values,2<MDL, 2007-20
Selenium	µg/L	annual	0	STORET; 30 values,30<MDL, 2009-20
Silver	µg/L	annual	0	No representative data available.
Strontium	µg/L	annual	1655	STORET; 30 values,0<MDL, 2009-20
Total Filterable Residue	µg/L	annual	403	STORET; 40 values,0<MDL, 2007-20
Zinc	µg/L	annual	5	STORET; 31 values,17<MDL, 2007-20

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

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
		Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Ammonia (Summer)	mg/L	--	--	2.771	--	--
Ammonia (Winter)	mg/L	--	--	24.78	--	--
Arsenic - TR [B]	µg/L	--	558	299	625	680
Barium	µg/L	--	--	354	3608	4000
Bis(2-ethylhexyl) phthalate	µg/L	315	--	8.4	2021	2100
Cadmium – TR [B]	µg/L	--	282 [A]	11.39	27.58	30
Chlorine - TRes	mg/L	27.81 [A]	--	0.024	0.037	0.038
Chromium - TR [B]	µg/L	--	552	418	7909	8700
Chromium VI - Diss	µg/L	--	--	22.01	29.43	31
Copper - TR	µg/L	7313 [A]	2806 [A]	43.99	68.24	77
Cyanide - free	µg/L	123940 [A]	--	24.01	84.62	92
Iron - TR [B]	µg/L	--	20241	--	--	--
Lead - TR [B]	µg/L	--	557	48.96	882	960
Mercury - TR [C]	ng/L	12	10000 [A]	910	1700	--
Molybdenum [B]	µg/L	--	--	40017	349515	370000
Nickel - TR [B]	µg/L	25893 [A]	1105	257	2205	2300
Selenium - TR	µg/L	61969 [A]	281	9.887	114	120
Silver [B]	µg/L	--	--	2.601	18.4	20
Strontium [B]	µg/L	--	--	40885	72680	81000
Total Filterable Residue	mg/L	--	--	2604	--	--
Zinc - TR [B]	µg/L	388675 [A]	140794 [A]	591 [A]	545	590

[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 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 3745-02-05(A)(2)(e)

Table 15. Parameter Assessment

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

Aluminum	Chlorides	Nitrogen Kjeldahl, Total
Phosphorus	Manganese - TR	

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

Antimony	Arsenic - TR	Beryllium
Cadmium - TR	Chromium - TR	Chromium VI - Diss
Iron - TR	Strontium	Thallium
Molybdenum	Nickel - TR	Nitrate-N + Nitrite-N
Lead - TR	Silver	Toluene
Zinc - TR		

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

Barium	Bis(2-ethylhexyl) phthalate	Copper - TR
Cyanide - free	Mercury - TR	Selenium - TR
Total Filterable Residue		

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

Ammonia – W	Chlorine – Tres [B]

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

			Recommended Effluent Limits	
Parameter	Units	Period	Average	Maximum
Ammonia - S[A]	mg/L	summer	2.771	--

[B] = requires a permit tracking requirement in accordance with OAC 3745-33-07(A)(2) since the PEQ is > or = 75 percent of the PEL.

PEL = preliminary effluent limit

PEQ = projected effluent quality

TR = total recoverable

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[e]	--	--	WQS
Total Suspended Solids	mg/L	12	18[d]	396	593[d]	PD
Oil & Grease	mg/L	--	10	--	--	WQS
Ammonia						
Winter	mg/L	3.0	4.5[d]	98.8	149[d]	PD
Summer	mg/L	1.0	1.5[d]	33	49.4[d]	PD
Total Kjeldahl Nitrogen	mg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Nitrate+Nitrite	mg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Phosphorus	mg/L	- - - - - - - - - - Monitor - - - - - - - - - -				PMR
Orthophosphate, Dissolved	mg/L	- - - - - - - - - - Monitor - - - - - - - - - -				PMR
Selenium	µg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Nickel	µg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Silver	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
Molybdenum	µg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Hex. Chromium (dissolved)	µg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
E. coli	#/100 ml	126	284[d]	--	--	WQS
Flow Rate	MGD	- - - - - - - - - - Monitor - - - - - - - - - -				M[c]
Mercury	ng/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Cyanide, Free	µg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M
Acute Toxicity						
Ceriodaphnia dubia	TU_a	- - - - - - - - - - Monitor - - - - - - - - - -				WET
Pimephales promelas	TU_a	- - - - - - - - - - Monitor - - - - - - - - - -				WET
Chronic Toxicity						
Ceriodaphnia dubia	TU_c	- - - - - - - - - - Monitor - - - - - - - - - -				WET
Pimephales promelas	TUc	- - - - - - - - - - Monitor - - - - - - - - - -				WET
pH	SU	6.5 - 9.0		--	--	WQS
Total Filterable Residue	mg/L	- - - - - - - - - - Monitor - - - - - - - - - -				M

Table 16. Final Effluent Limits for Outfall 001, continued.

		Concentration		Loading (kg/day)[a]		
		30 Day	Daily	30 Day	Daily	
Parameter	Units	Average	Maximum	Average	Maximum	Basis[b]
CBOD 5 day	mg/L	10	15[d]	330	494[d]	PD

[a] Effluent loadings based on average design discharge flow of 8.7 MGD.

[b] Definitions:

CFR = Code of Federal Regulations

M = Division of Surface Water NPDES Permit Guidance 1: Monitoring frequency requirements for Sanitary Discharges

NPDES = National Pollutant Discharge Elimination System

OAC = Ohio Administrative Code

PD = Plant Design (OAC 3745-33-05(E))

PMR=Phosphorus Monitoring Requirements at OAC 6111.03

RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in permits (OAC 3745-33-07(A))

WET = Minimum testing requirements for whole effluent toxicity [OAC 3745-33-07(B)(11)] toxicity in NPDES permits [OAC 3745-33-07(B)]

WLA = Wasteload Allocation procedures (OAC 3745-2)

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.

