National Pollutant Discharge Elimination System (NPDES) Permit Program

FACT SHEET

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for Beavercreek Water Resource Reclamation Facility

Public Notice No.: 13-10-063
Public Notice Date: October 30, 2013
Comment Period Ends: November 23, 2013

Ohio EPA Permit No.: 1PK00003*MD
Application No.: OH0025381

Name and Address of Applicant:

Greene County Board of Commissioners
667 Dayton-Xenia Rd.
Xenia, Ohio 45385

Name and Address of Facility Where Discharge Occurs:

Beavercreek Water Resource Reclamation Facility
420 Factory Road
Beavercreek, Ohio 45434
Greene County, OH

Receiving Water: Beaver Creek

Subsequent Stream Network: Little Miami River to Ohio River

Introduction

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

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

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 (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 may have changed: flow, temperature, dissolved oxygen, $CBOD_5$, total suspended solids, ammonia-nitrogen, nitrite+nitrate-nitrogen, total Kjeldahl nitrogen, oil and grease, pH, total residual chlorine, free cyanide, Gamma-BHC, barium, nickel, and zinc.

The proposed phosphorus limits for Beavercreek Water Reclamation Facility (WRRF) are consistent with the steps that have been taken in the upper Little Miami River basin to implement the findings of the Total Maximum Daily Load (TMDL) for the Upper Little Miami River - Final Report (Ohio EPA, April 2002).

Quarterly chronic toxicity testing with the determination of acute endpoints is proposed for the first two years of the permit. Annual monitoring is proposed for the remainder of the permit.

New monitoring requirements are required for cadmium, dissolved hexavalent chromium, copper, lead, and silver. The current method detection level (MDL), the minimum concentration at which one can be confident that the effluent concentration is greater than zero, for these parameters are too high. New MDLs are proposed.

Final effluent limits are proposed for *Escherichia coli.* New water quality standards for *E. coli* became effective in March 2010. These limits will take the place of fecal coliform limits.

Current permit limits for mercury are being removed because effluent data shows that they no longer have the reasonable potential to contribute to exceedances of water quality standards.

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; 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 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 Michelle Waller, (937)285-6454, michelle.waller@epa.ohio.gov, or Andy Bachman, (614)644-3075, andrew.bachman@epa.ohio.gov

Location of Discharge/Receiving Water Use Classification

The Beavercreek waste water treatment plant discharges to Beaver Creek at River Mile (RM) 0.35. Beaver Creek flows into the Little Miami River. Figure 1 shows the approximate location of the facility.

Beavercreek WRRF discharges to Beaver Creek in the Eastern Corn Belt Plains ecoregion. This segment of Beaver Creek is described by Ohio River Code: 11-305, USEPA River Reach No.: 05090202-056, County: Greene. Beaver Creek is presently designated for the following uses: Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Class A Primary Contact Recreation (PCR). Although Beaver Creek is a stream designated as "Class B," the Beavercreek WRRF discharge dominates the stream it discharges to and the Little Miami River, which is designated "Class A" is less than one half of a mile downstream. Without a Class A designation to Beavercreek WRRF, TMDL goals for impaired streams could not be met at the Little Miami River and thus a "Class A" designation has been proposed for the Beavercreek WRRF discharge.

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 cannot meet the Clean Water Act goals because of human-caused conditions that cannot be remedied without causing fundamental changes to land use and widespread economic impact. The dredging and clearing of some small streams to support agricultural or urban drainage is the most common of these conditions. These streams are given Modified Warmwater or Limited Resource Water designations.

Recreation uses are defined by the depth of the waterbody and the potential for wading or swimming. Uses are defined for bathing waters, swimming/canoeing (Primary Contact) 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 Beavercreek wastewater plant was constructed in 1963 with the latest modification completed in 2007. The average daily design flow of the plant is 8.5 MGD (million gallons per day). The treatment plant includes the following equipment and/or wet processes:

- Influent pumping
- Bar screens
- Flow Equalization
- Primary Clarifiers
- Activated sludge – extended aeration
- Secondary clarification
- Ultraviolet disinfection

Table 1. Sludge Removed from Beavercreek WRRF

Year	Dry Tons Removed
2008	1513
2009	1358
2010	746
2011	870
2012	754

Solid stream processes include sludge stabilization by aerobic digestion. Process design capacity of the sewage sludge treatment system is 2600 dry tons/year. However, dry ton figures have been declining recently (see Table 1). Stabilized sludge is sent to Cherokee Run Landfill in Bellefontaine, OH.

Beavercreek WRRF is also considering sending sludge to a third party company. Sludge will continue to be hauled to the landfill unless it is determined that a third party company has the ability to accept Beavercreek WRRF sludge.

The wastewater plant serves the City of Beavercreek (34,000) and Beavercreek Township (4,000) in Greene County. The total population served is estimated to be 38,000.

The Beavercreek plant is served by a separate sanitary sewer system. The County's pretreatment program was approved on October 5, 1984. There is one categorical industrial user discharges approximately 0.047 MGD to the plant.

Description of Existing Discharge

Table 2 shows the annual effluent flow rates for the Beavercreek treatment plant from 2008 through 2012 based upon Discharge Monitoring Report (DMR) data. The 50th percentile flow rates have remained relatively constant over this time period, while the 95th percentile flow rates and maximum flow rates have been somewhat more variable.

The collection system is 100 percent separate sanitary sewers. Over the life of the last permit there were 17 recorded overflows from the system wide sanitary sewer overflow monitoring station (the 300 station). All 17 occurrences took place from 2009 to 2011. No overflows took place in 2012.

Table 2. Effluent Flow Rates for Beavercreek WRRF 2008-2012

Year	Annual Flow in MGD		
	50th Percentile	95th Percentile	Maximum
2008	6.119	12.866	23.864
2009	5.92	8.192	11.363
2010	5.78	8.94	13.191
2011	6.853	16.45	26.7
2012	5.609	9.271	12.075

Table 6 presents all the recorded data of the plant effluent from 2008 to 2012. Ohio EPA and Pretreatment data can be found in Table 7. Table 9 presents a summary of acute toxicity and chronic toxicity data and Table 10 contains a summary of projected effluent quality for the Beavercreek plant.

Assessment of Impact on Receiving Waters

In July 2002, U.S. EPA approved the Ohio EPA report *Total Maximum Daily Loads for the Upper Little Miami River, Final Report* (TMDL). The complete report is available at the following internet site: http://www.epa.state.oh.us/dsw/tmdl/LittleMiamiRiver.aspx

The implementation recommendations from the TMDL report for point source dischargers such as the Beavercreek wastewater plant were incorporated into the existing permit for this facility which became effective in May 2003. The compliance schedule in the existing permit required the plant to reduce its monthly average phosphorus discharge to 1.0 mg/l (May through October) not later than May 2006. To comply with the TMDL, the permit also required the County to implement additional steps to reduce the total phosphorus summer loading from the Beavercreek plant to 16.1 kg/day by 2013. These associated limits through the TMDL are proposed to continue through the life of the permit.

The upper Little Miami River and selected tributaries were evaluated for aquatic life and recreational use potential during the 2011 and 2012 field seasons. This assessment included the collection of water chemistry and biological sampling at numerous sites on the mainstem Little Miami River and tributaries which included

the Little Beaver Creek and Beaver Creek, upstream and downstream of the Eastern Regional WWTP and Beavercreek WRRF.

