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 the Springfield Wastewater Treatment Plant
(Revised 2/14/13)

Public Notice No.: 12-10-047
Public Notice Date: October 30, 2012
Comment Period Ends: November 30, 2012

OEPA Permit No.: 1PE00007*OD
Application No.: OH0027481

Name and Address of Applicant:

City of Springfield
76 East High Street
Springfield, Ohio 45502

Name and Address of Facility Where Discharge Occurs:

Springfield Wastewater Treatment Plant
965 Dayton Avenue
Springfield, Ohio

Receiving Water: Mad River

Subsequent Stream Network: Great Miami River, Ohio River

Introduction

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

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

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

Ohio EPA reviews the need for water-quality-based limits on a pollutant-by-pollutant basis. Wasteload allocations are used to develop these limits based on the pollutants that have been detected in the discharge, and the receiving water's assimilative capacity. The assimilative capacity depends on the flow in the water receiving the discharge, and the concentration of the pollutant upstream. The greater the upstream flow, and the lower the upstream concentration, the greater the assimilative capacity is. Assimilative capacity may represent 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 effluent limits and monitoring requirements proposed for the following parameters are the same as in the current permit, although some monitoring frequencies have changed: flow, temperature, dissolved oxygen, $CBOD_5$, total suspended solids, ammonia-nitrogen, total phosphorus, nitrite+nitrate-nitrogen, total Kjeldahl nitrogen, oil and grease, pH, *E.* coli, total residual chlorine, free cyanide, cadmium, chromium, dissolved hexavalent chromium, copper, lead, nickel and zinc.

New limits are proposed for mercury and silver. Effluent data show that they have the reasonable potential to cause a violation of water quality standards. A two year interim monitoring period is proposed for silver. This will provide time for the City to take actions through its industrial pretreatment program to reduce the silver load coming to the treatment plant and come into compliance with the final limits.

New monitoring is proposed for total filterable residue (total dissolved solids) to obtain additional data for characterizing its concentration in the plant's effluent.

Annual chronic toxicity monitoring with the determination of acute endpoints is proposed for the life of the permit. This satisfies the minimum testing requirements of OAC 3754-33-07(B)(11) and will adequately characterize toxicity in the plant's effluent.

An 18-year implementation schedule is proposed for the City's combined sewer overflow (CSO) long-term control plan.

In Part II of the permit, special conditions are included that address implementing the nine minimum controls for CSOs; CSO monitoring and sampling; a CSO annual report; sanitary sewer overflow reporting; operator certification, minimum staffing and operator of record; whole effluent toxicity testing; 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 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 Joe Reynolds, Southwest District Office, (937) 285-6097, Joe.Reynolds@epa.ohio.gov , or Gary Stuhlfauth, Central Office, (614) 644-2026, Gary.Stuhlfauth@epa.ohio.gov .

Location of Discharge/Receiving Water Use Classification

The Springfield wastewater treatment plant discharges to the Mad River at River Mile (RM) 25.34. Figure 1 shows the approximate location of the facility.

This segment of the Mad River is described by Ohio EPA River Code: 14-100, U.S. EPA River Reach #: 05080001-002, County: Clark, Ecoregion: Eastern Corn Belt Plains. The Mad River is designated for the following uses under Ohio's Water Quality Standards (OAC 3745-1-21): Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Class A 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 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 Springfield wastewater treatment plant, which has an average design flow of 25 million gallons per day (MGD), is a trickling filter and complete-mixed activated sludge facility designed to provide preliminary, primary, secondary, and advanced secondary treatment. Wet stream processes include screening and grit removal, primary settling, trickling filters, activated sludge aeration, secondary clarification, disinfection by chlorination, dechlorination, and post aeration. Solid stream processes include sludge stabilization by anaerobic digestion, sludge storage, sludge dewatering using a belt filter press, and recycling of the processed sludge by land application at agronomic rates.

There are two bypasses at the wastewater plant. Station 066 is an influent bypass that discharges through horizontal screens to the Mad River. The City is constructing a high rate treatment system at this station that is scheduled for completion by January 1, 2016.

The other bypass, Station 067 is a secondary treatment bypass after primary settling that goes to the Mad River. From January 2008 through August 2012, there was a discharge from this station on three days.

The Springfield collection system consists of separate sanitary sewers (approximately 78 percent) and combined sewers (22 percent). The combined portion of the system includes 57 combined sewer overflows (CSOs). These overflows are included in the NPDES permit, and discharges through the overflow points are authorized

during wet weather when the capacity of the sewers is exceeded. A majority of the overflows are located in the Buck Creek drainage area. Overflows also are located in the Mill Run drainage area, to a tributary of Mill Creek, and to the Mad River and tributary ditches.

In 2004, Springfield submitted a CSO long term control plan (LTCP). The City and the Agency agreed to include a compliance schedule in the current NPDES permit for construction of two components of the 2004 LTCP: a high-rate treatment facility at the treatment plant for bypass station 066, and the Erie Express Sewer. Both projects are underway and are scheduled for completion in 2015 and 2016.

In a permit modification that became effective in April 2011, the Agency added a compliance schedule for the City to submit an addendum to its 2004 LTCP that includes:

- An update and recalibration of the City's SWMM model;
- Using the model for sizing and a cost-benefit analysis of the City's current plan;
- A No Feasible Alternatives Analysis (NFA) to reduce or eliminate bypasses at the treatment plant;
- An updated financial capability analysis and implementation schedule for the LTCP; and
- A post-construction monitoring plan.

The Agency received the addendum in March 2012, and the parties have continued negotiations towards an approvable LTCP. The draft permit proposes an 18-year implementation schedule for the long-term control plan. Fixed dates are proposed for the projects scheduled during the term of the renewal permit.

The City will submit its final NFA report while the NPDES permit renewal is on public notice. The Agency will review the NFA and anticipates adding a compliance schedule for projects identified in the report to the permit before it is issued final.

The City implements an Ohio EPA-approved industrial pretreatment program. Eight categorical industrial users and three significant noncategorical industrial users discharge to the treatment plant based on information in the City's NPDES renewal application.

Description of Existing Discharge

Table 1 presents chemical specific data compiled from data reported in annual pretreatment reports and data collected by Ohio EPA.

Table 2 presents a summary of unaltered Discharge Monitoring Report (DMR) data for outfall 1PE00007001. Data are presented for the period September 2007 through August 2012, and current permit limits are provided for comparison.

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

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

Table 5 summarizes discharges from bypass station 066 for the period January 2008 through August 2012.

Table 6 presents total CSO occurrences and volume for each CSO station for the period January 2008 through December 2011.

The City reports sanitary sewer overflow (SSO) occurrences under Station 300 in its NPDES permit. The City reported 11 SSOs in 2010, 19 in 2011 and 5 through August 2012. Based on information from the City, all SSOs are caused by blockages and are corrected when they are discovered.

