

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

REVISED FACT SHEET

PARTIALLY REVISED DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NUMBER: **MA0102253**

NAME AND MAILING ADDRESS OF APPLICANT:

**Mr. Jeffrey J. Quick, Director
Massachusetts Department of Correction
Division of Resource Management
2 Clark Street
Norfolk, MA 02056**

NAME AND ADDRESS OF THE FACILITY WHERE DISCHARGE OCCURS:

**MCI – Norfolk Water Pollution Control Facility
10 Old Campbell Street
Norfolk, Massachusetts 02056**

RECEIVING WATER: **Stop River**

RECEIVING WATER CLASSIFICATION: **Class B (Warm Water Fishery)**

I. Proposed Action

In response to a timely application by the Massachusetts Department of Corrections, for reissuance of the above-referenced National Pollutant Discharge Elimination System (NPDES) permit, the United States Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) made a draft permit and fact sheet available for public notice on March 28, 2006 and accepted comments on the proposed action until April 27, 2006. As a result of the comments received in 2006, the copper and total phosphorus effluent limits have changed from those in the draft permit previously issued. The purpose of this fact sheet is to convey the new limits for both parameters and provide an explanation for the changes.

Phosphorus

Comments received from the Conservation Law Foundation and the Charles River Watershed Association on the draft permit raised substantial new questions on whether the monthly average total phosphorus limit of 0.2 mg/l (effective April through October) was sufficiently stringent to ensure compliance with applicable Water Quality Standards (Standards) in Massachusetts and relevant provisions of the Clean Water Act. Based on an analysis of the comments, as well as

other technical information and guidance in the administrative record, EPA has determined that the monthly average total phosphorus limit in effect for the months of April through October must be reduced from 0.2 mg/l to 0.10 mg/l to assure that water quality standards will be met.

Copper

In March 2007, EPA approved revisions to MassDEP Surface Water Quality Regulations which included site specific copper criteria for the Stop River. See 314 CMR 4.05(e) and Table 28 in 314 CMR 4.06(5). These criteria have been developed in instances where national criteria are invalid due to site-specific physical, chemical, or biological considerations, and do not exceed the safe exposure levels determined by toxicity testing. MassDEP has adopted an acute site specific criterion of 25.7 ug/l and a chronic site specific criterion of 18.1 ug/l for dissolved copper in the Stop River. The effluent limits for copper in the draft permit were re-calculated based on these criteria.

Public Comment

The Agencies have further concluded that a limited opportunity for interested persons to comment on these specific changes to the draft permit will assist the Agencies in their deliberations and improve the quality of the final permit decision. We are, therefore, reopening public comment on the draft permit pursuant to 40 CFR § 124.14(b). In accordance with 40 C.F.R. § 124.14(c), comments filed during the reopened comment period shall be limited to the “substantial new questions that caused its reopening”, which in this case, are limited to the revised monthly average total phosphorus limit of 0.10 mg/l, the compliance schedule for attaining the revised total phosphorus limit, and the revised monthly average and maximum daily copper limit of 23 ug/l and 33 ug/l.

This revised Fact Sheet sets forth the record basis for the new total phosphorus limit and the compliance schedule for attaining the limit, and the total recoverable copper limits. These revised sections supersedes the section entitled “Phosphorus” appearing on pages 5 to 7 and “Copper” appearing on pages 12 to 15 in Section V. D. (“Permit Limits and Explanation of Effluent Limitation Derivation”; “Non-Conventional Pollutants”; “Phosphorus” and “Permit Limits and Explanation of Effluent Limitation Derivation”; “Toxic Pollutants”; “Copper”) of the original Fact Sheet that accompanied the March 27, 2006 draft permit. In all other respects, the original draft permit and the original Fact Sheet remain in place and have not been re-opened for comment. Comments outside the scope of the revised total phosphorus limit, the compliance schedule for attaining the total phosphorus limit, and the revised total copper limits shall not be considered.

