

National Pollutant Discharge Elimination System (NPDES) Permit Program

F A C T S H E E T

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for Canal Winchester WWTP

Public Notice No.: 13-05-013
Public Notice Date: May 3, 2013
Comment Period Ends: June 3, 2013

OEPA Permit No.: 4PB00012*KD
Application No.: OH0024333

Name and Address of Applicant:

Mayor and Council
City of Canal Winchester
36 South High Street
Canal Winchester, Ohio 43110

Name and Address of Facility Where
Discharge Occurs:

Canal Winchester Water Reclamation Facility
400 Ashbrook Road
Canal Winchester, Ohio 43110

Receiving Water: Walnut Creek

Subsequent
Stream Network: Scioto River, Ohio River

Introduction

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

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

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

Ohio EPA reviews the need for water-quality-based limits on a pollutant-by-pollutant basis. Wasteload allocations are used to develop these limits based on the pollutants that have been detected in the discharge, and the receiving water's assimilative capacity. The assimilative capacity depends on the flow in the water receiving the discharge, and the concentration of the pollutant upstream. The greater the upstream flow, and the lower the upstream concentration, the greater the assimilative capacity is. Assimilative capacity may represent

Fact Sheet for NPDES Permit Renewal, Canal Winchester WWTP, 2013

dilution (as in allocations for metals), or it may also incorporate the break-down of pollutants in the receiving water (as in allocations for oxygen-demanding materials).

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

Summary of Permit Conditions

The existing effluent limits for the following pollutants will continue in the renewal permit: dissolved oxygen, CBOD5 (5-day carbonaceous biochemical oxygen demand), total suspended solids and ammonia-nitrogen (all plant design criteria); mercury, oil and grease, and pH (all based on Ohio water quality standards).

Continued monitoring for cadmium, total chromium, copper, lead, nickel, zinc, nitrate+nitrite-nitrogen, phosphorus, total dissolved solids, flow, temperature, and whole effluent toxicity is proposed.

New monitoring requirements are proposed for barium and strontium.

It is proposed that monitoring for free cyanide and dissolved hexavalent chromium be discontinued. There have been zero detections for these parameters, and there are no known industries that contribute to these pollutants at the Canal Winchester WWTP.

Final effluent limits are proposed for *Escherichia coli*. New water quality standards for *E. coli* became effective in March 2010. A compliance schedule is not needed for meeting these new final effluent limits because the facility uses UV disinfection.

In Part II of the permit, special conditions are included that address sanitary sewer overflow reporting; operator certification, minimum staffing and operator of record; whole effluent toxicity testing; and outfall signage.

Table of Contents

	Page
Introduction	1
Summary of Permit Conditions	2
Table of Contents	3
Procedures for Participation in the Formulation of Final Determinations	4
Location of Discharge/Receiving Water Use Classification	5
Facility Description	5
Description of Existing Discharge	5
Assessment of Impact on Receiving Waters	6
Development of Water Quality Based Effluent Limits	6
Reasonable Potential / Effluent Limits / Hazard Management Decisions	8
Other Requirements	9

List of Figures

Figure 1. Location of Canal Winchester WWTP	10
---	----

List of Tables

Table 1. Effluent Characterization Using Self-Monitoring Data	11
Table 2. Ohio EPA Compliance Sampling Data	13
Table 3. Effluent Data for Canal Winchester WWTP	14
Table 4. Summary of toxicity test results on the Canal Winchester WWTP effluent	15
Table 5. Water Quality Criteria in the Study Area	16
Table 6. Instream Conditions and Discharger Flow	17
Table 7. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria	19
Table 8. Parameter Assessment	20
Table 9. Final Effluent Limits and Monitoring Requirements	21

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

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

For additional information about this fact sheet or the draft permit, contact Megan Zale, (614) 644-2027, megan.zale@epa.state.oh.us.

Location of Discharge/Receiving Water Use Classification

The Canal WWTP discharges to Walnut Creek at River Mile (RM) 24.2, which flows into the Scioto River. Figure 1 shows the approximate location of the facility.

This segment of Walnut Creek is described by Ohio EPA River Code: 02-078, U.S. EPA River Reach #: 05060001-008, County: Franklin. Walnut Creek is designated for the following uses under Ohio's Water Quality Standards (OAC 3745-1-09): Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Primary Contact Recreation (PCR).

