AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §§1251 et seq.; the "CWA"), and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§ 26-53),

The Commonwealth of Massachusetts
Executive Office of Public Safety and Security
Department of Correction

is authorized to discharge from the facility located at

Massachusetts Correctional Institute (MCI)
965 Elm Street
Concord, MA 01742-9106

to receiving water named

Assabet River

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit will become effective on the first day of the calendar month immediately following sixty days after signature.*

This permit and the authorization to discharge expire at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on August 12, 2005

This permit consists of 15 pages in Part I including effluent limitations and monitoring requirements Attachment A (USEPA Region 1 Freshwater Acute Toxicity Test Procedure and Protocol, February 2011, 8 pages); and Part II (25 pages including NPDES Part II Standard Conditions).

Signed this 30th day of August,

Ken Moraff, Director for
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

David Ferris, Director
Massachusetts Wastewater Management Program
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

* Pursuant to 40 CFR 124.15(b)(3), if no comments requesting a change to the draft permit are received, the permit will become effective upon the date of signature.

PART I

A.1. During the period beginning on the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to the Assabet River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS					MONITORING REQUIREMENTS [3]	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
EFFLUENT FLOW[2]	*********	*********	0.31 MGD	*********	Report MGD	CONTINUOUS	RECORDER
EFFLUENT FLOW[2]	*********	*********	Report MGD	*********	*********	CONTINUOUS	RECORDER
BOD_5 [4]	20 lbs/day	34 lbs/day	15 mg/L	25 mg/L	30 mg/L	1/WEEK	24-HOUR COMPOSITE[5]
TSS [4]	20 lbs/day	34 lbs/day	15 mg/L	25 mg/L	30 mg/L	1/WEEK	24-HOUR COMPOSITE[5]
pH RANGE[1]	6.5 - 8.3 s.u. (SEE PERMIT PARAGRAPH I.A.1.b.)					1/DAY	GRAB
TOTAL RESIDUAL CHLORINE[1,7]	*********	**********	0.34 mg/L	*********	0.59 mg/L	3/DAY	GRAB
ESCHERICHIA COLI [1,6]	*********	**********	126 cfu/100 ml	*********	409 cfu/100 ml	3/WEEK	GRAB
TOTAL PHOSPHORUS April 1 – October 31	0.52 lbs/day	**********	0.2 mg/L	*********	Report µg/L	3/WEEK	24-HOUR COMPOSITE[5]
TOTAL PHOSPHORUS November 1 – March 31	1.25 lbs/day	**********	0.5 mg/L	*********	Report µg/L	1/WEEK	24-HOUR COMPOSITE[5]
DISSOLVED OXYGEN (April 1st-October 31st)	NOT LESS THAN 5.0 mg/L					1/DAY	GRAB

CONTINUED FROM PREVIOUS PAGE

A.1. During the period beginning the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to the Assabet River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTIC	**EFFLUENT LIMITS**					**MONITORING REQUIREMENTS [3]**	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
AMMONIA-NITROGEN (May 1 - September 30)	20 lbs/day	********* *********	7.8 mg/L	*********	Report mg/L	1/WEEK	24-HOUR COMPOSITE[5]
AMMONIA-NITROGEN (October 1 – April 30)	********** **********	********* *********	Report mg/L	********* *********	Report mg/L	2/MONTH	24-HOUR COMPOSITE[5]
TOTAL RECOVERABLE ALUMINUM[8,14]	**********	*********	147 µg/L	*********	Report µg/L	1/MONTH	24-HOUR COMPOSITE[5]
TOTAL RECOVERABLE CADMIUM[9]	**********	*********	Report µg/L	********	Report µg/L	1/MONTH	24-HOUR COMPOSITE[5]
TOTAL RECOVERABLE LEAD[9,14]	**********	*********	1.5 µg/L	*********	Report µg/L	1/MONTH	24-HOUR COMPOSITE[5]
WHOLE EFFLUENT TOXICITY [10, 11, 12]	Acute $LC_{50} \geq 100\%$					4/YEAR	24-HOUR COMPOSITE[5]
Hardness[13]	*********	*********	*********	*********	Report mg/L	4/YEAR	24-HR COMP[5]
Ammonia Nitrogen as N[13]	*********	*********	*********	*********	Report mg/L		24-HR COMP[5]
Total Recoverable Aluminum[13]	*********	*********	*********	*********	Report µg/L		24-HR COMP[5]
Total Recoverable Cadmium[13]	*********	*********	*********	*********	Report µg/L		24-HR COMP[5]
Total Recoverable Copper[13]	*********	*********	*********	*********	Report µg/L		24-HR COMP[5]
Total Recoverable Nickel[13]	*********	*********	*********	*********	Report µg/L		24-HR COMP[5]
Total Recoverable Lead[13]	*********	*********	*********	*********	Report µg/L		24-HR COMP[5]
Total Recoverable Zinc[13]	*********	*********	*********	*********	Report µg/L		24-HR COMP[5]

Footnotes:

1. Required for State Certification.

2. Report annual average, monthly average, and the maximum daily flow. The limit is an annual average, which shall be reported as a rolling average. The value will be calculated as the arithmetic mean of the monthly average flow for the reporting month and the monthly average flows of the previous eleven months.

3. Effluent sampling shall be of the discharge. Any change in sampling location must be reviewed and approved in writing by EPA and MassDEP.

   A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of the week each month. Occasional deviations from the routine sampling program are allowed, but the reason for the deviation shall be documented in correspondence appended to the applicable discharge monitoring report.

   All samples shall be tested in accordance with the procedures in 40 C.F.R. §136, unless specified elsewhere in the permit.

4. Sampling required for influent and effluent.

5. 24-hour composite samples will consist of at least twenty-four (24) grab samples taken during one consecutive 24-hour period, either collected at equal intervals and combined proportional to flow or continuously collected proportionally to flow.

6. The monthly average limit for Escherichia coli (*E. coli)* is expressed as a geometric mean. *E. coli* monitoring shall be conducted concurrently with a total residual chlorine sample.

7. The minimum level (ML) for total residual chlorine is defined as 20 µg/L. This value is the minimum level for chlorine using EPA approved methods found in the most currently approved version of Standard Methods for the Examination of Water and Wastewater, Methods 4500 CL-E and G. One of these methods must be used to determine total residual chlorine. For effluent limitations less than 20 µg/L, compliance/non-compliance will be determined based on the ML. Sample results of 20 µg/L or less shall be reported as zero on the discharge monitoring report.

   Chlorination and dechlorination systems shall include an alarm system for indicating system interruptions or malfunctions. Any interruption or malfunction of the chlorine dosing system that may have resulted in levels of chlorine that were inadequate for achieving effective disinfection, or interruptions or malfunctions of the dechlorination system that may have resulted in excessive levels of chlorine in the final effluent shall be reported with the monthly DMRs. The report shall include the date and time of the interruption or malfunction, the nature of the problem, and the estimated amount of time that the reduced levels of chlorine or dechlorination chemicals occurred.

8. The monthly composite aluminum sample shall be taken on the same day as one of the composite

phosphorus samples.

9. The minimum levels (MLs) for lead and cadmium are each defined as 0.2 µg/l. Total lead and cadmium analyses shall be performed using EPA Method 200.8 ICP/MS – inductively coupled plasma spectrometry, as this is the only approved method under 40 CFR Part 136 that provides a minimum level of detection (0.2 µg/l) in the range of the water quality criteria.

10. The permittee shall conduct acute toxicity tests *four* times per year. Toxicity test samples shall be collected during the months of March, June, September, and December. Toxicity test samples must be collected during the same week of each month when testing occurs. The test results shall be submitted by the last day of the following month. The results are due April 30th, July 31st, October 31st, and January 31st, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachment A** of this permit.

Test Dates specified week in	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**
March June September December	April 30th July 31st October 31st January 31st	Ceriodaphnia dubia (daphnid) Pimiphales promelas (fathead minnow)	≥ 100%

After submitting **one year** and a **minimum** of four consecutive sets of WET test results, all of which demonstrate compliance with the WET permit limits, the permittee may request a reduction in the WET testing requirements. The permittee is required to continue testing at the frequency specified in the permit until notice is received by certified mail from the EPA that the WET testing requirement has been changed.

11. The LC_{50} is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.

12. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall either follow procedures outlined in **Attachment A (Toxicity Test Procedure and Protocol**) **Section IV., DILUTION WATER** in order to obtain an individual approval for use of an alternate dilution water, or the permittee shall follow the Self-Implementing Alternative Dilution Water Guidance, which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. This guidance is found in Attachment G of *NPDES Program Instructions for the Discharge Monitoring Report Forms (DMRs)*, which may be found on the EPA Region I web site at http://www.epa.gov/Region1/enforcementandassistance/dmr.html. If this guidance is revoked, the permittee shall revert to obtaining individual approval as outlined in **Attachment A**. Any modification or revocation to this guidance will be transmitted to the permittees. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined

in **Attachment A**.

13. For each whole effluent toxicity test the permittee shall report on the appropriate discharge monitoring report, (DMR), the concentrations of the hardness, ammonia nitrogen as nitrogen, total recoverable aluminum, cadmium, copper, lead, nickel, and zinc found in the 100 percent effluent sample. All these aforementioned chemical parameters shall be determined to at least the minimum quantification level shown in **Attachment A**. Also the permittee should note that all chemical parameter results must still be reported in the appropriate toxicity report.

14. See Section E. for Compliance Schedule.

Part I.A.1. (Continued)

a. The discharge shall not cause a violation of the water quality standards of the receiving waters.

b. The pH of the effluent shall not be less than 6.5 or greater than 8.3 at any time.

c. The discharge shall not cause objectionable discoloration of the receiving waters.

d. The effluent shall not contain a visible oil sheen, foam, or floating solids at any time.

e. The permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand. The percent removal shall be based on monthly average values.

f. The permittee shall minimize the use of chlorine while maintaining adequate bacterial control.

g. The results of sampling for any parameter done in accordance with EPA approved methods above its required frequency must also be reported.

h. If the average annual flow in any calendar year exceeds 80 percent of the facility's design flow, the permittee shall submit a report to MassDEP by March 31 of the following calendar year describing its plans for further flow increases and describing how it will maintain compliance with the flow limit and all other effluent limitations and conditions.

2. All POTWs must provide adequate notice to the Director of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For purposes of this paragraph, adequate notice shall include information on:

(1) The quantity and quality of effluent introduced into the POTW; and

(2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

3. Prohibitions Concerning Interference and Pass Through:

Pollutants introduced into POTWs by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.

4. Toxics Control

a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.

b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

5. Numerical Effluent Limitations for Toxicants

EPA or MassDEP may use the results of the toxicity tests and chemical analyses conducted pursuant to this permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants, including but not limited to those pollutants listed in Appendix D of 40 CFR Part 122.

B. UNAUTHORIZED DISCHARGES

This permit authorizes discharges only from the outfall(s) listed in Part I.A.1, in accordance with the terms and conditions of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs), are not authorized by this permit and shall be reported to EPA and MassDEP in accordance with Part II.D.1.e.(1) of this permit (Twenty-four hour reporting).

Notification of SSOs to MassDEP shall be made on its SSO Reporting Form (which includes MassDEP Regional Office telephone numbers). The reporting form and instruction for its completion may be found on-line at http://www.mass.gov/eea/agencies/massdep/service/approvals/sanitary-sewer-overflow-bypass-backup-notification.html.

C. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

Operation and maintenance (O&M) of the sewer system shall be in compliance with the General Requirements of Part II and the following terms and conditions. The permittee is required to complete the following activities for the collection system which it owns:

1. Maintenance Staff

The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing

functions required to ensure compliance with the terms and conditions of this permit. Provisions to meet this requirement shall be described in the Collection System O&M Plan required pursuant to Section C.5. below.

2. Preventive Maintenance Program

The permittee shall maintain an ongoing preventive maintenance program to prevent overflows and bypasses caused by malfunctions or failures of the sewer system infrastructure. The program shall include an inspection program designed to identify all potential and actual unauthorized discharges. Plans and programs to meet this requirement shall be described in the Collection System O&M Plan required pursuant to Section C.5. below.

3. Infiltration/Inflow

The permittee shall control infiltration and inflow (I/I) into the sewer system as necessary to prevent high flow related unauthorized discharges from their collection systems and high flow related violations of the wastewater treatment plant's effluent limitations. Plans and programs to control I/I shall be described in the Collection System O&M Plan required pursuant to Section C.5. below.

4. Collection System Mapping

The permittee shall prepare and maintain maps of the entire sewer collection system and submit the maps to EPA within one month of the effective date of the permit. The collection system maps shall be kept up-to-date and available for review by federal, state, or local agencies. Such maps shall include, but not be limited to the following:

a. All sanitary sewer lines and related manholes;
b. All combined sewer lines, related manholes, and catch basins;
c. All combined sewer regulators and any known or suspected connections between the sanitary sewer and storm drain systems (e.g. combination manholes);
d. All outfalls, including the treatment plant outfall(s), CSOs, and any known or suspected SSOs, including stormwater outfalls that are connected to combination manholes;
e. All pump stations and force mains;
f. The wastewater treatment facility(ies);
g. All surface waters (labeled);
h. Other major appurtenances such as inverted siphons and air release valves;
i. A numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;
j. The scale and a north arrow; and
k. The pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow.

5. Collection System O&M Plan

The permittee shall develop and implement a Collection System O&M Plan.

a. Within six (6) months of the effective date of the permit, the permittee shall submit to

EPA and MassDEP

(1) A description of the collection system management goals, staffing, information management, and legal authorities;
(2) A description of the collection system and the overall condition of the collection system including a list of all pump stations and a description of recent studies and construction activities; and
(3) A schedule for the development and implementation of the full Collection System O&M Plan including the elements in paragraphs b.1. through b.9. below.

b. The full Collection System O&M Plan shall be completed, implemented and submitted to EPA and MassDEP within twenty four (24) months from the effective date of this permit. The Plan shall include:

(1) The required submittal from paragraph 5.a. above, updated to reflect current information;
(2) A preventive maintenance and monitoring program for the collection system;
(3) Description of sufficient staffing necessary to properly operate and maintain the sanitary sewer collection system and how the operation and maintenance program is staffed;
(4) Description of funding, source(s) of funding, and provisions for funding sufficient for implementing the plan;
(5) Identification of known and suspected overflows and back-ups, including manholes. A description of the cause of the identified overflows and back-ups, corrective actions taken, and a plan for addressing the overflows and back-ups consistent with the requirements of this permit;
(6) A description of the permittee's programs for preventing I/I related effluent violations and all unauthorized discharges of wastewater, including overflows and by-passes and the ongoing program to identify and remove sources of I/I. The program shall include an inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts; and
(7) An educational public outreach program for all aspects of I/I control, particularly private inflow;
(8) Measures to promote the proper disposal of pharmaceuticals and prevent their disposal into the sewer system; and
(9) An Overflow Emergency Response Plan to protect public health from overflows and unanticipated bypasses or upsets that exceed any effluent limitation in the permit.

6. Annual Reporting Requirement

The permittee shall submit a summary report of activities related to the implementation of its Collection System O&M Plan during the previous calendar year. The report shall be submitted to EPA and MassDEP annually by March 31. The summary report shall, at a minimum, include:

a. A description of the staffing levels maintained during the year;
b. A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year;
c. Expenditures for any collection system maintenance activities and corrective actions taken during the previous year;

d. A map with areas identified for investigation/action in the coming year;
e. If treatment plant flow has reached 80% of its design flow [specify 80 percent of design flow value] based on the annual average flow during the reporting year, or there have been capacity related overflows, submit a calculation of the maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year; and
f. A summary of unauthorized discharges during the past year and their causes and a report of any corrective actions taken as a result of the unauthorized discharges reported pursuant to the Unauthorized Discharges section of this permit.

7. Alternate Power Source

In order to maintain compliance with the terms and conditions of this permit, the permittee shall provide an alternative power source(s) sufficient to operate the portion of the publicly owned treatment works it owns and operates.

D. SLUDGE CONDITIONS

1. The permittee shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices, including EPA regulations promulgated at 40 CFR Part 503, which prescribe "Standards for the Use or Disposal of Sewage Sludge" pursuant to Section 405(d) of the CWA, 33 U.S.C. § 1345(d).

2. If both state and federal requirements apply to the permittee's sludge use and/or disposal practices, the permittee shall comply with the more stringent of the applicable requirements.

3. The requirements and technical standards of 40 CFR Part 503 apply to the following sludge use or disposal practices.

   a. Land application - the use of sewage sludge to condition or fertilize the soil
   b. Surface disposal - the placement of sewage sludge in a sludge only landfill
   c. Sewage sludge incineration in a sludge only incinerator

4. The requirements of 40 CFR Part 503 do not apply to facilities which dispose of sludge in a municipal solid waste landfill. 40 CFR § 503.4. These requirements also do not apply to facilities which do not use or dispose of sewage sludge during the life of the permit but rather treat the sludge (e.g. lagoons, reed beds), or are otherwise excluded under 40 CFR § 503.6.

5. The 40 CFR. Part 503 requirements including the following elements:

   a. General requirements
   b. Pollutant limitations
   c. Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
   d. Management practices
   e. Record keeping
   f. Monitoring

g. Reporting

Which of the 40 C.F.R. Part 503 requirements apply to the permittee will depend upon the use or disposal practice followed and upon the quality of material produced by a facility. The EPA Region 1 Guidance document, "EPA Region 1 - NPDES Permit Sludge Compliance Guidance" (November 4, 1999), may be used by the permittee to assist it in determining the applicable requirements.[1]

6. The sludge shall be monitored for pollutant concentrations (all Part 503 methods) and pathogen reduction and vector attraction reduction (land application and surface disposal) at the following frequency. This frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year

- less than 290 — 1/ year
- 290 to less than 1,500 — 1 /quarter
- 1,500 to less than 15,000 — 6 /year
- 15,000 + — 1 /month

Sampling of the sewage sludge shall use the procedures detailed in 40 CFR 503.8.

7. Under 40 CFR § 503.9(r), the permittee is a "person who prepares sewage sludge" because it "is … the person who generates sewage sludge during the treatment of domestic sewage in a treatment works …." If the permittee contracts with *another* "person who prepares sewage sludge" under 40 CFR § 503.9(r) – i.e., with "a person who derives a material from sewage sludge" – for use or disposal of the sludge, then compliance with Part 503 requirements is the responsibility of the contractor engaged for that purpose. If the permittee does not engage a "person who prepares sewage sludge," as defined in 40 CFR § 503.9(r), for use or disposal, then the permittee remains responsible to ensure that the applicable requirements in Part 503 are met. 40 CFR § 503.7. If the ultimate use or disposal method is land application, the permittee is responsible for providing the person receiving the sludge with notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

8. The permittee shall submit an annual report containing the information specified in the 40 CFR Part 503 requirements (§ 503.18 (land application), § 503.28 (surface disposal), or § 503.48 (incineration)) by **February 19** (*see also* "EPA Region 1 - NPDES Permit Sludge Compliance Guidance"). Reports shall be submitted to the address contained in the reporting section of the permit. If the permittee engages a contractor or contractors for sludge preparation and ultimate use or disposal, the annual report need contain only the following information:

a. Name and address of contractor(s) responsible for sludge preparation, use or disposal
b. Quantity of sludge (in dry metric tons) from the POTW that is transferred to the sludge contractor(s), and the method(s) by which the contractor will prepare and use or dispose of the sewage sludge.

1 This guidance document is available upon request from EPA Region 1 and may also be found at: http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf

E. ALUMINUM AND LEAD COMPLIANCE SCHEDULE

a. Within 24 months of the effective date of the permit, the permittee shall complete and submit to EPA and DEP an evaluation of alternatives, and an implementation schedule, for achieving the monthly average total aluminum and lead limitations. At a minimum, the evaluation shall include the following:

i. An evaluation of alternative water treatment practices, including corrosion control, by MCI-Concord in order to reduce aluminum and lead concentrations in the water supply.

ii. An evaluation of pre-treatment requirements in order to ensure that all significant sources of aluminum and lead from indirect dischargers are adequately controlled.

iii. An evaluation of all other potentially significant sources of aluminum and/or lead in the sewer system and alternatives for minimizing these sources.

iv. An evaluation of alternative modes of operation at the wastewater treatment facility in order to enhance removal of aluminum and lead.

b. Within 12 months of the effective date of the permit, the permittee shall submit to EPA and DEP a progress report relative to completing the evaluation of alternatives.

c. Within 24 and 36 months from the effective date of the permit, the permittee shall submit to EPA and DEP progress reports relative to implementation of the alternatives identified as necessary to ensure attainment of the aluminum and lead limits.

d. Within 48 months of the effective date of the permit, the permittee shall comply with the aluminum and lead limits.

F. MONITORING AND REPORTING

1. Submittal of DMRs Using NetDMR

The permittee shall continue to submit its monthly monitoring data in discharge monitoring reports (DMRs) to EPA and MassDEP no later than the 15th day of the month electronically using NetDMR. When the permittee submits DMRs using NetDMR, it is not required to submit hard copies of DMRs to EPA or MassDEP.

2. Submittal of Reports as NetDMR Attachments

Unless otherwise specified in this permit, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies. Permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. (See Part I.E.6. for more information on state reporting.) Because the due dates for reports described in this permit may not coincide with the due date for submitting DMRs (which is no later than the 15th day of the month), a report submitted electronically as a NetDMR attachment shall be considered timely if it is electronically submitted to EPA using NetDMR with the next DMR due following the particular report due date specified in this permit.

4. Submittal of Requests and Reports to EPA/OEP

The following requests, reports, and information described in this permit shall be submitted to the EPA/OEP NPDES Applications Coordinator in the EPA Office Ecosystem Protection (OEP).

A. Transfer of Permit notice
B. Request for changes in sampling location
C. Request for reduction in testing frequency
D. Request for reduction in WET testing requirement
E. Report on unacceptable dilution water / request for alternative dilution water for WET testing
F. Notification of proposal to add or replace chemicals and bio-remedial agents including microbes

These reports, information, and requests shall be submitted to EPA/OEP electronically at R1NPDES.Notices.OEP@epa.gov or by hard copy mail to the following address:

U.S. Environmental Protection Agency
Office of Ecosystem Protection
EPA/OEP NPDES Applications Coordinator
5 Post Office Square - Suite 100 (OEP06-03)
Boston, MA 02109-3912

5. Submittal of Reports in Hard Copy Form

The following notifications and reports shall be submitted as hard copy with a cover letter describing the submission. These reports shall be signed and dated originals submitted to EPA.

A. Written notifications required under Part II
B. Notice of unauthorized discharges, including Sanitary Sewer Overflow (SSO) reporting
C. Sludge monitoring reports

This information shall be submitted to EPA/OES at the following address:

U.S. Environmental Protection Agency
Office of Environmental Stewardship (OES)
Water Technical Unit
5 Post Office Square, Suite 100 (OES04-SMR)
Boston, MA 02109-3912

All sludge monitoring reports required herein shall be submitted only to:

U.S. Environmental Protection Agency, Region 7
Biosolids Center
Water Enforcement Branch
11201 Renner Boulevard
Lenexa, Kansas 66219

6. State Reporting

Unless otherwise specified in this permit, duplicate signed copies of all reports, information, requests or notifications described in this permit, including the reports, information, requests or notifications described in Parts I.F.3, I.F.4, and I.F.5 also shall be submitted to the State at the following addresses:

MassDEP – Northeast Region
Bureau of Water Resources
205B Lowell Street
Wilmington, MA 01887

Copies of toxicity tests only shall be submitted to:

Massachusetts Department of Environmental Protection
Watershed Planning Program
8 New Bond Street
Worcester, Massachusetts 01606

7. Verbal Reports and Verbal Notifications

Any verbal reports or verbal notifications, if required in Parts I and/or II of this permit, shall be made to both EPA and to MassDEP. This includes verbal reports and notifications which require reporting within 24 hours. (As examples, see Part II.B.4.c. (2), Part II.B.5.c. (3), and Part II.D.1.e.) Verbal reports and verbal notifications shall be made to EPA's Office of Environmental Stewardship at:

617-918-1510

G. STATE PERMIT CONDITIONS

1. This authorization to discharge includes two separate and independent permit authorizations. The two permit authorizations are (i) a federal National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (EPA) pursuant to the Federal Clean Water Act, 33 U.S.C. §§1251 et seq.; and (ii) an identical state surface water discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.

2. This authorization also incorporates the state water quality certification issued by MassDEP under § 401(a) of the Federal Clean Water Act, 40 C.F.R. 124.53, M.G.L. c. 21, § 27 and 314 CMR 3.07. All of the requirements (if any) contained in MassDEP's water quality certification for the permit are hereby incorporated by reference into this state surface water discharge permit as special conditions pursuant to 314 CMR 3.11.

3. Each agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the agency taking such action, and shall not affect the validity or status of this permit as issued by the other agency, unless and until each agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared invalid, illegal or otherwise issued in violation of state law such permit shall remain in full force and effect under federal law as a NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of federal law, this permit shall remain in full force and effect under state law as a permit issued by the Commonwealth of Massachusetts.

Attachment A
USEPA REGION 1 FRESHWATER ACUTE TOXICITY TEST PROCEDURE AND PROTOCOL

I. GENERAL REQUIREMENTS

The permittee shall conduct acceptable acute toxicity tests in accordance with the appropriate test protocols described below:

- **Daphnid (Ceriodaphnia dubia) definitive 48 hour test.**
- **Fathead Minnow (Pimephales promelas) definitive 48 hour test.**

Acute toxicity test data shall be reported as outlined in Section VIII.

II. METHODS

The permittee shall use 40 CFR Part 136 methods. Methods and guidance may be found at:

http://water.epa.gov/scitech/methods/cwa/wet/disk2_index.cfm

The permittee shall also meet the sampling, analysis and reporting requirements included in this protocol. This protocol defines more specific requirements while still being consistent with the Part 136 methods. If, due to modifications of Part 136, there are conflicting requirements between the Part 136 method and this protocol, the permittee shall comply with the requirements of the Part 136 method.

III. SAMPLE COLLECTION

A discharge sample shall be collected. Aliquots shall be split from the sample, containerized and preserved (as per 40 CFR Part 136) for chemical and physical analyses required. The remaining sample shall be measured for total residual chlorine and dechlorinated (if detected) in the laboratory using sodium thiosulfate for subsequent toxicity testing. (Note that EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection.) Grab samples must be used for pH, temperature, and total residual chlorine (as per 40 CFR Part 122.21).

Standard Methods for the Examination of Water and Wastewater describes dechlorination of samples (APHA, 1992). Dechlorination can be achieved using a ratio of 6.7 mg/L anhydrous sodium thiosulfate to reduce 1.0 mg/L chlorine. If dechlorination is necessary, a thiosulfate control (maximum amount of thiosulfate in lab control or receiving water) must also be run in the WET test.

All samples held overnight shall be refrigerated at 1- 6^{o}C.

IV. DILUTION WATER

A grab sample of dilution water used for acute toxicity testing shall be collected from the receiving water at a point immediately upstream of the permitted discharge's zone of influence at a reasonably accessible location. Avoid collection near areas of obvious road or agricultural runoff, storm sewers or other point source discharges and areas where stagnant conditions exist. In the case where an alternate dilution water has been agreed upon an additional receiving water control (0% effluent) must also be tested.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable, an alternate standard dilution water of known quality with a hardness, pH, conductivity, alkalinity, organic carbon, and total suspended solids similar to that of the receiving water may be substituted **AFTER RECEIVING WRITTEN APPROVAL FROM THE PERMIT ISSUING AGENCY(S)**. Written requests for use of an alternate dilution water should be mailed with supporting documentation to the following address:

Director
Office of Ecosystem Protection (CAA)
U.S. Environmental Protection Agency-New England
5 Post Office Sq., Suite 100 (OEP06-5)
Boston, MA 02109-3912

and

Manager
Water Technical Unit (SEW)
U.S. Environmental Protection Agency
5 Post Office Sq., Suite 100 (OES04-4)
Boston, MA 02109-3912

Note: USEPA Region 1 retains the right to modify any part of the alternate dilution water policy stated in this protocol at any time. Any changes to this policy will be documented in the annual DMR posting.