[e] Minimum.

Attachment 1. Ohio River Basin Whole Effluent Toxicity

Reasonable Potential for Ohio EPA NPDES Permits

Reviewer:	Mary Osika
Date:	2/3/2022

Facility Name:	Piqua WWTP
Permit Number:	1PD0008
Date Range Searched	1/1/16 to 9/1/21

Outfall # 001				
	Water flea (*Ceriodaphnia dubia)*		Fathead minnow (*Pimephales promelas)*	
	Acute	Chronic	Acute	Chronic
WLA	1.0 TUa	6.81 TUc	1.0 TUa	6.81 TUc
# of tests	6	6	6	6
Maximum value	0.2	AA	AA	1.9
Percent of tests greater than WLA	0	0	0	0
Geometric mean	0.13	1.3	0.2	1.4
Average Exceedance (Geomean * Per cent of tests greater than WLA)	0	0	0	0
Average Exceedance / WLA	0	0	0	0

Factors to consider [OAC 3745-33-07(B)(1)]	
(a) The magnitude, frequency and variability of toxicity discharged.	Included in Table 1.
(b) The degree and type of near-field and far-field effects in the receiving water as measured by physical, chemical, toxicity or biological index measurements	Included in Table 1.
(c) The quality and quantity of each type of data available.	Included in Table 1.
(d) Other relevant factors.	
See Table 1 below	

Optional information if available Impacts Table 1(A)(4) and (A)(5) (NOT EVALUATED)	
Is there near-field data available?	Complete Table 1(B)
Is there far-field data available?	Complete Table 1(C)
Results – Hazard Categorization	

	Water flea		Fathead minnow	
	Acute	Chronic	Acute	Chronic
Effluent Toxicity	4	4	4	4
Near-Field Impact	NE		NE	
Far-field Impact		NE		NE
Overall Categorization	4		4	

NE = not evaluated

Table 1. Attribute Evaluated	Hazard Category 1	Hazard Category 2	Hazard Category 3	Hazard Category 4
Degree of toxicity problem	Adequately Documented	Strongly Suspected	Possible	None
(A) Effluent toxicity				
.....(1) Minimum number of tests (Actual number **6**)	**3 YES**	1	0 or 1	0 or 1
.....(2) Per cent of tests greater than WLA (Actual per cent **0**)	> 30	20 to 30	10 to 20	**< 10 YES**
.....(3) Effluent geometric mean TU TUa (**0.2**) TUc **(1.4**) P. promelas				
.....(4) Average exceedance[1] (Geometric Mean TU_x * Per cent of tests greater than WLA)	P. promelas only			
.....(a) Without paragraph (B) and (C) of this table available				
.....(i) Acute[2]	> 0.3	≥ 0.3	≥ 0.2	**< 0.2 YES**
.....(ii) Chronic	> 0.3 x WLA	≥ 0.3 x WLA	**≥** 0.2 x WLA	**< 0.2 x WLA YES**
.....(b) With paragraph (B) or (C) of this table available				
.....(i) Acute[2]	> 0.5	≥ 0.3	≥ 0.3	< 0.3
.....(ii) Chronic	> 0.67 x WLA	≥ 0.5 x WLA	≥ 0.5 x WLA	< 0.5 x WLA
.....(5) Maximum TU value TUa (**0.2**) TUc (**1.4**)	Chronic only for P. promelas			
.....(a) Without paragraph (B) and (C) of this table available	≥ 3 x WLA	**≥** 1 x WLA	**≥** 1 x WLA	**< 1 x WLA YES**

Table 1. Attribute Evaluated	Hazard Category 1	Hazard Category 2	Hazard Category 3	Hazard Category 4
Degree of toxicity problem	Adequately Documented	Strongly Suspected	Possible	None
.....(b) With paragraph (B) or (C) of this table available and confirming toxic impact	> 1 x WLA	≥ 1 x WLA	≥ 0.5 x WLA	< 0.5 x WLA
(B) Near-field impact				
.....(1) Mortality within mixing zone[3]	≥ 20%	≤ 20%	≤ 20%	< 20%
.....(2) Stream community impact within mixing zone				
.....(a) Implied chemically[4]	≥ 3 x IMZM	≥ 1.5 x IMZM	≥ IMZM	≤ 0.5 x IMZM
.....(b) Implied toxicologically[4]	≥ 1.0 TUa	≥ 1.0 TUa	≥ 1.0 TUa	< 1.0 TUa
.....(c) Measured biologically	Toxic or severe unknown signature	Fair/poor community	Slight impact or unknown impact signature	None or non-toxic signature
(C) Far-field impact				
.....(1) Aquatic life use impairment (Ohio EPA biological criteria) ….(2) stream community impact	Yes[5]	Yes or partial[5]	Partial	None or non-toxic signature
.....(a) Implied toxicologically[3]	Significant effect	Significant effect	Unknown or slight effect	None
.....(3) Other indicators	Stress indicated	Stress indicated	Stress indicated	No stress

[1] Compare (per cent exceedances x geometric mean TU) to table factor.

[2] Use 0.3 x WLA for situations where AIM exists.

[3] Results of ambient toxicity test are not binding or required for classification as to category but, if available, will be interpreted under the weight of evidence principle giving due consideration as to sampling location and conditions.

[4] Based on effluent data. May not be appropriate for situations where AIM exists.

[5] Lack of attainment due to toxic, complex or unidentifiable type of impact.

Attachment 2. 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