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

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

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

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

Facility Description

The Canal Winchester wastewater treatment plant has an average daily design flow of 2.48 MGD (million gallons per day). Wet stream processes include influent pumping, screening, and grit removal, comminution, flow equalization, activated sludge extended aeration, secondary clarification and ultra violet disinfection. Solid stream processes include aerobic digestion, dewatering using a rotary press and land application of stabilized sludge at agronomic rates.

Canal Winchester has a separate sanitary sewer system and provides service to the villages of Lithopolis and a portion of Pickerington. Lithopolis maintains the sewer lines in its service area; all other are maintained by Canal Winchester.

The Village does not implement an approved industrial pretreatment program.

Description of Existing Discharge

Table 1 presents a summary of unaltered Discharge Monitoring Report (DMR) data for outfall 4PB00012001. Data are presented for the period January 2008 through February 2013, and current permit limits are provided for comparison.

Table 2 presents chemical specific data collected by Ohio EPA.

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

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

The facility has not been reporting sanitary sewer overflow (SSO) data for station 300.

Assessment of Impact on Receiving Waters

Ohio EPA completed a Total Maximum Daily Load (TMDL) report for Walnut Creek and its tributaries in 2010. TMDLs were calculated for fecal coliform bacteria, habitat, and sedimentation. Recommendations made in the TMDL were to reduce home sewage treatment system failures, restrict livestock access to streams and improve manure management, manage stormwater quantity and quality in suburban areas, protect both floodplain and streamside areas and create effective buffer areas, and improve erosion and sediment control in all areas, particularly crop fields. The TMDL report can be found at http://epa.ohio.gov/portals/35/tmdl/WalnutCreekTMDL_final_feb10_wo_app.pdf.

The results of Ohio EPA's 2005 survey of Walnut Creek are included in the report, *Biological and Water Quality Study of Walnut Creek and Tributaries* (Ohio EPA; December 28, 2006). The entire length of Walnut Creek fully attains its Warmwater Habitat aquatic life use designation. The complete report is available at the following Internet site: <http://www.epa.state.oh.us/dsw/documents/WalnutCreek2005TSD.pdf>.

Development of Water-Quality-Based Effluent Limits

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

Parameter Selection Effluent data for the Danbury WWTP were used to determine what parameters should undergo wasteload allocation. The parameters discharged are identified by the data available to Ohio EPA - Discharge Monitoring Report (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 February 2013
Ohio EPA compliance sampling data	2011

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

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

potential and needs to have a limit or if monitoring is required. See Table 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 Water Quality Standards (OAC 3745-1). Most pollutants are allocated by a mass-balance method because they do not degrade in the receiving water. Wasteload allocations using this method are done using the following general equation: Discharger WLA = (downstream flow x WQS) - (upstream flow x background concentration). Discharger WLAs are divided by the discharge flow so that the allocations are expressed as concentrations.

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

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

Allocations are developed using a percentage of stream design flow as specified in Table 6, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

Ohio’s water quality standard implementation rules [OAC 3745-2-05(A)(2)(d)(iv)] required a phase out of mixing zones for bioaccumulative chemicals of concern (BCCs) as of November 15, 2010. This rule applied statewide. Mercury is a BCC. The mixing zone phase-out means that as of November 15, 2010 all dischargers requiring mercury limits in their NPDES permit must meet water quality standards at the end-of-pipe, which are 12 ng/l (average) and 1700 ng/l (maximum) in the Ohio River basin, or 1.3 ng/l (average) and 1700 ng/l (maximum) in the Lake Erie basin.

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

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

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

The wasteload allocation calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Canal Winchester WWTP, the wasteload allocation values are 0.8 TU_a and 2.91 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the IC₂₅:

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

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

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

The acute toxicity unit (TU_a) is defined as 100 divided by the LC₅₀ 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 wasteload allocation is less than 1.0 TU_a, it may be defined as:

<u>Dilution Ratio</u> <u>(downstream flow to discharger flow)</u>	<u>Wasteload Allocation</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 wasteload allocation for Canal Winchester WWTP is 50 percent mortality in 100 percent effluent based on the dilution ratio of 2.8 to 1.

