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),

Town of Concord
Department of Public Works

is authorized to discharge from the facility located at

Concord Wastewater Treatment Plant
509 Bedford Street
Concord, MA 01742

to receiving water named

Concord River

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

This permit shall become effective on **(See ** below)**

This permit expires at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on January 12, 2006.

This permit consists of 14 pages in Part I including effluent limitations and monitoring requirements, 25 pages in Part II Standard Conditions, Attachment A –Revised Acute Toxicity Test Procedure and Protocol, Attachment B -- Revised Freshwater Chronic Toxicity Test Procedure and Protocol, and Attachment C – Summary of Required Reports.

Signed this 1st day of August, 2013.

/S/ SIGNATURE ON FILE

Ken Moraff, Acting Director
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

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 Concord 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[3] TYPE**
FLOW[2]	*********	*********	1.2 MGD	*********	Report MGD	CONTINUOUS	RECORDER
FLOW[2]	*********	*********	Report MGD	*********	*********	CONTINUOUS	RECORDER
BOD_5 [4]	300 lbs/Day 136 kgs/Day	450 lbs/Day 204 kgs/Day	30 mg/L	45 mg/L	Report mg/L	2/WEEK	24-HOUR COMPOSITE[5]
TSS [4]	300 lbs/Day 136 kgs/Day	450 lbs/Day 204 kgs/Day	30 mg/L	45 mg/L	Report mg/L	2/WEEK	24-HOUR COMPOSITE[5]
pH RANGE[1,10]	6.5- 8.3 SU (SEE PERMIT PAGE 5 OF 14, PARAGRAPH I.A.1.b.)					1/DAY	GRAB
ESCHERICHIA COLI [1,6]	*********	*********	126 cfu/100 mL	*********	409 cfu/100 mL	2/WEEK	GRAB
DISSOLVED OXYGEN (April 1st-October 31st)	NOT LESS THAN 5.0 mg/l					1/WEEK	GRAB
TOTAL PHOSPHORUS[7] April 1st – October 31st November 1st – March 31st	********* *********	********* *********	200 µg/L 1,000 µg/L	********* *********	1,000 µg/L Report µg/L	1/MONTH	24-HOUR COMPOSITE[5]
TOTAL AMMONIA NITROGEN (N) June 1 – September 30 October 1 – May 31	********* *********	********* *********	Report mg/L Report mg/L	********* *********	Report mg/L Report mg/L	1/WEEK 2/MONTH	24-HOUR COMPOSITE[5]
DI(2-ETHYLHEXYL) PHTHALATE[8]	*********	*********	********	*********	Report µg/L	1/QUARTER	24-HOUR COMPOSITE[5]
TOTAL RECOVERABLE ALUMINUM[9]	*********	*********	255 µg/L	*********	Report µg/L	1/MONTH	24-HOUR COMPOSITE[5]
WHOLE EFFLUENT TOXICITY [11, 12, 13,14,15] Total Recoverable Cadmium Total Recoverable Lead Total Recoverable Copper Total Recoverable Zinc Total Recoverable Nickel Total Recoverable Aluminum	Acute $LC_{50} \geq$ 100% Chronic C-NOEC Report Report maximum daily, µg/l Report maximum daily, µg/l Report maximum daily, µg/l Report maximum daily, µg/l Report maximum daily, µg/l Report maximum daily, µg/l					2/YEAR	24-HOUR COMPOSITE[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. All samples shall be representative of the discharge from outfall 001. 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 using the analytical methods found in 40 CFR§136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR§136.

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 *E. coli* is expressed as a geometric mean.

7. The sampling frequency identified is the minimum sampling frequency and, in accordance with footnote #3, sampling must be conducted on the same day(s) each week. If any additional phosphorus sampling is conducted, including process control samples, the individual phosphorus results, including the day each sample was taken, the type of sample, i.e., 24-hour composite or grab, and the analytical method, must be reported on an attachment to the DMR. Additionally, the chemical dosing rate for all chemicals added for the purpose of phosphorus removal shall be reported for each day of the month. Only 24 hour composite samples analyzed with an EPA approved method shall be used in determining compliance with the permit limit.

8. If DEHP analysis is non-detect, the permittee shall include the reporting limit in the DMR cover letter or as an attachment to the DMR.

9. The aluminum samples shall be collected concurrently with the phosphorus samples.

10. The pH range of 6.5 – 8.3 Standard Units (SU) must be achieved in the final effluent unless the permittee meets the requirements of Part I.F., Special Conditions.

11. The permittee shall conduct both chronic and acute toxicity tests twice each year, in March

and September. The permittee shall test the daphnid, *Ceriodaphnia dubia*, only. The test results shall be submitted by the last day of the month following the completion of the test. The results are due April 30th and October 31st, respectively. The tests must be performed in accordance with test procedures and protocols specified in Attachments A and B of this permit.

Test Dates	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**	**Chronic Limit C-NOEC**
March September	April 30 October 31	Ceriodaphnia dubia (daphnid)	≥ 100%	Report

12. The LC50 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.

13. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction, based on a statistically significant difference from dilution control, at a specific time of observation as determined from hypothesis testing. Under the NPDES program, as indicated in the EPA WET Method Manual EPA 821-R-02-013, Section 10.2.6.2, all test results are to be reviewed and reported in consultation with EPA guidance on the evaluation of the concentration-response relationship.

14. 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 at http://epa.gov/region1/npdes/permits/generic/Alternatedilutionwaterguidance.pdf. 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.

15. 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.

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. Use of chlorine is prohibited.

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

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

a. Any new introduction of pollutants into the WWTP 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 WWTP by a source introducing pollutants into the WWTP at the time of issuance of the permit.

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

i. The quantity and quality of effluent introduced into the WWTP; and

ii. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the WWTP.

3. Prohibitions Concerning Interference and Pass Through:

Pollutants introduced into WWTP's by a non-domestic source (user) shall not pass through

the WWTP 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 that 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

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 this permit and shall be reported to EPA and MassDEP in accordance with Section D.1.e. (1) of Part II Standard Conditions 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 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

Within 30 months of the effective date of this permit, the permittee shall prepare a map of the sewer collection system it owns and/or operates (see page 1 of this permit for the effective date). The map shall be on a street map of the community, with sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up to date and available for review by federal, state, or local agencies. Such map(s) 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 Operation and Maintenance Plan

The permittee shall develop and implement a Collection System Operation and Maintenance 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.8. below.

b. The full Collection System O & M Plan shall be submitted and implemented 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, the 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) 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 the design flow (0.96 MGD) 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[1] 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:

[1] As defined at 40 CFR §122.2, which references the definition at 40 CFR §403.3

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; and
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.[2]

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

[2] 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

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; and
   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.

E. MONITORING AND REPORTING

1. **For a period of one year from the effective date of the permit**, the permittee may either submit monitoring data and other reports to EPA in hard copy form or report electronically using NetDMR, a web-based tool that allows permittees to electronically submit discharge monitoring reports (DMRs) and other required reports via a secure internet connection. **Beginning no later than one year after the effective date of the permit**, the permittee shall begin reporting using NetDMR, unless the facility is able to demonstrate a reasonable basis that precludes the use of NetDMR for submitting DMRs and reports. Specific requirements regarding submittal of data and reports in hard copy form and for submittal using NetDMR are described below:

a. Submittal of Reports Using NetDMR

   NetDMR is accessed from: http://www.epa.gov/netdmr. **Within one year of the effective date of this permit**, the permittee shall begin submitting DMRs and reports required under this permit electronically to EPA using NetDMR, unless the facility is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt-out request").

DMRs shall be submitted electronically to EPA no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA, including the MassDEP Monthly Operations and Maintenance Report, as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees shall continue to send hard copies of reports other than DMRs (including Monthly Operation and Maintenance Reports) to MassDEP until further notice from MassDEP.

b. Submittal of NetDMR Opt-Out Requests

Opt-out requests must be submitted in writing to EPA for written approval at least sixty (60) days prior to the date a facility would be required under this permit to begin using NetDMR. This demonstration shall be valid for twelve (12) months from the date of EPA approval and shall thereupon expire. At such time, DMRs and reports shall be submitted electronically to EPA unless the permittee submits a renewed opt-out request and such request is approved by EPA. All opt-out requests should be sent to the following addresses:

Attn: NetDMR Coordinator
U.S. Environmental Protection Agency, Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

And

Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608

c. Submittal of Reports in Hard Copy Form

Monitoring results shall be summarized for each calendar month and reported on separate hard copy Discharge Monitoring Report Form(s) (DMRs) postmarked no later than the 15th day of the month following the completed reporting period. All reports required under this permit, including MassDEP Monthly Operation and Maintenance Reports, shall be submitted as an attachment to the DMRs. Signed and dated originals of the DMRs, and all other reports or notifications required herein or in Part II shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency
Water Technical Unit (OES04-SMR)

5 Post Office Square - Suite 100
Boston, MA 02109-3912

Duplicate signed copies of all reports or notifications required above shall be submitted to the State at the following addresses:

MassDEP – Northeast Region
Bureau of Resource Protection
205B Lowell Street
Wilmington, MA 01887

Copies of WET test reports **only** shall be submitted to the following address:

Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608

Any verbal reports, if required in **Parts I** and/or **II** of this permit, shall be made to both EPA-New England and to MassDEP.

F. SPECIAL CONDITIONS

pH Limit Adjustment

The permittee may submit a written request to the EPA-New England requesting a change in the permitted pH limit range to be not less restrictive than 6.0 to 9.0 Standard Units found in the applicable National Effluent Limitation Guideline (Secondary Treatment Regulations in 40 CFR Part 133) for this facility. The permittee's written request must include the State's approval letter containing an original signature (no copies). The State's letter shall state that the permittee has demonstrated to the State's satisfaction that as long as discharges to the receiving water from a specific outfall are within a specific numeric pH range the naturally occurring receiving water pH will be unaltered. That letter must specify for each outfall the associated numeric pH limit range. Until written notice is received by certified mail from the EPA-New England indicating the pH limit range has been changed, the permittee is required to meet the permitted pH limit range in the respective permit.

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.

NPDES PART II STANDARD CONDITIONS
(January, 2007)

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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.

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/swguidance/methods/wet/index.cfm#methods

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/enforcementandassistance/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 $\pm$ 1^{o} C or 25 $\pm$ 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	$\geq$ 0.5, must bracket the permitted RWC

15.	Number of dilutions[3]	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 ~~the~~ others~~~~
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[3]	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[4]	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.

FRESHWATER CHRONIC TOXICITY TEST PROCEDURE AND PROTOCOL

USEPA Region 1

I. GENERAL REQUIREMENTS

The permittee shall be responsible for the conduct of acceptable chronic toxicity tests using three fresh samples collected during each test period. The following tests shall be performed as prescribed in Part 1 of the NPDES discharge permit in accordance with the appropriate test protocols described below. (Note: the permittee and testing laboratory should review the applicable permit to determine whether testing of one or both species is required).

- **Daphnid (Ceriodaphnia dubia) Survival and Reproduction Test.**
- **Fathead Minnow (Pimephales promelas) Larval Growth and Survival Test.**

Chronic toxicity data shall be reported as outlined in Section VIII.

II. METHODS

Methods to follow are those recommended by EPA in: Short Term Methods For Estimating The Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition. October 2002. United States Environmental Protection Agency. Office of Water, Washington, D.C., EPA 821-R-02-013. The methods are available on-line at http://www.epa.gov/waterscience/WET/ . Exceptions and clarification are stated herein.

III. SAMPLE COLLECTION AND USE

A total of three fresh samples of effluent and receiving water are required for initiation and subsequent renewals of a freshwater, chronic, toxicity test. The receiving water control sample must be collected immediately upstream of the permitted discharge's zone of influence. Fresh samples are recommended for use on test days 1, 3, and 5. However, provided a total of three samples are used for testing over the test period, an alternate sampling schedule is acceptable. The acceptable holding times until initial use of a sample are 24 and 36 hours for on-site and off-site testing, respectively. A written waiver is required from the regulating authority for any hold time extension. All test samples collected may be used for 24, 48 and 72 hour renewals after initial use. All samples held for use beyond the day of sampling shall be refrigerated and maintained at a temperature range of 0-6^{o} C.

All samples submitted for chemical and physical analyses will be analyzed according to Section VI of this protocol.

Sampling guidance dictates that, where appropriate, aliquots for the analysis required in this protocol shall be split from the samples, containerized and immediately preserved, or analyzed as per 40 CFR Part 136. EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection. Testing for the presence of total residual chlorine (TRC) must be analyzed immediately or as soon as possible, for all effluent samples, prior to WET testing. TRC analysis may be performed on-site or by the toxicity testing laboratory and the samples must be dechlorinated, as necessary, using sodium thiosulfate prior to sample use for toxicity testing.

If any of the renewal samples are of sufficient potency to cause lethality to 50 percent or more of the test organisms in any of the test treatments for either species or, if the test fails to meet its permit limits, then chemical analysis for total metals (originally required for the initial sample only in Section VI) will be required on the renewal sample(s) as well.

IV. DILUTION WATER

Samples of receiving water must be collected from a location in the receiving water body 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. EPA strongly urges that screening for toxicity be performed prior to the set up of a full, definitive toxicity test any time there is a question about the test dilution water's ability to achieve test acceptability criteria (TAC) as indicated in Section V of this protocol. The test dilution water control response will be used in the statistical analysis of the toxicity test data. All other control(s) required to be run in the test will be reported as specified in the Discharge Monitoring Report (DMR) Instructions, Attachment F, page 2,Test Results & Permit Limits.

The test dilution water must be used to determine whether the test met the applicable TAC. When receiving water is used for test dilution, an additional control made up of standard laboratory water (0% effluent) is required. This control will be used to verify the health of the test organisms and evaluate to what extent, if any, the receiving water itself is responsible for any toxic response observed.

If dechlorination of a sample by the toxicity testing laboratory is necessary a "sodium thiosulfate" control, representing the concentration of sodium thiosulfate used to adequately dechlorinate the sample prior to toxicity testing, must be included in the test.

If the use of an alternate dilution water (ADW) is authorized, in addition to the ADW test control, the testing laboratory must, for the purpose of monitoring the receiving water, also run a receiving water control.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable an ADW of known quality with hardness similar to that of the receiving water may be substituted. Substitution is species specific meaning that the decision to use ADW is made for each species and is based on the toxic response of that particular species. Substitution to an ADW is authorized in two cases. The first is the case where repeating a test due to toxicity in the site dilution water requires an **immediate decision** for ADW use be made by the permittee and toxicity testing laboratory. The second is in the case where two of the most recent documented incidents of unacceptable site dilution water toxicity requires ADW use in future WET testing.

For the second case, written notification from the permittee requesting ADW use **and** written authorization from the permit issuing agency(s) is required **prior to** switching to a long-term use of ADW for the duration of the permit.

Written requests for use of ADW must be mailed with supporting documentation to the following addresses:

Director
Office of Ecosystem Protection (CAA)
U.S. Environmental Protection Agency, Region 1
Five Post Office Square, Suite 100
Mail Code OEP06-5
Boston, MA 02109-3912

and

Manager
Water Technical Unit (SEW)
U.S. Environmental Protection Agency
Five Post Office Square, Suite 100
Mail Code 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/enforcementandassistance/dmr.html for further important details on alternate dilution water substitution requests.

V. TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA

Method specific test conditions and TAC are to be followed and adhered to as specified in the method guidance document, EPA 821-R-02-013. If a test does not meet TAC the test must be repeated with fresh samples within 30 days of the initial test completion date.

V.1. Use of Reference Toxicity Testing

Reference toxicity test results and applicable control charts must be included in the toxicity testing report.

If reference toxicity test results fall outside the control limits established by the laboratory for a specific test endpoint, a reason or reasons for this excursion must be evaluated, correction made and reference toxicity tests rerun as necessary.

If a test endpoint value exceeds the control limits at a frequency of more than one out of twenty then causes for the reference toxicity test failure must be examined and if problems are identified corrective action taken. The reference toxicity test must be repeated during the same month in which the exceedance occurred.

If two consecutive reference toxicity tests fall outside control limits, the possible cause(s) for the exceedance must be examined, corrective actions taken and a repeat of the reference toxicity test must take place immediately. Actions taken to resolve the problem must be reported.

V.1.a. Use of Concurrent Reference Toxicity Testing

In the case where concurrent reference toxicity testing is required due to a low frequency of testing with a particular method, if the reference toxicity test results fall slightly outside of laboratory established control limits, but the primary test met the TAC, the results of the primary test will be considered acceptable. However, if the results of the concurrent test fall well outside the established **upper** control limits i.e. ≥3 standard deviations for IC25 values and ≥ two concentration intervals for NOECs, and even though the primary test meets TAC, the primary test will be considered unacceptable and must be repeated.

V.2. For the *C. dubia* test, the determination of TAC and formal statistical analyses must be performed using only the first three broods produced.

V.3. Test treatments must include 5 effluent concentrations and a dilution water control. An additional test treatment, at the permitted effluent concentration (% effluent), is required if it is not included in the dilution series.

VI. CHEMICAL ANALYSIS

As part of each toxicity test's daily renewal procedure, pH, specific conductance, dissolved oxygen (DO) and temperature must be measured at the beginning and end of each 24-hour period in each test treatment and the control(s).

The additional analysis that must be performed under this protocol is as specified and noted in the table below.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1, 4]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3, 4]	x		0.02
Alkalinity[4]	x	x	2.0
pH[4]	x	x	--
Specific Conductance[4]	x	x	--
Total Solids[6]	x		--
Total Dissolved Solids[6]	x		--
Ammonia[4]	x	x	0.1
Total Organic Carbon[6]	x	x	0.5
Total Metals[5]			
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
- USEPA 1983. Manual of Methods Analysis of Water and Wastes
  -Method 330.5

3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing
4. Analysis is to be performed on samples and/or receiving water, as designated in the table above, from all three sampling events.
5. Analysis is to be performed on the initial sample(s) only unless the situation arises as stated in Section III, paragraph 4
6. Analysis to be performed on initial samples only

VII. TOXICITY TEST DATA ANALYSIS AND REVIEW

A. Test Review

1. Concentration / Response Relationship

A concentration/response relationship evaluation is required for test endpoint determinations from both Hypothesis Testing and Point Estimate techniques. The test report is to include documentation of this evaluation in support of the endpoint values reported. The dose-response review must be performed as required in Section 10.2.6 of EPA-821-R-02-013. Guidance for this review can be found at http://water.epa.gov/scitech/methods/cwa/ . In most cases, the review will result in one of the following three conclusions: (1) Results are reliable and reportable; (2) Results are anomalous and require explanation; or (3) Results are inconclusive and a retest with fresh samples is required.

2. Test Variability (Test Sensitivity)

This review step is separate from the determination of whether a test meets or does not meet TAC. Within test variability is to be examined for the purpose of evaluating test sensitivity. This evaluation is to be performed for the sub-lethal hypothesis testing endpoints reproduction and growth as required by the permit. The test report is to include documentation of this evaluation to support that the endpoint values reported resulted from a toxicity test of adequate sensitivity. This evaluation must be performed as required in Section 10.2.8 of EPA-821-R-02-013.

