National Pollutant Discharge Elimination System (NPDES) Permit Program

F A C T   S H E E T
(Revised)

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for Warren Water Pollution Control Facility

Public Notice No.: 11-12-004
Public Notice Date: December 1, 2011
Comment Period Ends: January 12, 2012

OEPA Permit No.: 3PE00008*ND
Application No.: OH0027987

Name and Address of Applicant:

City of Warren
2323 Main Street
Warren, Ohio 44481

Name and Address of Facility Where Discharge Occurs:

Warren Water Pollution Control Facility
2323 Main Street
Warren, Ohio

Receiving Water: Mahoning River

Subsequent Stream Network: Beaver River (PA), Ohio River

Introduction

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

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

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

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

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

Summary of Permit Conditions

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

A slightly lower limit is proposed for total residual chlorine based on the wasteload allocation.

Final effluent limits are proposed for *Escherichia coli.* New water quality standards for *E. coli* became effective in March 2010. A compliance schedule is proposed for meeting these new final effluent limits. Based on best engineering judgment, it is proposed that the plant comply with its current fecal coliform limits during the interim period.

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

Current permit limits for free cyanide are being removed because effluent data shows that it no longer has the reasonable potential to contribute to exceedances of water quality standards. Continued monitoring is proposed.

The current monitoring requirement for strontium is being removed from the permit because effluent data show that it is present at levels that do not pose environmental concerns.

In Part II of the permit, special conditions are included that address sanitary sewer overflow reporting; operator certification, minimum staffing and operator of record; whole effluent toxicity testing; tracking of group 4 parameters; outfall signage; disposal of brine wastewater; and pretreatment program requirements.

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Procedures for Participation in the Formulation of Final Determinations

A public hearing on this NPDES permit renewal is scheduled for 6:00 PM, Thursday, January 12, 2012, at the Warren G. Harding High School , 860 Elm Avenue, Warren, Ohio 44483.

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

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

For additional information about this fact sheet or the draft permit, contact Gary Stuhlfauth, (614) 644-2026, Gary.Stuhlfauth@epa.ohio.gov

Location of Discharge/Receiving Water Use Classification

The Warren wastewater treatment plant (WWTP) discharges to the Mahoning River at River Mile (RM) 35.25. Figure 1 shows the approximate location of the facility.

This segment of the Mahoning River is described by Ohio EPA River Code: 18-001, U.S. EPA River Reach #: 05030103-050, County: Trumbull, Ecoregion: Erie Drift Plain. The Mahoning River is designated for the following uses under Ohio's Water Quality Standards (OAC 3745-1-25): Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Class A Primary Contact Recreation (PCR).

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

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

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

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

Facility Description

The Warren Water Pollution Control Facility has an average daily design flow of 16 MGD (million gallons per day). Wet stream processes are screening and grit removal, primary settling, activated sludge aeration, final clarification, chlorination, dechlorination and post aeration. Solid stream processes are thickening by dissolved air floatation, dewatering using a belt filter press, lime stabilization, and disposal of stabilized sludge by land application or by distribution and marketing of exceptional quality sludge.

The City of Warren completed separation of its combined sewer system in September 2006. Infiltration and inflow continued, causing basement backups in the downtown business area during an intense rain storm. An old CSO was reopened - now the High Street sanitary sewer overflow - to stop the backups. The current NPDES permit for the Warren plant included a compliance schedule to eliminate collection system overflows and a headworks bypass (station 602) by January 31, 2012, the permit's expiration date.

The City eliminated the headworks bypass. Due to project delays, in September 2011 the City requested that Ohio EPA allow until late spring/early summer 2012 for elimination of the High Street sanitary sewer overflow. A compliance schedule in the renewal permit requires elimination by July 31, 2012.

The City implements an Ohio EPA-approved industrial pretreatment program. Based on information in its September 2011 NPDES renewal application, nine categorical industrial users and one significant noncategorical industrial user discharge an average of 1.019 MGD to the Warren wastewater plant.

Disposal of Brine Wastewater at the Warren Wastewater Treatment Plant

In June 2010, the City requested a modification of its NPDES permit to allow the plant to accept brine wastewater generated by Marcellus Shale hydraulic fracturing operations. In September, the Agency issued a permit modification that became effective on December 1, 2010. A provision in the permit's compliance schedule allowed the plant to accept a maximum of 100,000 gallons per day of wastewater with a maximum total dissolved solids concentration of 50,000 mg/l from a regulated centralized waste treatment (CWT) facility that is tributary to the City's collection system. The permit required monitoring of several brine-related parameters as well as quarterly toxicity testing.

The City and the CWT appealed the permit modification to the Environmental Review Appeals Commission because of the restrictions it placed on the wastewater plant's ability to accept brine wastewater. On November 1, 2011, the Director of Ohio EPA filed a *Determination of Unlawful Permit Issuance* with the Commission and requested that the permit be remanded back to the Agency for further action consistent with Ohio law.

The disposal of brine wastewater from oil or gas drilling, exploration or production through a wastewater treatment plant and discharge to waters of the state is not an authorized method of disposal under section 1509.22(C) of the Ohio Revised Code unless and until it is approved by the Chief of the Division of Oil and Gas Resources Management for testing or implementing a new technology or method of disposal. The proposed renewal of the NPDES permit for the Warren wastewater treatment plant is not an approval of a new technology or method of disposal for brine wastewater from oil or gas drilling, exploration or production.

Description of Existing Discharge

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

Table 2 presents a summary of unaltered Discharge Monitoring Report (DMR) data for outfall 3PE00008001. Data are presented for the period January 2006 through September 2011, and current permit limits are provided for comparison.

Table 3 summarizes the chemical specific data for outfall 001 by presenting the average and maximum Projected Effluent Quality (PEQ) values.

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

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

Assessment of Impact on Receiving Waters

Figure 2 presents the large river assessment unit results for the Mahoning River mainstem downstream from Eagle Creek to the Pennsylvania border from the *Ohio 2010 Integrated Water Quality Monitoring and Assessment Report* (March 8, 2010; Ohio EPA). The complete report is available at the following Ohio EPA web site:

http://epa.ohio.gov/dsw/tmdl/2010IntReport/2010OhioIntegratedReport.aspx .

The next Ohio EPA survey of the Mahoning River is scheduled for 2013. A TMDL (total maximum daily loads) study to address impairments identified during the survey is scheduled for 2016.

In September 2004, U.S. EPA Region 5 finalized the *Mahoning River Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria*. The TMDL addresses segments of the Mahoning River where the Primary Contact designated use was impaired by fecal coliform, including Eagle Creek, downstream to Mosquito Creek and Mill Creek, and further downstream to the Pennsylvania border. The report identified fecal coliform reductions necessary to meet the Primary Contact recreational use. This report is available at the following Ohio EPA web site:

http://www.epa.ohio.gov/dsw/tmdl/MahoningRiverTMDL.aspx .

The most recently published Ohio EPA survey of the Mahoning River basin is the *Biological and Water Quality Study of the Mahoning River Basin* (Ohio EPA Technical Report MAS/1995-12-14; May 1, 1996). This report is available at the following Ohio EPA web site:

http://www.epa.ohio.gov/portals/35/documents/mahon94.pdf .

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. In addition, antidegradation and whole effluent toxicity issues must be addressed.

As in past modeling studies, all facilities discharging to the Mahoning River mainstem between the Leavittsburg dam and the Ohio-Pennsylvania boundary are considered interactive and are included in the wasteload allocation (WLA). The WLA contains a total of 23 outfalls from six municipal wastewater treatment plants (WWTP) and seven industrial facilities, as follows:

Warren Steel Holdings (CSC Industries)
Thomas Steel Strip
RG Steel - Warren
ArcelorMittal-Warren
Warren WWTP
RMI-Niles
GenOn Niles Power
Niles WWTP
McDonald Steel
Campbell WWTP
Youngstown WWTP
Lowellville WWTP
Struthers WWTP

Four dischargers located on tributaries are allocated separately from the mainstem discharges: Meander Creek WWTP (Meander Creek), Girard WWTP (Little Squaw Creek), Mosquito Creek WWTP (Mosquito Creek), and Boardman WWTP (Mill Creek). Travel time to and distance from the Mahoning River are considered large enough that, for modeling purposes, the effluents from the respective treatment plants are considered non-interactive with the direct dischargers to the Mahoning. Effluents from these four treatment plants were allocated to meet water quality standards for the conditions, habitat, and use designation for their particular receiving waters and separate Permit Support Documents were prepared for each facility. Monitoring was conducted downstream of these dischargers or at the mouths of these tributaries, however, for inputs into the Mahoning River mainstem model. Figure 3 is a schematic of the Mahoning River study area.

Parameter Selection Effluent data for the Warren wastewater plant were used to determine what parameters should undergo wasteload allocation. The parameters discharged are identified by the data available to Ohio EPA - Monthly Operating Report (MOR) 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	January 2006 through September 2011
Pretreatment data	2006 - 2010
OEPA compliance sampling data	April and October 2010

The data were examined for outliers, and no values were eliminated from the data set.

This data is evaluated statistically, and Projected Effluent Quality (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. The average and maximum PEQ values are presented in Table 3.