Reasonable Potential/ Effluent Limits/Hazard Management Decisions

After appropriate effluent limits are calculated, the reasonable potential of the discharger to violate the water quality standards must be determined. Each parameter is examined and placed in a defined "group". Parameters that do not have a water quality standard or do not require a wasteload allocation based on the initial screening are assigned to either group 1 or 2. For the allocated parameters, the preliminary effluent limits (PEL) based on the most restrictive average and maximum wasteload allocations are selected from Table 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} ÷ PEL_{avg}) X 100, or (PEQ_{max} ÷ PEL_{max}) X 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 Canal Winchester WWTP outfall 4PB00012001 and the basis for their recommendation.

It is proposed that the current permit limits for dissolved oxygen, CBOD5, total suspended solids, and ammonia-nitrogen be continued. These are design criteria for the treatment plant. The existing ammonia-N limits were evaluated and are protective of water quality standards for ammonia toxicity.

Limits proposed for oil and grease, pH, and *Escherichia coli* are based on Water Quality Standards (OAC 3745-1-07). Class B Primary Contact Recreation *E. coli* standards apply to Walnut Creek. Water quality standards for *E. coli* became effective in March 2010.

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 since they were based on two data points. 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.

The Ohio EPA risk assessment (Table 8) places mercury in group 5. This placement as well as the data in Tables 1 and 3 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 wasteload allocation AND/OR the PEQ is between 75 and 100 percent of the wasteload allocation and certain conditions exist that increase the risk to the environment. Pollutants that meet this requirement must have permit limits under OAC Rule 3745-33-07(A)(1). The limits for mercury are based on water quality standards and wasteload allocation.

It is proposed that monitoring continue for cadmium, total chromium, copper, lead, nickel and zinc. Because these contaminants were included in Groups 2 and 3 under the risk assessment procedures (Table 8), monitoring at a reduced frequency of once per quarter is proposed. It is proposed that twice per month monitoring for total filterable residue continue from the existing permit. This parameter was placed in Group 3 under the risk assessment procedures. The purpose of the monitoring is to maintain a current data base on the level of these contaminants in the plant effluent. The data will be used to assess reasonable potential at future permit renewals.

Limits and monitoring requirements proposed for the disposal of sewage sludge by the following management practices are based on OAC 3745-40: land application and removal to sanitary landfill.

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

Whole Effluent Toxicity Reasonable Potential

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

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

Storm Water Compliance

In order to comply with industrial storm water regulations, the permittee submitted a form for "No Exposure Certification" which was signed on June 24, 2008. Compliance with the industrial storm water regulations must be re-affirmed every five years. No later than June 24, 2013, the permittee must submit a new form for "No Exposure Certification" or make other provisions to comply with the industrial storm water regulations.

Outfall Signage

Part II of the permit includes requirements for signs to be placed at each outfall to Walnut Creek, providing information about the discharge. Signage at outfalls is required pursuant to Ohio Administrative Code 3745-33-08(A).