See the most current annual DMR instructions which can be found on the EPA Region 1 website at http://www.epa.gov/region1/enforcement/water/dmr.html *for further important details on alternate dilution water substitution requests.*

It may prove beneficial to have the proposed dilution water source screened for suitability prior to toxicity testing. EPA strongly urges that screening be done prior to set up of a full definitive toxicity test any time there is question about the dilution water's ability to support acceptable performance as outlined in the 'test acceptability' section of the protocol.

V. TEST CONDITIONS

The following tables summarize the accepted daphnid and fathead minnow toxicity test conditions and test acceptability criteria:

EPA NEW ENGLAND EFFLUENT TOXICITY TEST CONDITIONS FOR THE DAPHNID, CERIODAPHNIA DUBIA 48 HOUR ACUTE TESTS[1]

1.	Test type	Static, non-renewal
2.	Temperature (^{o}C)	20 ± 1^{o}C or 25 ± 1^{o}C
3.	Light quality	Ambient laboratory illumination
4.	Photoperiod	16 hour light, 8 hour dark
5.	Test chamber size	Minimum 30 ml
6.	Test solution volume	Minimum 15 ml
7.	Age of test organisms	1-24 hours (neonates)
8.	No. of daphnids per test chamber	5
9.	No. of replicate test chambers per treatment	4
10.	Total no. daphnids per test concentration	20
11.	Feeding regime	As per manual, lightly feed YCT and Selenastrum to newly released organisms while holding prior to initiating test
12.	Aeration	None
13.	Dilution water[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q^{R} or equivalent deionized water and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14.	Dilution series	≥ 0.5, must bracket the permitted RWC
15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution

		series.
16.	Effect measured	Mortality-no movement of body or appendages on gentle prodding
17.	Test acceptability	90% or greater survival of test organisms in dilution water control solution
18.	Sampling requirements	For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples must first be used within 36 hours of collection.
19.	Sample volume required	Minimum 1 liter

Footnotes:

1. Adapted from EPA-821-R-02-012.
2. Standard prepared dilution water must have hardness requirements to generally reflect the characteristics of the receiving water.

EPA NEW ENGLAND TEST CONDITIONS FOR THE FATHEAD MINNOW (PIMEPHALES PROMELAS) 48 HOUR ACUTE TEST[1]

1.	Test Type	Static, non-renewal
2.	Temperature (^{o}C)	20 $\pm$ 1 ^{o} C or 25 $\pm$ 1^{o}C
3.	Light quality	Ambient laboratory illumination
4.	Photoperiod	16 hr light, 8 hr dark
5.	Size of test vessels	250 mL minimum
6.	Volume of test solution	Minimum 200 mL/replicate
7.	Age of fish	1-14 days old and age within 24 hrs of each other
8.	No. of fish per chamber	10
9.	No. of replicate test vessels per treatment	4
10.	Total no. organisms per concentration	40
11.	Feeding regime	As per manual, lightly feed test age larvae using concentrated brine shrimp nauplii while holding prior to initiating test
12.	Aeration	None, unless dissolved oxygen (D.O.) concentration falls below 4.0 mg/L, at which time gentle single bubble aeration should be started at a rate of less than 100 bubbles/min. (Routine D.O. check is recommended.)
13.	dilution water[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q^{R} or equivalent deionized and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14.	Dilution series	$\geq$ 0.5, must bracket the permitted RWC

15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution series.
16.	Effect measured	Mortality-no movement on gentle prodding
17.	Test acceptability	90% or greater survival of test organisms in dilution water control solution
18.	Sampling requirements	For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples are used within 36 hours of collection.
19.	Sample volume required	Minimum 2 liters

Footnotes:

1. Adapted from EPA-821-R-02-012
2. Standard dilution water must have hardness requirements to generally reflect characteristics of the receiving water.

VI. CHEMICAL ANALYSIS

At the beginning of a static acute toxicity test, pH, conductivity, total residual chlorine, oxygen, hardness, alkalinity and temperature must be measured in the highest effluent concentration and the dilution water. Dissolved oxygen, pH and temperature are also measured at 24 and 48 hour intervals in all dilutions. The following chemical analyses shall be performed on the 100 percent effluent sample and the upstream water sample for each sampling event.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3]	x		0.02
Alkalinity	x	x	2.0
pH	x	x	--
Specific Conductance	x	x	--
Total Solids	x		--
Total Dissolved Solids	x		--
Ammonia	x	x	0.1
Total Organic Carbon	x	x	0.5
Total Metals			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02
Other as permit requires			

Notes:

1. Hardness may be determined by:
   - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
     - Method 2340B (hardness by calculation)
     - Method 2340C (titration)
2. Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.
   - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
     - Method 4500-CL E Low Level Amperometric Titration
     - Method 4500-CL G DPD Colorimetric Method
3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing.

VII. TOXICITY TEST DATA ANALYSIS

LC50 Median Lethal Concentration (Determined at 48 Hours)

Methods of Estimation:

- Probit Method
- Spearman-Karber
- Trimmed Spearman-Karber
- Graphical

See the flow chart in Figure 6 on p. 73 of EPA-821-R-02-012 for appropriate method to use on a given data set.

No Observed Acute Effect Level (NOAEL)

See the flow chart in Figure 13 on p. 87 of EPA-821-R-02-012.

VIII. TOXICITY TEST REPORTING

A report of the results will include the following:

- Description of sample collection procedures, site description
- Names of individuals collecting and transporting samples, times and dates of sample collection and analysis on chain-of-custody
- General description of tests: age of test organisms, origin, dates and results of standard toxicant tests; light and temperature regime; other information on test conditions if different than procedures recommended. Reference toxicant test data should be included.
- All chemical/physical data generated. (Include minimum detection levels and minimum quantification levels.)
- Raw data and bench sheets.
- Provide a description of dechlorination procedures (as applicable).
- Any other observations or test conditions affecting test outcome.

NPDES PART II STANDARD CONDITIONS
(January, 2007)

TABLE OF CONTENTS

PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

a. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

b. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any of such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402 (a)(3) or 402 (b)(8) of the CWA is subject to a civil penalty not to exceed $25,000 per day for each violation. Any person who negligently violates such requirements is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both. Any person who knowingly violates such requirements is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

Note: See 40 CFR §122.41(a)(2) for complete "Duty to Comply" regulations.

2. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notifications of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Provide Information

The permittee shall furnish to the Regional Administrator, within a reasonable time, any information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

4. Reopener Clause

The Regional Administrator reserves the right to make appropriate revisions to this permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the CWA in order to bring all discharges into compliance with the CWA.

For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Regional Administrator or Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405 (d) of the CWA. The Regional Administrator or Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or contains a pollutant or practice not limited in the permit.

Federal regulations pertaining to permit modification, revocation and reissuance, and termination are found at 40 CFR §122.62, 122.63, 122.64, and 124.5.

5. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the CWA, or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

6. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges.

7. Confidentiality of Information

a. In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

b. Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee;
(2) Permit applications, permits, and effluent data as defined in 40 CFR §2.302(a)(2).

c. Information required by NPDES application forms provided by the Regional Administrator under 40 CFR §122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

8. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Regional Administrator. (The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

9. State Authorities

Nothing in Part 122, 123, or 124 precludes more stringent State regulation of any activity covered by these regulations, whether or not under an approved State program.

10. Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, or local laws and regulations.

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Bypass

a. Definitions

(1) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

(2) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can be reasonably expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Paragraphs B.4.c. and 4.d. of this section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph D.1.e. of this part (Twenty-four hour reporting).

d. Prohibition of bypass

Bypass is prohibited, and the Regional Administrator may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
(3) i) The permittee submitted notices as required under Paragraph 4.c. of this section.
ii) The Regional Administrator may approve an anticipated bypass, after considering its adverse effects, if the Regional Administrator determines that it will meet the three conditions listed above in paragraph 4.d. of this section.

5. Upset

a. Definition. *Upset* means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph B.5.c. of this section are met. No determination made during

administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The permittee submitted notice of the upset as required in paragraphs D.1.a. and 1.e. (Twenty-four hour notice); and
(4) The permittee complied with any remedial measures required under B.3. above.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

PART II. C. MONITORING REQUIREMENTS

1. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records for monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application except for the information concerning storm water discharges which must be retained for a total of 6 years. This retention period may be extended by request of the Regional Administrator at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

d. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by

imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

2. Inspection and Entry

The permittee shall allow the Regional Administrator or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

PART II. D. REPORTING REQUIREMENTS

1. Reporting Requirements

a. Planned Changes. The permittee shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR§122.29(b); or
(2) The alteration or addition could significantly change the nature or increase the quantities of the pollutants discharged. This notification applies to pollutants which are subject neither to the effluent limitations in the permit, nor to the notification requirements at 40 CFR§122.42(a)(1).
(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition or change may justify the application of permit conditions different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Anticipated noncompliance. The permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Regional Administrator. The Regional Administrator may require modification or revocation and reissuance of the permit to change the name of the permittee and

incorporate such other requirements as may be necessary under the CWA. (See 40 CFR Part 122.61; in some cases, modification or revocation and reissuance is mandatory.)

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

(2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. Twenty-four hour reporting.

(1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information which must be reported within 24 hours under this paragraph.

(a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
(b) Any upset which exceeds any effluent limitation in the permit.
(c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Regional Administrator in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)

(3) The Regional Administrator may waive the written report on a case-by-case basis for reports under Paragraph D.1.e. if the oral report has been received within 24 hours.

f. Compliance Schedules. Reports of compliance or noncompliance with, any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

g. Other noncompliance. The permittee shall report all instances of noncompliance not reported under Paragraphs D.1.d., D.1.e., and D.1.f. of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D.1.e. of this section.

h. Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, it shall promptly submit such facts or information.

2. Signatory Requirement

a. All applications, reports, or information submitted to the Regional Administrator shall be signed and certified. (See 40 CFR §122.22)

b. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 2 years per violation, or by both.

3. Availability of Reports.

Except for data determined to be confidential under Paragraph A.8. above, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA.

PART II. E. DEFINITIONS AND ABBREVIATIONS

1. Definitions for Individual NPDES Permits including Storm Water Requirements

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all, State, interstate, and Federal standards and limitations to which a “discharge”, a “sewage sludge use or disposal practice”, or a related activity is subject to, including “effluent limitations”, water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices”, pretreatment standards, and “standards for sewage sludge use and disposal” under Sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of the CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions, or modifications to the forms; or forms approved by EPA for use in "approved States", including any approved modifications or revisions.

Average means the arithmetic mean of values taken at the frequency required for each parameter over the specified period. For total and/or fecal coliforms and Escherichia coli, the average shall be the geometric mean.

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" measured during the calendar week divided by the number of "daily discharges" measured during the week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Best Professional Judgment (BPJ) means a case-by-case determination of Best Practicable Treatment (BPT), Best Available Treatment (BAT), or other appropriate technology-based standard based on an evaluation of the available technology to achieve a particular pollutant reduction and other factors set forth in 40 CFR §125.3 (d).

Coal Pile Runoff means the rainfall runoff from or through any coal storage pile.

Composite Sample means a sample consisting of a minimum of eight grab samples of equal volume collected at equal intervals during a 24-hour period (or lesser period as specified in the section on Monitoring and Reporting) and combined proportional to flow, or a sample consisting of the same number of grab samples, or greater, collected proportionally to flow over that same time period.

Construction Activities - The following definitions apply to construction activities:

(a) Commencement of Construction is the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

(b) Dedicated portable asphalt plant is a portable asphalt plant located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject to the asphalt emulsion effluent limitation guideline at 40 CFR Part 443.

(c) Dedicated portable concrete plant is a portable concrete plant located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

(d) Final Stabilization means that all soil disturbing activities at the site have been complete, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

(e) Runoff coefficient means the fraction of total rainfall that will appear at the conveyance as runoff.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility except for infrequent shutdowns for maintenance, process changes, or similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, and Pub. L. 97-117; 33 USC §§1251 et seq.

Daily Discharge means the discharge of a pollutant measured during the calendar day or any other 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Director normally means the person authorized to sign NPDES permits by EPA or the State or an authorized representative. Conversely, it also could mean the Regional Administrator or the State Director as the context requires.

Discharge Monitoring Report Form (DMR) means the EPA standard national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by "approved States" as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

Discharge of a pollutant means:

(a) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source", or

(b) Any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation (See "Point Source" definition).

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead

to a treatment works; and discharges through pipes, sewers, or other conveyances leading into privately owned treatment works.

This term does not include an addition of pollutants by any "indirect discharger."

Effluent limitation means any restriction imposed by the Regional Administrator on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States", the waters of the "contiguous zone", or the ocean.

Effluent limitation guidelines means a regulation published by the Administrator under Section 304(b) of CWA to adopt or revise "effluent limitations".

EPA means the United States "Environmental Protection Agency".

Flow-weighted composite sample means a composite sample consisting of a mixture of aliquots where the volume of each aliquot is proportional to the flow rate of the discharge.

Grab Sample – An individual sample collected in a period of less than 15 minutes.

Hazardous Substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the CWA.

Indirect Discharger means a non-domestic discharger introducing pollutants to a publicly owned treatment works.

Interference means a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

(a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(b) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act (CWA), the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resources Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SDWA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection Research and Sanctuaries Act.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

Land application unit means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

Large and Medium municipal separate storm sewer system means all municipal separate storm sewers that are either: (i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and 40 CFR Part 122); or (ii) located in the counties with unincorporated urbanized

populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships, or towns within such counties (these counties are listed in Appendices H and I of 40 CFR 122); or (iii) owned or operated by a municipality other than those described in Paragraph (i) or (ii) and that are designated by the Regional Administrator as part of the large or medium municipal separate storm sewer system.

Maximum daily discharge limitation means the highest allowable "daily discharge" concentration that occurs only during a normal day (24-hour duration).

Maximum daily discharge limitation (as defined for the Steam Electric Power Plants only) when applied to Total Residual Chlorine (TRC) or Total Residual Oxidant (TRO) is defined as "maximum concentration" or "Instantaneous Maximum Concentration" during the two hours of a chlorination cycle (or fraction thereof) prescribed in the Steam Electric Guidelines, 40 CFR Part 423. These three synonymous terms all mean "a value that shall not be exceeded" during the two-hour chlorination cycle. This interpretation differs from the specified NPDES Permit requirement, 40 CFR § 122.2, where the two terms of "Maximum Daily Discharge" and "Average Daily Discharge" concentrations are specifically limited to the daily (24-hour duration) values.

Municipality means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribe organization, or a designated and approved management agency under Section 208 of the CWA.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program".

New Discharger means any building, structure, facility, or installation:

(a) From which there is or may be a "discharge of pollutants";

(b) That did not commence the "discharge of pollutants" at a particular "site" prior to August 13, 1979;

(c) Which is not a "new source"; and

(d) Which has never received a finally effective NPDES permit for discharges at that "site".

This definition includes an "indirect discharger" which commences discharging into "waters of the United States" after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a "site" for which it does not have a permit; and any offshore rig or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a "site" under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be in an area of biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR §§125.122 (a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a "new discharger" only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants", the construction of which commenced:

(a) After promulgation of standards of performance under Section 306 of CWA which are applicable to such source, or

(b) After proposal of standards of performance in accordance with Section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.

NPDES means "National Pollutant Discharge Elimination System".

Owner or operator means the owner or operator of any "facility or activity" subject to regulation under the NPDES programs.

Pass through means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved" State.

Person means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to any pipe ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 CFR §122.2).

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §§2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Primary industry category means any industry category listed in the NRDC settlement agreement (Natural Resources Defense Council et al. v. Train, 8 E.R.C. 2120 (D.D.C. 1976), modified 12 E.R.C. 1833 (D. D.C. 1979)); also listed in Appendix A of 40 CFR Part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operation is not the operator of the treatment works or (b) not a "POTW".

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Publicly Owned Treatment Works (POTW) means any facility or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a "State" or "municipality".

This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Regional Administrator means the Regional Administrator, EPA, Region I, Boston, Massachusetts.

Secondary Industry Category means any industry which is not a "primary industry category".

Section 313 water priority chemical means a chemical or chemical category which:

(1) is listed at 40 CFR §372.65 pursuant to Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986);

(2) is present at or above threshold levels at a facility subject to EPCRA Section 313 reporting requirements; and

(3) satisfies at least one of the following criteria:

(i) are listed in Appendix D of 40 CFR Part 122 on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols), or Table V (certain toxic pollutants and hazardous substances);
(ii) are listed as a hazardous substance pursuant to Section 311(b)(2)(A) of the CWA at 40 CFR §116.4; or
(iii) are pollutants for which EPA has published acute or chronic water quality criteria.

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage Sludge means any solid, semisolid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, Type III Marine Sanitation Device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Significant materials includes, but is not limited to: raw materials, fuels, materials such as solvents, detergents, and plastic pellets, raw materials used in food processing or production, hazardous substance designated under section 101(14) of CERCLA, any chemical the facility is required to report pursuant to EPCRA Section 313, fertilizers, pesticides, and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills includes, but is not limited to, releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 CFR §110.10 and §117.21) or Section 102 of CERCLA (see 40 CFR § 302.4).

Sludge-only facility means any "treatment works treating domestic sewage" whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to Section 405(d) of the CWA, and is required to obtain a permit under 40 CFR §122.1(b)(3).

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands.

Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Storm water discharge associated with industrial activity means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. (See 40 CFR §122.26 (b)(14) for specifics of this definition.

Time-weighted composite means a composite sample consisting of a mixture of equal volume aliquots collected at a constant time interval.

Toxic pollutants means any pollutant listed as toxic under Section 307 (a)(1) or, in the case of "sludge use or disposal practices" any pollutant identified in regulations implementing Section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or wastewater treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices.

For purposes of this definition, "domestic sewage" includes waste and wastewater from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under Section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR Part 503 as a "treatment works treating domestic sewage", where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR Part 503.

Waste Pile means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Waters of the United States means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide;

(b) All interstate waters, including interstate "wetlands";

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands", sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purpose;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in Paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in Paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole Effluent Toxicity (WET) means the aggregate toxic effect of an effluent measured directly by a toxicity test. (See Abbreviations Section, following, for additional information.)

2. Definitions for NPDES Permit Sludge Use and Disposal Requirements.

Active sewage sludge unit is a sewage sludge unit that has not closed.

Aerobic Digestion is the biochemical decomposition of organic matter in sewage sludge into carbon dioxide and water by microorganisms in the presence of air.

Agricultural Land is land on which a food crop, a feed crop, or a fiber crop is grown. This includes range land and land used as pasture.

Agronomic rate is the whole sludge application rate (dry weight basis) designed:

(1) To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and

(2) To minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.

Air pollution control device is one or more processes used to treat the exit gas from a sewage sludge incinerator stack.

Anaerobic digestion is the biochemical decomposition of organic matter in sewage sludge into methane gas and carbon dioxide by microorganisms in the absence of air.

Annual pollutant loading rate is the maximum amount of a pollutant that can be applied to a unit area of land during a 365 day period.

Annual whole sludge application rate is the maximum amount of sewage sludge (dry weight basis) that can be applied to a unit area of land during a 365 day period.

Apply sewage sludge or sewage sludge applied to the land means land application of sewage sludge.

Aquifer is a geologic formation, group of geologic formations, or a portion of a geologic formation capable of yielding ground water to wells or springs.

Auxiliary fuel is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, and municipal solid waste (not to exceed 30 percent of the dry weight of the sewage sludge and auxiliary fuel together). Hazardous wastes are not auxiliary fuel.

Base flood is a flood that has a one percent chance of occurring in any given year (i.e. a flood with a magnitude equaled once in 100 years).

Bulk sewage sludge is sewage sludge that is not sold or given away in a bag or other container for application to the land.

Contaminate an aquifer means to introduce a substance that causes the maximum contaminant level for nitrate in 40 CFR §141.11 to be exceeded in ground water or that causes the existing concentration of nitrate in the ground water to increase when the existing concentration of nitrate in the ground water exceeds the maximum contaminant level for nitrate in 40 CFR §141.11.

Class I sludge management facility is any publicly owned treatment works (POTW), as defined in 40 CFR §501.2, required to have an approved pretreatment program under 40 CFR §403.8 (a) (including any POTW located in a state that has elected to assume local program responsibilities pursuant to 40 CFR §403.10 (e) and any treatment works treating domestic sewage, as defined in 40 CFR § 122.2,

classified as a Class I sludge management facility by the EPA Regional Administrator, or, in the case of approved state programs, the Regional Administrator in conjunction with the State Director, because of the potential for sewage sludge use or disposal practice to affect public health and the environment adversely.

Control efficiency is the mass of a pollutant in the sewage sludge fed to an incinerator minus the mass of that pollutant in the exit gas from the incinerator stack divided by the mass of the pollutant in the sewage sludge fed to the incinerator.

Cover is soil or other material used to cover sewage sludge placed on an active sewage sludge unit.

Cover crop is a small grain crop, such as oats, wheat, or barley, not grown for harvest.

Cumulative pollutant loading rate is the maximum amount of inorganic pollutant that can be applied to an area of land.

Density of microorganisms is the number of microorganisms per unit mass of total solids (dry weight) in the sewage sludge.

Dispersion factor is the ratio of the increase in the ground level ambient air concentration for a pollutant at or beyond the property line of the site where the sewage sludge incinerator is located to the mass emission rate for the pollutant from the incinerator stack.

Displacement is the relative movement of any two sides of a fault measured in any direction.

Domestic septage is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

Domestic sewage is waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works.

Dry weight basis means calculated on the basis of having been dried at 105 degrees Celsius (°C) until reaching a constant mass (i.e. essentially 100 percent solids content).

Fault is a fracture or zone of fractures in any materials along which strata on one side are displaced with respect to the strata on the other side.

Feed crops are crops produced primarily for consumption by animals.

Fiber crops are crops such as flax and cotton.

Final cover is the last layer of soil or other material placed on a sewage sludge unit at closure.

Fluidized bed incinerator is an enclosed device in which organic matter and inorganic matter in sewage sludge are combusted in a bed of particles suspended in the combustion chamber gas.

Food crops are crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.

Forest is a tract of land thick with trees and underbrush.

Ground water is water below the land surface in the saturated zone.

Holocene time is the most recent epoch of the Quaternary period, extending from the end of the Pleistocene epoch to the present.

Hourly average is the arithmetic mean of all the measurements taken during an hour. At least two measurements must be taken during the hour.

Incineration is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

Industrial wastewater is wastewater generated in a commercial or industrial process.

Land application is the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

Land with a high potential for public exposure is land that the public uses frequently. This includes, but is not limited to, a public contact site and reclamation site located in a populated area (e.g., a construction site located in a city).

Land with low potential for public exposure is land that the public uses infrequently. This includes, but is not limited to, agricultural land, forest and a reclamation site located in an unpopulated area (e.g., a strip mine located in a rural area).

Leachate collection system is a system or device installed immediately above a liner that is designed, constructed, maintained, and operated to collect and remove leachate from a sewage sludge unit.

Liner is soil or synthetic material that has a hydraulic conductivity of 1×10^{-7} centimeters per second or less.

Lower explosive limit for methane gas is the lowest percentage of methane gas in air, by volume, that propagates a flame at 25 degrees Celsius and atmospheric pressure.

Monthly average (Incineration) is the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month.

Monthly average (Land Application) is the arithmetic mean of all measurements taken during the month.

Municipality means a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created by or under State law; an Indian tribe or an authorized Indian tribal organization having jurisdiction over sewage sludge management; or a designated and approved management agency under section 208 of the CWA, as amended. The definition includes a special district created under state law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity, or an integrated waste management facility as defined in section 201 (e) of the CWA, as amended, that has as one of its principal responsibilities the treatment, transport, use or disposal of sewage sludge.

Other container is either an open or closed receptacle. This includes, but is not limited to, a bucket, a box, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

Pasture is land on which animals feed directly on feed crops such as legumes, grasses, grain stubble, or stover.

Pathogenic organisms are disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.

Permitting authority is either EPA or a State with an EPA-approved sludge management program.

Person is an individual, association, partnership, corporation, municipality, State or Federal Agency, or an agent or employee thereof.

Person who prepares sewage sludge is either the person who generates sewage sludge during the treatment of domestic sewage in a treatment works or the person who derives a material from sewage sludge.

pH means the logarithm of the reciprocal of the hydrogen ion concentration; a measure of the acidity or alkalinity of a liquid or solid material.

Place sewage sludge or sewage sludge placed means disposal of sewage sludge on a surface disposal site.

Pollutant (as defined in sludge disposal requirements) is an organic substance, an inorganic substance, a combination or organic and inorganic substances, or pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could on the basis on information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction) or physical deformations in either organisms or offspring of the organisms.

Pollutant limit (for sludge disposal requirements) is a numerical value that describes the amount of a pollutant allowed per unit amount of sewage sludge (e.g., milligrams per kilogram of total solids); the amount of pollutant that can be applied to a unit of land (e.g., kilograms per hectare); or the volume of the material that can be applied to the land (e.g., gallons per acre).

Public contact site is a land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

Qualified ground water scientist is an individual with a baccalaureate or post-graduate degree in the natural sciences or engineering who has sufficient training and experience in ground water hydrology and related fields, as may be demonstrated by State registration, professional certification, or completion of accredited university programs, to make sound professional judgments regarding ground water monitoring, pollutant fate and transport, and corrective action.

Range land is open land with indigenous vegetation.

Reclamation site is drastically disturbed land that is reclaimed using sewage sludge. This includes, but is not limited to, strip mines and construction sites.

Risk specific concentration is the allowable increase in the average daily ground level ambient air concentration for a pollutant from the incineration of sewage sludge at or beyond the property line of a site where the sewage sludge incinerator is located.

Runoff is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off the land surface.

Seismic impact zone is an area that has 10 percent or greater probability that the horizontal ground level acceleration to the rock in the area exceeds 0.10 gravity once in 250 years.

Sewage sludge is a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to:, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in treatment works.

Sewage sludge feed rate is either the average daily amount of sewage sludge fired in all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located for the number of days in a 365 day period that each sewage sludge incinerator operates, or the average daily design capacity for all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located.

Sewage sludge incinerator is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

Sewage sludge unit is land on which only sewage sludge is placed for final disposal. This does not include land on which sewage sludge is either stored or treated. Land does not include waters of the United States, as defined in 40 CFR §122.2.

Sewage sludge unit boundary is the outermost perimeter of an active sewage sludge unit.

Specific oxygen uptake rate (SOUR) is the mass of oxygen consumed per unit time per unit mass of total solids (dry weight basis) in sewage sludge.

Stack height is the difference between the elevation of the top of a sewage sludge incinerator stack and the elevation of the ground at the base of the stack when the difference is equal to or less than 65 meters. When the difference is greater than 65 meters, stack height is the creditable stack height determined in accordance with 40 CFR §51.100 (ii).

State is one of the United States of America, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and an Indian tribe eligible for treatment as a State pursuant to regulations promulgated under the authority of section 518(e) of the CWA.

Store or storage of sewage sludge is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.

Surface disposal site is an area of land that contains one or more active sewage sludge units.

Total hydrocarbons means the organic compounds in the exit gas from a sewage sludge incinerator stack measured using a flame ionization detection instrument referenced to propane.

Total solids are the materials in sewage sludge that remain as residue when the sewage sludge is dried at 103 to 105 degrees Celsius.