Table 3 (below) summarizes the use designation status and causes/sources of impairment found during the 2011 and 2012 sampling in Little Beaver Creek and Beaver Creek. It can be seen in Table 3 that attainment has been achieved both directly upstream and directly downstream of the discharge from Beavercreek WRRF to Beaver Creek.

Table 3. Little Beaver and Beaver Creek Use Designation Status, Causes, and Sources

Location	RM	Use Desig.	Status (1998)	Status (2011)	Causes (2011)	Sources (2011)
L. Beaver Ck upst Eastern Reg WWTP	4.76	WWH	NON	B	Comment: Macroinvertebrates impacted by nutrient enrichment due to urban runoff.	
L. Beaver Ck upst Grange Hall Rd; dst Eastern Reg.WWTP	3.54	WWH	NON	B	Comment: Macroinvertebrates impacted by nutrient enrichment and embedded substrates due to combined effect from WWTP and urban runoff.	
L. Beaver Ck @ Valleywood	2.83	WWH	A	Partial	Nutrient enrichment biological indicators; Particle distribution (embeddedness); other flow regime alterations	Urban runoff/storm sewers; Municipal point source discharges; Municipal (urbanized high density area)
L. Beaver Ck @ Factory Rd. near Alpha	0.05	WWH	NON	Partial	Nutrient enrichment biological indicators; Particle distribution (embeddedness); other flow regime alterations	Urban runoff/storm sewers; Municipal point source discharges; Municipal (urbanized high density area)
Beaver Ck @ Fairgrounds Rd	3.86	WWH	Full	B	Comment: Macroinvertebrate community reflects wetland stream conditions (ie, slack flow, low D.O.)	
Beaver Ck @ Dayton-Xenia Rd	1.57	WWH	Partial	Partial	Natural conditions (Flow or habitat)	Natural sources
Beaver Ck @ US 35; dst L.Beaver Ck	1.04	WWH	A	Partial	Nutrient enrichment biological indicators	Urban runoff/Storm sewers; Municipal point source discharges
Beaver Ck @ Adj Factory Rd; dst Beavercreek WWTP	0.20	WWH	Partial	Full		

[A.] Location not sampled.
[B.] Only an ICI qualitative sample was available here; no attainment status assessment was made.

As Table 3 shows, the 2011 and 2012 assessment showed improvement in the biological communities for both Little Beaver Creek and Beaver Creek. At the only sampling location downstream of the Greene County Beavercreek WRRF, and just prior to the confluence with the Little Miami River, Beaver Creek was found to be in full attainment of the WWH use designation.

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 Beavercreek WRRF were used to determine what parameters should undergo Wasteload Allocation (WLA). 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 December 2012
NPDES Application data / Pretreatment data	Annual Reports from 2008 through 2012
Ohio EPA compliance sampling data	3/21/2011 and 4/26/2011

The data were examined, and the following values were removed from the evaluation to give a more reliable projection of effluent quality: zinc – TR, one value of 93 µg/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 8.

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 13 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. 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 following dischargers in the upper Little Miami River segment were considered interactive:

- Xenia-Ford Road WWTP
- Xenia-Glady Run WWTP
- Montgomery County Eastern Regional WWTP
- Beavercreek WWTP
- Sugarcreek WWTP

The available assimilative capacity was distributed among these facilities using the CONSWLA water quality model (Figure 2) for conservative parameters.

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 11, 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 in the Ohio River Basin requiring mercury limits in their NPDES permit must meet WQS at the end-of-pipe.

The data used in the WLA are listed in Tables 10 and 11. The WLA results to maintain all applicable criteria are presented in Table 12. The current permit limits for ammonia-nitrogen were evaluated and are adequate to maintain water quality criteria in the Little Miami River.

Dissolved Metals Translators

A dissolved metals translator (DMT) is the factor used to convert a dissolved metal aquatic life criterion to an effective total recoverable aquatic life criterion with which a total recoverable aquatic life allocation can be calculated as required by NPDES permit rules [OAC Rule 3745-33-05(C)(2)]. Currently, a DMT is based on site- or area-specific field data; each field data sample consists of a total recoverable measurement paired with a dissolved metal measurement.

For Beavercreek, there were 5 such paired samples available applicable to copper, lead, and zinc. These paired samples were used in the determination of background water quality from 1998 as can be seen in Table 11. To account for the limited quantity of data, the DMT for each of these metals was determined as the lower end of the 95 percent confidence interval (1-tail) about the geometric mean of the total recoverable-to-dissolved ratios of the sample pairs. Each DMT is metal-specific and is applied by multiplying the dissolved criteria by the DMT, resulting in total effective recoverable criteria which are used in the wasteload allocation procedures.

In some cases, it is possible that the use of a DMT may result in instream concentrations of metals that may increase the risk of non-attainment of the aquatic life use designation. This was evaluated for Beavercreek WRRF. The application of the dissolved metal translators resulted in effective total recoverable criteria for copper, lead, nickel and zinc that were lower than the total recoverable criteria listed in OAC 3745-1.

The Beaver Creek near Beavercreek WRRF is attaining its designated use. In addition, Beavercreek WRRF has not requested any increase in permitted load. Therefore, the facility can receive permit limits that maintain all numeric criteria, up to their current limits, without undergoing any further review to ensure that the limits for the metals will protect the aquatic life and other uses.

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 Beavercreek WRRF, the wasteload allocation values are 0.79 TU_a and 2.66 TU_c.

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

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

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

TU_c = 100/geometric mean of No Observed Effect Concentration and Lowest Observed Effect Concentration

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

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

This equation applies outside the mixing zone for 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 (downstream flow to discharger flow)	Allowable Effluent Toxicity (percent effects in 100% effluent)
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 Beavercreek WRRF is 30 percent mortality in 100 percent effluent based on the dilution ratio of 1.08 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 12. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 8, and the PEL_{max} is compared to the PEQ_{max}. Based on the calculated percentage of the allocated value [($PEQ_{avg} \div PEL_{avg}$) X 100, or ($PEQ_{max} \div PEL_{max}$) X 100)], the parameters are assigned to group 3, 4, or 5. The groupings are listed in Table 13.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Federal and State laws/regulation require that dischargers meet both treatment-technology-based limits and any more stringent standards needed to comply with state WQS. Permit limits are based on the more restrictive of the two. Table 14 shows the draft NPDES permit limits for the Beavercreek plant. The limits and monitoring requirements for outfall 001 are discussed in detail below.

Oil and Grease, pH, and Dissolved Oxygen

Limits proposed for oil and grease, pH, and dissolved oxygen are based on water quality standards (OAC 3745-1), and are a continuation of existing permit limits.

Escherichia coli

Effluent limits are being proposed for Escherichia coli. Water quality standards for *E. coli* became effective in March 2010 and take the place of fecal coliform testing. As the facility uses UV disinfection, Beavercreek WRRF should not anticipate problems meeting the proposed monthly and weekly geometric mean concentrations of 126 and 284 per 100 ml respectively, these limits have been recommended in the permit for final effluent tables. Class A Primary Contact Recreation *E. coli* standards apply to Beaver Creek.

Total Suspended Solids, Ammonia, and $CBOD_5$

The limits for total suspended solids, ammonia-nitrogen, and $CBOD_5$ (5-day carbonaceous biochemical oxygen demand) 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 Beavercreek. The loading limits are based upon the plant design flow of 8.5 MGD. Ammonia-nitrogen limits were evaluated and are protective of water quality standards for ammonia-nitrogen toxicity.

