

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I – NEW ENGLAND
ONE CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023**

STATEMENT OF BASIS

MODIFICATION OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES Permit No.: **MA0102369**

Name and Address of Applicant:

**Upper Blackstone Water Pollution Abatement District
50 Route 20
Millbury, Massachusetts 01527**

Name and Address of Facility Where Discharge Occurs:

**Upper Blackstone Water Pollution Abatement District
50 Route 20
Millbury, Massachusetts 01527**

Receiving Water: **Blackstone River**

Classification: **B (Warm Water Fishery)**

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I. PROPOSED ACTION, TYPE OF FACILITY AND DISCHARGE LOCATION

This action is a proposed modification of the National Pollutant Discharge Elimination System (NPDES) permit issued to the Upper Blackstone Water Pollution Abatement District (UBWPAD) on August 22, 2008 (final permit) authorizing the discharge of treated wastewater from the UBWPAD's wastewater treatment plant. More specifically, the draft permit modification proposes to add a numeric effluent limitation and associated monitoring for aluminum to the conditions included in the final permit that went into effect on January 1, 2009.

The UBWPAD owns and operates an advanced wastewater treatment plant with an annual average design flow of 56 million gallons per day (MGD). The facility is engaged in the collection and treatment of domestic, commercial and industrial wastewater from the City of Worcester and portions of the Towns of Auburn, West Boylston, Holden, Rutland, Oxford and Millbury. More than 200 industrial facilities currently contribute flow to the WWTP. The collection system consists of both separate and combined sewers. There is one combined sewer overflow (CSO) discharge outfall, which is located in the City of Worcester and is within Worcester's jurisdiction. The UBWPAD accepts sludge from many communities, which is dewatered and incinerated in the multiple hearth incinerators. The District also accepts septage from many communities, which is stored in a septage holding facility and is then introduced into the headworks of the treatment facility. The treated wastewater (effluent) is discharged through outfall No. 001 to a discharge channel to the Blackstone River.

The UBWPAD is in the process of a major upgrade of the treatment facility. The upgrade is being completed in two phases, with a scheduled completion date of August 5, 2009. Among the benefits of the upgrade will be enhanced flow management capabilities. The preliminary and primary treatment facilities are being upgraded to accept a peak hourly flow of 160 MGD, thereby providing primary treatment to flows that currently are discharged with minimal treatment at the CSO facility in Worcester. The advanced treatment process is being designed to accept a peak hourly flow of 120 MGD and a maximum daily flow of 80 MGD. Discharges in excess of the advanced treatment process capacity will receive primary treatment and disinfection prior to being discharged through outfall 001A, which will be located adjacent to outfall 001.

II. LIMITS AND CONDITIONS

The draft permit modification proposes to add a numeric effluent limitation and associated monitoring requirement for aluminum to the conditions included in Part I.A.1.a. of the portion of the final permit that went into effect on January 1, 2009 (see page 4, footnote 2, of this statement of basis). All other conditions in the final permit, including effluent limitations and monitoring requirements, shall remain unchanged.

These changes are discussed in more detail in subsequent sections of this statement of basis and are shown in the draft permit modification.

A. Modification Basis

1. Background

On August 22, 2008, the United States Environmental Protection Agency (EPA) issued a National Pollutant Discharge Elimination System (NPDES) permit (final permit) authorizing the discharge of treated effluent from the Upper Blackstone Water Pollution Abatement District (UBWPAD) wastewater treatment plant to the Blackstone River. The final permit superseded the prior permit which had been issued to the facility on September 30, 1999 and was modified on December 19, 2001, pursuant to a settlement agreement.

Between September 15, 2008 and September 24, 2008, the UBWPAD, the City of Worcester, the Town of Millbury, the Town of Holden, the Cherry Valley Sewer District, MassDEP, the Northern Rhode Island Chapter 737 of Trout Unlimited, and the Conservation Law Foundation filed petitions for review with the EPA's Environmental Appeals Board (EAB) appealing certain conditions in the final permit.¹ Those appeals are currently pending before the EAB. The contested conditions of the final permit are stayed during pendency of the appeals and until final agency action under 40 CFR 124.19(f), while the uncontested conditions went into effect on January 1, 2009.² In this action, EPA is modifying that portion of the final permit that went into effect on January 1, 2009 to include an effluent limitation and associated monitoring requirement for aluminum.

