

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 Defiance Wastewater Treatment Plant (WWTP)

Public Notice No.: 14-05-091  
Public Notice Date: May 29, 2014  
Comment Period Ends: June 28, 2014

Ohio EPA Permit No.: 2PD00013\*UD  
Application No.: OH0024899

Name and Address of Applicant:

City of Defiance  
26273 State Route 281 East  
Defiance, Ohio 43512

Name and Address of Facility Where  
Discharge Occurs:

Defiance WWTP  
26273 State Route 281 East  
Defiance, Ohio 43512  
Defiance County

Receiving Water: Maumee River

Subsequent  
Stream Network: Lake Erie

Introduction

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

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

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

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

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

### Summary of Permit Conditions

The effluent limits and monitoring requirements proposed for the following parameters are the same as in the current permit, although some monitoring frequencies have changed: flow, temperature, dissolved oxygen, 5-day carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>), total suspended solids (TSS), ammonia-nitrogen, total phosphorus, *Escherichia coli* (*E. coli*), oil and grease, pH, total residual chlorine, bis (2-ethylhexyl) phthalate, total filterable residue (total dissolved solids (TDS)), cadmium, chromium, dissolved hexavalent chromium, copper, lead, nickel, and zinc.

The mercury variance that the permittee had applied to as part of the permit renewal has been proposed to continue with a lower variance based limit for the monthly concentration and corresponding loading for mercury. The average effluent limit of 10.6 ng/L was calculated as the PEQ<sub>avg</sub> of the Discharge Monitoring Report (DMR) data from 2009 through 2013 and is the proposed monthly limit for mercury.

Monitoring for nitrate+nitrite and total Kjeldahl nitrogen (TKN) is proposed at outfalls 2PD00013602, 2PD00013801, and 2PD00013901 based on best engineering judgment. The purpose of the monitoring is to maintain a nutrient data set for use in possible future total maximum daily load (TMDL) studies.

Current monitoring requirements for antimony and strontium are being removed from the permit because there were limited detections over the past five years of data and these parameters do not have the reasonable potential to contribute to WQS exceedances.

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

New NPDES permits no longer authorize the use of method 4500 CN-I from Standard Methods for free cyanide testing. Either method ASTM D7237-10 or OIA-1677-09 shall be used as soon as possible to monitor free cyanide.

Part I.C of the permit includes a schedule of compliance for the permittee to submit a dissolved metal translator (DMT) study. The results of this study may affect future wasteload allocations and local limits and thus the local limit review has been delayed until the next permit renewal.

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; WET testing; storm water compliance; outfall signage; and pretreatment program requirements.

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## Procedures for Participation in the Formulation of Final Determinations

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

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

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

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

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

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

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

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

For additional information about this fact sheet or the draft permit, contact Dana Martin-Hayden (419)373-3067, [dana.martin-hayden@epa.ohio.gov](mailto:dana.martin-hayden@epa.ohio.gov), or Andy Bachman, (614)644-3075, [andrew.bachman@epa.ohio.gov](mailto:andrew.bachman@epa.ohio.gov).

## Information Regarding Certain Water Quality Based Effluent Limits

This draft permit may contain proposed water quality based effluent limitations for parameters that **are not** priority pollutants. (See the following link for a list of the priority pollutants: [http://epa.ohio.gov/portals/35/pretreatment/Pretreatment\\_Program\\_Priority\\_Pollutant\\_Detection\\_Limits.pdf](http://epa.ohio.gov/portals/35/pretreatment/Pretreatment_Program_Priority_Pollutant_Detection_Limits.pdf) ).

In accordance with ORC Section 6111.03(J)(3), the Director established these water quality based effluent limits after considering, to the extent consistent with the Federal Water Pollution Control Act, evidence relating to the technical feasibility and economic reasonableness of removing the polluting properties from those wastes and to evidence relating to conditions calculated to result from that action and their relation to benefits to the people of the state and to accomplishment of the purposes of this chapter. This determination was made based on data and information available at the time the permit was drafted, which included the contents of the timely submitted 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, written notification for any additional time shall be sent to the above address no later than 30 days after the Public Notice Date on Page 1.

Should the applicant determine that compliance with the proposed water quality based effluent limitations for parameters other than the priority pollutants is technically and/or economically unattainable, the permittee may submit an application for a variance to the applicable 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 3745-1-35. 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

Defiance WWTP discharges to the Maumee River at river mile (RM) 62.05. Figure 1 shows the approximate location of the facility.

This segment of the Maumee River is described by Ohio EPA River Code: 04-001, U.S. EPA River Reach #: 04100009-009, County: Defiance, Ecoregion: Huron-Erie Lake Plain. The Maumee River is designated for the following uses under Ohio's WQS (OAC 3745-1-18): Modified Warmwater Habitat (MWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), State Resource Water (SRW), and Primary Contact Recreation (PCR) Class A.

Use designations define the goals and expectations of a waterbody. These goals are set for aquatic life protection, recreation use and water supply use, and are defined in the Ohio WQS (OAC 3745-1-07). The use

designations for individual waterbodies are listed in rules -08 through -32 of the Ohio WQS. Once the goals are set, numeric WQS are developed to protect these uses. Different uses have different water quality criteria.

Use designations for aquatic life protection include habitats for coldwater fish and macroinvertebrates, warmwater aquatic life and waters with exceptional communities of warmwater organisms. These uses all meet the goals of the federal CWA. Ohio WQS also include aquatic life use designations for waterbodies which cannot meet the CWA goals because of human-caused conditions that cannot be remedied without causing fundamental changes to land use and widespread economic impact. The dredging and clearing of some small streams to support agricultural or urban drainage is the most common of these conditions. These streams are given MWH 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 (PCR) and wading only (Secondary Contact - generally waters too shallow for swimming or canoeing).

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

Facility Description

The Defiance WWTP was originally constructed in 1956, and upgraded in 2000. The Defiance WWTP facility is an advanced treatment facility with an average design flow of 6.0 million gallons per day (MGD). The treatment plant includes the following equipment and/or wet processes:

- Influent Pumping
- Bar Screen
- Grit Removal
- Primary Sedimentation
- Trickling Filter – Plastic Media
- Activated Sludge – Conventional
- Secondary Clarification
- Alum Addition – Secondary
- Chlorination
- Dechlorination

Year	Dry Tons Land Applied
2009	871
2010	533
2011	599
2012	562
2013	1188

Sludge processing includes anaerobic digesters, sludge lagoons, and land spreading. Table 1 shows the total tons of sludge removed from Defiance WWTP from 2009 through 2013 based upon DMR data.

The plant serves the City of Defiance, Village of Ayersville, and other parts of Defiance County. The total population served is estimated to be 18,972. The collection system for Defiance WWTP, which is served by Ayersville and Defiance County, is approximately 62 percent separate sanitary sewers and 38 percent combined sewers. Previous actions included in the facility long term control plan included separation of parts of downtown, inflow/infiltration projects, and elimination of cross connections. The inflow/infiltration rate for the collection system is estimated to be 1.17 MGD, this vary based on river intrusion. The pretreatment program was approved on August 20, 1985. According to the permit renewal application, there are 12 significant industrial users responsible for 0.266 MGD of daily flow into the plant. One of these facilities is categorical, accounting for 0.006 MGD of flow and 11 are non-categorical accounting for 0.26 MGD of flow.