Total Phosphorus and TMDL Compliance

The existing permit for the Beavercreek treatment plant included a compliance schedule to meet phosphorus reductions required by the *Total Maximum Daily Loads for the Upper Little Miami River, Final Report* (Ohio EPA; approved by U.S. EPA, July 2002). The Phase 1 reductions required the plant to meet average total phosphorus limits of 1.0 mg/L (monthly) and 1.5 mg/L (weekly) during the months of May through October no later than April 1, 2008.

Table 4: Phosphorus Loading at Beavercreek WRRF

Year	Loading (kg/day)
2008	16.31
2009	13.17
2010	16.02
2011	11.26
2012	13.00

Phase 2 reductions required the Beavercreek plant to meet an allowable total phosphorus load of 16.1 kg/day during the summer months beginning in March 2013. As defined in the permit, the plant's summer phosphorus load is calculated using the median plant flow (May – October) for the previous 5 calendar years and the median phosphorus concentration (May – October).

Table 4 shows that over the past four years Beavercreek has produced phosphorus loads less than 16.1 kg/day. The loading limit of 16.1kg/day is proposed to continue for this permit for the summer months of May through October as it is in the current permit to help maintain river attainment levels. Weekly limits of 1.5mg/L and monthly limits of 1.0mg/L will also continue in the summer.

Nitrate+Nitrite-Nitrogen and Total Kjeldahl Nitrogen

The continuation of monitoring for nitrate+nitrite-nitrogen and total Kjeldahl nitrogen is proposed based on best engineering judgment. Monitoring nitrate+nitrite-nitrogen and total Kjeldahl nitrogen 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 upper Little Miami River basin.

Free Cyanide, Cadmium, Total Recoverable Chromium, Dissolved Hexavalent Chromium, Nickel, Barium and Zinc

Based on reasonable potential for requiring monitoring in NPDES permits [OAC 3745-33-07(A)], monitoring is proposed to continue for free cyanide, cadmium, total chromium, dissolved hexavalent chromium, nickel, barium, and zinc. Because these contaminants were included in Group 2 and 3 under the risk assessment procedures (Table 13), monitoring at a reduced frequency of once per quarter is proposed. The purpose of the monitoring is to maintain a current data base on the level of these contaminants in the plant effluent. This data will be used to assess reasonable potential at future permit renewals.

Copper, Mercury, and Total Filterable Residue

Ohio EPA risk assessment (Table 13) places copper, mercury, and total filterable residue in group 4. This placement as well as the data in Tables 6 and 8 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).

Gamma-BHC, Silver, and Lead

Gamma-BHC, silver, and lead are included in Group 5 under the risk assessment procedure (Table 13). However, using the discretion allowed in paragraph A(5) of Rule 3745-33-07, monitoring, rather than effluent limits, is proposed for these pollutants. The PEQ values calculated for these pollutants (Table 8) may not be representative of their actual levels in the plant effluent because they were based on limited data sets. There was only one detection of Gamma-BHC while every other test was under the method detection level over the past five years. Continued monitoring for Gamma-BHC is thus proposed.

DMR data showed no detections of silver. However, two detections in pretreatment data (Table 7) were reported. There was also a single detection of lead while every other test was under the method detection level over the past five years. For silver and lead, proposed monitoring with a decreased MDL will allow for additional data on the frequency of occurrence and variability of this pollutant in the plant's effluent.

MDLs for Cadmium, Dissolved Hexavalent Chromium, Copper, Lead, and Silver

Table 5 shows a list of parameters and the accompanying method detection limits compared to the appropriate water quality criteria minimum values. The method detection limit should be approximately one third of the most stringent water quality criteria from Table 12. To ensure that data is obtained that allows Ohio EPA to make water quality-related decisions regarding cadmium, dissolved hexavalent chromium, copper, lead, and

silver; a special condition is proposed in Part II, Item L of the permit that provides guidance on the MDL the permittee should use in analyzing these contaminants.

Table 5. Beavercreek WRRF Method Detection Limit Analysis			
Parameter (µg/L)	Current MDL	Water Quality Criteria Minimum	Proposed MDL
Cadmium	4.7	8.1	3.0
Chromium (Dissolved Hex.)	20	12	4.0
Copper	29	37	12
Lead	49	41	14
Silver	40	1.4	0.5

Whole Effluent Toxicity

To determine the appropriate whole effluent toxicity (WET) for the discharge at Beavercreek WRRF, Table 1 of rule OAC 3745-33-07(B) was filled and reviewed. Several parameters indicated categories of 1, 2, 3, and 4. The effluent showed no toxicity towards the fathead minnows tested. However, evidence from bioassay screening and toxicity reports produced by Beavercreek shows that plant effluent has been both acutely and chronically toxic to Ceriodaphnia dubia. The wasteload allocations assigned to WET are $0.79TU_a$ and $2.66TU_c$. Chronic toxicity had several tests above detection and the annual 2010 testing showed that chronic toxicity was $5.66TU_c$, more than twice the allowable toxicity according to the wasteload allocation. Summaries of the annual toxicity tests can be found in Table 9a. Also Table 9c shows that Ohio EPA Screening Bioassay Tests at Beavercreek found effluent to be acutely toxic in some cases.

Based on evaluating the whole effluent toxicity data presented in Tables 9a, 9b, and 9c and other pertinent data under the provisions of OAC 3745-33-07(B), the Beavercreek wastewater treatment plant is placed in Category 3 with respect to whole effluent toxicity. Based on best engineering judgment, quarterly chronic toxicity testing with the determination of acute endpoints is proposed for the first two years of the permit for Ceriodaphnia dubia. Annual chronic testing is proposed for the remainder of the permit.

Monitoring is proposed to take place at Outfall 001 and downstream of the plant. Proposed monitoring would take place at both Outfall 001 and Outfall 801 in February, May, August, and November for the first two years of the permit. The proposed monitoring would allow for an appropriate sample sized data set and determine whether effluent from Beavercreek WRRF is toxic and how it affects stream water downstream.

Annual chronic toxicity testing with the determination of acute endpoints is proposed for the life of the permit for Pimephales promelas (fathead minnows).

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

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 Beavercreek WRRF to have a Class IV wastewater treatment plant operator in charge of the sewage treatment plant operations discharging through outfall 001.

Operator of Record

In December 2006, Ohio Administrative Code rule revisions became effective which 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 language necessary to implement rule 3745-7-02 of the Ohio Administrative Code (OAC), and requires the permittee to designate one or more operator of record to oversee the technical operation of the Beavercreek wastewater plant.

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 Beavercreek WRRF may seek permit coverage under the general permit for industrial stormwater (permit # OHR000004) or submit a "No Exposure Certification." Parts IV, V, and VI will be removed from the final permit if: 1) the Beavercreek WRRF 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 Beaver Creek providing information about the discharge. Signage at outfalls is required pursuant to Ohio Administrative Code 3745-33-08(A).