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

Assessment of Impact on Receiving Waters

An assessment of the impact of a permitted point source on the immediate receiving waters includes an evaluation of the available chemical/physical, biological, and habitat data which have been collected by Ohio EPA pursuant to the Five-Year Basin Approach for Monitoring and NPDES Reissuance. Other data may be used provided it was collected in accordance with Ohio EPA methods and protocols as specified by the Ohio Water Quality Standards and Ohio EPA guidance documents. Other information which may be evaluated includes, but is not limited to: NPDES permittee self-monitoring data; effluent and mixing zone bioassays conducted by Ohio EPA, the permittee, or U.S. EPA.

In evaluating this data, Ohio EPA attempts to link environmental stresses and measured pollutant exposure to the health and diversity of biological communities. Stresses can include pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. Indicators of exposure to these stresses include whole effluent toxicity tests, fish tissue chemical data, and fish health biomarkers (for example, fish blood tests).

Use attainment is a term which describes the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing use attainment status for aquatic life uses primarily relies on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These criteria apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on measuring several characteristics of the fish and macroinvertebrate communities; these characteristics are combined into multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), which indicate the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Numerical criteria are broken down by ecoregion, use designation, and stream or river size. Ohio has five ecoregions defined by common topography, land use, potential vegetation and soil type.

Three attainment status results are possible at each sampling location -full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. Nonattainment means that either none of the applicable indices meet the biocriteria or one of the organism groups indicates poor or very poor performance. An aquatic life use attainment table (see Figure 2) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (i.e., full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI), and comments and observations for each sampling location.

A biological and water quality survey conducted in 2003 showed that the entire length of the Mad River mainstem was in full of partial attainment of its aquatic life use designations based on biological criteria. The monitoring also showed impairment for fish consumption and for Primary Contact Recreation. Figures 2 and 3 present the aquatic life use attainment tables and assessment unit summaries for Buck Creek and the Mad River from the *Biological and Water Quality Study of the Mad River Basin, 2003* (Ohio EPA; May 25, 2005). The complete report is available at this web site:
http://www.epa.ohio.gov/dsw/document_index/psdindx.aspx .

Ohio EPA conducted a TMDL study (total maximum daily loads) to address impairments that were identified during the 2003 survey. U.S. EPA approved the report, *Total Maximum Daily Loads for the Mad River Watershed, Final Report* (Ohio EPA, December 18, 2009), on January 26, 2010. The study calculated TMDLs for nitrate, sedimentation, fecal coliform, and habitat. Potential solutions include habitat improvement and

stream restoration, reduction of nutrients through agricultural best management practices and fixing and replacing failing home sewage treatment systems. The TMDL included fecal coliform wasteload allocations for Springfield's combined sewer overflows.

To achieve the necessary reductions, the TMDL recommended implementation of the City's long-term CSO control plan, which is underway. The study did not make any specific recommendations for the Springfield wastewater treatment plant. The complete TMDL report is available at this Ohio EPA web site: http://www.epa.ohio.gov/dsw/tmdl/MadRiverTMDL.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 the Springfield wastewater plant were used to determine what parameters should undergo wasteload allocation. The parameters discharged are identified by the data available to Ohio EPA - Discharge Monitoring Report (DMR) data submitted by the permittee, compliance sampling data collected by Ohio EPA, and any other data submitted by the permittee, such as priority pollutant scans required by the NPDES application or by pretreatment, or other special conditions in the NPDES permit. The sources of effluent data used in this evaluation are as follows:

Self-monitoring data (DMR)	September 2007 through August 2012
Pretreatment data	2006 - 2010
Ohio EPA compliance sampling data	2008, 2009

The data were examined, and the following values were removed from the evaluation to give a more reliable projection of effluent quality: total phosphorus (six values less than 1 mg/l).

This data is evaluated statistically, and Projected Effluent Quality (PEQ) values are calculated for each pollutant. Average PEQ (PEQ_{avg}) values represent the 95^{th} percentile of monthly average data, and maximum PEQ (PEQ_{max}) values represent the 95^{th} 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 10 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 8, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

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

The data used in the WLA are listed in Tables 7 and 8. The wasteload allocation results to maintain all applicable criteria are presented in Table 9. The current ammonia limits have been evaluated using the wasteload allocation procedures and are protective of water quality standards for ammonia toxicity.

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

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

The wasteload allocation calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Springfield, the wasteload allocation values are 1.0 TU_a and 4.07 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the IC_{25}:

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

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

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

The acute toxicity unit (TU_a) is defined as 100 divided by the LC_{50} for the most sensitive test species:

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

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

Reasonable Potential/ Effluent Limits/Hazard Management Decisions

After appropriate effluent limits are calculated, the reasonable potential of the discharger to violate the 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 9. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 3, and the PEL_{max} is compared to the PEQ_{max}. Based on the calculated percentage of the allocated value [($PEQ_{avg} \div PEL_{avg}$) 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 10.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Table 11 presents the final effluent limits and monitoring requirements proposed for Springfield outfall 1PE00007001 and the basis for their recommendation.

Based on best engineering judgment, it is proposed that the current limits for dissolved oxygen, total suspended solids, ammonia-nitrogen and 5-day carbonaceous biochemical oxygen demand ($CBOD_5$) be continued. These limits are all design criteria for the treatment plant and are protective of water quality standards.

Limits proposed for oil and grease, pH, and *Escherichia coli* are based on Water Quality Standards (OAC 3745-1-07). Class A Primary Contact Recreation *E. coli* standards apply to the Mad River. These are a continuation of existing permit limits.

The proposed limit for total residual chlorine is based on wasteload allocation as limited by the inside mixing zone maximum (IMZM). The IMZM is a value calculated to avoid rapidly lethal conditions in the effluent mixing zone. This is also a continuation of the existing permit limit.

A continuation of monitoring for total phosphorus, nitrite+nitrate-nitrogen and total Kjeldahl nitrogen is proposed based on best engineering judgment. In addition, monitoring for total phosphorus and nitrite+nitrate-nitrogen is proposed to continue at the upstream and downstream stations, 800, 801 and 900. The Springfield wastewater plant discharges to the Mad River, which is part of the Great Miami River basin. The purpose of the monitoring is to maintain a data base on nutrient loadings and ambient concentrations in the basin. This data will be available for future studies addressing nutrient-related water quality impairment.

The Ohio EPA risk assessment (Table 10) places mercury and silver in group 5. This placement as well as the data in Tables 2 and 3 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. For these parameters, the PEQ is greater than 100 percent of the wasteload allocation. Pollutants that meet this requirement must have permit limits under OAC Rule 3745-33-07(A)(1). The proposed limits are based on wasteload allocation.

A review of DMR data shows that prior to April 2009, silver in the plant's influent and effluent was generally reported as "below detection" with a method detection limit of 1.8 ug/l. Since April 2009, silver has been routinely detected in both the influent and effluent. The data show that the plant is currently not able to comply with the proposed monthly average limit of 5.3 ug/l and would have occasionally violated a daily maximum limit of 26 ng/l.

