

National Pollutant Discharge Elimination System (NPDES) Permit Program

FACT SHEET

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for Upper Hocking Water Pollution Control Facility (WPCF)

Public Notice No.: 12-08-048
Public Notice Date: August 20, 2012
Comment Period Ends: September 19, 2012

Ohio EPA Permit No.: 4PD00102*BD
Application No.: OH0136603

Name and Address of Applicant:

City of Lancaster
800 Lawrence Street
Lancaster, Ohio 43130

Name and Address of Facility Where
Discharge Occurs:

City of Lancaster
Upper Hocking Water Pollution Control Facility
1442 Campground Road
Lancaster, Ohio 43130
Fairfield County

Receiving Water: Hocking River

Subsequent
Stream Network: Ohio River

Introduction

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

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

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 EPA (USEPA) 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

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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 for most parameters are the same as in the current permit. Monitoring for barium on a monthly basis is proposed for this permit based on the WLA. Monitoring for total Kjeldahl nitrogen is proposed in order to collect more data on nutrients discharging to the Hocking River. No current monitoring requirements or limits are proposed to be removed.

Final effluent limits are proposed for *Escherichia coli*. New WQS for *E. coli* became effective in March 2010. No compliance schedule is proposed to meet this limit. Based on best engineering judgment (BEJ), it is expected that the facility will be able to comply with the new limits without an interim monitoring period.

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Procedures for Participation in the Formulation of Final Determinations

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

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

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

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

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

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

The 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 Sara Hise, (614) 644-4824, sara.hise@epa.state.oh.us.

Location of Discharge/Receiving Water Use Classification

The Upper Hocking WPCF discharges to the Hocking River at River Mile (RM) 94.54. Figure 1 shows the approximate location of the facility.

This segment of the Hocking River is described by Ohio EPA River Code: 01-001, USEPA River Reach #: 05030204, County: Fairfield, Ecoregion: Western Allegheny Plateau. The Hocking River is designated for the following uses under Ohio's WQS (Ohio Administrative Code [OAC] 3745-1-07): Modified Warmwater habitat (MWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Class B 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 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 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 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 (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 AWS and IWS.

Facility Description

The Upper Hocking WPCF is a primary treatment facility with an average design flow of 2.0 million gallons per day (MGD) and a peak hydraulic capacity of 8.0 MGD. The facility was originally constructed in 2011. Treatment processes and/or equipment include:

- Influent pumping;
- Preliminary screening;
- Grit removal;
- Activated sludge – vertical loop reactor;
- Membrane bio-reactor; and
- Ultra-violet disinfection.

Preliminary processing of wastewater involves screening the influent followed by grit removal. Wastewater is then sent to the vertical loop reactor. After biological treatment, wastewater flows through the membrane bio-reactor. The wastewater is then treated by ultra-violet treatment prior to being discharged at outfall 001.

Sludge processing includes a sludge holding tank, sludge thickener, and a dewatering centrifuge. Sludge from the Upper Hocking WPCF is removed for disposal in a landfill. The facility has only been in operation since

July of 2011, so no sludge has been removed to date. However, the sewage sludge treatment system has a process design capacity of 228 dry tons per year.

The collection system of the Upper Hocking WPCF is 100 percent separate sanitary sewers with no bypasses or overflows. There are three lift stations in the collection system.

The Upper Hocking WPCF serves the city of Lancaster and the Greenfield Township Water and Sewer District for a total service population of 10,755. The water supply sources for the service area are groundwater wells.

Description of Existing Discharge

The Upper Hocking WPCF has only been in operation since July of 2011; there is not enough data to determine a trend in the effluent flow rate. To date, the 50th percentile is 1.541 MGD, well under the average design flow of 2 MGD.

According to the permit renewal application, there are no categorical industrial users, five industrial users, and two non-categorical significant industrial users (SIU) (SIUs are defined as any industry discharging more than 25,000 gallons per day, industries subject to federal categorical standards for wastewater discharges, or any other industry classified as “significant” by the local pretreatment program due to the nature of the effluent from the industry). Non-categorical SIUs discharge 0.128 MGD, and all industrial users discharge 0.371 MGD.

To date, the facility has not reported any permit violations.

Table 1 presents chemical specific data collected by Ohio EPA.

Table 2 presents a summary of unaltered Discharge Monitoring Report (DMR) data for outfall 4PD00102001. Data are presented for the period July 2011 to December 2011, and current permit limits are provided for comparison.

Table 3 presents the average and maximum PEQ values.