The PEQ values are used according to Ohio rules to compare to applicable water quality standards (WQS) and allowable wasteload allocation (WLA) values for each pollutant evaluated. Initially, PEQ values are compared to the applicable average and maximum WQS. If both PEQ values are less than 25 percent of the applicable WQS, the pollutant does not have the reasonable potential to cause or contribute to exceedances of WQS, and no wasteload allocation is done for that parameter. If either PEQ_{avg} or PEQ_{max} is greater than 25 percent of the applicable WQS, a wasteload allocation is conducted to determine whether the parameter exhibits reasonable potential and needs to have a limit or if monitoring is required. See Table 10 for a summary of the screening results.

For total dissolved solids, the PEQ values were calculated using data submitted by the permittee during December 2010 and January 2011. The 33 data points used in the calculation were from days when the treatment plant was not receiving brine wastewater.

For barium and strontium, the PEQ values calculated using the Ohio EPA compliance data were used in the reasonable potential evaluation. These samples were collected prior to December 2010 when the plant would not have been receiving brine wastewater.

Water Quality Standards Ohio water quality standards (WQS) were used for all parameters except for chronic cadmium, chronic hexavalent chromium, chronic iron, chronic lead, chronic selenium and total dissolved solids. The Mahoning River enters Pennsylvania at about river mile (RM) 11.43, and Pennsylvania WQS must be met at that point. The Pennsylvania Aquatic Life criteria and Human Health criteria were met at the state line for all other parameters (metals and organics).

Flows in the Mahoning River Flows in the Mahoning River are contributed by a series of reservoirs in the headwaters and on Mosquito Creek, controlled and mostly owned by the U.S. Army Corps of Engineers. Constructed several decades ago to provide adequate flow for the steel industry of the Mahoning River valley, the reservoirs are operated on a schedule to maintain specific seasonal flows at Leavittsburg and Youngstown. The operation of the reservoir system is discussed at length in earlier USEPA Mahoning River studies (Amendola et al., 1977; Schregardus and Amendola, 1984).

Modeling Approach and Wasteload Allocations Appropriate effluent concentrations for dischargers to the Mahoning River were determined using two models: a Monte Carlo model for the six commonly allocated metals (cadmium, total chromium, copper, lead, nickel, and zinc) and the conventional Ohio EPA conservative parameter model (CONSWLA) for all other parameters. The models and their applications are discussed in the sections that follow and model inputs are presented.

Dissolved Metals Translators A dissolved metals translator (DMT) is the factor used to convert a dissolved metal aquatic life criterion to an effective total recoverable aquatic life criterion with which a total recoverable aquatic life allocation can be calculated as required in the NPDES permit process. Currently, a DMT is based on site- or area-specific field data; each field data sample consists of a total recoverable measurement paired with a dissolved metal measurement. For the Mahoning River, there were 5 such paired samples available applicable to copper, lead, and silver. To account for the limited quantity of data, the DMT for each of these metals was determined as the lower end of the 95% confidence interval (1-tail) about the geometric mean of the total recoverable-to-dissolved ratios of the sample pairs. A DMT for zinc, cadmium, chromium, and nickel could not be determined due to shortcomings in the data. Each DMT is metal-specific and is applied by multiplying the dissolved criteria by the DMT, resulting in total effective recoverable criteria which can be used in the wasteload allocation procedures.

The Monte Carlo Model

The application of the Monte Carlo method was limited to the six commonly allocated metals (cadmium, total chromium, copper, lead, nickel, and zinc). Previous allocations using the conventional Ohio EPA conservative parameter model resulted in stringent limits for these parameters that have been difficult for dischargers to maintain. As a result, Ohio EPA was asked to consider other methods for determining effluent limits that would adequately protect the river while allowing the dischargers some relief. The Monte Carlo method addresses these concerns, but does not guarantee more favorable discharge limits. This is the fifth permit cycle where a Monte Carlo method was used to determine the wasteload allocations for the six metals listed above.

Conventional water quality modeling methods project the receiving water pollutant concentration which will occur under critical low-flow conditions. The Monte Carlo probabilistic method, as applied to water quality modeling, projects the year-round probability distribution for the pollutant. This allows a more accurate determination of the frequency at which water quality criteria are violated or maintained. Conventional modeling methods, when applied to systems with numerous dischargers, may be overly conservative because they model all dischargers at their maximum permitted concentration. (The conventional methods assume that all facilities will simultaneously discharge at their permit limits during critical stream flow conditions, the probability of which decreases significantly as the number of discharges increases.) The Monte Carlo method accounts for the independent variability of discharges as well as other model inputs.

The Monte Carlo model for the Mahoning River was originally developed by Limno-Tech, Inc., for their 1993 study to determine alternative copper limits for Thomas Strip Steel. The model combines the Monte Carlo statistical method with a multi-discharge mass-balance model and allows upstream flow to be input from a historical gaging station flow record to account for unusual flow fluctuations caused by the numerous upstream dams and reservoirs. Ohio EPA approved the alternative limits developed using this model and received permission to modify and apply the model in the future. The original model was written in 1992-1993 in Borland Pascal. For this permit cycle, the model has been modified by the Ohio EPA and re-written in the ‘C’ programming language.

River Hardness and Water Quality Criteria Water quality criteria for the six metals depends on instream hardness. Thus, hardness is a key element in determining effluent limits. A detailed analysis of the available hardness and flow data was conducted. This analysis revises and updates the Ohio EPA analysis previously performed in 2006. Stream hardness data was taken from the two main STORET stations on the Mahoning River main stem, at Leavittsburg, Ohio (RM 45.51) and at Lowellville, Ohio (RM 12.42). The hardness data for the two stations was analyzed for the period October 2000 to September 2010.

A linear correlation between the Leavittsburg USGS gaging station flow and instream hardness was determined for both STORET stations. These correlations were then used to calculate hardness as a function of river mile at 129 cfs (Leavittsburg 1Q10 low flow) and 136 cfs (7Q10 low flow).

Acute Criteria, at 1Q10

river hardness (mg/L) = (-0.682)(river mile) + 185.82

<u>Chronic Criteria, at 7Q10</u>
river hardness (mg/L) = (-0.681)(river mile) + 185.62

Discharger hardness was calculated with these equations. This relationship established local river hardness for calculating outside-mixing-zone, hardness-dependent criteria in the Monte Carlo model. Inside-mixing-zone, maximum criteria were determined with effluent hardness data when available, or outside-mixing-zone hardness when effluent data was unavailable.

Table 5 contains the water quality criteria for the six metals in the vicinity of the Warren wastewater plant.

This Monte Carlo method uses a seven-day averaging period with a ten-year return period for meeting chronic (average) water quality criteria. A one-day averaging period with a ten-year return period is used for meeting the acute (maximum) water quality criteria. Since the chronic aquatic life criteria are less than or approximate to both the agriculture and human health criteria and since the return periods for both agriculture and human health criteria would be longer than ten years, the allocations that meet the average aquatic life criteria will be protective of the agriculture and human health criteria as well.

Federal rules require that a downstream state's water quality criteria be considered when calculating effluent limits. The Pennsylvania state line is at RM 11.43. Pennsylvania's standards are the same as Ohio's for copper, total chromium, nickel, and zinc. However, Pennsylvania's standards for cadmium and lead are more stringent than Ohio's and had to be considered. Since Pennsylvania uses, in effect, a one hundred-day return period, Ohio's acute criteria for those two metals, in combination with a ten-year return period, still meet Pennsylvania's water quality criteria. However, the same is not true for the chronic criteria.

Data Analysis for the Monte Carlo Model The Monte Carlo method accounts for individual system component variability by generating probability distributions that predict a range of possible input conditions. These distributions are derived from the mean and the coefficient of variation input by the user and based on field data for each of these components. Table 6 lists the calculated mean and coefficient of variation for such system characteristics as background/ambient concentrations and discharger and tributary flows.

<u>The Conservative Substance Wasteload Allocation Model (CONSWLA)</u>

The CONSWLA model was used to allocate all parameters not included in the Monte Carlo model. CONSWLA is the model Ohio EPA typically uses in multiple discharger situations. Different from the Monte Carlo model previously described, 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).

Pollutants are allocated by a mass-balance method. Wasteload allocations using this method are done using the following general equation: Discharger WLA = (downstream flow x WQS) - (upstream flow x background concentration). Discharger WLAs are divided by the discharge flow so that the allocations are expressed as concentrations. This technique is appropriate when data bases are unavailable to generate statistical distributions for inputs (like those used in the Monte Carlo method) and if the parameters modeled are conservative.

Wasteload Allocation For those parameters that require a WLA, the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. Dischargers are allocated pollutant loadings/concentrations based on the Ohio Water Quality Standards (OAC 3745-1).

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

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

Allocations are developed using a percentage of stream design flow as specified in Table 8, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

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

The data used in the CONSWLA modeling are listed in Tables 7 and 8. The wasteload allocation results to maintain all applicable criteria are presented in Table 9. This table includes results from both the Monte Carlo and the CONSWLA modeling. The current ammonia limits have been evaluated using the wasteload allocation procedures and are protective of water quality standards for ammonia toxicity.