The treatment plant has two bypasses, Outfalls 2PD00013050 and 2PD00013051. Outfall 2PD00013050 is a bypass of secondary treatment; Outfall 2PD00013051 bypasses both primary and secondary treatment. A review of reported data shows that bypasses from Outfall 2PD00013050 have ranged from one occurrence to 71

occurrences over the last five years; over the same timeframe Outfall 2PD00013051 has not reported any discharges. Table 2a below shows the number of bypass events and flows for Outfall 2PD00013050.

Year	Number of Occurrences	Median Value for:				
		Volume (MG)	Phosphorus (mg/L)	Ammonia (mg/L)	TSS (mg/L)	CBOD <sub>5</sub> (mg/L)
2009	1	0.015	1.23	6.1	166	36
2010	17	0.1605	1.268	10.3	60	58
2011	71	0.864	N/A	N/A	76.5	61
2012	34	0.089	N/A	N/A	148	186
2013	55	0.283	N/A	N/A	102	68.5

\*MG = Million Gallons, TSS = Total Suspended Solids, CBOD<sub>5</sub> = Carbonaceous Biochemical Oxygen Demand, N/A = Not tested during this year.

The facility also has 35 combined sewer overflow (CSO) outfalls that reported DMR data in the past five years. In December 1998, the City submitted a long-term CSO control plan. After negotiations with Ohio EPA, the City entered into a consent order (03/02/10) that includes a revised long-term control plan and CSO abatement schedule. Table 2b shows the occurrences and total volumes that have occurred from 2010 through 2012 and Table 2c shows effluent data at select CSO outfalls.

Outfall Number	Number of Occurrences	Total Volume (MG)	Outfall Number	Number of Occurrences	Volume (MG)
CSO Outfall 002	352	44.3	CSO Outfall 025	354	55.9
CSO Outfall 003	346	24.4	CSO Outfall 026	7	0
CSO Outfall 004	129	2.9	CSO Outfall 027	43	1.5
CSO Outfall 005	27	0.5	CSO Outfall 030	287	23.9
CSO Outfall 006	229	6.7	CSO Outfall 031	0	0
CSO Outfall 007	351	43.1	CSO Outfall 032	349	152.2
CSO Outfall 010	153	4.2	CSO Outfall 033	79	4.9
CSO Outfall 011	346	131.2	CSO Outfall 035	110	10.4
CSO Outfall 012	343	16.6	CSO Outfall 037	359	1.7
CSO Outfall 013	31	0.5	CSO Outfall 038	0	0
CSO Outfall 014	343	16.6	CSO Outfall 039	77	2.7
CSO Outfall 015	34	0.9	CSO Outfall 040	93	3.5
CSO Outfall 016	247	7	CSO Outfall 041	3	0
CSO Outfall 017	347	30.1	CSO Outfall 044	93	8.8
CSO Outfall 018	145	3.3	CSO Outfall 045	359	14.4
CSO Outfall 019	77	1.5	CSO Outfall 046	0	0
CSO Outfall 020	153	4.3	CSO Outfall 047	250	2.2
CSO Outfall 024	355	73.7	TOTAL:	6471	693.9

\*CSO = Combined Sewer Overflow, MG = Million Gallons

Outfall Number	Mean Value for:	
	TSS (mg/L)	CBOD <sub>5</sub> (mg/L)
CSO Outfall 007	22.5	30.1
CSO Outfall 012	64.2	67.5
CSO Outfall 017	84.2	84.6
CSO Outfall 018	47.7	27.7
CSO Outfall 032	159.1	55.1
Average:	75.5	53.0

\*CSO = Combined Sewer Overflow,  
TSS = Total Suspended Solids, CBOD<sub>5</sub> =  
Carbonaceous Biochemical Oxygen Demand

Description of Existing Discharge

The facility consists of two final outfalls 2PD00013001 and 2PD00013602 and two bypasses at outfalls 2PD00013050 and 2PD00013051. Outfall 2PD00013602 is plant effluent that has gone through primary and secondary treatment. During wet weather a bypass can occur at outfall 2PD00013050. When a discharge occurs at outfall 2PD00013050, influent comes into the head works and surpasses secondary treatment. The bypass stream from 2PD00013050 then mixes with effluent from outfall 2PD00013602, passes through chlorination, and then is discharged to the stream through outfall 2PD00013001. Most parameters with the exceptions of the limits placed on dissolved oxygen, *E. coli*, chlorine, and pH are monitored at outfall 2PD00013602.

Table 3 shows the annual effluent flow rates for the Defiance WWTP based upon DMR data. The flow rates have been relatively steady across this period. Heavy rains in 2009 and 2011 contributed to increased flow rates in these years, however differences between drier and wetter years appear to be minimal. The median flow is substantially less than the design flow of 6.0MGD.

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

Table 6 presents a summary of unaltered DMR data for outfalls 2PD00013001 and 2PD00013602. Data are presented for the period from January, 2008 through December 2012, and current permit limits are provided for comparison.

Year	Annual Flow in MGD		
	50th Percentile	95th Percentile	Maximum
2009	2.96	6.55	11.48
2010	2.42	6.43	10.20
2011	2.85	9.76	14.10
2012	2.37	5.00	10.28
2013	2.52	7.40	13.03

Table 7 summarizes the chemical specific data for outfalls 2PD00013001 and 2PD00013602 by presenting the average and maximum PEQ values.

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

Defiance WWTP reports SSO occurrences under station 2PD00013300 in its NPDES permit.

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

### Assessment of Impact on Receiving Waters

The most recent Ohio EPA survey of the Maumee River basin was conducted as part of the *2014 Integrated Water Quality Monitoring and Assessment Report* (Ohio EPA). The Large River Assessment Unit of the Maumee River summarizes the attainment status of the Maumee River from Tiffin River to Beaver Creek. In this segment 34.44 miles were monitored and 33.46 (97.2%) of the river miles were in attainment of their MWH or warmwater habitat (WWH) status. The report stated the following:

Comprehensive biological, habitat, and water quality data were collected from this reach of the Maumee River in 2012. Most of this assessment unit consists of river reaches impounded by the Independence and Grand Rapids lowhead dams. Near full attainment of applicable biological indices was achieved at all sites sampled, the exception being a short reach of partial attainment at the lower end of the assessment unit downstream from the Grand Rapids lowhead dam. Fish communities reflected significant positive structural and functional changes at most sites since previous sampling in 1997. However, macroinvertebrate communities reflected consistent declines in ICI scores and key community attributes at nearly all sites since the previous 1997 sampling and did not achieve WWH expectations at one site downstream from the Grand Rapids lowhead dam. As below normal flows in 2012 may have confounded results, additional limited follow-up monitoring was conducted in 2013 during a more normal water year to further investigate the observed decline, which was confirmed. Status of reports and analyses can be accessed via the Maumee River Mainstem tab at <http://epa.ohio.gov/dsw/tmdl/MaumeeRiver.aspx>.