Table 4 summarizes the results of the facility’s acute and chronic toxicity tests and the Ohio EPA’s acute whole effluent toxicity screening tests of the final effluent.

Assessment of Impact on Receiving Waters

Ohio EPA conducted a comprehensive physical, chemical and biological survey in portions of the Hocking River watershed from 2003 to 2005. TMDLs have been developed for pollutants which have impaired water uses and precluded attainment of applicable WQS. The complete Hocking River TMDL study can be found on this website:

<http://www.epa.ohio.gov/dsw/tmdl/HockingRiverTMDL.aspx>

TMDLs establish allowable loadings or other quantifiable parameters for a waterbody, and thereby provide the basis to establish water quality based controls. These should provide the pollution reduction necessary for a waterbody to meet WQS.

Overall concerns in the watershed were nutrient enrichment (primarily the discharge of phosphorus) and bacteria concentration (specifically fecal coliforms). The primary source of phosphorus was nonpoint source runoff, such as from cropland. The primary source of fecal coliform concentrations was identified as home sewer treatment systems (HSTSS) which were failing or not connected to the sanitary sewer system. The Upper Hocking WPCF was built specifically to handle HSTSS that were otherwise not connected to a municipal treatment system.

The TMDL recommended phosphorus limits for certain point sources within the watershed, but not specifically for the Upper Hocking WPCF.

Development of Water-Quality-Based Effluent Limits

Determining appropriate effluent concentrations is a multiple-step process in which parameters are identified as likely to be discharged by a facility, evaluated with respect to Ohio water quality criteria, and examined to determine the likelihood that the existing effluent could violate the calculated limits.

Parameter Selection

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

Self-monitoring data (DMR)	July 2011 through December 2011
Ohio EPA data	November 2011

Outliers

The data were examined, and the following values were removed from the evaluation to give a more reliable PEQ: nitrite plus nitrate on 8/25/11 (84 mg/L).

This data is evaluated statistically, and PEQ values are calculated for each pollutant. Average PEQ (PEQ_{avg}) values represent the 95th percentile of monthly average data, and maximum PEQ (PEQ_{max}) values represent the 95th percentile of all data points. The average and maximum PEQ values are presented in Table 3.

The PEQ values are used according to Ohio rules to compare to applicable WQS and allowable WLA values for each pollutant evaluated. Initially, PEQ values are compared to the applicable average and maximum WQS. If both PEQ values are less than 25 percent of the applicable WQS, the pollutant does not have the reasonable potential to cause or contribute to exceedances of WQS, and no WLA is done for that parameter. If either PEQ_{avg} or PEQ_{max} is greater than 25 percent of the applicable WQS, a WLA is conducted to determine whether the parameter exhibits reasonable potential and needs to have a limit or if monitoring is required. See Table 8 for a summary of the screening results.

Wasteload Allocation

For those parameters that require a WLA, the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. Dischargers are allocated pollutant loadings/concentrations based on the Ohio WQS (OAC 3745-1). 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 allocations are expressed as concentrations.

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

Agricultural Water Supply
Human Health (nondrinking)

Winter 30Q10
Harmonic mean flow
Harmonic mean flow

Allocations are developed using a percentage of stream design flow as specified in Table 6, 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 (12 ng/l in the Ohio River basin).

The data used in the WLA are listed in Tables 5 and 6. The WLA results to maintain all applicable criteria are presented in Table 7. The current ammonia limits have been evaluated using the WLA procedures and are protective of WQS 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.

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

The WLA calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Upper Hocking WPCF, the WLA values are 0.4 TU_a and 1.34 TU_c .

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

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

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

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

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

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

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

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

Dilution Ratio

Allowable Effluent Toxicity

<u>(downstream flow to discharger flow)</u>	<u>(percent effects in 100% effluent)</u>
up to 2 to 1	30
greater than 2 to 1 but less than 2.7 to 1	40
2.7 to 1 to 3.3 to 1	50

The acute WLA for the Upper Hocking WPCF is 30 percent mortality in 100 percent effluent based on the dilution ratio of 1 to 1.

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 7. 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 $[(PEQ_{avg} \div PEL_{avg}) \times 100, \text{ or } (PEQ_{max} \div PEL_{max}) \times 100]$, the parameters are assigned to group 3, 4, or 5. The groupings are listed in Table 8.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 9 presents the final effluent limits and monitoring requirements proposed for the Upper Hocking WPCF outfall 4PD00102001 and the basis for their recommendation.

Oil and Grease, pH, and Fecal Coliforms

Limits proposed for oil and grease, pH, and fecal coliforms are based on WQS (OAC 3745-1). The proposed monitoring frequencies will adequately document these parameters.