Treat or treatment of sewage sludge is the preparation of sewage sludge for final use or disposal. This includes, but is not limited to, thickening, stabilization, and dewatering of sewage sludge. This does not include storage of sewage sludge.

Treatment works is either a federally owned, publicly owned, or privately owned device or system used to treat (including recycle and reclaim) either domestic sewage or a combination of domestic sewage and industrial waste of a liquid nature.

Unstable area is land subject to natural or human-induced forces that may damage the structural components of an active sewage sludge unit. This includes, but is not limited to, land on which the soils are subject to mass movement.

Unstabilized solids are organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Vector attraction is the characteristic of sewage sludge that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents.

Volatile solids is the amount of the total solids in sewage sludge lost when the sewage sludge is combusted at 550 degrees Celsius in the presence of excess air.

Wet electrostatic precipitator is an air pollution control device that uses both electrical forces and water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

Wet scrubber is an air pollution control device that uses water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

3. Commonly Used Abbreviations

BOD	Five-day biochemical oxygen demand unless otherwise specified
CBOD	Carbonaceous BOD
CFS	Cubic feet per second
COD	Chemical oxygen demand
Chlorine	
Cl_2	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)

TRO	Total residual chlorine in marine waters where halogen compounds are present
FAC	Free available chlorine (aqueous molecular chlorine, hypochlorous acid, and hypochlorite ion)
Coliform	
Coliform, Fecal	Total fecal coliform bacteria
Coliform, Total	Total coliform bacteria
Cont. (Continuous)	Continuous recording of the parameter being monitored, i.e. flow, temperature, pH, etc.
Cu. M/day or M^3/day	Cubic meters per day
DO	Dissolved oxygen
kg/day	Kilograms per day
lbs/day	Pounds per day
mg/l	Milligram(s) per liter
ml/l	Milliliters per liter
MGD	Million gallons per day
Nitrogen	
Total N	Total nitrogen
NH_3-N	Ammonia nitrogen as nitrogen
NO_3-N	Nitrate as nitrogen
NO_2-N	Nitrite as nitrogen
NO_3-NO_2	Combined nitrate and nitrite nitrogen as nitrogen
TKN	Total Kjeldahl nitrogen as nitrogen
Oil & Grease	Freon extractable material
PCB	Polychlorinated biphenyl
pH	A measure of the hydrogen ion concentration. A measure of the acidity or alkalinity of a liquid or material
Surfactant	Surface-active agent

Temp. °C	Temperature in degrees Centigrade
Temp. °F	Temperature in degrees Fahrenheit
TOC	Total organic carbon
Total P	Total phosphorus
TSS or NFR	Total suspended solids or total nonfilterable residue
Turb. or Turbidity	Turbidity measured by the Nephelometric Method (NTU)
ug/l	Microgram(s) per liter
WET	"Whole effluent toxicity" is the total effect of an effluent measured directly with a toxicity test.
C-NOEC	"Chronic (Long-term Exposure Test) – No Observed Effect Concentration". The highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specified time of observation.
A-NOEC	"Acute (Short-term Exposure Test) – No Observed Effect Concentration" (see C-NOEC definition).
LC_{50}	LC_{50} is the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC_{50} = 100% is defined as a sample of undiluted effluent.
ZID	Zone of Initial Dilution means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

FACT SHEET

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

NPDES PERMIT NO: **MA0102245**

NAME AND ADDRESS OF PERMITTEE:

The Commonwealth of Massachusetts
Executive Office of Public Safety and Security
Department of Correction

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

MCI – Concord Water Pollution Control Facility
965 Elm Street
Concord, MA 01742

RECEIVING WATERS: **Assabet River (MA82B-07)**

CLASSIFICATION: **Class B - Warm Water Fishery**

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Appendices

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I. PROPOSED ACTION

The above-named applicant has applied to the U.S. Environmental Protection Agency for the re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water.

The draft permit proposes an expiration date five (5) years from the effective date of the final permit.

II. TYPE OF FACILITY AND DISCHARGE LOCATION

The facility's discharge outfalls are listed below:

Outfall	Description of Discharge	Receiving Water	Outfall Location
01	Treated Effluent	Assabet River	42.462600 N, 71.392636 W

MCI Concord is a medium security prison facility that operates a 0.31 million-gallon per day (MGD) wastewater treatment facility serving the prisoner and staff population, a local public works building and state police barracks. This facility serves a population of about 1,600 inmates and staff employees.

III. DESCRIPTION OF DISCHARGE

Quantitative descriptions of the discharge in terms of significant effluent parameters, based on discharge monitoring reports (DMRs) submitted for April 2010 through March 2015 are shown in Appendix A of this fact sheet.

IV. LIMITATIONS AND CONDITIONS

The effluent limitations and monitoring requirements may be found in the draft NPDES permit.

V. PERMIT BASIS AND EXPLANATION OF EFFLUENT LIMITATION DERIVATION

A. PROCESS DESCRIPTION

The on-site water pollution control facility (WPCF) is an extended aeration activated sludge facility. The headworks receive influent flow, which is passed through a shredder and receives lime addition for pH neutralization. This flow is then sent to four parallel extended aeration tanks. The operator adds alum (aluminum sulfate) at a point prior to the aeration tanks, which reduces phosphorus levels through the treatment process. Following the aeration tanks are four clarifiers which remove solids, followed by chlorination in a contact chamber. The facility uses a portable sodium bisulfite tank for dechlorination. See Figure 2 for a schematic of the facility operations.

Sludge is thickened by belt filtration, with the aid of polymer. It is then picked up twice per week at about 5,000 gallons per load. MCI Concord sends sludge to the Upper Blackstone Wastewater Treatment Facility in Millbury, Massachusetts for incineration.

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Overview of Federal and State Regulations

EPA is issuing this permit pursuant to Section 402(a) of the Clean Water Act (CWA). The Commonwealth of Massachusetts is also issuing this permit pursuant to Massachusetts General Laws ch. 21, § 43 (2004).

The CWA prohibits the discharge of pollutants to waters of the United States without a NPDES permit unless such a discharge is otherwise authorized by the CWA. The NPDES permit is the mechanism used to implement technology and water quality-based effluent limitations and other requirements including monitoring and reporting. The draft NPDES permit was developed in accordance with various statutory and regulatory requirements established pursuant to the CWA and any applicable State administrative rules. The regulations governing EPA's NPDES permit program are generally found in 40 CFR Parts 122, 124, 125 and 136.

EPA is required to consider technology and water quality-based requirements when developing permit limits. The technology-based limits for publicly owned treatment works (POTWs) are based on secondary treatment and are found in 40 CFR Part 133.

Section 301(b)(1)(C) of the CWA requires NPDES permits to contain effluent limits more stringent than technology-based limits where more stringent limits are necessary to comply with, among other things, any applicable state or federal water quality standards. EPA's regulations at 40 C.F.R. §122.44(d)(1) require that effluent limits more stringent than technology-based limits be included in permits when necessary to achieve water quality standards. Compliance schedules to meet water quality-based effluent limits may be included in permits only when the state's water quality standards clearly authorize such schedules and when the limits are established to meet a water quality standard that is adopted, revised, or newly interpreted after July 1, 1977.

A water quality standard consists of three elements: (1) beneficial designated use or uses for a water body or a segment of a water body; (2) numeric and narrative water quality criteria sufficient to protect the assigned designated use(s); and (3) antidegradation requirements to ensure that existing uses and high quality waters are protected and maintained.

The Massachusetts Surface Water Quality Standards (MA SWQS) at 314 CMR 4.00 establish designated uses of the State’s waters, criteria to protect those uses, and an antidegradation provision to ensure that existing uses and high quality waters are protected and maintained. They also include requirements for the regulation and control of toxic constituents and specify that EPA’s recommended water quality criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site-specific criterion is established.

Section 401(a)(1) of the CWA forbids the issuance of a federal license for a discharge to waters of the United States unless the state where the discharge originates either certifies that the discharge will comply with, among other things, state water quality standards, or waives certification. EPA’s regulations at 40 CFR §122.44(d)(3), §124.53 and §124.55 describe the manner in which NPDES permits must conform to conditions contained in state certifications.

Section 402(o) of the CWA and 40 CFR §122.44(l) provide, generally, that the effluent limitations of a renewed, reissued, or modified permit must be at least as stringent as the comparable effluent limitations in the previous permit. Except under certain limited circumstances “backsliding” from effluent limitations contained in previously issued permits is prohibited.

2. Development of Water Quality-based Limits

Receiving stream requirements are established according to numerical and narrative standards adopted under state law for each stream classification. When using chemical-specific numeric criteria from the state's water quality standards to develop permit limits, both the acute and chronic aquatic life criteria are used and expressed in terms of maximum allowable in-stream pollutant concentration. Maximum daily limits are generally derived from the acute aquatic life criteria, and the average monthly limit is generally derived from the chronic aquatic life criteria. Chemical-specific limits are established in accordance with 40 CFR §122.44(d) and §122.45(d).

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that causes or has "reasonable potential" to cause or contribute to an excursion above any water quality criterion. An excursion occurs if the projected or actual instream concentration exceeds the applicable criterion.

In determining reasonable potential, EPA considers: (1) existing controls on point and non-point sources of pollution; (2) pollutant concentration and variability in the effluent and receiving water as determined from the permit application, monthly discharge monitoring reports (DMRs), State and Federal water quality reports; (3) sensitivity of the species to toxicity testing; (4) statistical approach outlined in *Technical Support Document for Water Quality-based Toxics Controls*, March 1991, EPA/505/2-90-001 (TSD) in Section 3; and, where appropriate, (5) dilution of the effluent in the receiving water. In accordance with the MA SWQS [314 CMR 4.03(3)], available dilution for rivers and streams is based on a known or estimated value of the lowest mean flow which occurs for seven (7) consecutive days with a recurrence interval of once in ten (10) years (7Q10).

3. Water Quality Standards; Designated Use; Outfall 001

The Assabet River is classified in the MA SWQS (314 CMR 4.00) as a Class B-warm water fishery. Class B waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions. They are also designated for primary and secondary contact recreation. Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.

A warm water fishery is defined in the MA SWQS (314 CMR 4.02) as a water in which the maximum mean monthly temperature generally exceeds 68° F (20° C) during the summer months and is not capable of sustaining a year-round population of cold water stenothermal aquatic life.

Section 303(d) of the CWA requires states to identify those waterbodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDLs). The segment of the Assabet River receiving the MCI Concord WPCF discharge (MA82B-07) is listed on the Massachusetts 2012 Integrated List of Waters (303d) as Category 5, requiring a TMDL for phosphorus and fecal coliform. An Assabet River phosphorus TMDL has been completed and approved, and is described in further detail in the Total Phosphorus section of this Fact Sheet (Section 6.B.). MassDEP has released a Draft Pathogen TMDL for the Concord River watershed, which includes the Assabet River. This TMDL is discussed further in the *E. coli* section of this Fact Sheet (Section 5.D.)

4. Design Flow, 7Q10, and Available Dilution

Effluent Flow

Sewage treatment plant discharge is encompassed within the definition of "pollutant" and is subject to regulation under the CWA. The CWA defines "pollutant" to mean, *inter alia*, "municipal . . . waste" and "sewage…discharged into water." 33 U.S.C. § 1362(6).

EPA may use design flow of effluent to both determine the necessity for effluent limitations in the permit that comply with the Act, and to calculate the limits themselves. EPA practice is to use design flow as a reasonable and important worst-case condition in EPA's reasonable potential and water quality-based effluent limitation (WQBEL) calculations to ensure compliance with water quality standards under Section 301(b)(1)(C). Should the effluent discharge flow exceed the flow assumed in these calculations, the instream dilution would decrease and the calculated effluent limits would not be protective of WQS. Further, pollutants that did not have the reasonable potential to exceed WQS at the lower discharge flow may have reasonable potential at a higher flow due to the decreased dilution. In order to ensure that the assumptions underlying the Region's reasonable potential analyses and derivation of permit effluent limitations remain sound for the duration of the permit, the Region may ensure its "worst-case" effluent wastewater flow assumption through imposition of permit conditions for effluent flow. Thus, the effluent flow limit is a component of WQBELs because the WQBELs are premised on a maximum level of flow. In addition, the flow limit is necessary to ensure that other pollutants remain at levels that do not have a reasonable potential to exceed WQS.

Using a facility's design flow in the derivation of pollutant effluent limitations, including conditions to limit wastewater effluent flow, is fully consistent with, and anticipated by NPDES permit regulations. Regarding the calculation of effluent limitations for POTWs, 40 CFR § 122.45(b)(1) provides, "permit effluent limitations…shall be calculated based on design flow." POTW permit applications are required to include the design flow of the treatment facility. *Id.* § 122.21(j)(1)(vi).

Similarly, EPA's reasonable potential regulations require EPA to consider "where appropriate, the dilution of the effluent in the receiving water," 40 CFR § 122.44(d)(1)(ii), which is a function of *both* the wastewater effluent flow and receiving water flow. EPA guidance directs that this "reasonable potential" analysis be based on "worst-case" conditions. EPA accordingly is authorized to carry out its reasonable potential calculations by presuming that a plant is operating at its design flow when assessing reasonable potential.

The limitation on sewage effluent flow is within EPA's authority to condition a permit in order to carry out the objectives of the Act. *See* CWA §§ 402(a)(2) and 301(b)(1)(C); 40 CFR §§ 122.4(a) and (d); 122.43 and 122.44(d). A condition on the discharge designed to protect EPA's WQBEL and reasonable potential calculations is encompassed by the references to "condition" and "limitations" in 402 and 301 and implementing regulations, as they are designed to assure compliance with applicable water quality regulations, including antidegradation. Regulating the quantity of pollutants in the discharge through a restriction on the quantity of wastewater effluent is consistent with the overall structure and purposes of the CWA.

In addition, as provided in Part II.B.1 and 40 CFR § 122.41(e), the permittee is required to properly operate and maintain all facilities and systems of treatment and control. Operating the facilities wastewater treatment systems as designed includes operating within the facility's design effluent flow. Thus, the permit's effluent flow limitation is necessary to ensure proper facility operation, which in turn is a requirement applicable to all NPDES permits. *See* 40 CFR § 122.41.

The current permit contains a flow limit of 0.31 MGD, equal to the design flow, expressed as a 12-month rolling average. From April 2010 through March 2015, the range of 12-month average effluent flow was from 0.202 MGD to 0.235 MGD, averaging 0.23 MGD. No violation of the 12-month rolling average

flow limit occurred during the specified review period. The draft permit carries forward the 12-month rolling average flow limit of 0.31 MGD.

7Q10
Water quality-based limitations are established with the use of a calculated available dilution. 314 § CMR 4.03(3)(a) requires that effluent dilution be calculated based on the receiving water 7Q10. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10-year recurrence interval. The 7Q10 streamflows were determined using the gaged flows for the selected period of record and DFlow 3.1b, a streamflow modeling computer program.

Maynard, MA USGS gage (01097000), 7Q10 for 4/1/1984 – 04/01/2014 (30 years): **12.8 cfs** (drainage area = 109 mi^2)

Natural Baseflow factor for the Assabet River from the downstream of the headwaters impoundment to Maynard:
= Maynard gage 7Q10 – WWTF effluent flows* = net baseflow
(12.8 cfs – 12.14 cfs) / 109 square miles = **0.006 cfs/sq. mile**

The flow factor for the Maynard USGS gage is the 7Q10 flow divided by the drainage area in square miles. This number, along with the drainage area of the outfall (168 square miles), is used to interpolate the amount of 7Q10 flow added between the gage and the outfall.

Estimated 7Q10 flow at MCI Concord = Maynard gage 7Q10 + [(168 square miles – 109 square miles) x 0.006 cfs/sq. mile] = 13.2 cfs

12.8 cfs + (59 square miles x 0.006 cfs/sq. mile) = 13.2 cfs

*This is the sum of the monthly average effluent flow from the four WWTPs upstream of the Maynard gage for September 2010, which was the month with the lowest streamflow over the past 5 years.

Table 1. Average monthly effluent flows on the Assabet River in September 2010.

Facility Name	September 2010 Monthly Average Effluent Flow, cfs
Westborough WWTP	7.45
Hudson WWTF	2.21
Marlborough Westerly Waste Treatment Works	2.48
Sum	**12.14 cfs**

Design Flow Dilution:

Design Flow = 0.31 MGD x 1.547 cfs/MGD** = 0.48 cfs

$$\frac{\text{Design flow + 7Q10 flow}}{\text{Design flow}} = \frac{\text{0.48 cfs + 13.2 cfs}}{\text{0.48 cfs}} = \textbf{28.5 =} \text{ Dilution Factor}$$

**This is the conversion factor between cubic feet per second and million gallons per day.

5. Conventional Pollutants: BOD_5, TSS, pH, and E. coli

a) Biochemical Oxygen Demand (BOD5)

Under Section 301(b)(1)(B) of the CWA, POTWs must have achieved effluent limitations based on secondary treatment by July 1, 1977. The secondary treatment requirements are set forth at 40 CFR Part 133. Effluent limitations for monthly and weekly average Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS) are based on requirements under Section 301(b)(1)(B) of the CWA and 40 CFR 133.102. 40 CFR Part 133.102 also requires that the 30-day average percent removal of BOD_5 be no less than 85%.

The BOD_5 concentration limits in the current (2005) permit are 15 milligrams per liter (mg/L or parts per million) average monthly, 25 mg/L average weekly, and 30 mg/L maximum daily. These limits are more protective than the secondary treatment requirements, which are 30 mg/L for a monthly average and 45 mg/L for a weekly average. These limits were first established in a previous permit to ensure that water quality standards for dissolved oxygen were achieved in the Assabet River.

From April 2010 through March 2015, the reported monthly average BOD_5 concentration ranged from 1.4 mg/L to 10 mg/L, and the average weekly BOD_5 concentration ranged from 1.8 mg/L to 24 mg/L. There were no violations of the BOD_5 concentration limits.

In 1993, facility upgrades increased the design flow from 0.162 MGD to 0.31 MGD. In accordance with antibacksliding requirements, the BOD_5 load limits based on 0.162 MGD design flow continued into the current permit: 20 lbs/day average monthly and 34 lbs/day average weekly. The monthly average BOD loading ranged from 2 lbs/day to 19 lbs/day, and the weekly average loading ranged from 3 lbs/day to 48 lbs/day, with one violation in December 2010. The average BOD percent removal was 96.0% with no violations during the review period. The same limits in the current permit be carried over into the draft permit in accordance with antibacksliding provisions. The monitoring frequency remains once per week.

Monthly average mass limit, lbs/day = (flow, MGD)(monthly average limit, mg/L)(8.34)
= (0.162 MGD)(15 mg/L)(8.34)
= 20 lbs/day

Weekly average mass limit, lbs/day = (flow, MGD)(weekly average limit, mg/L)(8.34)
= (0.162 MGD)(25 mg/L)(8.34)
= 34 lbs/day

b) Total Suspended Solids (TSS)

The TSS limits in the current permit are 15 mg/L average monthly, 25 mg/L average weekly, and 30 mg/L maximum daily. These limits are the same as the water quality-based limits for BOD_5 discussed above and were established at the same time. The load limits are 20 pounds per day average monthly and 34 pounds per day average weekly, and were calculated the same way as the BOD limits discussed above.

The TSS limits in the draft permit are the same as those in the current permit, in accordance with antibacksliding provisions. Monitoring frequency remains once per week.

From April 2010 through March 2015, the monthly average TSS concentration ranged from 0.4 mg/L to 4 mg/L, and the average weekly TSS concentration ranged from 0.7 mg/L to 10 mg/L. The monthly average TSS loading ranged from 1 lbs/day to 10 lbs/day, and the weekly average loading ranged from 1 lbs/day to 22 lbs/day. The TSS removal percentage average was 97.9%. There were no TSS effluent violations during the April 2010 through March 2015 review period.

c) pH

The current permit contains pH limitations that are required by state water quality standards. The minimum pH limit is 6.5 standard units (s.u.), and the maximum pH limit is 8.3 s.u. There was one violation of the minimum pH limit in June 2010. There were no violations of the maximum pH limit from April 2010 through March 2015.

The draft permit includes pH limitations carried forward from the current permit, which are at least as stringent as pH limitations set forth at 40 C.F.R. § 133.102(c). The pH of the effluent shall not be less than 6.5 or greater than 8.3 standard units at any time. The monitoring frequency is once per day.

d) Escherichia coli (E. coli)

The current permit contains fecal coliform limits of 200 colony-forming units per 100 milliliters of water (cfu/100 mL) as a monthly geometric mean and a single sample maximum of 400 cfu/100 mL. From April 2010 through March 2015, there were six exceedances of the single sample limit, and one exceedance of the monthly geometric mean limit. Data for June 2011, March 2012, and August 2012 were also missing.

The Commonwealth of Massachusetts promulgated *E. coli* criteria in the MA SWQS (314 CMR 4.00) on December 29, 2006, replacing the fecal coliform bacteria criteria. These new criteria were approved by EPA on September 27, 2007.

As described earlier, MassDEP has released a Draft Pathogen TMDL for the Concord River watershed, which includes the Assabet River watershed. The Wasteload Allocation (WLA) for wastewater treatment facilities discharging to Class B waters is "shall not exceed a geometric mean of 200 organisms in any set of representative samples, nor shall 10% of the samples exceed 400 organisms, or shall be consistent with the …NPDES permit." These thresholds are derived from the previous Class B freshwater pathogen criteria that used fecal coliform as the indicator organism.

To be consistent with the current MA SWQS, the draft permit is based on the updated pathogen criteria for Class B freshwaters, which use *E. coli*. EPA believes these limits are consistent with the TMDL because that they will ensure that the discharge achieves water quality the criteria established by the Commonwealth to protect Class B uses.

The *E. coli* limits proposed in the draft permit for Outfall 001 are a monthly geometric mean of 126 colony forming units per 100 mL (cfu/100 mL) and a daily maximum of 409 cfu/100 mL (this is the 90% distribution of the geometric mean of 126 cfu/100 mL). This limit is effective year-round. The proposed *E. coli* monitoring frequency in the draft permit is three times per week. The draft permit requires that *E. coli* samples be collected at the same time as one of the total residual chlorine samples.

e) Dissolved Oxygen

Dissolved oxygen is often a limiting factor in aquatic ecosystems. Absence of dissolved oxygen in the water column can fundamentally change the macroinvertebrate and fish communities, and rapid drops in dissolved oxygen can cause fish kills. The MA SWQS require that Class B warm water fisheries have dissolved oxygen of at least 5.0 mg/L (314 CMR 4.05(3)(b)(1)).

The current permit contains a dissolved oxygen limit of "not less than 5.0 mg/L". From the period of April 2010 through March 2015, there were four violations of the dissolved oxygen minimum limit, in May through July 2010, and November 2011. All of the violations were in the 4.5 – 5.0 mg/l range. The facility has consistently been in compliance since December 2011.

The draft permit carries forward the same dissolved oxygen limits from the current permit, in accordance with antibacksliding provisions. This limit is based on water quality considerations for this segment of the river. The proposed monitoring frequency, once per day, is the same as in the current permit.

6. Non-Conventional Pollutants

a) Total Residual Chlorine

Chlorine is a toxic chemical, and chlorine compounds produced from the disinfection of wastewater can be extremely toxic to aquatic life. The current permit contains an average monthly limit of 0.48 mg/L and a maximum daily limit of 0.82 mg/L, based on water quality criteria and a dilution factor of 43. Monitoring frequency in the current permit is three times per day. There were no total residual chlorine violations from April 2010 through March 2015.

Pursuant to 314 CMR 4.05(5)(e), allowable receiving water concentrations for toxics are those found in *National Recommended Water Quality Criteria 2002* EPA822-R-02-047, November 2002. The acute and chronic water quality criteria for chlorine defined in the 2002 EPA National Recommended Water Quality Criteria for freshwater are 19 micrograms per liter (µg/L, or parts per billion) and 11 µg/L, respectively. Given the revised dilution factor of 28.5, total residual chlorine limits have been recalculated as 0.54 mg/L maximum daily and 0.31 mg/L average monthly. This limit is in effect year-round, and the monitoring frequency is 3 times per day.

Total Residual Chlorine Limitations:

(acute criteria * dilution factor) = Acute limit (Maximum Daily)
(19 µg/L x 28.5) = 541.5 µg/L (0.54 mg/L)

(chronic criteria * dilution factor) = Chronic limit (Monthly Average)
(11 µg/L x 28.5) = 313.5 µg/L (0.31 mg/L)

b) Total Phosphorus

The MA SWQS (314 CMR 4.00) do not contain numeric criteria for total phosphorus. The narrative criteria for nutrients is found at 314 CMR 4.05(5)(c), which states that "[u]nless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs " (314 CMR 4.05(5)(c)). MassDEP has established that a monthly average total phosphorus limit of 0.2 mg/L represents highest and best practical treatment for POTWs.

It is well documented that reaches along the Assabet River suffer from eutrophication, a condition primarily caused by excessive nutrients entering and accumulating in the river. Phosphorus and other nutrients (i.e., nitrogen) promote the growth of nuisance algae and rooted aquatic plants. Typically, elevated levels of nutrients will cause excessive algal and/or plant growth resulting in reduced water clarity and poor aesthetic quality. Also, through respiration and the decomposition of dead plant matter, excessive algae and plant growth can reduce in-stream dissolved oxygen concentrations to levels that could negatively impact aquatic life and/or produce strong unpleasant odors.

The Assabet River Phosphorus Total Maximum Daily Load (TMDL) was finalized in 2004. The TMDL established an adaptive, multi-phase plan. The TMDL included wasteload allocations for the wastewater treatment plants on the river, including the MCI Concord WPCF, which was allocated a wasteload of 1.25 lbs/day, which correlates to an effluent concentration of 0.48 mg/L (~0.5 mg/L) at a design flow of 0.3 MGD. The wasteload allocation was to be applied year-round.

The current permit includes a 60-day rolling average limit of 0.2 mg/L for the months of June through October (phosphorus removal consistent with meeting the limit begins in April). This limit, more protective than the TMDL requires, is based on the highest and best practical treatment (HBPT) requirement of the MA SWQS (see 314 CMR 4.04(5)). From April 2010 through March 2015, there were seven violations of the 0.2 mg/L 60-day average phosphorus limit. Two of these violations were during the 2010 season, and five during 2011. There were no violations from 2012 through 2014. From 2012 through 2014, for the months of April and May, monthly average total phosphorus at outfall 001 ranged from 0.03 mg/L to 0.2 mg/L and for the months of June through October, rolling averages ranged from 0.04 mg/L to 0.4 mg/L.

The 2005 permit also includes a monthly average limit of 1.0 mg/L for the months of November through March. EPA notes that this limit is not consistent with the approved TMDL wasteload allocation of 1.25 lbs/day for these months, and has included the TMDL wasteload allocation limits in the draft permit.

In addition to considering the TMDL wasteload allocation and the Massachusetts HBPT limit, EPA also evaluated the reasonable potential for the discharge to exceed the narrative water quality criteria for phosphorus at critical conditions. To do this, EPA typically uses a mass balance equation to estimate whether the upstream loading of phosphorus at 7Q10 low flow conditions plus the effluent loading at design flow will cause an exceedance of the narrative criteria (which EPA interprets for this situation to be 0.1 mg/L at 7Q10 low flow[1]) downstream of the WWTF outfall. However, in this case, there is little recent phosphorus data in the Assabet River within one mile upstream of the discharge, and water column phosphorus concentrations elsewhere in the river are in flux due to recent WWTF upgrades to improve phosphorus removal. For these reasons, EPA determined that there was not enough information to identify upstream phosphorus concentrations during 7Q10 and estimate the upstream loading of phosphorus. Instead, EPA used the same mass balance equation to test an assumption that the narrative criteria is met at the downstream location at the current effluent limit of 0.2 mg/L. This was done by calculating the highest upstream phosphorus concentration that would ensure attainment of MAWQS with the facility discharging at the design flow of 0.31 MGD and an effluent concentration of 0.2 mg/L.