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

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

The wasteload allocation calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. An assessment of biological and hydraulic data in the vicinity of the Warren wastewater plant indicated that the effluent acute toxicity is interactive with ISG Mittal Steel and the Warren Consolidated Industries discharges. For the Warren wastewater plant, the wasteload allocation values are 0.47 TU_a and 7.32 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the IC_{25}:

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

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

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

The acute toxicity unit (TU_a) is defined as 100 divided by the LC_{50} for the most sensitive test species:

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

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

Reasonable Potential/ Effluent Limits/Hazard Management Decisions

After appropriate effluent limit**s** are calculated, the reasonable potential of the discharger to violate the water quality standards must be determined. Each parameter is examined and placed in a defined "group". Parameters that do not have a water quality standard or do not require a wasteload allocation based on the initial screening are assigned to either group 1 or 2. For the allocated parameters, the preliminary effluent limits (PEL) based on the most restrictive average and maximum wasteload allocations are selected from Table 9. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 3, and the PEL_{max} is compared to the PEQ_{max}. Based on the calculated percentage of the allocated value [$(PEQ_{avg} \div PEL_{avg})$ X 100, or $(PEQ_{max} \div PEL_{max})$ X 100)], the parameters are assigned to group 3, 4, or 5. The groupings are listed in Table 10.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 11 presents the final effluent limits and monitoring requirements proposed for Warren outfall 3PE00008001 and the basis for their recommendation.

Based on best engineering judgment, it is proposed that the existing limits for dissolved oxygen, total suspended solids, ammonia-nitrogen and 5-day carbonaceous biochemical oxygen demand ($CBOD_5$) be continued. The current limits for ammonia-N were reviewed as part of the current modeling and are protective of the water quality standards for ammonia toxicity.

Limits proposed for oil and grease, pH, and *Escherichia coli* are based on Water Quality Standards (OAC 3745-1-07). Class A Primary Contact Recreation *E. coli* standards apply to the Mahoning River.

Water quality standards for *E. coli* became effective in March 2010, and a compliance schedule is proposed for meeting these new final effluent limits no later than May 1, 2013. The schedule provides time during the summer disinfection season for the plant to evaluate the ability of its existing disinfection system to achieve the new limits and to make operational changes or equipment upgrades if necessary. Based on best engineering judgment, it is proposed that the plant comply with its current fecal coliform limits during the interim period.

The proposed limit for total residual chlorine is based on the current wasteload allocation and is slightly lower than the limit in the existing permit limit.

The *2010 Ohio Integrated Water Quality Monitoring and Assessment Report* (Ohio EPA) lists the Mahoning River as impaired for aquatic life. Nutrients and organic enrichment/dissolved oxygen are listed as causes of impairment, and major municipal point sources are listed among the sources. Considering this information and the fact that municipal wastewater treatment plants discharge a nutrient load to the river, continued monitoring for phosphorus, nitrite+nitrate and total Kjeldahl nitrogen is proposed based on best engineering judgment. Monitoring for phosphorus and nitrite+nitrate 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 TMDL (total maximum daily loads) study.

Based on best engineering judgment, twice per week monitoring is proposed for total filterable residue (total dissolved solids).

Ohio EPA evaluated instream total dissolved solids (TDS) data collected in the Mahoning River at Lowellville, approximately one mile from the Ohio-Pennsylvania border (n = 128, range = 164 – 650 mg/l, period of record = January 1999 – January 2012). The Agency calculated summer and winter concentrations to characterize instream TDS levels. These concentrations are 95th percentiles of the monthly averages and daily values of the data. The calculated values are: monthly average – 364 mg/l (S), 456 mg/l (W); maximum – 423 mg/l (S), 587 mg/l (W).

These values are lower than the monthly average and maximum Pennsylvania TDS standards, 500 mg/l and 750 mg/l. This demonstrates that currently there is not reasonable potential for the instream TDS concentration to exceed the Pennsylvania standards at Lowellville, close to the state line. Based on this finding, water quality based effluent limits for TDS are not currently necessary for Ohio wastewater facilities discharging at their existing TDS loads.

Ohio EPA is pursuing a plan to begin regular TDS monitoring at a site in the lower part of the Mahoning River in Ohio. This monitoring would provide additional baseline data on ambient TDS concentrations with Ohio facilities discharging at their existing TDS loads. The Agency will consider options for reducing the TDS load to the Mahoning River if an upward trend in the ambient concentration is observed

Ohio EPA will evaluate proposals for new or increased TDS loadings to the Mahoning River from Ohio NPDES dischargers, which could be subject to provisions of Ohio's antidegradation rule (OAC 3745-1-05).

Ohio EPA risk assessment (Table 10) places barium, free cyanide, cadmium, mercury and selenium in group 4. This placement as well as the data in Tables 2 and 3 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 for Group 4 pollutants (where PEQ exceeds 50 percent of the WLA) is required by OAC Rule 3745-33-07(A)(2).

In addition, the barium and selenium average PEQ values (Table 3) are greater than 75 percent of the wasteload allocation (Table 9). Under OAC 3745-33-07(A)(2), parameters in this range must have a tracking requirement in the permit that specifies reductions in pollutant concentrations if effluent concentrations exceed the WLA. The tracking/reduction requirements are included in Part II Item AA of the draft permit.

Ohio EPA risk assessment (Table 10) places total chromium, dissolved hexavalent chromium, copper, lead, nickel and zinc in groups 2 and 3. This placement as well as the data in Tables 2 and 3 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.

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

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

Whole Effluent Toxicity Reasonable Potential
Annual chronic toxicity monitoring with the determination of acute endpoints is proposed for the life of the permit. Evaluating the toxicity data presented in Table 4 and other pertinent data under the provisions of OAC 3745-33-07(B) placed the Warren wastewater plant in Category 4 with respect to whole effluent toxicity. While this indicates that the plant's effluent does not currently pose a toxicity problem, annual toxicity testing is proposed consistent with the minimum monitoring requirements at OAC 3754-33-07(B)(11). The proposed monitoring will adequately characterize toxicity in the plant's effluent.

<u>Other Requirements</u>

Compliance Schedule
A three month compliance schedule is proposed for the City to submit an approvable technical justification for either revising its local industrial user limits or retaining its existing local limits. If revisions to local limits are required, the City must also submit a pretreatment program modification request.

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

Operator Certification
Operator certification requirements have been included in Part II, Item A of the permit in accordance with rules adopted in December 2006. These rules require the City of Warren to have a Class IV wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 001.

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

Disposal of Brine Wastewater
Part II, Item BB is a special condition regarding the disposal of brine wastewater from oil or gas drilling, exploration or production at the Warren wastewater treatment plant.

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 City of Warren may seek permit coverage under the general permit for industrial storm water (permit # OHR000004) or submit a "No Exposure Certification." Parts IV, V, and VI will be removed from the final permit if: 1) Warren submits a Notice of Intent (NOI) for coverage under the general permit for industrial storm water or submits a No Exposure Certification, 2) Ohio EPA determines that the facility is eligible for coverage under the general permit or meets the requirements for a No Exposure Certification, and 3) the determination by Ohio EPA can be made prior to the issuance of the final permit.

Outfall Signage
Part II of the permit includes requirements for the permittee to place a sign at each outfall to the Mahoning River providing information about the discharge. Signage at outfalls is required pursuant to Ohio Administrative Code 3745-33-08(A).