Total Suspended Solids, Ammonia, Five-Day Carbonaceous Biochemical Oxygen Demand, and Dissolved Oxygen

Proposed limits for total suspended solids (TSS), ammonia, and five-day carbonaceous biochemical oxygen demand (CBOD₅) are all based on plant design and continued from the existing permit. The limits recommended for total suspended solids and 5-day carbonaceous biochemical oxygen demand (CBOD₅) are standards included in 40 CFR Part 122.29, new sources and new dischargers.

Total Kjeldahl Nitrogen, Nitrite+Nitrate, and Phosphorus

Monitoring is proposed to continue for nitrite+nitrate and phosphorus in order to assist in the evaluation of effluent quality in accordance with Ohio EPA guidance. Monitoring is proposed to be implemented for TKN. Monitoring for these parameters is important in order to provide data for potential nutrient sources in the Hocking River watershed as implementation of the TMDL proceeds.

Flow Rate, Temperature, Dissolved Oxygen, and Ammonia

Monitoring of flow rate, temperature, and dissolved oxygen is specified to assist in the evaluation of effluent quality and treatment plant performance. For a facility required to meet secondary treatment standards, monitoring of ammonia-nitrogen is appropriate and is proposed.

Cadmium, Chromium, Chromium⁺⁶, Cyanide - free, Lead, Mercury, Nickel, Total Filterable Residue (Dissolved solids), and Zinc

Ohio EPA risk assessment (Table 8) places these parameters in group 3 or 2. This placement as well as the data in Tables 1, 2, and 3 supports that these parameters do not have the reasonable potential to contribute to WQS

exceedances, and limits are not necessary to protect water quality. Monitoring is proposed to document that these pollutants continue to remain at low levels. To ensure that data is obtained that allows Ohio EPA to make water quality-related decisions regarding free cyanide, cadmium, dissolved hexavalent chromium (chromium⁺⁶), and zinc, a special condition is proposed in Part II of the permit that provides guidance on the MDLs (method detection limits) the permittee should use in analyzing for these contaminants.

Barium

The Ohio EPA risk assessment (Table 8) places barium in group 5, which recommends limits to protect water quality. Using the discretion allowed the Director under OAC 3745-33-07(A)(5), we are proposing monitoring, rather than limits, for these pollutants. The PEQ values calculated for barium (Table 3) may not be representative of its actual levels in the plant effluent they were based on one data point. The purpose of the proposed monitoring is to collect additional data on the frequency of occurrence and variability of these pollutants in the plant's effluent.

E. coli

Final effluent limits are proposed for *E. coli*. New WQS for *E. coli* became effective in March 2010 and replace the limits for fecal coliforms. No compliance schedule is proposed to meet this limit. Based on BEJ, it is expected that the facility will be able to comply with the new limits without an interim monitoring period.

Whole Effluent Toxicity Reasonable Potential

An acute and chronic toxicity test was performed in November of 2011. The results showed no acute or chronic toxicity. An Ohio EPA screening test indicated the effluent may be acutely toxic to *Ceriodaphnia dubia*. 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.

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

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

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 Upper Hocking WPCF to have a Class III wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 001.

Operator of Record

In December 2006, OAC 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 OAC. It requires the permittee to designate one or more operator of record to oversee the technical operation of the Upper Hocking WPCF.

Pretreatment

The City of Lancaster's Lancaster WPCF has an approved pretreatment program. The new Upper Hocking WPCF is not covered by that pretreatment program; therefore no schedule of compliance is included in the permit.

Storm Water Compliance

Parts IV, V, and VI have been included with the draft permit in order 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 Upper Hocking WPCF may seek permit coverage under the general permit for industrial stormwater (permit # OHR000005) or submit a "No Exposure Certification." Parts IV, V, and VI will be removed from the final permit if: 1) the City of Lancaster submits a Notice of Intent (NOI) for coverage under the general permit for industrial stormwater 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 Hocking River providing information about the discharge. Signage at outfalls is required pursuant to OAC 3745-33-08(A).