To determine the adequacy of test sensitivity, USEPA requires the calculation of test percent minimum significant difference (PMSD) values. In cases where NOEC determinations are made based on a non-parametric technique, calculation of a test PMSD value**,** for the sole purpose of assessing test sensitivity, shall be calculated using a comparable parametric statistical analysis technique. The calculated test PMSD is then compared to the upper and lower PMSD bounds shown for freshwater tests in Section 10.2.8.3, p. 52, Table 6 of EPA-821-R-02-013. The comparison will yield one of the following determinations.

- The test PMSD exceeds the PMSD upper bound test variability criterion in Table 6, the test results are considered highly variable and the test may not be sensitive enough to determine the presence of toxicity at the permit limit concentration (PLC). If the test results indicate that the discharge is not toxic at the PLC, then the test is considered insufficiently sensitive and must be repeated within 30 days of the initial test completion using fresh samples. If the test results indicate that the discharge is toxic at the PLC, the test is considered acceptable and does not have to be repeated.

- The test PMSD falls below the PMSD lower bound test variability criterion in Table 6, the test is determined to be very sensitive. In order to determine which treatment(s) are statistically significant and which are not, for the purpose of reporting a NOEC, the relative percent difference (RPD) between the control and each treatment must be calculated and compared to the lower PMSD boundary. See *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program*, EPA 833-R-00-003, June 2002, Section 6.4.2. The following link: Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program can be used to locate the USEPA website containing this document. If the RPD for a treatment falls below the PMSD lower bound, the difference is considered statistically insignificant. If the RPD for a treatment is greater that the PMSD lower bound, then the treatment is considered statistically significant.

- The test PMSD falls within the PMSD upper and lower bounds in Table 6, the sub-lethal test endpoint values shall be reported as is.

B. Statistical Analysis

1. General - Recommended Statistical Analysis Method

Refer to general data analysis flowchart, EPA 821-R-02-013, page 43

For discussion on Hypothesis Testing, refer to EPA 821-R-02-013, Section 9.6

For discussion on Point Estimation Techniques, refer to EPA 821-R-02-013, Section 9.7

2. *Pimephales promelas*

Refer to survival hypothesis testing analysis flowchart, EPA 821-R-02-013, page 79

Refer to survival point estimate techniques flowchart, EPA 821-R-02-013, page 80

Refer to growth data statistical analysis flowchart, EPA 821-R-02-013, page 92

3. *Ceriodaphnia dubia*

Refer to survival data testing flowchart, EPA 821-R-02-013, page 168

Refer to reproduction data testing flowchart, EPA 821-R-02-013, page 173

VIII. TOXICITY TEST REPORTING

A report of results must include the following:

- Test summary sheets (2007 DMR Attachment F) which includes:
  - Facility name
  - NPDES permit number
  - Outfall number
  - Sample type
  - Sampling method
  - Effluent TRC concentration
  - Dilution water used
  - Receiving water name and sampling location
  - Test type and species
  - Test start date
  - Effluent concentrations tested (%) and permit limit concentration
  - Applicable reference toxicity test date and whether acceptable or not
  - Age, age range and source of test organisms used for testing
  - Results of TAC review for all applicable controls
  - Test sensitivity evaluation results (test PMSD for growth and reproduction)
  - Permit limit and toxicity test results
  - Summary of test sensitivity and concentration response evaluation

In addition to the summary sheets the report must include:

- A brief description of sample collection procedures
- Chain of custody documentation including names of individuals collecting samples, times and dates of sample collection, sample locations, requested analysis and lab receipt with time and date received, lab receipt personnel and condition of samples upon receipt at the lab(s)
- Reference toxicity test control charts
- All sample chemical/physical data generated, including minimum limits (MLs) and analytical methods used
- All toxicity test raw data including daily ambient test conditions, toxicity test chemistry, sample dechlorination details as necessary, bench sheets and statistical analysis
- A discussion of any deviations from test conditions
- Any further discussion of reported test results, statistical analysis and concentration-response relationship and test sensitivity review per species per endpoint

Summary of Required Report Submittals*

Required Report	Date Due	Submitted by:	Submitted to:
Chlorination System Report (Part I.A.1. Footnote 9)	With monthly DMRs, if interruption or malfunction of the chlorine dosing system occurs (See Footnote 9).	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887
Whole Effluent Toxicity Test Report (Part I.A.1. Footnote 10)	By February 28th, March 31st, August 31st and November 30th of each year	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887
			MassDEP Division of Watershed Management Surface Water Discharge Permit Program 627 Main Street, 2nd Floor Worcester, MA 01608
Notification of SSO discharge	Within 24 hours	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887

Required Report	Date Due	Submitted by:	Submitted to:
Collection System Mapping (Part I.C.4)	Within 30 months of the effective date	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887
Initial Collection System Operation and Maintenance Plan (Part I. C.5.a)	Within 6 months of the effective date	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887
Full Collection System Operation and Maintenance Plan (Part I. C.5.a)	Within 24 months of the effective date	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887

Required Report	Date Due	Submitted by:	Submitted to:
Annual Summary Report of Activities related to implementation of Collection System O & M Plan	Annually by March 31	Newburyport WPCF	U.S. Environmental Protection Agency Water Technical Unit (OES04-SMR) 5 Post Office Square – Suite 100 Boston, MA 02109-3912
			MassDEP Bureau of Resource Protection Northeast Regional Office 205A Lowell Street Wilmington, MA 01887
Local Limits Technical Evaluation (Part I.B.1)	Within 120 days of the effective date	Newburyport WPCF	EPA New England Attn: Justin Pimpare 5 Post Office Square Mail Code: OEP6-3 Boston, MA 02109-3912
			MassDEP Bureau of Waste Prevention Industrial Wastewater Program One Winter Street Boston, MA 02108
Annual Pretreatment Report (Part I. B.3)	Annually by March 1	Newburyport WPCF	EPA New England Attn: Justin Pimpare 5 Post Office Square Mail Code: OEP6-3 Boston, MA 02109-3912
			MassDEP Bureau of Waste Prevention Industrial Wastewater Program One Winter Street Boston, MA 02108

* This table is a summary of the reports required to be submitted under this NPDES permit as an aid to the permittee(s). If there are any discrepancies between the permit and this summary, the permittee(s) shall follow the permit requirements.

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: **MA0100668**

PUBLIC NOTICE START AND END DATES: July 13, 2012 thru August 11, 2012

NAME AND ADDRESS OF PERMITTEE:

Town of Concord
135 Keyes Road
Concord, MA 01742

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Concord Wastewater Treatment Plant
509 Bedford Street
Concord, MA 01742

RECEIVING WATERS: **Concord River (MA82A-07)**
USGS Hydrologic Code: 01070005

CLASSIFICATION: **Class B - Warm Water Fishery, Treated Water Supply**

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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 (EPA) for the re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water. The current permit became effective March 13, 2006 and expired on February 28, 2011. EPA received the re-application on September 1, 2010. The draft permit proposes an expiration date five (5) years from the effective date of the final permit.

In discussions regarding the draft permit, the Town requested that EPA delay the public notice of the draft permit to allow the Town time to complete planning that it believes will support an increase to the authorized discharge flow. The Town has indicated that it will be conducting such planning consistent with EPA's recently issued *Integrated Municipal Stormwater and Wastewater Planning Approach Framework*. (EPA Office of Water and Office of Enforcement and Compliance Assurance. June 5, 2012) As stated in the framework, EPA is committed to working with states and communities to find efficiencies in implementing municipal wastewater and stormwater programs, and we encourage the Town to proceed with this approach.

However, as stated in the memorandum, "permit issuance and the implementation of existing permit and enforcement requirements and activities shall not be delayed while an integrated plan is being developed." We believe that completion of an integrated plan for the Town, addressing the six elements described in the June, 5, 2012 memo, is (conservatively) over a year away. In addressing the likely timeframe, we note that the Town's requested flow increase requires a state approved Comprehensive Wastewater Management Plan (CWMP). This CWMP can be an initial step, and potentially an effective basis, for the fourth element of the framework - a process for identifying, evaluating, and selecting alternatives.

For this reason, EPA has decided to release the draft permit for public comment without delay. EPA is committed to working with and assisting the Town as it undertakes its planning process. Completion of the plan, including the state-required CWMP, will be considered new information for purposes of reopening or modifying the final permit.

II. TYPE OF FACILITY AND DISCHARGE LOCATION

The facility's discharge outfall is listed below:

Outfall	Description of Discharge	Receiving water	Outfall Location
001	Treated Effluent	Concord River	42.475º N 71.341° W

The above named applicant has applied to EPA for the reissuance of its NPDES permit to discharge into the designated receiving waters. The facility collects and treats domestic wastewater and septage. The discharge from this advanced secondary wastewater treatment facility is via Outfall 001 to the Concord River. See Figure 1 for site location.

The Town of Concord's Wastewater Treatment Plant (Concord WWTP or WWTP) is a 1.2 million gallon per day (MGD) secondary wastewater treatment facility located in Concord, Massachusetts, serving a population of about 6,500. The facility also accepts up to 13,000 gallons per day of septage from the Town of Concord. There are currently no industrial users contributing wastewater to this facility.

The collection system is 100% separate sanitary sewers.

III. DESCRIPTION OF DISCHARGE

Quantitative descriptions of the discharge in terms of significant effluent parameters, based on discharge monitoring reports (DMRs) submitted for January 2009 through December 2010, 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 Concord WWTP, located in Concord, Massachusetts, is an advanced secondary treatment facility equipped with CoMag phosphorus removal and ultraviolet disinfection. See Figure 2 for treatment plant schematic.

The influent first passes through a rotary fine screen to remove solid material over ¼ inch in diameter. In-town septage is delivered via private hauler to a bar rack receiving station. Septage is stored in two 20,000-gallon capacity tanks, aerated to blend and freshen, circulated through chopper pumps to further blend and suspend solids and discharged to the headworks. Grit and sand is removed in a shallow detention basin using a motor-driven, continuously operating sweep.

After being screened and de-gritted, wastewater goes to primary clari-thickeners, and then flows through trickling filters for biological treatment, followed by secondary clarifiers, which provide further removal of solids. Aluminum sulfate is fed to the influent to the clarifiers to enhance phosphorus removal.

Following the secondary clarifiers, flow enters the CoMag process for further phosphorus removal. CoMag is a ballasted flocculation system consisting of a flocculator, clarifier, and magnetic filter. Magnetite, alum, and polymer are mixed with wastewater in the flocculator to create a floc with a high specific gravity. This floc settles quickly in the clarifier. Effluent quality is further enhanced by passing the clarified effluent through a magnet filter, which removes any remaining magnetite.

Flow then goes to a single channel three bank ultraviolet disinfection system, and the final effluent then flows through a Parshall flume where the flow rate is measured before discharge to the Concord River.

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) requires 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 (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 in stream 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), and 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 in Section 3; and, where appropriate, (5) dilution of the effluent in the receiving water. In accordance with Massachusetts Water Quality Standards [314 CMR 4.03(3)], available dilution for rivers and streams is based on a known or estimated value of the lowest average 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 segment of the Concord River receiving the Concord WWTP discharge is classified in the Massachusetts Surface Water Quality Standards (314 CMR 4.00) as a Class B-warm water fishery and treated water supply.

These waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). 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 Massachusetts Surface Water Quality Standards (314 CMR 4.02) as waters in which the maximum mean monthly temperature generally exceeds 20º Celsius (68º Fahrenheit) during the summer months and are not capable of supporting a year-round population of cold water stenothermal aquatic life.

The Town of Billerica uses the Concord River as its drinking water supply. A designated treated water supply is a Class B water that is used as a water supply after appropriate treatment. These waters may be subject to site-specific criteria to protect this use. No site-specific criteria have been designated for the Concord River.

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 (TMDL). This reach of the Concord River (MA82A-07), which extends from the confluence of the Sudbury and Assabet Rivers to the Billerica water supply intake, is listed on the *Massachusetts 2010 Integrated List of Waters* (303d) as impaired and requiring a TMDL for mercury in fish tissue, total phosphorus, and fecal coliform. EPA anticipates submission and approval of the final bacteria TMDL in 2012. The mercury impairment, which is caused by airborne deposition, is subject to a regional mercury TMDL. It is not known when the total phosphorus TMDL will be finalized.

4. Design Flow, 7Q10, and Available Dilution

Water quality based limits are established with the use of a calculated available dilution. Title 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, occurring over a 10-year recurrence interval. Additionally, the facility design flow is used to calculate available effluent dilution.

Discharge Flow

Review of facility flow between January 2009 and December 2010 shows that the average flow was 1.1 MGD. The facility design flow is 1.2 MGD (1.9 cfs). The flow limit in the current permit is expressed as a 12-month rolling average. No exceedances of this limit occurred during the specified data period. This limit has been carried forward in the draft permit.

7Q10

The 7Q10 for the Concord River at the Concord WWTP has been calculated as 34 cfs (21.9 MGD). Please see Appendix B for supporting calculations.

Available Dilution

Dilution Factor = (Facility Flow + 7Q10)/Facility Flow
Dilution Factor = (34 cfs + 1.9 cfs)/1.9 cfs = **19**

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

BOD and TSS

The Biochemical Oxygen Demand (BOD) and the Total Suspended Solids (TSS) draft limits are based on secondary treatment requirements and are the same as those in the current permit. Discharge monitoring data was reviewed from January 2009- December 2010. There have been no violations for BOD or TSS during this period with discharge levels typically well below permit limitations. Mass limits of 300 pounds (lbs)/day average monthly and 450 lbs/day maximum daily have also been included for BOD and TSS. The BOD and TSS removal percentages have met the 85% removal requirement. The monitoring frequency remains twice per week.

E. coli

The *Escherichia coli* (*E. coli*) limits for Outfall 001 are based on state water quality standards for Class B waters (314 CMR 4.05(b)(4)). The Commonwealth of Massachusetts promulgated *E. coli* criteria in the Surface Water Quality Standards (314 CMR 4.00) on December 29, 2006, replacing fecal coliform bacteria criteria. These new criteria were approved by EPA on September 19, 2007.

The current permit contains a year-round monthly average fecal coliform limit of 200 colony forming units per 100 milliliters (mL) (cfu/100 mL) and a maximum daily limit of 400 cfu/100 mL. Monitoring frequency is twice per week. Concord WWTF met all of its fecal coliform limits, with reported bacteria counts well below the permit limit.

The *E. coli* limits proposed in the draft permit for Outfall 001 are a monthly geometric mean of 126 colony 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). The proposed *E. coli* monitoring frequency in the draft permit is twice per week.

pH

The current permit requires effluent pH to be between 6.0 and 8.3. The minimum pH limit of 6.0 is less stringent than the customary limit of 6.5 for facilities discharging to Class B waters, and was granted in the current permit based on dilution levels and operational considerations. Because the receiving water has not shown any adverse effects due to occasional low pH in the discharge, the pH range requirement in the draft permit is maintained as 6.0 to 8.3. From January 2009 through December 2010, two pH values exceeded the maximum limit of 8.3. The pH shall be monitored daily.

6. Non-Conventional Pollutants

Total Phosphorus

The Massachusetts Surface Water Quality Standards (314 CMR 4.00) do not contain numerical criteria for total phosphorus. The narrative criterion for nutrients is found at 314 CMR 4.05(5)(c), which states that, “unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses…”

The Standards also require that "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,… to remove such nutrients to ensure protection of existing and designated uses." (314 CMR 4.05(5)(c)). The Massachusetts Department of Environmental Protection (MassDEP) has established that a monthly average total phosphorus limit of 0.2 mg/l (200 µg/l) represents highest and best practical treatment (HBPT) for Publicly Owned Treatment Works (POTWs).

The current permit contains the HBPT limit of 0.2 mg/l (200 µg/l) from April through October and a limit of 1 mg/l the rest of the year. From January 2009 through December 2010, there were no violations of the total phosphorus limit.

EPA calculated the downstream phosphorus concentration with the existing 0.2 mg/l permit limit for Concord WWTP to verify that the existing limit is sufficiently protective of designated uses. The upstream concentration, 45 µg/l, is the median phosphorus concentration reported for the Concord River at Lowell Street, Concord by the Organization for the Assabet River (OARS) in 2009 and 2010[1]. As the calculation below shows, the existing limit results in a downstream phosphorus concentration of 53 µg/l during 7Q10 conditions, lower than the Gold Book criteria of 100 µg/l.

Downstream Phosphorus Concentration

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	200 µg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	45 µg/l
Q_r	=	Streamflow below outfall	=	23.1 MGD (effluent + upstream)

Therefore,

$$C_r = \frac{(1.2\ \text{MGD} \times 200\ \mu\text{g/l}) + (21.9\ \text{MGD} \times 45\ \mu\text{g/l})}{23.1\ \text{MGD}}$$

$$= \mathbf{53\ \mu g/l} < 100\ \mu\text{g/l (Gold Book criterion)}$$

[1] http://www.oars3rivers.org/sites/default/files/Data-2009-2010-Appendix-II.pdf

The average monthly total phosphorus limit remains at 200 µg/l from April 1st through October 31st. From November 1st through March 31st, the average monthly limit remains at 1 mg/l. Sampling frequency will be once per month.

The draft permit also requires Concord WWTP to report daily alum, magnetite, and polymer dosing levels with the DMR. The CoMag process allows for rapid changes in phosphorus removal by adjusting the dosing levels of the chemicals used in the process. The rationale for this requirement is that reporting of dosing level will provide verification that nutrient removal occurs throughout the month without more frequent effluent monitoring.

Aluminum

Aluminum, in the form of alum or other compounds, is a commonly used chemical additive in wastewater treatment to remove phosphorus. The release of metals such as aluminum into the environment can result in levels that are highly toxic to aquatic life. Therefore, it is necessary to evaluate the downstream effects of discharges of aluminum from wastewater treatment plants. Water quality-based effluent limitations are imposed on dischargers when it is determined that limitations more stringent than technology-based limitations are necessary to achieve or maintain the water quality standards in the receiving water (40 CFR § 122.44(d)(1)). Such determinations are made when EPA finds that there is reasonable potential for the discharge to cause or contribute to an instream excursion above a water quality criterion contained within applicable state water quality standards (40 CFR § 122.44(d)(1)(i)).

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

The Massachusetts Surface Water Quality Standards include requirements for the regulation and control of toxic constituents and also require that EPA-recommended criteria established pursuant to Section 304(a) of the CWA be used unless site-specific criteria are established (314 CMR § 4.05(5)(e)). Massachusetts has not adopted site-specific criteria for aluminum. Therefore, the freshwater criteria for aluminum found in the *National Recommended Water Quality Criteria*: *2002* (US EPA 2002 [EPA-822-R-02-047]), which are an acute concentration of 750 µg/l and a chronic concentration of 87 µg/l, apply in Massachusetts.

The potential for discharges of aluminum from the Concord WWTP to cause or contribute to an excursion above water quality criteria was determined by statistically projecting the maximum concentration of the pollutant in the discharge assuming a lognormal distribution. A histogram of the effluent data verified this assumption. EPA projected the maximum effluent concentration as 4,411 µg/l (4.4 mg/l) by calculating the 99th percentile measurement of the existing effluent data

set from January 2009 through January 2011 (n=25). The 95th percentile concentration, 2,720 µg/l (2.7 mg/l), was also calculated for comparison with the chronic WQC (see Appendix C).