II. Description of Discharge

III. Limitations and Conditions

IV. Permit Basis and Explanation of Effluent Limitation Derivation

Limits Derivation

Phosphorus

The Stop River is listed on the Massachusetts Year 2006 Integrated List of Waters (which incorporates the CWA § 303(d) list) as a water that is impaired (not meeting water quality standards) and requires one or more Total Maximum Daily Loads (TMDL) be prepared to establish load allocation that will ensure attainment of water quality standards. The segment of the Stop River from the MCI-Norfolk Water Pollution Control Facility to the confluence with the Charles River, which includes the discharge from the MCI-Norfolk Water Pollution Control Facility's treatment plant, is listed as impaired due to impaired biocommunity, nutrients, organic enrichment/low dissolved oxygen, and pathogens. A TMDL for the Stop River has not yet been prepared.

The Massachusetts Water Quality Standards do not contain numeric criteria for total phosphorus. The narrative criterion for nutrients is found at 314 CMR 4.05(5)(c), which states that nutrients "shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication." Massachusetts Standards also require that "any existing point source discharges containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practicable treatment to remove such nutrients." See 314 CMR 4.04(5). MassDEP construes "highest and best practical treatment" for POTWs as a monthly average total phosphorus limit of 0.2 mg/l.

In the absence of a numeric criterion for phosphorus, EPA looks to nationally recommended criteria, supplemented by other relevant materials, such as EPA technical guidance and information published under Section 304(a) of the CWA, peer-reviewed scientific literature and site-specific surveys and data. See 40 CFR §122.44(d)(1)(vi)(B). EPA has produced several guidance documents which set forth total ambient phosphorus concentrations that are sufficiently stringent to control cultural eutrophication and other adverse nutrient-related impacts. These guidance documents present protective in-stream phosphorus concentrations based on two different analytical approaches. An effects-based approach provides a threshold value above which adverse effects (*i.e.*, water quality impairments) are likely to occur. It applies empirical observations of a causal variable (*i.e.*, phosphorus) and a response variable (*i.e.*, chlorophyll *a*) associated with designated use impairments. Alternatively, reference-based values are statistically derived from a comparison within a population of rivers in the same eco-region class. They are a quantitative set of river characteristics (physical, chemical and biological) that represent conditions in waters in that ecoregion that are minimally impacted by human activities (*i.e.*, reference conditions), and thus by definition representative of water without cultural eutrophication. Thus, while reference conditions, which reflect minimally disturbed conditions, will meet the requirements necessary to support designated uses, they may also exceed the water quality necessary to support such requirements.

The 1986 Quality Criteria of Water (commonly known as the "Gold Book") follows an effects-based approach. It recommends maximum threshold concentrations designed to prevent or control adverse nutrient-related impacts from occurring. Specifically, the Gold Book recommends in-stream phosphorus concentrations of no greater than 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impoundments, and 0.025 mg/l within the lake or reservoir. A more recent technical guidance manual, the Nutrient Criteria Technical Guidance Manual: Rivers and Streams (EPA 2000) ("Nutrient Criteria Technical Guidance Manual"), cites a range of values drawn from the peer-reviewed scientific literature to control periphyton and plankton, two types of aquatic plant growth commonly associated with eutrophication. This guidance recommends an in-stream phosphorus concentration from 0.01

mg/l to 0.09 mg/l to control periphyton growth and concentrations from 0.035 mg/l to 0.070 mg/l to control plankton (see Table 4 on page 101).

EPA has also released recommended ecoregional nutrient criteria, established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. The published criteria represent conditions in waters in that ecoregion that are minimally impacted by human activities, and thus free from cultural eutrophication. Norfolk is within Ecoregion XIV, Eastern Coastal Plains. The total phosphorus criterion for this ecoregion, found in Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV (2000), is 24 ug/l (0.024 mg/l).