Figure 1. Approximate Location of the Upper Hocking WPCF

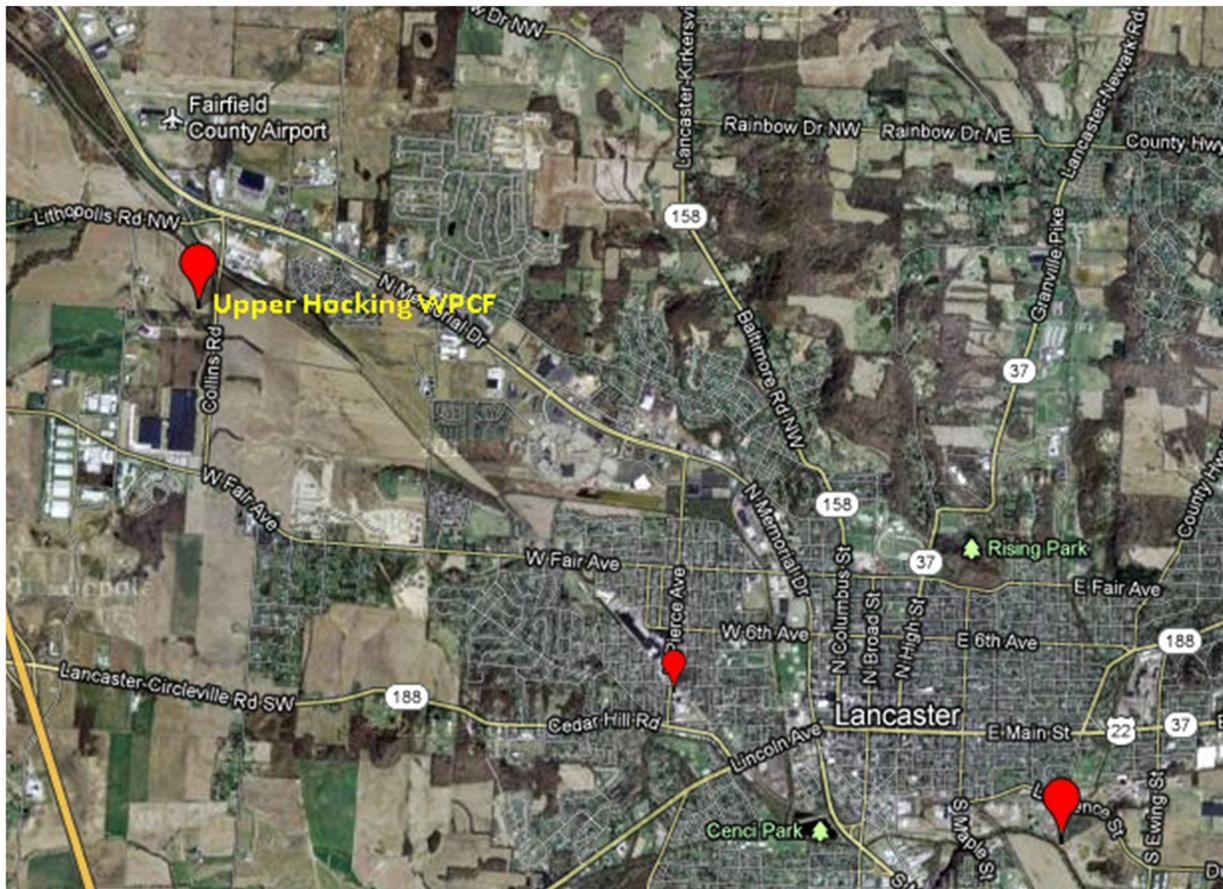


Table 1. Effluent Characterization Using Ohio EPA Data

Summary of data collected by the Ohio EPA on 11/9/2011. AA = not detected (method limit). NA = not analyzed.

Parameter	Results	Units
Aluminium	AA (200)	µg/L
Ammonia	AA (0.05)	mg/L
Arsenic	2.3	µg/L
Barium	51	µg/L
Cadmium	AA (0.2)	µg/L
Calcium	87	mg/L
Carbonaceous biochemical oxygen demand (5-day)	AA (2)	mg/L
Chemical oxygen demand	AA (20)	mg/L
Chloride	165	mg/L
Chromium	AA (2)	µg/L
Copper	3.3	µg/L
Iron	AA (50)	µg/L
Lead	AA (2)	µg/L
Magnesium	24	µg/L
Manganese	35	µg/L
Nickel	3.5	µg/L
Nitrate+nitrite	1.81	mg/L
Oil & Grease	AA (2.1)	mg/L
Phosphorus, total	1.42	mg/L
Potassium	9	mg/L
Selenium	AA (2)	µg/L
Sodium	181	mg/L
Strontium	438	µg/L
Total dissolved solids	770	mg/L
Total Kjeldahl nitrogen	1.26	mg/L
Total suspended solids	AA (5)	mg/L
Zinc	18	µg/L