The projected pollutant level was then inserted into a steady-state mixing equation to determine if it could cause or contribute to an excursion from water quality standards under critical conditions. The median aluminum level reported in the 2008-2010 WET test dilution samples, 75 µg/l, was used in this analysis.

As shown in the boxes below, the projected maximum aluminum effluent of 4,411 µg/l results in a receiving water concentration of 303 µg/l during critical conditions, below the acute criterion of 750 µg/l. A concentration of 2,720 µg/l, the 95th percentile concentration, results in a receiving water concentration of 215 µg/l, above the chronic criterion of 87 µg/l. Therefore, there is reasonable potential for the discharge to cause or contribute to an excursion of the chronic water quality standard for aluminum.

Reasonable Potential Analysis for Aluminum

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	4,411 µg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall	=	23.1 MGD (effluent + upstream)

Therefore,

$$Cr = \frac{(1.2 \text{ MGD} \times 4{,}411 \text{ µg/l}) + (21.9 \text{ MGD} \times 75 \text{ µg/l})}{23.1 \text{ MGD}}$$

= **300 µg/l** < 750 µg/l (acute criterion)

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an excursion from the acute water quality criterion for aluminum.

Reasonable Potential Analysis for Aluminum

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	2,720 µg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall	=	23.1 MGD (effluent + upstream)

Therefore,

$$C_r = \frac{(1.2\ \text{MGD} \times 2{,}720\ \mu\text{g/l}) + (21.9\ \text{MGD} \times 75\ \mu\text{g/l})}{23.1\ \text{MGD}}$$

= **212 µg/l** > 87 µg/l (chronic criterion)

Therefore, there **is reasonable potential** for the discharge to cause or contribute to an excursion from the chronic water quality criterion for aluminum.

The effluent limits calculated below will result in attainment of water quality criteria downstream of the facility during critical conditions. The limit was calculated using the same steady state model that was used in determining reasonable potential, but setting the downstream concentration equal to the applicable water quality criteria and solving for the effluent concentration.

Monthly Average Aluminum Limit

$$C_d = \frac{(Q_rC_r - Q_sC_s)}{Q_d}$$

Where

C_d	=	Discharge concentration	=	?
C_r	=	Concentration below outfall	=	87 µg/l (chronic criterion)
Q_d	=	Discharge flow	=	1.2 MGD
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	23.1 MGD

$$C_d = \frac{(23.1\ \text{MGD})(87\ \mu\text{g/l}) - (21.9\ \text{MGD})(75\ \mu\text{g/l})}{1.2\ \text{MGD}}$$

= 306 µg/l

The draft permit therefore includes an average monthly limit of 306 µg/l and a requirement to report the maximum daily effluent concentration. The proposed monitoring frequency is once per month. If the facility monitors at this frequency, the single sample must be reported as both the monthly average and the daily maximum. If Concord WWTP chooses to sample more often than once per month, the average of the samples must be reported as the monthly average, and the highest sample of the month reported as the daily maximum.

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 does not contain a limit for ammonia. DMR data show that effluent ammonia levels range from 0.49 mg/l to 2.81 mg/l (see Appendix A).

EPA ammonia criteria recommend using the 30Q10 conditions (the lowest 30-day average daily flow with a 10-year expected recurrence interval) rather than the 7Q10 for setting ammonia limits. Interpolation of flow records for USGS Gages in Maynard and Lowell indicates that the 30Q10 is 49 cfs. The 30Q10 and dilution factor calculations are presented in Appendix D.

Given the dilution factor of 27 during 30Q10 conditions, no reasonable potential for an exceedance of water quality standards exists (see Appendix E for calculations). The draft permit carries forward the monitoring requirements of once per week from June 1- September 30 and twice per month from October 1 – May 31.

Copper

Copper is an abundant naturally occurring trace element in the earth's crust that is also found in surface waters. Copper is a micronutrient at low concentrations and is essential to virtually all plants and animals. At higher concentrations copper can become toxic to aquatic life.

An examination of Concord WWTP's whole effluent toxicity (WET) testing data shows effluent copper concentrations ranging from non-detect to 16 µg/l (see Appendix A).

The *National Recommended Water Quality Criteria*: *2002* (US EPA 2002 [EPA-822-R-02-047]) includes copper criteria for the protection of aquatic life. These criteria are hardness-based. The calculations below estimate hardness in the receiving water downstream of the facility, which is then used to establish the applicable copper criteria. The hardness data used in the calculations are from Concord WWTP's Whole Effluent Toxicity (WET) test reports from March 2008 through December 2010. The hardness values used in this calculation are the median hardness values measured in the treatment plant discharge and the upstream receiving water during this period. Hardness data used to calculate the criteria are included in Appendix F.

Hardness Analysis

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	86 mg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	55 mg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	23.1 MGD

Therefore,

$$C_r = \frac{(1.2\ \text{MGD} \times 87\ \text{mg/l}) + (21.9\ \text{MGD} \times 50\ \text{mg/l})}{23.1\ \text{MGD}}$$

$$= 56\ \text{mg/l}$$

1. Acute Criteria (Total Recoverable) = $\exp\{m_a[\ln(h)] + b_a\}$ = **8.11 µg/l**

Where:

m_a = Pollutant-specific coefficient = 0.9422
b_a = Pollutant-specific coefficient = -1.700
ln = Natural logarithm
h = hardness of the receiving water = 56 mg/l

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2. Chronic Criteria (Total Recoverable) = $\exp\{m_c[\ln(h)] + b_c\}$ = **5.68 µg/l**

Where:

m_c = Pollutant-specific coefficient = 0.8545
b_c = Pollutant-specific coefficient = -1.702
ln = Natural logarithm
h = hardness of the receiving water = 56 mg/l

EPA used information from the quarterly WET tests to perform a Reasonable Potential Analysis to determine the potential for discharges of copper from the Concord WWTP to cause or contribute to an excursion above water quality criteria. First, EPA projected the maximum effluent concentration as 46.40 µg/l by calculating the 99th percentile measurement the effluent data from March 2008 through December 2010. EPA then calculated the 95th percentile concentration, 27.82 µg/l, to characterize the maximum monthly average concentration (see Appendix F).

Background conditions in the Concord River were determined from the median of the WET chemistry dilution water samples from March 2008 through December 2010. The projected pollutant levels were then inserted into a steady-state mixing equation to determine if the discharge could cause or contribute to an excursion from water quality criteria under critical conditions.

As shown in the box below, the projected maximum copper effluent concentration of 46.40 µg/l results in a downstream receiving water concentration of 5.25 µg/l, below the acute criteria of 8.11 µg/l. A concentration of 27.82 µg/l, the 95th percentile concentration, results in a receiving water concentration of 4.29 µg/l, below the chronic criterion of 5.68 µg/l. Therefore, there is no reasonable potential for the discharge to cause or contribute to an excursion of either the acute or chronic water quality standard for copper.

Reasonable Potential Analysis for Copper – Acute

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	46.40 µg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	3 µg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	23.1 MGD

Therefore,

$$C_r = \frac{(1.2 \text{ MGD} \times 46.40 \text{ µg/l}) + (21.9 \text{ MGD} \times 3 \text{ µg/l})}{4.1 \text{ MGD}}$$

$$= \mathbf{5.25} < 8.11 \text{ µg/l (acute criterion)}$$

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an excursion from the acute water quality criterion for copper.

Reasonable Potential Analysis for Copper – Chronic

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	27.82 µg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	3 µg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	23.1 MGD

Therefore,

$$C_r = \frac{(1.2 \text{ MGD} \times 27.82 \text{ µg/l}) + (21.9 \text{ MGD} \times 3 \text{ µg/l})}{23.1 \text{ MGD}}$$

= **4.29 µg/l** < 5.68 µg/l (chronic criterion)

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an excursion from the chronic water quality criterion for copper.

Because there is no reasonable potential for an excursion from water quality standards from copper discharges from Concord WWTP, the draft permit does not contain copper limits. The permittee will continue to monitor for copper as part of the quarterly whole effluent toxicity testing.

Di(2-ethylhexyl) Phthalate

Di(2-ethylhexyl) phthalate (also known as DEHP) is used in the production of polyvinyl chloride (PVC). It is commonly detected in the environment due to the widespread use of plastic products, though it is only slightly soluble in water and is broken down quickly in the presence of oxygen. For more information on this chemical, see Appendix G for a fact sheet on DEHP produced by the Agency for Toxic Substances and Disease Registry (ATSDR).

DEHP was detected in pollutant scans of Concord WWTP effluent conducted for the NPDES reissuance application.

Table 1. DEHP Levels in Concord WWTP Effluent

Date	Concentration
4/19/2010	<10 µg/l *
6/21/2010	11 µg/l
8/22/2010	19 µg/l
5/31/2011	6.6 µg/l

* not detected in laboratory analysis

The human health criteria for DEHP are 1.2 µg/L for consumption of water and organism, and 2.2 µg/L for organism only. The water and organism criterion applies when the water body is used for drinking water and animals from the water body are consumed. The organism-only criterion applies when animals from the water body are consumed. The drinking water MCL (Maximum Contaminant Level) for DEHP is 6 µg/L. The reason for the apparent discrepancy in these numbers is that cost and laboratory detection limits are considered in the determination of MCLs, while human health criteria do not account for either.

As of 2010 (the most recent report available online), the Town of Billerica, which uses the Concord River as a drinking water source, did not detect DEHP in its drinking water. Because the Concord River is a drinking water source for towns downstream, the water and organism criterion was used to determine whether an effluent limit would be needed under the Massachusetts Water Quality Standards and the Clean Water Act.

To determine whether an effluent limit is necessary, EPA conducted a Reasonable Potential Analysis to assess the likelihood that the effluent caused or contributed to an exceedance of water quality standards under critical conditions. Critical conditions are considered to be 7Q10 streamflow with the facility operating at design capacity. EPA could not project the 99% or 95% percentile concentration, because at least ten samples are necessary to confirm that the data are lognormally distributed. Therefore, EPA used the highest observed effluent concentration. Finally, because DEHP breaks down quickly in the presence of oxygen, EPA assumes that the upstream concentration of DEHP is zero.

Reasonable Potential Analysis for DEHP

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	19 µg/l
Q_s	=	Upstream flow	=	21.9 MGD
C_s	=	Upstream concentration	=	0 µg/l
Q_r	=	Streamflow below outfall	=	23.1 MGD (effluent + upstream)

Therefore,

$$Cr = \frac{(1.2\ MGD \times 19\ \mu g/l) + (21.9\ MGD \times 0\ \mu g/l)}{23.1\ MGD}$$

$$= \mathbf{0.99\ \mu g/l} < 1.2\ \mu g/l \text{ (water and organism criterion)}$$

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an exceedance of the water and organism human health criterion for DEHP.

Because there is not reasonable potential at this time for the effluent to cause or contribute to an exceedance of the human health criteria for DEHP, the draft permit does not include a limit for this pollutant. However, the permittee is required to monitor for and report DEHP concentrations in the effluent. Monitoring frequency will be once per quarter, in the same months as the Whole Effluent Toxicity tests. Because the detection level of DEHP can vary widely, if DEHP is not detected in the effluent, Concord WWTP must report the detection level of the analysis with the DMR. This requirement will help EPA determine if water quality standards are being met and assist in future permit limit development, if needed.

Outfall 001 – Whole Effluent Toxicity

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The Massachusetts Surface Water Quality Standards 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. Pursuant to EPA Region 1 and MassDEP policy, discharges having a dilution ratio between 10:1 and 20:1 require an acute toxicity limit of LC50 >100% and chronic toxicity testing four times per year. (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 current permit requires acute and chronic toxicity tests to be performed four times each year; in March, June, September, and December. The current permit also requires that the LC50 concentration exceed 100% effluent (i.e. 100% of effluent not cause mortality in more than 50% of test organisms), and that the Chronic C-NOEC (concentration of effluent that produces significant chronic effects in the test organism) be reported. From March 2008 through December 2010, there was one violation of the acute toxicity limit in June 2008, when the LC50 was 62% effluent.

The draft permit carries forward the requirements for quarterly chronic and acute toxicity tests using the species *Ceriodaphnia dubia*, only. The acute toxicity endpoint, expressed as LC50, must equal or exceed 100% effluent. The reporting requirement for chronic toxicity is carried forward into the draft permit. 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.

The draft permit also requires reporting of certain metals in the 100% effluent sample. These are parameters that the permittee already measures and reports as part of the quarterly WET test. The requirement to report the parameters on the DMR will add these data to the compliance database and facilitate reasonable potential analyses for future permits.

VI. OPERATION AND MAINTENANCE OF THE COLLECTION SYSTEM

EPA regulations set forth a standard condition for "Proper Operation and Maintenance" that is included in all NPDES permits. *See* 40 CFR § 122.41(e). This condition is specified in Part II.B.1 (Standard Conditions) of the draft permit and it requires the proper operation and maintenance of all wastewater treatment systems and related facilities installed or used to achieve permit conditions.

EPA regulations also specify a standard condition to be included in all NPDES permits that specifically imposes on permittees a "duty to mitigate." *See* 40 CFR § 122.41(d). This condition is specified in Part II.B.3 of the draft permit and it requires permittees to take all reasonable steps – which in some cases may include operations and maintenance work - to minimize or prevent any discharge in violation of the permit which has the reasonable likelihood of adversely affecting human health or the environment.

Proper operation of collection systems is critical to prevent blockages and equipment failures that would cause overflows of the collection system (sanitary sewer overflows, or SSOs), and to limit the amount of non-wastewater flow entering the collection system (inflow and infiltration or I/I). I/I in a collection system can pose a significant environmental problem because it may displace wastewater flow and thereby cause, or contribute to causing, SSOs. Moreover, I/I could reduce the capacity and efficiency of the treatment plant and cause bypasses of secondary treatment. Therefore, reducing I/I will help to minimize any SSOs and maximize the flow receiving proper treatment at the treatment plant. There is presently estimated to be approximately 198,075 gpd of (I/I) in the sewer system. MassDEP has stated that the inclusion in NPDES permits of I/I control conditions is a standard State Certification requirement under Section 401 of the CWA and 40 CFR § 124.55(b).

Therefore, specific permit conditions have been included in Part I.B., and I.C. and I.D. of the draft permit. These requirements include mapping of the wastewater collection system, preparing and implementing a collection system operation and maintenance plan, reporting unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling infiltration and inflow 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 intended 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.

VII. SLUDGE INFORMATION AND REQUIREMENTS

Concord WWTP transports its sludge to the Upper Blackstone Water Pollution Abatement District for final treatment and disposal. Concord WWTP generates approximately 200 dry metric tons of sludge each year.

In February 1993, the Environmental Protection Agency (EPA) promulgated standards for the use and disposal of sewage sludge. The regulations were promulgated under the authority of

§405(d) of the Clean Water Act (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.

VIII. ESSENTIAL FISH HABITAT (EFH)

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.

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.

Concord WWTP discharges to the Concord River, which is a tributary of 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 1.2 MGD and the effluent receives advanced treatment;
- The facility withdraws no water from the Concord 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 and aluminum based on EPA water quality criteria;
- The facility uses ultra-violet disinfection; therefore the effluent is free from chlorine.
- Acute and chronic toxicity testing on *Ceriodaphnia dubia* is required four (4) times per year and the recent toxicity results are in compliance with permit limits;
- 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.

IX. ENDANGERED SPECIES

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 Concord WWTP. 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.

X. 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 includes new provisions related to Discharge Monitoring Report (DMR) submittals to EPA and the State. The Draft Permit requires that, no later than one year after the effective date of the permit, the permittee submit all monitoring data and other reports required by the permit to EPA using NetDMR, unless the permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt-out request").

In the interim (until one year from the effective date of the permit), the permittee may either submit monitoring data and other reports to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit discharge monitoring reports (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, including contacts for EPA Region 1, is provided on this website.

EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To participate in upcoming trainings, visit http://www.epa.gov/netdmr for contact information for Massachusetts.

The Draft Permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR, no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be 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.**

The Draft Permit also includes an "opt-out" request process. Permittees who believe they cannot use NetDMR due to technical or administrative infeasibilities, or other logical reasons, must demonstrate the reasonable basis that precludes the use of NetDMR. These permittees must submit the justification, in writing, to EPA at least sixty (60) days prior to the date the facility would otherwise be required to begin using NetDMR. Opt-outs become effective upon the date of written approval by EPA and are valid for twelve (12) months from the date of EPA approval. The opt-outs expire at the end of this twelve (12) month period. Upon expiration, the permittee must submit DMRs and reports to EPA using NetDMR, unless the permittee submits a renewed opt-out request sixty (60) days prior to expiration of its opt-out, and such a request is approved by EPA.

Until electronic reporting using NetDMR begins, or for those permittees that receive written approval from EPA to continue to submit hard copies of DMRs, the Draft Permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format. Hard copies of DMRs must be postmarked no later than the 15th day of the month following the completed reporting period.

XI. 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.

XII. GENERAL CONDITIONS

The general 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.

XIII. STATE CERTIFICATION REQUIREMENTS

The staff of 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.

XIV. 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.

XV. EPA CONTACT

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:

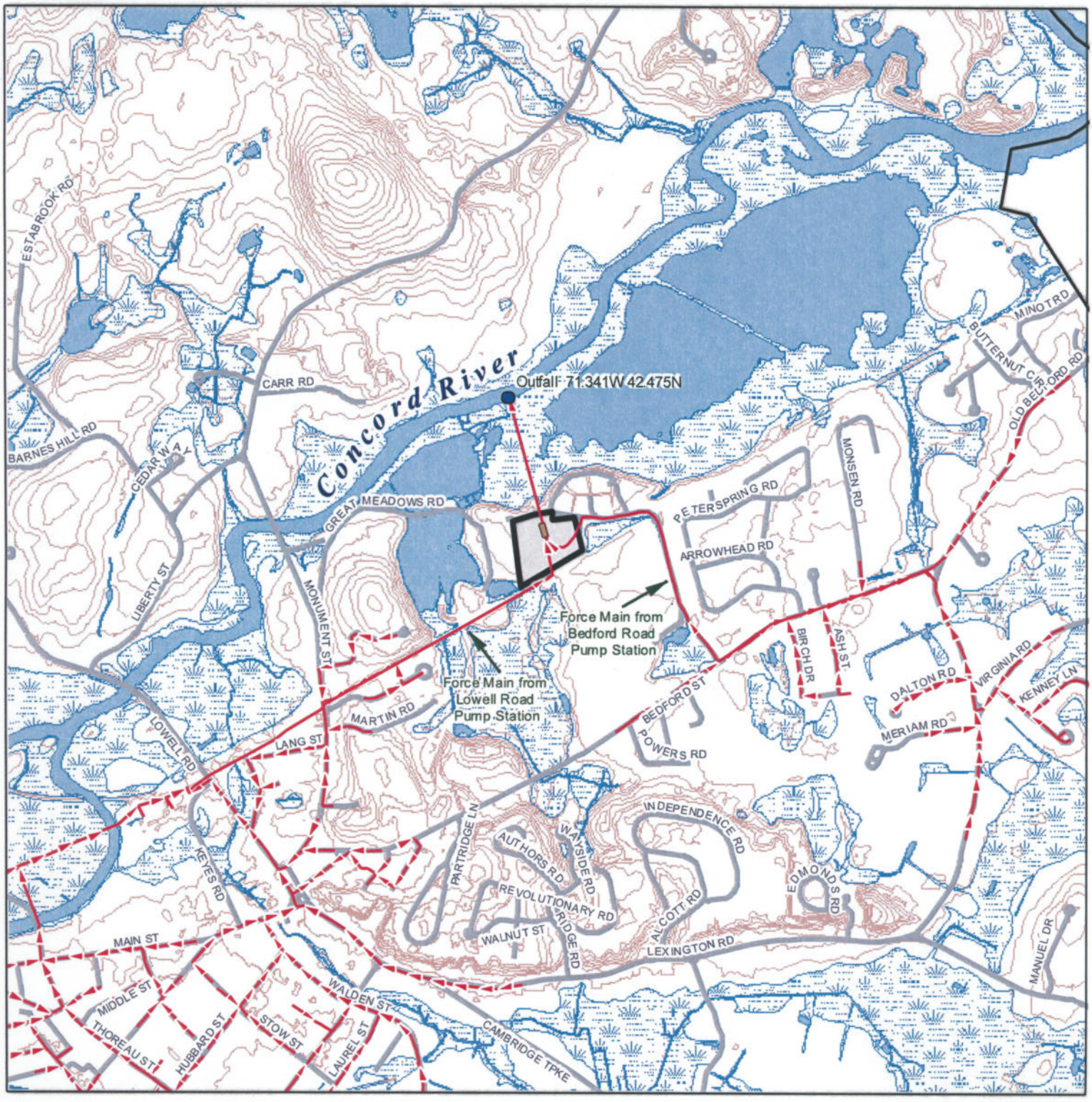
Robin L. Johnson
EPA New England – Region 1
5 Post Office Square, Suite 100
Mail Code OEP06-1
Boston, MA 02109-3912
Telephone: (617) 918-1045
Johnson.Robin@epa.gov

Kathleen Keohane, Massachusetts Department of Environmental Protection
Division of Watershed Management, Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608
Telephone: (508) 767-2856 FAX: (508) 791-4131
kathleen.keohane@state.ma.