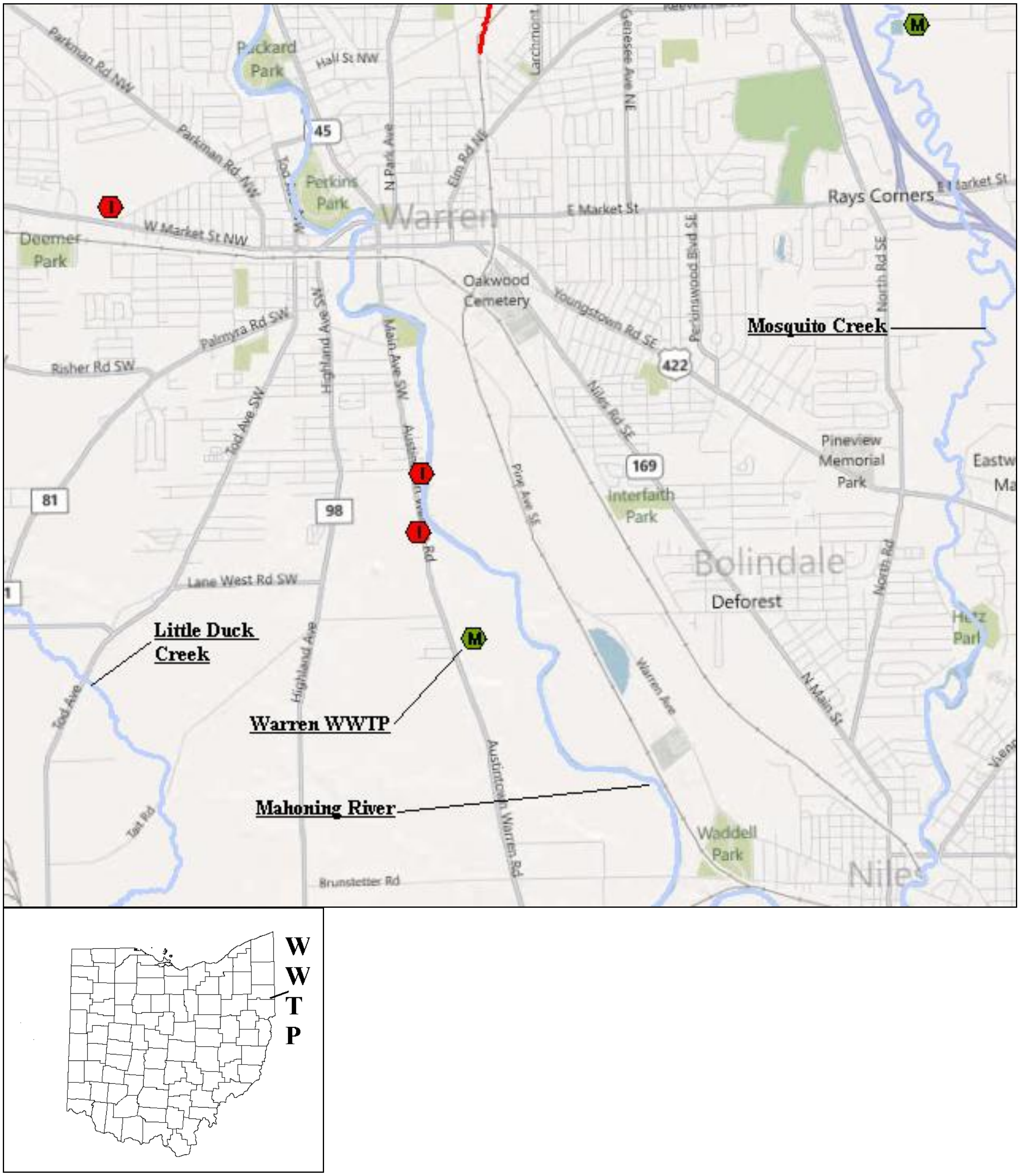

Figure 1. Location of Warren wastewater treatment plant.

Table 1. Effluent Characterization Using Ohio EPA and Pretreatment Data

Summary of analytical results for Warren outfall 3PE00008001. Units ug/l unless otherwise noted; OEPA = data from analyses by Ohio EPA; PT = data from pretreatment program reports; NA = not analyzed; ND = not detected (detection limit).

PARAMETER	OEPA 10/26/10	OEPA 04/20/10	PT 11/17/10	PT 11/18/09	PT 11/19/08	PT 11/15/07	PT 11/14/06
Barium	ND(15)	117	NA	NA	NA	NA	NA
Chloride (mg/l)	154	144	NA	NA	NA	NA	NA
Copper	6.4	6.3	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Dissolved solids, total (mg/l)	576	592	NA	NA	NA	NA	NA
Iron	253	149	NA	NA	NA	NA	NA
Mercury - low level (ng/l)	NA	NA	4.31	NA	2.38	NA	NA
Nickel	26.2	11.1	13.2	ND(10)	14.9	12.5	ND(10)
Nitrite+Nitrate-N (mg/l)	14.5	12.7	NA	NA	NA	NA	NA
Phosphorus, T (mg/l)	1.93	0.977	NA	NA	NA	NA	NA
Selenium	13.9	ND(2.0)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Strontium	198	758	NA	NA	NA	NA	NA
Zinc	ND(10)	29	25.4	11.6	19.4	12.1	14
Bromodichloromethane	0.90	ND(0.50)	ND(5)	NND(5)	ND(5)	ND(5)	ND(5)
Chloroform	1.85	2.03	ND(5)	ND(5)	ND(50)	ND(5)	ND(5.0)
Dibromochloromethane	0.63	ND(0.50)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)

Table 2. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered discharge monitoring report data for Warren outfall 3PE00008001 (January 2006 – September 2011). All values are based on annual records unless otherwise indicated. * = For minimum pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; a = weekly average.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50th	95th	
Water Temperature	Annual	C	Monitor		2097	16	23	6-24
Dissolved Oxygen	Summer	mg/l		5.0 min	1056	9.1	6.41**	5.1-14.5
Dissolved Oxygen	Winter	mg/l		5.0 min	999	10.2	6.2**	5.1-14.9
Chemical Oxygen Demand)	Annual	mg/l	Monitor		113	27	55.2	0-78
Total Suspended Solids	Annual	mg/l	20	30[a]	1431	3	13.5	1-65
Oil and Grease, Total	Annual	mg/l		10	298	1.45	4.5	0-7.5
Nitrogen, Ammonia (NH3)	Summer	mg/l	3.0	4.5[a]	745	0.02	1.8	0-5.5
Nitrogen, Ammonia (NH3)	Winter	mg/l	15	22[a]	699	0.03	5.74	0-12
Nitrogen Kjeldahl, Total	Annual	mg/l	Monitor		175	4.2	11.8	0-16.6
Nitrite Plus Nitrate, Total	Annual	mg/l	Monitor		175	10.4	15.7	0.91-31
Phosphorus, Total (P)	Annual	mg/l	Monitor		296	1.07	1.9	0.3-2.2
Cyanide, Free	Annual	mg/l	Monitor		160	0	0.0121	0-0.06
Chloride, Total	Annual	mg/l	Monitor		10	174	339	82.2-364
Sulfate, (SO4)	Annual	mg/l	Monitor		10	75.2	134	38.8-152
Selenium, Total Recoverable	Annual	ug/l	Monitor		160	0	14	0-18.3
Barium, Total Recoverable	Annual	ug/l	Monitor		10	252	719	18.4-930
Thallium, Total	Annual	ug/l	--		70	0	0	0-10
Nickel, Total Recoverable	Annual	ug/l	Monitor		110	11.5	25.3	0-40
Strontium, Total Recoverable	Annual	ug/l	Monitor		10	778	4020	36.1-4860
Zinc, Total Recoverable	Annual	ug/l	Monitor		110	18	29	0-36.9
Antimony, Total	Annual	ug/l	--		30	0	18.8	0-21
Cadmium, Total Recoverable	Annual	ug/l	Monitor		160	0	1.02	0-2.5
Lead, Total Recoverable	Annual	ug/l	Monitor		109	0	0	0-13.1
Chromium, Total Recoverable	Annual	ug/l	Monitor		110	0	0	0-0
Copper, Total Recoverable	Annual	ug/l	Monitor		110	0	10.6	0-21
Chromium, Dissolved Hexavalent	Annual	ug/l	Monitor		68	0	2	0-2.7
Fecal Coliform	Annual	#/100 ml	1000	2000[a]	510	90	931	1-2100
Flow Rate	Summer	MGD	Monitor		1073	11.7	24.2	5.67-54.9
Flow Rate	Winter	MGD	Monitor		1008	14.2	33.9	7.61-59.6
Flow Rate	Annual	MGD	Monitor		2081	13.1	29.6	5.67-59.6
Chlorine, Total Residual	Annual	mg/l		0.028	741	0.02	0.03	0-0.03
Mercury, Total (Low Level)	Annual	ng/l	Monitor		69	2.92	8.85	0-18.6
pH, Maximum	Annual	S.U.		9.0	2095	7.6	7.9	6.6-8.4
pH, Minimum	Annual	S.U.		6.5	2092	6.8*	7.8	6.5-8.2
Residue, Total Filterable	Annual	mg/l	Monitor		210	744	1050	384-1250
CBOD 5 day	Summer	mg/l	12	18[a]	742	2	6	1-10
CBOD 5 day	Winter	mg/l	12	18[a]	697	3	6	1-10

Table 3. Projected Effluent Quality Values

Parameter	Units		# of Samples	# > MDL	Average PEQ	Maximum PEQ
Self-Monitoring (DMR) Data						
Ammonia	mg/L	Summer	512	307	2.41	3.30
Ammonia	mg/L	Winter	343	200	6.13	8.40
Nitrate+Nitrite [B]	mg/L		177	177	16.91	24.18
Phosphorus [B]	mg/L		298	298	1.66	2.27
Cyanide, free	µg/L		160	12	12.58	16.07
Selenium [B]	µg/L		167	34	9.44	14.14
Nickel [B]	µg/L		117	69	19.83	27.98
Zinc [B]	µg/L		117	115	24.58	31.33
Cadmium	µg/L		160	26	0.924	1.348
Lead	µg/L		109	3	8.607	11.79
Chromium, tot.	µg/L		110	0	--	--
Copper [B]	µg/L		117	15	8.396	12.65
Chromium^{+6}, diss.	µg/L		68	7	1.971	2.70
Chlorine, tot. res.	µg/L		741	406	13.14	18.0
Mercury [B]	ng/L		71	68	6.562	9.998
Chloride, total	mg/L		10	10	346.	556.
Sulfate*	mg/L		10	10	136.	204.
TDS**	mg/L		33	33	743	1018
Strontium*	µg/L		10	10	6031.	8262.
Barium*	µg/L		9	9	607.	832.
Ohio EPA and Pretreatment Data						
Chloride, total	mg/L		2	2	427.2	585.2
TDS	mg/L		2	2	1642.	2250.
Strontium***	µg/L		2	2	896.1	1228.
Barium***	µg/L		2	1	324.6	444.6
Iron	µg/L		2	2	701.8	961.4
Bromodichloromethane [A]	µg/L		7	1	2.497	3.42
Chloroform [A]	µg/L		7	2	5.631	7.714
Dibromochloromethane [A]	µg/L		7	6	1.748	2.394

[A] Carcinogen
[B] OEPA and Pretreatment data were combined with the DMR data
* Period of record December 2010 – September 2011
** Period of record December 2010 – January 2011
*** PEQs used in reasonable potential evaluation

Table 4. Summary of toxicity test results.