Figure 1. Approximate location of the Beavercreek Water Resource Reclamation Facility

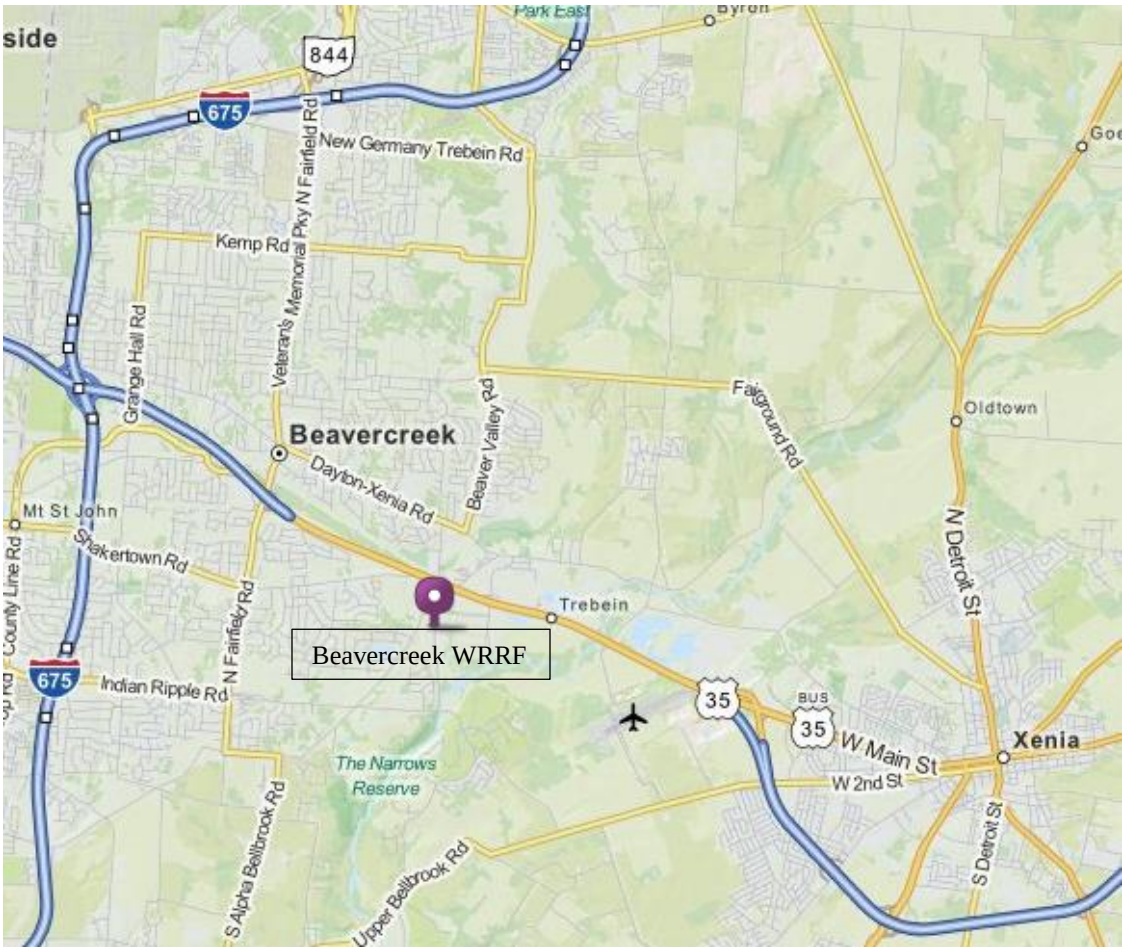

Figure 2. Schematic Depiction of the Upper Little Miami River Study Area

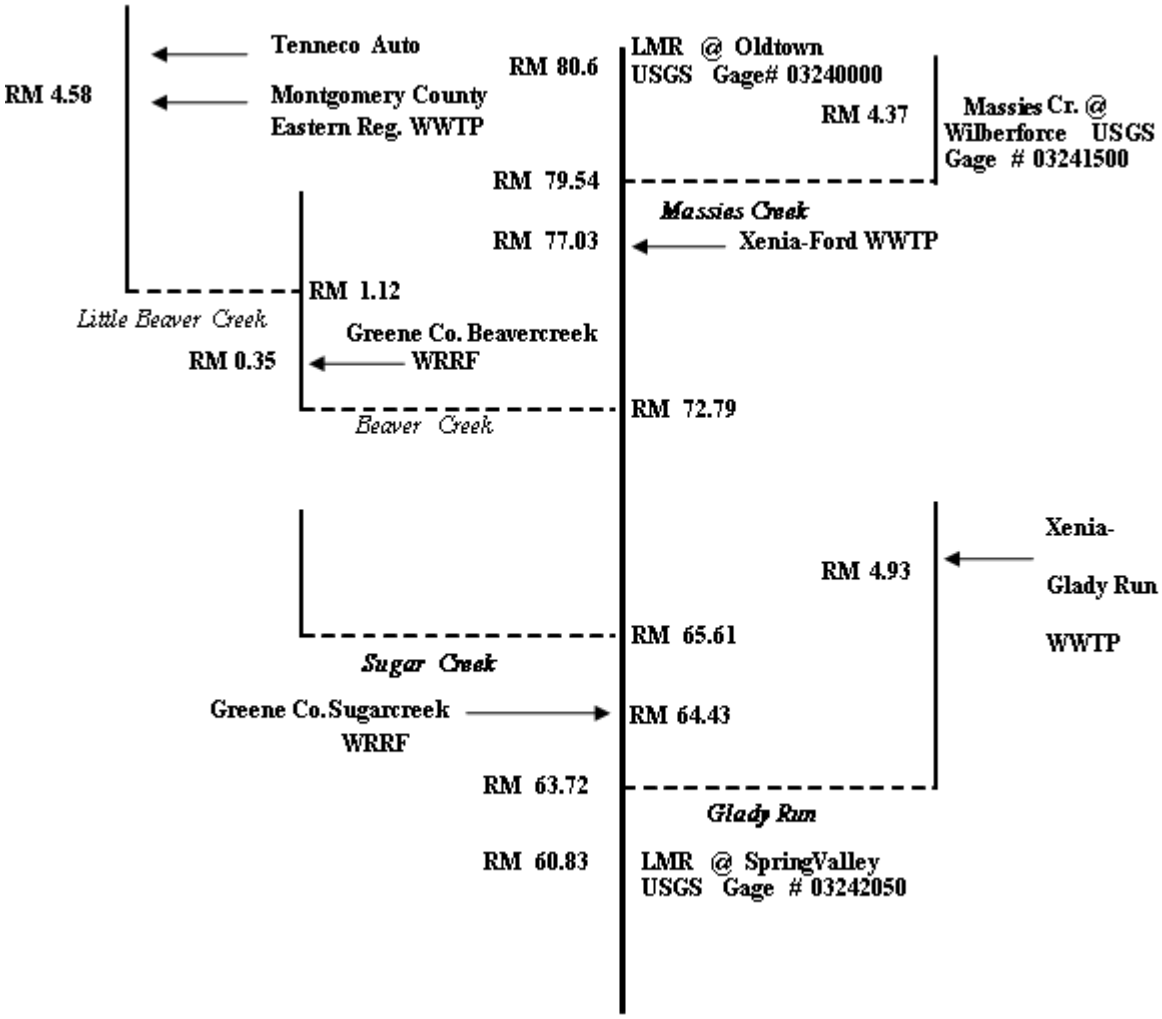

Table 6. Effluent Characterization and Decision Criteria

Summary of current permit limits and unaltered monthly operating report (MOR) data for Beavercreek outfall 1PK00003001. All values are based on annual records from Jan 2008 through Dec 2012. A = 7 day average.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50th	95th	
Water Temperature	Annual	C	------ Monitor- -----		1722	16	20	9-22
Dissolved Oxygen	Summer	mg/l	--	6.0 (min)	866	7.8	9.2	6-12.1
Dissolved Oxygen	Winter	mg/l	--	6.0 (min)	856	8.5	10.2	6.2-13.3
Residue, Total Dissolved	Annual	mg/l	------ Monitor- -----		113	969	1090	602-1430
Total Suspended Solids	Summer	mg/l	11	16	731	3	7	0-58
Total Suspended Solids	Winter	mg/l	16	24	731	3	7	0-58
Oil and Grease, Hexane Extr Method	Annual	mg/l	--	10	88	0	3.29	0-8.9
Nitrogen, Ammonia (NH3)	Summer	mg/l	1.1	1.6	365	0.12	1.28	0-4.98
Nitrogen, Ammonia (NH3)	Winter	mg/l	3.8	5.7	367	0.11	4.12	0-20
Nitrogen Kjeldahl, Total	Annual	mg/l	------ Monitor- -----		60	1.28	4.07	0.45-9.88
Nitrite Plus Nitrate, Total	Annual	mg/l	------ Monitor- -----		60	7.59	11.3	2.89-13
Phosphorus, Total (P)	Annual	mg/l	1.0	1.5	268	0.905	2.07	0.06-4.23
Cyanide, Free	Annual	mg/l	------ Monitor- -----		62	0	0	0-0
Barium, Total Recoverable	Annual	ug/l	------ Monitor- -----		50	87.9	125	0-134
Nickel, Total Recoverable	Annual	ug/l	------ Monitor- -----		47	0	0	0-45
Silver, Total Recoverable	Annual	ug/l	------ Monitor- -----		45	0	0	0-0
Zinc, Total Recoverable	Annual	ug/l	------ Monitor- -----		47	0	29	0-32
Cadmium, Total Recoverable	Annual	ug/l	------ Monitor- -----		47	0	0	0-0
Lead, Total Recoverable	Annual	ug/l	------ Monitor- -----		47	0	0	0-57
Chromium, Total Recoverable	Annual	ug/l	------ Monitor- -----		47	0	0	0-0
Copper, Total Recoverable	Annual	ug/l	------ Monitor- -----		77	0	11.4	0-37
Chromium, Dissolved Hexavalent	Annual	ug/l	------ Monitor- -----		29	0	0	0-0
Fecal Coliform	Annual	#/100 ml	1000	2000	390	10	186	0-4400
Gamma-BHC, Total	Annual	ug/l	------ Monitor- -----		15	0	0.015	0-0.05
Flow Rate	Annual	MGD	------ Monitor- -----		1827	6.01	11.1	3.07-26.7
Mercury, Total (Low Level)	Annual	ng/l	17	300	60	3.9	9.54	0.7-14.7
pH, Maximum	Annual	S.U.	--	9.0	1722	7.4	7.9	6.9-8.7
pH, Minimum	Annual	S.U.	--	6.5	1722	7.4	7.8	6.7-8.2
CBOD 5 day	Summer	mg/l	10	15	357	0	3	0-10
CBOD 5 day	Winter	mg/l	25	40	362	0	5	0-49