_____
Date

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

Town of Concord, Massachusetts



WWTP Site

WWTP Building

WWTP Outfall 001

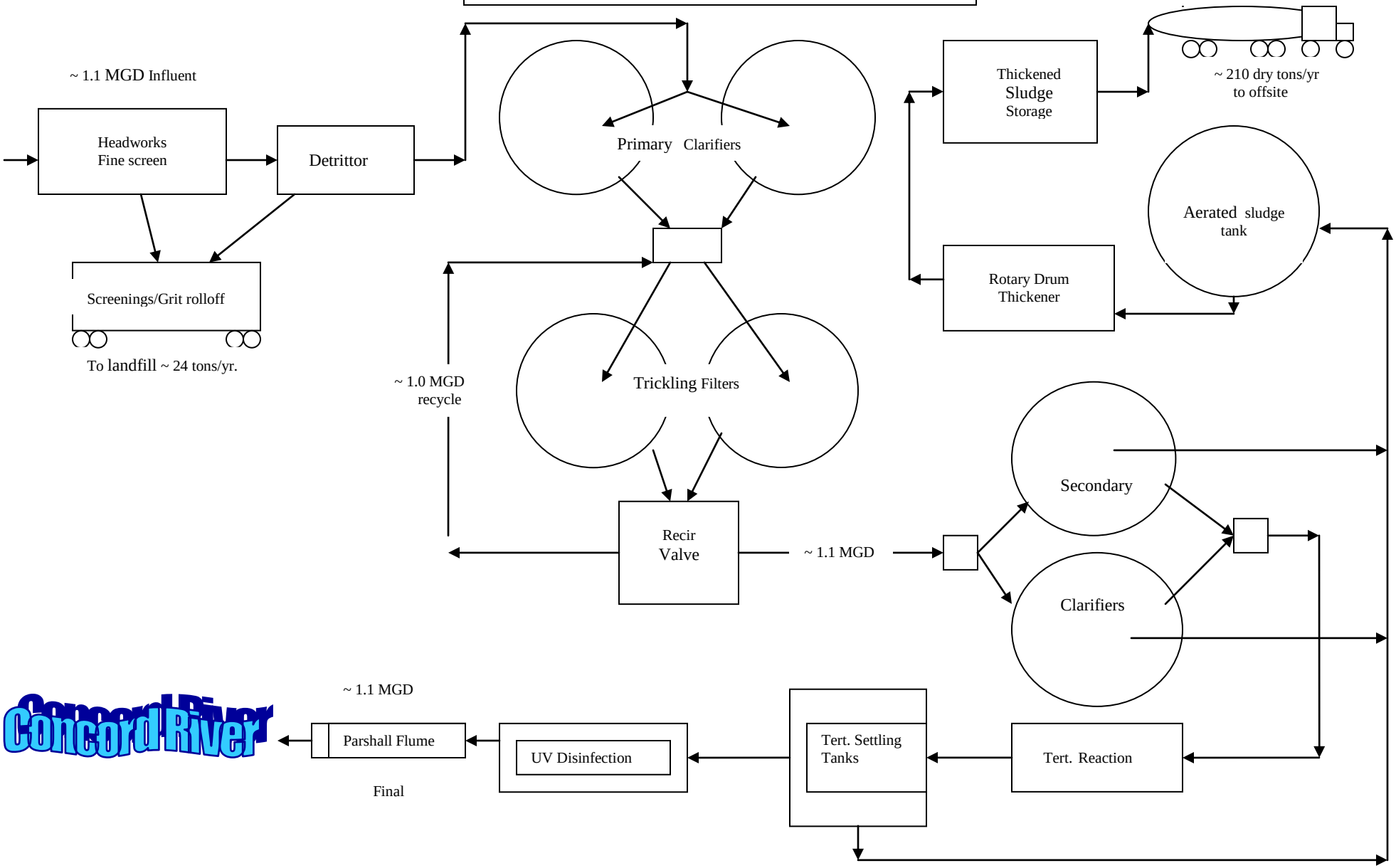
Sanitary Sewer

Concord WWTP
MA0100668
Location Map

July 2010

0 0.1 0.2 Miles

Concord, Mass. Wastewater Treatment Facility
Process Flow Diagram



Appendix A
DMR SUMMARY - Concord WWTF
1/1/2009 - 12/31/2010

Monitoring Period End Date	Flow Max	Flow avg*	pH Min	pH Max	BOD, avg monthly loading	BOD, max daily loading	BOD, monthly avg	BOD, weekly avg	BOD, daily max	TSS, avg monthly loading	TSS, max daily loading	TSS, avg monthly	TSS, avg weekly	TSS, max daily
	MGD	MGD	s.u.	s.u.	lb/day	lb/day	mg/l	mg/l	mg/l	lb/day	lb/day	mg/l	mg/l	mg/l
01/31/2009	1.559	1.278	6.3	7.3	59.	79.	5.	7.	7.	95.	159.	9.	12.	13.
02/28/2009	1.24	1.1179	6.2	7.	45.	56.	5.	6.	6.	77.	116.	8.	10.	12.
03/31/2009	1.417	1.2382	6.2	7.04	40.	51.	4.	5.	5.	75.	104.	7.	10.	10.
04/30/2009	1.3583	1.1688	6.01	6.98	29.	33.	3.	4.	3.	15.	39.	2.	5.	4.
05/31/2009	1.131	.974	6.31	8.3	32.	47.	4.	5.	5.	13.	26.	2.	2.	3.
06/30/2009	.92	.82	6.	7.8	52.	75.	4.	5.	6.	25.	48.	2.	4.	4.
07/31/2009	1.19	.96	6.15	8.63	27.	34.	3.	4.	4.	26.	42.	3.	5.	5.
08/31/2009	1.134	.919	6.28	7.08	25.	37.	3.	4.	4.	22.	41.	3.	4.	5.
09/30/2009	.95	.839	6.32	6.78	50.	148.	3.	6.	10.	31.	92.	2.	4.	6.
10/31/2009	.947	.849	6.3	7.3	20.	29.	3.	4.	4.	15.	22.	2.	3.	3.
11/30/2009	1.097	.931	6.31	9.62	40.	62.	5.	6.	7.	80.	97.	10.	13.	13.
12/31/2009	1.224	1.096	6.38	6.93	41.	57.	4.	5.	6.	81.	144.	9.	16.	16.
01/31/2010	1.278	1.032	6.36	6.66	43.	67.	5.	6.	8.	63.	94.	7.	8.	9.
02/28/2010	2.09	1.12	6.11	7.66	40.	53.	5.	5.	6.	75.	135.	9.	10.	13.
03/31/2010	3.76	2.4	6.06	6.78	136.	269.	6.	9.	9.	283.	847.	12.	24.	25.
04/30/2010	3.213	1.89	6.28	6.8	58.	107.	4.	4.	4.	34.	65.	2.	6.	3.
05/31/2010	1.147	1.02	6.31	6.72	26.	38.	3.	4.	4.	14.	35.	2.	2.	4.
06/30/2010	.97	.83	6.15	6.71	20.	24.	3.	3.	3.	16.	25.	2.	3.	3.
07/31/2010	.753	.6731	6.16	6.47	18.	24.	3.	4.	4.	13.	24.	2.	3.	4.
08/31/2010	.979	.799	6.08	6.64	23.	51.	3.	5.	7.	20.	58.	3.	5.	8.
09/30/2010	1.	.82	6.08	6.76	16.	22.	2.	3.	3.	11.	21.	2.	2.	3.
10/31/2010	.972	.869	6.4	7.16	17.	23.	2.	2.	3.	11.	22.	2.	2.	3.
11/30/2010	1.02	.895	6.31	7.07	28.	38.	4.	4.	5.	56.	100.	7.	10.	13.
12/31/2010	1.093	.958	6.25	6.85	35.	43.	4.	5.	5.	88.	254.	11.	18.	30.
Jan 2006 limits	Report	1.2	6	8.3	300	450	30	45	Report	300	450	30	45	Report
Minimum	.753	.6731	6.	6.47	16.	22.	2.	2.	3.	11.	21.	2.	2.	3.
Maximum	3.76	2.4	6.4	9.62	300.	269.	6.	9.	10.	283.	847.	12.	24.	30.
Average	1.35	1.06	6.22	7.21	48.80	61.13	3.75	4.79	5.33	51.63	108.75	5.00	7.54	8.83
Standard Deviation	0.71	0.37	0.12	0.73	57.54	52.83	1.03	1.44	1.93	57.45	167.16	3.55	5.79	7.15
#measurement	24	24	24	24	25	25	25	24	24	24	25	25	25	24
#exceed 2006 limits	N/A	0	0	2	0	0	0	0	N/A	0	1	0	0	N/A

Appendix A
DMR SUMMARY - Concord WWTF
1/1/2009 - 12/31/2010

Monitoring Period End Date	Fecal coliform, geo avg	Fecal coliform, daily max	Dissolved oxygen	Total Phosphorus, monthly avg	Total Phosphorus, daily max	Ortho-phosphate, max daily	Ortho-phosphate, avg monthly	Ammonia, monthly avg	Ammonia, daily max	Aluminum, daily max	Aluminum, monthly avg
	#/100 ml	#/100 ml	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l	µg/l
01/31/2009	2.	20.	9.5	.79	1.52	.05	.07	.96	1.01	2270.	2270.
02/28/2009	1.	2.	7.9	.98	1.28	.06	.11	1.03	1.51	2270.	2270.
03/31/2009	1.	4.	10.1	.51	.76	.05	.09	.87	.95	1510.	1510.
04/30/2009	1.	1.	9.2	.11	.18			.85	1.08	444.	444.
05/31/2009	1.	1.	9.8	.15	.28			.55	.91	737.	737.
06/30/2009	1.	1.	8.2	.2	.3			1.34	1.54	375.	375.
07/31/2009	2.	10.	8.5	.19	.32			.62	1.13	598.	598.
08/31/2009	1.	1.	8.3	.18	.25			.93	1.21	415.	415.
09/30/2009	1.	1.	8.	.2	.25			1.05	1.21	625.	625.
10/31/2009	1.	1.	8.6	.19	.39			1.24	1.67	283.	283.
11/30/2009	1.	2.	9.5	.76	.81	.38	.64	1.29	1.66	870.	870.
12/31/2009	2.	22.	9.6	.68	.91	.09	.12	1.88	2.21	1840.	1840.
01/31/2010	1.	4.	9.9	.66	.84	.16	.33	.55	.97	1260.	1260.
02/28/2010	1.	2.	10.	.96	1.02	.09	.12	.71	.76	1370.	1370.
03/31/2010	2.	9.	10.	.66	.99	.05	.07	1.36	1.81	1360.	1360.
04/30/2010	1.	6.	10.	.2	.28			.62	.67	577.	577.
05/31/2010	1.	1.	9.2	.19	.28			1.14	1.3	893.	893.
06/30/2010	1.	1.	8.7	.19	.26			.49	.61	662.	662.
07/31/2010	1.	1.	8.	.16	.27			.75	.92	329.	329.
08/31/2010	1.	2.	8.3	.19	.3			.98	1.48	1280.	1280.
09/30/2010	1.	2.	8.4	.19	.24			1.49	1.88	1210.	1210.
10/31/2010	1.	4.	7.8	.17	.28			.95	1.13	191.	191.
11/30/2010	1.	4.	9.2	.5	.75	.09	.28	2.81	4.18	609.	609.
12/31/2010	2.	36.	9.	.61	.78	.02	.02	.67	.78	2170.	2170.
Jan 2006 limits	200	400	5	Varies	Report	Report	Report	Report	Report	Report	Report
Minimum	1.	1.	7.8	.11	.18	.02	.02	.49	.61	191.	191.
Maximum	2.	36.	10.1	.98	1.52	.38	.64	2.81	4.18	2270.	2270.
Average	1.21	5.75	8.99	0.40	0.56	0.10	0.19	1.05	1.36	1006.17	1006.17
Standard Deviation	0.41	8.59	0.77	0.29	0.38	0.10	0.19	0.51	0.73	643.45	643.45
#measurement	24	25	24	24	24	10	10	24	24	24	24
#exceed 2006 limits	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix A
DMR SUMMARY - Concord WWTF
1/1/2009 - 12/31/2010

Whole Effluent Toxicity							
Date	LC50	C-NOEC	Copper (mg/l)	Zinc (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Nickel (mg/l)
March-08	100	12.5	0.0116	0.0061	<0.0005	<0.0002	0.0019
June-08	60.2	100.	0.0099	0.0223	<0.0005	<0.0002	0.0022
September-08	100	100.	0.0069	0.0211	<0.0005	<0.0002	0.0024
December-08	100	100.	0.0081	0.0174	<0.0005	<0.0002	0.0023
March-09	100	100.	0.0076	0.0238	<0.0005	<0.0002	0.0053
June-09	100	100.	0.0055	0.0045	<0.001	<0.0002	0.0045
September-09	100	100.	<0.01	0.023	<0.04	<0.004	<0.01
December-09	100	100.	0.009	0.025	<0.0005	<0.0002	<0.01
March-10	100	100.	0.009	0.027	<0.0005	<0.0002	0.007
June-10	100	100.	0.008	0.015	<0.001	<0.0002	0.005
September-10	100	100.	0.006	0.016	<0.001	<0.0002	0.005
December-10	100	100.	0.016	0.035	<0.001	<0.0002	0.005
Limit	100.	Report	Report	Report	Report	Report	Report
Minimum	60.2	12.5	.0055	.0045	N/A	N/A	.0019
Maximum	100.	100.	.016	.035	N/A	N/A	.007
# measurements	21.	21.	21.	22.	23.	24.	25.
#exceed limit	1	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B – 7Q10 AND DILUTION CALCULATIONS

To obtain an estimate of a 7Q10 flow at a point between the two USGS gages listed below, the drainage areas (DA) between them must be calculated and other flows included or excluded as explained below. All drainage area values for the locations below are estimated from USGS topographic maps and the USGS gazetteer of 1984 for the Merrimack River in which the SUASCO (Sudbury-Assabet-Concord) river basin is included. The streamflows were determined using DFlow 3.1b, a streamflow modeling computer program.

Lowell, MA USGS gage (01099500), 7Q10 for the period 1971 - 2000: **38 cfs**
Maynard, MA USGS gage (01097000), 7Q10 for the period 1971 - 2000: **14 cfs**(1)

Flow factor calculation for main stretch of river between Maynard and Lowell gages:

400 square miles -116 square miles = 284 sq. mi. (Lowell gage DA) (Maynard gage DA) (DA between Maynard and Lowell)

Low flow attributable to this stretch of river:

38 cfs -14 cfs -1.5 cfs(2) = 22.5 cfs (7Q10 @ Lowell) (7Q10 @ Maynard)

Flow factor for this stretch of river:

22.5 cfs / 284 square miles = **0.079 cfs/sq. mile**

Estimated 7Q10 flow at Concord MCI:

14 cfs + 1.5 cfs + (168 mi^2 - 116 mi^2) 0.079 = **20 cfs** (DA between Maynard gage and Concord MCI discharge)

Estimated 7Q10 flow at Concord POTW:

20 cfs + (345 mi^2 -168 mi^2) 0.079 = **34 cfs** (DA between Concord MCI and Concord POTW)

(1). This is the estimated 7Q10 at the Maynard USGS gage.
(2). This is the average effluent flow from the Maynard WWTP from the period of June to Sept of 2009-2010, reflecting the low flow season over that period. This discharge is just downstream of the Maynard gage.

Design Flow Dilution:

Design Flow = 1.2 MGD x 1.55[(3)] cfs/MGD = 1.9 cfs

$$\frac{\text{Design flow + 7Q10 flow}}{\text{Design flow}} = \frac{\text{1.9 cfs + 34 cfs}}{\text{1.9 cfs}} = \mathbf{19} = \text{Dilution Factor}$$

(3). This is the conversion factor between cubic feet per second and million gallons per day.