In its petition for review of the final permit, Trout Unlimited contends that an effluent limitation for aluminum should have been established in the final permit due to the existence of effluent data which suggest that the concentrations of aluminum in the effluent are at levels known to be detrimental to the fish populations in the Blackstone River. (Note: The final permit included monitoring and reporting requirements for aluminum, but did not include a numeric effluent limitation.) Upon re-evaluating the available effluent data and other pertinent information in light of the petition filed by Trout Unlimited, EPA (the Region) concluded that there is reasonable potential for the discharge to cause or contribute to an excursion above the applicable state water quality standards, and that the incorporation of a numeric effluent limitation in the permit is warranted. In its response to the petition filed by Trout Unlimited, the Region stated that it intended to modify the permit to include an aluminum effluent limitation. Therefore, EPA is hereby proposing to modify the permit with respect to the addition of a chronic

¹ These petitions for review have been docketed as EAB appeal numbers NPDES 08-11 (in the case of the UBWPAD), NPDES 08-12 (in the case of MassDEP), NPDES 08-13 (in the case of the Conservation Law Foundation), NPDES 08-14 (in the case of the Northern RI Chapter 737 of Trout Unlimited), NPDES 08-15 (in the case of the Town of Holden), NPDES 08-16 (in the case of the Town of Millbury), NPDES 08-17 (in the case of the Cherry Valley Sewer District) and NPDES 08-18 (in the case of the City of Worcester).

² In accordance with the federal regulations found at 40 CFR §§ 124.16(a)(2)(i) and 124.16(a)(2)(ii), the filing of a petition for review stays the entire permit for the duration of proceedings before the EAB except to the extent that EPA issues a notice of uncontested and severable conditions. Such conditions become effective after 30 days notice. Pursuant to 40 CFR § 124.16 (a) and § 124.60(b), by letter dated November 26, 2008, EPA issued a notice identifying the following conditions as contested: (i) imposition of requirements of Parts D and E, (ii) seasonal (Nov. 1 – March 31) fecal coliform bacteria limits, (iii) ammonia-nitrogen limits, (iv) total nitrogen limits, (v) total phosphorus limits, (vi) total aluminum, lead and nickel monitoring and reporting requirements, (vii) total copper and cadmium limits, (viii) sampling protocol for fecal coliform bacteria limits when outfall 001A is active, and (ix) sampling schedule for whole effluent toxicity (see Notice of Uncontested and Severable Conditions of NPDES Permit No. MA0102369 (November 26, 2008)). The remaining conditions were determined to be uncontested and severable, and went into effect on January 1, 2009.

effluent limit for aluminum and an associated aluminum monitoring requirement, pursuant to 40 CFR §§ 124.19(d) and 124.6. The proposed limitation is presented in the draft permit modification and its derivation is described below.

B. Detailed Description of Modified Conditions

The following limitations and conditions are included in the draft permit modification:

1. Aluminum

The release of metals, including aluminum, into the environment, and in particular to surface waters, from anthropogenic activities such as discharges from municipal waste water treatment plants, can result in their accumulation to levels that are highly toxic to aquatic life. Therefore, it is imperative to evaluate the downstream effects of discharges of aluminum from wastewater treatment plants.

Water quality-based effluent limitations are imposed on dischargers when it is determined that limitations more stringent than technology-based limitations are necessary to achieve or maintain the water quality standards in the receiving water (40 CFR § 122.44(d)(1)). Such determinations are made when EPA finds that there is reasonable potential for the discharge to cause or contribute to an instream excursion above a water quality criterion contained within applicable state water quality standards (40 CFR § 122.44(d)(1)(i)).

