

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 **Licking Co. Buckeye Lake WWTP**

Public Notice No.: 12-04-033
Public Notice Date: April 16, 2012
Comment Period Ends: May 16, 2012

OEPA Permit No.: **4PJ00000*JD**
Application No.: **OH0039098**

Name and Address of Applicant:

**Licking County Board of Commissioners
20 South Second Street
Newark, Ohio 43055**

Name and Address of Facility Where
Discharge Occurs:

**Buckeye Lake WWTP
458 Hilton Road
Buckeye Lake, Ohio 43008**

Receiving Water: **South Fork Licking River**

Subsequent
Stream Network: **Licking River to
Muskingum River to 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).

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

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

Summary of Permit Conditions

The limits proposed for dissolved oxygen, total suspended solids, ammonia-nitrogen and 5-day carbonaceous biochemical oxygen demand (CBOD₅) are all based on plant design criteria. These limits are protective of water quality standards.

Limits proposed for oil and grease, pH, and E.coli are based on Water Quality Standards (OAC 3745-1-07).

Proposed limits for cadmium and hexavalent chromium are based off of wasteload allocation group 5 placements.

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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 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 Daniel A. Kopec, (614) 644-1987, daniel.kopec@epa.state.oh.us.

Location of Discharge/Receiving Water Use Classification

Licking County Buckeye Lake WWTP discharges to South Fork Licking River at River Mile (RM) 14.2. The approximate location of the facility is shown in Figure 1.

This segment of the South Fork Licking River is described by Ohio EPA River Code: 17-220, USEPA River Reach #: 05040006-019, County: Licking, Ecoregion: Erie-Ontario Lake Plain. The South Fork Licking River is presently designated for the following uses: 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 Buckeye Lake WWTP came on-line in 1957, with the new WWTP going online in 2008 as part of the signed consent order with USEPA. The current facility has a design flow 2.0 MGD.

The current wet stream process includes a retention basin, bar screen, comminutors, primary settling tanks, oxidation ditch, secondary clarifiers, post aeration, and UV disinfection. Sludge is aerobically digested and sent to a landfill.

The Buckeye Lake WWTP collection system is 100% separate sewers. The system has no industrial users, and therefore is not required to develop a pretreatment program.

While this collection system is separate sewers, there is a great deal of inflow and infiltration (I&I) into the collection system. The new WWTP upgraded the retention basin to provide flow equalization during

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storm events. As part of the USEPA consent decree, flows from Outfall 002 to Wastewir Run, a tributary of South Fork, is prohibited.

Description of Existing Discharge

Table 1 presents a summary of analytical results for outfall 001 effluent samples compiled from the compliance samplings done by Ohio EPA. The monthly average PEQ_{avg} and daily maximum PEQ_{max} decision criteria are also included on this table.

Table 2 presents a summary of unaltered monthly operation report data for the period November 2006 to October 2011 for the Buckeye Lake WWTP as well as current permit limits, and monthly average PEQ_{avg} and daily maximum PEQ_{max} values.

Assessment of Impact on Receiving Waters

The *2010 Ohio Integrated Water Quality Monitoring and Assessment Report* (Ohio EPA) lists the South Fork of the Licking River as mostly in attainment. Nutrients and ammonia (total) are listed as causes of impairment with dam or impoundments and impacts from hydro structure flow regulation/modification as the source of impairment. Considering this information and the fact that municipal wastewater treatment plants discharge a nutrient load to the river, monthly monitoring for phosphorus, nitrate + nitrite and total Kjeldahl nitrogen is proposed based on best engineering judgment.

For a complete look at the 2010 Ohio Integrated Water Quality Monitoring and Assessment Report:

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

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 Buckeye Lake WWTP was 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)	June 2008 through November 2011
OEPA compliance sampling data	September 2010, March 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 6 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 7, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

The data used in the WLA are listed in Tables 2 and 3. The wasteload allocation results to maintain all applicable criteria are presented in Table 6. The current ammonia limits have been evaluated using the wasteload allocation procedures and are protective of water quality standards.