Table 7. Effluent Characterization Using Ohio EPA and Pretreatment Data

Summary of analytical results for Beavercreek outfall 1PK00003001. Units ug/l unless otherwise noted; OEPA = data from analyses by Ohio EPA; PT = data from pretreatment program reports; NA = not analyzed; ND = not detected (detection limit).

	OEPA	OEPA	PT	PT	PT	PT
PARAMETER	4/19/2011	3/15/2011	10/23/2012	5/17/2011	12/8/2009	11/18/2008
Arsenic	2.7	3.2	ND(5)	ND(5)	ND(5)	ND(3)
Barium	116	110	NA	NA	NA	NA
Cadmium	ND(0.2)	ND(0.2)	ND(2)	ND(0.5)	ND(0.2)	0.2
Chromium	ND(2.0)	11.9	ND(5)	ND(5)	ND(5)	ND(5)
Copper	5.9	5.3	11	74	82.3	7.96
Total Filterable Residue (mg/l)	854	942	NA	NA	NA	NA
Iron	82	292	NA	NA	NA	NA
Nickel	2.4	43.2	ND(5)	ND(5)	ND(5)	ND(5)
Nitrate+nitrite (mg/l)	6	6.66	NA	NA	NA	NA
Phosphorus, T (mg/l)	0.636	0.388	NA	NA	NA	NA
Silver	NA	NA	ND(2)	0.5	0.95	ND(0.5)
Strontium	430	410	NA	NA	NA	NA
Zinc	17	25	27	17	93	13.8
Phenol	2.3	ND(2.1)	ND(10)	ND(10)	ND(10)	ND(10)

Table 8. Effluent Data for Greene County Beavercreek WRRF

Parameter	Units	# of Samples	# > MDL	Average PEQ	Maximum PEQ
Self-Monitoring (DMR) Data					
Filterable Residue, Total [A]	mg/l	115	115	1068.	1187.
Ammonia-S	mg/l	244	216	0.596	1.247
Ammonia-W	mg/l	179	130	5.566	7.624
Nitrate + Nitrite [A]	mg/l	62	62	10.72	13.98
Phosphorus, Total [A]	mg/l	270	270	1.739	2.527
Cyanide - free	µg/l	62	0	--	--
Barium -TR [A]	µg/l	52	51	112.2	139.6
Nickel -TR [A]	µg/l	53	3	32.85	45.0
Silver [A]	µg/l	49	2	2.081	2.85
Strontium -TR [A]	µg/l	4	4	1156.	1583.
Zinc-TR [A]	µg/l	52	20	23.36	32.0
Cadmium -TR [A]	µg/l	53	1	0.380	0.520
Lead -TR	µg/l	47	1	45.77	62.70
Chromium -TR [A]	µg/l	53	1	18.24	24.99
Copper -TR [A]	µg/l	83	19	26.16	30.81
$Chromium^{+6}$, diss.	µg/l	29	0	--	--
Aldrin	µg/l	5	0	--	--
Gamma-BHC, Total	µg/l	2	1	0.139	0.190
Mercury-Total	ng/l	60	60	8.163	12.58
OEPA and Pretreatment Program Data					
Arsenic	µg/l	6	2	7.008	9.60
Iron - TR	µg/l	2	2	810.0	1110.
Phenol	µg/l	6	1	6.380	8.740

[A] OEPA and Pretreatment data were combined with the DMR data.

Table 9a. Acute/Chronic Toxicity for Beavercreek WRRF

Summary of acute and chronic toxicity test results for Beavercreek WRRF effluent:

Test Date(a)	*Ceriodaphnia dubia 48 hours*	*Fathead Minnows 96 hours*	*Ceriodaphnia dubia 7 days*	*Fathead Minnows 7 days*
	TUa[b]	TUa[b]	TUc[b]	TUc[b]
9/1/09	BD	BD	1.4	BD
8/28/10	0.4	BD	5.66	BD
10/12/11	0.4	BD	1.7	BD
10/10/12	BD	BD	1.34	BD

[a] O = EPA test;
[b] E = entity test
[c] TU_a = acute toxicity units
[d] TU_c = chronic toxicity units
[e] BD = below detection limit (0.2 TU_a, 1.0 TU_c)

Table 9b. Summary of Acute Toxicity Test Results for Beavercreek WRRF:

Test Date(a)	*Ceriodaphnia dubia 48 hours*						*Fathead Minnows 96 hours*					
	UP[b]	C[c]	LC_{50}[d]	%M[e]	TUa[f]	NF[g]	UP[b]	C[c]	LC_{50}[d]	%M[e]	TUa[f]	NF[g]
9/1/09	0	0	>100	0	BD	NT	0	0	>100	0	BD	NT
8/28/10	0	0	>100	20	0.4	NT	8	8	>100	15	BD	NT
10/12/11	0	0	>100	20	0.4	NT	32	0	>100	0	BD	NT
10/10/12	0	0	>100	0	BD	NT	7	0	>100	7	BD	NT

[a] O = EPA test; E = entity test
[b] UP = upstream control water
[c] C = laboratory water control
[d] LC_{50} = median lethal concentration
NT = not tested
[e] %M = percent mortality in 100% effluent
[f] TUa = acute toxicity units
[g] NF = near field sample
BD = below detection

Table 9c. Ohio EPA Screening Bioassay Tests at Beavercreek WRRF Outfall 001

Acute Toxicity Tests					
Sample	Date	Cumulative Percent Mortality			
		P. promelas Time (hrs)		C. dubia Time (hrs)	
		24	48	24	48
Beavercreek Upstream	3/15/2011	0	0	0	0
Manual Mixing Zone	3/15/2011	0	0	0	0
Grab 001	3/15/2011	0	0	0	0
Rearing Unit Water Control	3/15/2011	0	0	-	-
Reconstituted Water Control	3/15/2011	-	-	0	0
Grab 001	3/16/2011	0	0	5	5
Composite 001	3/16/2011	0	0	5	65
Rearing Unit Water Control	3/16/2011	0	0	-	-
Reconstituted Water Control	3/16/2011	-	-	0	0
Beavercreek Upstream	4/19/2011	0	0	0	0
Manual Mixing Zone	4/19/2011	0	0	0	20
Grab 001	4/19/2011	0	0	85	95
Rearing Unit Water Control	4/19/2011	0	10	-	-
Reconstituted Water Control	4/19/2011	-	-	0	5
Grab 001	4/20/2011	0	0	0	0
Composite 001	4/20/2011	0	0	0	5
Rearing Unit Water Control	4/20/2011	0	0	-	-
Reconstituted Water Control	4/20/2011	-	-	0	0

Table 10. Water Quality Criteria in the Beaver Creek Study Area

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
		Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Ammonia-S	mg/l	--	--	1.3	--	--
Ammonia-W	mg/l	--	--	1.5	--	--
Arsenic - TR	µg/l	--	100.	150.	340.	680.
Barium	µg/l	--	--	220.	2000.	4000.
Bis (2-ethylhexyl) phthalate	µg/l	59. [C]	--	8.4	1100.	2100.
Cadmium - TR	µg/l	--	50.	6.5	18.	37.
Chlorine, tot. res.	µg/l	--	--	11.	19.	38.
Chromium -TR.	µg/l	--	100.	240.	5000.	10000.
$Chromium^{+6}$, diss.	µg/l	--	--	11.	16.	31.
Copper - TR	µg/l	1300.	500.	29. [D]	49. [D]	98. [D]
Cyanide, free	µg/l	220000.	--	12.	46.	92.
Dieldrin	µg/l	0.0014 [C]	--	0.056	0.24	0.47
Filterable Residue, Total	mg/l	--	--	1500.	--	--
Iron - TR	µg/l	--	5000.	--	--	--
Lead - TR	µg/l	--	100.	86. [D]	1600. [D]	3300. [D]
gamma-BHC (Lindane) [B]	µg/l	0.63 [C]	--	0.057	0.95	1.9
Mercury - TR [B]	ng/l	12.	10000.	910.	1700.	3400.
Molybdenum	µg/l	--	--	20000.	190000.	370000.
Nickel - TR	µg/l	4600.	200.	150.	1300.	2700.
NO_2+NO_3	mg/l	--	100.	--	--	--
Phenol	µg/l	4600000.	--	400.	4700.	9400.
Selenium - TR	µg/l	11000.	50.	5.0	--	--
Silver - TR	µg/l	--	--	1.3	14. [D]	27. [D]
Strontium	µg/l	--	--	21000.	40000.	81000.
Zinc - TR	µg/l	69000.	25000.	360.	360.	710.

[B] Bioaccumulative Chemical of Concern (BCC)
[C] Based on a carcinogenic endpoint.
[D] Criteria based on applicable dissolved metal translator.

Table 11. Instream Conditions and Discharger Flow

Parameter	Season	Value	Basis
Stream Flows (cfs)			
Little Miami River (upstream of Xenia - Ford Rd. WWTP)			
1Q10	annual	8.65	USGS gage #03240000 & 03241500,
7Q10	annual	10.63	1952 to 1997 data.
30Q10	summer	12.88	"
	winter	29.09	"
Harmonic Mean Flow	annual	56.61	"
Little Beaver Creek (upstream of Eastern Reg. WWTP and Tenneco)			
1Q10	annual	0.19	USGS gage #03241500, 1952-97 data
7Q10	annual	0.22	"
30Q10	summer	0.32	"
	winter	1.01	"
Harmonic Mean Flow	annual	1.84	"
Incremental flow for L. Beaver Creek between Eastern Reg. WWTP and mouth			
1Q10	annual	0.31	USGS gage #03241500, 1952-97 data
7Q10	annual	0.36	"
30Q10	summer	0.52	"
	winter	1.66	"
Harmonic Mean Flow	annual	3.01	"
Beaver Creek (upstream of L. Beaver Cr. confluence)			
1Q10	annual	0.66	USGS gage #03241500, 1952-97 data
7Q10	annual	0.73	"
30Q10	summer	0.93	"
	winter	2.45	"
Harmonic Mean Flow	annual	4.23	"
Incremental Flow for Little Miami River between Xenia - Ford Rd. WWTP and Sugarcreek WRRF			
1Q10	annual	1.87	USGS gage #03241500, 1952-97 data
7Q10	annual	2.07	"
30Q10	summer	2.66	"
	winter	7.04	"
Harmonic Mean Flow	annual	12.2	"
Sugar Creek (@ mouth)			
1Q10	annual	0.64	USGS gage #03241500, 1952-97 data
7Q10	annual	0.75	"
30Q10	summer	1.07	"
	winter	3.42	"
Harmonic Mean Flow	annual	6.20	"

Table 11. Instream Conditions and Discharger Flow (continued)