Table 2. Effluent Characterization Using Self-Monitoring Data

Effluent characterization for outfalls 001, 601, 801, and 901. No data is available for stations 300, 586, or 588.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50 th	95 th	
Outfall 001								
Water Temperature	Annual	°C	MONITOR		171	20.3	22.8	14.4-23.9
Dissolved Oxygen	Summer	mg/L	6.0 MINIMUM		110	8.8	9.25	7.41-9.33
Dissolved Oxygen	Winter	mg/L	MONITOR		61	9.68	9.98	9.23-10.1
Residue, Total Dissolved	Annual	mg/L	MONITOR		23	700	806	440-900
Total Suspended Solids	Annual	mg/L	12	18	67	0	3.8	0-6
Oil and Grease, Hexane Extr Method	Annual	mg/L	10 MAXIMUM		12	0	0.868	0-1.93
Nitrogen, Ammonia	Summer	mg/L	1	1.5	43	0.05	0.089	0-0.09
Nitrogen, Ammonia	Winter	mg/L	3	4.5	24	0.03	0.214	0-0.25
Nitrite Plus Nitrate, Total	Annual	mg/L	MONITOR		22	2.75	7.89	0.58-84
Phosphorus, Total	Annual	mg/L	MONITOR		21	1.7	2.8	0.76-3.2
Cyanide, Free	Annual	mg/L	MONITOR		8	0	0	0-0
Nickel, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Zinc, Total Recoverable	Annual	µg/L	MONITOR		6	23.8	46.3	0-50
Cadmium, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Lead, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Chromium, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Copper, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Chromium, Dissolved Hexavalent	Annual	µg/L	MONITOR		7	0	0	0-0
Fecal Coliform	Annual	#/100 mL	1000	2000	43	0	10	0-330
Flow Rate	Summer	MGD	MONITOR		112	1.46	2.01	0.147-3.18
Flow Rate	Winter	MGD	MONITOR		61	2.28	4.16	1.36-5.12
Flow Rate	Annual	MGD	MONITOR		173	1.54	3.21	0.147-5.12
Mercury, Total (Low Level)	Annual	ng/L	MONITOR		6	0.755	1.2	0-1.2
Acute Toxicity, <i>Ceriodaphnia dubia</i>	Annual	TU _a	MONITOR		1	0	0	0-0
Chronic Toxicity, <i>Ceriodaphnia dubia</i>	Annual	TU _c	MONITOR		1	0	0	0-0
Acute Toxicity, <i>Pimephales promelas</i>	Annual	TU _a	MONITOR		1	0	0	0-0
Chronic Toxicity, <i>Pimephales promelas</i>	Annual	TU _c	MONITOR		1	0	0	0-0

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50 th	95 th	
pH, Maximum	Annual	S.U.	--	9.5	171	7.55	7.8	6.85-7.93
pH, Minimum	Annual	S.U.	--	6	171	7.45	7.76	6.67-7.91
Carbonaceous biochemical oxygen demand (5-day)	Summer	mg/L	10	15	43	0	4.03	0-6.2
Carbonaceous biochemical oxygen demand (5-day)	Winter	mg/L	10	15	24	0	0	0-3
Outfall 601								
Total Suspended Solids	Annual	mg/L	MONITOR		66	150	290	30-630
Cyanide, Total	Annual	mg/L	MONITOR		5	0	0	0-0
Nickel, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Zinc, Total Recoverable	Annual	µg/L	MONITOR		6	91.5	203	73.3-239
Cadmium, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Lead, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Chromium, Total Recoverable	Annual	µg/L	MONITOR		6	0	0	0-0
Copper, Total Recoverable	Annual	µg/L	MONITOR		6	95.8	210	76.5-237
Chromium, Dissolved Hexavalent	Annual	µg/L	MONITOR		6	0	0	0-0
Mercury, Total (Low Level)	Annual	ng/L	MONITOR		6	19	32.3	10-33
pH, Maximum	Annual	S.U.	MONITOR		170	7.54	7.75	6.4-7.99
pH, Minimum	Annual	S.U.	MONITOR		170	7.36	7.55	6.36-7.61
Carbonaceous biochemical oxygen demand (5-day)	Summer	mg/L	MONITOR		42	115	172	51-182
Carbonaceous biochemical oxygen demand (5-day)	Winter	mg/L	MONITOR		24	103	158	33.4-165
Outfall 801								
Water Temperature	Annual	°C	MONITOR		6	15.5	22.4	6.8-23.1
Dissolved Oxygen	Summer	mg/L	MONITOR		4	8.45	8.6	7.2-8.62
Dissolved Oxygen	Winter	mg/L	MONITOR		2	10.4	11.3	9.42-11.4
pH	Annual	S.U.	MONITOR		6	8.07	8.47	7.94-8.56
Nitrogen, Ammonia	Summer	mg/L	MONITOR		4	0.045	0.264	0-0.3
Nitrogen, Ammonia	Winter	mg/L	MONITOR		2	0.025	0.0475	0-0.05
Phosphorus, Total	Annual	mg/L	MONITOR		6	0.07	0.5	0-0.6