Appendix C
Aluminum Calculations

Background Al (from WET chemistry)

3/10/2008	183
6/18/2008	154
9/8/2008	235
12/8/2008	118
3/18/2009	76
6/10/2009	29.4
9/14/2009	50
12/7/2009	72
3/8/2010	62
6/7/2010	75
9/13/2010	73
12/13/2010	565

Average	141.0333333
Median	75.5

originally non-detect. Changed to 1/2 detection level for this analysis

Appendix C
Aluminum Calculations

Aluminum RP Analysis
Al, no ND, >10 samples, Lognormal distribution

Date	Al (ug/L)	Yi lnAl (ug/L)	$(y_i - u_y)^2$
01/31/2009	2270.	7.7275	0.972854
02/28/2009	2270.	7.7275	0.972854
03/31/2009	1510.	7.3199	0.334852
04/30/2009	444.	6.0958	0.416511
05/31/2009	737.	6.6026	0.019214
06/30/2009	375.	5.9269	0.663044
07/31/2009	598.	6.3936	0.120833
08/31/2009	415.	6.0283	0.508259
09/30/2009	625.	6.4378	0.092082
10/31/2009	283.	5.6454	1.200678
11/30/2009	870.	6.7685	0.000745
12/31/2009	1840.	7.5175	0.602672
01/31/2010	1260.	7.1389	0.158138
02/28/2010	1370.	7.2226	0.231712
03/31/2010	1360.	7.2152	0.224713
04/30/2010	577.	6.3578	0.146964
05/31/2010	893.	6.7946	0.00285
06/30/2010	662.	6.4953	0.060484
07/31/2010	329.	5.7961	0.893296
08/31/2010	1280.	7.1546	0.170911
09/30/2010	1210.	7.0984	0.127574
10/31/2010	191.	5.2523	2.216906
11/30/2010	609.	6.4118	0.108493
12/31/2010	2170.	7.6825	0.88601
01/31/2011	2250.	7.7187	0.955475

Aluminum- (Lognormal distribution, no ND)

Daily Maximum Limit Derivation

u_y = Avg of Nat. Log of daily Discharge (lbs/day) =	6.74120
σ_y = Std Dev. of Nat Log of daily discharge =	0.70970
$\Sigma (y_i - u_y)^2$ =	12.08812
k = number of daily samples =	25
σ_y^2 = estimated variance = $(\Sigma[(y_i - u_y)^2]) / (k-1)$ =	0.50367

Daily Max Limit = exp (u_y + 2.326*σ_y)

Daily Max Limit = 4411.45 ug/L
(Lognormal distribution, 99th percentile)

Average Monthly Limit Derivation

Number of samples per month, n =	1
E(x) = Daily Avg = $\exp(u_y + 0.5\,\sigma_y^2)$ =	1089.02403
V(x) = Daily Variance = $\exp(2u_y + \sigma_y^2) * [\exp(\sigma_y^2) - 1]$ =	776559.07235
σ_n^2 = Monthly Average variance = $\ln\{ V(x) / (n[E(x)]^2) + 1\}$ =	0.50367
σ_n = Monthly Average standard deviation = σ_n^2^(0.5) =	0.70970
u_n = n-day monthly average = $\ln(E(x)) - 0.5\sigma_n^2$ =	6.74120

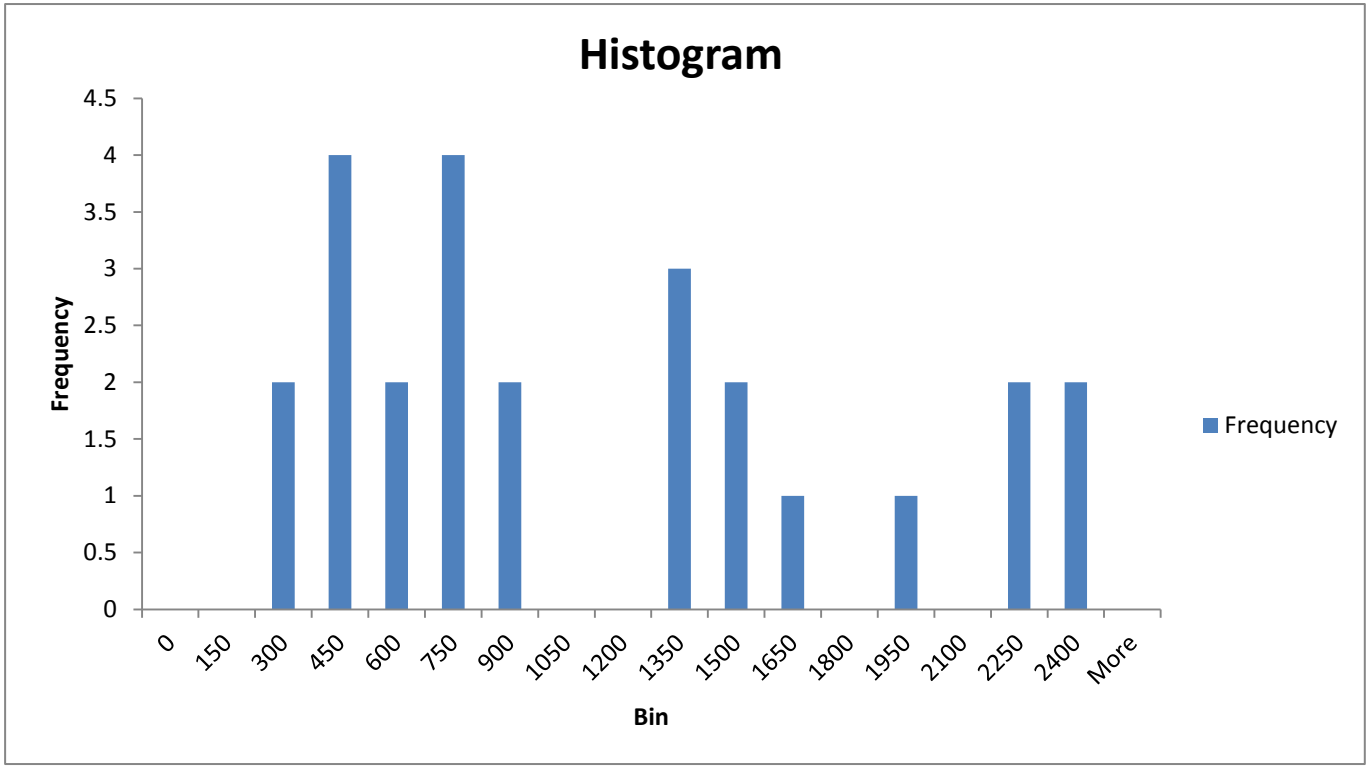
Monthly Average Limit = exp (u_n + 1.645*σ_n)

Monthly Avg Limit* = 2720.73 ug/L
(Lognormal distribution, 95th percentile of average monthly values)

*Based on sampling frequency of 1 time per month

Appendix C
Aluminum Calculations

Bin	*Frequency*
0	0
150	0
300	2
450	4
600	2
750	4
900	2
1050	0
1200	0
1350	3
1500	2
1650	1
1800	0
1950	1
2100	0
2250	2
2400	2
More	0



APPENDIX D – 30Q10 LOW FLOW AND DILUTION FACTOR CALCULATIONS

Summer (April 1st – October 31st) 30Q10 Calculations

Lowell, MA USGS gage (01099500), 30Q10 for the period 1981 - 2000: **55.3 cfs**
Maynard, MA USGS gage (01097000, 30Q10 for the period 1981 - 2000: **19.8 cfs** (1)

Flow factor calculation for main stretch of river between Maynard and Lowell gages:

400 square miles -116 square miles = 284 sq. mi. (Lowell gage DA) (Maynard gage DA) (DA between Maynard and Lowell)

Low flow attributable to this stretch of river:

55.3 cfs -19.8 cfs -1.7 cfs(b) = 33.8 cfs (30Q10 @ Lowell) (30Q10 @ Maynard)

Flow factor for this stretch of river:

33.8 cfs / 284 square miles = **0.12 cfs/sq. mile**

Estimated 30Q10 flow at Concord MCI:

19.8 cfs(a)+ 1.7 cfs(b) + (168 mi^2 - 116 mi^2) 0.12 = **28 cfs** (DA between Maynard gage and Concord MCI discharge)

Estimated 30Q10 flow at Concord WWTP:

28 cfs + (345 mi^2 -168 mi^2) 0.12 = **49 cfs** (DA between Concord MCI and Concord WWTP)

(a) This is the estimated 30Q10 at the Maynard USGS gage.

(b) This is the average effluent flow from the Maynard WWTP from the period of 2009-2010, reflecting the low flow season over that period. This discharge is just downstream of the Maynard gage.

(c) This is the conversion factor between cubic feet per second and million gallons per day.

Design Flow Dilution:

Design Flow = 1.2 MGD x 1.55[(c)] cfs/MGD = 1.9 cfs

$$\frac{\text{Design flow + 30Q10 flow}}{\text{Design flow}} = \frac{\text{1.9 cfs + 49 cfs}}{\text{1.9 cfs}} = \mathbf{27} = \text{Dilution Factor}$$

APPENDIX E
AMMONIA CALCULATIONS

Summer Ammonia Criteria (at 22° C and pH 7.2, salmonids present, early fish life stages present)[1]

Acute: 19.7 mg/l
Chronic: 3.33 mg/l

Ambient Data (from OARS 2009-2010 data, Concord at Lowell Road, Station ABT-010[2])

Date	pH	Temperature
6/21/2009	7.09	19.86
7/19/2009	7.14	22.91
8/16/2009	7.26	23.51
6/13/2010	7.16	18.51
7/18/2010	7.43	26.17
8/22/2010	7.59	21.37
Median	7.21	22.14

Reasonable Potential Analysis for Summer Ammonia Discharges

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

Q_d = effluent flow, i.e. facility design flow = 1.2 MGD
C_d = effluent pollutant concentration = 2.47 mg/l (projected highest data point)
Q_s = 30Q10 flow of receiving water = 49 cfs = 31.6 MGD
C_s = upstream concentration = 0 mg/l
Q_r = receiving water flow = $Q_s + Q_d$ = 1.2 MGD + 31.6 MGD = 32.8 MGD
C_r = receiving water concentration = ?

$$C_r = \frac{(1.2 \text{ MGD} \times 2.47 \text{ mg/l}) + (31.6 \text{ MGD} \times 0 \text{ mg/l})}{32.8 \text{ MGD}}$$

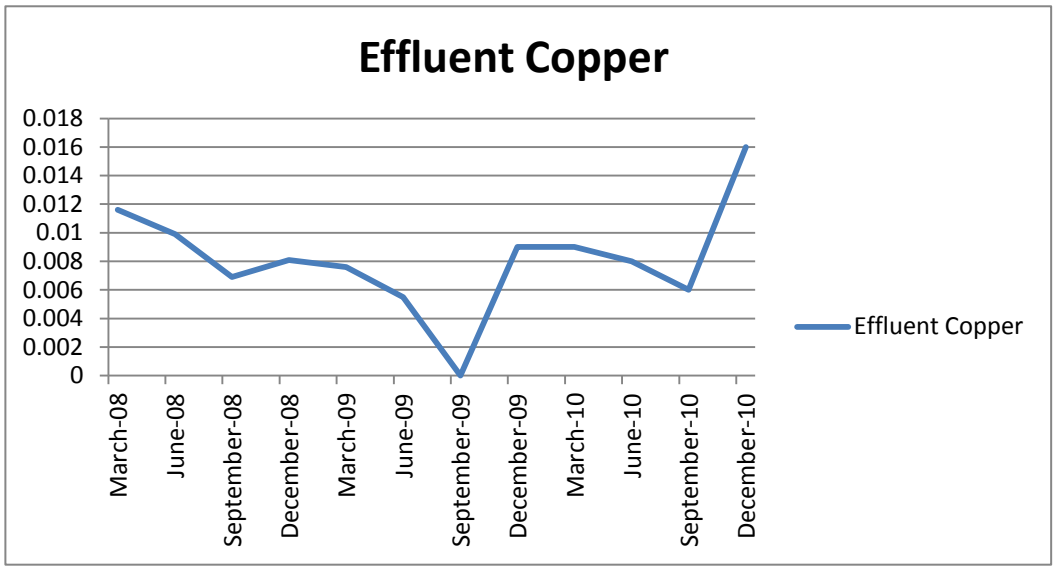
C_r = 0.09 mg/l < 3.33 mg/l (summer chronic criterion)

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

1 Pages 86-87 of 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014)
2 http://www.oars3rivers.org/sites/default/files/Data-2009-2010-Appendix-II.pdf

Appendix F
Copper Calculations

	Effluent			Upstream	
	mg/l	ug/l			
March-08	0.0116		11.6	0.00445	0.00445
June-08	0.0099		9.9	0.0034	0.0034
September-08	0.0069		6.9	0.0041	0.0041
December-08	0.0081		8.1	0.0017	0.0017
March-09	0.0076		7.6	0.0013	0.0013
June-09	0.0055		5.5	0.0093	0.0093
September-09	<0.01			<0.01	0.0005
December-09	0.009		9	0.003	0.003
March-10	0.009		9	0.003	0.003
June-10	0.008		8	0.004	0.004
September-10	0.006		6	0.002	
December-10	0.016		16	0.001	
	0.008873	mean		0.003386	0.003475
		median		0.0034	



Freshwater Metals Criteria and Limits

Step 1: Input the following values (highlighted in green)

7Q10	21.90	MGD
Design flow	1.2	MGD
Hardness =	56	mg/L

Step 2: The spreadsheet calculates the Total Recoverable Limits

Step 3: Input background metals values (if available)

Metal	m_A	b_A	m_C	b_C	CF acute	CF chronic	Background (ug/l)	Dissolved Criteria	
								Acute Criteria (CMC) (ug/L)	Chronic Criteria (CCC) (ug/L)
Hardness Dependent Metals									
Cadmium	1.0166	-3.9240	0.7409	-4.7190	0.968	0.933	0.000	1.15	0.16
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860	0.000	354.37	46.10
Copper	0.9422	-1.7000	0.8545	-1.7020	0.960	0.960	3.000	7.78	5.46
Lead	1.2730	-1.4600	1.2730	-4.7050	0.875	0.875	0.000	34.17	1.33
Nickel	0.8460	2.2550	0.8460	0.0584	0.998	0.997	0.000	286.70	31.84
Silver	1.7200	-6.5900	---	---	0.850	---	0.000	1.19	---
Zinc	0.8473	0.8840	0.8473	0.8840	0.978	0.986	0.000	71.70	72.28
Non-Hardness Dependent Metals									
Arsenic					1.000	1.000	0.000	340.00	150.00
Chromium VI					0.982	0.962	0.000	16.00	11.00
Mercury					0.850	0.850	0.000	1.40	0.77
Aluminum					---	---	75.000	---	---

Source: National Recommended Water Quality Criteria 2002
http://www.epa.gov/waterscience/criteria/wqctable/

Step 4: Identifiy the limit (highlighted in blue)

Total Recoverable Criteria		Total Recoverable Limit	
Acute Criteria (CMC) (ug/L)	Chronic Criteria (CCC) (ug/L)	Maximum Daily Limit (ug/L)	Monthly Ave Limit (ug/L)
1.18	0.18	22.8	3.4
1121.43	53.60	21587.6	1031.8
8.11	5.68	101.3	54.7
39.03	1.52	751.3	29.3
287.28	31.94	5530.1	614.8
1.40	---	26.9	
73.31	73.31	1411.2	1411.2
340.00	150.00	358.6	2887.5
16.29	11.43	17.2	220.1
1.65	0.91	1.7	17.4
750.00	87.00	13068.8	306.0

Hardness (mg/l)

	Background	Effluent
March-08	23.8	81.2
June-08	60.6	83.3
September-08	30.8	77
December-08	42.6	78.2
March-09	44.2	89.4
June-09	63.8	97.2
September-09	54.9	96
December-09	42.2	89.4
March-10	40.5	88.9
June-10	60.3	86
September-10	81.3	86
December-10	58.7	84.2
median	54.9	86
average	52.71818182	86.87273

Hardness Analysis

Conc downstream = (QeCe+QsCs)/(Qe+Qs) 56.51311

Qe	1.2	MGD	Design flow
Ce	86.00	mg/l	Effluent Hardness
Qs	21.93548	MGD	7Q10 Stream flow
Cs	54.9	mg/l	Background concentration

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

Dilution Factor:	19

Date	Cu* (ug/l)	ln/Cu (ug/l)	$(y_i - u_y)^2$
March-08	11.6	2.4510	0.0968339
June-08	9.9	2.2925	0.0233207
September-08	6.9	1.9315	0.0433898
December-08	8.1	2.0919	0.0023001
March-09	7.6	2.0281	0.0124714
June-09	5.5	1.7047	0.1892908
September-09	0*		4.5788454
December-09	9	2.1972	0.0032949
March-10	9	2.1972	0.0032949
June-10	8	2.0794	0.003646
September-10	6	1.7918	0.1211487
December-10	16	2.7726	0.4003916

Cu- (Lognormal distribution, ND)

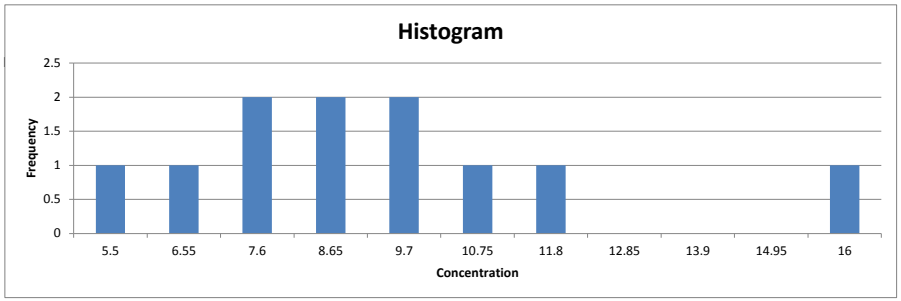
Daily Maximum Effluent Derivation (some measurements < detection limit)	
Detection Limit** =	10.0
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	2.13982
S $(y_i - u)^2$ =	5.47823
k = number of daily samples =	12
r = number of non-detects =	1
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	0.54782
s_y = standard deviation = square root s_y^2 =	0.74015
δ = number of nondetect values/number of samples =	0.08333
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	2.29352
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	1.602292655
Daily Max = exp (u_y + z-score*s_y)	
99th Percentile Daily Max Estimate=	**46.4034 ug/l**
99th Percentile Daily Max Estimate including dilution factor=	**2.4423 ug/l**
95th Percentile Daily Max Estimate =	**27.8202 ug/l**
95th Percentile Daily Max Estimate including dilution factor=	**1.4642 ug/l**

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

Histogram 1

max	16	
min	5.5	*not including NDs
number of bins	10	*not including min bin -
bin separation	1.05	

Bin		count
0	5.5	1
1	6.55	1
2	7.6	2
3	8.65	2
4	9.7	2
5	10.75	1
6	11.8	1
7	12.85	0
8	13.9	0
9	14.95	0
10	16	1

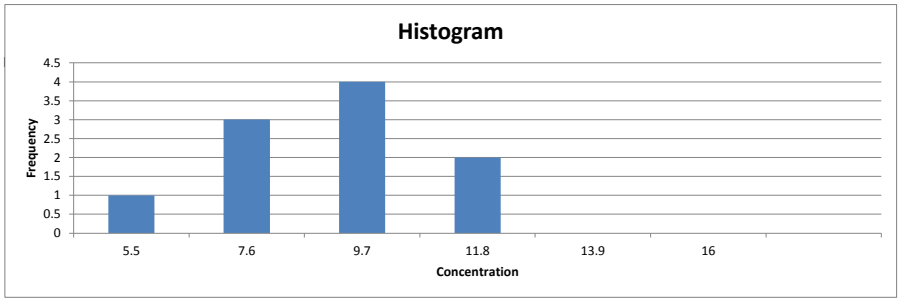


*ND values not plotted

Histogram 2

max	16	
min	5.5	*not including NDs
number of bins	5	*not including min bin -
bin separation	2.1	

Bin		count
0	5.5	1
1	7.6	3
2	9.7	4
3	11.8	2
4	13.9	0
5	16	0



*ND values not plotted

Acute			
Conc downstream = (QeCe+QsCs)/(Qe+Qs)			5.251263
Qe	1.2	MGD	Design flow
Ce	46.40	ug/l	Projected copper
Qs	21.93548	MGD	7Q10 Stream flow
Cs	3	ug/l	Background concentration

Chronic			
Conc downstream = (QeCe+QsCs)/(Qe+Qs)			4.287382
Qe	1.2	MGD	Design flow
Ce	27.82	ug/l	Projected copper
Qs	21.93548	MGD	7Q10 Stream flow
Cs	3	ug/l	Background concentration

(calculations also in Fact Sheet)

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Di(2-ethylhexyl) phthalate (DEHP)

CAS # 117-81-7

Division of Toxicology ToxFAQs™ **September 2002**

This fact sheet answers the most frequently asked health questions (FAQs) about di(2-ethylhexyl) phthalate (DEHP). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Di(2-ethylhexyl) phthalate (DEHP) is found in many plastics. Exposure to DEHP is generally very low. Increased exposures may come from intravenous fluids delivered through plastic tubing, and from ingesting contaminated foods or water. DEHP is not toxic at the low levels usually present in the environment. In animals, high levels of DEHP damaged the liver and kidney and affected the ability to reproduce. DEHP has been found in at least 733 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is di(2-ethylhexyl) phthlate?