Phosphorus concentrations in the Charles River Basin

The impacts associated with the excessive loading of phosphorus are well documented in three recent reports on the Charles River Watershed Basin. The Charles River Basin 2002-2006 Water Quality Assessment Report published by MassDEP in April 2008 and its Appendix B, Technical Memorandum TM 72-9; the Upper Charles River Watershed Total Maximum Daily Load Project, project # 2001-03/104, Volume I: Phase I Final Report, dated May 2004, and the Upper Charles River Watershed Total Maximum Daily Load, Project # 2001-03/104, Volume I: Phase II Final Report and Phase III Data Report, dated July 2006.

The Charles River Basin 2002-2006 Water Quality Assessment Report states that 4.0 miles of the segment of the Stop River above the MCI outfall are impaired for aquatic life use due to impairment from low dissolved oxygen, high total phosphorus and poor survival of the tests organisms exposed to river water just upstream from the facility's discharge. The segment below the discharge is impaired for low dissolved oxygen, elevated stream temperatures, biological indicators of organic enrichment, and elevated total phosphorus.

The MassDEP Technical Memorandum T72-9, Charles River Watershed DWM Year 2002 Water Quality Monitoring Data – Rivers includes two sampling locations on the Stop River, one upstream of the MCI discharge and the other downstream of the discharge. Dissolved oxygen concentrations measured upstream of the discharge were less than 5.0 mg/l in August 2002. Downstream of the discharge, continuous monitoring in July and on two consecutive days in August and September measured DO concentrations less than 5.0 mg/l. Phosphorus concentrations during the April through September period were measured between 0.11 mg/l and 0.17 mg/l upstream of the discharge and between 0.10 mg/l and 0.14 mg/l downstream of the discharge.

The Upper Charles River Watershed Total Maximum Daily Load, Project # 2001-03/104, Volume I: Phase I Final Report, and Volume I: Phase II Final Report and Phase III Data Report include data from dry weather sampling in August 2002 and August 2005 collected from the Stop River in Medfield downstream of the discharge in Medfield. The phosphorus concentration was 0.038 mg/l in 2002 and 0.106 mg/l in 2005. Dissolved oxygen samples from the Stop River, taken downstream of the discharge, were reported below 5.0 mg/l.

Limit Derivation

Because there is very little dilution provided by the receiving water under summer low flow conditions (a dilution factor of 1.26) and the total phosphorus concentration in the dilution flow

exceeds the criteria in the Gold Book and other guidance, the monthly average limit of 0.2 mg/l in the current permit is inadequate to ensure that the discharge does not cause or contribute to exceedances of the water quality standards. Within this range of concentrations suggested by the available guidance (*i.e.*, 0.01 mg/l to 0.10 mg/l), eutrophication is expected to be prevented or controlled. To address the documented eutrophication in the Stop River ambient phosphorus concentrations must be brought within this protective range. In order to do so, the phosphorus effluent limits in the draft permit published in March 2006 must be made more stringent.

A monthly average total phosphorus effluent limit of 0.10 mg/l has been established to ensure that the Gold Book recommended value of 0.10 mg/l will not be exceeded in the reaches of the river below the discharge under 7Q10 conditions. In addition to being consistent with the Gold Book, the 0.10 mg/l limit will typically result in an instream concentration within the range of effects-based values cited in the Nutrient Criteria Technical Guidance Manual and in the peer-reviewed scientific literature after adjustments are made to account for the differing flow assumptions used to determine those values (*i.e.*, 7Q10 versus 2 or 3-month summer seasonal flows). *See, e.g., Developing Nutrient Targets to Control Benthic Chlorophyll Levels in Streams: A Case Study of the Clark Fork River*¹ (citing use of flows from June 21 to September 21 to calculate recommended values); *Suggested Classification of Stream Trophic States: Distributions of Temperate Stream Types by Chlorophyll, Total Nitrogen, and Phosphorus*², (citing use of 2-3 month seasonal means). In addition, the instream concentration will approach the ecoregional reference-condition criterion of 0.024 mg/l, which is also calculated using 3-month summer seasonal flows.