A two year interim monitoring period is proposed before the silver limits become effective. This will provide time for the City to take steps through its industrial pretreatment program to reduce the headwords loading of silver and come into compliance with the proposed limits. The proposed pretreatment compliance schedule includes an option for the City to develop and implement a silver reduction plan if its evaluation of a local limit shows that allocating the available load would be impracticable or ineffective in assuring compliance with the final limits.

Ohio EPA risk assessment (Table 10) places free cyanide, cadmium, total chromium, dissolved hexavalent chromium, copper, lead, nickel, zinc and total filterable residue (total dissolved solids) in groups 2 and 3. This placement as well as the data in Tables 1, 2 and 3 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 at a low frequency is proposed 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
Annual chronic toxicity monitoring with the determination of acute endpoints is proposed for the life of the permit. Evaluating the toxicity data presented in Table 4 and other pertinent data under the provisions of OAC 3745-33-07(B) placed the Springfield wastewater plant in Category 4 with respect to whole effluent toxicity. While this indicates that the plant's effluent does not currently pose a toxicity problem, annual toxicity testing is proposed consistent with the minimum monitoring requirements at OAC 3754-33-07(B)(11). The proposed monitoring will adequately characterize toxicity in the plant's effluent.

Other Requirements

Compliance Schedule – Pretreatment Program
A six month compliance schedule is proposed for the City to submit a technical justification for either revising its local industrial user limits or retaining its existing local limits. The schedule requires that the City consider loading from septage as part of the technical justification. This schedule also includes the option to develop and implement a silver reduction program. If revisions to local limits are required, the City must also submit a pretreatment program modification request.

The Agency is also proposing to add a section to the pretreatment schedule that addresses minimizing industrial user impacts on CSO discharges. The proposed language requires that the City work with its industrial users to establish cooperative agreements to minimize, to the extent practicable, pollutant loads that are discharged through the City's combined sewer overflows during wet weather. These actions are consistent with implementing the nine minimum control measures for CSOs, which are addressed in Part II, Item G of the draft permit.

A six month compliance schedule is proposed for the City to submit a pretreatment program modification request for implementing changes required by Ohio's pretreatment rules and U.S. EPA's pretreatment streamlining rule.

The compliance schedule related to implementing CSO controls was previously discussed.

CSO-Related Provisions
On its January DMR, the City is required to report the total occurrences and total volume for all of its CSOs during the previous calendar year.

A special condition in Part II of the permit requires the City to submit an annual report summarizing its CSO discharges and CSO control activities during the previous year.

Another special condition requires the City to monitor and sample at least five CSO stations on a rotating schedule and report the results as part of its annual CSO report.

All of these provisions are continued from the existing permit.

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

Storm Water Compliance
To comply with industrial storm water regulations, the permittee submitted a form for "No Exposure Certification" which was accepted on November 17, 2011. Compliance with the industrial storm water regulations must be re-affirmed every five years. No later than November 17, 2016, the permittee must submit a new form for "No Exposure Certification" or make other provisions to comply with the industrial storm water regulations.

Outfall Signage

Part II of the permit includes requirements for the permittee to place a sign at each outfall to the Mad River, Buck Creek, ditches and channels to Buck Creek and Mill Run providing information about the discharge. Signage at outfalls is required pursuant to Ohio Administrative Code 3745-33-08(A)

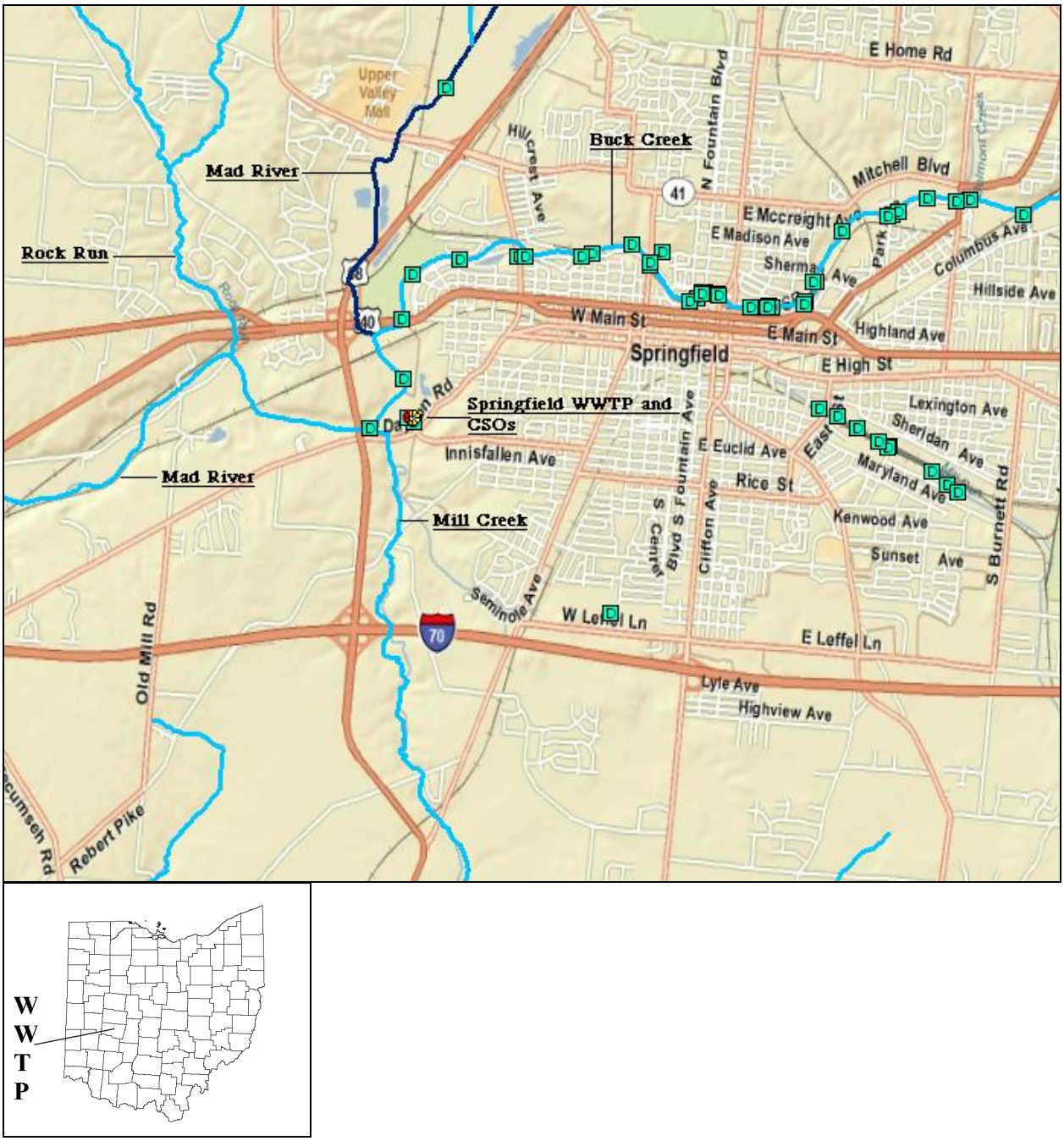

Figure 1. Location of Springfield wastewater treatment plant and combined sewer overflows.