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 Buckeye Lake WWTP, the wasteload allocation values are 0.4 TU_a and 1.71 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> (downstream flow to discharger flow)	<u>Allowable Effluent Toxicity</u> (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 AET is 30% mortality in 100% effluent based on the dilution ratio of 1.4 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 2. 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 7.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 8 presents the final effluent limits and monitoring requirements proposed for 4PJ00000 outfall 001 and the basis for their recommendation.

The limits proposed for dissolved oxygen, total suspended solids, ammonia-nitrogen and 5-day carbonaceous biochemical oxygen demand (CBOD₅) are all based on plant design criteria. These limits are protective of water quality standards.

Limits proposed for oil and grease, pH, and E.coli are based on Water Quality Standards (OAC 3745-1-07).

The Ohio EPA risk assessment (Table 7) places both cadmium and chromium VI 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 this pollutant due to the small data set.

Ohio EPA risk assessment (Table 7) places copper into group 4. The placement of this parameter as well as the data presented in Tables 1 and 2 supports that this parameter does 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).

Ohio EPA risk assessment (Table 7) places mercury, dissolved solids, nitrate + nitrite, and oil & grease into group 3. The placement of these parameters as well as the data presented in Tables 1 and 2 supports that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. Monitoring is proposed to continue for dissolved solids, and nitrate + nitrite to document that these pollutants continue to remain at low levels.

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

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

Whole Effluent Toxicity Reasonable Potential WET values are compared to a calculated allowable effluent toxicity “AET” value. This comparison along with an assessment of the instream community is two ways in which whole effluent toxicity is evaluated. For the Licking County Buckeye Lake WWTP, the chronic AET is 1.71 TU_c and acute AET is 0.4 TU_a.

The available effluent toxicity results for this discharger showed no acute toxicity, nor are there any chemistry results available to suggest acute toxicity. Because the Ohio Water Resource Inventory lists nutrients and habitat modifications as the only stressors to this stream segment, we are classifying the Buckeye Lake WWTP as a Category 4 toxicity hazard, and monitoring of toxicity is not being proposed.

Other Requirements

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 Buckeye Lake WWTP to have a Class III wastewater treatment plant operator in technical 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 represents 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 treatment works.

To verify whether an operator of record is current on file with the Ohio EPA Division of Surface Water, please visit the following website:

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

Within 60 days of the effective date of this permit, the permittee shall notify the Director of Ohio EPA of the operators of record on a form acceptable to Ohio EPA. The form is located:

http://www.epa.ohio.gov/portals/28/Documents/opcert/Operator_of_Record_Notification_Form.pdf

Storm Water Compliance Under the provisions of the NPDES Phase II Storm Water Program Final Rule, Publically Owned Treatment Works (POTW's) with a design flow greater than 1.0 mgd or are required to have a pretreatment program that discharges storm water directly to state surface waters (not to the POTW) were required to apply for industrial storm water discharge permit by March 10, 2003. Since Licking Co. Buckeye Lake WWTP submitted a No Exposure Certification their draft will not need Parts IV, V, and VI of the storm water language.