EPA recognizes that background phosphorus concentrations may continue to cause violations of water quality standards if not addressed, and will consider the need for more stringent phosphorus limitations on the only upstream NPDES discharge, the Wrentham Developmental Center, when the permit is reissued. EPA also expects that the TMDL for the Upper Charles, when completed, will include load reductions for phosphorus associated with non point sources that will result in a reduction in background concentrations in the Stop River.

The limit of 0.10 mg/l will be in effect from April 1 to October 31. The application of the lower seasonal limit remains from April to October to encompass the entire season when there is active aquatic plant growth. Because the proposed limit is a new water quality-based effluent limitation that the current facility is not designed to achieve, the draft permit includes a compliance schedule for achieving the limit. The schedule may be found in Part I.E. of the draft permit.

The draft permit contains a winter season total phosphorus limit of 1.0 mg/l for November through March. No change was made to this limit, and it is not subject to re-opened comment.

Copper

The Massachusetts Surface Water Quality Standards were revised in December 2006 and included site-specific criteria for copper that were developed for specific receiving waters where national criteria are invalid due to site-specific physical, chemical, or biological considerations,

¹ Dodds W. K. Smith V.H. and Zander B. (1997) *Developing Nutrient Targets to Control Benthic Chlorophyll Levels in Streams: A Case Study of the Clark Fork River*. *Wat. Res.* Volume 31, No.7, pg 1739.

² Dodds W. K. Jones J.R. and Welch E.B. (1998) *Suggested Classification of Stream Trophic States: Distributions of Temperate Stream Types by Chlorophyll, Total Nitrogen, and Phosphorus*. *Wat. Res.* Vol. 32, No.5, pp 1455 -1462.

and do not exceed the safe exposure levels determined by toxicity testing [314 CMR 4.05(5)(e) Table 28]. EPA approved an acute criterion of 25.7 ug/l and a chronic criterion of 18.1 ug/l for the Stop River from river mile 4.4 to the confluence with the Charles River on March 26, 2007. The MCI Norfolk-Walpole facility discharges to this segment of the river.

MassDEP prepared *Protocol For and Determination of Site Specific Copper Criteria for Ambient Waters in Massachusetts* (the Site Specific Copper Protocol) in conjunction with the new criteria. In this document MassDEP states that “While site-specific copper criteria are being established, prudence dictates that loads of copper and other metals be minimized. This, in part, is because possible impacts on sediment quality and toxicity remain an open question. Therefore, as part of the site-specific criteria, all reasonable efforts to minimize the loads of metals, and copper in this case, are part of the criteria revision protocol. So, the Department will develop copper limits on a case-by-case basis. Each determination will be based not only on the adjusted concentration resulting from the appropriate multiplier but will reflect the demonstrated level of copper reduction routinely achievable at the facility in order to minimize copper loads and thereby reduce its accumulation in the sediment.”

Antibacksliding requirements in 402(o) of the Clean Water Act (CWA) and 40 CFR 122.44(l) generally prohibit relaxation of effluent limits. Water quality-based limits can only be relaxed if one of the exceptions found at CWA 402(o)(2) is met or if the requirements of CWA 303(d)(4) are met. In this case, the requirements in CWA 303(d)(4) apply.

CWA 303(d)(4) requires that a determination be made whether the receiving water is attaining the applicable water quality standard. If the water is in attainment of the standard, a relaxation of the limit would be allowed subject to the State’s antidegradation policy. If the receiving water is not in attainment of the applicable standard, the existing limit must be based on a wasteload allocation or a total maximum daily load (TMDL) and the relaxed limit is only allowed if attainment of water quality standards is ensured.