Test Date(a)	*Ceriodaphnia dubia 48*	*Fathead Minnows 96*	*Ceriodaphnia dubia 7 days*	*Fathead Minnows 7*
	TUa[b]	TUa[b]	TUc[b]	TUc[b]
07/15/11(E)	BD	BD	1.19	BD
04/10/11(E)	BD	BD	3.54	BD
01/14/11(E)	BD	BD	3.91	BD
05/10/10(E)	BD	BD	BD	BD
05/11/09(E)	BD	BD	BD	BD
05/16/08(E)	BD	BD	BD	BD
05/14/07(E)	BD	BD	BD	BD
10/26, 27/10(O)*	BD	BD	NT	NT
04/20, 21/10(O)*	BD	BD	NT	NT

[a] O = EPA test; E = entity test
[b] TUa = acute toxicity units, TUc = chronic toxicity units
* = 48 hour screening test
NT = not tested

Division of Surface Water Large River Assessment Unit Summary

Overview Information

Waterbody: Mahoning River

Segment: Eagle Creek to Pennsylvania border

Length: 37.00 miles

Priority Points: 6

Monitoring Scheduled: 2013

TMDL Scheduled: 2016

Aquatic Life Use Assessment

Reporting Category: 5x

Aquatic Life Uses: WWH

Sampling Years: 1997, 2002, 2003, 2006

Sites Monitored: 14

Total Miles Monitored: 16.00

Assessment Unit Score: 47.5

Miles in Full Attainment: 7.60 (47.50%)

Miles in Partial Attainment: 3.40 (21.30%)

Miles in Non Attainment: 5.00 (31.20%)

Most Recent Data

Year Assessed	Station Name	River Mile	Drainage Area	Aquatic Life Use	Attainment Status
2006	MAHONING R. AT WARREN @ 3RD ISLAND DST. SUMMIT ST.	39.08	594	WWH	Full
2006	MAHONING R. AT WARREN @ WEST MARKET ST.	38.26	594	WWH	Full
2006	MAHONING R. NEAR YOUNGSTOWN SHEET & TUBE, CAMPBELL	17	1018	WWH	Non
2006	MAHONING R. AT LTV STEEL CAMPBELL @ POLAND AVE.	16.46	1022	WWH	Non
2006	MAHONING R. DST. LTV 039, UPST. 041	16.1	1022	WWH	Non

Causes of Impairment

cause unknown
chlorine
direct habitat alterations
metals
nutrients
oil and grease
organic enrichment/DO
priority organics
thermal modifications

Sources of Impairment

combined sewer overflows
contaminated sediments
dam construction - development
flow regulation/modification - development
hazardous wastes
major municipal point source
minor industrial point source
source unknown
spills
urban runoff/storm sewers (NPS)

Comments: The WWH aquatic life use for the Mahoning River mainstem was listed as impaired based on historical data in the 2006 Integrated Report. For the 2008 report, aquatic life data from several small surveys conducted between 1997 and 2006 were included to update the mainstem assessment. Mainstem coverage was somewhat limited in that only 16 of 37 mainstem miles were considered assessed based on these small surveys. Aquatic life use status of the remaining 21 miles remains unknown. Identified causes and sources based on the intensive survey conducted in 1994 were carried over to this Integrated Report.

Recreation Use Assessment

Reporting Category: 3i

Assessment Unit Score: Not calculated

Public Drinking Water Supply Assessment

Reporting Category: 0

Cause of Impairment: None

Nitrate Watch List: No

Fish Tissue Assessment

Reporting Category: 5

Causes of Impairment: PCBs

PCB Concentration: 531 ppb

Figure 2. Large River Assessment Unit Summary from the *Ohio 2010 Integrated Water Quality Monitoring and Assessment Report.*