The *2014 Integrated Water Quality Monitoring and Assessment Report* can be found at the following Internet page: <http://wwwapp.epa.ohio.gov/gis/mapportal/IR2014.html>

The recent Consent Order contains a compliance schedule to reduce the number of CSOs and the total amount of pollution discharged from these outfalls. The treatment plant itself meets its treatment technology-based limits for phosphorus. Any further reductions in plant nutrient levels will be considered during the TMDL process, scheduled for completion in 2019.

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

Self-monitoring data (DMR)	January 2008 through December 2012
DMR to Calculate Mercury Variance	January 2009 through December 2013
NPDES Application data / Pretreatment data	4/29/08, 5/16/09, 3/17/10, 4/21/11, and 1/27/12
Ohio EPA Bioassay Studies	5/1/2012

The data were examined, and the following values were removed from the evaluation to give a more reliable projection of effluent quality: chromium 879 µg/L (4/21/08).

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

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<sub>avg</sub> or PEQ<sub>max</sub> is greater than 25 percent of the applicable WQS, a WLA is conducted to determine whether the parameter exhibits reasonable potential and needs to have a limit or if monitoring is required. See Table 12 for a summary of the screening results.

### *Wasteload Allocation*

For those parameters that require a WLA, the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. Dischargers are allocated pollutant loadings/concentrations based on WQS. Most pollutants are allocated by a mass-balance method because they do not degrade in the receiving water. WLAs using this method are done using the following general equation: Discharger WLA = (downstream flow x WQS) - (upstream flow x background concentration). Discharger WLAs are divided by the discharge flow so that the WLAs are expressed as concentrations. The WLA for this segment divided loads between the General Motors (GM) Casting Operations (2IN00004), GM's remediation discharge (2IN00202001), and the Defiance WWTP discharge.

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

Aquatic life (MWH)		
Toxics (metals, organics, etc.)	Average	Annual 7Q10
	Maximum	Annual 1Q10
Ammonia	Average	Summer 30Q10
		Winter 30Q10
Wildlife		Annual 90Q10
AWS		Harmonic mean flow
Human Health (nondrinking)		Harmonic mean flow

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

Ohio's WQS implementation rules [OAC 3745-2-05(A)(2)(d)(iv)] required a phase out of mixing zones for bioaccumulative chemicals of concern (BCCs) as of November 15, 2010. This rule applied statewide. Mercury is a BCC. The mixing zone phase-out means that as of November 15, 2010 all dischargers requiring mercury limits in their NPDES permit must meet WQS at the end-of-pipe, which are 1.3 ng/L (average) and 1700 ng/L (maximum) in the Lake Erie basin.

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

### Whole Effluent Toxicity WLA

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

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

The WLA calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit ( $TU_c$ ) and 7Q10 flow for the average and the acute toxicity unit ( $TU_a$ ) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Defiance WWTP, the WLA values are 1.0  $TU_a$  and 3.53  $TU_c$ .

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

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

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

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

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

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

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

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

### Reasonable Potential/ Effluent Limits/Hazard Management Decisions

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

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 13 presents the final effluent limits and monitoring requirements proposed for Defiance WWTP outfalls 2PD00013001 and 2PD00013602 and the basis for their recommendation.

***Antimony, Arsenic, Chloroform, Chromium, Dimethyl phthalate, Dissolved Hexavalent Chromium, Free Cyanide, Iron, Manganese, Molybdenum, Nitrate+Nitrite, Selenium, and Strontium***

Ohio EPA risk assessment (Table 12) places the following parameters in group 2: antimony, arsenic, chloroform, chromium, dimethyl phthalate, dissolved hexavalent chromium, free cyanide, iron, manganese, molybdenum, nitrate+nitrite, selenium, and strontium. This placement as well as the data in Tables 5, 6, and 7 supports that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. For chromium, dissolved hexavalent chromium, and free cyanide, continued monitoring at a quarterly frequency is proposed to document that these pollutants continue to remain at low levels. Monitoring requirements for antimony and strontium are being removed from the permit.

***Free Cyanide Monitoring***

Currently there are two approved methods for free cyanide listed in 40 CFR 136.3 that have quantification levels lower than the WQS:

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

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

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

***Aluminum, Barium, Bis(2-ethylhexyl) phthalate, Butyl benzyl phthalate, Diethyl phthalate, Lead, Nickel, Tetrachloroethylene, Total Filterable Residue, and Zinc***

Ohio EPA risk assessment (Table 12) places the following parameters in group 3: aluminum, barium, bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, diethyl phthalate, lead, nickel, tetrachloroethylene, total filterable residue, and zinc. This placement as well as the data in Tables 5, 6, and 7 supports that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. For bis(2-ethylhexyl) phthalate, lead, nickel, total filterable residue, and zinc, continued monitoring at a quarterly frequency is proposed to document that these pollutants continue to remain at low levels.

***Cadmium and Copper***

Ohio EPA risk assessment (Table 12) places cadmium and copper in group 4. This placement as well as the data in Tables 5, 6, and 7 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).

Quarterly monitoring is proposed to continue for both copper and cadmium. In the 26 data points submitted through DMR, bioassay, and pretreatment used to generate the PEQ for cadmium, there were only 2 detections and neither detection was above the associated WLA (found in Table 11) for cadmium. In the 26 data points submitted through DMR, bioassay, and pretreatment used to generate the PEQ for copper, 10 were above the detection level but not of these were above the associated WLA (found in Table 11) for copper, and only one sample was above half of the WLA for copper.

### ***Oil and Grease, pH, E. coli, and Dissolved Oxygen***

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

### ***TSS, Ammonia, and CBOD<sub>5</sub>***

The limits for TSS, ammonia, and CBOD<sub>5</sub> that were approved for the treatment plant under the existing permit are proposed to continue. The concentration limits for these parameters are based upon the treatment technology associated with the plant design of Defiance WWTP. The loading limits are based upon the plant's average design flow of 6.0 MGD.

### ***Total Phosphorus***

The limits for total phosphorus are a continuation from the previous permit. Phosphorus treatment to maintain effluent with a 1.0mg/L concentration is required under OAC 3745-33-06(C).

### ***Nitrate + Nitrite***

The monitoring for nitrate+nitrite is proposed to take the place of nitrate based on best engineering judgment. Monitoring nitrate+nitrite at the upstream and downstream stations is also proposed. The purpose of the monitoring is to maintain a data set tracking nutrient levels in the Maumee River and may be used for future permit decisions relating to nutrients.

### ***Total Kjeldahl Nitrogen (TKN)***

New monitoring for TKN is proposed based on best engineering judgment. Monitoring TKN at the upstream and downstream stations is also proposed. The purpose of the monitoring is to maintain a data set tracking nutrient levels in the Maumee River area and may be used for future permit decisions relating to nutrients

### ***Total Residual Chlorine***

The Ohio EPA risk assessment (Table 12) places total residual chlorine in group 5. This placement as well as the data in Tables 6 and 7 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. For these parameters, the PEQ is greater than 100 percent of the WLA. Pollutants that meet this requirement must have permit limits under OAC 3745-33-07(A)(1). The daily maximum limit for total residual chlorine is proposed to remain 0.038 mg/L based on WLA as limited by the inside mixing zone maximum (IMZM). The IMZM is a value calculated to avoid rapidly lethal conditions in the effluent mixing zone.