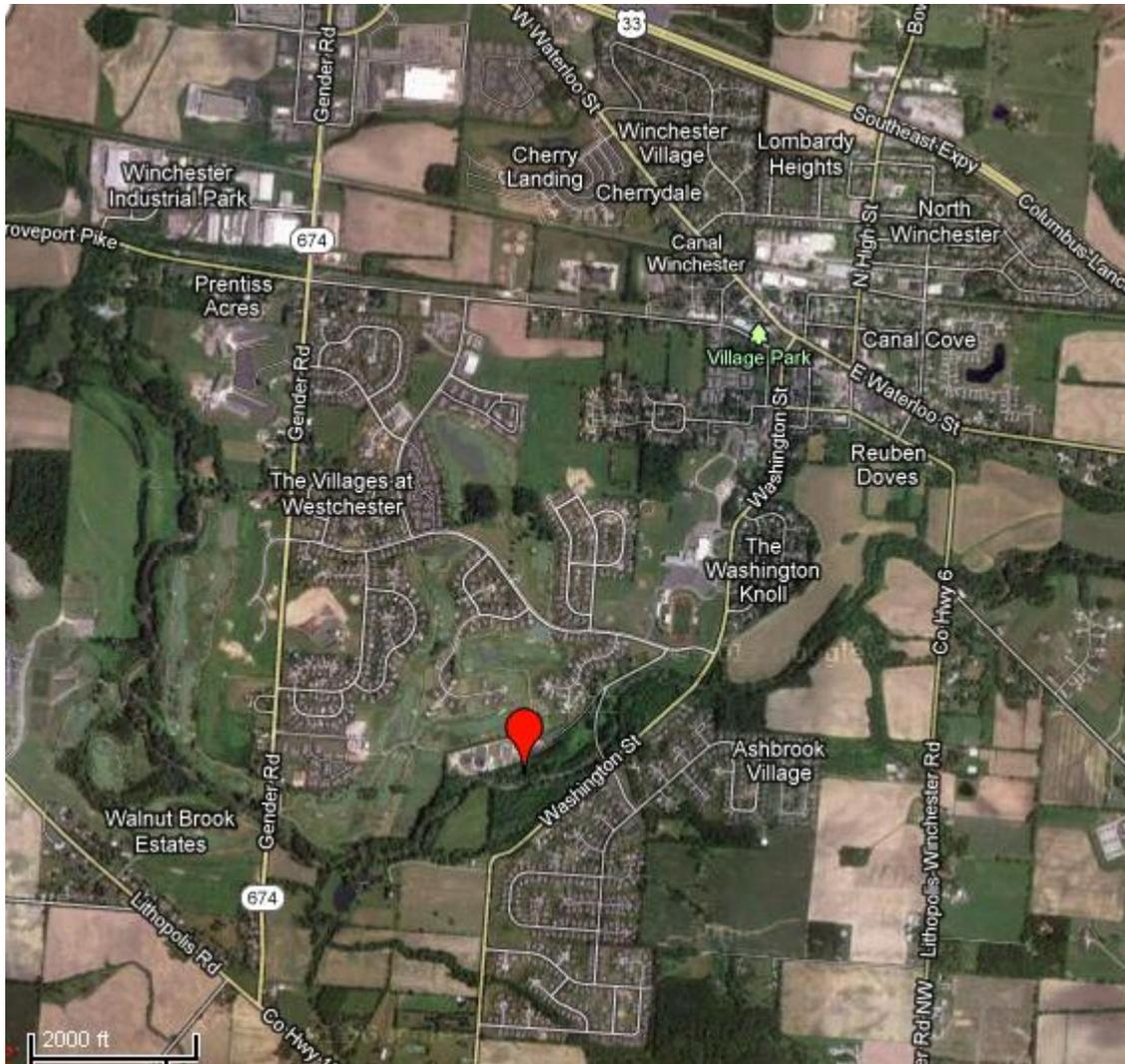


Figure 1. Location of Canal Winchester wastewater treatment plant.

Table 1. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered discharge monitoring report data for Canal Winchester WWTP outfall 4PB00012001 (January 2008 – February 2013). All values are based on annual records unless otherwise indicated. * = For minimum pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; a = weekly average.

Parameter	Season	Units	Current Permit Limits		# Obs	Percentiles		Data Range
			30 day	Daily		50th	95th	
Water Temperature	Annual	C	Monitor		1295	17	22	4-24
Dissolved Oxygen	Summer	mg/L	-	6.0 min.	426	8.2	8.7	6.1-9.4
Dissolved Oxygen	Winter	mg/L	-	6.0 min.	349	8.4	9.5	7.1-10
pH, Maximum	Annual	S.U.	-	9.0 max.	1293	7.1	8.3	6.9-8.5
pH, Minimum	Annual	S.U.	-	6.5 min.	1293	7.1	8.2	6.8-8.4
Residue, Total Dissolved	Annual	mg/L	Monitor		113	1340	1714	848-5220
Total Suspended Solids	Annual	mg/L	12	18	747	4	10	0-116
Oil and Grease, Hexane	Annual	mg/L	-	10	133	0	0.56	0-4
Nitrogen, Ammonia (NH3)	Summer	mg/L	1.0	1.5	241	0.2	1.9	0-23.4
Nitrogen, Ammonia (NH3)	Winter	mg/L	3.0	4.5	204	0.4	1.985	0-4.3
Nitrite Plus Nitrate, Total	Annual	mg/L	Monitor		62	5.4	14.99	0-19.6
Phosphorus, Total (P)	Annual	mg/L	Monitor		113	1.39	2.468	0.27-4.65
Cyanide, Free	Annual	mg/L	Monitor		20	0	0	0-0
Nickel, Total Recoverable	Annual	ug/L	Monitor		19	0	0	0-0
Zinc, Total Recoverable	Annual	ug/L	Monitor		19	43	63.9	28-81
Cadmium, Total Recoverable	Annual	ug/L	Monitor		19	0	0	0-0
Lead, Total Recoverable	Annual	ug/L	Monitor		19	0	0	0-0
Chromium, Total Recoverable	Annual	ug/L	Monitor		19	0	0	0-0
Copper, Total Recoverable	Annual	ug/L	Monitor		62	0	21.95	0-36
Chromium, Dissolved Hexavalent	Annual	ug/L	Monitor		26	0	0	0-0
Fecal Coliform	Summer	#/100ml	1000	2000	354	0	108.2	0-1450
Flow Rate	Summer	MGD	Monitor		610	0.971	1.3296	0.34-3.6
Flow Rate	Winter	MGD	Monitor		511	1.065	1.5365	0.789-3.45
Flow Rate	Annual	MGD	Monitor		1886	1.019	1.6148	0.117-3.92