Table 1. Effluent Characterization Using Ohio EPA and Pretreatment Data

Summary of analytical results for Springfield outfall 1PE00007001. 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).

PARAMETER	OEPA 04/14/09	OEPA 09/30/08	PT 11/04/10	PT 10/29/09	PT 11/15/07	PT 10/26/06
Arsenic	ND(2.0)	ND(2.0)	1.3	ND(1.0)	8.1	ND(1.0)
Barium	57	58	NA	NA	NA	NA
Chromium	2.5	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Copper	9.2	5.3	11	5	13	ND(2.0)
Dissolved solids, total (mg/l)	452	532	NA	NA	NA	NA
Iron	360	110	NA	NA	NA	NA
Lead	2.1	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Nickel	ND(2.0)	10.5	2.5	ND(0.2)	ND(0.2)	ND(0.2)
Nitrite+nitrate-N	8.41	9.9	NA	NA	NA	NA
Phosphorus, Total	2.08	2.73	NA	NA	NA	NA
Selenium	ND(2.0)	ND(2.0)	ND(1.0)	4.2	4.2	1.8
Strontium	182	243	NA	NA	NA	NA
Thallium	NA	NA	9	ND(2.0)	ND(2.0)	ND(2.0)
Zinc	40	32	52	55	32	16
Bis(2-ethylhexyl) - phthalate	ND(10.5)	ND(10.2)	4.7	1.3	3.6	3.8
Bromodichloromethane	ND(0.5)	1.82	1.1	1.4	ND(2.2)	ND(2.2)
Chloroform	ND(0.5)	5.09	2.6	2.3	1.1	1.7
Phenol	ND(2.1)	4.7	ND(1.5)	ND(1.5)	ND(1.5)	ND(1.5)

Table 2. Effluent Characterization Using Self-Monitoring Data

Summary of current permit limits and unaltered discharge monitoring report data for Springfield outfall 1PE00007001 (September 2007 – August 2012). All values are based on annual records unless otherwise indicated. * = For minimum pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; a = weekly average.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range
			30 day	Daily		50th	95th	
Water Temperature	Annual	C	Monitor		1796	18	25	9-30
Dissolved Oxygen	Summer	mg/l		5.0 min	920	6.6	6.0**	4.7-9.3
Dissolved Oxygen	Winter	mg/l		5.0 min	876	7.55	6.2**	4.6-10
Total Suspended Solids	Annual	mg/l			1215	9.5	27.6	1.5-48.2
			20	30[a]				
			30	45[a]				
Oil and Grease, Freon	Annual	mg/l		10	116	0	0	0-0
Nitrogen, Ammonia (NH3)	Summer	mg/l	3.0	4.5[a]	632	0.054	0.264	0-2.37
Nitrogen, Ammonia (NH3)	Winter	mg/l	10	15[a]	586	0.05	1.82	0-5.52
Nitrogen Kjeldahl, Total	Annual	mg/l	Monitor		64	1.38	3.83	0.199-8.77
Nitrite Plus Nitrate, Total	Annual	mg/l	Monitor		116	9.24	12.7	3.2-15.9
Phosphorus, Total (P)	Annual	mg/l	Monitor		93	2.35	3.14	0.11-3.4
Cyanide, Free	Annual	mg/l	Monitor		59	0	0.00115	0-0.016
Nickel, Total Recoverable	Annual	ug/l	Monitor		160	1.3	6	0-49
Silver, Total Recoverable	Annual	ug/l	Monitor		160	0	19.1	0-84
Zinc, Total Recoverable	Annual	ug/l	Monitor		160	47.5	140	0-316
Cadmium, Total Recoverable	Annual	ug/l	Monitor		160	0	0.621	0-6.64
Lead, Total Recoverable	Annual	ug/l	Monitor		160	1.35	5.42	0-8.6
Chromium, Total Recoverable	Annual	ug/l	Monitor		160	2	5	0-9
Copper, Total Recoverable	Annual	ug/l	Monitor		160	11.4	25.9	0-49
Chromium, Dissolved Hexavalent	Annual	ug/l	Monitor		61	0	7	0-10.1
Fecal Coliform	Annual	#/100 ml	--	--	339	95	591	9-7840
E. coli	Annual	#/100 ml	126	284[a]	150	46	491	4-1200
Flow Rate	Summer	MGD	Monitor		920	14.7	25.3	10.4-35
Flow Rate	Winter	MGD	Monitor		876	16.8	29.6	9.8-35.2
Flow Rate	Annual	MGD	Monitor		1796	15.4	27.7	9.8-35.2
Chlorine, Total Residual	Annual	mg/l		0.038	920	0.02	0.03	0-0.06
Mercury, Total (Low Level)	Annual	ng/l	Monitor		59	7.2	18.2	1-34
pH, Maximum	Annual	S.U.		9.0	1796	7.7	8.3	6.9-9
pH, Minimum	Annual	S.U.		6.5	1796	6.9*	7.7	6.5-8.2
CBOD 5 day	Summer	mg/l	15	23[a]	613	2	5	0-10
CBOD 5 day	Winter	mg/l	22	33[a]	560	4	14	0-41

Table 3. Projected Effluent Quality Values

Parameter	Units	Number of Samples	Number > MDL	PEQ Average	PEQ Maximum
Ammonia-S	mg/l	423	415	0.124	0.287
Ammonia-W	mg/l	276	251	0.329	0.73
Arsenic - TR	ug/l	6	2	12.4173	17.01
Barium - TR	ug/l	2	2	160.892	220.4
Bis(2-ethylhexyl)phthalate	ug/l	4	4	8.9206	12.22
Bromodichloromethane	ug/l	6	3	3.3726	4.62
Cadmium - TR	ug/l	160	62	0.66	0.89
Chlorine - TRes	mg/l	920	917	0.02628	0.036
Chloroform	ug/l	6	5	7.80297	10.689
Chromium - TR	ug/l	160	159	3.82	5.53
Chromium VI - Diss	ug/l	61	29	7.373	10.1
Copper - TR	ug/l	160	145	24	35.8
Cyanide - free	mg/l	59	3	0.01168	0.016
Dissolved solids (ave)	mg/l	2	2	1475.768	2021.6
Iron - TR	ug/l	2	2	998.64	1368
Lead - TR	ug/l	160	121	4.04	6.11
Mercury - TR	ng/l	59	59	15.2	23.4
Nickel - TR	ug/l	160	98	5.2	7.79
Nitrate-N + Nitrite-N	mg/l	116	116	11.8	14.6
Phenol	ug/l	6	1	7.2051	9.87
Selenium - TR	ug/l	6	3	6.4386	8.82
Silver - TR	ug/l	159	77	19.5	27.7
Strontium - TR	ug/l	2	2	674.082	923.4
Thallium - TR	ug/l	4	1	17.082	23.4
Zinc - TR	ug/l	160	145	150	228

Table 4. Summary of acute and chronic toxicity test results.