Parameter (Units)	Season	Value	Basis
Glady Run (upstream of Glady Run WWTP)			
1Q10	annual	0.09	USGS gage #03241500, 1952-97 data
7Q10	annual	0.10	"
30Q10	summer	0.15	"
	winter	0.47	"
Harmonic Mean Flow	annual	0.84	"
Discharger Flows (cfs)			
Xenia- Ford Rd. WWTP		5.57	DSW
Mont. Co. East. Regional WWTP		20.11	DSW
Greene Co. Beaver creek WRRF		13.15	DSW
Greene Co. Sugarcreek WRRF		15.32	DSW
Xenia- Glady Run WWTP		6.19	DSW
Mixing Assumption	% average	100	Stream-to-discharge ratio
	% maximum	100	Stream-to-discharge ratio
Instream Summer Temperature (^{o}C)			
L. Miami River (RM 77.0)		22.	Xenia-Ford 901Station; 19 values, 2008-12
L. Miami River (RM 64.0)		21.	Sugarcreek 901 Station; 20 values, 2008-12
Beaver Creek		21.	Beavercreek 901Station; 20 values, 2008-12
L. Beaver Creek		22.	East.Reg. 901Station; 20 values, 2008-12
Glady Run		19.	Xenia-Glady 901Station; 19 values, 2008-12
Instream Winter Temperature (^{o}C)			
L. Miami River (RM 77.0)		4.8	Xenia-Ford 901Station; 9 values, 2008-12
L. Miami River (RM 64.0)		6.1	Sugarcreek 901 Station; 14 values, 2008-12
Beaver Creek		8.0	Beavercreek 901Station; 14 values, 2008-12
L. Beaver Creek		8.9	East.Reg. 901Station; 14 values, 2008-12
Glady Run		7.2	Xenia-Glady 901Station; 9 values, 2008-12
Instream Summer pH (S.U.)			
L. Miami River (RM 77.0)		8.3	Xenia-Ford 901Station; 19 values, 2008-12
L. Miami River (RM 64.0)		8.1	Sugarcreek 901 Station; 20 values, 2008-12
Beaver Creek		8.0	Beavercreek 901Station; 20 values, 2008-12
L. Beaver Creek		7.9	East.Reg. 901Station; 20 values, 2008-12
Glady Run		8.2	Xenia-Glady 901Station; 19 values, 2008-12
Instream Winter pH (S.U.)			
L. Miami River (RM 77.0)		8.4	Xenia-Ford 901Station; 9 values, 2008-12
L. Miami River (RM 64.0)		8.3	Sugarcreek 901 Station; 14 values, 2008-12
Beaver Creek		8.4	Beavercreek 901Station; 14 values, 2008-12
L. Beaver Creek		7.9	East.Reg. 901Station; 14 values, 2008-12
Glady Run		8.3	Xenia-Glady 901Station; 9 values, 2008-12

Table 11. Instream Conditions and Discharger Flow (continued)

Parameter (Units)	Value	Basis
Instream Hardness (mg/l)		
L. Miami River dst Xenia-Ford Rd. WWTP	336.	Xenia-Ford 901; 18 values, 2008-12
L. Miami River dst Sugarcreek WWTP	331.	Sugarcreek 901; 60 values, 2008-12
Beaver Creek	347.	Beavercreek 901; 60 values, 2008-12
L. Beaver Creek	301.	East.Reg. 901; 61 values, 2008-12
Glady Run	367.	Xenia-Glady Run 901; 52 values, 2008-12
Background Water Quality (µg/l)		
Little Miami River		
Ammonia, summer (mg/l)	0.025	DMRs; 19 values, 18<MDL, 2008-12 data
Ammonia, winter (mg/l)	0.0	DMRs; 9 values, 9<MDL, 2008-12 data
Arsenic	0.	STORET; 3 values, 3<MDL, 2011 data
Barium	93.7	STORET; 3 values, 0<MDL, 2011 data
Bis (2-ethylhexyl) phthalate	0.	No representative data available
Cadmium	0.	STORET; 3 values, 3<MDL, 2011 data
Chlorine	0.	No representative data available
Chromium	0.	STORET; 3 values, 3<MDL, 2011 data
Dissolved Hexavalent Chromium	0.	No representative data available
Copper	1.8	STORET; 3 values, 1<MDL, 2011 data
Free Cyanide	0.	No representative data available
Dieldrin	0.	No representative data available
Gamma – BHC	0.	No representative data available
Iron	370.	STORET; 3 values, 0<MDL, 2011 data
Lead	0.	STORET; 3 values, 3<MDL, 2011 data
Mercury (ng/l)	0.	No representative data available
Molybdenum	0.	No representative data available
Nickel	3.4	STORET; 3 values, 0<MDL, 2011 data
Selenium	0.	STORET; 3 values, 3<MDL, 2011 data
Silver	0.	No representative data available
Total Dissolved Solids (mg/l)	408.	STORET; 6 values, 0<MDL, 2011 data
Zinc	16.3	STORET; 3 values, 1<MDL, 2011 data

Table 11. Instream Conditions and Discharger Flow (continued)

Parameter (µg/l)	Value	Basis
Beaver Creek		
Ammonia, summer (mg/l)	0.08	DMRs; 20 values, 5<MDL, 2008 -12 data
Ammonia, winter (mg/l)	0.08	DMRs; 14 values, 5<MDL, 2008 -12 data
Arsenic	0.	STORET; 11 values, 11<MDL, 2011-12
Barium	100.	STORET; 11 values, 0<MDL, 2011-12
Bis (2-ethylhexyl) phthalate	0.	No representative data available
Cadmium	0.	STORET; 11 values, 11<MDL, 2011-12
Chlorine	0.	No representative data available
Chromium	0.	STORET; 11 values, 11<MDL, 2011-12
Dissolved Hexavalent Chromium	0.	No representative data available
Copper	1.0	STORET; 11 values, 10<MDL, 2011-12
Free Cyanide	0.	No representative data available
Dieldrin	0.	No representative data available
Gamma – BHC	0.	No representative data available
Iron	438.	STORET; 11 values, 0<MDL, 2011-12
Lead -	0.	STORET; 11 values, 11<MDL, 2011-12
Mercury (ng/l)	0.	No representative data available
Molybdenum	0.	No representative data available
Nickel	2.5	STORET; 11 values, 0<MDL, 2011-12
Selenium	0.	STORET; 11 values, 11<MDL, 2011-12
Silver	0.	No representative data available
Total Dissolved Solids (mg/l)	455.	STORET; 14 values, 0<MDL, 2011-12
Zinc	0.	STORET; 11 values, 11<MDL, 2011-12

Table 11. Instream Conditions and Discharger Flow (continued)

Parameter (µg/l)	Value	Basis
Little Beaver Creek		
Ammonia, summer (mg/l)	0.07	DMRs; 20 values, 1<MDL, 2008-12 data
Ammonia, winter (mg/l)	0.05	DMRs; 15 values, 2<MDL, 2008-12 data
Arsenic	0.	STORET; 5 values, 5<MDL, 2011 data
Barium	93.	STORET; 5 values, 0<MDL, 2011 data
Bis (2-ethylhexyl) phthalate	0.	No representative data available
Cadmium	0.	STORET; 5 values, 5<MDL, 2011 data
Chlorine	0.	No representative data available
Chromium	0.	STORET; 5 values, 5<MDL, 2011 data
Dissolved Hexavalent Chromium	0.	No representative data available
Copper	1.6	STORET; 5 values; 2<MDL, 2011 data
Free Cyanide	0.	No representative data available
Dieldrin	0.	No representative data available
Gamma – BHC	0.	No representative data available
Iron	140.	STORET; 5 values, 0<MDL, 2011 data
Lead	0.	STORET; 5 values, 5<MDL, 2011 data
Mercury (ng/l)	0.	No representative data available
Molybdenum	0.	No representative data available
Nickel	1.8	STORET; 5 values, 2<MDL, 2011 data
Selenium	0.	STORET; 5 values, 5<MDL, 2011 data
Silver	0.	No representative data available
Total Dissolved Solids (mg/l)	443.	STORET; 10 values, 0<MDL,2011 data
Zinc	6.6	STORET; 5 values, 4<MDL, 2011 data

Table 11. Instream Conditions and Discharger Flow (continued)