### ***Whole Effluent Toxicity Reasonable Potential***

Based on evaluating the WET data presented in Table 8, annual toxicity testing is proposed consistent with the minimum monitoring requirements at OAC 3745-33-07(B)(11). The proposed monitoring will adequately characterize toxicity in the plant's effluent.

### ***Mercury Reasonable Potential and Mercury Variance***

The Ohio EPA risk assessment (Table 12) places mercury in group 5. This placement as well as the data in Table 6, Table 10, and Table 11 indicates that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality.

To comply with mercury limits, the permittee has applied for coverage under the general mercury variance, Rule 3745-33-07(D)(10) of the Ohio Administrative Code. Based on the results of low-level mercury monitoring, the permittee has determined that its wastewater treatment plant cannot meet the 30-day average water quality-based effluent limit (WQBEL) of 1.3 ng/L. However, the permittee believes that the plant will be able to achieve an annual average mercury effluent concentration of 12 ng/L. The variance application also demonstrated to the satisfaction of Ohio EPA that there is no readily apparent means of complying with the WQBEL without constructing prohibitively expensive end-of-pipe controls for mercury. Based on these factors, the permittee is eligible for coverage under the general mercury variance.

Ohio EPA has reviewed the mercury variance application in a letter dated April 25, 2013 and has determined that it meets the requirements of the OAC. Items AB, AC, and AD in Part II of the draft NPDES permit list the provisions of the mercury variance, and includes the following requirements:

- A variance-based monthly average effluent limit of 10.6 ng/L, which was developed from sampling data submitted by the permittee \*\*;
- A requirement that the permittee make reasonable progress to meet the water-quality-based effluent limit for mercury by implementing the plan of study, which has been developed as part of the Pollutant Minimization Program (PMP);
- Low-level mercury monitoring of the plant's influent and effluent;
- A requirement that the annual average mercury effluent concentration is less than or equal to 12 ng/L as specified in the plan of study;
- A summary of the elements of the plan of study;
- A requirement to submit an annual report on implementation of the PMP; and
- A requirement for submittal of a certification stating that all permit conditions related to implementing the plan of study and the PMP have been satisfied, but that compliance with the monthly average WQBEL for mercury has not been achieved.

\*\* The variance-based monthly average effluent limit of 10.6 ng/L was calculated as the  $PEQ_{avg}$  of the DMR data from 2009 through 2013. The most recent five calendar years were used to assess this PEQ value using a data set of 49 data points. The facility has only reported values above this limit twice in the past five years, on 3/2/11 (22.4ng/L) and 8/3/11 (17.9ng/L). Based on the current mercury data set, Ohio EPA believes that the permittee can maintain discharges below this variance based limit.

### ***Sludge***

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

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

### **Other Requirements**

#### ***Compliance Schedule***

A 24 month compliance schedule is proposed for Defiance WWTP to submit a DMT study. If revisions to local limits are required, Defiance WWTP must also submit a pretreatment program modification request.

### *Sanitary Sewer Overflow Reporting*

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

### *Operator Certification*

Operator certification requirements have been included in Part II, Item A of the permit in accordance with rules adopted in December 2006. These rules require Defiance WWTP to have a Class III wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 2PD00013001.

### *Operator of Record*

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

### *Storm Water Compliance*

Parts IV, V, and VI have been included with the draft permit to ensure that any storm water flows from the facility site are properly regulated and managed. In the previous permit, the permittee had requested specific portions of the storm water language to be removed. Since the previous renewal, the storm water language has changed and all parts are pertinent to WWTPs.

As an alternative to complying with Parts IV, V, and VI, Defiance WWTP attempted permit coverage through a “No Exposure Certification” under permit number 2GNR00470\*EG on 8/14/14. However, upon further inspection and review of the site, Ohio EPA personnel do not believe this facility qualifies as a “No Exposure” facility as stormwater does not drain to the headworks of the plant and is discharged directly to the Maumee River.

### *Outfall Signage*

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

### *Local Limits*

Several local limits may dramatically change in the future. These changes can be seen below in Table 4. Local limits are derived from the calculated effluent limits to maintain applicable water quality criteria (Table 11). Compared to the WLAs in the last permit renewal, many of these have significantly changed. This is due to two reasons:

First, the upstream chemistry, including pH and water temperature, and downstream water hardness of the Maumee River has changed slightly resulting in small differences in water quality criteria.

Second, dissolved metal translators (DMTs) have no longer been included in WLA calculations. This caused significant decreases in proposed local limits for cadmium, chromium, copper, lead, nickel, and zinc. As

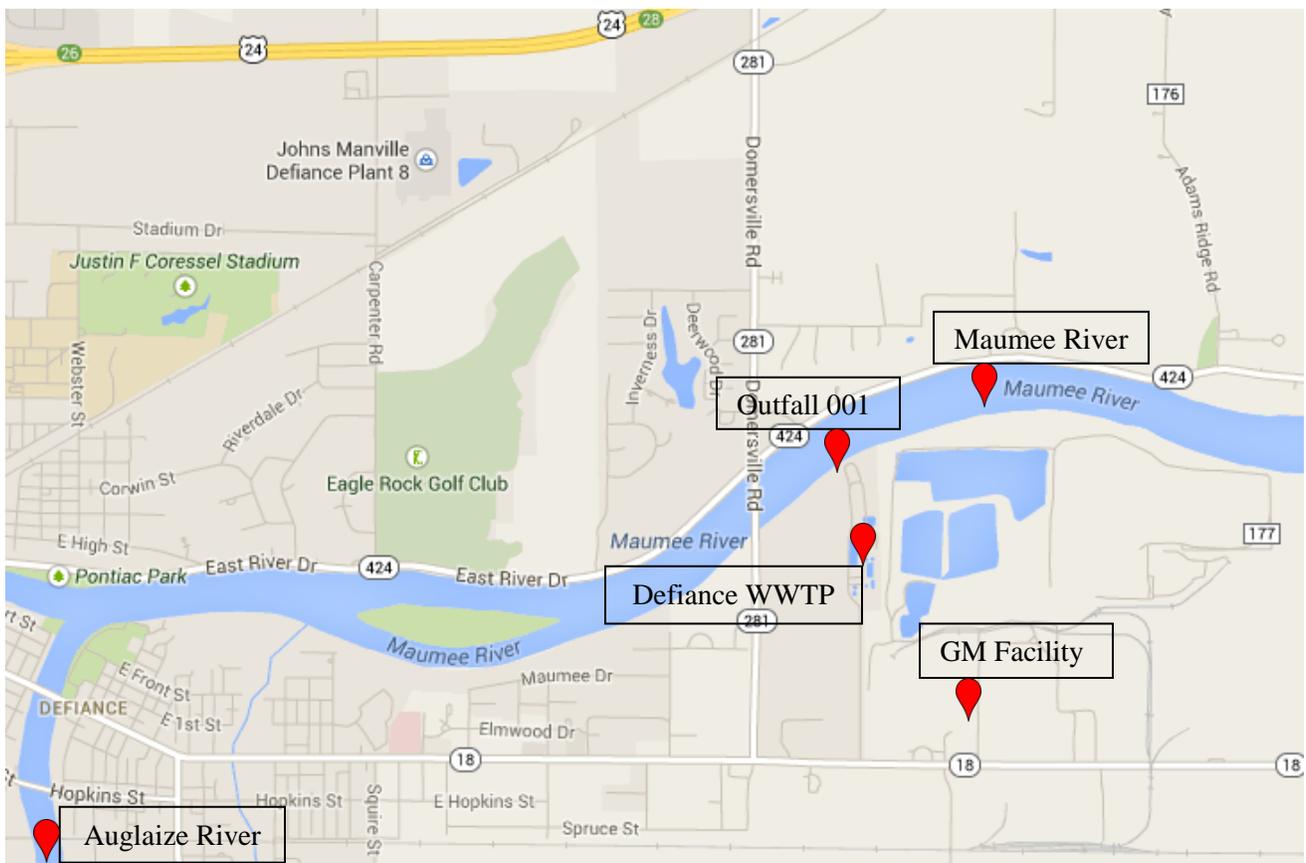
explained in Part II, Item AH of the previous permit, if the permittee wished to continue using DMTs for future WLAs, a new DMT analysis should have been completed prior to the renewal of this permit and submitted with the renewal application. As the facility did not submit a new DMT analysis with the permit application, DMTs were not used in water quality calculations resulting in new effluent limits to maintain applicable water quality criteria at the facility.