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]
05/11/07(E)	BD	BD	--	--
06/19/07(E)	BD	--	BD	--
07/26/07(E)	BD	BD	--	--
08/23/07(E)	BD	BD	BD	BD
09/14/07(E)	BD	BD	--	--
10/26/07(E)	BD	BD	--	--
11/14/07(E)	BD	BD	--	--
12/06/07(E)	BD	BD	BD	BD
02/08/08(E)	BD	BD	--	--
03/06/08(E)	BD	BD	BD	BD
04/11/08(E)	BD	BD	--	--
09/30/08(O)*	BD	BD	--	--
04/14/09(O)*	BD	BD	--	--

[a] O = EPA test; E = entity test
[b] TUa = acute toxicity units, TUc = chronic toxicity units
* = 48 hour screening test

Table 5. Bypass Station 066 Discharge Summary by Year

Year	Occur Total	Volume(MG) Total	TSS (mg/l) Avg.	$CBOD_5$ (mg/l) Avg.
2008	60	531.076	164	89
2009	56	143.748	183	85
2010	52	153.065	220	81
2011	70	576.796	190	80
2012*	30	110.514	224	111

* Through August

Table 6. Total CSO Occurrences and Volumes (MG) by Year

Station No.	2008 Occur	2008 Vol	2009 Occur	2009 Vol	2010 Occur	2010 Vol	2011 Occur	2011 Vol
002	20	0.415	14	0.425	10	0.351	4	0.07717
003	25	0.207	16	0.199	11	0.244	4	0.07663
004	38	4.487	32	3.568	34	3.508	30	2.0903
005	20	0.199	14	0.175	8	0.252	4	0.08329
006	61	4.601	60	3.798	60	3.685	48	2.10341
007	20	0.523	16	1.119	14	1.658	11	0.38703
008	13	1.047	11	1.765	6	1.919	4	0.93229
010	1	0.002	1	0.005	4	0.025	1	0.00001
011	17	0.077	9	0.152	9	0.397	7	0.07142
012	3	0.041	3	0.818	3	1.958	2	0.17751
013	6	0.237	8	0.495	5	1.401	3	0.29398
014	31	0.612	26	1.106	25	1.311	26	0.53695
015	2	0.001	3	0.052	3	0.258	2	0.00725
017	25	0.11	15	0.162	14	0.337	13	0.10944
018					1	0.00001		
019	46	4.031	43	5.276	40	5.949	37	2.75314
020	20	0.034	17	0.735	16	0.999	16	0.31296
021	17	0.501	14	0.418	8	1.501	13	0.29795
022	68	11.289	64	9.275	63	10.604	59	6.9263
023	20	0.151	11	0.289	10	0.674	8	0.16918
024	70	2.089	74	2.235	70	2.603	61	1.34122
025	70	4.275	73	4.683	70	5.636	61	2.60717
026	41	3.725	36	3.879	35	4.524	37	2.7569
027	45	1.855	39	1.849	38	1.994	39	1.30945
028	17	0.048	10	0.084	10	0.15	8	0.06056
029	41	5.475	38	7.767	32	6.9	32	6.36998
030	61	14.556	55	12.244	52	14.065	48	10.80024
031	66	4.39	60	3.703	60	3.781	54	2.91319
032	24	0.099	18	0.082	16	0.141	17	0.08113
033	20	0.251	16	0.21	14	0.437	16	0.21492
034	27	1.39	21	2.207	19	2.095	23	1.30107
035	42	4.768	43	5.98	40	5.281	39	4.53817
036	26	1.644	19	1.399	17	2.96	18	0.89826
037	57	1.247	61	1.375	53	1.165	48	1.01716
038	23	0.439	17	0.918	17	1.732	17	0.55198
039	44	27.042	48	32.594	43	28.407	41	22.90822
040	51	36.182	52	33.17	42	26.61	41	21.71196
041	50	52.256	51	52.203	42	48.636	38	35.03042
042	40	22.155	35	23.309	32	23.295	31	15.77828
043	52	20.297	52	18.858	43	15.749	41	12.10575
044	60	14.862	64	15.155	51	13.685	47	10.40974
045	20	0.502	15	0.85	15	1.029	18	0.66159
046	15	0.145	15	0.273	15	0.329	16	0.20584

Table 6 Total CSO Occurrences and Volumes (MG) by Year (Continued)

Station No.	2008 Occur	2008 Vol	2009 Occur	2009 Vol	2010 Occur	2010 Vol	2011 Occur	2011 Vol
047	43	4.288	37	4.523	34	4.418	31	3.19007
050	39	1.298	32	1.681	30	1.883	29	1.29968
053	44	14.88	40	15.936	37	15.749	34	11.21385
055	32	2.017	24	2.699	25	3.534	23	1.58621
056	45	23.756	42	23.523	38	21.507	34	15.5371
057	87	33.872	90	35.402	76	34.119	34	21.47436
059	38	7.664	26	6.461	28	5.719	22	3.17673
068	48	3.254	50	3.524	48	4.29	42	126.48079
069	37	0.899	30	1.205	27	1.126	30	0.80123
070	11	3.384	13	6.181	11	10.201	11	4.23059
082	24	2.288	15	2.329	10	3.014	5	1.09309
083		7.664		0.425	22	1.037	22	0.50888

Table 11 Aquatic life use attainment status of the Buck Creek watershed assessment unit, June- October, 2003. The Index of Biotic Integrity (IBI), Modified Index of Well Being (MIwb) and Invertebrate Community Index (ICI) scores are based on the performance of fish (IBI, MIwb) and macroinvertebrate (ICI) communities. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support biological communities.

Stream River Mile Invertebrate/Fish	Attainment Status	IBI	MIwb	ICI/ narrative	QHEI	Drainage Area
WAU: 5080001 170						
Buck Creek				*(PHWH candidate)*		
19.5/---	NA			P*		3.8
				CWH (verified)		
17.5/17.5	Full	54		VG	82.5	9.5
13.1/13.1	Full	46		48	73.5	30.5
				WWH		
6.4/6.4	Partial	44	8.7	24*	69.5	82
0.6/0.6	Full	46	9.4	52	60	141

Table 15 Aquatic life use attainment status of the Mad River from below Chapman Creek to above Mud Creek watershed assessment unit, June- October, 2003. The Index of Biotic Integrity (IBI), Modified Index of Well Being (MIwb) and Invertebrate Community Index (ICI) scores are based on the performance of fish (IBI, MIwb) and macroinvertebrate (ICI) communities. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support biological communities.