Table 1. continued

Parameter	Season	Units	Current Permit Limits		# Obs	Percentiles		Data Range
			30 Day	Daily		50th	95th	
Mercury, Total (Low Level)	Annual	ng/L	12	1700	42	5.7	14.99	0-22.6
CBOD5	Summer	mg/L	10	15	240	3	6	0-12
CBOD5	Winter	mg/L	10	15	203	3	8	0-3.355

Table 2. Ohio EPA Compliance Sampling Data

Results of sampling tests conducted by Ohio EPA during bioassay evaluations

Parameter	Units	6/07/2011	9/13/2011
CBOD5	mg/L	<2.0	<2.0
Total Dissolved Solids	mg/L	1380	1230
Total Suspended Solids	mg/L	<5	<5
Arsenic	ug/L	3.6	4.2
Cadmium	ug/L	<0.20	<0.20
Chromium	ug/L	<2.0	<2.0
Copper	ug/L	4.6	3.3
Lead	ug/L	<2.0	<2.0
Nickel	ug/L	4.3	5.3
Selenium	ug/L	<2.0	<2.0
Aluminum	ug/L	<200	<200
Barium	ug/L	124	114
Calcium	mg/L	164	142
Hardness, Total	mg/L	607	528
Iron	ug/L	77	73
Magnesium	mg/L	48	42
Manganese	ug/L	17	14
Potassium	mg/l	10	13
Sodium	mg/L	282	236
Strontium	ug/L	1130	835
Zinc	ug/L	32	41
Mercury	ug/L	<.20	NA
Ammonia	mg/L	0.151	0.150
Chloride	mg/L	467	432
Nitrate+nitrite	mg/L	3.45	5.00
TKN	mg/L	1.96	1.53
Total Phosphorus	mg/L	1.00	1.79

Table 3. Effluent data for Canal Winchester WWTP

Parameter	Units	Number of Samples	Number > MDL	PEQ Average	PEQ Maximum
Aluminum	ug/l	2	0	--	--
Arsenic - TR	ug/l	2	2	11.6508	15.96
Barium	ug/l	2	2	343.976	471.2
Cadmium - TR	ug/l	20	0	--	--
Chromium - TR	ug/l	21	0	--	--
Chromium VI - Diss	ug/l	26	0	--	--
Copper - TR	ug/l	64	29	19.975	31.27
Cyanide - free (wwh,ewh,mwh)	mg/l	20	0	--	--
Dissolved solids (ave)	mg/l	114	114	1553.9	1775.3
Iron - TR	ug/l	2	2	213.598	292.6
Lead - TR	ug/l	21	0	--	--
Magnesium	mg/l	2	2	133.152	182.4
Manganese - TR	ug/l	2	2	47.158	64.6
Mercury - TR (BCC)	ng/l	42	37	17.154	27.961
Nickel - TR	ug/l	21	2	9.49	13
Nitrate-N + Nitrite-N	mg/l	64	64	24.801	37.45
Selenium - TR	ug/l	2	0	--	--
Strontium	ug/l	2	2	3134.62	4294
TKN	mg/l	2	2	5.43704	7.448
Zinc - TR	ug/l	21	21	58.836	76.561

Table 4. Summary of toxicity test results on the Canal Winchester WWTP effluent

Test Date	P. promelas				C. dubia			
	TUa	TUc	% mortality (24 hr screening)	% mortality (48 hr screening)	TUa	TUc	% mortality (24 hr screening)	% mortality (48 hr screening)
8/18/2009	AA	AA	-	-	AA	1.1	-	-
8/8/2010	AA	AA	-	-	AA	-	-	-
6/7/2011*	-	-	0	0	-	-	0	0
8/22/2011	AA	AA	-	-	AA	1.41	-	-
9/13/2011*	-	-	0	0	-	-	5	5
8/26/2012	0.6	AA	-	-	AA	AA	-	-