Parameter	Current Limit (µg/L)	New Limit without DMT (µg/L)
Antimony	554	672
Arsenic	440	429
Cadmium	22	13
Chromium	1838	466
Dissolved Hexavalent Chromium	31	31
Copper	68	47
Free Cyanide	15	18
Lead	279	52
Mercury	--	1.3 (ng/L)
Molybdenum	58525	58208
Nickel	460	281
Selenium	17	15
Zinc	1400	470

More stringent WLAs did not lead to new limits at the final outfall as the Defiance WWTP PEQs were still lower than WLAs. However, local limits are based upon WLAs and several parameters would decrease without the use of the DMT analysis as Table 4 indicates. The permittee has expressed concern over decreased local limits and has proposed to perform and submit a DMT analysis to Ohio EPA and delay the municipal pretreatment schedule, which includes revision of local limits, development of technical justification for local limits, and incorporation of local limits at industrial dischargers. Ohio EPA agrees that a DMT study is satisfactory and should take place before the permittee proceeds with the municipal pretreatment schedule.

Part 1.C – Dissolved Metal Translator Study has been included in the permit to require Defiance WWTP to develop a study plan for a DMT analysis, implement the study plan, and share results with Ohio EPA. The results of the DMT study shall be evaluated in the development of future WLAs and local limits.

Figure 1. Location of Defiance WWTP



**Table 5. Effluent Characterization Using Ohio EPA and Pretreatment Data**

Summary of analytical results for Defiance WWTP outfall 2PD00013001. Units µg/L unless otherwise noted; PT = data from pretreatment program reports; ND = not detected (detection limit).

<b>PARAMETER</b>	<b>Ohio EPA 5/1/2012</b>	<b>PT 1/27/2012</b>	<b>PT 4/21/2011</b>	<b>PT 3/17/2010</b>	<b>PT 5/16/2009</b>	<b>PT 4/29/2008</b>
Aluminum	517					
Barium	15					
Copper	2.8	ND (8)				
Iron	157					
Magnesium (mg/L)	17					
Manganese	108					
Nickel	4	ND (8)				
Strontium	482					
Total Filterable Residue (mg/L)	650					
Zinc	17	39	29	ND(10)	34	29
Butyl Benzyl Phthalate	ND (2.1)	ND (10)	ND (10)	15.1	ND (10)	ND (10)
Chloroform	ND (0.5)	5.1	ND (5)	ND (5)	ND (5)	ND (5)
Diethylphthalate	172	ND (10)				
Dimethylphthalate	23.7	ND (10)				
Tetrachloroethylene	ND (0.5)	ND (5)	ND (5)	ND (5)	30.9	ND (5)

**Table 6. Effluent Characterization Using Self-Monitoring Data**

Summary of current permit limits and unaltered discharge monitoring report data for Defiance WWTP outfall 2PD00013001 (January 2008 - December 2012). 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, CBOD<sub>5</sub> = 5-day carbonaceous biochemical oxygen demand

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range	
			30 day	Daily		50 <sup>th</sup>	95 <sup>th</sup>		
<b><u>Outfall 001</u></b>									
Water Temperature	Annual	°C	----	Monitor	----	1809	16.7	24.4	6.1-28.6
Total Precipitation	Annual	Inches	----	Monitor	----	884	0	0.468	0-4.4
Dissolved Oxygen	Summer	mg/L	Not Less than 5.3		636	8	9.23	3.8-9.9	
Dissolved Oxygen	Winter	mg/L	Not Less than 5.3		609	9.7	10.9	5.3-12.5	
Total Filterable Residue	Annual	mg/L	----	Monitor	----	20	710	886	304-1080
Total Suspended Solids	Annual	mg/L	----	Monitor	----	115	32	179	0-316
Ammonia	Summer	mg/L	----	Monitor	----	54	1.21	13.3	0-26.9
Ammonia	Winter	mg/L	----	Monitor	----	61	1.27	5.48	0-16.3
Nitrogen-Nitrate	Annual	mg/L	----	Monitor	----	69	8.22	24.6	0-36.6
Phosphorus	Annual	mg/L	----	Monitor	----	109	0.88	3.76	0-13.4
Fecal Coliform	Annual	#/100 mL	1000	2000 <sup>a</sup>	235	155	13000	1-110000	
<i>E. coli</i>	Annual	mL	126	284 <sup>a</sup>	192	40	6090	1-31400	
Flow Rate	Annual	MGD	----	Monitor	----	1825	2.65	7.51	1.5-14.1
Chlorine, Total Residual	Annual	mg/L	--	0.038	635	0	0	0-4.63	
Acute Toxicity, <i>Ceriodaphnia dubia</i>	Annual	TU <sub>a</sub>	----	Monitor	----	5	0	0	0-0
Acute Toxicity, <i>Pimephales promelas</i>	Annual	TU <sub>a</sub>	----	Monitor	----	5	0	0	0-0
pH, Maximum	Annual	S.U.	Not More than 9.0		1246	6.9	7.3	5.8-7.8	
pH, Minimum	Annual	S.U.	Not Less than 6.5		1246	6.8	7.2	5.6-7.6	
CBOD <sub>5</sub>	Summer	mg/L	----	Monitor	----	47	9.3	36.2	0-52
CBOD <sub>5</sub>	Winter	mg/L	----	Monitor	----	54	14.9	64.4	2-72

**Table 6 (Continued). Effluent Characterization Using Self-Monitoring Data**

Summary of current permit limits and unaltered discharge monitoring report data for Defiance WWTP outfall 2PD00013602 (January 2008 - December 2012). All values are based on annual records unless otherwise indicated; a = weekly average, CBOD<sub>5</sub> = 5-day carbonaceous biochemical oxygen demand