Stream River Mile Invertebrate/Fish	Attainment Status	IBI	MIwb	ICI/ narrative	QHEI	Drainage Area
WAU: 5080001 180						
Mad River				*CWH*		
29.6/29.6	Full	44		54	73.5	310
27.0/27.0	Full	46		G	79	323
				WWH		
25.5/25.8	Partial	35*	8.7	42	84.5	464
24.1/24.1	Full	38^{ns}	9	G	75	490

Figure 2. Aquatic life use attainment tables for Buck Creek and Mad River from the *Biological and Water Quality Study of the Mad River Basin, 2003* (Ohio EPA; May 25, 2005)

Table 22. Aquatic life use attainment status of the Mad River large river assessment unit (LRAU: 5080001 003), June- October, 2003. The Index of Biotic Integrity (IBI), Modified Index of Well Being (MIwb) and Invertebrate Community Index (ICI) scores are based on the performance of fish (IBI, MIwb) and macroinvertebrate (ICI) communities. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support biological communities.

Stream River Mile Invertebrate/Fish	Attainment Status	IBI	MIwb	ICI/ narrative	QHEI	Drainage Area
LRAU: 5080001 003						
Mad River			*WWH*			
17.5/17.5	Partial	34*	8.4[ns]	G	77.5	527
13.1/13.1	Full	41[ns]	9.2	G	83.5	554
11.5/11.5	Full	38[ns]	9	46	83	554
9.0/8.6	Full	40[ns]	9.2	G	81.5	617
6.0/6.0	Full	43	8.7	40	77.5	622
4.0/4.0	Full	52	10.1	42	76.5	642
1.6/1.6	Full	52	9.7	G	74	654
0.3/0.3	Full	50	9.5	G	61	657

Ecoregion Biocriteria: E. Corn Belt Plains (ECBP)

INDEX - Site Type	LRW	MWH channel modified	CWH	WWH	EWH
IBI Headwater - Wading/ Boat	18/18	24/24	40	40/ 42	50
MIwb Wading/ Boat	4.0/4.0	6.2/5.8	-/6.6	8.3/ 8.5	9.4/ 9.6
ICI	8	22	36	36	46

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
ns Nonsignificant departure from biocriterion (<4 IBI or ICI units; <0.5 MIwb units).
a Narrative evaluation used in lieu of ICI (E=Exceptional; G=Good; MG=Marginally Good; F=Fair; P=Poor).
b Use attainment status based on one organism group is parenthetically expressed.
N/A Not Applicable. The MIwb is not applicable to headwater sites.

Figure 2 (Continued). Aquatic life use attainment tables for Buck Creek and Mad River from the *Biological and Water Quality Study of the Mad River Basin, 2003* (Ohio EPA; May 25, 2005)

Table 1 Summary of Mad River assessment unit scoring. The assessment unit score is an average grade of aquatic life use status. An assessment unit score of 80 is used as the benchmark above which a watershed in considered to be in good condition relative to aquatic life uses. A maximum assessment unit score of 100 is possible if all monitored sites meet designated aquatic life uses. The method of calculation is presented in the 2002 Integrated Water Quality Monitoring and Assessment Report (www.epa.state.oh.us/dsw/tmdl/2002IntReport/2002OhioIntegratedReport.html). The comments provided include principal causes and sources of impact on aquatic life and recreational uses and significant contaminants in sediment and fish tissue.

Buck Creek WAU# (5080001 170)	**Aquatic Life Attainment Status**							**Assessment Unit Score**
	Total	**Full**		**Partial**		**NON**		
		#	%	#	%	#	%	
Sites < 50mi^2 drainage area	10	10	100	-	-	-	-	**79.6**
Miles of assessed streams with > 50mi^2 and < 500mi^2 drainage area	8.8	5.2	59.1	3.6	40.9	-	-	

Comments

The aquatic life uses in a significant portion of streams within the Buck Creek watershed had not been verified with biological sampling prior to 2003. A Coldwater Habitat (CWH) use is recommended for the principle streams in the watershed upstream from C.J. Brown Reservoir: Buck Creek upstream from C.J. Brown reservoir, East Fork Buck Creek, and Dugan Ditch. The Warmwater Habitat use is recommended for the entirety of Beaver Creek and Sinking Creek.

The only portion of the Buck Creek assessment unit where the designated aquatic life use was not met was downstream from C.J. Brown Reservoir. Buck Creek partially attained the WWH aquatic life use at RM 6.4, a short distance downstream from the lake outlet (RM 7.1). The site was typical of stream reaches below similarly constructed reservoirs in Ohio. The stream was channelized and water released from the lake likely carried with it an abundance of fine organic material. Ammonia levels were elevated but did not exceed water quality standards. The estimated extent of the partially attaining reach was 3.6 miles beginning immediately downstream from the lake outlet.

Based on the three sites sampled for bacteria (fecal coliform and *E. coli*), the PCR use designation was not attained in the Buck Creek assessment unit Elevated concentrations occurred primarily on two of the five sampling dates (September 3 and 22) after significant rainfall in the basin. Some of the highest concentrations of the entire survey occurred on September 22 in Buck Creek at RM 0.60 downstream from Springfield's numerous CSOs.

Chemical constituents in the water column and sediment were not directly implicated in impacts on aquatic life uses. Nevertheless, ammonia-N concentrations in Sinking Creek downstream from the Brookside Village MHP were consistently elevated above the 90th percentile of background levels for the Eastern Corn Belt Plain ecoregion. Elevated stream nitrate levels upstream from C.J. Brown Reservoir were attributed to the interaction between groundwater and surface water.

Sediment ammonia, manganese and zinc values downstream from C.J. Brown Reservoir (RM 6.5) were elevated. Polycyclic aromatic hydrocarbon compounds (PAHs) and Chlordane concentrations in the sediment at RM 0.6 were above levels that could predictably impact on aquatic communities. Dieldrin, PCB-1254 , sediment ammonia and lead values were also elevated. The contaminants at RM 0.6 reflected the urbanized nature of the lower watershed.

Figure 3. Assessment unit summaries for Buck Creek and Mad River from the *Biological and Water Quality Study of the Mad River Basin, 2003* (Ohio EPA; May 25, 2005)

Mad River from below Chapman Cr to above Mud Creek (excluding Buck Cr) (RM 32.6 to RM 10.4); excluding mainstem >500mi^2 WAU# 5080001 180	Aquatic Life Attainment Status							Assessment Unit Score
	Total	Full		Partial		NON		
		#	%	#	%	#	%	
Sites < 50mi^2 drainage area	17	12	70.6	4	23.5	1	5.8	
Miles of assessed streams with > 50mi^2 and < 500mi^2 drainage area	14.2	10.3	72.5	3.9	27.5	-	-	66.5

Comments

This assessment unit includes Mad River tributaries streams between Chapman Creek and Mud Creek (except for Buck Creek) and the Mad River mainstem reach from RM 32.6 to RM 24.0 at which point the drainage area exceeds 500mi^2. Biological and habitat assessments were conducted at 21 sites. Seventeen locations were on tributaries to the Mad River with drainage areas of 2.6 mi^2 to 25.6 mi^2. The remaining four sites were on the Mad River.