In determining reasonable potential, EPA considers existing controls on point and nonpoint sources of pollution, pollutant concentration and variability in the effluent and receiving water as determined from the permittee's reissuance application, DMRs, state and federal water quality reports; and, where appropriate, the dilution of the effluent in the receiving water (see 40 CFR §122.44(d)(1)(ii)). If EPA concludes, after using the procedures found at 40 CFR § 122.44(d)(1)(ii), toxicity testing data, or other available information, that a discharge causes or has the reasonable potential to cause or contributes to an in-stream excursion above a numeric criterion within an applicable state water quality standard, effluent limitations must be included in NPDES discharge permits in order to ensure that water quality standards in the receiving water are met (40 CFR § 122.44(d)(1)(v)).

Receiving stream requirements are established by numerical and narrative water quality standards adopted under state law for each stream classification. Water quality-based limits are established in accordance with the requirements of 40 CFR §122.44(d). When developing permit limits based on numeric criteria within state water quality standards, both the acute and chronic criteria are used. These criteria are expressed in terms of maximum allowable instream pollutant concentrations. Maximum daily limits are generally derived from acute aquatic life criteria, and average monthly limits are generally derived from chronic aquatic life criteria.

The Blackstone River is an interstate water which has its headwaters in Worcester, Massachusetts. It flows south into Rhode Island where it discharges into the Seekonk River in Pawtucket. The Seekonk River, in turn, flows into the Providence River. The Providence River flows into Narragansett Bay. Because the Blackstone River is an interstate water, EPA considered the water quality standards of both Massachusetts and Rhode Island in determining the potential for the discharge to cause or contribute to a

violation of a state water quality standard in the receiving water. The Massachusetts Surface Water Quality Standards include requirements for the regulation and control of toxic constituents and also require that EPA-recommended criteria established pursuant to Section 304(a) of the CWA shall be used unless site-specific criteria are established (314 CMR § 4.05(5)(e)). Massachusetts has not adopted site-specific criteria for aluminum. Therefore, the freshwater criteria for aluminum found in the *National Recommended Water Quality Criteria: 2000* (US EPA 2000 [EPA-822-R-02-047]), which are an acute concentration of 750 µg/l and a chronic concentration of 87 µg/l, apply in Massachusetts. The acute and chronic freshwater aquatic life criteria for aluminum specified in the Rhode Island Water Quality Regulations are also 750 µg/l and 87 µg/l, respectively (Rhode Island Water Quality Regulations Rule 8., Appendix B).

The potential for discharges of aluminum from the UBWPAD's waste water treatment plant to cause or contribute to an excursion above water quality criteria was determined by projecting the concentration of the pollutant in the receiving water downstream from the discharge under critical (7Q10 flow) stream conditions using the results of metals analyses performed on samples of the effluent in conjunction with whole effluent toxicity (WET) tests conducted in June 2005, July 2005, October 2005, October 2006, July 2007, October 2007 and July 2008. Also considered in this evaluation were the results of metals analyses conducted on samples of the receiving water collected upstream of the discharge for use as dilution water for these WET tests (see **Appendix A** for effluent and ambient data. Note: Aluminum data from the July 2006 WET test were not available). The results of analyses conducted during these months were used in this evaluation because they are the months in which the receiving water typically experiences lower flows; therefore, the data are more representative of critical flow conditions. During periods of low flow, the flow in the river in the vicinity of the UBWPAD Waste Water Treatment Plant is dominated by the effluent discharged from the facility. Accounting for the 7Q10 flow in the receiving water at the point of discharge (4.4 MGD = 6.8 cfs) and the facility's 56 MGD (86.7 cfs) annual average design flow yields a dilution factor of 1.1 (see **Appendix B** for calculations). This lack of significant dilution makes the use of data that most closely represents critical flow conditions appropriate in making determinations related to assessing the affects of the discharge.