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

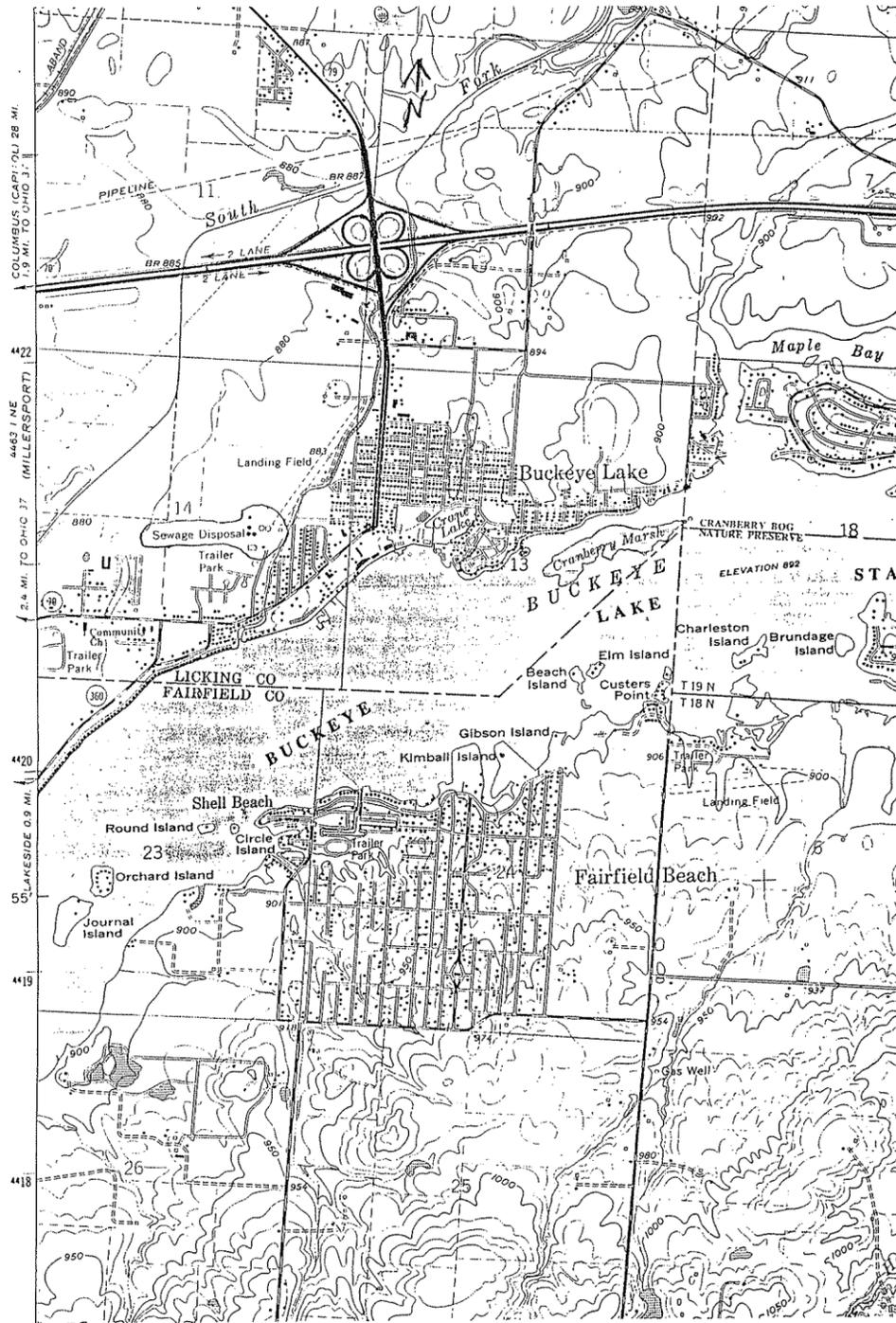


Figure 1. Approximate location of the Buckeye Lake WWTP

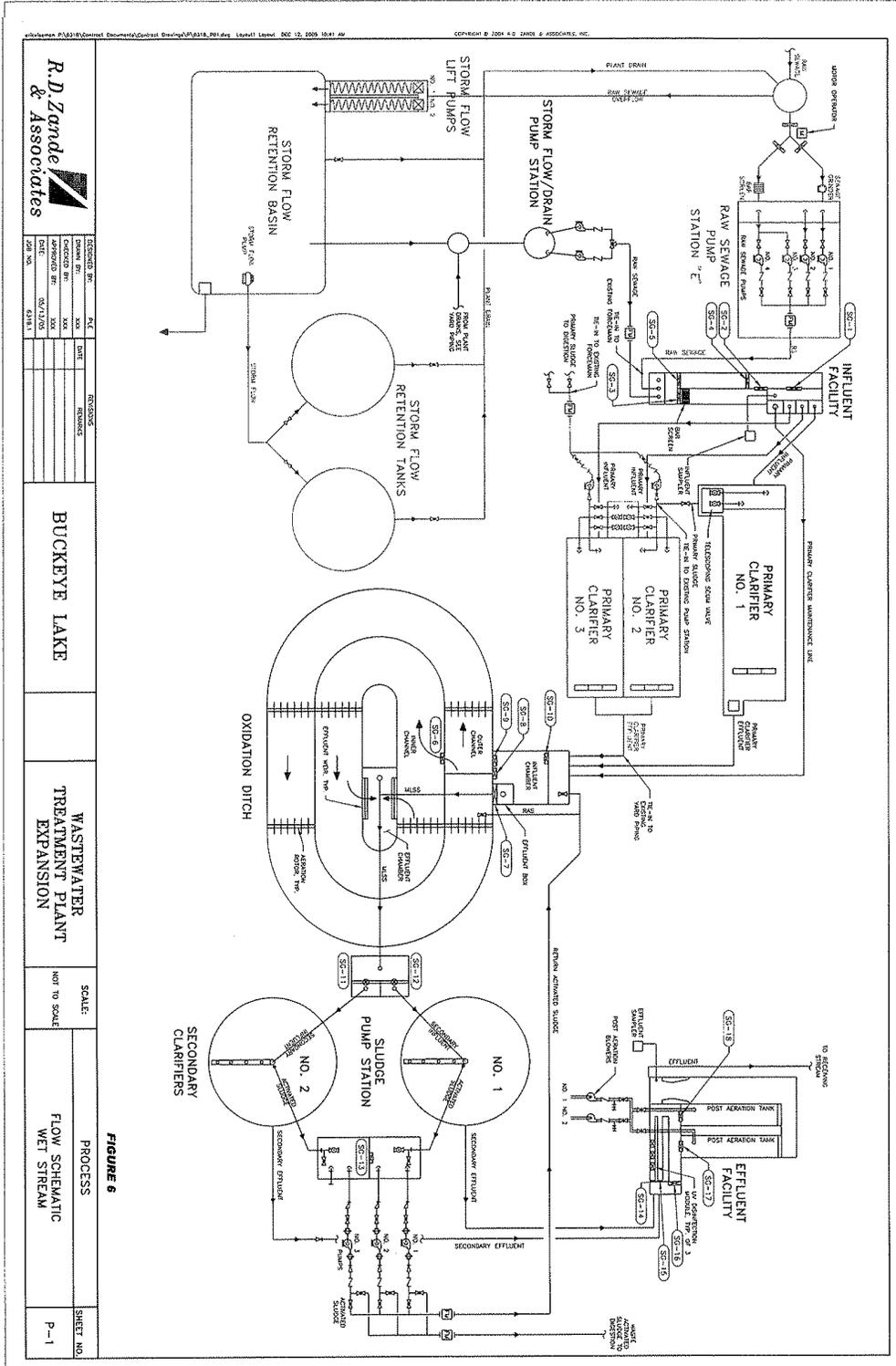


Figure 2. Wastewater Treatment Schematic for Buckeye Lake WWTP

Table 1. Effluent Characterization Using Ohio EPA Data

Summary of analytical results for the Licking Co. Buckeye Lake WWTP outfall 4PJ00000001. OEPA = data from analyses by Ohio EPA; ND = below detection (detection limit); NA = not analyzed. Decision Criteria: PEQ_{avg} = monthly averages; PEQ_{max} = daily maximum analytical results.