* = Ohio EPA screening test

TUa = acute toxicity units

TUc = chronic toxicity units

AA = not detected

Table 5. Water Quality Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
		Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Aluminum	ug/l	--	--	--	--	--
Arsenic - TR	ug/l	--	100	150	340	680
Barium	ug/l	--	--	220	2000	4000
Cadmium - TR	ug/l	--	50	5.8	16	31
Chromium - TR	ug/l	--	100	210	4400	8900
Chromium VI - Diss	ug/l	--	--	11	16	31
Copper - TR	ug/l	1300	500	24	40	79
Cyanide - free (wwh,ewh,mwh)	mg/l	220	--	0.012	0.046	0.092
Dissolved solids (ave)	mg/l	--	--	1500	--	--
Iron - TR	ug/l	--	5000	--	--	--
Lead - TR	ug/l	--	100	26	500	1000
Magnesium	mg/l	--	--	--	--	--
Manganese - TR	ug/l	--	--	--	--	--
Mercury - TR (BCC)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	4600	200	130	1200	2400
Nitrate-N + Nitrite-N	mg/l	--	100	--	--	--
Selenium - TR	ug/l	11000	50	5	--	--
Strontium	ug/l	--	--	21000	40000	81000
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	69000	25000	300	300	610

Table 6. Instream Conditions and Discharger Flow

Parameter	Units	Season	Value	Basis
<i>Stream Flows</i>				
1Q10	cfs	annual	6.83	previous WLA (USGS gage 03229800 1952-1973 data)
7Q10	cfs	annual	7.35	previous WLA (USGS gage 03229800 1952-1973 data)
30Q10	cfs	summer	8.3	avg of USGS gages 0322770 and 03229750
		winter	15	avg of USGS gages 0322770 and 03229750
Harmonic Mean	cfs	annual	32.16	previous WLA (USGS gage 03229800 1952-1973 data)
Mixing Assumption	%	average	100	
		maximum	100	
<i>Hardness</i>	mg/l	annual	301	avg at 901 station
<i>pH</i>	S.U.	summer	7.725	901 Station
		winter	7.6	901 Station
<i>Temperature</i>	C	summer	22	901 Station
		winter	7	901 Station
<i>Canal Winchester WWTP flow</i>	cfs	annual	3.84	Form 2A application data
<i>Background Water Quality</i>				
Aluminum	ug/l		696.6	STORET; 2005; n=5; 3<MDL; Station V08W08
Arsenic - TR	ug/l		4.3	STORET; 2005; n=5; 0<MDL; Station V08W08
Barium	ug/l		126.8	STORET; 2005; n=5; 0<MDL; Station V08W08
Cadmium - TR	ug/l		0.13	STORET; 2005; n=6; 5<MDL; Station V08W08
Chromium - TR	ug/l		0	STORET; 2005; n=6; 6<MDL; Station V08W08
Chromium VI - Diss	ug/l		0	No representative data available.
Copper - TR	ug/l		0	STORET; 2005; n=6; 6<MDL; Station V08W08
Cyanide - free (wwh,ewh,mwh)	mg/l		0	No representative data available.
Dissolved solids (ave)	mg/l		608.33	STORET; 2005; n=6; 0<MDL; Station V08W08
Iron - TR	ug/l		1300.33	STORET; 2005; n=6; 0<MDL; Station V08W08
Lead - TR	ug/l		1.63	STORET; 2005; n=6; 5<MDL; Station V08W08

Magnesium	mg/l	31.33	STORET; 2005; n=6; 0<MDL; Station V08W08
-----------	------	-------	--

Table 6 continued

<u>Parameter</u>	<u>Units</u>	<u>Value</u>	<u>Basis</u>
Manganese - TR	ug/l	102	STORET; 2005; n=6; 0<MDL; Station V08W08
Mercury - TR (BCC)	ng/l	0	STORET; 2005; n=5; 5<MDL; Station V08W08
Nickel - TR	ug/l	0	STORET; 2005; n=6; 6<MDL; Station V08W08
Nitrate-N + Nitrite-N	mg/l	0.802	STORET; 2005; n=6; 0<MDL; Station V08W08
Selenium - TR	ug/l	0	STORET; 2005; n=6; 0<MDL; Station V08W08
Strontium	ug/l	1710	STORET; 2005; n=6; 0<MDL; Station V08W08
TKN	mg/l	0.663	STORET; 2005; n=6; 0<MDL; Station V08W08
Zinc - TR	ug/l	9.17	STORET; 2005; n=6; 5<MDL; Station V08W08