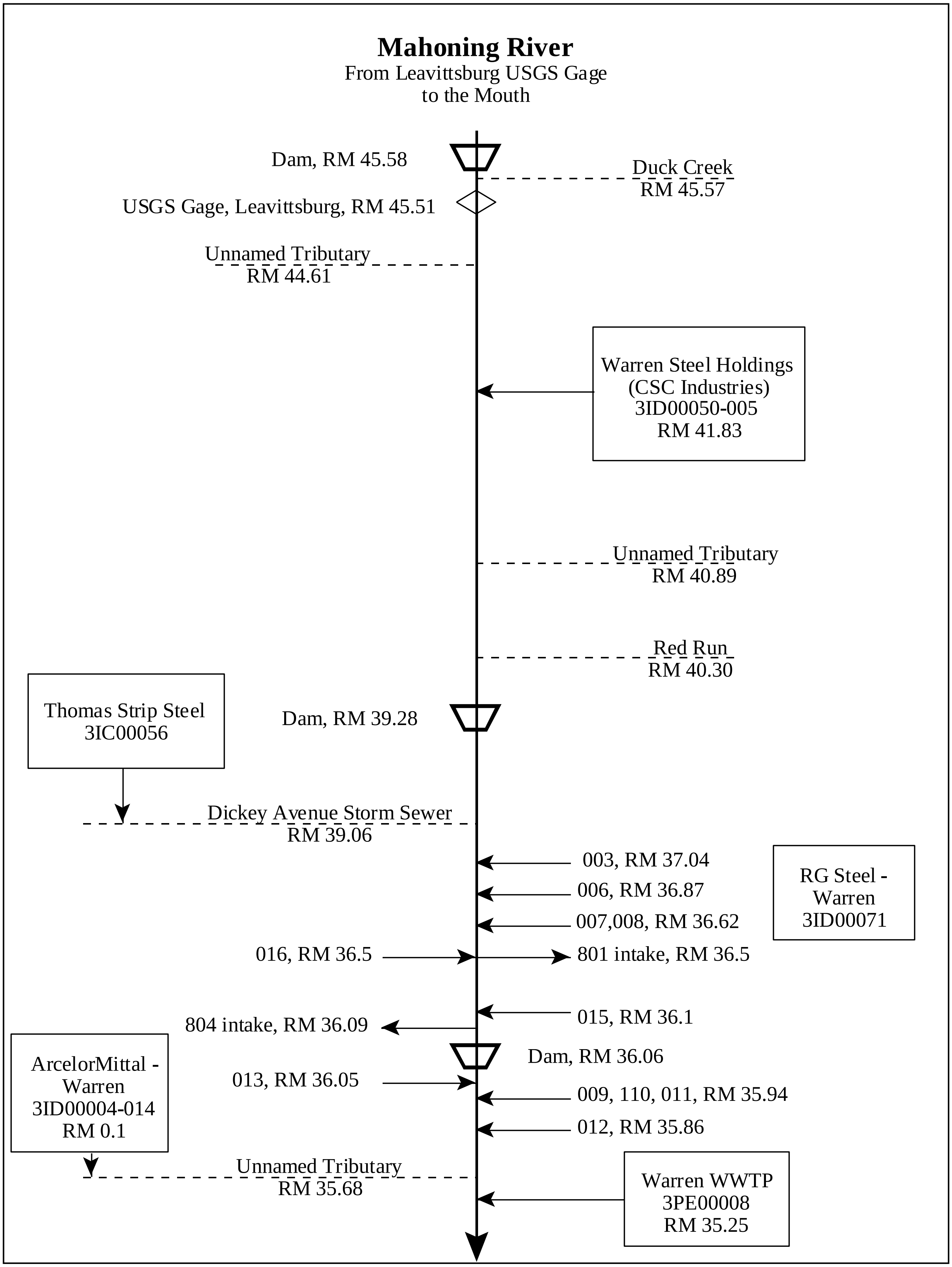

Figure 3. Mahoning River Study Area

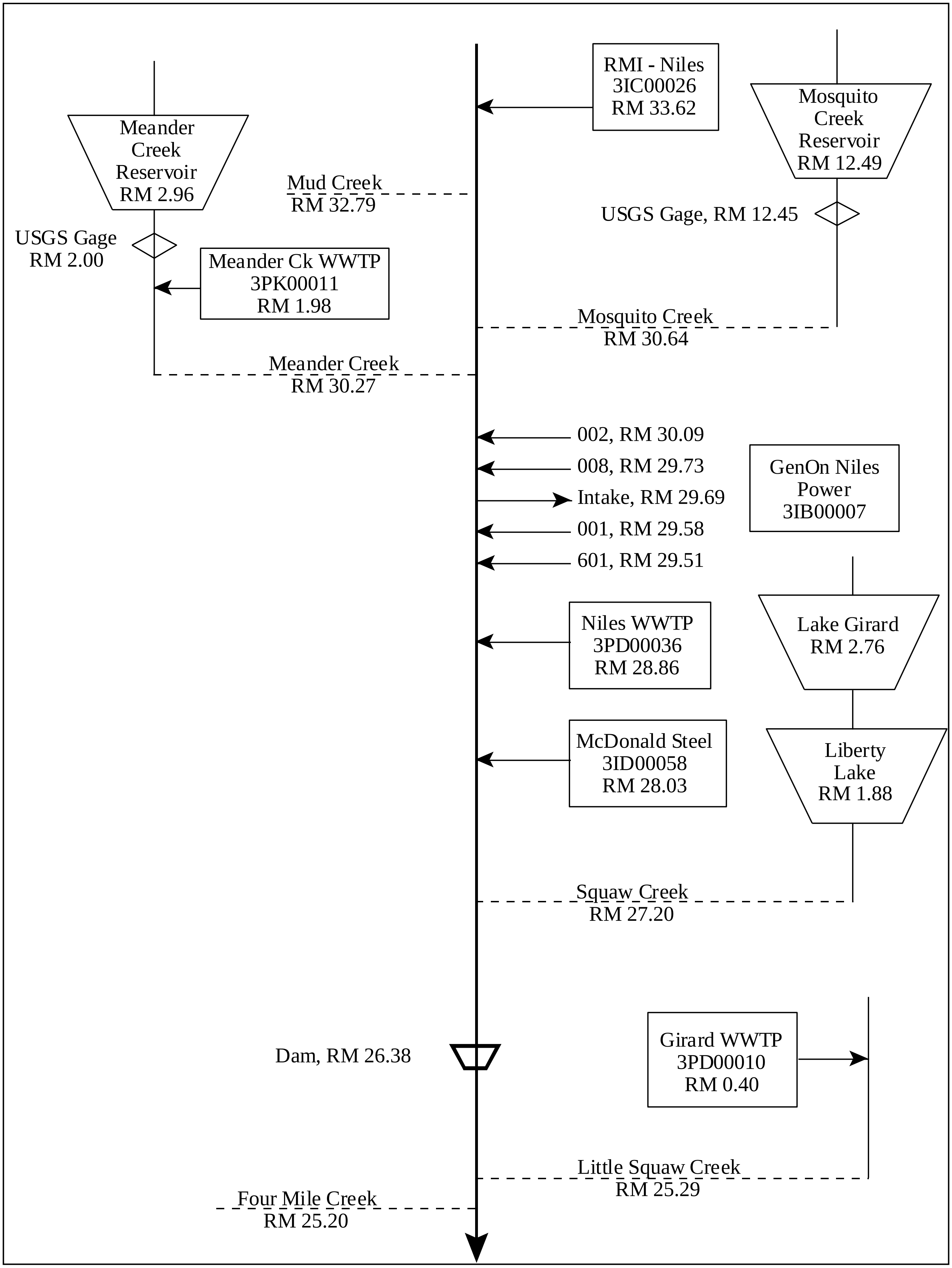

Figure 3. Mahoning River Study Area (Continued)

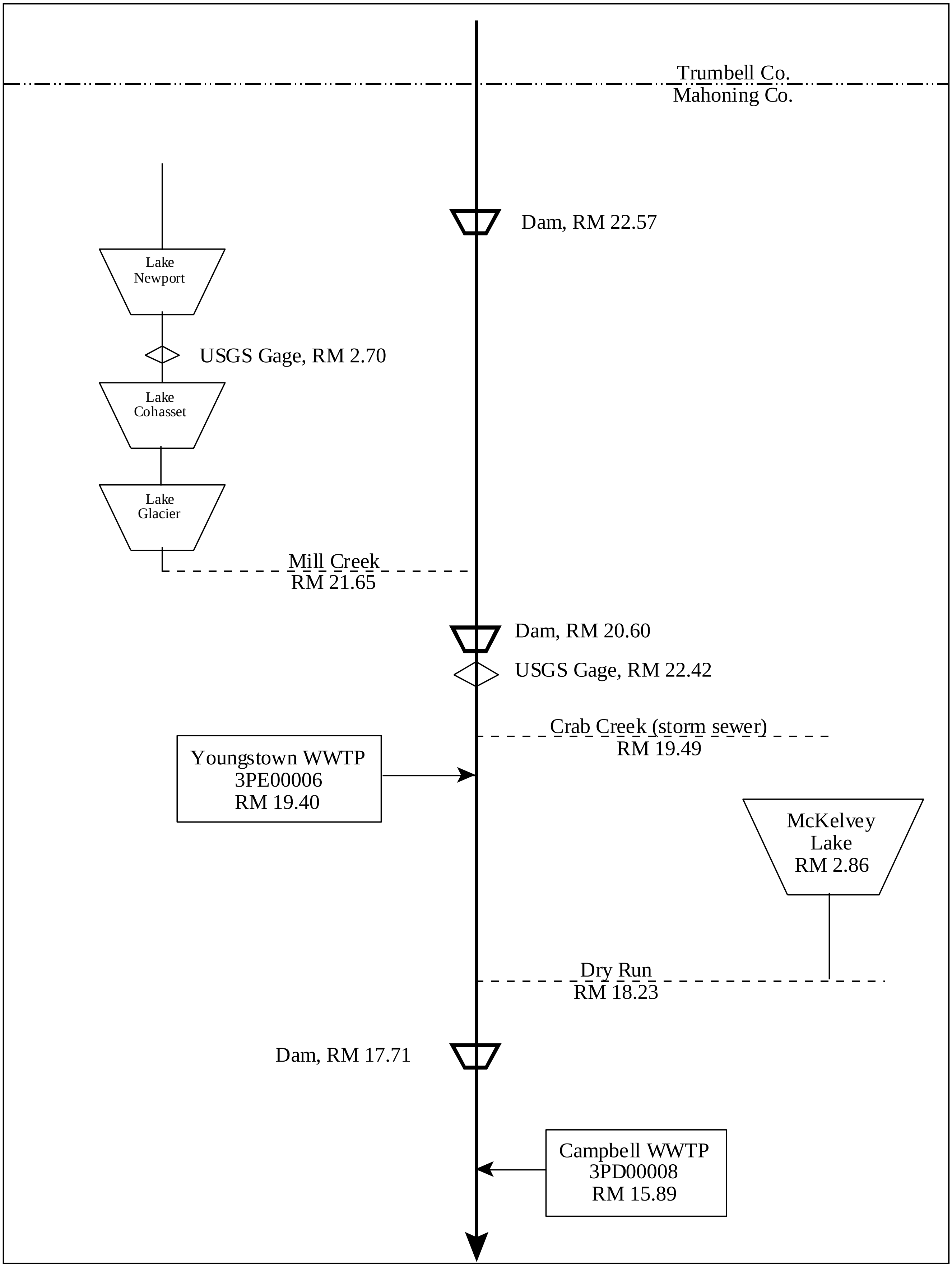

Figure 3. Mahoning River Study Area (Continued)

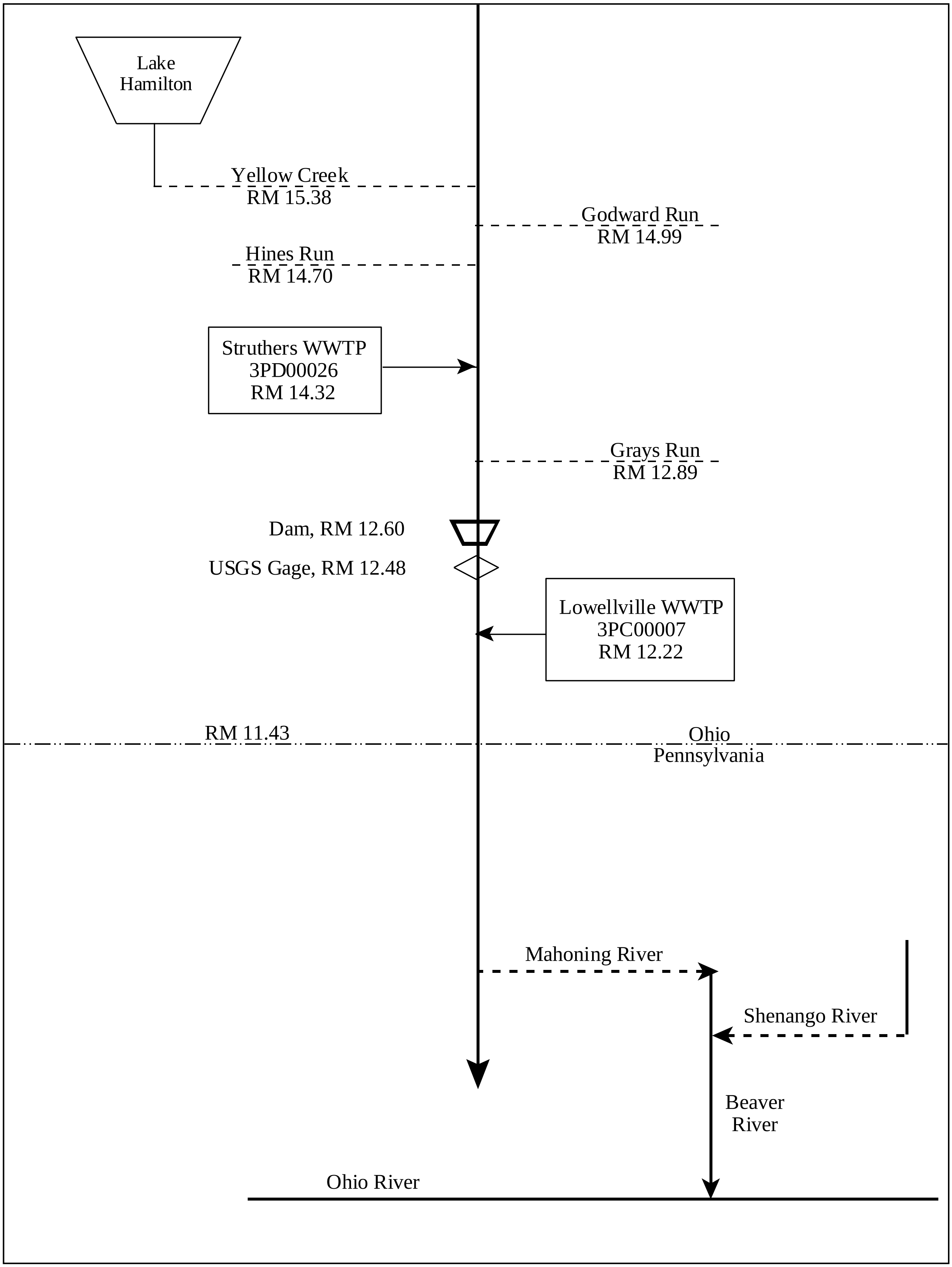

Figure 3. Mahoning River Study Area (Continued)

Table 5. Water Quality Criteria for Monte Carlo Model Parameters (Warren WWTP)

Parameter (µg/L)	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum[C]
	Average			Maximum	
	Human Health	Agri-culture[A]	Aquatic Life[B]	Aquatic Life[B]	
Cadmium	-	50.	0.41[E]	7.8	19.
Chromium, total	-	100.	130.	2700.	6100.
Copper	1300.	500.	15.[D]	23.[D]	51.
Lead	-	100.	6.1[D,E]	230.[D]	550.
Nickel	610.[E]	200.	78.	710.	1600.
Zinc	69000.	25000.	180.	180.	410.