Parameter (µg/l)	Value	Basis
Glady Run		
Ammonia, summer (mg/l)	0.025	DMRs; 19 values,18<MDL, 2008-12 data
Ammonia, winter (mg/l)	0.025	DMRs; 9 values, 8<MDL, 2008-12 data
Arsenic	0.	STORET; 11 values, 11<MDL, 2011-12
Barium	100.	STORET; 11 values, 0<MDL, 2011-12
Bis (2-ethylhexyl) phthalate	0.	No representative data available
Cadmium	0.	STORET; 11 values, 11<MDL, 2011-12
Chlorine	0.	No representative data available
Chromium	0.	STORET; 11 values, 11<MDL, 2011-12
Dissolved Hexavalent Chromium	0.	No representative data available
Copper	1.0	STORET; 11 values, 10<MDL, 2011-12
Free Cyanide	0.	No representative data available
Dieldrin	0.	No representative data available
Gamma – BHC	0.	No representative data available
Iron	438.	STORET; 11 values, 0<MDL, 2011-12
Lead	0.	STORET; 11 values, 11<MDL, 2011-12
Mercury (ng/l)	0.	No representative data available
Molybdenum	0.	No representative data available
Nickel	2.5	STORET; 11 values, 0<MDL, 2011-12
Selenium	0.	STORET; 11 values, 11<MDL, 2011-12
Silver	0.	No representative data available
Total Dissolved Solids (mg/l)	455.	STORET; 14 values, 0<MDL, 2011-12
Zinc	0.	STORET; 11 values, 11<MDL, 2011-12
Dissolved Metal Translators (Little Beaver Creek)		
Copper	1.072	OEPA; 5 samples, 0 < MDL, 1998
Lead	1.335	OEPA; 5 samples, 0 < MDL, 1998
Nickel	1.010	OEPA; 5 samples, 0 < MDL, 1998
Silver	2.034	OEPA; 5 samples, 0 < MDL, 1998
Dissolved Metal Translators (Little Miami River – apply to upper segment only)		
Copper	1.125	OEPA; 5 samples, 0 < MDL, 1998
Lead	3.456	OEPA; 5 samples, 0 < MDL, 1998
Zinc	1.059	OEPA; 5 samples, 0 < MDL, 1998

Table 12. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

Parameter	Units	Average		Maximum		Inside
		Human	Agri	Aquatic	Aquatic	Mixing Zone
		Health	Supply	Life	Life	Maximum
Arsenic [C]	µg/l	--	155.	162.	365.	680.
Barium	µg/l	--	--	230.	2140.	4000.
Cadmium [C]	µg/l	--	78. [A]	8.1	22.	37.
Chromium [C]	µg/l	--	155.	307.	6314.	10000.
Dissolved-Hexavalent Chromium [C]	µg/l	--	--	12.	17.	31.
Copper	µg/l	2015. [A]	775. [A]	37. [D]	58. [D]	98.
Free Cyanide [C]	µg/l	341100. [A]	--	13.	49.	92.
Total Dissolved Solids	mg/l	--	--	1587.	--	--
Gamma-BHC [B]	µg/l	0.63	--	0.057	0.95	1.9
Lead	µg/l	--	155.	41. [D]	763. [D]	3300.
Mercury [B]	ng/l	12.	10000. [A]	910.	1700.	3400.
Molybdenum [C]	µg/l	--	--	21660.	204000.	370000.
Nickel [C]	µg/l	7131. [A]	309.	194.	1553.	2700.
Selenium [C]	µg/l	17060.	78.	5.4	--	--
Silver	µg/l	--	--	1.4	15. [D]	27.
Zinc [C]	µg/l	107000. [A]	38760. [A]	477.	455.	710.

[A] Allocation must not exceed the Inside Mixing Zone Maximum.

[B] 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).

[C] Parameter would not require a WLA based on reasonable potential procedures, but allocation requested for use in pretreatment program.

[D] WLA based on applicable dissolved metal translator.

Table 13. Parameter Assessment for Beavercreek WRRF

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

Phosphorus

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

Aldrin	Arsenic	Cadmium
Dissolved Hexavalent Chromium	Chromium	Free Cyanide
Iron	Molybdenum	Nickel
Nitrate + Nitrite	Phenol	Selenium
Strontium	Zinc	

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

Barium

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

Copper	Total Dissolved Solids	Mercury

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

Limits to Protect Numeric Water Quality Criteria

Parameter	Units	Applicable Period	Recommended Effluent Limits Average	Maximum
Gamma-BHC	µg/l	annual	0.057	0.95
Lead	µg/l	annual	41.	763.
Silver	µg/l	annual	1.4	15.

Table 14. Final Effluent Limits and Monitoring Requirements for Beavercreek WRRF Outfall PK00003001

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
Flow	MGD	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M
Temperature	°C	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M
Dissolved Oxygen	mg/L	- - - - - - - - - - -	Not less than 6.0	- - - - - - - -		PD/EP
Carbonaceous biochemical oxygen demand (5-day)						
Summer	mg/L	10	15[c]	322	483[c]	PD/EP
Winter	mg/L	25	40[c]	804	1287[c]	PD/EP
Total Suspended Solids						
Summer	mg/L	11	16[c]	354	515[c]	PD/EP
Winter	mg/L	16	24[c]	515	772[c]	PD/EP
Total Dissolved Solids	mg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		RP
Ammonia						
Summer	mg/L	1.1	1.6[c]	35.4	51.5[c]	PD/EP
Winter	mg/L	3.8	5.7[c]	122	183[c]	PD/EP
Total Kjeldahl nitrogen	mg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Nitrate + Nitrite	mg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Phosphorus						
Summer	mg/L	1.0	1.5[c]	32.2	48.3[c]	TMDL/EP
Winter	mg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
May-Oct		- - - - - -	16.1 kg/day seasonal limit	- - - - - -		TMDL
Oil and Grease	mg/L	- - - - - - - -	Not greater than 10.0	- - - - - - - -		WQS
pH	S.U.		6.5 - 9.0			WQS
E. coli - Summer	#/100mL	126	284[c]	--	--	WQS
Gamma BHC	ug/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		RP
Free Cyanide	mg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Barium	mg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Cadmium	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Chromium	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Dissolved Hex. Chromium	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Copper	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		RP
Lead	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		RP
Mercury	ng/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		RP
Nickel	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Silver	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		RP
Zinc	µg/L	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		M/EP
Whole Effluent Toxicity						
Acute, *Ceriodaphnia dubia*	TU_a	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		WET
Chronic, *Ceriodaphnia dubia*	TU_c	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		WET
Acute, *Pimephales prom.*	TU_a	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		WET
Chronic, *Pimephales prom.*	TU_c	- - - - - - - - - - - - -	Monitor	- - - - - - - - - - -		WET

[a] Effluent loadings based on average design discharge flow of 8.5 MGD.

[b] Definitions:

ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l))
BADCT = Best Available Demonstrated Control Technology
BEJ = Best Engineering Judgment
BPJ = Best Professional Judgment
BPT = Best Practicable Waste Treatment Technology, 40 CFR Part 133, Secondary Treatment Regulation
EP = Existing Permit
M = Best Engineering Judgement of *Division of Surface Water NPDES 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 (3745-33-07(A))
PD = Plant Design
PTS = Phosphorus Treatment Standards (OAC 3745-33-06 (C))
TMDL = Total Maximum Daily Load
WET = Whole Effluent Toxicity (OAC 3745-33-07(B))
WLA = Wasteload Allocation procedures (OAC 3745-2)
WLA/IMZM = Wasteload Allocation limited by Inside Mixing Zone Maximum
WQS = Ohio Water Quality Standards (OAC 3745-1)

[c] 7 day average limit.