The mass balance equation shown on the next page yielded a necessary upstream concentration of 96 µg/L or less for the current limits to be protective. Instream sampling of the Assabet River downstream of Maynard WWTF (3.6 miles upstream of MCI Concord), shown in **Table 2**, indicates that the upstream phosphorus concentration at the closest upstream sampling station has been lower than 96 µg/L since June 2012, and exhibits a steady downward trend. Because it is unlikely that the Assabet River upstream of the discharge will reach 0.096 mg/L during the term of the next permit, EPA has determined that the current warm season limit of 0.2 mg/L is sufficiently protective.

[1] EPA's Quality Criteria for Water, 1986. Also known as the "Gold Book."

Necessary Upstream Concentration

$$Q_R C_R = Q_D C_D + Q_S C_S$$

Solving for C_S (upstream concentration), where

Q_R	=	Streamflow below outfall	=	13.68 (effluent + upstream)
C_R	=	Concentration below outfall	=	assumed 0.1 mg/L
Q_D	=	Discharge flow	=	0.48 cfs
C_D	=	Discharge concentration	=	0.2 mg/L
Q_S	=	Upstream flow	=	13.2 cfs

$$C_S = (Q_R C_R - Q_D C_D) / Q_S$$

$$C_S = \frac{(13.68 \text{ cfs} \times 0.1 \text{ mg/L}) - (0.48 \text{ cfs} \times 0.2 \text{ mg/L})}{13.2 \text{ cfs}}$$

C_S = **96 µg/L**

Table 2. Water Column Total Phosphorus at Assabet River station ABT-063 (canoe access at Route 62, Acton, MA) 3.6 Miles Upstream of MCI Concord.

Date	Total Phosphorus (mg/L)
7/15/2012	0.08
8/19/2012	0.06
7/21/2013	0.05
8/18/2013	0.01
7/20/2014	0.02
8/24/2014	0.02

The current permit establishes 0.2 mg/L as a 60-day rolling average. This limit is not consistent with 40 CFR 122.45(d)(2), which requires limitations for POTWs to be established as average weekly and average monthly limitations, unless impracticable. Therefore, EPA has changed the averaging period for the limit to monthly. Based on the reported 60-day average concentrations, which have been well below the 0.2 mg/L limit, EPA believes that MCI Concord could meet an average monthly total phosphorus limit of 0.2 mg/L. As in the current permit, the limit is in effect from April through October.

For the months of November through March, the proposed average monthly limit is 0.5 mg/L and 1.25 lbs/day in accordance with the TMDL. As in the current permit, orthophosphate will be monitored during the winter months at a frequency of once per week to determine the bioavailable concentration of phosphorus in the water column.

Cold season monthly average mass limit, lbs/day = (flow, MGD)(weekly average limit, mg/L)(8.34)
= (0.3)(0.5)(8.34)
= 1.25 lbs/day

The permit also contains a warm weather mass limit based on the proposed average monthly limit and design flow.

Warm season monthly average mass limit, lbs/day = (flow, MGD)(monthly average limit, mg/L)(8.34)
= (0.31)(0.2)(8.34)
= 0.52 lbs/day

Sampling frequency will be three times per week for the months of April through October and once per week for the months of November through March.

c) Ammonia Nitrogen

High levels of ammonia in the water column can be toxic to fish by making it more difficult for fish to excrete this chemical via passive diffusion from gill tissues. Ammonia toxicity varies with pH and temperature. Ammonia can also lower dissolved oxygen levels by conversion to nitrate/nitrate, which consumes oxygen.

The current permit contains ammonia monthly average limits of 7.8 mg/L and 20 lbs/day from May through October. These limits are based on maintaining adequate dissolved oxygen in the water column. From November through April the monthly average and maximum daily concentrations must be reported. These limits are based on the permitted load, 20 lbs/day, when the facility's design flow was 0.162 and the ammonia limit was 15 mg/L. From April 2010 through March 2015, there were no ammonia violations, with reported values far below the 7.8 mg/L and 20 lbs/day limits.

Evaluation of current permit limits
EPA evaluated whether the ammonia limits in the current permit are still protective of aquatic life. The Massachusetts WQS refer to the 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014). The recommended chronic criterion for total ammonia, at a pH of 7.8 and 26 degrees C, is 1.73 mg/L. The acute criterion is based on temperature and the presence or absence of salmonid fish. The acute criterion at this location in the Assabet River is 8.11 mg/L, which is based on instream pH of 7.8 and the presence of salmonids, specifically trout. These criteria apply at the lowest expected 30-day flow in a 10-year interval, also known as the 30Q10.

30Q10 Calculation
Maynard, MA USGS gage (01097000), 30Q10 for 4/1/1984 – 4/1/2014 (30 years): **18.8 cfs** (drainage area = 109 mi^2)

Natural Baseflow factor for the Assabet River from the downstream of the headwaters impoundment to Maynard:
= Maynard gage 30Q10 – WWTF effluent flows* = net baseflow
(18.8 cfs – 12.14 cfs) / 109 square miles = **0.061 cfs/sq. mile**

The flow factor for the Maynard USGS gage is the 30Q10 flow divided by the drainage area in square miles. This number, along with the drainage area of the outfall (168 square miles), is used to interpolate the amount of 30Q10 flow added between the gage and the outfall.

Estimated 30Q10 flow at MCI Concord = Maynard gage 30Q10 + [(168 square miles – 109 square miles) x 0.061 cfs/sq. mile] =

18.8 cfs + (59 square miles x 0.061 cfs/sq. mile) = 22.4 cfs

*This is the sum of the monthly average effluent flow from the four WWTPs upstream of the Maynard gage for September 2010, which was the month with the lowest streamflow over the past 5 years.

Table 3. Average monthly effluent flows on the Assabet River in September 2010.

Facility Name	September 2010 Monthly Average Effluent Flow, cfs
Westborough WWTP	7.45
Hudson WWTF	2.21
Marlborough Westerly Waste Treatment Works	2.48
Sum	**12.14 cfs**

Reasonable Potential Analysis for Summer Ammonia Discharges

$$C_R = \frac{Q_D C_D + Q_S C_S}{Q_R}$$

Solving for C_R (receiving water concentration), where

Q_D = effluent flow, i.e. facility design flow = 0.31 MGD = 0.48 cfs
C_D = effluent pollutant concentration = 7.8 mg/l (current summertime limit)
Q_S = 30Q10 flow of receiving water = 22.4 cfs
C_S = upstream concentration = 0.5 mg/l (1/2 detection limit)
Q_R = receiving water flow = $Q_S + Q_D$ = 0.48 cfs + 22.4 cfs = 22.88 cfs

$$C_R = \frac{(0.48 \text{ cfs} \times 7.8 \text{ mg/l}) + (22.4 \text{ cfs} \times 0.5 \text{ mg/l})}{22.88 \text{cfs}}$$

$C_R = 0.65$ mg/l < 1.73 mg/l (summer chronic criterion)

There is no reasonable potential for the discharge to cause or contribute to an exceedance of the acute or chronic water quality criterion.

Because the limits in the current permit do not cause a violation of the chronic criterion during the summer months, it follows that they do not violate the summer acute criterion (which would require a higher downstream concentration) or the winter chronic criterion (as ammonia is less toxic in colder water and river flows are higher, providing more dilution). These limits, which are 7.8 mg/L and 20 lbs/day from May through October, have been retained in the draft permit. The permittee must report average monthly and maximum daily ammonia nitrogen from the months of November through April, and the monitoring frequency is twice per month.

d) Metals

Certain metals in water can be toxic to aquatic life. The CWA requires EPA to limit toxic metal concentrations in the effluent when metal discharges may result in an exceedance of water quality criteria. An evaluation of the concentration of metals in the facility's effluent (from Whole Effluent Toxicity reports submitted between March 2010 and March 2015) was used to determine reasonable potential for toxicity caused by aluminum, cadmium, copper, lead, nickel and zinc.

Metals may be present in both dissolved and particulate forms in the water column. However, extensive studies suggest that it is the dissolved fraction that is biologically available, and therefore, presents the greatest risk of toxicity to aquatic life inhabiting the water column. This conclusion is widely accepted by the scientific community both within and outside of EPA (Water Quality Standards Handbook: Second Edition, Chapter 3.6 and Appendix J, EPA 1994 [EPA 823-B-94-005a]. Also see http://www.epa.gov/waterscience/standards/ handbook/chapter03.html#section6). As a result, water

quality criteria are established in terms of dissolved metals.

However, many inorganic components of domestic wastewater, including metals, are in the particulate form, and differences in the chemical composition between the effluent and the receiving water affects the partitioning of metals between the particulate and dissolved fractions as the effluent mixes with the receiving water, often resulting in a transition from the particulate to dissolved form (The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion (USEPA 1996 [EPA-823-B96-007]). Consequently, quantifying only the dissolved fraction of metals in the effluent prior to discharge may not accurately reflect the biologically-available portion of metals in the receiving water. Regulations at 40 CFR 122.45(c) require, with limited exceptions, that metals limits in NPDES permits be expressed as total recoverable metals.

The facility's effluent concentrations (from Appendix A) were characterized assuming a lognormal distribution in order to determine the estimated 95th percentile of the daily maximum. For metals with hardness-based water quality criteria, the criteria were determined using the equations in 2002 National Recommended Water Quality Criteria, using the appropriate factors for the individual metals (see table below). The downstream hardness was calculated to be 55 mg/L as $CaCO_3$, using a mass balance equation with the design flow, receiving water at 7Q10, an upstream median hardness of 52 mg/l as $CaCO_3$ and an effluent median hardness of 154 mg/l as $CaCO_3$.

Hardness Mass Balance

$$C_R = \frac{Q_D C_D + Q_S C_S}{Q_R}$$

Solving for C_R (receiving water concentration), where

Q_D = effluent flow, i.e. facility design flow	= 0.31 MGD = 0.48 cfs
C_D = effluent hardness	= 154 mg/l
Q_S = 7Q10 flow of receiving water	= 13.2 cfs
C_S = upstream hardness	= 52 mg/l
Q_R = receiving water flow = $Q_S + Q_D$	= 0.48 cfs + 13.2 cfs = 13.68 cfs

$$C_R = \frac{(0.48 \text{ cfs} \times 154 \text{ mg/l}) + (13.2 \text{ cfs} \times 52 \text{ mg/l})}{13.68}$$

C_R = 55 mg/l (downstream hardness for calculation of certain hardness based metal criteria)

The following table presents the factors used to determine the acute and chronic total recoverable criteria for each metal, with the exceptions of aluminum and copper. The water quality criteria for aluminum are not hardness dependent, and MassDEP has approved site specific copper criteria for the Assabet River.

Table 4. Parameters for Calculating Total Recoverable Metals Criteria
Hardness = 55 mg/L

Metal	Parameters	Total Recoverable Criteria*

	ma	ba	mc	bc	Acute Criteria (CMC) (µg/L)	Chronic Criteria (CCC) (µg/L)
Aluminum	**—**	**—**	**—**	**—**	**750**	**87**
Cadmium	**1.0166**	**-3.9240**	**0.7409**	**-4.7190**	**1.16**	**0.17**
Copper*	**Not applicable – site specific criteria**				**26.8**	**18.9**
Lead	**1.273**	**-1.46**	**1.273**	**-4.705**	**37.97**	**1.48**
Nickel	**0.846**	**2.255**	**0.846**	**0.0584**	**282.06**	**31.36**
Zinc	**0.8473**	**0.884**	**0.8473**	**0.884**	**71.98**	**71.98**

1. Acute Criteria (CMC) = exp{ma*ln(hardness)+ba}
2. Chronic Criteria (CCC) = exp{mc*ln(hardness)+bc}

* Converted to total recoverable with the conversion factor 0.960. Total recoverable = Total dissolved/0.960

**Site specific criteria for copper are 25.7 µg/L (acute) and 18.1 µg/L (chronic) total dissolved copper. Converted to total recoverable in the table above.

In order to determine whether the effluent has the reasonable potential to cause or contribute to an exceedance above the in-stream water quality criteria for each metal, the following mass balance is used to project in-stream metal concentrations downstream from the discharge.

Reasonable Potential Analysis for Metals

$$C_R = \frac{Q_D C_D + Q_S C_S}{Q_R}$$

Solving for C_R (receiving water concentration), where

Q_D = effluent flow, i.e. facility design flow	= 0.31 MGD = 0.48 cfs
C_D = effluent pollutant concentration	= effluent metals concentration in µg/L (95^{th} percentile)
Q_S = 7Q10 flow of receiving water	=13.2 cfs
C_S = upstream concentration	= background in-stream metals concentration in µg/L (median)
Q_R = receiving water flow	= Q_S + Q_D = 0.48 cfs + 13.2 cfs = 13.68 cfs

Table 5. Reasonable Potential Analysis for Metals

Metal	Q_D	C_D (95th Percentile)	Q_S	C_S (Median)	Q_R	$C_R = (Q_D C_D + Q_S C_S)/Q_R$	Criteria		Acute Reasonable Potential	Chronic Reasonable Potential	Limits	
	cfs	µg/L	cfs	µg/L	cfs	µg/L	Acute (µg/L)	Chronic (µg/L)	C_R > Criteria	C_R > Criteria	Acute (µg/L)	Chronic (µg/L)
Aluminum	0.48	374	13.2	85	13.68	95.1	750	87	N	Y	N/A	142.00
Cadmium		<0.5		<0.5		N/A	1.16	0.17	N	N	N/A	N/A
Copper		25.4		8		8.61	28.90	26.80	N	N	N/A	N/A
Lead		3.45		2.1		2.15	37.97	1.48	N	Y	N/A	1.48
Nickel		3.4		2.5*		2.53	282.06	31.36	N	N	N/A	N/A
Zinc		24.9		8.4		9.0	71.98	71.98	N	N	N/A	N/A

Because most of the upstream nickel results were below detection level (<5 µg/L), half of the detection level was used in place of the median for the nickel reasonable potential calculation.

Reasonable potential is then determined by comparing this resultant in-stream concentration (for both acute and chronic conditions) with the criteria for each metal. In EPA's Technical Support Document for Water Quality Based Toxics Control, EPA/505/2-90-001, March 1991, commonly known as the "TSD", box 3-2 describes the statistical approach in determining if there is reasonable potential for an excursion above the maximum allowable concentration (criteria). If there is reasonable potential (for either acute or chronic conditions), the appropriate limit is then calculated by rearranging the above mass balance to solve for the effluent concentration (C_D) using the criterion as the resultant in-stream concentration (C_r). See the table below for the results of this analysis with respect to aluminum, cadmium, chromium, copper, lead, nickel and zinc.

There is reasonable potential for the discharge of aluminum and lead from MCI Concord WPCF to cause or contribute to a violation of water quality standards (see Table 4 on next page). The draft permit includes limits for these two metals: a monthly average aluminum limit of 142 µg/L and a monthly average lead limit of 1.5 µg/L. The proposed monitoring frequency for both metals is once per month. EPA recognizes that the permittee must evaluate its options for achieving the total recoverable aluminum and lead limits. Section E of the draft permit proposes a 48-month compliance schedule with interim alternatives for achieving the limits. As an alternative to including this or an alternative compliance schedule in the permit, EPA is willing to discuss establishing an alternative schedule via an administrative order.

Cadmium was detected both in the discharge (0.9 µg/L) and an upstream sample (0.7 µg/L) in December 2013. All other cadmium samples were below detection level, which is 0.5 µg/L. There is not enough information to determine reasonable potential for cadmium at this time. Because both detections happened in the same month, it is possible that sampling procedures or other factors may have produced a false positive. To better characterize this metal in the discharge, EPA is including a monitoring requirement for total recoverable cadmium at once per month in the draft permit.

Total lead and cadmium analysis shall be performed using EPA Method 200.8 ICP/MS – inductively coupled plasma spectrometry, as this is the only approved method under 40 CFR Part 136 that provides a minimum level of detection (0.2 µg/l) in the range of interest for these metals.

e) Outfall 001 – Whole Effluent Toxicity (WET)

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The MA SWQS include the following narrative statement and require that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria: All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife.

National studies conducted by the EPA have demonstrated that domestic sources contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents, aromatic hydrocarbons and others. Based on the potential for toxicity from domestic sources, the state narrative water quality criterion, the limited dilution at the discharge location, and in accordance with EPA national and regional policy and 40 C.F.R.§ 122.44(d), the draft permit includes a limitation on whole effluent acute toxicity ($LC50 \geq 100\%$). (See also "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants", 49 Fed. Reg. 9016 March 9, 1984, and EPA's "Technical Support Document for Water Quality-Based Toxics Control", September, 1991.)

The draft permit carries forward the requirements for quarterly acute toxicity tests using the species *Pimiphales promelas* and *Ceriodaphnia dubia*. The tests must be performed in accordance with the test procedures and protocols specified in **Permit Attachment A**. The tests will be conducted four times a year, during the following months: March, June, September and December.

MCI Concord's dilution factor is 28.5. The LC_{50} limit of ≥100% is established by EPA/MassDEP policy for facilities with dilution factors between 20 and 100 (See MassDEP's "Implementation Policy for the Control of Toxic Pollutants in Surface Waters, February 23, 1990). MCI Concord had no violations of the acute toxicity limit for the period between March 2010 and March 2015.

VI. UNAUTHORIZED DISCHARGES

The permittee is authorized to discharge only in accordance with the terms and conditions of this permit and only from the outfall(s) listed in Part I.A.1. of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs), are not authorized by the permit and shall be reported in accordance with Part II.D.1.e.(1) of the permit (Twenty-four hour reporting). No SSO discharges have been reported by the permittee to date.

Notification of SSOs to MassDEP shall be made on its SSO Reporting Form (which includes MassDEP Regional Office telephone numbers). The reporting form and instruction for its completion may be found on-line at http://www.mass.gov/eea/agencies/massdep/service/approvals/sanitary-sewer-overflow-bypass-backup-notification.html.

VII. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

The standard permit conditions for "Proper Operation and Maintenance", set forth at 40 CFR §122.41(e), require the proper operation and maintenance of permitted wastewater systems and associated facilities to achieve permit conditions. The requirements at 40 CFR §122.41(d) impose a "duty to mitigate" upon the permittee, which requires that "all reasonable steps be taken to minimize or prevent any discharge violation of the permit which has a reasonable likelihood of adversely affecting human health or the environment." EPA and the MassDEP maintain that an infiltration and inflow (I/I) removal program is an integral component to ensuring compliance with the requirements of the permit under the provisions at 40 CFR §122.41(d) and (e).

General requirements for proper operation and maintenance, and mitigation have been included in Part II of the permit. Specific permit conditions have also been included in Part I.B. and I.C. of the draft permit. These requirements include mapping of the wastewater collection system, preparing and implementing a collection system operation and maintenance plan, reporting of unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling inflow and infiltration to separate sewer collection systems (combined sewers are not subject to I/I requirements) to the extent necessary to prevent SSOs and I/I related effluent violations at the wastewater treatment plant, and maintaining alternate power where necessary. These requirements are included to minimize the occurrence of permit violations that have a reasonable likelihood of adversely affecting human health or the environment.

Several of the requirements in the draft permit are not included in the current permit, including collection system mapping, and preparation of a collection system operation and maintenance plan. EPA has determined that these additional requirements are necessary to ensure the proper operation and maintenance of the collection system and has included schedules for completing these requirements in the draft permit.

VIII. SLUDGE INFORMATION AND REQUIREMENTS

MCI Concord generates approximately 141 dry metric tons per year of sludge. Sludge is trucked to the Upper Blackstone Water Pollution Abatement Facility in Millbury, MA for final treatment and incineration.

In February 1993, the EPA promulgated standards for the use and disposal of sewage sludge. The regulations were promulgated under the authority of §405(d) of the CWA. Section 405(f) of the CWA requires that these regulations be implemented through permits. This permit is intended to implement the requirements set forth in the technical standards for the use and disposal of sewage sludge, commonly referred to as the Part 503 regulations.

Section 405(d) of the CWA requires that sludge conditions be included in all municipal permits. The sludge conditions in the draft permit satisfy this requirement and are taken from EPA's proposed Standards for the Disposal of Sewage Sludge to be codified at 40 CFR Part 503 (February 19, 1993 - Volume 58, pp 9248-9415). These conditions are outlined in the draft permit.

IX. ESSENTIAL FISH HABITAT

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes; may adversely impact any essential fish habitat as: waters and substrate necessary to fish for spawning,

breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat (EFH) is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999.

MCI Concord discharges to the Assabet River. The Assabet joins with the Sudbury River to form the Concord River, which ultimately drains into the Merrimack River. The Merrimack River system has been designated as EFH for Atlantic salmon. Although EFH has been designated for this general location, EPA has concluded that this activity is not likely to affect EFH or its associated species for the following reasons:

- The quantity of the discharge from the WWTP is 0.31 MGD (0.48 cfs), and the effluent receives advanced treatment;
- The facility withdraws no water from the Assabet River; therefore no life stages of Atlantic salmon are vulnerable to impingement or entrainment from this facility;
- Limits specifically protective of aquatic organisms have been established for phosphorus, ammonia, aluminum, lead, and chlorine, based on EPA water quality criteria;
- Acute toxicity testing on *Pimiphales promelas* and *Ceriodaphnia dubia* is required four (4) times per year.
- The permit prohibits any violation of state water quality standards.

EPA believes that the conditions and limitations contained within the draft permit adequately protect all aquatic life, including those species with EFH designation. Impacts associated with issuance of this permit to the EFH species, their habitat and forage, have been minimized to the extent that no significant adverse impacts are expected. Further mitigation is not warranted.

X. ENDANGERED SPECIES ACT

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) typically administers Section 7 consultations for bird, terrestrial, and freshwater aquatic species. The National Marine Fisheries Service (NMFS) typically administers Section 7 consultations for marine species and anadromous fish.

EPA has reviewed the federal endangered or threatened species of fish and wildlife to determine if any listed species might potentially be impacted by the re-issuance of this NPDES permit. The review revealed that one federally protected species, the small whirled pogonia (*Isotria medeoloides*), an orchid, merited further discussion.

The small whirled pogonia orchid has been identified in Groton, Massachusetts, which is three towns away from the MCI Concord. In addition, the small whorled pogonia is found in "forests with somewhat

poorly drained soils and/or a seasonally high water table," according to the USFWS website. This species is not aquatic; therefore it is unlikely that it would come into contact with the facility discharge.

EPA is coordinating a review of this finding with USFWS and NMFS through the Draft Permit and Fact Sheet, and consultation under Section 7 of the ESA with USFWS and NMFS is not required.

XI. MONITORING AND REPORTING

The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308 (a) of the CWA in accordance with 40 CFR §§122.41 (j), 122.44 (l), and 122.48.

The Draft Permit requires the permittee to continue to electronically report monitoring results obtained during each calendar month as Discharge Monitoring Report (DMRs) to EPA and the state using NetDMR no later than the 15th day of the month following the completed reporting period.

NetDMR is a national web-based tool for regulated CWA permittees to submit DMRs electronically via a secure internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR § 122.41 and § 403.12. NetDMR is accessed from the following url: http://www.epa.gov/netdmr. Further information about NetDMR can be found on the EPA Region 1 NetDMR website located at http://www.epa.gov/region1/npdes/netdmr/index.html.

In most cases, reports required under the permit shall be submitted to EPA as an electronic attachment through NetDMR. Certain exceptions are provided in the permit such as for providing written notifications required under the Part II Standard Permit Conditions. With the use of NetDMR to report DMRs and reports, the permittee is no longer required to submit hard copies of DMRs or other reports to EPA and is no longer required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. State reporting requirements are further explained in the draft permit.

XII. STATE PERMIT CONDITIONS

The NPDES Permit is issued jointly by the U. S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under federal and state law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the MassDEP Commissioner.

XIII. STANDARD CONDITIONS

The standard conditions of the permit are based on 40 CFR Parts 122, Subparts A and D and 40 CFR 124, Subparts A, D, E, and F and are consistent with management requirements common to other permits.

XIV. STATE CERTIFICATION REQUIREMENTS

The staff of the Massachusetts Department of Environmental Protection ("MassDEP") has reviewed the draft permit. EPA has requested permit certification by the State pursuant to 40 CFR Part 124.53 and expects that the draft permit will be certified.

XV. PUBLIC COMMENT PERIOD AND PROCEDURES FOR FINAL DECISION

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 the U.S. EPA, Office of Ecosystem Protection, 5 Post Office Square, Suite 100, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. Public hearings may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates a significant public interest. In reaching a final decision on the draft permit, 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 a hearing is held, the Regional Administrator 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.