In establishing the background (ambient) aluminum concentrations that would be the most representative of critical flow conditions, flow data collected by the United States Geological Survey (USGS) flow gage No. 01112500, which is located in the Blackstone River at Woonsocket, RI, was reviewed. Using the DFLOW 3.1b flow analysis program, the 7Q10 flow in the Blackstone River at the gage for the period of record February 1929 – May 2008 was determined to be 87.5 cfs. Of the months in which the WET tests evaluated for the purposes of the draft permit modification were conducted, the lowest flows recorded by the gage occurred in July 2007 (186.1 cfs) and October 2007 (196.2) (USGS National Water Information System, <http://waterdata.usgs.gov>). The average of the results of aluminum analyses conducted on samples of the receiving water collected upstream from the discharge for use as dilution water in the July 2007 and October 2007 WET tests ($[183 \mu\text{g/l} + 35 \mu\text{g/l} / 2] = 109 \mu\text{g/l}$) was used as the background aluminum concentration to project the instream concentration immediately downstream of the discharge in order to yield results that best represent low-flow conditions in the receiving water (see **Appendix A**).

The results of the aluminum analyses conducted in conjunction with the June 2005, July 2005, October 2005, October 2006, July 2007, October 2007, and July 2008 WET tests indicate that the concentration

of aluminum in the discharge ranged from 45 µg/l to 344 µg/l (with the average concentration discharged being 127 µg/l) (see **Appendix A**).

The maximum concentration of aluminum detected in samples of the effluent ($C_d = 344 \mu\text{g/l}$), a background aluminum concentration of 109 µg/l ($C_s = 109 \mu\text{g/l}$), the design flow of the facility ($Q_d = 56 \text{ MGD} = 86.7 \text{ cfs}$), the 7Q10 flow of the receiving water at the point of discharge ($Q_s = 4.4 \text{ MGD} = 6.8 \text{ cfs}$), and the 7Q10 flow in the receiving water immediately downstream from the discharge ($Q_r = Q_d + Q_s = 93.5 \text{ cfs}$), were used to project the concentration of aluminum in the receiving water immediately downstream from the discharge using the equation show below.

$$Q_r C_r = Q_d C_d + Q_s C_s$$

Which can be rearranged as:

$$C_r = [(Q_s C_s) + (Q_d C_d)] / Q_r$$

Where:

C_r = Downstream concentration of aluminum

Q_s = Receiving water flow upstream from the discharge (4.4 MGD = 6.8 cfs)

C_s = Ambient concentration of aluminum (109 µg/l)

Q_d = Design flow of the facility (56 MGD = 86.7 cfs)

C_d = Concentration of aluminum in the discharge (344 µg/l)

Q_r = Receiving water flow downstream from the discharge ($Q_r = Q_d + Q_s = 93.5 \text{ cfs}$)

$$C_r = [(6.8 \text{ cfs} * 109 \mu\text{g/l}) + (86.7 \text{ cfs} * 344 \mu\text{g/l})] / 93.5 \text{ cfs} = 327 \mu\text{g/l}$$

This calculation was also performed using the average concentration of aluminum detected in the effluent ($C_d = 127 \mu\text{g/l}$). All other variables were held constant, as shown below.

$$C_r = [(6.8 \text{ cfs} * 109 \mu\text{g/l}) + (86.7 \text{ cfs} * 127 \mu\text{g/l})] / 93.5 \text{ cfs} = 126 \mu\text{g/l}$$

The elevated concentration of aluminum in the receiving water upstream from the discharge exceeds the chronic instream aluminum criterion of 87 µg/l contained in the Massachusetts water quality standards even before any additional inputs of aluminum from the UBWPAD wastewater treatment plant. This alone presents reasonable potential for the discharge of any aluminum from the facility to cause or contribute to an excursion of the criteria downstream. Further, the results of the metals analyses conducted on effluent samples in conjunction with WET tests conducted in June 2005, July 2005, October 2005, October 2006, July 2007, October 2007 and July 2008 show that the concentration of aluminum in the effluent exceeded the chronic criterion on all but two occasions (October 2007 and July 2008; see **Appendix A**). Therefore, there is reasonable potential for the discharge to cause or contribute to an excursion above the criteria in the downstream receiving water even if the ambient concentration were assumed to be zero.

The results of the above analyses, which account for ambient conditions, the minimal dilution afforded by the receiving water under critical flow conditions and the concentration of aluminum in the effluent, does in fact indicate that reasonable potential exists for the discharge to cause or contribute to excursions above the chronic criterion in the segment of the receiving water immediately downstream, which warrants the imposition of a chronic effluent limitation in the permit, in accordance with the requirements of 40 CFR 122.44(d)(i) and 40 CFR 122.44(d)(iii) .