PARAMETER	Ohio EPA September 14, 2010	Ohio EPA March 23, 2011	DECISION CRITERIA	
			PEQ _{avg}	PEQ _{max}
Total Dissolved Solids (mg/l)	1000	672	2774	3800
Arsenic (ug/l)	6.1	3.8	16.9	23.18
Copper (ug/l)	7.2	5.2	19.9	27.36
Nickel (ug/l)	2.7	2.3	7.48	10.26
Barium (ug/l)	57	81	224.7	307.8
Calcium (mg/l)	61	81	224.7	307.8
Hardness, Total (mg/l)	247	305	846.1	1159
Magnesium (mg/l)	23	25	69.35	95
Manganese (ug/l)	11	--	49.7	68.2
Potassium (mg/l)	13	6	36.1	49.4
Sodium (mg/l)	227	127	629.7	862.6
Strontium (ug/l)	2530	1340	7018.2	9614
Zinc (ug/l)	20	20	55.48	76
Alkalinity (mg/l)	184	205	568.7	779
COD (mg/l)	23	--	104.1	142.6
Chloride (mg/l)	273	172	757.3	1037.4
Conductivity (umhos/cm)	1700	1190	4716	6460
Nitrate + Nitrite (mg/l)	35	16.4	97.1	133
TKN (mg/l)	1.25	0.80	3.47	4.75
Total Phosphorus (mg/l)	3.82	1.26	10.6	14.5
Phenol (ug/l)	2.6	--	11.7	16.1

Table 2. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered monthly operating report (MOR) data for Buckeye Lake WWTP outfall 4PJ00000001. All values are based on annual records unless otherwise indicated. N = Number of Analyses. * = For pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; A = 7 day average. Decision Criteria: PEQ_{avg} = monthly average; PEQ_{max} = daily maximum analytical results.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range	Decision Criteria		
			30 day	Daily ¹		50 th	95 th		# Obs.	PEQ _{ave}	PEQ _{max}
Outfall 001											
Water Temperature	Annual	C			1278	15.9	24.1	4.1-33.6			
Dissolved Oxygen	Summer	mg/l	6.0 min		705	8.5	9.7	7.5-10.9	488	8.4614	8.955
Dissolved Oxygen	Winter	mg/l			573	10.9	12.2	8.4-12.7	270	11.688	12.686
Residue, Total Dissolved	Annual	mg/l			42	783	998	523-1060	42	925.23	1065.4
Total Suspended Solids	Annual	mg/l	12	18	509	3	10	0-20	509	5.4968	10.321
Oil and Grease, Hexane Extr Method	Annual	mg/l	10 max		84	0	5.69	0-13.3	83	4.862	5.9587
Nitrogen, Ammonia (NH3)	Summer	mg/l	1.0	1.5	277	0.0613	0.18	0-0.629	193	0.10921	0.19896
Nitrogen, Ammonia (NH3)	Winter	mg/l	3.0	4.5	228	0.04	0.09	0-0.429	108	0.052898	0.099466
Nitrite Plus Nitrate, Total	Annual	mg/l			17	20.8	28.6	8.5-30.9	17	30.225	43.618
Phosphorus, Total (P)	Annual	mg/l			17	2.4	4.31	0.608-7.9	17	4.9643	8.1221
Nickel, Total Recoverable	Annual	ug/l			14	0	0	0-0	14	--	--
Zinc, Total Recoverable	Annual	ug/l			14	20	30.8	11.8-34	14	27.9	36.668
Cadmium, Total Recoverable	Annual	ug/l			14	0	7	0-20	14	21.9	30
Lead, Total Recoverable	Annual	ug/l			14	0	0	0-0	14	--	--
Chromium, Total Recoverable	Annual	ug/l			14	0	0	0-0	14	--	--
Copper, Total Recoverable	Annual	ug/l			42	0	16.9	0-25.3	42	18.276	24.547
Chromium, Dissolved Hexavalent	Annual	ug/l			42	0	0	0-17.3	42	13.89	19.03
Fecal Coliform	Annual	#/100 ml	1000	2000	276	50	270	0-520			