XVI. EPA & 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:

Robin L. Johnson
EPA New England – Region 1
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Date

Ken Moraff, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Month	12-Month Rolling AverageFlow*	Maximum Daily Flow	BOD, monthly avg	BOD, weekly avg	BOD, daily max	BOD, avg monthly	BOD, avg weekly	BOD removal percentage	TSS, avg monthly	TSS, avg weekly	TSS, max daily	TSS, avg monthly	TSS, avg weekly	TSS removal percentage
	MGD	MGD	mg/l	mg/l	mg/l	lbs/day	lbs/day	%	mg/l	mg/l	mg/l	lbs/day	lbs/day	%
Apr-10	.216	.358	3.	4.	4.	6.	9.	98.3	1.	2.	2.	3.	4.	98.3
May-10	.215	.25	4.	5.	5.	6.	9.	97.1	2.	2.	2.	3.	4.	94.4
Jun-10	.215	.249	5.	7.	7.	8.	10.	97.9	2.	3.	3.	3.	5.	99.1
Jul-10	.217	.304	4.	5.	5.	9.	10.	97.9	1.	2.	2.	3.	4.	99.3
Aug-10	.219	.301	4.	5.	5.	9.	13.	98.2	2.	3.	3.	4.	5.	99.
Sep-10	.219	.245	3.	4.	4.	5.	7.	97.7	2.	2.	2.	3.	4.	95.6
Oct-10	.222	.28	4.	5.	5.	8.	9.	98.8	2.	2.	2.	3.	4.	99.4
Nov-10	.222	.236	5.	7.	7.	9.	13.	97.9	2.	2.	2.	3.	4.	97.8
Dec-10	.225	.253	10.	24.	24.	19.	48.	93.4	3.	3.	3.	5.	7.	99.1
Jan-11	.226	.251	5.	7.	7.	8.	13.	98.	3.	3.	3.	10.	22.	98.
Feb-11	.225	.241	4.	7.	7.	8.	13.	97.4	3.	6.	6.	6.	11.	98.2
Mar-11	.224	.264	5.	9.	9.	9.	16.	96.8	4.	6.	6.	7.	11.	98.2
Apr-11	.225	.257	4.5	6.6	6.6	9.	13.	98.3	2.1	2.4	2.4	4.	5.	96.5
May-11	.228	.306	4.	5.	5.	8.	9.	97.1	1.	2.	2.	3.	5.	99.3
Jun-11	.228	.249	5.	6.	6.	9.	13.	97.1	2.	3.	3.	5.	6.	99.2
Jul-11	.228	.297	5.	8.	8.	11.	19.	97.5	2.	3.	3.	4.	6.	98.6
Aug-11	.228	.261	4.1	5.2	5.2	8.	10.	98.4	2.1	3.1	3.1	4.	6.	98.3
Sep-11	.23	.271	5.	7.	7.	10.	16.	97.4	2.	3.	3.	3.	5.	99.2
Oct-11	.231	.27	2.5	3.2	3.2	5.	6.	98.6	1.4	1.8	1.8	3.	4.	99.1
Nov-11	.233	.282	3.	4.	4.	7.	9.	98.3	2.	2.	2.	4.	5.	99.
Dec-11	.233	.259	4.	7.	7.	8.	14.	93.4	3.	4.	4.	6.	9.	98.7
Jan-12	.233	.241	5.	7.	7.	10.	13.	96.	3.	4.	4.	6.	8.	98.1
Feb-12	.233	.233	5.1	6.1	6.1	9.	11.	97.2	2.9	3.8	3.8	5.	7.	98.7
Mar-12	.234	.242	6.	7.	7.	12.	13.	94.1	4.	4.	4.	8.	8.	98.1
Apr-12	.234	.328	4.	5.	5.	8.	8.	97.5	4.	5.	5.	8.	8.	97.8
May-12	.232	.257	5.	8.	8.	10.	17.	95.7	3.	4.	4.	5.	9.	97.2
Jun-12	.233	.256	5.	9.	9.	9.	11.	97.1	2.	3.	3.	5.	6.	98.4
Jul-12	.233	.266	2.	3.	3.	5.	6.	96.2	3.	3.	3.	6.	7.	98.2
Aug-12	.232	.253	2.	5.	5.	4.	10.	95.	3.	6.	6.	6.	11.	97.
Sep-12	.231	.254	4.	10.	10.	7.	17.	92.	3.	4.	4.	5.	8.	96.
Oct-12	.231	.306	4.7	6.3	6.3	9.	12.	94.	3.3	4.	4.	6.	7.	97.
Nov-12	.227	.232	4.7	6.3	6.3	9.	12.	93.5	3.2	5.	5.	6.	10.	96.
Dec-12	.227	.256	5.4	6.	6.	10.	11.	94.9	2.4	3.9	3.9	5.	7.	92.6

Month	12-Month Rolling AverageFlow*	Maximum Daily Flow	BOD, monthly avg	BOD, weekly avg	BOD, daily max	BOD, avg monthly	BOD, avg weekly	BOD removal percentage	TSS, avg monthly	TSS, avg weekly	TSS, max daily	TSS, avg monthly	TSS, avg weekly	TSS removal percentage
	MGD	MGD	mg/l	mg/l	mg/l	lbs/day	lbs/day	%	mg/l	mg/l	mg/l	lbs/day	lbs/day	%
Jan-13	.227	.243	6.2	8.	8.	12.	15.	91.8	2.3	2.9	2.9	4.	5.	91.3
Feb-13	.227	.253	4.3	4.8	4.8	8.	9.	97.	4.	10.	10.	8.	18.	97.
Mar-13	.23	.25	6.3	9.	9.	12.	18.	91.4	2.3	3.	3.	5.	6.	92.3
Apr-13	.213	.232	4.1	5.4	5.4	8.	10.	94.7	2.3	3.	3.	4.	6.	91.2
May-13	.223	.252	3.4	6.7	6.7	6.	12.	92.1	.7	1.1	1.1	1.	2.	98.
Jun-13	.222	.236	2.8	5.4	5.4	5.	11.	94.3	.6	.7	.7	1.	1.	98.
Jul-13	.235	.265	2.6	4.1	4.1	5.	8.	91.5	.6	.8	.8	1.	2.	99.1
Aug-13	.221	.261	2.7	3.3	3.3	5.	6.	97.2	.7	1.1	1.1	1.	2.	98.
Sep-13	.22	.252	2.8	4.	4.	5.	7.	95.8	1.3	2.	2.	3.	4.	99.6
Oct-13	.22	.262	4.	5.	5.	7.	9.	94.	1.	2.	2.	2.	3.	99.
Nov-13	.219	.344	2.6	3.1	3.1	5.	7.	96.	1.	1.	1.	2.	2.	99.4
Dec-13	0.21	1.23	2.30	3.00	3.00	4.	6.00	97.30	1.80	2.	2.	3.	4.	99.
Jan-14	0.22	1.25	2.90	3.40	3.40	5.	6.00	95.60	3.30	4.5	4.5	6.	9.	98.8
Feb-14	0.22	1.22	2.30	2.60	2.60	4.	5.00	97.90	1.20	1.6	1.6	2.	3.	99.5
Mar-14	0.21	1.24	2.30	3.00	3.00	4.	5.40	98.20	1.60	2.5	2.5	2.8	4.3	98.2
Apr-14	0.21	1.23	2.00	2.70	2.70	3.	5.00	94.80	2.70	3.8	3.8	5.	6.	98.7
May-14	0.20	1.23	1.80	2.40	2.40	3.	4.30	98.20	1.20	1.5	1.5	3.4	2.7	98.9
Jun-14	0.21	1.22	1.40	2.20	2.20	2.	4.00	98.70	0.50	.8	.8	1.	2.	99.6
Jul-14	0.21	1.25	1.40	2.40	2.40	2.	4.00	98.50	0.40	.9	.9	1.	2.	99.3
Aug-14	0.21	1.25	1.40	1.80	1.80	3.	3.00	98.70	0.50	.9	.9	1.	2.	99.4
Sep-14	0.21	1.25	1.40	2.00	2.00	2.6	3.80	97.80	0.60	1.2	1.2	1.2	2.2	99.6
Oct-14	0.21	1.24	1.50	1.90	1.90	2.	3.00	98.80	0.90	1.1	1.1	2.	2.	99.8
Nov-14	0.22	1.26	2.20	2.80	2.80	4.	5.00	98.50	0.90	1.	1.	2.	2.	99.4
Dec-14	0.21	1.26	2.60	4.10	4.10	4.8	7.60	97.40	1.20	3.1	3.1	2.3	5.7	99.2
Jan-15	0.21	1.22	1.90	2.30	2.30	3.	4.00	92.80	0.70	1.2	1.2	1.	2.1	98.6
Feb-15	0.20	1.21	2.40	2.70	2.70	3.9	4.20	95.60	0.90	1.	1.	1.4	1.7	98.2
Mar-15	0.20	1.22	2.00	2.70	2.70	3.5	4.60	98.90	1.50	3.3	3.3	2.6	5.8	99.4
8/2005 Permit Limits	0.31	Report	15	25	30	20	34	85	15	25	30	20	34	85
Minimum	.202	.232	1.4	1.8	1.8	2.	3.	91.4	.4	.7	.7	1.	1.	91.2
Average	0.22	0.52	3.66	5.34	5.34	6.88	10.12	96.37	1.97	2.80	2.80	3.83	5.66	97.97
Maximum	.235	1.26	10.	24.	24.	19.	48.	98.9	4.	10.	10.	10.	22.	99.8
Standard Deviation	0.01	0.43	1.58	3.22	3.22	3.16	6.45	2.15	1.02	1.66	1.66	2.09	3.74	1.98
# measurements	60	60	60	60	60	60	60	60	60	60	60	60	60	60
# violations	0	N/A	0	0	0	0	1	0	0	0	0	0	0	0

Month	pH min	pH max	Total Residual Chlorine, avg monthly	Total Residual Chlorine, max daily	Fecal Coliform, geometric avg	Fecal coliform, daily max	Dissolved oxygen	Ammonia, avg monthly	Ammonia, avg monthly	Ammonia, max daily	Total Phosphorus, avg monthly	Total Phosphorus, avg monthly	Total Phosphorus, max daily
	s.u.	s.u.	µg/L	µg/L	#/100 ml	#/100 ml	mg/L	mg/L	lbs/day	mg/L	mg/l	lbs/day	mg/L
Apr-10	6.7	7.1	.14	.48	3.	265.	5.6	.7		1.6	.1	1.	.2
May-10	6.5	7.1	.1	.2	29.	291.	4.5	.2	1.	.5	.2	1.	.4
Jun-10	6.4	7.2	.11	.22	25.	152.	4.8	.8	2.	2.5	.17	.3	.27
Jul-10	6.5	7.1	.14	.41	11.	212.	4.9	.4	1.	.6	.18	.4	.31
Aug-10	6.7	7.2	.1	.22	89.	306.	5.1	.3	.6	.5	.27	.5	.59
Sep-10	6.7	7.1	.14	.28	65.	215.	5.3	.3	.6	.5	.2	.4	.4
Oct-10	6.6	7.	.12	.32	218.	344.	6.	.3	1.	.3	.3	1.	.6
Nov-10	6.6	7.2	.19	.29	19.	101.	6.7	.6		.8	.31		.4
Dec-10	6.7	7.	.18	.29	17.	429.	7.2	.8		2.	.39		.58
Jan-11	6.5	7.5	.22	.39	14.	166.	7.2	.9		1.	.48		.58
Feb-11	6.6	7.1	.23	.46	37.	293.	7.	.4		.6	.68		.86
Mar-11	6.7	7.	.18	.39	63.	286.	7.1	.3		.4	.38		.61
Apr-11	6.6	7.	.11	.16	50.	247.	6.4	.7		1.5	.2	.4	.3
May-11	6.5	7.4	.15	.34	6.	284.	6.3	.9	2.	1.5	.2	.4	.3
Jun-11	6.5	7.1	.14	.53	No data	No data	5.6	1.4	3.	2.1	.4	.8	.5
Jul-11	6.5	7.	.13	.33	46.	305.	5.6	.6	2.	.8	.3	.6	.4
Aug-11	6.5	7.	.13	.26	17.	255.	5.5	1.	2.	1.6	.35	.7	.54
Sep-11	6.5	7.	.15	.55	15.	741.	5.6	.8	2.	1.	.3	1.	.4
Oct-11	6.6	7.3	.16	.3	26.	299.	5.9	.4	1.	.5	.27	.6	.33
Nov-11	6.7	7.2	.11	.4	16.	928.	4.9	.3		.8	.3		.48
Dec-11	6.7	7.3	.13	.32	7.	294.	5.2	.4		.7	.35		.74
Jan-12	6.6	7.1	.1	.26	6.	154.	5.9	.7		1.	.3		.47
Feb-12	6.7	7.2	.18	.44	8.	218.	5.7	.8		1.	.27		.63
Mar-12	6.7	7.1	.23	.71	No data	No data	5.4	1.		1.7	.54		.71
Apr-12	6.5	7.	.17	.63	3.	24.	5.5	1.6		2.5	.09	.2	.5
May-12	6.6	7.2	.15	.31	1.	5.	5.5	1.6	3.	2.2	.14	1.	.54
Jun-12	6.7	7.	.16	.37	2.	111.	5.5	1.1	2.	1.6	.06	1.	.25
Jul-12	6.8	7.	.24	.4	2.	27.	5.4	.3	.6	.5	.06	.2	.14
Aug-12	67.	7.1	.18	.5	No data	No data	5.1	.6	1.2	1.	.07	.13	.14
Sep-12	6.7	6.9	.24	.38	1.	27.	5.2	.7	1.2	1.	.08	.14	.1
Oct-12	6.6	7.4	.23	.42	2.	243.	5.6	.6	1.2	1.2	.11	.2	.13
Nov-12	6.8	7.3	.22	.37	6.	169.	5.6	1.		1.7	.32		.19
Dec-12	7.	7.2	.22	.3	1.	11.	6.	.9		1.2	.52		.54

Month	pH min	pH max	Total Residual Chlorine, avg monthly	Total Residual Chlorine, max daily	Fecal Coliform, geometric avg	Fecal coliform, daily max	Dissolved oxygen	Ammonia, avg monthly	Ammonia, avg monthly	Ammonia, max daily	Total Phosphorus, avg monthly	Total Phosphorus, avg monthly	Total Phosphorus, max daily
	s.u.	s.u.	µg/L	µg/L	#/100 ml	#/100 ml	mg/L	mg/L	lbs/day	mg/L	mg/l	lbs/day	mg/L
Jan-13	7.	7.3	.26	.31	2.	16.	6.	1.2		1.8	.7		.9
Feb-13	6.9	7.2	.25	.44	1.	6.	6.1	.5		.7	.7		.9
Mar-13	6.8	7.2	.25	.38	1.	34.	5.9	1.2		1.2	.3		.33
Apr-13	6.8	7.1	.31	.38	1.	13.	6.2	1.3		1.4	.2	.11	.26
May-13	6.8	7.1	.23	.34	1.	10.	6.1	1.5	2.7	2.	.05	.03	.08
Jun-13	6.7	7.1	.15	.26	5.	77.	5.2	.6	1.2	1.1	.1	.04	.08
Jul-13	6.7	7.2	.14	.25	5.	83.	5.	1.1	2.2	2.3	.004	.002	.03
Aug-13	6.9	7.2	.15	.24	10.	54.	5.5	.3	.6	.5	.07	.04	.11
Sep-13	6.8	7.2	.14	.23	4.	557.	5.3	.6	1.1	1.2	.04	.02	.13
Oct-13	6.8	7.2	.09	.16	9.	249.	5.5	.4	.8	.8	.07	.04	.1
Nov-13	7.	7.3	.16	.42	36.	376.	5.7	.23		.3	.5	.5	.56
Dec-13	7.	7.3	.25	.41	18.	673.	5.70	.3		.4	.62		.67
Jan-14	7.1	7.2	.13	.33	23.	357.	6.10	.13		.2	.57		.91
Feb-14	6.8	7.3	.25	.37	2.	24.	7.10	.1		.2	.22		.32
Mar-14	6.9	7.2	.23	.33	1.	12.	7.20	.45		.5	.18		.23
Apr-14	6.8	7.2	.37	.48	.	6.	6.20	.5		.7	.09	.16	.16
May-14	6.6	7.1	.19	.45	1.3	14.	5.60	.5	.8	.8	.03	.05	.09
Jun-14	6.7	7.2	.21	.49	3.	74.	5.90	.5	.8	.8	.01	.02	.05
Jul-14	6.7	7.1	.26	.74	6.	125.	5.50	.5	.9	.6	.02	.04	.02
Aug-14	6.6	7.1	.16	.28	1.	139.	5.80	.2	.4	.3	.02	.04	.03
Sep-14	6.9	7.3	.13	.27	2.	114.	6.40	.2	.4	.3	.02	.04	.03
Oct-14	6.8	7.4	.14	.23	5.	85.	6.60	.2	.4	.4	.05	.1	.21
Nov-14	6.8	7.2	.13	.24	6.	575.	6.60	.2		.2	.41		0.54
Dec-14	6.9	7.2	.14	.29	7.	152.	6.50	.2		.3	.58		0.71
Jan-15	6.8	7.2	.12	.42	6.	320.	7.30	.2		.3	.7		0.70
Feb-15	6.8	7.1	.2	.3	4.	246.	7.40	.4		.4	.5		0.50
Mar-15	6.8	7.2	.16	.27	13.	63.	7.60	.25		.3	.36		0.37
8/2005 Permit Limits	6.7	7.1	47	82	200	400	5	7.8	20	N/A	0.2*	N/A	N/A
Minimum	6.4	6.9	.09	.16	0.00	5.	4.5	.1	.4	.2	.004	.002	.02
Average	7.72	7.16	0.18	0.36	17.16	208.00	5.91	0.62	1.32	0.97	0.27	0.37	0.39
Maximum	67.	7.5	.37	.74	218.	928.	7.6	1.6	3.	2.5	.7	1.	.91
Standard Deviation	7.78	0.12	0.06	0.12	32.67	196.28	0.73	0.39	0.77	0.64	0.20	0.36	0.25
# measurements	60	60	60	60	57	57	60	60	30	60	60	36	60
# violations	1	0	0	0	1	6	4	0	0	N/A	7	N/A	N/A

*0.2 mg/L from April - October and 1.0 mg/L from November - March

MCI Concord (MA0102245) Fact Sheet
Appendix A - DMR Data and Limit Calculations

Whole Effluent Toxicity Tests

Date	LC50 Ceriodaphnia	LC50 Pimiphales	Aluminum, µg/L	Copper, µg/L	Cadmium, µg/L	Lead, µg/L	Nickel, µg/L	Zinc, µg/L
March-10	100.	100.	64	6	0.25	2.5	2.5	No data
June-10	100.	100.	No data	No data	No data	No data	No data	No data
September-10	100.	100.	560	6	No data	No data	No data	No report
December-10	100.	100.	130	8	No report	No report	No report	No report
March-11	100.	100.	30	10	2	2.5	2.5	25
June-11	100.	100.	10	70	0.25	0.35	8	9
September-11	100.	100.	105	12	0.25	0.35	2.5	18
December-11	100.	100.	55	1.5	0.25	0.35	2.5	12
March-12	100.	100.	110	15	0.25	0.5	2.5	24
June-12	100.	100.	159	7	0.25	0.5	2.5	10
September-12	100.	100.	190	11	0.25	0.5	2.5	17
December-12	100.	100.	140	9	0.25	0.35	2.5	19
March-13	100.	100.	170	14	0.25	1.8	2.5	14
June-13	100.	100.	70	1.5	0.25	0.35	2.5	2.5
September-13	100.	100.	380	6	0.25	2	2.5	7
December-13	100.	100.	60	13	0.9	1.5	2.5	2.5
March-14	100.	100.	20	1.5	0.25	3	2.5	2.5
June-14	100.	100.	80	6	0.25	0.7	2.5	10
September-14	100.	100.	120	8	0.25	3.8	2.5	6
December-14	100.	100.	57	8	0.25	0.35	1	9
March-15	100.	100.	155	10	0.25	0.35	2.5	13
11/2005 Permit Limits	>100	>100	N/A	N/A	N/A	N/A	N/A	N/A
Minimum	100.00	100.00	<20	<3	<0.5	<0.7	<5	<5
Average	100.00	100.00	141.18	14.14	0.38	1.21	2.72	11.79
Maximum	100.00	100.00	560.00	70.00	2.00	3.80	8.00	25.00
Standard Deviation	0.00	0.00	129.35	14.38	N/A	1.12	1.36	7.00
# measurements	21	21	20	20	18	18	18	17
# exceed 2005 permit limit	0	0	N/A	N/A	N/A	N/A	N/A	N/A

Highlighted cells are non-detects. The values displayed in the shaded cells are one-half the detection limits.

Whole Effluent Toxicity Tests, Upstream Results

Date	Ammonia, mg/l	Aluminum, µg/L	Copper, µg/L	Cadmium, µg/L	Lead, µg/L	Nickel, µg/L	Zinc, µg/L
March-10	<0.1	355	<3	<0.5	5	<5	NS
June-10	NS	NS	NS	NS	NS	NS	NS
September-10	0.3	90	8	NS	NS	NS	NS
December-10	0.115	130	4	NS	NS	NS	NS
March-11	<0.1	30	<20	<4	<5	<5	14
June-11	<0.1	NS	10	<0.5	4	10	10
September-11	NS	107	NS	<0.5	<0.7	<5	8
December-11	<0.1	66	<3	<5	<0.7	<5	<5
March-12	<0.1	50	<3	<5	1	<5	10
June-12	<0.1	93	<3	<0.5	5	<5	8
September-12	<0.1	30	<3	<0.5	<0.7	<5	<5
December-12	<0.1	80	<3	<0.5	1	<5	11
March-13	<0.1	130	5	NS	2.1	NS	9
June-13	<0.1	100	<3	NS	<0.7	NS	<5
September-13	<0.1	25	<3	NS	2	NS	<5
December-13	0.2	50	8	0.7	1.2	<5	<5
March-14	0.2	5	3	<0.5	<0.7	<5	26
June-14	0.1	100	<3	<0.5	0.2	<5	9
September-14	<0.1	70	<3	<0.5	3	<5	<5
December-14	0.5	1780	10	<0.5	54	<5	22
March-15	0.2	NS	NS	NS	NS	NS	NS
Minimum	0.1	5.00	3.00	0.70	0.20	10.00	8.00
Median	0.2	85.00	8.00	<0.5	2.10	<5	10.00
Maximum	0.5	1780.00	10.00	0.70	54.00	10.00	26.00
Standard Deviation	0.133982053	405.68	2.85	N/A	15.63	N/A	6.27
# measurements	19	18	18	14	17	14	16

Reasonable Potential Analysis
data with ND, >10 samples, lognormal distribution

Dilution Factor:	1

Date	Al* (ug/l)	lnAl (ug/l)	$(y_i - u_y)^2$
March-10	64	4.1589	0.2257077
September-10	560	6.3279	2.869523
December-10	130	4.8675	0.0545523
March-11	30	3.4012	1.5197287
June-11	0		
September-11	105	4.6540	0.0003996
December-11	55	4.0073	0.3926739
March-12	110	4.7005	0.0044236
June-12	159	5.0689	0.1891676
September-12	190	5.2470	0.3758351
December-12	140	4.9416	0.0946622
March-13	170	5.1358	0.2518316
June-13	70	4.2485	0.1485909
September-13	380	5.9402	1.7061613
December-13	60	4.0943	0.2911958
March-14	20	2.9957	2.6838233
June-14	80	4.3820	0.0634755
September-14	120	4.7875	0.0235689
December-14	57	4.0431	0.3491851
March-15	155	5.0434	0.1676534

Al- (Lognormal distribution, ND)

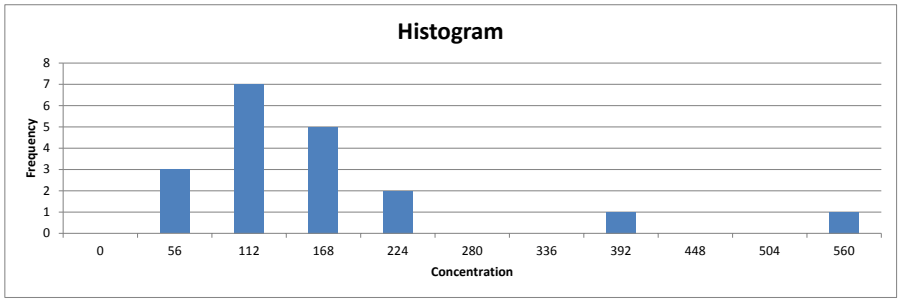
Daily Maximum Effluent Derivation (some measurements < detection limit)		
Detection Limit** =	5.0	
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	4.63397	
$S (y_i - u)^2$ =	11.41216	
k = number of daily samples =	20	
r = number of non-detects =	1	
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	0.63401	
s_y = standard deviation = square root s_y^2 =	0.79625	
δ = number of nondetect values/number of samples =	0.05000	
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	2.30704	
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	1.619856259	
Daily Max = exp (u_y + z-score*s_y)		
99th Percentile Daily Max Estimate=	**646.0925**	**ug/l**
99th Percentile Daily Max Estimate including dilution factor=	**646.0925**	**ug/l**
95th Percentile Daily Max Estimate =	**373.8204**	**ug/l**
95th Percentile Daily Max Estimate including dilution factor=	**373.8204**	**ug/l**

** Detection limit here is the detection limit that resulted in the greatest number of Non Detects in the dataset

Histogram 1

max	560	
min	0	*not including NDs
number of bins	10	*not including min bin -
bin separation	56	

	Bin	count
0	0	0
1	56	3
2	112	7
3	168	5
4	224	2
5	280	0
6	336	0
7	392	1
8	448	0
9	504	0
10	560	1

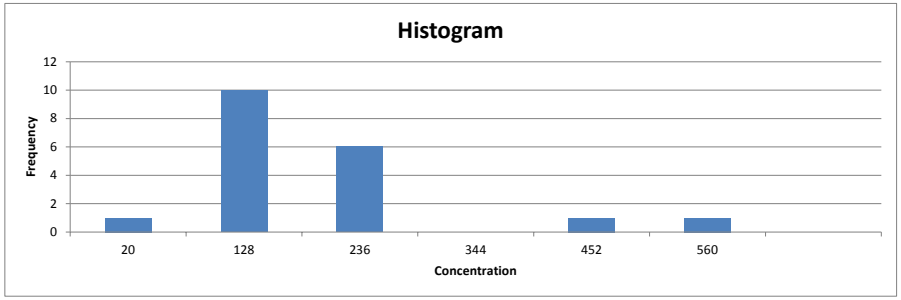


*ND values not plotted

Histogram 2

max	560	
min	20	*not including NDs
number of bins	5	*not including min bin -
bin separation	108	

	Bin	count
0	20	1
1	128	10
2	236	6
3	344	0
4	452	1
5	560	1



*ND values not plotted

Reasonable Potential Analysis
data with ND, >10 samples, lognormal distribution

Dilution Factor:	1

Date	Pb (ug/l)	lnPb (ug/l)	$(y_i - u_y)^2$
March-10	0		
March-11	0		
June-11	0		
September-11	0		
December-11	0		
March-12	0		
June-12	0		
September-12	0		
December-12	0		
March-13	1.8	0.5878	0.0015552
June-13	0		
September-13	2	0.6931	0.004346
December-13	1.5	0.4055	0.0491765
March-14	3	1.0986	0.222208
June-14	0.7	-0.3567	0.968055
September-14	3.8	1.3350	0.5009499
December-14	0		
March-15	0		

Pb- (Lognormal distribution, ND)

Daily Maximum Effluent Derivation (some measurements < detection limit)

Detection Limit** =	0.7
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	0.62722
S $(y_i - u)^2$ =	1.74629
k = number of daily samples =	18
r = number of non-detects =	12
s_y^2 = estimated variance = (S[$(y_i - u_y)^2$]) / (k-r-1) =	0.34926
s_y = standard deviation = square root s_y^2 =	0.59098
δ = number of nondetect values/number of samples =	0.66667
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	1.88079
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	1.036433389

Daily Max = exp (u_y + z-score*s_y)

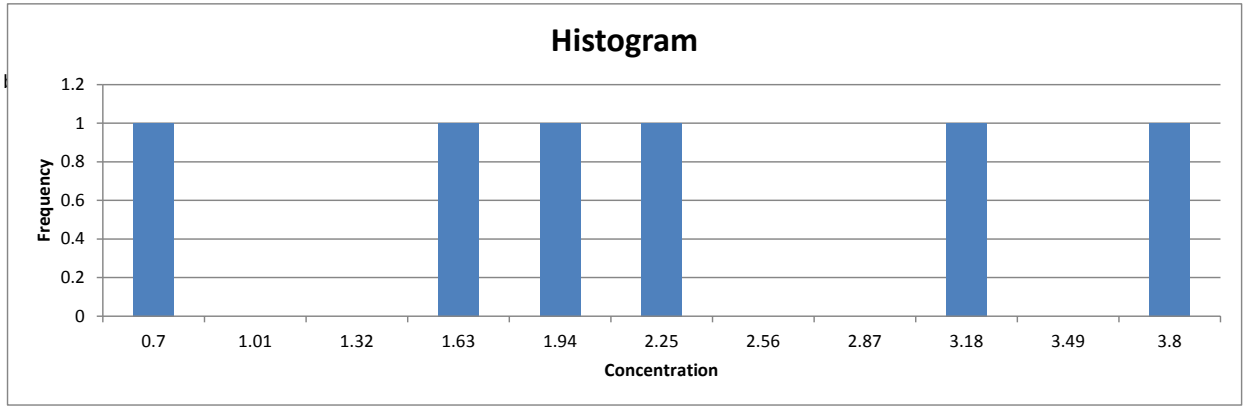
99th Percentile Daily Max Estimate=	**5.6901 ug/l**
99th Percentile Daily Max Estimate including dilution factor=	**5.6901 ug/l**
95th Percentile Daily Max Estimate =	**3.4547 ug/l**
95th Percentile Daily Max Estimate including dilution factor=	**3.4547 ug/l**

** Detection limit here is the detection limit that resulted in the greatest number of Non Detects in the dataset

Histogram 1

max	3.8	
min	0.7	*not including NDs
number of bins	10	*not including min bin -
bin separation	0.31	

	Bin	count
0	0.7	1
1	1.01	0
2	1.32	0
3	1.63	1
4	1.94	1
5	2.25	1
6	2.56	0
7	2.87	0
8	3.18	1
9	3.49	0
10	3.8	1