Di(2-ethylhexyl) phthlate (DEHP) is a manufactured chemical that is commonly added to plastics to make them flexible. DEHP is a colorless liquid with almost no odor.

DEHP is present in plastic products such as wall coverings, tablecloths, floor tiles, furniture upholstery, shower curtains, garden hoses, swimming pool liners, rainwear, baby pants, dolls, some toys, shoes, automobile upholstery and tops, packaging film and sheets, sheathing for wire and cable, medical tubing, and blood storage bags.

What happens to DEHP when it enters the environment?

❏ DEHP is everywhere in the environment because of its use in plastics, but it does not evaporate easily or dissolve in water easily.
❏ DEHP can be released in small amounts to indoor air from plastic materials, coatings, and flooring.
❏ It dissolves faster in water if gas, oil, or paint removers are present.
❏ It attaches strongly to soil particles.
❏ DEHP in soil or water can be broken down by microorganisms into harmless compounds.
❏ DEHP does not break down easily when it is deep in the soil or at the bottom of lakes or rivers.
❏ It is in plants, fish, and other animals, but animals high on the food chain are able to break down DEHP, so tissue levels are usually low.

How might I be exposed to DEHP?

DEHP is usually present at very low levels in:
❏ Medical products packaged in plastic such as blood products.
❏ Some foods packaged in plastics, especially fatty foods like milk products, fish or seafood, and oils.
❏ Well water near waste sites.
❏ Workplace air or indoor air where DEHP is released, but usually not at levels of concern.
❏ Fluids from plastic intravenous tubing if used extensively as for kidney dialysis.

How can DEHP affect my health?

At the levels found in the environment, DEHP is not expected to cause harmful health effects in humans. Most of what we know about the health effects of DEHP comes from studies of rats and mice given high amounts of DEHP.

Di(2-ethylhexyl) phthalate (DEHP)
CAS # 117-81-7

Harmful effects in animals generally occurred only with high amounts of DEHP or with prolonged exposures. Moreover, absorption and breakdown of DEHP in humans is different than in rats or mice, so the effects seen in rats and mice may not occur in humans.

Rats that breathed DEHP in the air showed no serious harmful effects. Their lifespan and ability to reproduce were not affected.

Brief oral exposure to very high levels of DEHP damaged sperm in mice. Although the effect reversed when exposure ceased, sexual maturity was delayed in the animals.

High amounts of DEHP damaged the liver of rats and mice. Whether or not DEHP contributes to human kidney damage is unclear.

Skin contact with products containing DEHP will probably cause no harmful effects because it cannot be taken up easily through the skin.

How likely is DEHP to cause cancer?

The Department of Health and Human Services (DHHS) has determined that DEHP may reasonably be anticipated to be a human carcinogen. The EPA has determined that DEHP is a probable human carcinogen. These determinations were based entirely on liver cancer in rats and mice. The International Agency for Research on Cancer (IARC) has stated that DEHP cannot be classified as to its carcinogenicity to humans.

How can DEHP affect children?

Children can be exposed to DEHP in the same manner as adults. In addition, small children can be exposed by sucking on or skin contact with plastic toys and pacifiers that contain DEHP, but there is no conclusive evidence of adverse health effects after such exposures. Nonetheless, because of concern for children's health, many toy manufacturers have discontinued use of DEHP in their products. In pregnant rats and mice exposed to high amounts of DEHP, researchers observed birth defects and fetal deaths.

How can families reduce the risk of exposure to DEHP?

❑ It is almost impossible to completely avoid contact with some DEHP because it is commonly found in plastics.
❑ Prevent babies and small children from chewing on plastic objects not designed for that purpose.

Is there a medical test to show whether I've been exposed to DEHP?

There is a test available that measures a breakdown product of DEHP called mono(2-ethylhexyl) phthalate (MEHP) in your urine or blood. This test can only detect recent exposure because DEHP is rapidly broken down and eliminated from your body. This test is not routinely available at the doctor's office because it requires special equipment.

Has the federal government made recommendations to protect human health?

The EPA limits the amount of DEHP that may be present in drinking water to 6 parts of DEHP per billion parts of water (6 ppb).

The Occupational Safety and Health Administration (OSHA) sets a maximum average of 5 milligrams of DEHP per cubic meter of air (5 mg/m^3) in the workplace during an 8-hour shift. The short-term (15-minute) exposure limit is 10 mg/m^3.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Di(2-ethylhexyl) phthlate (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

RESPONSE TO COMMENTS
NPDES PERMIT NO. MA0100668
CONCORD WASTEWATER TREATMENT PLANT
CONCORD, MASSACHUSETTS

From July 13 through August 11, 2012, the U.S. Environmental Protection Agency Region 1 (EPA-New England) and the Massachusetts Department of Environmental Protection (MassDEP) solicited public comments on the draft National Pollutant Discharge Elimination System (NPDES) permit to be reissued to the Concord Wastewater Treatment Plant in Concord, MA.

EPA-New England and MassDEP received comments from the Town of Concord (the Town), the Concord Business Partnership, OARS, Inc. (OARS), the River Stewardship Council and the National Park Service. The following are responses by EPA-New England to those comments and descriptions of any changes made to the public-noticed permit as a result of those comments.

The final permit is substantially identical to the draft permit that was available for public comment. Although EPA's knowledge of the facility has benefited from the various comments and additional information submitted, the information and arguments presented did not raise any substantial new questions concerning the permit. EPA did, however, make certain clarifications in response to comments. These improvements and changes are detailed in this document and reflected in the final permit. A summary of the changes made in the final permit are listed below. The analyses underlying these changes are explained in the responses to individual comments that follow.

A copy of the final permit and this response to comments document will be posted on the EPA Region 1 web site: http://www.epa.gov/region1/npdes/permits_listing_ma.html.

A copy of the final permit may also be obtained by writing or calling Robin Johnson, United States Environmental Protection Agency, 5 Post Office Square, Suite 100 (Mail Code: OEP06-1), Boston, Massachusetts 02109-3912; Telephone (617) 918-1045.

This response to comment document contains the following attachments:

Figure 1 7Q10 Map

Appendix A Updated 7Q10 and Water Quality-Based Limits

1. **Changes made to the final permit**
    a. Page 2 of 14: A monitoring requirement for ammonia nitrogen was added to the effluent limit table. (See Response C9)
    b. Page 2 of 14: The minimum effluent pH was changed from 6.0 to 6.5. (see Response C6)
    c. Page 2 of 14: The monitoring requirement for dissolved oxygen was reduced from once per day to once per week. Also, the date range for the

dissolved oxygen limit was removed. The limit is in effect year-round. (See Response A12)

d. Page 2 of 14: The whole effluent toxicity testing frequency has been reduced from four times per year to twice per year.
e. Page 2 of 14: The aluminum limit has been changed from 306 ug/L to 255 ug/L due to a correction in the 7Q10 calculation. (see Response C7 and Response to Comments Appendix A)
f. Page 3 of 14: In Footnote 11 (Footnote 10 in draft permit), the words "the second week of" have been removed. (see Response A11).
g. Page 4 of 14: Footnote 11 of the final permit (Footnote 10 in draft permit) requires separate acute and chronic toxicity tests.
h. Page 4 of 14: Footnote 15 was added. This footnote requires the permittee to report certain parameters from the whole effluent toxicity test on the DMR (see Response to Comments Appendix A).
i. Page 13 of 14: Part I.F. was added, describing the procedure whereby the minimum pH limit may be modified.

2. COMMENTS FROM THE TOWN OF CONCORD

OPENING COMMENT:

The Town of Concord, Massachusetts has reviewed the draft NPDES permit for its wastewater treatment plant (WWTP), which was placed on public notice for the period of July 13- August 11, 2012. The Town offers the following comments on this draft permit and hopes USEPA will review the context of each comment and make appropriate changes to the final permit.

Background

The town currently has a 1.2 MGD advanced wastewater treatment facility, which is operating under an NPDES permit (MA0100668), issued to the Town by USEPA and MassDEP. This permit expired in 2011 but remains administratively in force and will be updated and reissued following the completion of the current public notice process. The existing and proposed permit requires the WWTP to treat its wastewater to an extremely high level using advanced treatment technologies including the use of Co-Mag for phosphorus removal. The Town is approximately 30% sewered with the remaining parcels relying on Title 5 systems.

In 2003, the Town completed a Comprehensive Wastewater Management Plan (CWMP). Due primarily to collection system infill and modest expansion of the municipal sewer system to several neighborhoods where it had been determined to be a net environmental benefit, the Town has reached its flow capacity at the WWTP. Over the past several years, the Town has undertaken an extensive technical review of options to increase its ability to treat wastewater through a centralized of sub-regional treatment system, where necessary. This review has subsequently led to a detailed evaluation of options for treatment which have been captured within an in-depth wastewater capacity alternatives analysis.

In addition to treatment system expansion alternatives, the Town has continued to invest considerable amount of resources into an inflow/infiltration (I/I) reduction program, an exemplary groundwater recharge program which has been designed to capture stormwater from new developments (which includes an evaluation for enhanced recharge through existing sites), and one of the more comprehensive water conservation efforts in the state[1]. Our conservation program was developed by a full-time conservation coordinator and includes demand management incentives for both residential and commercial customers. One notable measure of success is our Residential Gallons Per Capita Day level of 63 gpdpc, which is above the stated adopted performance standard of 65 gpdpc.

Ultimately, as communicated directly to your staff prior to the issuance of this draft permit, the Town continues to believe that it would be best served if the permitting of our wastewater needs could be integrated with other regulated water resource management programs. While Concord regrets that EPA's permitting schedule cannot be modified to allow for such an approach, we are encouraged that our interest has at least been acknowledged in the Fact Sheet.

RESPONSE TO OPENING COMMENT:

EPA acknowledges the comment and commends Concord's commitment to stewardship of its water resources. Responses to specific comments are provided below.

Comments Regarding Permit Conditions

The Town has three significant areas for comments and several other comments about the conditions in the draft permit. The major comments are:

COMMENT A1:

1. Flow Limits: Concord has been actively engaged in wastewater planning activities which will supplement our Comprehensive Wastewater Management Plan, certified by DEP back in 2004. As part of these efforts, an Integrated Planning Initiative, completed in early 2009, concluded that an additional flow of 320,000 gallons per day was necessary to meet existing wastewater requirements resulting from development and re-development under current zoning. Projected wastewater flows associated with objectives referenced in Concord's 2005 Comprehensive Long Range Plan and 2004 Planned Production Housing Plan and quantified in the a February 2009 report by the Wastewater Planning Task Force Report [*sic*] would require additional treatment capacity of 600,000 gpd. The Wastewater Planning Task Force (convened at the direction of Concord Board of Selectmen), subsequently presented these findings to the 2009 Annual Town meeting where they received strong community support. More information and documents are available at:
http://www.concordma.gov/pages/ConcordMA_BComm/Wastewater%20Task%20Force

[1] MA DEP Water Conservation Award Winner 2008 & 2010

The wastewater needs identified above led to comprehensive planning activities that have focused on the identification of alternatives for creating additional wastewater capacity. Despite the complementary efforts placed on wastewater flow mitigation via water conservation and infiltration/inflow programs noted above, it has become increasingly evident that additional capacity at the Concord municipal WWTF is needed. Review of the options for effluent disposal includes possible groundwater discharge to supplement the WWTF surface water discharge. The town has been working towards evaluating a possible groundwater disposal site adjacent to the existing WWTF. As we continue to explore opportunities associated with each wastewater capacity alternative evaluated, it is clear that an increase in the effluent discharge capacity under the WWTF surface water discharge permit may be the most viable alternative available.

The effluent flow limit of 1.2 MGD annual average included within this draft permit has already placed constraints on the development and re-development opportunities within the Town of Concord. The Town understands that a formal request for a flow increase will require a future modification to the permit and will be initiated via a notice of project change to be via the Massachusetts EOEEA-MEPA office.

RESPONSE A1:

The commenter is correct that a flow increase will require a modification to the permit and a Notice of Project Change through MEPA. Authorizing an increased flow in a permit is not a simple process.

First, EPA will not process an NPDES permit authorizing an increased discharge from a POTW until the Commonwealth has approved a comprehensive wastewater management plan that justifies the flow increase. The permit authorizing the increase must then include limits that attain water quality standards, including antidegradation requirements. The difficulty of satisfying these requirements for a receiving water that is already listed as impaired and is effluent-dominated during low flow periods, should not be underestimated.

EPA does not necessarily agree with the claim that development cannot move forward without additional wastewater capacity. It may be possible to plan developments that generate little to no offsite wastewater flow, using water reuse technology. Wrentham Outlet Mall and Gillette Stadium are two examples of successful commercial developments where no expansion of point source discharges were necessary. In each case, an on-site wastewater treatment plant generates water for reuse in toilet flushing and other non-potable uses. While the appropriate wastewater system will vary by site, these are two examples of how onsite wastewater treatment and reuse can be integrated into commercial development.

Furthermore, EPA encourages the Town of Concord to consider cluster sewer treatment plants to recharge headwater streams, which might also be less expensive when costs to extend the central sewer system are considered. This alternative is identified as 4.3.1 in the Concord Wastewater Planning Task Force Summary Report. The Town of Littleton

is using this strategy in its "smart sewering" plan. We encourage Concord to consider these techniques when expanding the sewer system.

Also, the report seems to discount the benefits of further infiltration/inflow (I/I) reduction and water conservation. The Comprehensive Wastewater Management Plan (CWMP) recommended the removal of 98,000 gallons of I/I to compensate for higher flows from the sewer system, which have not yet been completed. In 2007, however, the Town concluded that only 20,000 to 45,000 gpd of I/I could be cost-effectively removed.

Review of the flow monitoring data submitted by the Town that was included in the draft permit fact sheet shows that the lowest monthly average flow to the plant was 0.67 MGD, in July 2010. This compares to an overall average flow of 1.06 MGD. Assuming that the lowest flow is indicative of the sewage base flow, this would mean that on average the flow to the plant includes 0.387 MGD of I/I. This is not an insignificant amount. The removal of I/I is part of proper collection system maintenance and should not be done solely on the basis of cost-effectiveness. I/I deprives headwater streams of baseflow, adding to the effect of drinking water withdrawals. It requires additional chemical and energy usage by wastewater treatment facilities. The Town of Concord expresses concerns about energy and chemical usage in its comments on the draft permit (see Comment A7), so surely it is aware that it is expending energy on treating I/I, which is approximately 20% of base flow to the WWTP.

In conclusion, EPA believes that Concord may be able to find capacity for its development plans without a flow increase through further I/I reduction, cluster sewering, further water conservation, and innovative on-site technologies. Concord can meet its wastewater needs without further degradation to headwater streams and the Concord River.

COMMENT A2:

2. Phosphorus limits: The Town is pleased to see no change in the Total Phosphorus (TP) limit for the summer and winter seasons. For the record

a. Since the design and construction of the state of the art CoMag process placed on line in February of 2008, the WWTF has consistently met permit limits for TP.
b. The fact sheet for the draft permit shows that, even at very low flow (7Q10) conditions, the WWTF (even if discharging right at the permit limits) raises the instream concentration of phosphorus in the Concord River only minimally (from 45 μg/L to 53 μg/L) and the resulting concentration is well below EPA's Gold Book criterion of 100 μg/L. Therefore, the WWTF is not causing or contributing to any phosphorus-related impairment.
c. Moreover, as the Fact Sheet notes, Concord's summer TP limit of 0.2 mg/L represents highest and best practicable treatment (i.e. limit of technology) for POTWs.
d. The Town is pleased to see that the orthophosphate monitoring requirement has been removed from the permit. This is appropriate, given the TP (of which orthophosphate is a subset) is consistently below the permit limit.

RESPONSE A2:

The comment is noted for the record. EPA would like to clarify, however, that while a monthly average limit of 0.2 mg/L has been used by MassDEP to define its "highest and best" requirements in 314 CMR 4.05(5)(c) for POTWs, treatment technologies are available that routinely achieve more stringent limits. EPA has determined that in this case, more stringent limits are not required to achieve water quality standards.

COMMENT A3:

3. Aluminum Limit: The aluminum limit for total aluminum at 306 µg/L average monthly is troublesome and incorrectly applied for several reasons:

a. The effluent taken from the WWTP consistently passes its effluent toxicity tests with no acute or chronic toxicity.

RESPONSE A3:

When determining reasonable potential for a discharge to cause or contribute to an excursion from water quality standards, EPA uses three approaches: biological assessment, chemical-specific criteria, and whole effluent toxicity testing.
With the advent of different ways of assessing the health of aquatic systems comes the possibility of conflicting results. To address such conflicts, EPA developed the policy of independent application. Independent application states that where different types of monitoring data are available for assessment of whether a water body is attaining aquatic life uses or for identifying the potential of pollution sources to cause or contribute to non-attainment of aquatic life uses, any one assessment is sufficient to identify an existing or potential impact/impairment, and **no one assessment can be used to override a finding of existing or potential impact or impairment based on another assessment.**[2]

Since each type of criteria (biological criteria, chemical-specific criteria, or whole-effluent toxicity evaluations) has different sensitivities and purposes, a criterion may fail to detect real impairments when used alone. As a result, these methods are used together in an integrated water quality assessment, each providing an independent evaluation of nonattainment of a designated use.

If any one type of criteria indicates impairment of the surface water, regulatory action can be taken to improve water quality. However, no one type of criteria can be used to confirm attainment of a use if another form of criteria indicates nonattainment. When these three methods are used together, they provide a powerful, integrated, and effective foundation for waterbody management and regulations.

For example, whole effluent toxicity (WET) tests are intended to measure toxicity on specific organisms from unknown toxins or synergistic toxicity between two or more

[2] EPA's Technical Support Document for Water Quality-Based Toxics Control, March 1991, EPA/505/2-90-001, Responsiveness Summary, page 2.

toxins. WET tests are not designed to measure the toxic effect of each toxin on organisms most sensitive to that pollutant, so are intended to be used in conjunction with chemical-specific criteria, which are intended to protect organisms sensitive to that chemical.

The aluminum criteria and limit in the draft permit were determined from analysis of the instream and effluent data provided by the Town of Concord, using the MassDEP numeric criteria specified in 314 CMR 4.05(5)(e). EPA is required to include numeric water quality-based limits for pollutants where the discharge has the reasonable potential to cause or contribute to an excursion above any State water quality standard (40 CFR 122.44 (d)). Compliance with whole effluent toxicity limits does not support removal of chemical-specific limits necessary to attain a State water quality criterion.