Flow Rate	Summer	MGD			705	0.803	2.03	0.203-7.12			
Flow Rate	Winter	MGD			573	1.05	2.75	0.375-3.82			
Flow Rate	Annual	MGD			1278	0.905	2.45	0.203-7.12			
Mercury, Total (Low Level)	Annual	ng/l			14	1.35	3.54	0-3.6	14	4.0028	7.1492
pH, Maximum	Annual	S.U.	9.0		1278	8.1	8.3	7.6-8.76			
pH, Minimum	Annual	S.U.	6.5		1278	8	8.2	7-8.3			
CBOD 5 day	Summer	mg/l	10	15	280	3	6	0-12	194	4.2892	7.3131
CBOD 5 day	Winter	mg/l	10	15	228	3.5	5	0-15	108	4.4777	6.577
Outfall 801											
Water Temperature	Annual	C			42	16.4	25.8	0-27.1			
Dissolved Oxygen	Summer	mg/l			23	7.82	9.49	5.9-10.2	16	8.7234	9.9712
Dissolved Oxygen	Winter	mg/l			19	12.3	13.8	8.3-14.9	9	19.58	26.82
pH	Annual	S.U.			42	7.97	8.4	7.2-8.8			
Nitrogen, Ammonia (NH3)	Summer	mg/l			23	0.083	0.161	0-0.739	16	0.12367	0.17541
Nitrogen, Ammonia (NH3)	Winter	mg/l			19	0.05	0.165	0-0.212	9	0.2102	0.288
Phosphorus, Total (P)	Annual	mg/l			42	0.323	1.1	0-2.23	42	1.2784	2.0791
Fecal Coliform	Annual	#/100 ml			23	1030	4130	157-4270			
Outfall 901											
Water Temperature	Annual	C			42	16.1	25.3	0-27.1			
Dissolved Oxygen	Summer	mg/l			23	6.9	8	5.5-8.3	16	7.538	8.591
Dissolved Oxygen	Winter	mg/l			19	12.1	13.9	8.9-14.1	9	18.53	25.38
pH	Annual	S.U.			42	7.9	8.29	7.2-8.4			
Nitrogen, Ammonia (NH3)	Summer	mg/l			23	0.101	0.248	0.042-0.749	16	0.16556	0.25166
Nitrogen, Ammonia (NH3)	Winter	mg/l			19	0.067	0.169	0-0.172	9	0.226	0.3096
Hardness, Total (CaCO3)	Annual	mg/l			42	227	288	1.19-302	42	656.89	1067.1
Fecal Coliform	Annual	#/100 ml			23	1530	4260	97-5300			

Table 3. Effluent Data for Buckeye Lake WWTP

Parameter	Units	Number of Samples	Number > MDL	PEQ Average	PEQ Maximum
Ammonia-S	mg/l	193	188	0.10921	0.19896
Ammonia-W	mg/l	108	83	0.052898	0.099466
Cadmium - TR	ug/l	14	1	21.9	30
Chromium - TR	ug/l	14	0	--	--
Chromium VI - Diss	ug/l	42	1	13.8919	19.03
Copper - TR	ug/l	42	5	18.276	24.547
Dissolved oxygen	mg/l	488	488	8.4614	8.955
Dissolved solids (ave)	mg/l	42	42	925.23	1065.4
Lead - TR	ug/l	14	0	--	--
Mercury - TR (BCC)	ng/l	14	13	4.0028	7.1492
Nickel - TR	ug/l	14	0	--	--
Nitrate-N + Nitrite-N	mg/l	17	17	30.225	43.618
Oil & grease	mg/l	83	7	4.862	5.9587
Phosphorus	mg/l	17	17	4.9643	8.1221
Zinc - TR	ug/l	14	14	27.9	36.668

Bioaccumulative Chemical of Concern (BCC)

Table 4. Water Quality Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum Aquatic Life	
		Human Health	Agri-culture	Aquatic Life		
Ammonia-S	mg/l	--	--	0.9	--	--
Ammonia-W	mg/l	--	--	3.3	--	--
Cadmium - TR	ug/l	--	50	5.6	15	29
Chromium - TR	ug/l	--	100	200	4200	8500
Chromium VI - Diss	ug/l	--	--	11	16	31
Copper - TR	ug/l	1300	500	23	37	75
Dissolved oxygen	mg/l	--	--	--	--	--
Dissolved solids (ave)	mg/l	--	--	1500	--	--
Lead - TR	ug/l	--	100	24	460	920
Mercury - TR (BCC)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	4600	200	130	1100	2300
Nitrate-N + Nitrite-N	mg/l	--	100	--	--	--
Oil & grease	mg/l	--	--	--	10	--
Phosphorus	mg/l	--	--	--	--	--
Zinc - TR	ug/l	69000	25000	290	290	580