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	
Aluminum	ug/l	--	--	--	--	--
Arsenic - TR	ug/l	--	901	429	937	680
Barium	ug/l	--	--	398	5332	4000
Cadmium - TR	ug/l	--	468	17	44	31
Chromium - TR	ug/l	--	938	612	12226	8900
Chromium VI - Diss	ug/l	--	--	32	44	31
Copper - TR	ug/l	12188	4688	70	111	79
Cyanide - free (wwh,ewh,mwh)	mg/l	2062	--	0.035	0.13	0.092
Dissolved solids (ave)	mg/l	--	--	3207	--	--
Iron - TR	ug/l	--	35985	--	--	--
Lead - TR	ug/l	--	924	73	1386	1000
Magnesium	mg/l	--	--	--	--	--
Manganese - TR	ug/l	--	--	--	--	--
Mercury - TR (BCC)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	43125	1875	379	3334	2400
Nitrate-N + Nitrite-N	mg/l	--	931	--	--	--
Selenium - TR	ug/l	103125	469	15	--	--
Strontium	ug/l	--	--	57922	108104	81000
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	646798	234298	857	817	610

Table 8. Parameter Assessment

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

Aluminum TKN	Magnesium	Manganese - TR
-----------------	-----------	----------------

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

Arsenic - TR	Cadmium - TR	Chromium - TR
Chromium VI - Diss	Cyanide - free (wwh,ewh,mwh)	Iron - TR
Lead - TR	Nickel - TR	Nitrate-N + Nitrite- N
Selenium - TR	Strontium	

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

Copper - TR	Dissolved solids (ave)	Zinc - TR
----------------	---------------------------	-----------

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

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>
Barium	ug/l	Annual	398	4000
Mercury - TR (BCC)	ng/l	Annual	12	1700

Barium becomes a Group 5 parameter based upon the loading test [OAC 3745-2-06(B)].

Table 9. Final Effluent Limits and Monitoring Requirements

Parameter	Units	Effluent Limitations				Basis ^b
		Concentration		Loading (kg/day) ^a		
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Temperature	°C	----- Monitor -----				M
Flow	MGD	----- Monitor -----				M
Dissolved Oxygen	mg/l	6.0 minimum				PD, EP
Suspended Solids	mg/l	12	18 ^c	113	169 ^c	PD, EP
Oil and Grease	mg/l	--	10	--	--	WQS, EP
Ammonia-N	mg/l					
Summer		1.0	1.5 ^c	9.4	14.1 ^c	PD, EP
Winter		3.0	4.5 ^c	28.2	42.2 ^c	PD, EP
Nitrite(N) + Nitrate(N)	mg/l	----- Monitor -----				M, EP
Phosphorus, Total	mg/l	----- Monitor -----				M, EP
Barium, T. R.	µg/l	----- Monitor -----				RP
Nickel, T. R.	µg/l	----- Monitor -----				M, EP
Zinc, T. R.	µg/l	----- Monitor -----				M, EP
Cadmium, T. R.	µg/l	----- Monitor -----				M, EP
Lead, T. R.	µg/l	----- Monitor -----				M, EP
Chromium, T. R.	µg/l	----- Monitor -----				M, EP
Copper, T. R.	µg/l	----- Monitor -----				M, EP
<i>E. coli</i>						
Summer Only	#/100ml	161	362 ^c	--	--	WQS
Mercury, T.	ng/l	12	1700	0.000113	0.016	WQS
Whole Effluent Toxicity						
Acute	TUa	----- Monitor -----				WET
Chronic	TUc	----- Monitor -----				WET
pH	S.U.	----- 6.5 to 9.0 -----				WQS, EP
Total Filterable Residue (Dissolved Solids)	mg/l	----- Monitor -----				RP, EP
CBOD ₅	mg/l	10	15 ^c	93.9	141 ^c	PD, EP

^a Effluent loadings based on average design discharge flow of 2.48 MGD.

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

^c Weekly average limit.