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50 th	95 th	
Fecal Coliform	Annual	#/100 mL	MONITOR		4	625	893	160-900
48-Hr. Acute Toxicity <i>Ceriodaphnia dubia</i>	Annual	% Affected	MONITOR		1	0	0	0-0
96-Hr. Acute Toxicity <i>Pimephales promela</i>	Annual	% Affected	MONITOR		1	0	0	0-0
7-Day Chronic Toxicity <i>Ceriodaphnia dubia</i>	Annual	% Affected	MONITOR		1	0	0	0-0
7-Day Chronic Toxicity <i>Pimephales promelas</i>	Annual	% Affected	MONITOR		1	2	2	2-2
Outfall 901								
Water Temperature	Annual	°C	MONITOR		6	17.2	22.1	10.6-22.7
Dissolved Oxygen	Summer	mg/L	MONITOR		4	8.16	8.52	7.51-8.53
Dissolved Oxygen	Winter	mg/L	MONITOR		2	9.9	10.5	9.25-10.5
pH	Annual	S.U.	MONITOR		6	8.03	8.5	7.97-8.59
Nitrogen, Ammonia	Summer	mg/L	MONITOR		4	0.045	0.348	0-0.4
Nitrogen, Ammonia	Winter	mg/L	MONITOR		2	0.02	0.038	0-0.04
Hardness, Total	Annual	mg/L	MONITOR		6	255	266	220-266
Fecal Coliform	Annual	#/100 mL	MONITOR		4	350	558	230-580

Table 3. Projected Effluent Quality Values for Outfall 001

Parameter	Units	Number of Samples	Number > MDL	PEQ	PEQ
				Average	Maximum
Ammonia-Summer	mg/L	31	21	0.07884	0.108
Ammonia-Winter	mg/L	12	8	0.292	0.4
Arsenic	µg/L	1	1	10.4098	14.26
Barium	µg/L	1	1	230.826	316.2
Cadmium	µg/L	7	0	--	--
Chromium	µg/L	7	0	--	--
Chromium ⁺⁶ (dissolved)	µg/L	7	0	--	--
Copper	µg/L	1	1	14.4832	19.84
Cyanide - free (wwh,ewh,mwh)	mg/L	8	0	--	--
Dissolved solids (average)	mg/L	24	24	811.13	949.64
Lead	µg/L	7	0	--	--
Manganese	µg/L	1	1	158.41	217
Mercury	ng/L	6	4	1.8396	2.52
Nickel	µg/L	6	1	5.3655	7.35
Nitrate + Nitrite	mg/L	22	22	7.4971	10.27
Oil & grease	mg/L	9	1	2.53602	3.474
Phosphorus	mg/L	22	22	2.6514	3.8088
Strontium	µg/L	1	1	1982.388	2715.6
Zinc	µg/L	7	6	73	100

EWH = exceptional warmwater habitat

MDL = method detection limit

MWH = modified warmwater habitat

PEQ = projected effluent quality

WWH = warmwater habitat

Table 4. Summary of Toxicity Discharge Monitoring Report Data and Ohio EPA Screening

Collection Date	<i>Ceriodaphnia dubia</i>									<i>Pimephales promelas</i>									
	24 Hours				48 Hours					24 Hours				48 Hours				96 Hours	
	UP	C	%M	TU _a	UP	C	%M	TU _a	TU _c	UP	C	%M	TU _a	UP	C	%M	TU _a	TU _a	TU _c
10/1/11-10/2/11 ^a	NR	NR	NR	ND	NR	NR	NR	AA	AA	NR	NR	NR	ND	NR	NR	NR	ND	AA	AA
11/8/11 ^b	0	0	5	ND	5	0	25	ND	NA	0	0	0	ND	5	0	0	ND	NA	NA
11/9/11 ^b	0	0	20	ND	0	0	20	ND	NA	0	0	0	ND	0	0	0	ND	NA	NA
11/8/11-11/9/11 ^c	0	0	0	ND	0	0	15	ND	NA	0	0	0	ND	0	0	0	ND	NA	NA

^a = Facility test; 24-hour composite sample

^b = Ohio EPA test

^c = Ohio EPA test; 24-hour composite sample

AA = non-detection (0.2 TU_a, 1.0 TU_c)