The first sampled location downstream from Buck Creek (RM 25.8) only partially met ecoregional expectations with an IBI score in the fair range. One factor that tended to depress the IBI scoring on the mainstem was an abundance of white suckers. Their presence likely was a continuation of the community structure that typified the CWH portion of the Mad River. There did not appear to be any obvious impact due to inputs from Buck Creek or the surrounding urban area. It is noteworthy however, that this site is apparently subject to variations in water quality due to urban runoff as evidenced by a 10°C difference in temperature recorded with 24-hr monitoring equipment between July 22-24 in the Mad River at RM 25.57 following a rain event.

All the sampled tributary streams in the assessment unit are designated or recommended for the WWH aquatic life use. Twelve sites were in full attainment of the WWH use. Four sites supported biological communities that partially attained ecoregional expectations. Nonattainment was documented at one tributary sampling location. On the mainstem, 10.3 miles of full attainment and 3.9 miles of partial attainment were documented for the reach prior to the 500mi^2 drainage area delineation. The WAU overall attainment score was 66.5.

Moore Run at RM 4.1 was the only site in the assessment unit with both impacted fish and macroinvertebrate communities that resulted in nonattainment of the WWH use. The site was in a severely habitat limited reach (QHEI = 28.5). Biological condition progressively improved at the two additional downstream sampling locations on Moore Run. Both sites had moderately improved habitat and additional flow volume. The site at RM 2.5 had a silty muck substrate and thick growths of aquatic macrophytes. EPA personnel noted a petroleum odor and an oily sheen on the water surface. The fish community marginally met ecoregional expectations but the macroinvertebrate community was in only fair condition. Low dissolved oxygen readings and significant sediment contamination were documented in this reach of Moore Run. Stormwater and process discharges at the International Truck and Engine facility upstream are possible pollutant sources at this site. Permit adequacy and compliance should be investigated along with a review of operational procedures at the facility to limit water quality impacts.

The PCR use designation was not attained. Median bacteria concentrations were generally higher in the four tributaries sampled when compared to the three mainstem sites with the highest medians measured in Donnels Creek (RM 3.70) and Jackson Creek (RM 0.90).

Figure 3 (Continued). Assessment unit summaries for Buck Creek and Mad River from the *Biological and Water Quality Study of the Mad River Basin, 2003* (Ohio EPA; May 25, 2005)

Mad River Mainstem (mainstem exceeding 500mi^2 drainage area) Downstream Donnels Creek (RM18.4) to mouth LRAU# (5080001 003)	Aquatic Life Attainment Status							Assessment Unit Score
	Total	Full		Partial		NON		
		#	%	#	%	#	%	
Assessed Miles with > 500 mi^2 drainage area	18.4	15.4	83.7	3.0	16.4	-	-	**83.7**

Comments

A 3.0 mile reach of partial attainment of the WWH aquatic life use appeared to be a lingering condition whereby the fish community maintained characteristics of a headwater fauna (brook fauna) even though the stream, based on watershed area, is much larger. A limited diversity of sunfish species and an abundance of white suckers depressed the IBI scores at the four sites between RM 17.5 and 9.0. The IBI score at RM 17.5 was below ecoregional expectations. Additionally, marginally attaining IBI scores resulted at the three subsequent sites as remnant headwater community characteristics persisted. This situation was likely a result of the extensive past channel alteration of the river upstream from Buck Creek. The channelization has increased the contribution of groundwater in the stream. Short time of travel (approx 10 hrs Springfield to the mouth) also extended the reach where the headwater characteristics were evident. Water chemistry was generally very good. Given the exceptionally elevated flows experienced during the survey, bacteria concentrations, however, were frequently elevated and the PCR use designation was not attained.

Figure 3 (Continued). Assessment unit summaries for Buck Creek and Mad River from the *Biological and Water Quality Study of the Mad River Basin, 2003* (Ohio EPA; May 25, 2005)

Table 7. Water Quality Criteria in the Study Area

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Outside Mixing Zone Criteria: Average: Agri-culture	Outside Mixing Zone Criteria: Average: Aquatic Life	Outside Mixing Zone Criteria: Maximum Aquatic Life	Inside Mixing Zone Maximum
Ammonia-S	mg/l	--	--	0.9	--	--
Ammonia-W	mg/l	--	--	2.8	--	--
Arsenic - TR	ug/l	--	100	150	340	680
Barium - TR	ug/l	--	--	220	2000	4000
Bis(2-ethylhexyl)phthalate	ug/l	59[c]	--	8.4	1100	2100
Bromodichloromethane	ug/l	460[c]	--	--	--	--
Cadmium - TR	ug/l	--	50	6.4	18	36
Chlorine - TRes	mg/l	--	--	0.011	0.019	0.038
Chloroform	ug/l	4700[c]	--	140	1300	2600
Chromium - TR	ug/l	--	100	230	4900	9800
Chromium VI - Diss	ug/l	--	--	11	16	31
Copper - TR	ug/l	1300	500	26	44	88
Cyanide - free	mg/l	220	--	0.012	0.046	0.092
Dissolved solids (ave)	mg/l	--	--	1500	--	--
Iron - TR	ug/l	--	5000	--	--	--
Lead - TR	ug/l	--	100	30	580	1200
Mercury - TR	ng/l	12	10000	910	1700	3400
Molybdenum - TR	ug/l	--	--	20000	190000	370000
Nickel - TR	ug/l	4600	200	150	1300	2600
Nitrate-N + Nitrite-N	mg/l	--	100	--	--	--
Phenol	ug/l	4600000	--	400	4700	9400
Selenium - TR	ug/l	11000	50	5	--	--
Silver – TR	ug/l	--	--	1.3	13	26
Strontium – TR	ug/l	--	--	21000	40000	81000
Thallium - TR	ug/l	6.3	--	17	79	160
Zinc - TR	ug/l	69000	25000	340	340	670