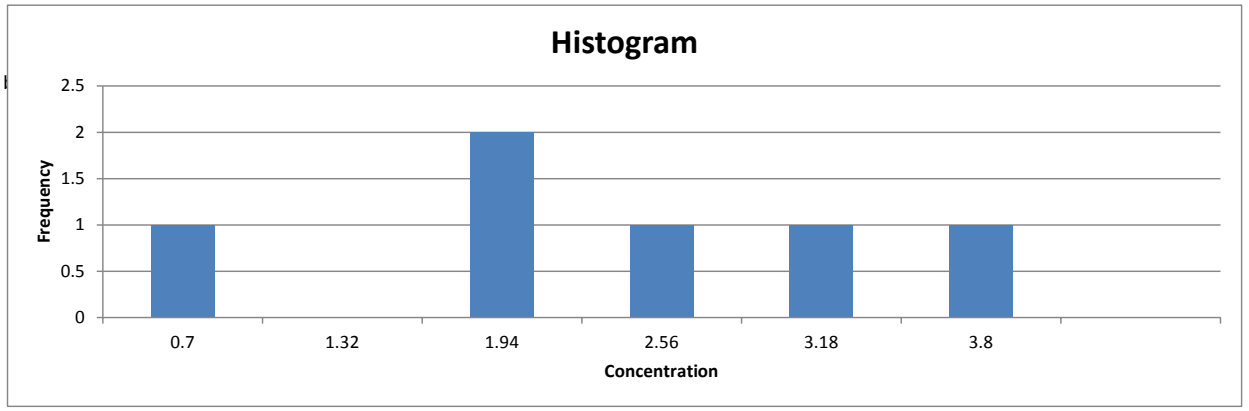


*ND values not plotted

Histogram 2

max	3.8	
min	0.7	*not including NDs
number of bins	5	*not including min bin -
bin separation	0.62	

	Bin	count
0	0.7	1
1	1.32	0
2	1.94	2
3	2.56	1
4	3.18	1
5	3.8	1



*ND values not plotted

Reasonable Potential Analysis
data with ND, >10 samples, lognormal distribution

Dilution Factor:	1

Date	Ni* (ug/l)	lnZn (ug/l)	$(y_i - u_y)^2$
March-10	0		
March-11	0		
June-11	8	2.0794	1.0810193
September-11	0		
December-11	0		
March-12	0		
June-12	0		
September-12	0		
December-12	0		
March-13	0		
June-13	0		
September-13	0		
December-13	0		
March-14	0		
June-14	0		
September-14	0		
December-14	1	0.0000	1.0810193
March-15	0		

*ND replaced with zeroes

Ni- (Lognormal distribution, ND)

Daily Maximum Effluent Derivation (some measurements < detection limit)

Detection Limit** =	5.0
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	1.03972
$S (y_i - u)^2$ =	2.16204
k = number of daily samples =	18
r = number of non-detects =	16
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	2.16204
s_y = standard deviation = square root s_y^2 =	1.47039
δ = number of nondetect values/number of samples =	0.88889
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	1.34076
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	0.125661347

Daily Max = exp (u_y + z-score*s_y)

99th Percentile Daily Max Estimate=	**20.3107 ug/l**
99th Percentile Daily Max Estimate including dilution factor=	**20.3107 ug/l**
95th Percentile Daily Max Estimate =	**3.4024 ug/l**
95th Percentile Daily Max Estimate including dilution factor=	**3.4024 ug/l**

** Detection limit here is the detection limit that resulted in the greatest number of Non Detects in the dataset

Reasonable Potential Analysis
data with ND, >10 samples, lognormal distribution

Dilution Factor:	1

Date	Zn* (ug/l)	lnZn (ug/l)	$(y_i - u_y)^2$
March-11	25	3.2189	0.4675732
June-11	9	2.1972	0.114148
September-11	18	2.8904	0.1262304
December-11	12	2.4849	0.0025176
March-12	24	3.1781	0.413412
June-12	10	2.3026	0.0540551
September-12	17	2.8332	0.088882
December-12	19	2.9444	0.1675727
March-13	14	2.6391	0.0108107
June-13	0		
September-13	7	1.9459	0.3471241
December-13	0		
March-14	0		
June-14	10	2.3026	0.0540551
September-14	6	1.7918	0.5525292
December-14	9	2.1972	0.114148
March-15	13	2.5649	0.000892

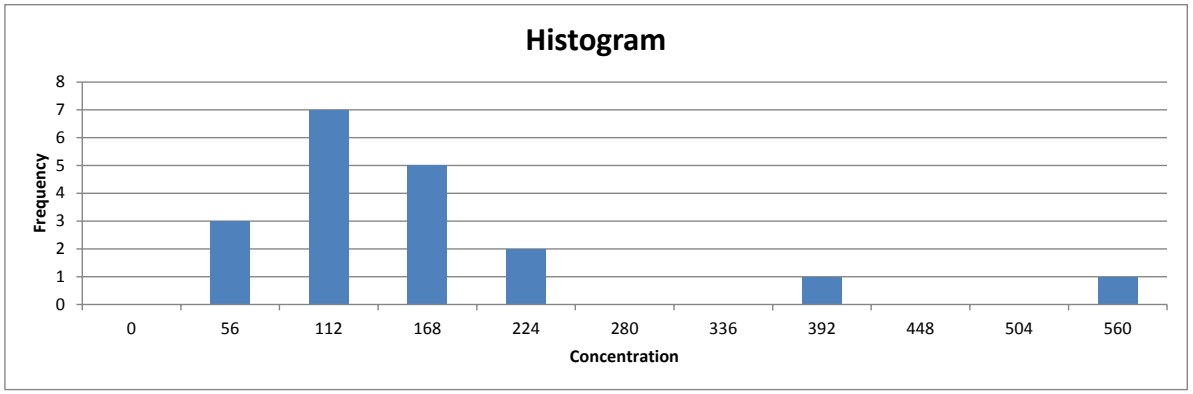
Zn- (Lognormal distribution, ND)

Daily Maximum Effluent Derivation (some measurements < detection limit)	
Detection Limit** =	5.0
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	2.53508
S $(y_i - u)^2$ =	2.51395
k = number of daily samples =	17
r = number of non-detects =	3
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	0.19338
s_y = standard deviation = square root s_y^2 =	0.43975
δ = number of nondetect values/number of samples =	0.17647
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	2.25258
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	1.548805132
Daily Max = exp (u_y + z-score*s_y)	
99th Percentile Daily Max Estimate=	**33.9761 ug/l**
99th Percentile Daily Max Estimate including dilution factor=	**33.9761 ug/l**
95th Percentile Daily Max Estimate =	**24.9325 ug/l**
95th Percentile Daily Max Estimate including dilution factor=	**24.9325 ug/l**

Histogram 1

max	25	
min	6	*not including NDs
number of bins	10	*not including min bin -
bin separation	1.9	

	Bin	count
0	6	4
1	7.9	2
2	9.8	2
3	11.7	1
4	13.6	1
5	15.5	2
6	17.4	0
7	19.3	0
8	21.2	1
9	23.1	1
10	25	#N/A

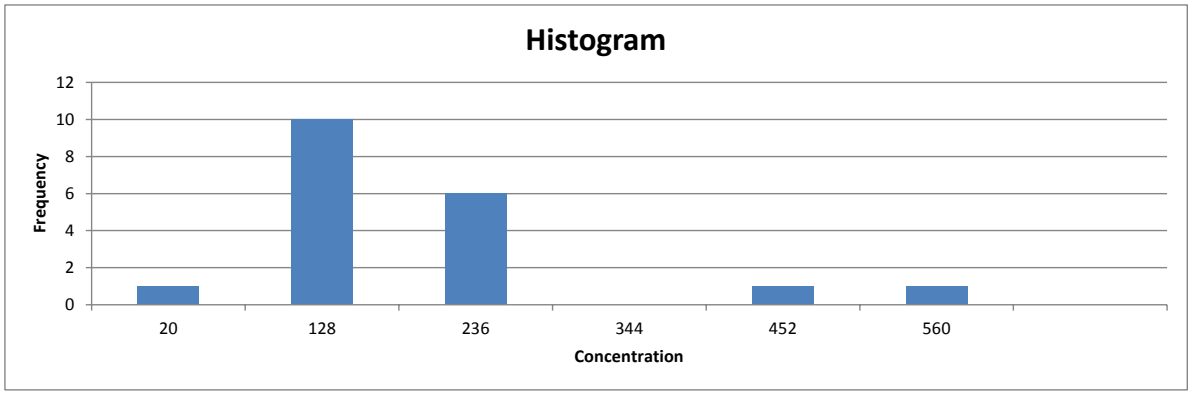


*ND values not plotted

Histogram 2

max	25	
min	6	*not including NDs
number of bins	5	*not including min bin -
bin separation	3.8	

	Bin	count
0	6	8
1	9.8	2
2	13.6	2
3	17.4	2
4	21.2	0
5	25	#N/A



Reasonable Potential Analysis
data with ND, >10 samples, lognormal distribution

Dilution Factor:	1

Date	Al* (ug/l)	lnAl (ug/l)	$(y_i - u_y)^2$
March-10	6	1.7918	0.2643428
September-10	6	1.7918	0.2643428
December-10	8	2.0794	0.0512845
March-11	0		
June-11	70	4.2485	3.7736674
September-11	12	2.4849	0.0320426
December-11	0		
March-12	15	2.7081	0.161723
June-12	7	1.9459	0.1295943
September-12	11	2.3979	0.0084627
December-12	9	2.1972	0.0118108
March-13	14	2.6391	0.1109923
June-13	0		
September-13	6	1.7918	0.2643428
December-13	13	2.5649	0.0671054
March-14	0		
June-14	6	1.7918	0.2643428
September-14	8	2.0794	0.0512845
December-14	8	2.0794	0.0512845
March-15	10	2.3026	1.1E-05

Al- (Lognormal distribution, ND)

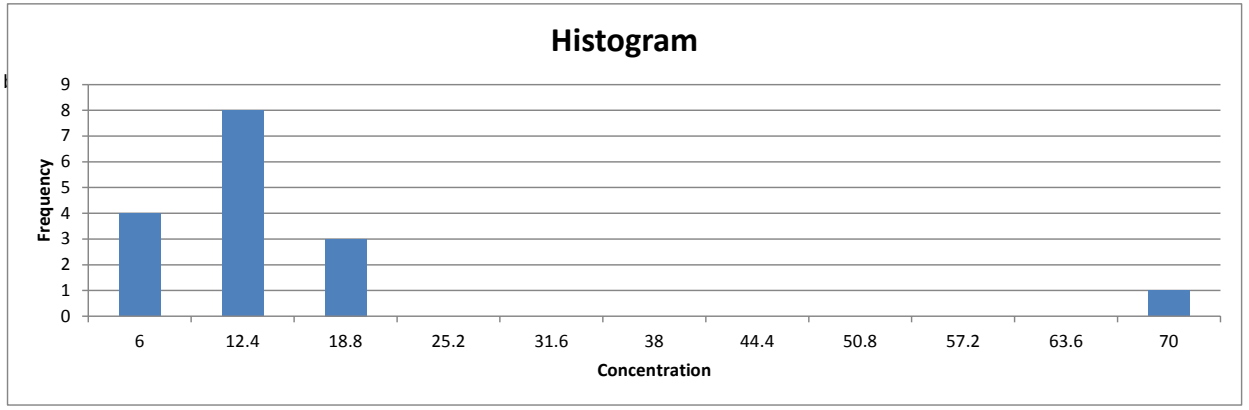
Daily Maximum Effluent Derivation (some measurements < detection limit)	
Detection Limit** =	5.0
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	2.30590
S $(y_i - u)^2$ =	5.50663
k = number of daily samples =	20
r = number of non-detects =	4
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	0.36711
s_y = standard deviation = square root s_y^2 =	0.60590
δ = number of nondetect values/number of samples =	0.20000
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	2.24140
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	1.534120544
Daily Max = exp (u_y + z-score*s_y)	
99th Percentile Daily Max Estimate=	**39.0154 ug/l**
99th Percentile Daily Max Estimate including dilution factor=	**39.0154 ug/l**
95th Percentile Daily Max Estimate =	**25.4170 ug/l**
95th Percentile Daily Max Estimate including dilution factor=	**25.4170 ug/l**

** Detection limit here is the detection limit that resulted in the greatest number of Non Detects in the dataset

Histogram 1

max	70	
min	6	*not including NDs
number of bins	10	*not including min bin -
bin separation	6.4	

	Bin	count
0	6	4
1	12.4	8
2	18.8	3
3	25.2	0
4	31.6	0
5	38	0
6	44.4	0
7	50.8	0
8	57.2	0
9	63.6	0
10	70	1

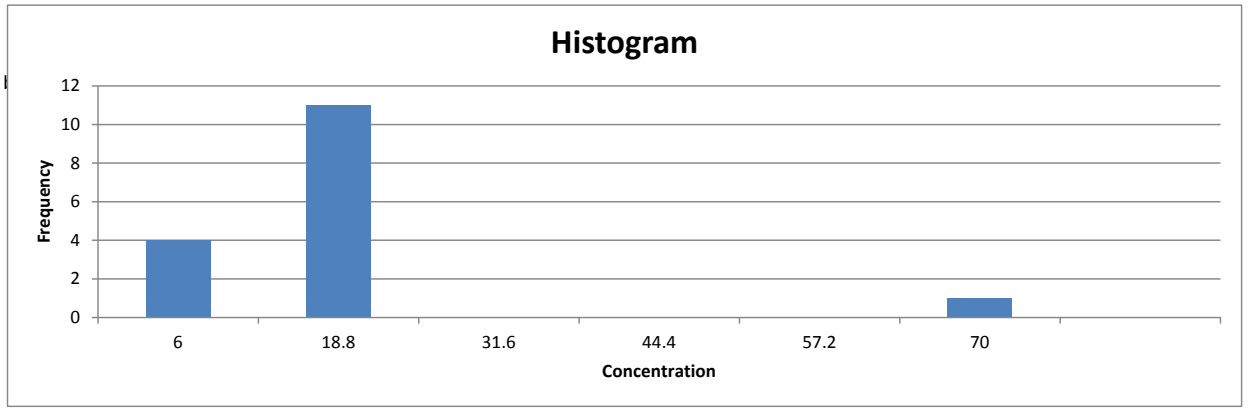


*ND values not plotted

Histogram 2

max	70	
min	6	*not including NDs
number of bins	5	*not including min bin -
bin separation	12.8	

	Bin	count
0	6	4
1	18.8	11
2	31.6	0
3	44.4	0
4	57.2	0
5	70	1



*ND values not plotted

APPENDIX B – STATISTICAL APPROACH FOR METALS EFFLUENT DATA (N ≥ 10)

EPA bases its determination of "reasonable potential" on a characterization of the upper bound of expected effluent concentrations based on a statistical analysis of the available monitoring data. As noted in the *Technical Support Document for Water Quality Based Toxics Control* (EPA 1991) ("TSD"), "[a]ll monitoring data, including results for concentrations of individual chemicals, have some degree of uncertainty associated with them. The more limited the amount of test data available, the larger the uncertainty." Thus with a limited data set, the maximum concentration that has been found in the samples may not reflect the full range of effluent concentration.

To account for this, EPA has developed a statistical approach to characterizing effluent variability when the monitoring dataset includes 10 or more samples.[1] As "experience has shown that daily pollutant discharges are generally lognormally distributed," *TSD* at App. E, EPA uses a lognormal distribution to model the shape of the observed data, unless analysis indicates a different distributional model provides a better fit to the data. The model parameters (mean and variance) are derived from the monitoring data. The model parameter μ is the mean of the natural logs of the monitoring data values, while σ is the standard deviation of the natural logs of the monitoring data values.

The lognormal distribution generally provides a good fit to environmental data because it is bounded on the lower end (i.e. you cannot have pollutant concentrations less than zero) and is positively skewed. It also has the practical benefit that if an original lognormal data set X is logarithmically transformed (i.e. Y = ln[X]) the resulting variable Y will be normally distributed. Then the upper percentile expected values of X can be calculated using the z-score of the standardized normal distribution (i.e. the normal distribution with mean = 0 and variance = 1), a common and relatively simple statistical calculation. The p^{th} percentile of X is estimated by

$$X_p = \exp(\mu_y + z_p \times \sigma_y),$$

where μ_y = mean of Y
σ_y = standard deviation of Y
Y = ln[X]
z_p = the z-score for percentile "p"

For the 95^{th} percentile, $z_{95} = 1.645$, so that

$$X_{95} = \exp(\mu_y + 1.645 \times \sigma_y)$$

The 95th percentile value is used to determine whether a discharge has a reasonable potential to cause or contribute to an exceedance of a water quality standard. The combination of the upper bound effluent concentration with dilution in the receiving water is calculated to determine whether the water quality criteria will be exceeded.

[1] A different statistical approach is applied where the monitoring data set includes less than 10 samples.

Datasets including non-detect values

The *TSD* also includes a procedure for determine such percentiles when the dataset includes non-detect results, based on a delta-lognormal distribution. In the delta-lognormal procedures, nondetect values are weighted in proportion to their occurrence in the data. The values above the detection limit are assumed to be lognormally distributed values.

The statistical derivation of the delta-lognormal upper bounds is quite complex and is set forth in the TSD at Appendix E. Calculation of the 95th percentile of the distribution, however, involves a relatively straightforward adjustment of the equations given above for the lognormal distribution, as follows.

For the deltalognormal, the pth percentile of X, referred to here as X_p*, is given by

$$X_p^* = \exp(\mu_y^* + z_p^* \times \sigma_y^*),$$

where μ_y*= mean of Y values for data points above the detection limit;
σ_y*= standard deviation of Y for data points above the detection limit;
Y = ln[X*];
X*= monitoring data above detection limit; and
z_p* = an adjusted z score that is given by the equation:

$$z_p^* = \text{z-score}[(p - \delta)/(1 - \delta)]$$

where δ is the proportion of nondetects in the monitoring dataset.

k = total number of dataset
r = number of nondetect values in the dataset
$\delta = r/k$

For the 95th percentile, this takes the form of $z_p^* = \text{z-score}[(.95 - \delta)/(1 - \delta)]$. The resulting values of z_p* for various values of δ is set forth in the table below; the calculation is easily performed in excel or other spreadsheet programs.

Example calculations of z_p* for 95th percentile

δ	(0.95 - δ)/ (1 - δ)	z_p*
0	0.95	1.645
0.1	0.94	1.593
0.3	0.93	1.465
0.5	0.90	1.282
0.7	0.83	0.967

Scale 1 : 24,000

0 500 Meters

0 1,000 2,000 Feet

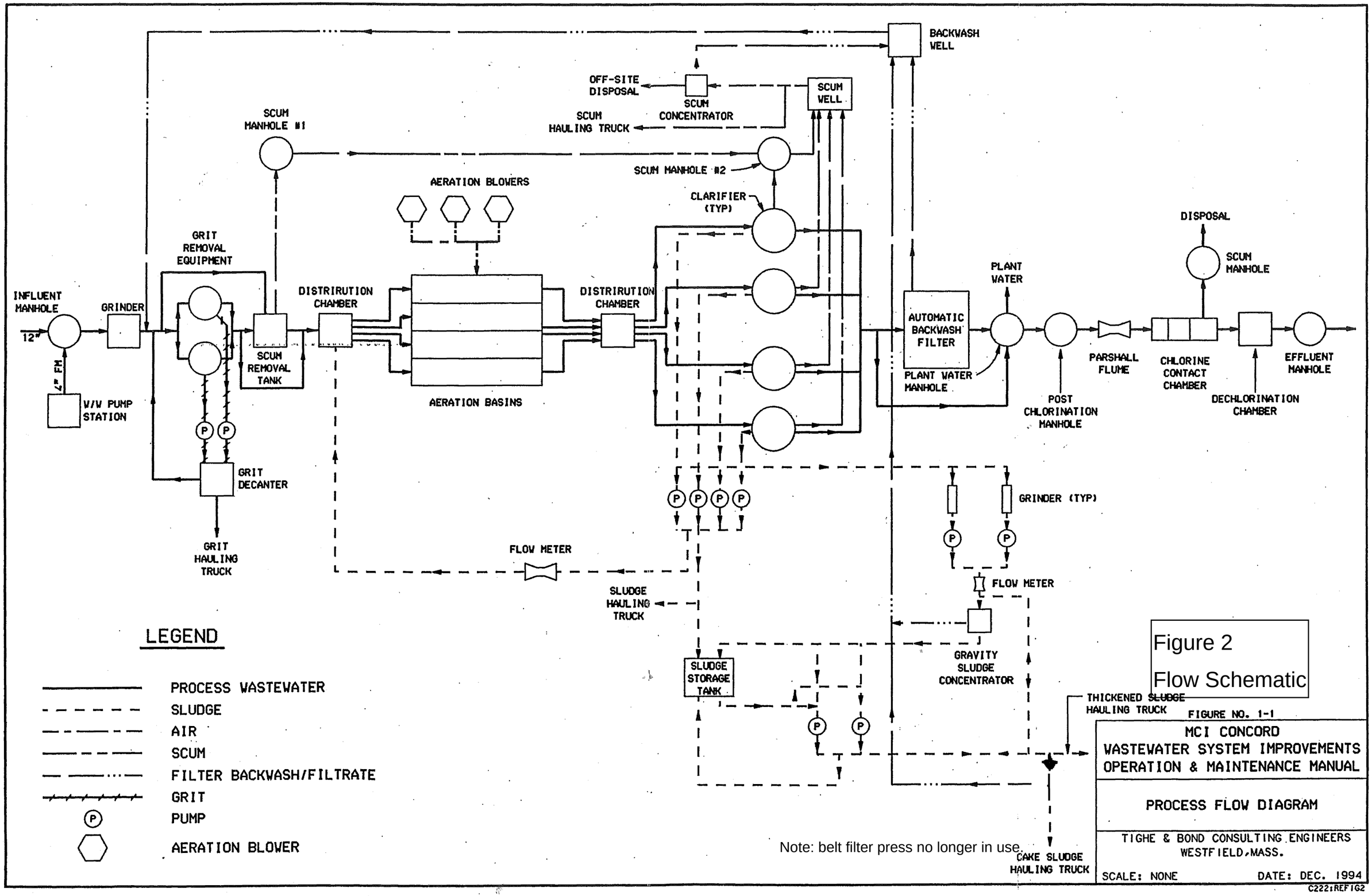
Regulated Facilities: EPA

FIGURE 1
Site Location Map

MCI Concord WWTF

EPA

10/1/2015


BACKWASH WELL
OFF-SITE DISPOSAL
SCUM CONCENTRATOR
SCUM WELL
SCUM HAULING TRUCK
SCUM MANHOLE #1
SCUM MANHOLE #2
AERATION BLOWERS
CLARIFIER (TYP)
GRIT REMOVAL EQUIPMENT
INFLUENT MANHOLE
12"
GRINDER
DISTRIRUTION CHAMBER
DISTRIRUTION CHAMBER
SCUM REMOVAL TANK
AERATION BASINS
AUTOMATIC BACKWASH FILTER
PLANT WATER
PLANT WATER MANHOLE
DISPOSAL
SCUM MANHOLE
POST CHLORINATION MANHOLE
PARSHALL FLUME
CHLORINE CONTACT CHAMBER
DECHLORINATION CHAMBER
EFFLUENT MANHOLE
4" FM
W/W PUMP STATION
GRIT DECANTER
GRIT HAULING TRUCK
FLOW METER
SLUDGE HAULING TRUCK
GRINDER (TYP)
FLOW METER
GRAVITY SLUDGE CONCENTRATOR
SLUDGE STORAGE TANK
THICKENED SLUDGE HAULING TRUCK
CAKE SLUDGE HAULING TRUCK
LEGEND
PROCESS WASTEWATER
SLUDGE
AIR
SCUM
FILTER BACKWASH/FILTRATE
GRIT
PUMP
AERATION BLOWER
Note: belt filter press no longer in use.
Figure 2
Flow Schematic
FIGURE NO. 1-1
MCI CONCORD
WASTEWATER SYSTEM IMPROVEMENTS
OPERATION & MAINTENANCE MANUAL
PROCESS FLOW DIAGRAM
TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASS.
SCALE: NONE
DATE: DEC. 1994
C222:REFIG2

Response to Public Comments

In accordance with the provisions of 40 C.F.R. §124.17, this document presents EPA's responses to comments received on the draft NPDES Permit, #MA0102245. The response to comments explains and supports the EPA determinations that form the basis of the final permit. From October 20 to November 18, 2015, the United States Environmental Protection Agency ("EPA") and the Massachusetts Department of Environmental Protection ("MassDEP") (together, the "Agencies") solicited public comments on a draft NPDES permit, #MA0102245, developed pursuant to an individual permit application from the Massachusetts Correctional Institution at Concord ("MCI-Concord"), for the reissuance of a National Pollutant Discharge Elimination System ("NPDES") permit to discharge treated domestic sewage from Outfall 001 to the Assabet River (Segment MA82B-07) in Concord, Massachusetts.

After a review of the comments received, EPA and MassDEP have made a final decision to issue this permit authorizing these discharges. The Final Permit is substantially identical to the Draft Permit that was available for public comment.

Although EPA's decision-making process has benefitted from the comments and additional information submitted, the information and arguments presented did not raise any substantial new questions concerning the permit. EPA did, however, make minor changes in response to comments which are listed below. The analyses underlying these changes are explained in the responses to individual comments that follow and are reflected in the Final Permit.

Copies of the Final Permit may be obtained by writing or calling EPA's NPDES Municipal Permits Section (OEP 06-1), Office of Ecosystem Protection, 5 Post Office Square, Suite 100, Boston, MA 02109-3912; Telephone: (617) 918-1045.

Summary of Changes in the Final Permit

1. Cover Page

Deletion: The permit effective date sentence which stated, "If no comments are received, this permit shall become effective upon signature," has been removed, as public comments were received.

2. Part I.A.

The average monthly limit for total residual chlorine was changed from 0.31 mg/L to 0.34 mg/L, and the maximum daily limit was changed from 0.54 mg/L to 0.59 mg/L. See Response to Comment C6: Calculations.

The average monthly aluminum limit was changed from 142 µg/L to 147 µg/L. See Response to Comment C6: Calculations.

The orthophosphate monitoring requirement was removed from the permit. See Response to Comment B3: Orthophosphate Monitoring

3. Part I.C.

In Part I.C., three changes were made in response to Comment B4: Operation and maintenance of sewer collection system:

- In Part I.C.4., the compliance schedule for collection system mapping was removed.
- In Part I.C.4., a requirement was added for the permittee to submit the collection system map to EPA within one month of the effective date of the permit.
- In Part I.C.5.b., a program to prevent disposal of pharmaceuticals into the sewer system was added to the required items in the Full Collection System O&M Plan.

Public Comments

Comments submitted by Christopher T. Yacino, Environmental Analyst, Massachusetts Department of Correction, Division of Resource Management:

Comment A1: Aluminum and Lead Compliance Schedules
First, the aluminum and lead compliance schedule outlined on page 12 of 15 in section I.E. allows 48 months for achieving compliance with the new limits listed in the permit. While there are steps that may be able to be taken in-house to work toward achieving compliance, there is a possibility that new processes, such as an activated carbon contactor, ion exchange or some form of chemical precipitation, will need to be added to the treatment facility. If the addition of treatment processes is necessary to achieve compliance, additional time may be needed to secure funding for a study, design and construction through our DCAMM division. This process could conceivably take an additional two years, totaling six years to achieve compliance. We therefore request that the compliance schedule be amended to a total of 72 months under subsection I.E.d. as follows: "Within ~~48~~ 72 months of the effective date of the permit, the permittee shall comply with the aluminum and lead limits."