C = laboratory control water

%M = percent mortality in 100% effluent

NA = not analyzed

ND = not determined

NR = not reported

TU_a = acute toxicity units

UP = percent mortality in upstream control water

Table 5. Water Quality Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
		Human Health	Agriculture	Aquatic Life	Aquatic Life	
Ammonia-Summer	mg/L	--	--	2.3	--	--
Ammonia-Winter	mg/L	--	--	3.9	--	--
Arsenic	µg/L	--	100	150	340	680
Barium	µg/L	--	--	220	2000	4000
Cadmium	µg/L	--	50	5	13	25
Chromium	µg/L	--	100	180	3800	7600
Chromium ⁺⁶ (dissolved)	µg/L	--	--	11	16	31
Copper	µg/L	1300	500	20	33	66
Cyanide - free (wwh,ewh,mwh)	mg/L	220	--	0.012	0.046	0.092
Dissolved solids (average)	mg/L	--	--	1500	--	--
Lead	µg/L	--	100	21	390	780
Manganese	µg/L	--	--	--	--	--
Mercury	ng/L	12	10000	910	1700	3400
Nickel	µg/L	4600	200	110	1000	2000
Nitrate + Nitrite	mg/L	--	100	--	--	--
Oil & grease	mg/L	--	--	--	10	--
Phosphorus	mg/L	--	--	--	--	--
Strontium	µg/L	--	--	21000	40000	81000
Zinc	µg/L	69000	25000	260	260	520

EWH = exceptional warmwater habitat
 MDL = method detection limit
 MWH = modified warmwater habitat
 PEQ = projected effluent quality
 WWH = warmwater habitat

Table 6. Instream Conditions and Discharger Flow

<u>Parameter</u>	<u>Units</u>	<u>Season</u>	<u>Value</u>	<u>Basis</u>
<i>Stream Flows</i>				
1Q10	cfs	annual	0.780497925	USGS gage 03156400
7Q10	cfs	annual	1.0406639	USGS gage 03156400
30Q10	cfs	summer	1.517634855	USGS gage 03156400
		winter	3.815767635	USGS gage 03156400
Harmonic Mean	cfs	annual	5.983817427	USGS gage 03156400
Mixing Assumption	%	average	100	
	%	maximum	100	
<i>Hardness</i>				
	mg/l	annual	249	Station 901 2011, n=6
<i>pH</i>				
	S.U.	summer	7.87	Lancaster WPCF Station 801, 2007-2011, n=20
		winter	7.91	Lancaster WPCF Station 801, 2007-2011, n=14
<i>Temperature</i>				
	C	summer	20.78	Lancaster WPCF Station 801, 2007-2011, n=20
		winter	4.125	Lancaster WPCF Station 801, 2007-2011, n=14
<i>Upper Hocking WPCF flow</i>				
	cfs	annual	3.09	
<i>Background Water Quality</i>				
Ammonia-Summer	mg/L		0.025	STORET; 2004; n=11; 5<MDL; Station J01K02
Ammonia-Winter	mg/L		0	No representative data available.
Arsenic	µg/L		2.2	STORET; 2004; n=11; 6<MDL; Station J01K02
Barium	µg/L		97	STORET; 2004; n=11; 11<MDL; Station J01K02
Cadmium	µg/L		0	STORET; 2004; n=11; 0<MDL; Station J01K02
Chromium	µg/L		0	STORET; 2004; n=11; 0<MDL; Station J01K02
Chromium ⁺⁶ (dissolved)	µg/L		0	No representative data available.

Table 6. Instream Conditions and Discharger Flow

Parameter	Units	Season	Value	Basis
Copper	µg/L		0	STORET; 2004; n=11; 0<MDL; Station J01K02
Cyanide - free (wwh,ewh,mwh)	mg/L		0	No representative data available.
Dissolved solids (average)	mg/L		339	STORET; 2004; n=12; 12<MDL; Station J01K02
Lead	µg/L		1	STORET; 2004; n=11; 1<MDL; Station J01K02
Manganese	µg/L		87	STORET; 2004; n=11; 11<MDL; Station J01K02
Mercury	ng/L		0	No representative data available.
Nickel	µg/L		0	STORET; 2004; n=11; 0<MDL; Station J01K02
Nitrate + Nitrite	mg/L		1.07	STORET; 2004; n=11; 11<MDL; Station J01K02
Oil & grease	mg/L		0	No representative data available.
Phosphorus	mg/L		0.0485	STORET; 2004; n=11; 11<MDL; Station J01K02
Strontium	µg/L		437	STORET; 2004; n=11; 11<MDL; Station J01K02
Zinc	µg/L		5	STORET; 2004; n=11; 4<MDL; Station J01K02