Bioaccumulative Chemical of Concern (BCC)

Table 5. Instream Conditions and Discharger Flow

Parameter	Units	Season	Value	Basis
<i>Stream Flows</i>				
1Q10	cfs	annual	1.4	USGS gage #03145000
7Q10	cfs	annual	2.2	USGS gage #03145000
30Q10	cfs	summer	3.6	USGS gage #03145000
		winter	16	USGS gage #03145000
Harmonic Mean	cfs	annual	19.9	USGS gage #03145000
Mixing Assumption	%	average	100	
		maximum	100	
<i>Hardness</i>	mg/l	annual	284	4PJ00000901; June 2008 - November 2011
<i>pH</i>	S.U.	summer	8.025	901; 6/08-11/11, 75th percentile
		winter	8	901; 6/08-11/11, 75th percentile
<i>Temperature</i>	C	summer	24.4	901; 6/08-11/11, 75th percentile
		winter	2.5	901; 6/08-11/11, 75th percentile
<i>Buckeye Lake WWTP flow</i>	cfs	annual	3.094	2011 NPDES Permit Renewal
<i>Background Water Quality</i>				
Ammonia-S	mg/l		0.0815	eDMR; 2006-2011; n=20; 1<MDL; 801, 50th percentile
Ammonia-W	mg/l		0.061	eDMR; 2006-2011; n=15; 0<MDL; 801, 50th percentile
Cadmium - TR	ug/l		0.27	STORET; 2008-2009; n=5; 2<MDL; Station R14P05, mean
Chromium - TR	ug/l		2.9	STORET; 2008-2009; n=5; 4<MDL; Station R14P05, mean
Chromium VI - Diss	ug/l			No representative data available.
Copper - TR	ug/l		4.6	STORET; 2008-2009; n=5; 0<MDL; Station R14P05, mean
Dissolved oxygen	mg/l			No representative data available.
Dissolved solids (ave)	mg/l		753.6	STORET; 2008-2009; n=5; 0<MDL; Station R14P05, mean
Lead - TR	ug/l		0	STORET; 2008-2009; n=5; 5<MDL; Station R14P05, mean

Mercury - TR (BCC)	ng/l		0	STORET; 2008-2009; n=5; 5<MDL; Station R14P05, mean
Nickel - TR	ug/l		4.18	STORET; 2008-2009; n=5; 0<MDL; Station R14P05, mean
Nitrate-N + Nitrite-N	mg/l		4.98	STORET; 2008-2009; n=5; 0<MDL; Station R14P05, mean
Oil & grease	mg/l			No representative data available.
Phosphorus	mg/l		0.48	STORET; 2008-2009; n=5; 0<MDL; Station R14P05, mean
Zinc - TR	ug/l		0	STORET; 2008-2009; n=5; 5<MDL; Station R14P05, mean

Bioaccumulative Chemical of Concern (BCC)

Table 6. Summary of Effluent Limits to Maintain Applicable WQ Criteria

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum Aquatic Life	
		Human Health	Agri-culture	Aquatic Life		
Ammonia-S	mg/l	--	--	--	--	--
Ammonia-W	mg/l	--	--	--	--	--
Cadmium - TR	ug/l	--	370	9.4	22	29
Chromium - TR	ug/l	--	725	340	6099	8500
Chromium VI - Diss	ug/l	--	--	19	23	31
Copper - TR	ug/l	9632	3686	36	52	75
Dissolved oxygen	mg/l	--	--	--	--	--
Dissolved solids (ave)	mg/l	--	--	2031	--	--
Lead - TR	ug/l	--	743	41	668	920
Mercury - TR (BCC)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	34159	1459	219	1596	2300
Nitrate-N + Nitrite-N	mg/l	--	711	--	--	--
Oil & grease	mg/l	--	--	--	15	--
Phosphorus	mg/l	--	--	--	--	--
Zinc - TR	ug/l	512794	185795	496	421	580