Regarding the WET test results submitted by the Town, the facility does routinely achieve its acute whole effluent toxicity limit (the permit does not include a chronic limit but does require chronic testing). However, during the period from March 2011 – March 2012 the measured Chronic-NOEC was 50, 100, 25, and 50 percent effluent, demonstrating some chronic toxicity. The cause of this toxicity was not identified.

Also, please note that review of the 7Q10 calculations done in response to Comment No. C7 resulted in a slightly lower 7Q10 and therefore a lower aluminum limit. The calculations for the revised 7Q10 and the new aluminum limit can be found in Fact Sheet Appendix A.

COMMENT A4:

b. The aluminum criteria upon which the limit is based introduces numerous scientific questions as to its applicability to Massachusetts waters. Most notably, the criteria document published by USEPA (National Recommended Water Quality Criteria: 2002, EPA-822-R-02-47) notes the chronic criterion for aluminum at 87 μg/L "is based on a toxicity test with the striped bass in water with pH 6.5-6.6 and hardness <10 mg/L. Data….indicate that aluminum is substantially less toxic at higher pH and hardness." These conditions are not representative of the ambient conditions for the Concord River – See e.g. monitoring results available at http://www.oars3rivers.org/river/waterquality/reports.

RESPONSE A4:

EPA is required to use approved state water quality standards in establishing water quality-based effluent limits in NPDES permits. The State of Massachusetts' Water Quality Standards require that effluent limitations for metals be based upon the criteria published in the National Recommended Water Quality Criteria: 2002 (USEPA 2002 [EPA-822-R-02-047]), unless site-specific criteria are established or MassDEP determines that natural background concentrations are higher than the criteria (314 CMR § 4.05(5)(e)).

The specific comments about the applicability of the water quality criteria are potentially valid in the setting of a water quality criteria revision, which is currently ongoing at MassDEP with assistance from certain municipalities. However, as discussed above, in the context of a permit reissuance, EPA is required to use the water quality criteria currently approved by the state to set permit limits.

EPA would note, however, that the striped bass was not the only sensitive species cited in the aluminum criteria document. Rainbow trout shows an increased ventilation rate at 75 μg/L aluminum concentration, and brook trout experiences reduced behavior at an aluminum concentration of 238 μg/L, at pH 7.3 to 7.8. Finally, goldfish larvae experienced significant death and deformation at 150 μg/L aluminum concentration, an effect that occurred with pH 7.4 and hardness of 150 mg/L.

COMMENT A5:

c. The aluminum calculations used to determine "reasonable [risk] potential" (Fact Sheet Appendix C) included all aluminum effluent data, not those obtained during the low flow periods when the proposed mixing calculation was conducted. The review of the data clearly shows that effluent aluminum concentrations are higher in the winter, when instream flows are much higher than during the critical low flow summer period. The Town requests that USEPA recalculate the "reasonable [risk] potential" during the months of May to October using effluent data from those time periods,

RESPONSE A5:

Because the instream aluminum concentration (75 μg/L) is relatively close to the water quality criterion (87 μg/L), there is very little assimilative capacity in the Concord River to dilute the discharge. EPA examined the relationship between background aluminum levels and streamflow at USGS Gage 01099500 (Concord River at Lowell) to determine if the background level used to calculate the permit limit is representative of 7Q10 conditions. As the chart below shows, none of the data was collected at 7Q10 flow (28 cfs), and there is only a weak correlation between streamflow and background aluminum concentrations. At the lowest streamflow, 54 cubic feet per second (cfs), the background aluminum concentration was 73 μg/L, close to the value (75 μg/L) used in the reasonable potential analysis in the draft permit.

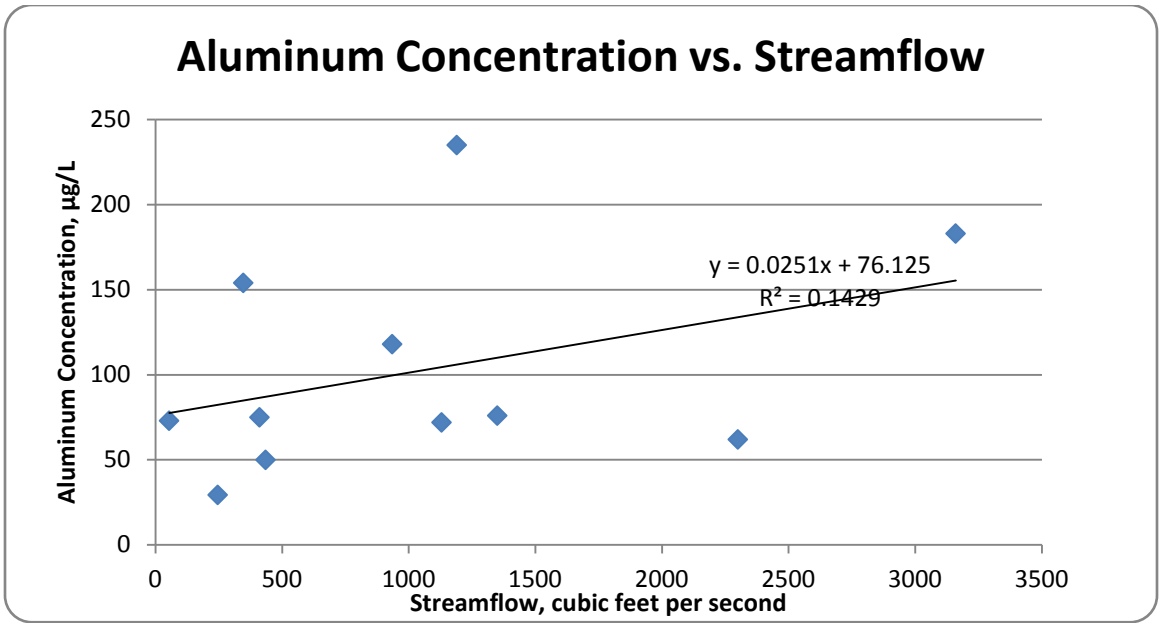


Table 1. Comparison of Background Aluminum Concentration and Streamflow.

Date	Concentration, µg/L	Streamflow, cfs
3/10/2008	183	3160
6/18/2008	154	347
9/8/2008	235	1190
12/8/2008	118	935
3/18/2009	76	1350
6/10/2009	29.4	246
9/14/2009	50*	435
12/7/2009	72	1130
3/8/2010	62	2300
6/7/2010	75	411
9/13/2010	73	54
12/13/2010	565**	253
Average	141.0	
Median	75.5	

*concentration originally non-detect (<100 µg/L). Value changed to ½ detection level for this analysis.
**outlier; excluded from chart.

As the calculation below shows, the maximum projected effluent concentration would have to be 255 µg/L or less for there to be no reasonable potential to cause or contribute to an exceedance of the water quality criteria. The levels of aluminum reported in the Concord WWTF discharge are consistently above this amount.

Effluent Concentration Necessary to Cause Reasonable Potential

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall	=	87 µg/L
Q_d	=	Discharge flow	=	1.2 MGD
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall	=	18 MGD (effluent + upstream)

Therefore,

$$C_d = (Q_sC_s - Q_rC_r)/Q_d$$

$$C_d = \frac{(18\ \text{MGD} \times 87\ \mu g/l) - (16.8\ \text{MGD} \times 75\ \mu g/l)}{1.2\ \text{MGD}}$$

$$= \mathbf{255\ \mu g/l}$$

As the table below shows, 88% of the May – October 2009-2011 effluent data cited by the commenter exceeds this concentration. The 95th percentile concentration of this data is 1,428 µg/L. Although this value is indeed lower than the projected 95th percentile value (2,720 µg/L) of all data used to determine reasonable potential in the draft permit, it still indicates a reasonable potential for the discharge to cause or contribute to an excursion from water quality standards for aluminum.

Table 1. Concord WWTF Aluminum Effluent Monthly Data (highlighted values exceed 255 µg/L)

Date	Conc. (µg/L)	Date	Conc. (µg/L)	Date	Conc. (µg/L)
05/31/2009	737.	05/31/2010	893.	05/31/2011	781.
06/30/2009	375.	06/30/2010	662.	06/30/2011	599.
07/31/2009	598.	07/31/2010	329.	07/31/2011	407.
08/31/2009	415.	08/31/2010	1280.	08/31/2011	465.
09/30/2009	625.	09/30/2010	1210.	09/30/2011	87.
10/31/2009	283.	10/31/2010	191.	10/31/2011	179.

Because there is demonstrated reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria in the Concord River, no changes have been made to the aluminum limit as a result of this comment.

COMMENT A6:

d. The Town understands that the MassDEP and others are currently evaluating aluminum criteria for Massachusetts' waters and such a project will likely result in developing new, less restrictive criteria. The Town feels that it is premature and unreasonable to include a limit in this permit based upon a criteria value that is very likely to be changed.

RESPONSE A6:

We are aware that MassDEP is considering developing site-specific aluminum criteria. If MassDEP were to propose, and EPA approve, less stringent criteria, these would be the basis for future limits.

Until such time, the acute and chronic criteria adopted by MassDEP into its water quality standards and approved by EPA must be used as the basis for the effluent limitations. EPA must limit pollutants that have the reasonable potential to cause or contribute to exceedances of those water quality standards. As shown elsewhere in this response and in the fact sheet, EPA has determined that the discharge of aluminum from the facility has reasonable potential to cause or contribute to a violation of water quality standards in the Concord River.

COMMENT A7:

e. Not only will an aluminum limit result in increased and needless operating cost, it will require the Town to use more chemicals, produce more sludge, utilize more electricity, and increase its "carbon footprint" all for the purpose of meeting a flawed water quality criteria value.

RESPONSE A7:

We are supportive of Concord's efforts to operate in the most environmentally sustainable manner necessary to meet the effluent limits. These considerations, however, come into play in selection of the appropriate treatment technologies and operational procedures – not in setting water quality-based effluent limits. Cost and technological considerations are not factors in establishing water quality-based limits.

The commenter claims that an aluminum limit will cause the Town to use more chemicals and produce more sludge, a statement that cannot be independently verified by EPA. Regardless, the most cost-effective and environmentally sustainable method of achieving effluent limits while managing sludge should be carefully considered as part of an updated CWMP. There are treatment processes that can be pursued that minimize the need for chemical addition and/or minimize the chemicals in the discharge and the sludge. For example, polyaluminum chloride (PAC) may be used instead of or in conjunction with alum to reduce sludge volume and effluent aluminum concentrations while still meeting phosphorus limits.

Regarding the carbon footprint of the Town's wastewater treatment operations, we believe it is important to examine energy efficiency holistically, across a utility's management and operations. One opportunity for gains in energy efficiency at Concord WWTF is through control of flows to the treatment facility. Concord has reduced its I/I significantly in recent years. The Town estimates that 0.3 MGD, or 24% of total influent flow, is inflow/infiltration. *See* NPDES Permit Application. We commend Concord on reducing the percent of flow from I/I to 24%, which is less than many POTWs. Nevertheless, pumping and treating extraneous flow is still a very energy-intensive process. A more aggressive infiltration/inflow control program could be an important component of an overall plan to reduce energy consumption. Concord has made significant progress in I/I removal, and it can continue to be a leader in this area and push for further I/I reductions.

EPA is very supportive of efforts to reduce power use and associated costs at wastewater treatment facilities. Energy is the largest expense for many facilities and one of the top three expenses at almost all of them. Reducing the amount of energy these facilities use without compromising the quality of treatment, results in both lower public expenditure money and greater overall environmental protection.

Through an energy management plan that sets goals for energy efficiency and optimizes the use of renewable sources of energy, the impacts of conventional energy use can be mitigated. A holistic plan could consider equipment choices, HVAC, lighting, vehicle use, methane capture, energy generation from microturbines, wind or solar, and the purchase of energy from renewable sources. To address this issue, EPA New England has produced an energy management guidebook[3] to help utilities set measurable energy goals, manage energy issues and reduce consumption.

COMMENT A8:

f. The Town views this permitting approach to be inconsistent with USEPA's "sustainability" mission and believes the effluent limit should not be included in the final permit.

RESPONSE A8:

Wastewater infrastructure sustainability is a concept that EPA supports and that the Town should embrace – not simply in evaluation of treatment to meet the new limits, but also across management and operations of the entire system. Sustainability arguments are not, however, part of the statutory and regulatory requirements for setting water quality-based effluent limitations.

Through their water quality standards, states determine the level of protection needed for receiving waters. Where EPA (or other permitting authorities) concludes there is a

[3] Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities http://water.epa.gov/infrastructure/sustain/upload/Final-Energy-Management-Guidebook.pdf

reasonable potential that a discharge will cause or contribute to a violation of the standards, EPA must then set an effluent limit necessary to ensure the standards are met. *See* 40 CFR §122.44(d)(1)(i). Costs and technical considerations are not considered at this point in the process of establishing water quality-based effluent limits. Once these limits are established and set forth in a final permit, however, the regulations include a mechanism[4] to allow relief from meeting the limits where they are demonstrated to be unaffordable. Under certain circumstances, permittees can conduct an analysis of affordability issues for the purposes of determining whether a designated use cannot be obtained or for obtaining a variance under the Water Quality Standards.

COMMENT A9:

4. Collection System Mapping and Operations and Maintenance Plans: The collection system mapping (page 7) and operation and maintenance plan (pages 7-8) are too prescriptive in format and introduce a significant level of effort and paperwork. These conditions also expand greatly upon what could be reasonably be considered NPDES authority. The Town has a robust mapping system of its sewer collection system and has regular operation and maintenance procedures in place. The Town acknowledges the value of such a system but feels the requirements outlined in the draft permit and the annual reporting are too detailed and are prescribing elements of a program that are not necessary in a NPDES permit. The Town recommends and requests the following actions be taken with respect to these plans:

a. The permit language should be significantly modified to include a more general requirement for proper mapping and an operation and maintenance plan. For example, the statement "Such map(s) shall include, but not be limited to the following" should be stricken as it imposes a subjective and unattainable limit for compliance
b. The requirement for a submittal of an annual report should be stricken.

RESPONSE A9:

The Operations and Maintenance requirements included in the draft permit are intended to minimize the occurrence of permit violations that have a reasonable likelihood of adversely affecting human health or the environment. The elements of the O&M plan in the draft permit are reasonable and are now being included as standard requirements in NPDES permits for POTWs in both NH and MA. Smaller towns with fewer financial resources than the Town of Concord have complied with the O&M plan.

As mentioned in the fact sheet Section IV. Operation and Maintenance, the Concord WWTF is a Publicly Owned Treatment Works (POTW) as defined at 40 C.F.R. § 403.3. This definition also includes sewers, pipes, and other conveyances that convey wastewater to a POTW treatment plant. Conditions applicable to all permits include the regulation of proper operation and maintenance (see 40 C.F.R. § 122.41(e)). This

[4] This mechanism is commonly referred to as a compliance schedule. It is noted that Concord has neither claimed that meeting the aluminum limits are unaffordable, nor requested a compliance schedule to allow more time for compliance. Therefore EPA is not offering a compliance schedule for the aluminum effluent limit.

regulation requires that "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." The treatment plant and collection system are included in the definition "facilities and systems of treatment and control" and are therefore subject to proper operation and maintenance requirements. The General requirements for proper operation and maintenance, and mitigation are typically found in Part II, Standard Conditions. Recently, EPA has included the specific permit conditions found in Parts I.C, I.D, and I.E in all reissued municipal permits as reasonable and logical practices that will ensure "proper operation and maintenance."

If a permittee submits information showing that despite its best efforts it is unable to complete the required sewer system mapping within the specified period, EPA may allow a reasonable extension of the schedule.

The commenter does not specify which of the requirements in the Collection System mapping requirements are "subjective and unattainable." The items listed in Section I.C.4., such as manhole identifications, flow direction, and location of pump stations are basic attributes of the collection system of which operators should be aware. The statement in the draft permit that "[s]uch map(s) shall include, but not be limited to the following:" merely allows municipalities to add extra features to the map that will assist them in operating and maintaining their sewer systems. EPA cannot anticipate what these features will be for each town, therefore the above language allows municipalities to add information to their maps as necessary, even if the information is not specifically included in the mapping requirements.

With regard to the annual report requirement, this is a typical requirement for permittees that operate collection systems in Massachusetts and New Hampshire. The commenter has not cited any unique circumstances that merit an exemption from this requirement; therefore, the annual reporting requirement remains unchanged.

COMMENT A10:

c. Whole Effluent Toxicity: The whole effluent toxicity (WET) limits (LC50 >/= 100%) and "report" C-NOEC) should be set with recognition of the fact that the Concord facility has a long record of no toxicity events (see data presented in the Fact Sheet). The one acute toxicity excursion seems to be an anomaly as there was not corresponding chronic toxicity identified. Based on this history, the town believes is more than justified to requests the following:

i. WET testing requirements be reduced to 2 times per year for acute toxicity only.

RESPONSE A10:

In establishing WET test monitoring frequency and limits, EPA looks to the Massachusetts Toxics Policy (the Policy). For discharges with dilution factors between 10 and 20, the Policy recommends an LC50 limit of >100% effluent, chronic toxicity

monitoring, and a testing frequency of 4 times per year with 2 species. Concord WWTP, with a dilution factor of 19, belongs in this category.

The Concord WWTP's WET test requirements generally mirror the Policy, except EPA and MassDEP have authorized a reduction in the number of species from two to one, *Ceriodaphnia dubia*. The table below summarizes the WET test results for the months of March 2008 through March 2012. As can be seen, 16 of the 17 test results were an LC50 of 100% or greater. During that time, the chronic C-NOEC has ranged from 25% to 100% effluent. Contrary to the comment, the acute toxicity that occurred in March 2008 does not appear to be an anomaly, as the C-NOEC for that test was 12.5% effluent.

Table 2. Concord WWTF WET test performance March 2008 – March 2012

Date	Acute LC50	C-NOEC
03/31/2008	60.2	12.5
06/30/2008	100.	100.
09/30/2008	100.	100.
12/31/2008	100.	100.
03/31/2009	100.	100.
06/30/2009	100.	100.
09/30/2009	100.	100.
12/31/2009	100.	100.
03/31/2010	100.	100.
06/30/2010	100.	100.
09/30/2010	100.	100.
12/31/2010	100.	100.
03/31/2011	100.	50.
06/30/2011	100.	100.
09/30/2011	100.	50.
12/31/2011	100.	25.
03/31/2012	100.	50.

However, Concord has met its acute toxicity limits for four years, or 16 straight tests. Given the record of compliance, EPA has decided to reduce WET test requirements to twice per year. Concord must conduct two chronic and acute WET tests per year; one in the month of March, and one in the month of September, using *Ceriodaphnia dubia*.

It should also be noted that the final permit requires separate acute and chronic toxicity tests in accordance with recent changes in EPA New England practice. The modified acute toxicity test in the current permit, which is conducted as part of the chronic toxicity test, is not an approved method under 40 CFR Part 136. As of March 2013 the modified acute testing requirement is being replaced by a stand-alone acute toxicity test. The acute toxicity testing protocol is Attachment A to the final permit.