On account of the exceedance of the chronic criterion for aluminum found in the Massachusetts water quality standards in the receiving water upstream from the discharge and the lack of significant dilution under 7Q10 conditions, the average monthly effluent limit proposed in the draft permit modification has been set at the chronic criterion of 87 µg/l found within the Massachusetts water quality standards to ensure that the discharge does not contribute to excursions above the criterion in the downstream receiving water (also see 314 CMR 4.05(5)(e)). The establishment of a monthly average limit for the protection of a chronic aquatic life criterion is consistent with the guidance found in the *U.S. EPA NPDES Permit Writers' Manual*, Chapter 6 (U.S. EPA, December 1996, [EPA-833-B-96-003]) and in the *Technical Support Document for Water Quality-based Toxics Control*, Chapter 5.4.1 (U.S. EPA, March 1991 [EPA/505/2-90-001]). The average monthly limit of 87 µg/l will also ensure adequate protection of the RI water quality standards further downstream, as the aluminum criteria found in the RI water quality standards are equivalent to those contained within the Massachusetts water quality standards (see Rhode Island Water Quality Regulations Rule 8., Appendix B).

The monitoring frequency proposed in the draft permit modification is once per week.

III. STATE CERTIFICATION REQUIREMENT

EPA may not issue a permit modification unless the State Water Pollution Control Agency with jurisdiction over the receiving waters certifies that the effluent limitations contained in the permit modification are stringent enough to assure that the discharge will not cause or contribute to a violation of state water quality standards in the receiving water or unless certification is waived. EPA has requested certification by the state pursuant to 40 C.F.R. § 124.53.

IV. COMMENT PERIOD AND PROCEDURES FOR FINAL DECISION

As part of the modification procedure, EPA will accept comments from the public on the proposed modification. The beginning and end dates for the public comment period are shown on page 1 of this statement of basis. Pursuant to 40 C.F.R § 122.62, only the conditions specifically proposed in the draft permit modification are subject to public comment. Comments on any other condition(s) of the permit will not be accepted.

All persons, including applicants, who believe any condition of the draft permit modification is inappropriate must raise all reasonably ascertainable issues and submit all reasonably available arguments and all supporting material for their arguments in full by the close of the public comment period to the EPA contacts listed below. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit modification to EPA. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least

thirty (30) days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit modification the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit modification decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

V. EPA CONTACTS

Additional information concerning the permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

David Pincumbe
U.S. Environmental Protection Agency
Office of Ecosystem Protection (CMP)
One Congress Street, Suite 1100
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Appendix A
Ambient Receiving Water and Effluent Aluminum Concentrations (2005-2008)

Date	Aluminum ¹ (µg/l)	Aluminum ² (µg/l)
	Effluent	Ambient
Existing Limits	Report	Report
June 2005	100	100
July 2005	80	170
October 2005	90	140
October 2006	100	100
July 2007	344	183
October 2007	45	35
July 2008	63	73
Min	45	35
Max	344	183
Avg.	127	114

¹Effluent data are from the results of metals analyses conducted on samples of the effluent in conjunction with whole effluent toxicity testing.

²Ambient data are from the results of analyses conducted on samples of the receiving water collected upstream from the discharge for use as dilution water in whole effluent toxicity tests.

Appendix B

7Q10 Flow and Dilution Factor Calculation

$$\text{Dilution Factor} = (Q_s + Q_e)/Q_e = (6.8 + 86.7)/86.7$$

Where:

Q_s = 7Q10 low flow in the Receiving Water (cfs)

Q_e = Design flow of the facility (cfs)

Receiving Water: Blackstone River

$$Q_s = (4.4 \text{ MGD} * 1.55) = 6.8 \text{ cfs}$$

Facility: UBWPAD Waste Water Treatment Plant

$$Q_e = (56 \text{ MGD} * 1.55) = 86.7 \text{ cfs}$$

$$\text{Dilution Factor} = (6.8 \text{ cfs} + 86.7 \text{ cfs})/86.7 \text{ cfs} = 1.1$$