c = Carcinogen

Table 8. Instream Conditions and Discharger Flow

Parameter	Units	Season	Value	Basis
Stream Flows				
1Q10	cfs	annual	115	USGS 03267900
7Q10	cfs	annual	119	USGS 03267900
30Q10	cfs	summer	132	USGS 03267900
		winter	157	USGS 03267900
Harmonic Mean	cfs	annual	265	USGS 03267900
Mixing Assumption	%	average	100	
	%	maximum	100	
Hardness	mg/l	annual	338	DMR, Station 900, n=59, 2006-11
pH	S.U.	summer	8.2	DMR, Station 900, n=20, 2006-11
		winter	8.1	DMR, Station 900, n=14, 2006-11
Temperature	C	summer	20	DMR, Station 900, n=20, 2006-11
		winter	6.75	DMR, Station 900, n=14, 2006-11
Springfield WWTP flow	cfs	annual	38.7	2A NPDES renewal application
Background Water Quality				
Ammonia-S	mg/l		0.0135	DMR; 2006-11; n=20; 6<MDL; Station 800
Ammonia-W	mg/l		0.0085	DMR; 2006-11; n=14; 4<MDL; Station 800
Arsenic - TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Barium	ug/l		112	STORET; 2003; Stations H03W23, H04S05, H04W09
Bis(2-ethylhexyl)phthalate	ug/l		0	No representative data available.
Bromodichloromethane	ug/l		0	No representative data available.
Cadmium - TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Chlorine - TRes	mg/l		0	No representative data available.
Chloroform	ug/l		0	No representative data available.
Chromium - TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Chromium VI - Diss	ug/l		0	No representative data available.
Copper – TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Cyanide - free	mg/l		0	No representative data available.
Dissolved solids (ave)	mg/l		432	STORET; 2003; Stations H03W23, H04S05, H04W09
Iron - TR	ug/l		290	STORET; 2003; Stations H03W23, H04S05, H04W09
Lead - TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Mercury - TR	ng/l		0	No representative data available.
Molybdenum - TR	ug/l		0	No representative data available.
Nickel - TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Nitrate-N + Nitrite-N	mg/l		3.6	STORET; 2003; Stations H03W23, H04S05, H04W09
Phenol	ug/l		0	No representative data available.
Selenium - TR	ug/l		0	STORET; 2003; Stations H03W23, H04S05, H04W09
Silver – TR	ug/l		0	No representative data available.
Strontium – TR	ug/l		652	STORET; 2003; Stations H03W23, H04S05, H04W09
Thallium - TR	ug/l		0	No representative data available.
Zinc – TR	ug/l		5	STORET; 2003; Stations H03W23, H04S05, H04W09

Table 9. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

		Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum	
Parameter	Units	Human Health	Agri-culture	Aquatic Life	Aquatic Life	
Ammonia-S	mg/l	--	--	3.9	--	--
Ammonia-W	mg/l	--	--	14.1	--	--
Arsenic - TR	ug/l	--	785	611	1350	680
Barium - TR	ug/l	--	--	552	7610	4000
Bis(2-ethylhexyl)phthalate	ug/l	463	--	34	4369	2100
Bromodichloromethane	ug/l	3610	--	--	--	--
Cadmium - TR	ug/l	--	392	26	71	36
Chlorine - TRes	mg/l	--	--	0.045	0.075	0.038
Chloroform	ug/l	36883	--	570	5163	2600
Chromium - TR	ug/l	--	785	937	19461	9800
Chromium VI - Diss	ug/l	--	--	45	64	31
Copper - TR	ug/l	10202	3924	106	175	88
Cyanide - free	mg/l	1726	--	0.049	0.18	0.092
Dissolved solids (ave)	mg/l	--	--	4784	--	--
Iron - TR	ug/l	--	37252	--	--	--
Lead - TR	ug/l	--	785	122	2304	1200
Mercury - TR (BCC)	ng/l	12	10000	910	1700	3400
Molybdenum - TR	ug/l	--	--	81499	754599	370000
Nickel - TR	ug/l	36099	1570	611	5163	2600
Nitrate-N + Nitrite-N	mg/l	--	760	--	--	--
Phenol	ug/l	36098708	--	1630	18666	9400
Selenium - TR	ug/l	86323	392	20	--	--
Silver - TR	ug/l	--	--	5.3	52	26
Strontium - TR	ug/l	--	--	83569	156926	81000
Thallium - TR	ug/l	49	--	69	314	160
Zinc - TR	ug/l	541446	196154	1370	1335	670

Table 10. Parameter Assessment

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

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

Arsenic - TR	Bromodichloromethane	Cadmium - TR
Chloroform	Chromium - TR	Iron - TR
Lead - TR	Molybdenum - TR	Nickel - TR
Nitrate-N+Nitrite-N	Phenol	Strontium - TR

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

Barium - TR	Bis(2-ethylhexyl)phthalate	Chromium VI - Diss
Copper - TR	Cyanide - free	Dissolved solids (ave)
Selenium - TR	Thallium - TR	Zinc - TR

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

Chlorine - TRes

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

Limits to Protect Numeric Water Quality Criteria

			Recommended Effluent Limits	
Parameter	Units	Period	Average	Maximum
Mercury - TR	ng/l	Annual	12	1700
Silver - TR	ug/l	Annual	5.3	26

Table 11. Final Effluent Limits and Monitoring Requirements

		Effluent Limitations				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Basis[b]
Temperature	°C	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Dissolved Oxygen	mg/l	5.0 minimum		--	--	BEJ, PD, EP
Suspended Solids	mg/l					
Summer		20	30[c]	1900	2840[c]	BEJ, PD, EP
Winter		30	45[c]	2840	4260[c]	BEJ, PD, EP
Oil and Grease	mg/l	--	10	--	--	WQS, EP
Ammonia-N	mg/l					
Summer		3.0	4.5[c]	284	426[c]	BEJ, PD, EP
Winter		10	15[c]	947	1420[c]	BEJ, PD, EP
Total Kjeldahl-N	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Nitrite(N) + Nitrate(N)	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Phosphorus, Total	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Cyanide, Free	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Nickel, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Silver, T. R.	µg/l	5.3	26	0.502	2.47	WLA
Zinc, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Cadmium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Lead, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Chromium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Copper, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
Hex. Chromium (Dissolved)	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M, EP
E. coli						
Summer Only	#/100ml	126	284[c]	--	--	WQS, EP
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
Chlorine, Total Residual						
Summer	mg/l	--	0.038	--	--	WLA/IMZM, EP
Mercury, T.	ng/l	12	1700	0.00114	0.161	WLA
Whole Effluent Toxicity						
Acute	TUa	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
Chronic	TUc	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				WET
pH	S.U.	- - - - - - - - - - - 6.5 to 9.0 - - - - - - - - - - -				WQS, EP
Total Filterable Residue (Dissolved Solids)	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - -				M
$CBOD_5$	mg/l					
Summer		15	23[c]	1420	2180[c]	BEJ, PD, EP
Winter		22	33[c]	2090	3130[c]	BEJ, PD, EP

[a] Effluent loadings based on average design discharge flow of 25 MGD.

[b] Definitions: BEJ = Best Engineering Judgment; EP = Existing Permit; M = BEJ of Permit Guidance 1: Monitoring Frequency Requirements for Sanitary Discharges; PD = Plant Design Criteria; WET = Minimum testing requirements for whole effluent toxicity [OAC 3745-33-07(B)(11)]; WLA = Wasteload Allocation procedures (OAC 3745-2); WLA/IMZM = Wasteload Allocation limited by Inside Mixing Zone Maximum; WQS = Ohio Water Quality Standards (OAC 3745-1-07).

[c] Weekly average limit.