Response to Comment A1:
EPA believes that 48 months is sufficient to complete source tracking, design treatment modifications, and construct necessary upgrades. We expect the facility to achieve the effluent limits through Best Management Practices (BMPs) rather than a large-scale upgrade to the treatment system. BMPs to reduce aluminum and lead in the effluent may include

- Source tracking and control

- Optimization of aluminum dosing
- Modified corrosion control to reduce lead leaching from pipes
- Outreach to prison employees and inmates about proper disposal of lead-containing materials.

Comment A2: Fecal coliform monitoring frequency
Second, we maintain that the proposed frequency of testing for Escherichia Coliform is excessive at three times per week (3/WEEK). This facility has no record of regularly exceeding Fecal Coliform permits in the past, and we therefore request that the frequency of testing be reduced to two times per week (2/WEEK) as is the case at two of the other DOC facilities: the Bridgewater Correctional Complex WPCF and the Norfolk-Walpole Correctional Complex WPCF. Laboratory testing such as this is conducted in-house by facility personnel in order to obtain more timely results on which we can then base our daily treatment plants.

Response to Comment A2:
There was one violation of the monthly average fecal coliform limit and four violations of the maximum daily limit during the past 2 years. While the facility does achieve low bacterial counts most months, the periodic exceedances of the maximum daily limit are concerning, especially given the heavy recreational use of the Assabet and Concord Rivers. The most recent violation of the maximum daily coliform limit occurred on May 21, 2016 due to problems with the chlorine pump.

Furthermore, the final permit replaces the fecal coliform limit with an *E. coli* limit, meaning that the MCI Concord laboratory will need to learn a different test method. Because of these complicating factors, the monitoring frequency of three times per week has been retained in the final permit.

Comments submitted by Jamie Fosburgh, National Park Service, Northeastern Region Rivers Program

Opening Comment
Thank you for the opportunity to comment on the draft MCI Concord NPDES permit. This facility discharges into the Assabet River within the 29 miles of the Sudbury, Assabet and Concord Rivers designated as a federal Wild and Scenic Rivers. The designation recognizes the outstanding river resources, including ecology, scenery, recreation, history and literature, of the SuAsCo river system. The River Stewardship Council (RSC) was created as part of the designation and is comprised of representatives from each of the shoreline communities, nonprofit organizations, and state and federal agencies. The RSC has been authorized to advise the National Park Service to help promote the long-term protection of the rivers and these resources. Given this responsibility, the National Park Service has reviewed the draft NPDES permit for this facility in consultation with the RSC, and assessed the proposed permit limitations, requirements and restrictions to fully understand how this discharge may impact the "outstandingly remarkable" attributes of this Wild and Scenic River system. The NPS offers the following comments, questions and observations.

Comment B1: Metals
The RSC recognizes the facility will face challenges in meeting the proposed new permit limitations for aluminum and lead but the existing data indicates reasonable potential for the facility to cause chronic toxicity in the Assabet River. The RSC found the proposed implementation schedule for identifying and instituting treatment systems to control these metals reasonable though the RSC would encourage the facility to move to implementation as soon as practicable to reduce potential threats to aquatic species and public health. The RSC also asks that the data from the proposed cadmium reporting requirements be carefully assessed in the next 2-3 years to determine if there is reasonable potential for acute and/or chronic toxicity instead of waiting until the next permit renewal. Cadmium poses a significant threat to not only wildlife but also to public health for those communities using the river system for municipal drinking water. If the reported data show there is reasonable potential for acute and/or chronic toxicity, the RSC requests EPA modify the permit with appropriate permit limits and testing requirements for cadmium.

Response to Comment B2:
The general conditions in Part II (NPDES Part II Standard Conditions) of the permit have a reopener clause that gives the Regional Administrator the authority to reopen a permit at any time to establish appropriate effluent limitations or a schedule of compliance to bring all discharges into compliance with the requirements of the Clean Water Act. If, in the future, water quality monitoring should show the need for a more stringent limit, this permit may be re-opened and modified.

Comment B2: Phosphorus
The RSC supports the proposed winter limitation on total phosphorus in the effluent and requests the permit also amend the summer total phosphorus limit to match the 0.1 mg/l limit imposed on all of the other wastewater dischargers into the Sudbury-Assabet-Concord River system. The Assabet River has long been impaired by excess nutrient loading with a significant percentage of the contributions derived from the publically owned wastewater treatment plants discharging into the river. Considerable resources have been expended to develop Total Maximum Daily Load (TMDL) allocations for the river system. These were followed by extensive treatment process retrofits at the wastewater treatment facilities to meet significantly lower nutrient concentrations and loadings. There is insufficient justification provided in the permit renewal materials to support this sole exception to the 0.1 mg/l summer limit for total phosphorus for a discharge to the impaired Assabet-Sudbury-Concord River system. The inconsistency is further illustrated by the 0.1 mg/l summer TP limit for the smaller Wayland facility (0.052 MGD). This facility discharges into the Sudbury River, a system with a less serious nutrient impairment but one that contributes nutrients to the downstream Concord River.

Response to Comment B2:
The final permit shortens the averaging period for the summer phosphorus limit, allowing less effluent variability, and includes a more protective winter limit. Both of these new

conditions will ultimately result in further reductions of total phosphorus loading to the Assabet River. The summer phosphorus limit remains unchanged.

The Wayland facility permit authorized an increased discharge flow, while the MCI Concord permit reissuance involves no flow increase. Because the Wayland facility permit was for a new or increased discharge, the effluent limits were derived to address antidegradation requirements per 314 CMR 4.04. EPA imposed a more protective phosphorus limit for the facility to prevent lowering of water quality in an already impaired receiving water.

Comment B3: Orthophosphate Monitoring
The RSC would like to advocate for extending the monitoring and reporting requirement for orthophosphate to a year-round requirement. A better understanding of the percentage of organic and inorganic/ bioavailable phosphorus will help decision makers and river advocates better understand the dynamics of this complex river system so dominated by treated effluent. Meeting water quality standards through the TMDL allocation process and through implementation of best management practices is an iterative process. This is greatly assisted by additional information including summer orthophosphate concentrations in the effluent to better understand the ratio of organic to inorganic phosphorus.

Response to Comment B3:
EPA's intention in requiring winter orthophosphate monitoring was to verify the assumption that the vast majority of the phosphorus discharges would be in the dissolved phase. It was EPAs determination at this time that the non-particulate orthophosphates would pass through the river system and not accumulate in the sediments. However, since the last permit issuance, a 2008 study of the TP in sediments in the Assabet River indicated that winter phosphorus loadings do accumulate in the sediments and reductions in wintertime TP loading contribute significantly to the reduction in sediment phosphorus flux[1], even when the proportion of non-particulate orthophosphate is relatively high.[2] Given the low levels of phosphorus discharged at the MCI Concord facility during the summer months, EPA estimates that the vast majority of effluent phosphorus is orthophosphate in the summer as well. Given that both dissolved and particulate phosphorus contribute to water quality impairments, EPA has determined that total phosphorus is the appropriate focus and cannot find reason to continue monitoring orthophosphate in the wintertime or add such monitoring in the summertime. Therefore, EPA has removed the orthophosphate monitoring requirement from the final permit.

Comment B4: Operation and maintenance of sewer collection system
The proposed permit will require MCI Concord to map its sewer collection system. The timeline in the proposed permit would allow 2.5 years to complete this mapping. The RSC requests the time line for the mapping of the system to be greatly accelerated given the atypical circumstances of a correctional facility. Since June of 2010, when MA DEP

[1] Assabet River Sediment and Dam Removal Study, Modeling Report, June 2008, CDM, page 6-7.
[2] Based on winter orthophosphate monitoring from November of 2013 through March of 2016, the average ratio of orthophosphate to total phosphorus in MCI Concord effluent is 70%.

issued MCI Concord an Administrative Order (File No. UAO-NE-1N001 – attached for reference), MCI Concord has been required to address mapping and illicit discharge issues at its facility. Again, in 2014 MA DEP sought to address these ongoing issues through an Order of Noncompliance (attached) which included additional mapping requirements related to both the WWTP and associated stormwater infrastructure.

The MCI Concord facility is a relatively small area with a limited number of buildings when compared to a town or city tasked with the same requirement thus the effort, and time, to accomplish this mapping requirement is on reduced scale. Simply put, MCI Concord does not face many of the typical obstacles of a municipal facility permittee. We also note the existing MCI Concord permit was issued just over a decade ago indicating the five year review and renewal coinciding with a permit's expiration was delayed five years. The EPA has achieved an admirable record of timely renewals for expiring municipal permits. Unfortunately this permit did not receive as timely a renewal but if it had been addressed in 2010, the sewer mapping requirement would have been complete several years ago. Further delay in this crucial component of operation and maintenance fails to recognize the need of the receiving waters and the efforts of many to move toward full compliance with water quality standards.

This system mapping is a priority of the RSC. Several members have expressed concerns about existing problems with cross-contamination of the drainage system that are well documented and as yet unresolved. This cross-contamination results in contaminated water directly entering the Assabet River with no treatment. Without a thorough understanding of the system, as the provisions in the proposed permit will require, specific and systemic problems are likely to continue into the future. The RSC requests the allotted time for the sewer system mapping be revised to 12 months which will allow the permittee to begin remediation and repair of deficiencies in the existing collection system sooner.

The draft permit requires the permittee to complete a system operation and maintenance plan within 24 months of the effective date of the new permit. While we would like to see an accelerated timeline for this undertaking, we respect the level of effort needed to complete a thorough and comprehensive plan. We do advocate the plan be revisited once the system mapping is completed, if the plan completion predates the mapping, to allow for an adjustment in the O&M plan should the mapping uncover unanticipated needs.

The RSC is aware of the potential impact of pharmaceuticals and other emerging contaminants on aquatic and human health. In this regard, we suggest that the facility be required to put in place a specific system in their operation and maintenance plan to prevent the disposal of unused pharmaceuticals into the wastewater system.

Response to Comment B4:
The Notice of Noncompliance issued in December 2014 to the MCI Concord facility included a corrective actions schedule that required the following activities, among others, to be completed by February 16, 2015[3]:

[3] To EPA's knowledge, the required activities have not been completed.

A. *A summary of all work performed to identify and remove illegal wastewater connections to the storm drain system, in the drainage area of the Assabet River.*
B. *A map of the drainage system including locations of manholes, catch basins, outfall pipe sizes, and identifying direction of flow.*
C. *A map of the MCI Concord's sewer system, which shall include locations of manholes, pipe sizes, flow direction, pump stations, and siphon structures.*

Because MCI Concord was legally obligated by the state to complete a collection system map by February 2015, the mapping is not a new requirement.

Three changes have been made to the permit as a response to this comment. The final permit has been changed to indicate that having a collection system map in place is required starting on the effective date of the permit, to require the permittee to submit its collection system map to EPA one month after the effective date of the permit, and to require the proper disposal of pharmaceutical products.

Comment B5: Chlorination
The Fact Sheet indicates the facility uses a portable dechlorination system to achieve the required total residual chlorine concentration in the effluent. The proposed permit requires an alarm system to warn operators when there is a malfunction of the effluent disinfection system resulting in either too little or too much chlorine. The RSC is unclear if the portable nature of the dechlorination system could result in delays in rectifying a problem should an emergency situation arise. We would appreciate additional information on the disinfecting system in regards to ability to address an abnormal situation and what procedures are in place to review and remediate an alarm incident. The failure of the permittee to file testing results for bacteria and the occasional exceedance of bacteria limits has raised some concerns about the efficacy of the disinfection process, follow-up to problems with the system and the frequency of alarm instances the facility has experienced over the past 5 years.

Response to Comment B5:
The facility has informed EPA that it does not currently have automatic alarms for the chlorination or dechlorination system, therefore it is out of compliance with the current permit and the new permit. Furthermore, problems with the chlorination pump caused a violation of the maximum daily fecal coliform limit on May 21, 2016, a violation that continued through the night until staff arrived in the morning and addressed the malfunction. State and federal compliance staff are aware of the violation and are currently addressing it with the permittee.

MCI Concord reports that it plans to switch to ultraviolet disinfection during the fiscal year beginning July 1, 2016.

Comment B6: Flow
The Fact Sheet provided a summary of discharge monitoring reports for the past five years. The RSC is pleased to see the facility's compliance record has improved and the plant meets its permit requirements consistently. One notable trend recorded in the monthly report is the maximum daily flow of the facility increased dramatically, (over three fold) starting in December 2013. This significant increase was not mirrored in the monthly flow average. If this is not a recording or clerical error, the RSC would be both concerned and interested in knowing what circumstances changed to result in this abrupt maximum flow increase to four times the maximum design flow of the plant. Having a flow well above the design of the treatment system would be an unacceptable condition.

Response to Comment B6:
The inconsistencies noted by the commenter stem from issues with the report generated from the database that manages DMR data. For unknown reasons, a value of 1 was added to certain maximum daily flow results. The problem with the reports has since been resolved. See Attachment A for a corrected DMR data table.

Comments submitted by Alison Field-Juma, Executive Director, OARS for the Assabet, Concord and Sudbury Rivers

Thank you for the opportunity to comment on the above referenced draft 5-year permit for the Department of Correction, Massachusetts, authorizing wastewater discharges into the Assabet River from the discharge facility located at Mass. Correctional Institute (MCI)—Concord. The draft permit has several good provisions, and we have a few suggestions to strengthen others. Below we provide some background on our organization and the Assabet River. We then provide a detailed discussion of the draft permit's provisions.

OARS is a non-profit watershed organization established in 1986 to protect, preserve, and enhance the natural and recreational features of the Assabet River, its tributaries and watershed. In 2011 the Sudbury and Concord Rivers were added to the mission of the Organization for the Assabet River (OAR) and the name changed to OARS.
OARS has over 600 members and operates a successful EPA-approved volunteer-based water quality and stream flow monitoring program, a biomass monitoring program, a large-scale volunteer annual river clean-up, and a variety of educational workshops, canoe trips and other activities designed to foster enjoyment and good stewardship of the rivers. OARS provides detailed Annual Water Quality Reports to the local municipalities, the public, the EPA and MassDEP (see: http://www.oars3rivers.org/river/waterquality).

The Assabet, Sudbury and Concord Rivers are federally-designated Wild and Scenic Rivers in segments flowing through the town of Concord and upstream and downstream of Concord. MCI-Concord discharges into a designated Wild and Scenic section.

As is discussed in the comments below, there are several positive aspects of the draft permit. However, the permit should be strengthened relative to addressing current collection system inadequacies and preparing for future 7Q10 conditions.

The Assabet River

The Assabet River originates in Westborough and flows north to the confluence with the Sudbury River in Concord to form the Concord River which flows north to the Merrimack River in Lowell. The Assabet OARS Comments on Draft NPDES Permit River is classified as Class B—Warm Water Fishery. The Concord River into which it flows is classified as Class B—Warm Water Fishery, Treated Water Supply, and is the sole public drinking water source of the Town of Billerica. There are three municipal wastewater treatment plants upstream of the MCI-Concord discharge: Westborough, Marlborough Westerly, Hudson and Maynard. The first three are upstream of the USGS flow gage in Maynard. The result of these wastewater flows is that the Assabet remains an effluent-dominated river, a concern in terms of public health and the health of aquatic life.

The Massachusetts Year 2014 Integrated List of Waters lists the Assabet River under Category 5 (Waters Requiring a TMDL). The 6.4 mile segment from Acton to the confluence with the Sudbury River is listed as impaired for total phosphorus and fecal coliform; there is a TMDL for phosphorus for the Assabet River.[4] Municipalities have made a large investment in improving the water quality and reducing the phosphorus pollution of the Assabet River through an adaptive management NPDES permitting process guided by the Assabet River TMDL for Phosphorus (2004). All four municipal wastewater treatment plants on the Assabet are meeting lower permit limits for phosphorus (0.1 mg/L TP growing season and 1.0 mg/L TP winter) contained in their 2005/2006 permits. The draft permit for the MCI-Concord plant is sets limits at 0.2 mg/L TP growing season and 0.5 mg/L TP winter. The Wayland wastewater treatment plant on the Sudbury River has a TP limit of 0.1 mg/L year-round.

This section of the Assabet River has a notable history of recreational use, particularly fishing, swimming and boating, stretching back several centuries. Despite the water quality impairments, Recreation, Scenery and Ecology were recognized as Outstandingly Remarkable Values by Congress when it was designated Wild and Scenic in 1999. RiverFest, an annual celebration of the three rivers, holds 45 river-based events every year, from canoe trips to fishing classes. As the river's popularity as a recreational resource has grown, area residents have become increasingly active in its stewardship. The Assabet River does not yet meet its designated Class B—Warm Water Fishery water quality standard. OARS water quality data show significant decreases in in-stream TP concentrations since the upstream wastewater treatment plants were upgraded. However excessive aquatic biomass continues to be a problem in both the Assabet and Concord Rivers.

[4] Assabet River Total Maximum Daily Load for Phosphorus, Report No: MA82B-01-2004-01, 2004.

Comment C1: Winter Phosphorus Limit
We fully support the new winter Total Phosphorus (TP) concentration of 0.5 mg/L and loading limit of 1.25 lbs/day.

The TP discharge limits contained in the draft permit finally meet the TMDL's concentration and loading requirements. It is evident from the DMRs that the treatment plant is able to meet these limits. Winter loading was thought to have little effect on eutrophication but more recent studies do not support this conclusion.[5]

Response to Comment C1:
Thank you for the comment.

Comment C2: Future Phosphorus Limits
More stringent future limits on TP should be anticipated in light of predicted increase in frequency of droughts and loss of base flow.

The permittee should start the process of planning and securing funds for treatment upgrades that will enable the treatment plant to meet the same growing season discharge limits as all the other facilities discharging to the Assabet and Sudbury Rivers: 0.1 mg/L TP, in the term of the next 5-year permit. Note that the far smaller Wayland treatment plant discharge limit is 0.1 mg/L year-round. This plant discharges to the Sudbury River; the Assabet should receive at least such stringent protection since it is already effluent-dominated.

Response to Comment C2:
See Response to Comment B2. The phosphorus limit in the current permit is being carried forward. EPA supports efforts to reduce phosphorus levels in the Assabet River and agrees that MCI Concord should plan for more stringent phosphorus limits in the future. If future analysis indicates that lower phosphorus limits are necessary to meet water quality requirements, EPA will include such limits in future permits.

Comment C3: 60-Day Rolling Average
We support the change from 60-day rolling average reporting to monthly average. Due to fluctuations in the data, a monthly rolling average is a far more useful metric.

Response to Comment C3:
Thank you for the comment. As stated in the fact sheet, the limit was changed from a 60-day rolling average to a monthly average limit to comply with regulations at CFR 122.45(d)(2), which require limitations for POTWs to be established as average weekly and average monthly limitations, unless impracticable.

[5] Assabet River Sediment and Dam Removal Study, Modeling Report, June 2008, CDM.

Comment C4: Operations and Maintenance
We support the addition of infiltration/inflow (C3), Collection System Mapping (C4), Collection System O&M Plan (C5) and Annual Reporting Requirement (C6) to Section C. Operation and Maintenance of the Sewer System.

The addition of these four requirements to the O&M requirements is most welcome. Since 2010 there have been ongoing stormwater violations at the MCI-Concord facility despite an Administrative Order issued by MassDEP that year, and a further Notice of Noncompliance in December 2014. Pollutants, including bacteria, surfactants and other evidence of wastewater appear to have been discharged directly into the Assabet River throughout this period. The problem is evidently from inadequacies of the wastewater collection system, some inadequacies of which have been addressed while others apparently remain; we have seen no evidence that the Administrative Order of 2010 was complied with.

We ask that the collection system mapping—corrective action required by MassDEP in 2014—be expedited in order to eliminate ongoing violations and prevent future ones. Waiting another 30 months is simply too long given the ongoing knowledge of the problem; we request that the permit be revised to require that the mapping be completed within 12 months. We also note that the MCI-Concord facility and associated buildings and police station which comprise the collection system is of very limited size and should not require 30 months to map. The preventive maintenance and monitoring program should be applied consistently to the full collection system. The permittee should include the stormwater outfall to the Assabet River in the monitoring program in order to protecting the water quality of the Assabet.

Since there is no industrial pretreatment at the facility, it is important that oil and grease from the cooking facilities be well contained and controlled, including strict adherence to maintenance procedures for oil and grease traps. We suggest that some initial testing for oil and grease be done to determine the levels in the effluent. Any oil or grease entering the Assabet River during low flow periods would have a significant detrimental effect on aesthetics, recreation and wildlife.

Lastly, due to the impact of pharmaceuticals, especially endocrine disruptors, on fish development, it is important that no pharmaceuticals be disposed of in the wastewater system except through normal human excretion. We ask that a provision for the proper disposal of pharmaceuticals be included in the O&M Plan.

Response to Comment C4:
Regarding system mapping and pharmaceuticals management, please see Response to Comment B4.

Levels of oil and grease in the MCI Concord discharge are well below EPA thresholds for additional sampling or effluent limits. Of three effluent samples that the facility analyzed for the reissuance application, the maximum oil and grease concentration was 2.0 mg/L. EPA uses an oil and grease threshold concentration of 15 mg/l in the context

of industrial and stormwater permitting to determine if further sampling or an effluent limit is necessary. An effluent concentration of 15 mg/L is also recognized as the concentration at which many oils produce a visible sheen and/or cause undesirable taste in edible fish. For this reason, effluent oil and grease concentrations of 15 mg/L or less are considered to meet the water quality standard established for Oil and Grease by Massachusetts Surface Water Quality Standards at 314 CMR § 4.05(3)(b)7. These standards state that Class B "…waters shall be free from oil, grease and petrochemicals that produce a visible film on the surface of the water, impart an oily taste to the water or an oily or other undesirable taste to the edible portions of aquatic life, coat the banks or bottom of the water course, or are deleterious or become toxic to aquatic life." Therefore, the final permit includes no increase in effluent monitoring for oil and grease.

Comment C5: Metals Limits
We support the addition of limits on aluminum, cadmium and lead. Aluminum, cadmium and lead can be highly toxic to aquatic life and discharge permits must contain limits that protect aquatic life using established criteria. We are pleased to see these metals included in the permit.

Response to Comment C5:
Thank you for the comment.

Comment C6: Calculations
It appears that the calculations of upstream flow and pollutant loading do not include the contributions of the Maynard treatment plant (Fact Sheet p. 7, 14).

Response to Comment C6:
The commenter is correct that the Maynard WWTP was not included in the 7Q10 calculations. However, pollutant loading from the Maynard WWTP was accounted for by use of sampling data upstream of the MCI-Concord outfall collected as part of WET testing.

The inclusion of effluent flow from the Maynard WWTP results in minor changes to the final permit. The dilution factor changes from 28.5 to 30.8. The only limits in the permit based on dilution and affected by this change are the total residual chlorine and aluminum limits. The changes to the limits are presented in the table below. All other limits in the draft permit remain the same in the final permit.

Parameter	Draft Permit Limit	Final Permit Limit
Total Residual Chlorine maximum daily	0.54 mg/L	0.59 mg/L
Total Residual Chlorine average monthly	0.31 mg/L	0.34 mg/L
Total Recoverable Aluminum, average monthly	142 µg/L	147 µg/L

Please see Attachment B to this Response to Comments for background calculations supporting these effluent limit adjustments.

Comment C7: DMR Data
The Maximum Daily Flow recorded in the DMRs from Dec. 2013 onwards appears to be incorrect (Fact Sheet Attachment A, p. 2/12). If this large increase in flow is correct it needs to be explained.

Response to Comment C7:
See Response to Comment B6.

Comment C8: Conclusions
The proposed draft permit has several good components and improvements. We expect that through timely system mapping and proper maintenance the current violations will be quickly resolved and future violations prevented. We also expect that MCI-Concord will in time invest in tertiary treatment to improve phosphorus removal to the standards of the other treatment facilities discharging to the Assabet River.

Response to Comment C8:
Thank you for the comment.