[A] There is some uncertainty regarding the return period used to develop the Agricultural Water Supply (AWS) criteria. Therefore, the AWS criteria for the Monte Carlo model are presented for information purposes only.

[B] Based on river hardness of 162 mg/L.

[C] Based on effluent hardness of 189 mg/L.

[D] Effective Criteria Based on Application of Dissolved Metal Translator.

[E] Pennsylvania WQC at the state line.

Table 6. Monte Carlo Model Inputs

Parameter	Mean	Coefficient of Variation Acute	Coefficient of Variation Chronic	Source
Mahoning River at Leavittsburg				
Flow (MGD)[A]	--	--	--	USGS
Cadmium (µg/L)	0.0	0.0	0.0	STORET
Chromium, total (µg/L)	0.0	0.0	0.0	STORET
Copper (µg/L)	2.1	0.31	0.12	STORET
Lead (µg/L)	0.83	1.59	0.60	STORET
Nickel (µg/L)	2.8	0.18	0.07	STORET
Zinc (µg/L)	7.01	0.36	0.14	STORET
Mosquito Creek at mouth				
Flow (MGD)	80.9	1.49	0.56	USGS/SWIMS
Cadmium (µg/L)	0.25	2.7	1.0	STORET
Chromium, total (µg/L)	0.0	0.0	0.0	STORET
Copper (µg/L)	2.4	0.7	0.27	STORET
Lead (µg/L)	0.0	0.0	0.0	STORET
Nickel (µg/L)	0.94	0.65	0.25	STORET
Zinc (µg/L)	11.3	1.3	0.47	STORET
Meander Creek at mouth				
Flow (MGD)	3.67	0.29	0.11	SWIMS
Cadmium (µg/L)	0.0	0.0	0.0	STORET
Chromium, total (µg/L)	1.3	0.97	0.37	STORET
Copper (µg/L)	6.0	0.92	0.35	STORET
Lead (µg/L)	0.0	0.0	0.0	STORET
Nickel (µg/L)	8.1	1.4	0.53	STORET
Zinc (µg/L)	40.	1.3	0.48	STORET
Little Squaw Creek at mouth				
Flow (MGD)	3.6	0.44	0.17	SWIMS
Cadmium (µg/L)	0.15	2.7	1.0	SWIMS
Chromium, total (µg/L)	3.2	0.35	0.13	SWIMS
Copper (µg/L)	12.	0.60	0.23	SWIMS
Lead (µg/L)	0.0	0.0	0.0	SWIMS
Nickel (µg/L)	9.8	0.87	0.33	SWIMS
Zinc (µg/L)	64.	0.80	0.30	SWIMS

Table 6. Monte Carlo Model Inputs (Continued)

Parameter		Mean	Coefficient of Variation		Source
			Acute	Chronic	
Mill Creek at mouth					
Flow (MGD)		44.5	2.2	0.84	USGS
Cadmium (µg/L)		0.12	0.48	0.18	STORET
Chromium, total (µg/L)		0.0	0.0	0.0	STORET
Copper (µg/L)		2.4	0.70	0.26	STORET
Lead (µg/L)		4.1	1.9	0.74	STORET
Nickel (µg/L)		28.1	0.30	0.11	STORET
Zinc (µg/L)		13.5	1.87	0.71	STORET
Discharger flows (MGD)					
Warren Steel Holdings (CSC)		0.76	0.94	0.35	SWIMS
Thomas Steel Strip		0.62	0.45	0.17	SWIMS
RG Steel					
	003	0.086	0.98	0.37	SWIMS
	006	0.013	1.56	0.59	SWIMS
	007	2.48[C]	0.31	0.12	SWIMS
	008	6.91	0.17	0.07	SWIMS
	Intake[B]	--.--	--.--	--.--	---
	013	34.3	0.11	0.04	SWIMS
	010	0.24	0.72	0.27	SWIMS
	011	1.47	0.60	0.23	SWIMS
	012	0.14	0.47	0.18	SWIMS
Mittal	014	2.58	0.44	0.17	SWIMS
Warren WWTP		14.9	0.49	0.19	SWIMS
Reactive Metals Inc.		0.35	0.51	0.19	SWIMS
GenOn					
	002	2.7	0.43	0.16	SWIMS
	008	0.001	0.0	0.0	SWIMS
	009	1.0	0.0	0.0	
Niles WWTP		4.99	0.52	0.20	SWIMS
McDonald Steel0.91		0.97	0.37	SWIMS	
Youngstown WWTP		34.6	0.39	0.15	SWIMS
Campbell WWTP		2.1	0.55	0.21	SWIMS
Struthers WWTP		4.7	0.31	0.12	SWIMS
Lowellville WWTP		0.43	0.72	0.27	SWIMS

[A] Each iteration of the model sequentially selects an upstream flow from the historical flow record at this gage.
[B] Intake flow was set equal to the sum of the WCI effluent flows plus the Mittal flow, multiplied by 0.871. (12.9% of the WCI / Mittal flow comes from sources other than the intake.)
[C] Recommended by Erm Gomes; outfall is submerged and no recent flows are available

Table 7. Water Quality Criteria for CONSWLA Modeling

		Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
Parameter	Units	Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Arsenic	µg/L	–	100.	150.	340.	680.
Barium	µg/L	–	-	220.	2000.	4000.
Bromodichloromethane	µg/L	460.	–	–	–	–
Chlorine, tot. res.	µg/L	–	–	11.	19.	38.
Chloroform	µg/L	5.7 [C]	–	140.	1300.	2600.
Chromium $^{+6}$, diss.	µg/L	–	–	10. [C]	16.	31.
Cyanide, free	µg/L	140. [C]	–	5.2 [C]	22. [C]	92.
Dibromochloromethane	µg/L	340.	–	–	–	–
Iron	µg/L	–	5000.	1500. [C]	–	–
Mercury [A]	ng/L	12.	10000.	910.	1700.	3400.
Molybdenum	µg/L	–	–	20000.	190000.	370000.
Nitrate+Nitrite	mg/L	–	100.	–	–	–
Selenium	µg/L	11000.	50.	4.6 [C]	–	–
Silver (Seg. 4)	µg/L	–	–	1.3	21. [E F]	42. [E F]
Strontium	µg/L	–	–	21000.	40000.	81000.
Total Dissolved Solids	mg/L	–	–	500. [C]	–	–

[A] Bioaccumulative Chemical of Concern (BCC)
[C] Pennsylvania Water Quality Criteria.
[E] Local river hardness at critical low design flow was used to determine the water quality criteria. Segment 1 is at the Ohio Pennsylania state line (RM 11.43), Segment 2 is from the GenOn Power Intake to the Ohio Pennsylania state line (RM 29.7 - RM11.43), Segment 3 is the RG Steel Intake to the GenOn Power Intake (RM 36.5 to Rm 29.7), and Segment 4 is from Leavittsburg to the RG Steel Intake (RM 45.5 to RM 36.5).
[F] Effective Criteria Based on Application of Dissolved Metal Translator.