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50 <sup>th</sup>	95 <sup>th</sup>	
<b><u>Outfall 602</u></b>								
Total Filterable Residue	Annual	mg/L	---- Monitor ----		20	751	877	390-975
Total Suspended Solids	Annual	mg/L	24.0	36.0 <sup>a</sup>	732	7	28.4	0-103
Oil and Grease	Annual	mg/L	Not More than 10.0		120	2	6	0-11
Ammonia	Summer	mg/L	5.3	8.0 <sup>a</sup>	365	0.7	10.7	0-35.3
Ammonia	Winter	mg/L	13.0	20.0 <sup>a</sup>	362	1	10.7	0-19.9
Nitrogen-Nitrate	Annual	mg/L	---- Monitor ----		59	17.7	32.2	3.52-51.4
Phosphorus	Annual	mg/L	1.0	1.5 <sup>a</sup>	258	0.355	1.13	0.09-3.01
Free Cyanide	Annual	mg/L	---- Monitor ----		19	0	0	0-0
Nickel	Annual	µg/L	---- Monitor ----		20	0	21.9	0-38
Strontium	Annual	µg/L	---- Monitor ----		20	1060	2530	352-2730
Zinc	Annual	µg/L	---- Monitor ----		20	33	83.5	4-92
Cadmium	Annual	µg/L	---- Monitor ----		20	0	3.31	0-9.2
Lead	Annual	µg/L	---- Monitor ----		20	0	0.75	0-15
Chromium	Annual	µg/L	---- Monitor ----		22	0	0	0-879
Copper	Annual	µg/L	---- Monitor ----		20	0	23.1	0-24
Dissolved Hexavalent								
Chromium	Annual	µg/L	---- Monitor ----		20	0	0	0-0
Antimony	Annual	µg/L	---- Monitor ----		20	0	2.25	0-45
Bis(2-ethylhexyl) Phthalate	Annual	µg/L	---- Monitor ----		20	0.9	8.24	0-10.8
Flow Rate	Annual	MGD	---- Monitor ----		1825	2.65	6.98	1.5-11.5
Mercury	Annual	ng/L	15.0	1700.0	49	3.2	14.1	0.6-22.4
CBOD <sub>5</sub>	Summer	mg/L	13.0	20.0 <sup>a</sup>	383	5.2	10.4	0-16.4
CBOD <sub>5</sub>	Winter	mg/L	20.0	30.0 <sup>a</sup>	370	5.7	13.5	0-40.5

**Table 7. Effluent Data for the Defiance WWTP- Projected Effluent Quality Values**

Parameter	Units	# of Samples	# > MDL	Average PEQ	Maximum PEQ
<u>Self-Monitoring (DMR) Data</u>					
Aluminum	µg/L	1	1	2339.942	3205.4
Ammonia-Summer	mg/L	244	166	15.0234	20.58
Ammonia-Winter	mg/L	182	128	10.8624	14.88
Antimony	µg/L	26	1	42.705	58.5
Arsenic	µg/L	5	0	--	--
Barium	µg/L	1	1	67.89	93
Bis(2-ethylhexyl) phthalate	µg/L	26	10	8.44	14.12
Butyl benzyl phthalate	µg/L	6	1	23.1483	31.71
Cadmium	µg/L	26	2	8.7308	11.96
Chlorides	mg/L	1	1	742.264	1016.8
Chlorine, Total Residual	mg/L	635	20	2.027502	2.7774
Chloroform	µg/L	6	1	7.8183	10.71
Chromium	µg/L	27	0	--	--
Dissolved Hexavalent Chromium	µg/L	20	0	--	--
Copper	µg/L	26	10	22.776	31.2
Free Cyanide	mg/L	19	0	--	--
Diethyl phthalate	µg/L	6	1	263.676	361.2
Dimethyl phthalate	µg/L	6	1	36.3321	49.77
Total Filterable Residue	mg/L	21	21	902.58	1127.4
Iron	µg/L	1	1	710.582	973.4
Lead	µg/L	23	1	14.235	19.5
Magnesium	mg/L	1	1	76.942	105.4
Manganese	µg/L	1	1	488.808	669.6
Mercury	ng/L	49	49	10.543	16.984
Molybdenum	µg/L	1	0	--	--
Nickel	µg/L	26	5	36.062	49.4
Nitrate	mg/L	69	68	18.149	27.05
Phosphorus	mg/L	259	259	0.815	1.18
Selenium	µg/L	5	0	--	--
Strontium	µg/L	21	21	2288.6	3790.1
Tetrachloroethylene	µg/L	6	1	47.3697	64.89
TKN <sup>A</sup>	mg/L	1	1	82.8258	113.46
Zinc	µg/L	26	25	87.308	119.6

<sup>A</sup> TKN = total Kjeldahl nitrogen

<sup>B</sup> DMR = discharge monitoring report, MDL = method detection limit, PEQ = projected effluent quality

**Table 8. Summary of Acute and Chronic Toxicity Test Results for Defiance WWTP**

Test Date	<i>Ceriodaphnia dubia</i> 48 hours	<i>Fathead Minnows</i> 96 hours	<i>Ceriodaphnia dubia</i> 7 days	<i>Fathead Minnows</i> 7 days
	TU <sub>a</sub> <sup>a</sup>	TU <sub>a</sub> <sup>a</sup>	TU <sub>c</sub> <sup>a</sup>	TU <sub>c</sub> <sup>a</sup>
6/12/2009	BD	BD	NT	NT
6/7/2010	BD	BD	NT	NT
6/21/2011	BD	BD	NT	NT
6/6/2012	BD	BD	NT	NT
6/1/2013	BD	BD	BD	BD

<sup>a</sup> TU<sub>a</sub> = acute toxicity units, TU<sub>c</sub> = chronic toxicity units

BD = Below Detection

NT = No Test was required

**Table 9. Water Quality Criteria in the Little Miami River Study Area**

Parameter	Units	Outside Mixing Zone Criteria				Maximum Aquatic Life	Inside Mixing Zone Maximum
		Average					
		Wildlife	Human Health	Agri-culture	Aquatic Life		
Aluminum	µg/L	--	4500	--	--	--	--
Ammonia-Summer	mg/L	--	--	--	0.7	--	--
Ammonia-Winter	mg/L	--	--	--	4	--	--
Antimony	µg/L	--	780	--	190	900	1800
Arsenic	µg/L	--	580	100	150	340	680
Barium	µg/L	--	160000	--	220	2000	4000
Bis(2-ethylhexyl) phthalate	µg/L	--	32	--	8.4	1100	2100
Butyl benzyl phthalate	µg/L	--	--	--	23	130	260
Cadmium	µg/L	--	730	50	4.6	11	22
Chlorides	mg/L	--	--	--	--	--	--
Chlorine	mg/L	--	--	--	0.011	0.019	0.038
Chromium	µg/L	--	14000	100	160	3500	6900
Dissolved Hexavalent Chromium	µg/L	--	14000	--	11	16	31
Copper	µg/L	--	64000	500	18	30	59
Diethyl phthalate	µg/L	--	--	--	220	980	2000
Dimethyl phthalate	µg/L	--	--	--	1100	3200	6400
Free Cyanide	mg/L	--	48	--	0.0052	0.022	0.044
Total Filterable Residue	mg/L	--	--	--	1500	--	--
Iron	µg/L	--	--	5000	--	--	--
Lead	µg/L	--	--	100	18	340	670
Magnesium	mg/L	--	--	--	--	--	--
Manganese	µg/L	--	61000	--	--	--	--
Mercury <sup>A</sup>	ng/L	1.3	3.1	10000	910	1700	3400
Molybdenum	µg/L	--	10000	--	20000	190000	370000
Nickel	µg/L	--	43000	200	100	920	1800
Nitrate + Nitrite	mg/L	--	--	100	--	--	--
Phosphorus	mg/L	--	--	--	--	--	--
Selenium	µg/L	--	3100	50	5	--	--
Strontium	µg/L	--	1400000	--	21000	40000	81000
Tetrachloroethylene	µg/L	--	1800	--	53	430	850
TKN <sup>B</sup>	mg/L	--	--	--	--	--	--
Zinc	µg/L	--	35000	25000	230	230	470