Appendix A
MCI-Concord Water WPCF
Effluent Characteristics

Month	12-Month Rolling AverageFlow*	Maximum Daily Flow	BOD, monthly avg	BOD, weekly avg	BOD, daily max	BOD, avg monthly	BOD, avg weekly	BOD removal percentage	TSS, avg monthly	TSS, avg weekly	TSS, max daily	TSS, avg monthly	TSS, avg weekly	TSS removal percentage
	MGD	MGD	mg/l	mg/l	mg/l	lbs/day	lbs/day	%	mg/l	mg/l	mg/l	lbs/day	lbs/day	%
Apr-10	0.22	0.36	3.	4.	4.	6.	9.	98.3	1.	2.	2.	3.	4.	98.3
May-10	0.22	0.25	4.	5.	5.	6.	9.	97.1	2.	2.	2.	3.	4.	94.4
Jun-10	0.22	0.25	5.	7.	7.	8.	10.	97.9	2.	3.	3.	3.	5.	99.1
Jul-10	0.22	0.30	4.	5.	5.	9.	10.	97.9	1.	2.	2.	3.	4.	99.3
Aug-10	0.22	0.30	4.	5.	5.	9.	13.	98.2	2.	3.	3.	4.	5.	99.
Sep-10	0.22	0.25	3.	4.	4.	5.	7.	97.7	2.	2.	2.	3.	4.	95.6
Oct-10	0.22	0.28	4.	5.	5.	8.	9.	98.8	2.	2.	2.	3.	4.	99.4
Nov-10	0.22	0.24	5.	7.	7.	9.	13.	97.9	2.	2.	2.	3.	4.	97.8
Dec-10	0.23	0.25	10.	24.	24.	19.	48.	93.4	3.	3.	3.	5.	7.	99.1
Jan-11	0.23	0.25	5.	7.	7.	8.	13.	98.	3.	3.	3.	10.	22.	98.
Feb-11	0.23	0.24	4.	7.	7.	8.	13.	97.4	3.	6.	6.	6.	11.	98.2
Mar-11	0.22	0.26	5.	9.	9.	9.	16.	96.8	4.	6.	6.	7.	11.	98.2
Apr-11	0.23	0.26	4.5	6.6	6.6	9.	13.	98.3	2.1	2.4	2.4	4.	5.	96.5
May-11	0.23	0.31	4.	5.	5.	8.	9.	97.1	1.	2.	2.	3.	5.	99.3
Jun-11	0.23	0.25	5.	6.	6.	9.	13.	97.1	2.	3.	3.	5.	6.	99.2
Jul-11	0.23	0.30	5.	8.	8.	11.	19.	97.5	2.	3.	3.	4.	6.	98.6
Aug-11	0.23	0.26	4.1	5.2	5.2	8.	10.	98.4	2.1	3.1	3.1	4.	6.	98.3
Sep-11	0.23	0.27	5.	7.	7.	10.	16.	97.4	2.	3.	3.	3.	5.	99.2
Oct-11	0.23	0.27	2.5	3.2	3.2	5.	6.	98.6	1.4	1.8	1.8	3.	4.	99.1
Nov-11	0.23	0.28	3.	4.	4.	7.	9.	98.3	2.	2.	2.	4.	5.	99.
Dec-11	0.23	0.26	4.	7.	7.	8.	14.	93.4	3.	4.	4.	6.	9.	98.7
Jan-12	0.23	0.24	5.	7.	7.	10.	13.	96.	3.	4.	4.	6.	8.	98.1
Feb-12	0.23	0.23	5.1	6.1	6.1	9.	11.	97.2	2.9	3.8	3.8	5.	7.	98.7
Mar-12	0.23	0.24	6.	7.	7.	12.	13.	94.1	4.	4.	4.	8.	8.	98.1
Apr-12	0.23	0.33	4.	5.	5.	8.	8.	97.5	4.	5.	5.	8.	8.	97.8
May-12	0.23	0.26	5.	8.	8.	10.	17.	95.7	3.	4.	4.	5.	9.	97.2
Jun-12	0.23	0.26	5.	9.	9.	9.	11.	97.1	2.	3.	3.	5.	6.	98.4
Jul-12	0.23	0.27	2.	3.	3.	5.	6.	96.2	3.	3.	3.	6.	7.	98.2
Aug-12	0.23	0.25	2.	5.	5.	4.	10.	95.	3.	6.	6.	6.	11.	97.
Sep-12	0.23	0.25	4.	10.	10.	7.	17.	92.	3.	4.	4.	5.	8.	96.
Oct-12	0.23	0.31	4.7	6.3	6.3	9.	12.	94.	3.3	4.	4.	6.	7.	97.
Nov-12	0.23	0.23	4.7	6.3	6.3	9.	12.	93.5	3.2	5.	5.	6.	10.	96.
Dec-12	0.23	0.26	5.4	6.	6.	10.	11.	94.9	2.4	3.9	3.9	5.	7.	92.6

Appendix A
MCI-Concord Water WPCF
Effluent Characteristics

Month	12-Month Rolling AverageFlow*	Maximum Daily Flow	BOD, monthly avg	BOD, weekly avg	BOD, daily max	BOD, avg monthly	BOD, avg weekly	BOD removal percentage	TSS, avg monthly	TSS, avg weekly	TSS, max daily	TSS, avg monthly	TSS, avg weekly	TSS removal percentage
	MGD	MGD	mg/l	mg/l	mg/l	lbs/day	lbs/day	%	mg/l	mg/l	mg/l	lbs/day	lbs/day	%
Jan-13	0.23	0.24	6.2	8.	8.	12.	15.	91.8	2.3	2.9	2.9	4.	5.	91.3
Feb-13	0.23	0.25	4.3	4.8	4.8	8.	9.	97.	4.	10.	10.	8.	18.	97.
Mar-13	0.23	0.25	6.3	9.	9.	12.	18.	91.4	2.3	3.	3.	5.	6.	92.3
Apr-13	0.21	0.23	4.1	5.4	5.4	8.	10.	94.7	2.3	3.	3.	4.	6.	91.2
May-13	0.22	0.25	3.4	6.7	6.7	6.	12.	92.1	.7	1.1	1.1	1.	2.	98.
Jun-13	0.22	0.24	2.8	5.4	5.4	5.	11.	94.3	.6	.7	.7	1.	1.	98.
Jul-13	0.24	0.27	2.6	4.1	4.1	5.	8.	91.5	.6	.8	.8	1.	2.	99.1
Aug-13	0.22	0.26	2.7	3.3	3.3	5.	6.	97.2	.7	1.1	1.1	1.	2.	98.
Sep-13	0.22	0.25	2.8	4.	4.	5.	7.	95.8	1.3	2.	2.	3.	4.	99.6
Oct-13	0.22	0.26	4.	5.	5.	7.	9.	94.	1.	2.	2.	2.	3.	99.
Nov-13	0.22	0.34	2.6	3.1	3.1	5.	7.	96.	1.	1.	1.	2.	2.	99.4
Dec-13	0.21	0.23	2.30	3.00	3.00	4.	6.00	97.30	1.80	2.	2.	3.	4.	99.
Jan-14	0.22	0.25	2.90	3.40	3.40	5.	6.00	95.60	3.30	4.5	4.5	6.	9.	98.8
Feb-14	0.22	0.22	2.30	2.60	2.60	4.	5.00	97.90	1.20	1.6	1.6	2.	3.	99.5
Mar-14	0.21	0.24	2.30	3.00	3.00	4.	5.40	98.20	1.60	2.5	2.5	2.8	4.3	98.2
Apr-14	0.21	0.23	2.00	2.70	2.70	3.	5.00	94.80	2.70	3.8	3.8	5.	6.	98.7
May-14	0.20	0.23	1.80	2.40	2.40	3.	4.30	98.20	1.20	1.5	1.5	3.4	2.7	98.9
Jun-14	0.21	0.22	1.40	2.20	2.20	2.	4.00	98.70	0.50	.8	.8	1.	2.	99.6
Jul-14	0.21	0.25	1.40	2.40	2.40	2.	4.00	98.50	0.40	.9	.9	1.	2.	99.3
Aug-14	0.21	0.25	1.40	1.80	1.80	3.	3.00	98.70	0.50	.9	.9	1.	2.	99.4
Sep-14	0.21	0.25	1.40	2.00	2.00	2.6	3.80	97.80	0.60	1.2	1.2	1.2	2.2	99.6
Oct-14	0.21	0.24	1.50	1.90	1.90	2.	3.00	98.80	0.90	1.1	1.1	2.	2.	99.8
Nov-14	0.22	0.26	2.20	2.80	2.80	4.	5.00	98.50	0.90	1.	1.	2.	2.	99.4
Dec-14	0.21	0.26	2.60	4.10	4.10	4.8	7.60	97.40	1.20	3.1	3.1	2.3	5.7	99.2
Jan-15	0.21	0.22	1.90	2.30	2.30	3.	4.00	92.80	0.70	1.2	1.2	1.	2.1	98.6
Feb-15	0.20	0.21	2.40	2.70	2.70	3.9	4.20	95.60	0.90	1.	1.	1.4	1.7	98.2
Mar-15	0.20	0.22	2.00	2.70	2.70	3.5	4.60	98.90	1.50	3.3	3.3	2.6	5.8	99.4
8/2005 Permit Limits	0.31	Report	15	25	30	20	34	85	15	25	30	20	34	85
Minimum	.202	.205	1.4	1.8	1.8	2.	3.	91.4	.4	.7	.7	1.	1.	91.2
Average	0.22	0.26	3.66	5.34	5.34	6.88	10.12	96.37	1.97	2.80	2.80	3.83	5.66	97.97
Maximum	.235	.358	10.	24.	24.	19.	48.	98.9	4.	10.	10.	10.	22.	99.8
Standard Deviation	0.01	0.03	1.58	3.22	3.22	3.16	6.45	2.15	1.02	1.66	1.66	2.09	3.74	1.98
# measurements	60	60	60	60	60	60	60	60	60	60	60	60	60	60
# violations	0	N/A	0	0	0	0	1	0	0	0	0	0	0	0

Appendix A
MCI-Concord Water WPCF
Effluent Characteristics

Month	pH min	pH max	Total Residual Chlorine, avg monthly	Total Residual Chlorine, max daily	Fecal Coliform, geometric avg	Fecal coliform, daily max	Dissolved oxygen	Ammonia, avg monthly	Ammonia, avg monthly	Ammonia, max daily	Total Phosphorus, avg monthly	Total Phosphorus, avg monthly	Total Phosphorus, max daily
	s.u.	s.u.	µg/L	µg/L	#/100 ml	#/100 ml	mg/L	mg/L	lbs/day	mg/L	mg/l	lbs/day	mg/L
Apr-10	6.7	7.1	.14	.48	3.	265.	5.6	.7		1.6	.1	1.	.2
May-10	6.5	7.1	.1	.2	29.	291.	4.5	.2	1.	.5	.2	1.	.4
Jun-10	6.4	7.2	.11	.22	25.	152.	4.8	.8	2.	2.5	.17	.3	.27
Jul-10	6.5	7.1	.14	.41	11.	212.	4.9	.4	1.	.6	.18	.4	.31
Aug-10	6.7	7.2	.1	.22	89.	306.	5.1	.3	.6	.5	.27	.5	.59
Sep-10	6.7	7.1	.14	.28	65.	215.	5.3	.3	.6	.5	.2	.4	.4
Oct-10	6.6	7.	.12	.32	218.	344.	6.	.3	1.	.3	.3	1.	.6
Nov-10	6.6	7.2	.19	.29	19.	101.	6.7	.6		.8	.31		.4
Dec-10	6.7	7.	.18	.29	17.	429.	7.2	.8		2.	.39		.58
Jan-11	6.5	7.5	.22	.39	14.	166.	7.2	.9		1.	.48		.58
Feb-11	6.6	7.1	.23	.46	37.	293.	7.	.4		.6	.68		.86
Mar-11	6.7	7.	.18	.39	63.	286.	7.1	.3		.4	.38		.61
Apr-11	6.6	7.	.11	.16	50.	247.	6.4	.7		1.5	.2	.4	.3
May-11	6.5	7.4	.15	.34	6.	284.	6.3	.9	2.	1.5	.2	.4	.3
Jun-11	6.5	7.1	.14	.53	No data	No data	5.6	1.4	3.	2.1	.4	.8	.5
Jul-11	6.5	7.	.13	.33	46.	305.	5.6	.6	2.	.8	.3	.6	.4
Aug-11	6.5	7.	.13	.26	17.	255.	5.5	1.	2.	1.6	.35	.7	.54
Sep-11	6.5	7.	.15	.55	15.	741.	5.6	.8	2.	1.	.3	1.	.4
Oct-11	6.6	7.3	.16	.3	26.	299.	5.9	.4	1.	.5	.27	.6	.33
Nov-11	6.7	7.2	.11	.4	16.	928.	4.9	.3		.8	.3		.48
Dec-11	6.7	7.3	.13	.32	7.	294.	5.2	.4		.7	.35		.74
Jan-12	6.6	7.1	.1	.26	6.	154.	5.9	.7		1.	.3		.47
Feb-12	6.7	7.2	.18	.44	8.	218.	5.7	.8		1.	.27		.63
Mar-12	6.7	7.1	.23	.71	No data	No data	5.4	1.		1.7	.54		.71
Apr-12	6.5	7.	.17	.63	3.	24.	5.5	1.6		2.5	.09	.2	.5
May-12	6.6	7.2	.15	.31	1.	5.	5.5	1.6	3.	2.2	.14	1.	.54
Jun-12	6.7	7.	.16	.37	2.	111.	5.5	1.1	2.	1.6	.06	1.	.25
Jul-12	6.8	7.	.24	.4	2.	27.	5.4	.3	.6	.5	.06	.2	.14
Aug-12	67.	7.1	.18	.5	No data	No data	5.1	.6	1.2	1.	.07	.13	.14
Sep-12	6.7	6.9	.24	.38	1.	27.	5.2	.7	1.2	1.	.08	.14	.1
Oct-12	6.6	7.4	.23	.42	2.	243.	5.6	.6	1.2	1.2	.11	.2	.13
Nov-12	6.8	7.3	.22	.37	6.	169.	5.6	1.		1.7	.32		.19
Dec-12	7.	7.2	.22	.3	1.	11.	6.	.9		1.2	.52		.54

Appendix A
MCI-Concord Water WPCF
Effluent Characteristics

Month	pH min	pH max	Total Residual Chlorine, avg monthly	Total Residual Chlorine, max daily	Fecal Coliform, geometric avg	Fecal coliform, daily max	Dissolved oxygen	Ammonia, avg monthly	Ammonia, avg monthly	Ammonia, max daily	Total Phosphorus, avg monthly	Total Phosphorus, avg monthly	Total Phosphorus, max daily
	s.u.	s.u.	µg/L	µg/L	#/100 ml	#/100 ml	mg/L	mg/L	lbs/day	mg/L	mg/l	lbs/day	mg/L
Jan-13	7.	7.3	.26	.31	2.	16.	6.	1.2		1.8	.7		.9
Feb-13	6.9	7.2	.25	.44	1.	6.	6.1	.5		.7	.7		.9
Mar-13	6.8	7.2	.25	.38	1.	34.	5.9	1.2		1.2	.3		.33
Apr-13	6.8	7.1	.31	.38	1.	13.	6.2	1.3		1.4	.2	.11	.26
May-13	6.8	7.1	.23	.34	1.	10.	6.1	1.5	2.7	2.	.05	.03	.08
Jun-13	6.7	7.1	.15	.26	5.	77.	5.2	.6	1.2	1.1	.1	.04	.08
Jul-13	6.7	7.2	.14	.25	5.	83.	5.	1.1	2.2	2.3	.004	.002	.03
Aug-13	6.9	7.2	.15	.24	10.	54.	5.5	.3	.6	.5	.07	.04	.11
Sep-13	6.8	7.2	.14	.23	4.	557.	5.3	.6	1.1	1.2	.04	.02	.13
Oct-13	6.8	7.2	.09	.16	9.	249.	5.5	.4	.8	.8	.07	.04	.1
Nov-13	7.	7.3	.16	.42	36.	376.	5.7	.23		.3	.5	.5	.56
Dec-13	7.	7.3	.25	.41	18.	673.	5.70	.3		.4	.62		.67
Jan-14	7.1	7.2	.13	.33	23.	357.	6.10	.13		.2	.57		.91
Feb-14	6.8	7.3	.25	.37	2.	24.	7.10	.1		.2	.22		.32
Mar-14	6.9	7.2	.23	.33	1.	12.	7.20	.45		.5	.18		.23
Apr-14	6.8	7.2	.37	.48	.	6.	6.20	.5		.7	.09	.16	.16
May-14	6.6	7.1	.19	.45	1.3	14.	5.60	.5	.8	.8	.03	.05	.09
Jun-14	6.7	7.2	.21	.49	3.	74.	5.90	.5	.8	.8	.01	.02	.05
Jul-14	6.7	7.1	.26	.74	6.	125.	5.50	.5	.9	.6	.02	.04	.02
Aug-14	6.6	7.1	.16	.28	1.	139.	5.80	.2	.4	.3	.02	.04	.03
Sep-14	6.9	7.3	.13	.27	2.	114.	6.40	.2	.4	.3	.02	.04	.03
Oct-14	6.8	7.4	.14	.23	5.	85.	6.60	.2	.4	.4	.05	.1	.21
Nov-14	6.8	7.2	.13	.24	6.	575.	6.60	.2		.2	.41		0.54
Dec-14	6.9	7.2	.14	.29	7.	152.	6.50	.2		.3	.58		0.71
Jan-15	6.8	7.2	.12	.42	6.	320.	7.30	.2		.3	.7		0.70
Feb-15	6.8	7.1	.2	.3	4.	246.	7.40	.4		.4	.5		0.50
Mar-15	6.8	7.2	.16	.27	13.	63.	7.60	.25		.3	.36		0.37
8/2005 Permit Limits	6.7	7.1	47	82	200	400	5	7.8	20	N/A	0.2*	N/A	N/A
Minimum	6.4	6.9	.09	.16	.	5.	4.5	.1	.4	.2	.004	.002	.02
Average	7.72	7.16	0.18	0.36	17.16	208.00	5.91	0.62	1.32	0.97	0.27	0.37	0.39
Maximum	67.	7.5	.37	.74	218.	928.	7.6	1.6	3.	2.5	.7	1.	.91
Standard Deviation	7.78	0.12	0.06	0.12	32.67	196.28	0.73	0.39	0.77	0.64	0.20	0.36	0.25
# measurements	60	60	60	60	57	57	60	60	30	60	60	36	60
# violations	1	0	0	0	1	6	4	0	0	N/A	7	N/A	N/A

*0.2 mg/L from April - October and 1.0 mg/L from November - March

Whole Effluent Toxicity Tests

Date	LC50 Ceriodaphnia	LC50 Pimiphales	Aluminum, µg/L	Copper, µg/L	Cadmium, µg/L	Lead, µg/L	Nickel, µg/L	Zinc, µg/L
March-10	100.	100.	64	6	<0.5	<0.5	<5	No data
June-10	100.	100.	No data	No data	No data	No data	No data	No data
September-10	100.	100.	560	6	No data	No data	No data	No report
December-10	100.	100.	130	8	No report	No report	No report	No report
March-11	100.	100.	30	<20	<4	<5	<5	25
June-11	100.	100.	<20	70	<0.5	<0.7	8	9
September-11	100.	100.	105	12	<0.5	<0.7	<5	18
December-11	100.	100.	55	<3	<0.5	<0.7	<5	12
March-12	100.	100.	110	15	<0.5	<1	<5	24
June-12	100.	100.	159	7	<0.5	<1	<5	10
September-12	100.	100.	190	11	<0.5	<1	<5	17
December-12	100.	100.	140	9	<0.5	<0.7	<5	19
March-13	100.	100.	170	14	<0.5	1.8	<5	14
June-13	100.	100.	70	<3	<0.5	<0.7	<5	<5
September-13	100.	100.	380	6	<0.5	2	<5	7
December-13	100.	100.	60	13	0.9	1.5	<5	<5
March-14	100.	100.	20	<3	<0.5	3	<5	<5
June-14	100.	100.	80	6	<0.5	0.7	<5	10
September-14	100.	100.	120	8	<0.5	3.8	<5	6
December-14	100.	100.	57	8	<0.5	<0.7	1	9
March-15	100.	100.	155	10	<0.5	<0.7	<5	13
11/2005 Permit Limits	>100	>100	N/A	N/A	N/A	N/A	N/A	N/A
Minimum	100.00	100.00	30.00	6.00	N/A	N/A	N/A	7.00
Average	100.00	100.00	154.30	16.00	0.90	2.13	4.50	16.75
Maximum	100.00	100.00	560.00	70.00	0.90	3.80	8.00	25.00
Standard Deviation	0.00	0.00	129.51	15.47	N/A	1.11	4.95	6.02
# measurements	21	21	20	20	18	18	18	17
# exceed 2005 permit limit	0	0	N/A	N/A	N/A	N/A	N/A	N/A

Whole Effluent Toxicity Tests, upstream results

Date	Aluminum, µg/L	Copper, µg/L	Cadmium, µg/L	Lead, µg/L	Nickel, µg/L	Zinc, µg/L
March-10	355	<3	<0.5	5	<5	NS
June-10	NS	NS	NS	NS	NS	NS
September-10	90	8	NS	NS	NS	NS
December-10	130	4	NS	NS	NS	NS
March-11	30	<20	<4	<5	<5	14
June-11	NS	10	<0.5	4	10	10
September-11	107	NS	<0.5	<0.7	<5	8
December-11	66	<3	<5	<0.7	<5	<5
March-12	50	<3	<5	1	<5	10
June-12	93	<3	<0.5	5	<5	8
September-12	30	<3	<0.5	<0.7	<5	<5
December-12	80	<3	<0.5	1	<5	11
March-13	130	5	NS	2.1	NS	9
June-13	100	<3	NS	<0.7	NS	<5
September-13	25	<3	NS	2	NS	<5
December-13	50	8	0.7	1.2	<5	<5
March-14	5	3	<0.5	<0.7	<5	26
June-14	100	<3	<0.5	0.2	<5	9
September-14	70	<3	<0.5	3	<5	<5
December-14	1780	10	<0.5	54	<5	22
March-15	NS	NS	NS	NS	NS	NS
Minimum	5.00	3.00	0.70	0.20	10.00	8.00
Median	85.00	8.00	0.70	2.10	10.00	10.00
Maximum	1780.00	10.00	0.70	54.00	10.00	26.00
Standard Deviation	405.68	2.85	N/A	15.63	N/A	6.27
# measurements	18	18	14	17	14	16

7Q10

Water quality-based limitations are established with the use of a calculated available dilution. 314 CMR 4.03(3)(a) requires that effluent dilution be calculated based on the receiving water 7Q10. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10-year recurrence interval. The 7Q10 streamflows were determined using the gaged flows for the selected period of record and DFlow 3.1b, a streamflow modeling computer program.

Maynard, MA USGS gage (01097000), 7Q10 for 4/1/1984 – 04/01/2014 (30 years): **12.8 cfs** (drainage area = 109 mi^2)

Natural Baseflow factor for the Assabet River from the downstream of the headwaters impoundment to the Maynard USGS gage:

= Maynard gage 7Q10 – WWTF effluent flows* = net baseflow
(12.8 cfs – 12.14 cfs) / 109 square miles = **0.006 cfs/sq. mile**

*This is the sum of the monthly average effluent flow from the three WWTPs upstream of the Maynard gage for September 2010, which was the month with the lowest streamflow over the past 5 years.

Table 1. Average monthly effluent flows on the Assabet River in September 2010.

Facility Name	September 2010 Monthly Average Effluent Flow, cfs
Westborough WWTP	7.45
Hudson WWTF	2.21
Marlborough Westerly Waste Treatment Works	2.48
Sum	**12.14 cfs**

The flow factor for the Maynard USGS gage is the 7Q10 flow divided by the drainage area in square miles. This number, along with the drainage area of the MCI Concord outfall (168 square miles), is used to interpolate the amount of 7Q10 flow added between the gage and the outfall.

Because the Maynard WWTP is downstream from the Maynard USGS gage and upstream of MCI Concord, the 7Q10 calculation includes this flow. Maynard WWTP's effluent flow in September 2010 was 0.736 MGD.

Estimated 7Q10 flow at MCI Concord = Maynard gage 7Q10 + Maynard WWTP flow + [(168 square miles – 109 square miles) x 0.006 cfs/sq. mile] = 13.2 cfs

12.8 cfs + 0.736 MGD x (1.547 cfs/MGD) + (59 square miles x 0.006 cfs/sq. mile) =

12.8 cfs + 1.14 cfs + 0.354 cfs = 14.3 cfs

Design Flow Dilution:

Design Flow = 0.31 MGD x 1.547 cfs/MGD** = 0.48 cfs

$$\frac{\text{Design flow + 7Q10 flow}}{\text{Design flow}} = \frac{\text{0.48 cfs + 14.3 cfs}}{\text{0.48 cfs}} = \textbf{30.8} = \text{Dilution Factor}$$

**This is the conversion factor between cubic feet per second and million gallons per day.

1. Non-Conventional Pollutants

a) Total Residual Chlorine

Total Residual Chlorine Limitations:

(acute criteria * dilution factor) = Acute limit (Maximum Daily)
(19 µg/L x 30.8) = 585 µg/L (0.59 mg/L)

(chronic criteria * dilution factor) = Chronic limit (Monthly Average)
(11 µg/L x 30.8) = 339 µg/L (0.34 mg/L)

b) Total Phosphorus

Necessary Upstream Concentration

$$Q_R C_R = Q_D C_D + Q_S C_S$$

Solving for C_S (upstream concentration), where

Q_R	=	Streamflow below outfall	=	14.78 (effluent + upstream)
C_R	=	Concentration below outfall	=	assumed 0.1 mg/L
Q_D	=	Discharge flow	=	0.48 cfs
C_D	=	Discharge concentration	=	0.2 mg/L
Q_S	=	Upstream flow	=	14.3 cfs

$$C_S = (Q_R C_R - Q_D C_D) / Q_S$$

$$C_S = \frac{(14.78 \text{ cfs} \times 0.1 \text{ mg/L}) - (0.48 \text{ cfs} \times 0.2 \text{ mg/L})}{14.3 \text{ cfs}} = (1.478 - 0.096)/14.3 =$$

C_S = 0.097 mg/L = **97 µg/L**

c) Ammonia Nitrogen

30Q10 Calculation
Maynard, MA USGS gage (01097000), 30Q10 for 4/1/1984 – 4/1/2014 (30 years): **18.8 cfs** (drainage area = 109 mi^2)

Natural Baseflow factor for the Assabet River from the downstream of the headwaters impoundment to Maynard:
= Maynard gage 30Q10 – WWTF effluent flows* = net baseflow
(18.8 cfs – 12.14 cfs) / 109 square miles = **0.061 cfs/sq. mile**

The flow factor for the Maynard USGS gage is the 30Q10 flow divided by the drainage area in square miles. This number, along with the drainage area of the outfall (168 square miles), is used to interpolate the amount of 30Q10 flow added between the gage and the outfall.

Estimated 30Q10 flow at MCI Concord = Maynard gage 30Q10 + Maynard WWTP effluent flow +[(168 square miles – 109 square miles) x 0.061 cfs/sq. mile] =

18.8 cfs + 0.736 MGD x 1.547 cfs/MGD + (59 square miles x 0.061 cfs/sq. mile) =
18.8 cfs + 1.14 cfs + 3.60 cfs = 23.54 cfs

*This is the sum of the monthly average effluent flow from the four WWTPs upstream of the Maynard gage for September 2010, which was the month with the lowest streamflow over the past 5 years.

Table 3. Average monthly effluent flows on the Assabet River in September 2010.

Facility Name	September 2010 Monthly Average Effluent Flow, cfs
Westborough WWTP	7.45
Hudson WWTF	2.21
Marlborough Westerly Waste Treatment Works	2.48
Sum	**12.14 cfs**

Reasonable Potential Analysis for Summer Ammonia Discharges

$$C_R = \frac{Q_D C_D + Q_S C_S}{Q_R}$$

Solving for C_R (receiving water concentration), where

Q_D = effluent flow, i.e. facility design flow = 0.31 MGD = 0.48 cfs
C_D = effluent pollutant concentration = 7.8 mg/l (current summertime limit)
Q_S = upstream 30Q10 flow = 23.54 cfs
C_S = upstream concentration = 0.5 mg/l (1/2 detection limit)
Q_R = receiving water flow = $Q_S + Q_D$ = 0.48 cfs + 23.54cfs = 24.02 cfs

$$C_R = \frac{(0.48 \text{ cfs} \times 7.8 \text{ mg/l}) + (23.54 \text{cfs} \times 0.5 \text{ mg/l})}{24.02 \text{ cfs}}$$

$C_R = 0.65$ mg/l < 1.73 mg/l (summer chronic criterion)

There is no reasonable potential for the discharge to cause or contribute to an exceedance of the acute or chronic water quality criterion.

d) Metals

Hardness Mass Balance

$$C_R = \frac{Q_D C_D + Q_S C_S}{Q_R}$$

Solving for C_R (receiving water concentration), where

Q_D = effluent flow, i.e. facility design flow	= 0.31 MGD = 0.48 cfs
C_D = effluent hardness	= 154 mg/l
Q_S = 7Q10 flow of receiving water	= 14.3 cfs
C_S = upstream hardness	= 52 mg/l
Q_R = receiving water flow = $Q_S + Q_D$	= 0.48 cfs + 14.3 cfs = 14.78 cfs

$$C_R = \frac{(0.48 \text{ cfs} \times 154 \text{ mg/l}) + (14.3 \text{ cfs} \times 52 \text{ mg/l})}{14.78}$$

C_R = 55 mg/l (downstream hardness for calculation of certain hardness based metal criteria)

Table 4. Parameters for Calculating Total Recoverable Metals Criteria
Hardness = 55 mg/L

Metal	Parameters				Total Recoverable Criteria	
	ma	ba	mc	bc	Acute Criteria (CMC) (µg/L)	Chronic Criteria (CCC) (µg/L)
Aluminum	—	—	—	—	750	87
Cadmium	1.0166	-3.9240	0.7409	-4.7190	1.17	0.17
Copper	0.9422	-1.7000	0.8545	-1.702	28.90	26.80
Lead	1.273	-1.46	1.273	-4.705	38.42	1.50
Nickel	0.846	2.255	0.846	0.0584	284.29	31.61
Zinc	0.8473	0.884	0.8473	0.884	72.55	72.55

Table 5. Reasonable Potential Analysis for Metals

Metal	Q_D	C_D (95th Percentile)	Q_S	C_S (Median)	Q_R	$C_R = (Q_D C_D + Q_S C_S)/Q_R$	Criteria		Acute Reasonable Potential	Chronic Reasonable Potential	Limits	
	cfs	µg/L	cfs	µg/L	cfs	µg/L	Acute (µg/L)	Chronic (µg/L)	C_R > Criteria	C_R > Criteria	Acute (µg/L)	Chronic (µg/L)
Aluminum	0.48	374	14.3	85	14.78	95.1	750	87	N	Y	N/A	146.58
Cadmium		<0.5		<0.5		N/A	1.17	0.17	N	N	N/A	N/A
Copper		25.4		8		8.61	28.90	26.80	N	N	N/A	N/A
Lead		3.45		2.1		2.15	38.42	1.50	N	Y	N/A	1.50
Nickel		3.4		2.5*		2.53	284.29	31.61	N	N	N/A	N/A
Zinc		24.9		8.4		9.0	72.55	72.55	N	N	N/A	N/A

Because most of the upstream nickel results were below detection level (<5 µg/L), half of the detection level was used in place of the median for the nickel reasonable potential calculation