Bioaccumulative Chemical of Concern (BCC)

Table 7. Parameter Assessment

<u>Group 1:</u>	Due to a lack of criteria, the following parameters could not be evaluated at this time.				
	<i>Dissolved Oxygen</i>		<i>Phosphorus</i>		
<u>Group 2:</u>	PEQ < 25 percent of WQS or all data below minimum detection limit. WLA not required. No limit recommended; monitoring optional.				
	<i>Chromium – TR</i>		<i>Lead - TR</i>		<i>Nickel - TR</i>
	<i>Zinc - TR</i>				
<u>Group 3:</u>	PEQ _{max} < 50 percent of maximum PEL and PEQ _{avg} < 50 percent of average PEL. No limit recommended; monitoring optional.				
	<i>Dissolved Solids (ave)</i>		<i>Mercury - TR (BCC)</i>		<i>Nitrate-N + Nitrite-N</i>
	<i>Oil & grease</i>				
<u>Group 4:</u>	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.				
	<i>Copper - TR</i>				
<u>Group 5:</u>	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.				
	<u>Limits to Protect Numeric Water Quality Criteria</u>				
					<u>Recommended Effluent Limits</u>
	<u>Parameter</u>	<u>Units</u>	<u>Period</u>	<u>Average</u>	<u>Maximum</u>
	Cadmium - TR	ug/l		9.4	22
	Chromium VI - Diss	ug/l		19	23

Table 8. Final effluent limits and monitoring requirements for Buckeye Lake WWTP outfall 4PJ00000 001 and the basis for their recommendation.

Parameter	Units	Effluent Limits				Basis ^b
		Concentration		Loading (kg/day) ^a		
		30 Day Average	Daily ¹ Maximum	30 Day Average	Daily ¹ Maximum	
Flow	MGD	-----Monitor-----				M ^c
Temperature	°C	-----Monitor-----				M ^c
Dissolved Oxygen	mg/L	6.0 min		--	--	PD, EP
Total Dissolved Solids	mg/L	-----Monitor-----				EP
Total Suspended Solids	mg/L	12	18	90.9	136.3	PD, EP
Oil & Grease, Hexane Ext Method	mg/L	10 max		--	--	WQS
Ammonia						
Summer	mg/L	1.0	1.5	7.57	11.4	PD, EP
Winter	mg/L	3.0	4.5	22.7	34.1	PD, EP
Nitrate-N + Nitrite-N	mg/L	-----Monitor-----				M ^c
Total Phosphorus	mg/L	-----Monitor-----				M ^c
Nickel – TR	ug/l	-----Monitor-----				M ^c
Zinc – TR	ug/l	-----Monitor-----				M ^c
Cadmium – TR	ug/l	-----Monitor-----				WLA
Lead – TR	ug/l	-----Monitor-----				M ^c
Chromium – TR	ug/l	-----Monitor-----				M ^c
Copper – TR	ug/l	-----Monitor-----				M ^c
Chromium VI Diss	ug/l	-----Monitor-----				WLA
E.coli	#/100ml	161	362	--	--	WQS
Mercury, low level	ng/l	-----Monitor-----				M ^c
pH	S.U.	-----6.5-9.0-----				WQS
CBOD ₅	mg/L	10	15	75.7	113.6	BADCT

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

^b Definitions: BADCT = Best Available Demonstrated Control Technology Currently Available, EP = Existing Permit, M = Monitoring; PD = Plant Design Criteria; WLA = Wasteload Allocation procedures (OAC 3745-2); WQS = Ohio Water Quality Standards (OAC 3745-1).

^c Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

^d 7 day average limit.