<sup>A</sup>. Bioaccumulative Chemical of Concern (BCC)

<sup>B</sup>. TKN = total Kjeldahl nitrogen

**Table 10. Instream Conditions and Discharger Flow**

Note USGS= United States Geological Survey, cfs=cubic feet per second, STORET= EPA STorage and RETrieval data management system, OEPA=Ohio Environmental Protection Agency, MDL=Method Detection Limit, n=number of samples

Parameter	Unit	Season	Value	Basis
<i>Stream Flows</i>				
1Q10	cfs	annual	67.2	USGS 4183500, 4191500, 4185000
7Q10	cfs	annual	94.1	USGS 4183500, 4191500, 4185000
		summer	0	
		winter	0	
30Q10	cfs	summer	137.5	USGS 4183500, 4191500, 4185000
		winter	310.5	
90Q10	cfs	annual	0	
Harmonic Mean	cfs	annual	650.5	USGS 4183500, 4191500, 4185000
Mixing Assumption	%	average	25	
	%	maximum	100	
<i>Hardness</i>	mg/L	annual	221	Defiance 901 Station; '08-'12; n=20
<i>pH</i>	S.U.	summer	8.1	Defiance 901 Station; '08-'12; n=20
		winter	7.9	Defiance 901 Station; '08-'12; n=13
<i>Temperature</i>	°C	summer	26	Defiance 901 Station; '08-'12; n=20
		winter	3	Defiance 901 Station; '08-'12; n=13
<i>Defiance flow</i>	cfs	annual	12.31412	

**Table 10. Instream Conditions and Discharger Flow (continued)**

Parameter	Unit	Value	Basis
<i>Background Water Quality</i>			
Aluminum	µg/L	609.63	OEPA; 2012; n=8; 0<MDL; Station P09W32 OEPA; 08-'12; n=27; 18<MDL; Station 801 and P09W32
Ammonia-Summer	mg/L	0.05	(1/2 of MDL)
Ammonia-Winter	mg/L	0.165	OEPA; 08-'12; n=13; 6<MDL; Station 801
Antimony			No representative data available.
Arsenic	µg/L	4.04	OEPA; 2012; n=7; 0<MDL; Station P09W32
Barium	µg/L	57	OEPA; 2012; n=8; 0<MDL; Station P09W32
Bis(2-ethylhexyl) phthalate	µg/L		No representative data available.
Butyl benzyl phthalate	µg/L		No representative data available.
Cadmium	µg/L	0	OEPA; 2012; n=7; 7<MDL; Station P09W32
Chlorides	mg/L	80.74	OEPA; 2012; n=7; 0<MDL; Station P09W32
Chlorine	mg/L		No representative data available.
Chromium Dissolved Hexavalent	µg/L	0	OEPA; 2012; n=7; 7<MDL; Station P09W32
Chromium	µg/L		No representative data available.
Copper	µg/L	2.96	OEPA; 2012; n=7; 0<MDL; Station P09W32
Diethyl phthalate	µg/L	0	OEPA; 2012; n=1; 1<MDL; Station P09W32
Dimethyl phthalate	µg/L	0	OEPA; 2012; n=1; 1<MDL; Station P09W32
Free Cyanide	mg/L		No representative data available.
Total Filterable Residue	mg/L	450.57	OEPA; 2012; n=7; 0<MDL; Station P09W32
Iron	µg/L	861.5	OEPA; 2012; n=8; 0<MDL; Station P09W32
Lead	µg/L	0	OEPA; 2012; n=7; 7<MDL; Station P09W32
Magnesium	mg/L	27	OEPA; 2012; n=11; 0<MDL; Station P09W32
Manganese	µg/L	86.88	OEPA; 2012; n=8; 0<MDL; Station P09W32
Mercury	ng/L		No representative data available.
Molybdenum	µg/L		No representative data available.
Nickel	µg/L	5.23	OEPA; 2012; n=7; 0<MDL; Station P09W32
Nitrate + Nitrite	mg/L	1.11	OEPA; 2012; n=7; 1<MDL; Station P09W32
Phosphorus	mg/L	0.093	OEPA; 2012; n=7; 0<MDL; Station P09W32
Selenium	µg/L	0	OEPA; 2012; n=7; 7<MDL; Station P09W32
Strontium	µg/L	1309.13	OEPA; 2012; n=8; 0<MDL; Station P09W32
Tetrachloroethylene	µg/L		No representative data available.
TKN <sup>A</sup>	mg/L	1.02	OEPA; 2012; n=7; 0<MDL; Station P09W32
Zinc	µg/L	5.63	OEPA; 2012; n=8; 7<MDL; Station P09W32

<sup>A</sup> TKN = total Kjeldahl nitrogen

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

Parameter	Units	Average			Aquatic Life	Maximum Aquatic Life	Inside Mixing Zone Maximum
		Wildlife	Human Health	Agri Supply			
Aluminum	µg/L	--	55878	--	--	--	--
Ammonia-Summer	mg/L	--	--	--	--	--	--
Ammonia-Winter	mg/L	--	--	--	--	--	--
Antimony	µg/L	--	14446	--	672	7413	1800
Arsenic	µg/L	--	8186	1367	429	2173	680
Barium	µg/L	--	2272269	--	531	12603	4000
Bis(2-ethylhexyl) phthalate	µg/L	--	593	--	30	9060	2100
Butyl benzyl phthalate	µg/L	--	--	--	81	1071	260
Cadmium	µg/L	--	10371	710	13	71	22
Chlorides	mg/L	--	--	--	--	--	--
Chlorine	mg/L	--	--	--	0.032	0.12	0.038
Chromium	µg/L	--	198889	1421	466	22600	6900
Dissolved Hexavalent Chromium	µg/L	--	259287	--	39	132	31
Copper	µg/L	--	909169	7064	47	178	59
Diethyl phthalate	µg/L	--	--	--	778	8072	2000
Dimethyl phthalate	µg/L	--	--	--	3888	26358	6400
Free Cyanide	mg/L	--	889	--	0.018	0.18	0.044
Total Filterable Residue	mg/L	--	--	--	3505	--	--
Iron	µg/L	--	--	59655	--	--	--
Lead	µg/L	--	--	1421	52	2195	670
Magnesium	mg/L	--	--	--	--	--	--
Manganese	µg/L	--	865442	--	--	--	--
Mercury <sup>A</sup>	ng/L	1.3	3.1	10000	910	1700	3400
Molybdenum	µg/L	--	142064	--	58208	1226859	370000
Nickel	µg/L	--	610805	2772	281	5912	1800
Nitrate + Nitrite	mg/L	--	--	1406	--	--	--
Phosphorus	mg/L	--	--	--	--	--	--
Selenium	µg/L	--	44040	710	15	--	--
Strontium	µg/L	--	19871649	--	58618	251142	81000
Tetrachloroethylene	µg/L	--	33337	--	187	3542	850
TKN <sup>B</sup>	mg/L	--	--	--	--	--	--
Zinc	µg/L	--	497149	355085	659	1454	470

<sup>A</sup> 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(L).