Table 8. Instream Conditions and Discharger Flows for the CONSWLA Model

Parameter	Units/Outfall		Value	Basis
Mahoning River Upstream				
7Q10	cfs	annual	136.	USGS gage #03094000, 1969-2010 data
1Q10	cfs	annual	129.	USGS gage #03094000, 1969-2010 data
30Q10	cfs	summer	186.	USGS gage #03094000, 1969-2010 data
	cfs	winter	192.	USGS gage #03094000, 1969-2010 data
HMQ	cfs	annual	383.	USGS gage #03094000, 1969-2010 data
Meander Creek at mouth				
7Q10	cfs	annual	6.19	USGS gage #03097500, 1929-51 data
1Q10	cfs	annual	6.19	USGS gage #03097500, 1929-51 data
30Q10	cfs	summer	6.19	USGS gage #03097500, 1929-51 data
	cfs	winter	6.19	USGS gage #03097500, 1929-51 data
HMQ	cfs	annual	6.19	USGS gage #03097500, 1929-51 data
Mosquito Creek at mouth				
7Q10	cfs	annual	10.6	USGS gage #03095500, 1954-91 data
1Q10	cfs	annual	9.47	USGS gage #03095500, 1954-91 data
30Q10	cfs	summer	14.0	USGS gage #03095500, 1954-91 data
	cfs	winter	12.6	USGS gage #03095500, 1954-91 data
HMQ	cfs	annual	28.0	USGS gage #03095500, 1954-91 data
Mill Creek at mouth				
7Q10	cfs	annual	9.99	USGS gage #03098500, 1952-71 data
1Q10	cfs	annual	9.87	USGS gage #03098500, 1952-71 data
30Q10	cfs	summer	10.7	USGS gage #03098500, 1952-71 data
	cfs	winter	15.7	USGS gage #03098500, 1952-71 data
HMQ	cfs	annual	14.3	USGS gage #03098500, 1952-71 data
Discharger Flow (cfs)				
Warren Steel Holdings	005		2.01	DSW Permits Staff
Thomas Steel Strip	001		1.83	DSW Permits Staff
RG Steel Warren	003		0.34	DSW Permits Staff
	006		0.08	DSW Permits Staff
	007		3.84	DSW Permits Staff
	008		13.4	DSW Permits Staff
	010		0.77	DSW Permits Staff
	011		4.56	DSW Permits Staff
	012		0.38	DSW Permits Staff
	013		57.6	DSW Permits Staff
ArcelorMittal Warren	014		6.50	DSW Permits Staff
Warren WWTP	001		24.8	DSW Permits Staff
RMI-Niles	001		0.743	DSW Permits Staff
Niles WWTP	001		9.59	DSW Permits Staff
McDonald Steel	001		2.82	DSW Permits Staff

Table 8. Instream Conditions and Discharger Flows for the CONSWLA Model (Continued)

Parameter	Units/Outfall		Value	Basis
Discharger Flow	cfs			
Mosquito Creek WWTP	001		6.50	DSW Permits Staff
Meander Creek WWTP	001		6.19	DSW Permits Staff
Boardman WWTP	001		7.74	DSW Permits Staff
GenOn Niles Power	001		264.6	DSW Permits Staff
	002		6.92	DSW Permits Staff
	008		0.002	DSW Permits Staff
	009		3.09	DSW Permits Staff
Girard WWTP	001		7.74	DSW Permits Staff
Youngstown WWTP	001		54.2	DSW Permits Staff
Campbell WWTP	001		2.94	DSW Permits Staff
Struthers WWTP	001		9.28	DSW Permits Staff
Lowellville WWTP	001		0.792	DSW Permits Staff
Mixing Assumption	%	average	100	Stream-to-discharge ratio
	%	maximum	100	Stream-to-discharge ratio
Background Water Quality				
Arsenic	µg/L	annual	2.0	STORET [C]; 38 values, 17<MDL, 2006-2011
Cadmium	µg/L	annual	0.	STORET [C]; 38 values, 38<MDL, 2006-2011
Chlorine, total res	µg/L	annual	0.	No representative data available
Chromium, tot.	µg/L	annual	1.	STORET [C]; 12 values, 11<MDL, 2006-2011
Chromium^{+6}, diss	µg/L	annual	0.	No representative data available
Chloroform	µg/L	annual	0.	No representative data available
Copper	µg/L	annual	5.	STORET [C]; 38 values, 30<MDL, 2006-2011
Cyanide free	µg/L	annual	0.	No representative data available
Iron	µg/L	annual	719.	STORET; 38 values, 0<MDL, 2006-2011
Lead	µg/L	annual	1.	STORET [C]; 38 values, 35<MDL, 2006-2011
Mercury	µg/L	annual	0.	STORET [C]; 38 values, 0<MDL, 2006-2011
Molybdenum	µg/L	annual	0.	No representative data available
Nickel	µg/L	annual	2.75	STORET [C]; 12 values, 0<MDL, 2006-2011
Selenium	µg/L	annual	0.	STORET; 38 values, 38<MDL, 2006-2011
Silver	µg/L	annual	0.	No representative data available
Strontium	µg/L	annual	127.	STORET; 38 values, 0<MDL, 2006-2011
TDS	mg/L	annual	252.	STORET [C]; 38 values, 0<MDL, 2006-2011
Zinc	µg/L	annual	5	STORET [C]; 38 values, 33<MDL, 2006-2011

[C] STORET station # 602280 Mahoning River @ Leavittsburg - Leavitt Rd. RM 45.51

Table 9. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

Parameter	Units	Average: Human Health	Average: Agri Supply	Average: Aquatic Life	Maximum Aquatic Life	Inside Mixing Zone Maximum
Arsenic [B]	µg/L	–	425.	343.	761.[A]	680.
Barium	µg/L	-	-	340.	3180.	4000.
Cadmium	µg/L	–	–	2.1 [E]	19.[A]	19.
Chlorine, total res summer	µg/L	–	–	14.	24.	38.
Chromium, tot. [B]	µg/L	–	–	633.	6100.[A]	6100.
$Chromium^{+6}$, dissolved [B]	µg/L	–	–	25. [E]	39.[A]	31.
Copper	µg/L	–	–	38.[D]	51. [A D]	51.
Cyanide free	µg/L	682400.[A]	–	20.	73.	92.
Lead	µg/L	–	–	23.[D, E]	550. [A D]	550.
Mercury [C]	ng/L	12.	10000. [A]	910.	1700.	3400.
Molybdenum [B]	µg/L	–	–	54110.	501000.[A]	370000.
Nickel	µg/L	–	–	376.	1600.[A]	1600.
Selenium	µg/L	52220.	237.	11.[E]	–	–
Silver [B]	µg/L	–	–	3.0	19.[D]	42.[D]
Total Dissolved Solids	mg/L	–	–	622. [E]	–	–
Zinc [B]	µg/L	--	--	410. [A]	410. [A]	410.

[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 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 the requirements for an exception are met as listed in 3745-2-08.
[D] WLA based on applicable dissolved metal translator.
[E] Pennsylvania water quality criteria was applied

Table 10. Parameter Assessment

<u>Group 1</u>: Due to a lack of criteria, the following parameters could not be evaluated at this time.

Chloride	Phosphorus	Sulfate

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

Arsenic	Bromodichloromethane	Chloroform
$Chromium^{+6}$, diss.	Chromium, tot.	Dibromochloromethane
Iron	Molybdenum	Nitrate+Nitrite
Silver	Strontium	Zinc

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

Copper	Lead	Nickel

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

Barium (>75%)	Cadmium	Chlorine, total res.(>75%)
Cyanide, free	Mercury	Selenium (>75%)

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

Limits to Protect Numeric Water Quality Criteria

Parameter	Units	Applicable Period	Recommended Effluent Limits Average	Recommended Effluent Limits Maximum
Total Dissolved Solids	mg/L	annual	622.	--

Table 11. Final Effluent Limits and Monitoring Requirements

		Effluent Limitations				
		Concentration		Loading (kg/day)[a]		
		Monthly	Daily	Monthly	Daily	
Parameter	Units	Average	Maximum	Average	Maximum	Basis[b]
Temperature	°C	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Dissolved Oxygen	mg/l	5.0 minimum		--	--	BEJ, EP
Suspended Solids	mg/l	20	30[c]	1211	1817	BEJ, EP
Oil and Grease	mg/l	--	10	--	--	WQS, EP
Ammonia-N	mg/l					
Summer		3.0	4.5[c]	182	273[c]	BEJ, EP
Winter		15	22[c]	909	1332[c]	BEJ, EP
Total Kjeldahl-N	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M, EP
Nitrite(N) + Nitrate(N)	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M, EP
Phosphorus, Total	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M, EP
Cyanide, Free	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				RP
Chloride, T.	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M, EP
Sulfate	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M, EP
Selenium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				RP
Barium, T. R.	ug/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				RP
Nickel, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Zinc, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Cadmium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				RP
Lead, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Chromium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Copper, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Hex. Chromium (Dissolved)	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Fecal Coliform						
Summer Only (Interim)	#/100ml	1000	2000[c]	--	--	BEJ, EP
E. coli						
Summer Only (Final)	#/100ml	126	284[c]	--	--	WQS
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				M
Chlorine, Total Residual						
Summer	mg/l	--	0.024	--	--	WLA
Mercury, T.	ng/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				RP
Whole Effluent Toxicity						
Acute	TUa	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				WET
Chronic	TUc	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				WET
pH	S.U.	- - - - - - - - - - - 6.5 to 9.0 - - - - - - - - - - -				WQS, EP
Total Filterable Residue (Dissolved Solids)	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - -				BEJ, EP
$CBOD_5$	mg/l	12	18[c]	727	1090[c]	BEJ, EP

[a] Effluent loadings based on average design discharge flow of 16 MGD.

[b] Definitions: BEJ = Best Engineering Judgment; EP = Existing Permit; M = BEJ of Permit Guidance 1: Monitoring Frequency Requirements for Sanitary Discharges; RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits [OAC 3745-33-07(A)]; WET = Minimum testing requirements for whole effluent toxicity [OAC 3745-33-07(B)(11)]; WLA = Wasteload Allocation procedures (OAC 3745-2); WQS = Ohio Water Quality Standards (OAC 3745-1-07).

[c] Weekly average limit.