First, we calculated the limits that would be necessary to ensure that the receiving water would be in attainment of the new criteria. The following equation can be used to perform this calculation:

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

or

$$C_d = \frac{Q_r C_r - Q_s C_s}{Q_d}$$

Where:

Q_r = receiving water flow downstream of the discharge ($Q_d + Q_s$)

C_r = copper concentration in the receiving water downstream of the discharge

Q_d = discharge flow from the facility

C_d = copper concentration in the discharge

Q_s = receiving water flow upstream of the discharge

C_s = copper concentration upstream of the discharge

The treatment plant’s design flow and the receiving water 7Q10 were used for Q_d and Q_s , respectively. Copper concentration in the receiving water, (C_s) was estimated using data from samples collected upstream of the treatment plant discharge for WET test dilution water (see

Attachment A of the fact sheet), and the copper concentration in the receiving water downstream of the discharge (C_r) was set at the applicable criteria. A conversion factor of 0.96 was used to convert dissolved copper concentrations to total copper concentrations using the formula Copper (dissolved) = Copper(total) *0.96. This conversion factor is recommended in National Recommended Water Quality Criteria: 2002 (see Appendix A) where there is no site specific translator.

The following calculations show the effluent limitations that are necessary to achieve the chronic (monthly average) and acute (daily maximum) site-specific criteria.

Monthly Average:

$$C_d = \frac{Q_r C_r - Q_s C_s}{Q_d}$$

Where:

$$Q_s = 0.125 \text{ MGD}$$

$$C_s = 2.2 \text{ } \mu\text{g/l (total copper)}$$

$$Q_d = 0.484 \text{ MGD}$$

$$Q_r = 0.61 \text{ MGD}$$

$$C_r = 18.9 \text{ } \mu\text{g/l (total copper)} = 18.1 \text{ } \mu\text{g/l dissolved copper}/0.96$$

$$C_d = [(0.61 \text{ MGD})(18.9 \text{ } \mu\text{g/l}) - (0.125 \text{ MGD})(2.2 \text{ } \mu\text{g/l})] / 0.484 \text{ MGD}$$

$$C_d = 23.2 \text{ } \mu\text{g/l (total copper)}$$

Daily Maximum

$$C_d = \frac{Q_r C_r - Q_s C_s}{Q_d}$$

Where:

$$Q_s = 0.125 \text{ MGD}$$

$$C_s = 2.2 \text{ } \mu\text{g/l}$$

$$Q_d = 0.484 \text{ MGD}$$

$$Q_r = 0.61 \text{ MGD}$$

$$C_r = 26.8 \text{ } \mu\text{g/l (total copper)} = 25.7 \text{ } \mu\text{g/l dissolved copper}/0.96$$

$$C_d = [(0.61 \text{ MGD})(26.8 \text{ } \mu\text{g/l}) - (0.125 \text{ MGD})(2.2 \text{ } \mu\text{g/l})] / 0.484 \text{ MGD}$$

$$C_d = 33.2 \text{ } \mu\text{g/l (total copper)}$$

In each case, the calculated limit was greater than the limit in the current permit. However, pursuant to the State's antidegradation policy and the Site Specific Protocol, the new limit will not be based entirely on these calculations, but must also reflect the demonstrated level of copper reduction routinely achievable at the facility in order to minimize copper loads and thereby reduce its accumulation in the sediment. Therefore, the effluent copper data from the facility for the years of 2005-2007 was reviewed to characterize the performance of the facility.

The monthly average effluent copper concentrations submitted on the facility's monthly

discharge monitoring reports (DMRs) are shown in Attachment B. In order to capture the statistical variation in the data, EPA referred to the Appendix E - TSD Lognormal Distribution and Permit Limit Derivations in the Technical Support Document for Water Quality-based Toxics Control, March 1991, EPA/505/2-90-001. This document provided technical guidance on statistical procedures used to factor in recent copper data submitted on the DMRs.