<sup>B</sup> TKN = total Kjeldahl nitrogen

**Table 12. Parameter Assessment**

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

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

Arsenic	Chromium	Iron
Manganese	Molybdenum	Nitrate + Nitrite
Selenium	Strontium	Free Cyanide
Antimony	Dimethyl phthalate	Chloroform
Dissolved Hexavalent Chromium		

*Group 3:* PEQ<sub>max</sub> < 50 percent of maximum PEL and PEQ<sub>avg</sub> < 50 percent of average PEL.  
No limit recommended; monitoring optional.

Aluminum	Barium	Total Filterable Residue
Lead	Nickel	Zinc
Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Tetrachloroethylene Diethyl phthalate

*Group 4:* PEQ<sub>max</sub> >= 50 percent, but < 100 percent of the maximum PEL or  
PEQ<sub>avg</sub> >= 50 percent, but < 100 percent of the average PEL. Monitoring is appropriate.

Cadmium	Copper
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*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

<u>Parameter</u>	<u>Units</u>	<u>Period</u>	<u>Recommended Effluent Limits</u>	
			<u>Average</u>	<u>Maximum</u>
Chlorine	mg/L		0.032	0.038
Mercury	ng/L		1.3	1700

\*TKN = Total Kjeldahl Nitrogen, WLA = Wasteload Allocation, PEQ = Projected Effluent Quality, PEL = Preliminary Effluent Limits, WQS = Water Quality Standards

**Table 13a. Final Effluent Limits and Monitoring Requirements for Outfall 2PD00013001**

Parameter	Units	Effluent Limitations				Basis <sup>b</sup>
		Concentration		Loading (kg/day) <sup>a</sup>		
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Temperature	°C	----- Monitor -----				M, EP
Dissolved Oxygen	mg/L	----- Not less than 5.3 -----				WQS, EP
Total Precipitation	in	----- Monitor -----				M, EP
Total Suspended Solids	mg/L	----- Monitor -----				M, EP
Ammonia	mg/L	----- Monitor -----				M, EP
Nitrate + Nitrite	mg/L	----- Monitor -----				M, EP
Phosphorus	mg/L	----- Monitor -----				M, EP
Total Filterable Residue	mg/L	----- Monitor -----				M, EP
<i>E. coli</i>						
Summer Only	#/100ml	126	284 <sup>c</sup>	--	--	WQS, EP
Flow	MGD	----- Monitor -----				M, EP
Chlorine	mg/L	--	0.038	--	--	WQS, EP, RP
Whole Effluent Toxicity – <i>Ceriodaphnia dubia</i> and <i>Pimephales promelas</i>						
Acute	TUa	----- Monitor -----				WET
Chronic	TUc	----- Monitor -----				WET
pH	S.U.	----- 6.5 to 9.0 -----				WQS, EP
CBOD <sub>5</sub> <sup>d</sup>	mg/L	----- Monitor -----				M, EP

<sup>a</sup> Defiance WWTP loading limits are expressed in the Final Effluent Limits and Monitoring Requirements for Outfall 2PD00013602 (Table 13a)

<sup>b</sup> Definitions: EP = Existing Permit;  
M = Best engineering judgment 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)]  
WQS = Ohio Water Quality Standards (OAC 3745-1-07).

<sup>c</sup> Weekly average limit.

<sup>d</sup> CBOD<sub>5</sub> = 5-day carbonaceous biochemical oxygen demand

**Table 13b. Final Effluent Limits and Monitoring Requirements for Outfall 2PD00013602**

Parameter	Units	Effluent Limitations				Basis <sup>b</sup>
		Concentration		Loading (kg/day) <sup>a</sup>		
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Total Suspended Solids	mg/L	36.0	24.0 <sup>c</sup>	817	545 <sup>c</sup>	PD, EP
Oil and Grease	mg/L	--	10.0	--	--	WQS, EP
Ammonia	mg/L					
Summer		5.3	8.0 <sup>c</sup>	121	182 <sup>c</sup>	PD, EP
Winter		13.0	20.0 <sup>c</sup>	295	454 <sup>c</sup>	PD, EP
Total Kjeldahl Nitrogen	mg/L	----- Monitor -----				M, EP
Nitrate + Nitrite	mg/L	----- Monitor -----				M, EP
Phosphorus	mg/L	1.0	1.5 <sup>c</sup>	22.7	34.0 <sup>c</sup>	PT, EP
Total Filterable Residue	mg/L	----- Monitor -----				M, EP
Free Cyanide	mg/L	----- Monitor -----				M, EP
Nickel	µg/L	----- Monitor -----				M, EP
Zinc	µg/L	----- Monitor -----				M, EP
Cadmium	µg/L	----- Monitor -----				RP
Lead	µg/L	----- Monitor -----				M, EP
Chromium	µg/L	----- Monitor -----				M, EP
Copper	µg/L	----- Monitor -----				RP
Dissolved Hexavalent Chromium	µg/L	----- Monitor -----				M, EP
Bis (2-ethylhexyl) Phthalate	µg/L	----- Monitor -----				M, EP
Flow	MGD	----- Monitor -----				M, EP
Mercury	ng/L	10.6	1700	0.00024	0.0387	RP, VAR
CBOD <sub>5</sub> <sup>d</sup>	mg/L					
Summer		13.0	20.0 <sup>c</sup>	295	454 <sup>c</sup>	PD, EP
Winter		20.0	30.0 <sup>c</sup>	454	681 <sup>c</sup>	PD, EP

<sup>a</sup> Effluent loadings based on average design discharge flow of 6.0 MGD.

<sup>b</sup> Definitions: EP = Existing Permit;  
M = Best engineering judgment of Permit Guidance 1: Monitoring Frequency Requirements for Sanitary Discharges;  
PD = Plant Design Criteria;  
PT = Phosphorus treatment required under OAC 3745-33-06(C)  
RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits [OAC 3745-33-07(A)];  
VAR = Mercury variance-based limits [OAC 3745-33-07(D)(10)]  
WLA = Wasteload Allocation procedures (OAC 3745-2);  
WQS = Ohio Water Quality Standards (OAC 3745-1-07).

<sup>c</sup> Weekly average limit.

<sup>d</sup> CBOD<sub>5</sub> = 5-day carbonaceous biochemical oxygen demand