EWB = exceptional warmwater habitat

MDL = method detection limit

MWH = modified warmwater habitat

n = number of samples

WWH = warmwater habitat

STORET = storage and retrieval water quality database

Table 7. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
		Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Ammonia-Summer	mg/L	--	--	3.42	--	--
Ammonia-Winter	mg/L	--	--	8.72	--	--
Arsenic	µg/L	--	289	200	425	680
Barium	µg/L	--	--	261	2481	4000
Cadmium	µg/L	--	147	6.7	16	25
Chromium	µg/L	--	294	241	4760	7600
Chromium ⁺⁶ (dissolved)	µg/L	--	--	15	20	31
Copper	µg/L	3817	1468	27	41	66
Cyanide - free (wwh,ewh,mwh)	mg/L	646	--	0.016	0.058	0.092
Dissolved solids (average)	mg/L	--	--	1891	--	--
Lead	µg/L	--	292	28	488	780
Manganese	µg/L	--	--	--	--	--
Mercury	ng/L	12	10000	910	1700	3400
Nickel	µg/L	13508	587	147	1253	2000
Nitrate + Nitrite	mg/L	--	292	--	--	--
Oil & grease	mg/L	--	--	--	13	--
Phosphorus	mg/L	--	--	--	--	--
Strontium	µg/L	--	--	27925	49993	81000
Zinc	µg/L	202610	73403	346	324	520

EWB = exceptional warmwater habitat

MWH = modified warmwater habitat

WWH = warmwater habitat

Table 9. Final Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Units	Concentration		Loading (kg/day) ^a		Basis ^b
		30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	
Flow	MGD	----- Monitor -----				M ^c
Temperature	°C	----- Monitor -----				M ^c
Dissolved Oxygen	mg/L	----- Not less than 6.0 -----				BADCT/PD
Carbonaceous biochemical oxygen demand (5-day)	mg/L	10	15	75.7	114	BADCT/PD
Total Suspended Solids	mg/L	12	18	90.8	136	BADCT/PD
Total Filterable Residue (Dissolved Solids)	mg/L	----- Monitor -----				M ^c
Ammonia						
Summer	mg/L	1.0	1.5	7.6	11.4	BADCT/PD
Winter	mg/L	3.0	4.5	22.7	34.1	BADCT/PD
Total Kjeldahl nitrogen	mg/L	----- Monitor -----				M ^c
Nitrite + Nitrate	mg/L	----- Monitor -----				M ^c
Phosphorus	mg/L	----- Monitor -----				M ^c
Oil and Grease	mg/L	----- Not greater than 10.0 -----				WQS
pH	S.U.	6.5 - 9.0				WQS
<i>E. coli</i>						
Summer	#/100mL	161	362 ^d	--	--	WQS
Barium	mg/L	----- Monitor -----				WLA
Cyanide, Free	mg/L	----- Monitor -----				EP
Chromium	µg/L	----- Monitor -----				EP
Chromium+6 (dissolved)	µg/L	----- Monitor -----				EP
Copper	µg/L	----- Monitor -----				EP
Lead	µg/L	----- Monitor -----				EP
Mercury	ng/L	----- Monitor -----				EP
Nickel	µg/L	----- Monitor -----				EP
Zinc	µg/L	----- Monitor -----				EP
Whole Effluent Toxicity						
Acute, <i>Ceriodaphnia dubia</i>	TU _a	----- Monitor w/o Trigger -----				BEJ
Chronic, <i>Ceriodaphnia dubia</i>	TU _c	----- Monitor w/o Trigger -----				BEJ
Acute, <i>Pimephales promelas</i>	TU _a	----- Monitor w/o Trigger -----				BEJ
Chronic, <i>Pimephales promelas</i>	TU _c	----- Monitor w/o Trigger -----				BEJ

^a Effluent loadings based on average design discharge flow of 2.0 MGD.

^b **Definitions:**
BADCT = Best Available Demonstrated Control Technology, 40 CFR Part 122.29
BEJ = Best Engineering Judgment
EP = Existing Permit
M = Monitoring
RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits (3745-33-07(A))

PD = Plant Design

WET = Whole Effluent Toxicity (OAC 3745-33-07(B))

WLA = Wasteload Allocation procedures (OAC 3745-2)

WQS = Ohio Water Quality Standards (OAC 3745-1)

- ^c Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.
- ^d 7 day average limit.