The guidance recommends using the 99th percentile of actual data for calculating the daily maximum limit and the 95th percentile for calculating the monthly average limit. Based on these calculations, the monthly average limit would be 23.3 ug/l and the maximum daily limit would be 35.6 ug/l. See Attachment C of the fact sheet.

Accordingly, the limitations in the draft permit are established at the more stringent of the limits calculated to achieve the new water quality criteria and those based on demonstrated performance of the facility. In this case, the monthly average limits were essentially the same (23.2 ug/l vs. 23.3 ug/l), so the draft permit includes a monthly average limitation of 23 ug/l. The maximum daily limit calculated to achieve the site-specific criteria (33.2 ug/l) was slightly more stringent than the limit based on performance (35.6 ug/l), so the maximum daily limit in the draft permit is 33 ug/l, based on the more stringent value.

V. State Certification Requirements

The staff of the Massachusetts Department of Environmental Protection has reviewed the partially revised draft permit. EPA has requested permit certification by the Commonwealth pursuant to CWA §401(a)(1) and 40 CFR § 124.53 and expects as the draft permit, as revised, will be certified.

VII. Comment Period and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period to Betsy Davis, U.S. EPA, Office of Ecosystem Protection, Municipal Permits Branch (CMP), 1 Congress Street, Suite 1100, Boston, Massachusetts 02114-2023. Any person, prior to such date, may submit a request in writing for a public hearing to consider the revised seasonal phosphorus limit and the revised copper limits in the draft permit. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public meeting may be held if the criteria stated in 40 C.F.R. § 124.12 are satisfied. In reaching a final decision on the Draft Permit, the EPA 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 any public hearings, if such hearings are held, the EPA will issue a Final Permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the Final Permit decision, any interested person may submit a petition for review of the permit to EPA's Environmental Appeals Board consistent with 40 C.F.R. § 124.19.

IX. EPA and MassDEP Contacts

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

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Date: _____

Stephen S.Perkins, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Attachment A

Date	Stop River Copper Concentration Upstream of Discharge*	Effluent Data*
July 2005	0.0008 mg/l	0.0104 mg/l
Oct. 2005	not detect at or above the reporting limit	0.0098 mg/l
July 2006	0.009 mg/l	0.0023 mg/l
Oct. 2006	0.0011 mg/l	0.0097 mg/l
July 2007	not detect at or above the reporting limit	0.0033 mg/l
Oct. 2007	0.0022 mg/l	0.0066 mg/l

* Toxicity Test Data

Attachment B

Date	Monthly Average Effluent Data
1/31/2005	13 ug/L
2/28/2005	12 ug/L
3/31/2005	13 ug/L
4/30/2005	23.8 ug/L
5/31/2005	17 ug/L
6/30/2005	12 ug/L
7/31/2005	10 ug/L
8/31/2005	14 ug/L
9/30/2005	11.2 ug/L
10/31/2005	9.8 ug/L
11/30/2005	16 ug/L
12/31/2005	11.2 ug/L
1/31/2006	14 ug/L
2/28/2006	12 ug/L
3/31/2006	17 ug/L
4/30/2006	9.3 ug/L
5/31/2006	6 ug/L
6/30/2006	4 ug/L
7/31/2006	2 ug/L
8/31/2006	12 ug/L
9/30/2006	9 ug/L
10/31/2006	10 ug/L

11/30/2006	23 ug/L
12/31/2006	14 ug/L
1/31/2007	8 ug/L
2/28/2007	7 ug/L
3/31/2007	7.1 ug/L
4/30/2007	5.6 ug/L
5/31/2007	4.1 ug/L
6/30/2007	3 ug/L
7/31/2007	3.3 ug/L
8/31/2007	3 ug/L
9/30/2007	5 ug/L
10/31/2007	6.6 ug/L
11/30/2007	2.9 ug/L
12/31/2007	6 ug/L