COMMENT A11:

ii. The required "second week of month" testing constraint be changed to any time within each designated month as the Town understands that the MassDEP has

received numerous such requests regarding toxicity testing from those laboratories that perform this work as it would eliminate a significant imbalance in their workload. The Town understands that MassDEP is not opposed to only designating the months for testing.

RESPONSE A11:

The requirement for taking toxicity test samples in the second week of the month has been removed; however, in accordance with footnote 3 of the final permit, WET test sampling must occur the same week each March and September.

COMMENT A12:

d. Dissolved oxygen: The WWTF has had many years of consistent compliance with Dissolved Oxygen (DO). It is observed that the DO in the effluent is, at times, higher than the receiving water. It is therefore requested that the permit reflect a decrease in DO monitoring from once per day to once per week.

RESPONSE A12:

Since April of 2009, Concord WWTF's effluent dissolved oxygen has ranged from 7.6 mg/l to 10.8 mg/L, with an average of 9.0 mg/L. Because the Concord WWTF has met its dissolved oxygen limit (>5.0 mg/L) for the last 72 months, the dissolved oxygen monitoring frequency will be reduced to once per week. Also, the date range for the dissolved oxygen limit in the draft permit, which was added in error, has been removed. The dissolved oxygen must be at least 5.0 mg/L year-round, which is the limit in the current permit.

COMMENT A13:

e. Di(2-Ethylhexyl) Phthalate (DEHP): The Town understands that the Concord River is used as a public water supply by the Town of Billerica. We also recognize that like other Class B rivers in Massachusetts used for water supply with treatment, such protection has been afforded Class B standard waters for many years. While it is plausible that the inclusion of DEHP has been added because of this, it is noted that DEHP is a chemical found in the plastic pipes which are commonly used in water supply, sewer collection, and storm water as well. Trace-levels of DEHP, similar to the level detected in the Town's effluent, are universally detected. The Town has no industries which could discharge DEHP in the effluent. Hence, its origins are most likely traced to the newer plastic sewer mains and services only. As there are no conventional treatment technologies available which could provide effective treatment, the Town requests that the monitoring requirement of DEHP be removed from the permit. If not eliminated, the monitoring should be reduced with an "opt-out" provision if such monitoring provides no value.

RESPONSE A13:

The draft permit does not require the Town to remove DEHP from its effluent, only to monitor for it on a quarterly basis.

It is possible that EPA will set an effluent limit for DEHP in the future, if data shows that the discharge has the reasonable potential to cause or contribute to an exceedance of water quality standards. In the case of a water quality-based limit, feasibility of treatment is not a factor that the CWA allows permitting authorities to consider.

While there is not yet sufficient data to require an effluent limit for DEHP in Concord's permit, monitoring data submitted in the reapplication indicates it is present in quantities that exceed the human health criteria before dilution in the receiving water. Given that there is a drinking water source downstream, there is ample justification for the monitoring requirement. Regardless of whether it is feasible to remove this chemical from the discharge, more data on the discharge of this chemical will supply important information to the Town of Billerica and to the agencies that manage the Concord River.

The Town should be aware that stringent QA/QC controls should be exercised in conducting DEHP sampling and analyses. It is possible that plastics used in sampling or analyses have skewed previous sampling results.

COMMENT A14:

f. pH: The Town agrees with the pH range as provided for within the draft permit. Specifically, the lower limit of 6.0 SU acknowledges natural dilution from the Concord River which is more environmentally advantageous than requiring the unnecessary introduction of additional chemical treatment.

RESPONSE A14:

See Comment C6 and Response C6. After receiving a comment about the lower pH limit from OARS, EPA examined the available pH data more closely and found that upstream receiving water tests conducted in conjunction with WET tests occasionally measured pH values less than the water quality standard of minimum pH of 6.5, meaning that dilution cannot be used in establishing the effluent limit. Furthermore, the river often has low alkalinity, or acid buffering capacity, in the winter months, meaning that the river has little ability maintain a neutral pH in response to an acidic discharge.

Therefore, EPA has changed the minimum pH value from 6.0 to 6.5, until the Town performs testing that demonstrates that the effluent has no reasonable potential to cause or contribute to an excursion from the pH water quality standards.

COMMENT A15:

g. Reporting Format: The Town is confused about the reporting requirements (page 12) in section c which still require submittal of hard copies even though the permit previously

states that "…it will no longer be required to submit hard copies…." The Town requests a clarification of these reporting requirements in the final permit.

RESPONSE A15:

The permit requires that hard copies of the Whole Effluent Toxicity Reports be submitted to MassDEP. This is because MassDEP does not yet have the capability to view scanned copies of WET test reports on the EPA database.

COMMENT A16:

Industrial Users: The Town would like to note that it will in the near future be receiving flow from an industrial user (Welch's fruit juice), and it will properly be permitted by the Town (page 5).

RESPONSE A16:

Comment noted for the record. In allowing an industrial user, the Town should be aware of Sections I.A.2. and I.A.3. of the permit. Section I.A.2. requires that permittees give the EPA "adequate notice" of introduction of pollutants by an indirect discharger, including quantity and quality of introduced flow and the potential for the flow to affect the POTW. Section I.A.3. prohibits the discharge of pollutants to a POTW that will pass through or interfere with the treatment works.

COMMENT A17:

Aluminum: The Town notes in the discussion of TMDLs that there is no 303d listing or need for a TMDL for aluminum as MassDEP has not found aluminum to be a problem in the Concord River.

RESPONSE A17:

As noted by the commenter, the Concord River is not listed on the 2010 303(d) list for aluminum. Whether or not the water segment is included on the 303(d) list for a particular pollutant, effluent limitations must be included for that pollutant if it is shown to have the reasonable potential to cause or contribute to exceedances of water quality standards. EPA and MassDEP have included limitations for aluminum in this permit based on such a determination.

COMMENT A18:

The reasonable potential for aluminum should be re-calculated using effluent values for the months of May-October, and those results should be used in the low flow analysis. The effluent data (Fact Sheet Appendix A) shows wide differences in effluent levels with lower values present during low flow, river conditions.

RESPONSE A18:

See Response A5.

COMMENT A19:

The Town appreciates USEPA's acknowledgement of its interest in exploring planning and permitting opportunities as they relate to an integrated water resource management model. Specifically one which leverages future investment and management tools required to operate and maintain essential drinking water, wastewater, and stormwater systems. The Town feels it would be appropriate to complete that process before finalizing this permit and hopes that USEPA will use discretion and reasonableness in carrying out the guidelines in the strategy that "permit issuance…shall not be delayed while the integrated plan is being developed," as this approach will likely take away any incentive to undertake such an integrated approach.

RESPONSE A19:

EPA does not agree that it would be appropriate to complete the integrated planning process before finalizing the permit. The Clean Water Act and EPA's regulations provide for the reissuance of permits on a regular basis so that permit terms are revisited and reviewed rather than left unexamined and unchanged for long periods of time. *See* 33USC §§ 1342(a)(3) and (b)(1)(B), and 40 C.F.R. § 122.46(a). This regular and periodic review supports the CWA's goal of restoring and maintaining the chemical, physical and biological integrity of the Nation's waters. As quoted in the comment, EPA's *Integrated Municipal Stormwater and Wastewater Planning Approach Framework*. (EPA Office of Water and Office of Enforcement and Compliance Assurance. June 5, 2012) specifically discourages delaying NPDES permit issuance due to integrated planning.

We also do not agree that issuing this permit should remove the Town's incentive to undertake an integrated approach. EPA remains open to new information that may support a future modification of the permit, if justified, and also remains open to discussing schedules of compliance that prioritize environmental projects in the most logical and effective manner.

<u>Comments on the Fact Sheet:</u>

COMMENT A20:

a. Industrial Users: The Town would like to note that it will in the near future be receiving flow from an industrial user (Welch's fruit juice) and it will be properly permitted by the Town (page 5).

RESPONSE A20:

Comment noted for the record. As discussed in Response A16, the Town should be aware of sections of the permit that require POTWs to notify EPA of new industrial flow and that prohibit interference and pass-through.

COMMENT A21:

b. Aluminum: The Town notes in the discussion of TMDLs that there is no 303d listing or need for a TMDL for aluminum as MassDEP has not found aluminum to be a problem in the Concord River (page 8).

RESPONSE A21:

See Response A17.

COMMENT A22:

c. The reasonable potential for aluminum should be re-calculated using effluent values for the months May-October, and those results should be used in the low flow analysis. The effluent data (Fact Sheet Appendix A) shows wide differences in effluent levels with lower values present during lower value present during low flow river conditions.

RESPONSE A22:

See Response A5.

COMMENT A23:

d. The Town appreciates USEPA's acknowledgement of its interest in exploring planning and permitting opportunities as they relate to an integrated water resource management model. Specifically one which leverages future investment and management tools required to operate and maintain essential drinking water, wastewater and stormwater systems. The Town feels it would be appropriate to complete that process before finalizing this permit and hopes the USEPA will use discretion and reasonableness in carrying out the guideline in the strategy that "…permit issuance…shall not be delayed while the integrated plan is being developed…" as this approach will likely take away any incentive to undertake such an innovative approach.

RESPONSE A23:

See Response A19.

COMMENT A24:

The Town has invested significant resources in its wastewater system and in its future planning needs analysis and feels some of the draft permit conditions are not in concert

with its efforts for a sustainable future. The Town requests that USEPA take these comments seriously and make appropriate changes to the final permit conditions in the draft permit (particularly aluminum).

RESPONSE A24:

We believe that the limitations included in the final permit are necessary to meet the requirements of the Clean Water Act and State Water Quality Standards. With regards to aluminum, EPA has an obligation under the CWA to ensure attainment of state water quality standards. The Region's decision to move forward with an effluent limit for aluminum at this time is consistent with the CWA and EPA regulations.

2. COMMENTS FROM THE CONCORD BUSINESS PARTNERSHIP

COMMENT B1:

The Concord Business Partnership is a group of commercial property and business owners in Concord, many of whom are elected, appointed, or volunteer members of committees and boards in Town. All have a deep interest in the well being of our community. Our membership includes current and past members of the Board of Selectmen, Finance Committee, Natural Resources, Board of Assessors, and many others who volunteer on committees through the town. The group was formed over 20 years ago, and still has many of its original members. The Board of Directors of the Partnership has reviewed the draft NPDES permit issued to the Town of Concord for the wastewater treatment plant (WWTP) and offers the following comments.

Over the past decade, we have become increasingly aware of wastewater management challenges facing the Town of Concord. The Town Manager and Wastewater Planning Task Force have kept us informed of more notable wastewater system improvements including a recent overhaul of our municipal wastewater treatment plant (at a cost of $15 million dollars) as well treatment capacity constraints which have affected residents and businesses alike. In this demanding economic climate, this constraint represents one more challenge for businesses that are attempting to expand and improve upon the service that they provide.

Many of our members, including owners of neighborhood restaurants, bakeries, and retail shops as well as larger commercial and regional establishments have already been impacted by the wastewater treatment capacity constraints realized within Concord. Many have had to modify business plans and pay significant fees when attempting to expand service resulting in economic hardships and significant planning challenges. We have come to learn of the delicate balance that the community has been asked to establish between environmental protection and socioeconomic interests. It is not lost on us that we live and work in this community, in part, because of its environmental stewardship.

Notwithstanding, we are aware that with the introduction of each new NPDES permit issued, the Town has been asked to, and has for the most part accommodated, increasingly stringent water quality improvements. Ironically, we have also learned that

the permitted treatment capacity allowance has not been increased since the mid 1980s. It is our understanding that, as rate payers, we continue to fund significant efforts associated with inflow and infiltration mitigation. Water conservation rates have also been imposed on all of our members for the purpose of providing an incentive to conserve water.

At this time, we believe it imperative that you consider the merits of allowing the Town to expand the amount of wastewater which could be treated at the existing wastewater treatment facility. We are confident that this could be done in a manner which could maintain the delicate balance between environmental protection and economic development. Furthermore, we urge you to base the decisions of the EPA relative to the inclusion of additional or more stringent permit limits on sound science based on well substantiated facts and data. We trust that our interest has been appropriately registered and appreciate your consideration of this request.

RESPONSE B1:

EPA recognizes and commends the steps taken by the Town of Concord and its ratepayers to invest in the construction of the new advanced wastewater treatment facility, which incorporates technological advances into its design that will provide for a greater degree of wastewater treatment and environmental protection.

Irrespective of all other factors, EPA is required to include any limitations and conditions in NPDES discharge permits in addition to or more stringent than technology-based limits that are necessary to achieve state water quality standards in the receiving water, including narrative criteria for water quality (CWA Section 301(b)(1)(C) and 40 CFR § 122.44(d)).

As explained in Response A1, an increase in design flow at the facility may be granted to the Town only after the facilities plan has been approved by MassDEP and it has been shown that the Class B water quality standards, including antidegradation, can be achieved at the increased flow. The difficulty of getting such an authorization for a river that is already impaired and effluent dominated during low flow periods should not be underestimated.

EPA does not necessarily agree with the claim that development cannot move forward without additional wastewater capacity. It is possible to plan developments that generate little to no offsite wastewater flow, using water reuse technology. Wrentham Outlet Mall and Gillette Stadium are two examples of successful commercial developments where no expansion of point source discharges were necessary. In each case, an on-site wastewater treatment plant generates water for reuse in toilet flushing and other non-potable uses. While the appropriate wastewater system will vary by site, these are two examples of how onsite wastewater treatment and reuse can be integrated into commercial development.

COMMENTS FROM OARS

OPENING COMMENT:

Thank you for the opportunity to submit the following comments on the above referenced draft 5-year permit for the town of Concord's municipal wastewater treatment plant discharge. The draft permit has several good provisions, while others need to be strengthened. Below we provide some background on our organization and the Concord 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 and the name changed to OARS[5].

OARS has some 900 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 and regulators (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.

As is discussed in the Comments section below, there are several positive aspects of the draft permit. However, the permit does not prevent the discharge from contributing to an existing impairment of the water quality of the Concord River.

The Concord River originates in Concord at the confluence of the Sudbury and Assabet Rivers and flows north for 15.5 miles through the towns of Concord, Carlisle, Bedford, Billerica, Chelmsford, and Tewksbury before emptying into the Merrimack River in Lowell. The Merrimack River discharges to the Atlantic Ocean in Newburyport, Mass. As shown on the draft permit's Fact Sheet, the Concord River is classified as Class B—Warm Water Fishery, Treated Water Supply. The Concord River is the sole public drinking water source of the Town of Billerica.

The *Massachusetts Year 2010 Integrated List of Waters* (and the proposed *List* for 2012) lists the Concord River under Category 5 (Waters Requiring a TMDL). The segment from the confluence of the Sudbury and Assabet Rivers to the Billerica water supply intake is listed as impaired for total phosphorus, mercury in fish tissue, and fecal coliform. From the Billerica intake to Rogers Street Bridge in Lowell the river is listed for total phosphorus, and mercury in fish tissue. From Rogers Street Bridge to the confluence with the Merrimack River it is listed for total phosphorus, mercury in fish tissue, fecal coliform and excess algal growth. Non-native aquatic plants and Eurasian

[5] Previously, the name was the Organization for the Assabet River.

water milfoil are also listed as impairments throughout its length up to Rogers Street. The Assabet River, where it meets the Concord River, is listed as Category 5 impaired for total phosphorus and fecal coliform; there is a TMDL for phosphorus for the Assabet River.[6] The Sudbury River, where it meets the Concord River, is also listed under Category 5, impaired for mercury in fish and for non-native aquatic plants. There is a *Draft Pathogen TMDL for the Concord River Watershed*, but there is no indication that it will be approved this year.

There has been a large investment in improving the water quality and reducing the phosphorus pollution of the Assabet River, which contributes about half of the Concord River's flow. This summer all four municipal wastewater treatment plants on the Assabet are meeting lower permit limits for phosphorus (100 μg/L TP seasonal and 1,000 μg/L TP winter) for the first time. Similar investments in tertiary wastewater treatment have been made by the towns of Concord and Billerica.

The Concord River has had 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, held 31 river-based events in 2012, 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. Yet much of the Concord River still suffers each summer and early fall from excessive nuisance plant growth that degrades recreation, aesthetics and wildlife habitat. The Concord River is impounded by the Talbot Dam in Billerica which is said to influence water levels well upstream of its confluence with the Sudbury River.

The Concord River does not meet its designated Class B—Warm Water Fishery, Treated Water Supply water quality standard. The agencies have adopted an "adaptive management" approach in which MassDEP and EPA jointly issue NPDES discharge permits with phosphorus limits on wastewater treatment plant (WWTP) discharges designed as an initial step toward meeting water quality standards. The current permit (2005) has limits of 200 μg/L Total Phosphorus (TP) during the growing season and five times this (1,000 μg/L TP) during the winter. OARS' water quality data show that the in-stream concentrations of phosphorus entering the Concord River from the Assabet River are significantly higher than those from the Sudbury River (see: www.oars3rivers.org/river/waterquality). OARS data from 2009-2011 show summer TP concentrations in the Concord River in Bedford (the sampling site downstream of the Concord WWTP) vary from a high of 160 μg/L TP (6/21/09) to a low of 40 μg/L TP (7/17/11), with 78% of the readings above 50 μg/L TP. TP levels upstream of the Concord WWTP at Lowell Road bridge in Concord are consistently lower than the Bedford readings.[7] Excessive aquatic biomass continues to be a problem in the Concord River.

[6] *Assabet River Total Maximum Daily Load for Phosphorus, Report No: MA82B-01-2004-01*, 2004.
[7] Further analysis of the data is required to assess the sources of the TP measured at each site.

RESPONSE TO OPENING COMMENT:

EPA appreciates the comment and acknowledges that the Concord River experiences eutrophication, particularly in the summer months. EPA is confident that the limits contained in this final permit and other permits on the Assabet and Concord River will prevent excursions from water quality standards in the future.

COMMENT C1:

We support approaching NPDES permitting through the new EPA "Integrated Municipal Stormwater and Wastewater Planning Approach Framework" (May 2012).

An overarching goal in water resources management in the Concord River watershed, supported at the state and federal levels, is to restore the water balance in order to achieve sustainable water use that protects both human uses and ecosystem health. Land development and modern wastewater and stormwater infrastructure have had the unintended effect of draining water out of the headwaters of our streams and rivers and discharging it far downstream into the mainstem rivers. The result is increasingly stressed streams and aquifers, which damages wildlife habitat, drinking water supplies and recreational resources. However, the water balance can be improved significantly by recharging stormwater and wastewater, reducing impervious cover, and minimizing water withdrawals from those subwatersheds that are stressed.

We support the May 2012 "Framework" approach and efforts to optimize the human and environmental health benefits of public investments under the Clean Water Act. Concord has worked hard to properly plan its wastewater management, as shown by the Comprehensive Wastewater Management Plan (2004), the "update" to the CWMP—*The Status of Municipal Wastewater Treatment in Concord, MA* (2007), and the *Wastewater Planning Task Force Summary Report: An integrated Planning Initiative* (2009) which integrates housing and long-range community plans with wastewater plans. This work provides a very solid foundation that could be used to integrate wastewater and stormwater planning. It would make sense to integrate drinking water planning into this process as well. We do not believe that a CWMP that focuses exclusively on wastewater would be as useful.

We support the agencies' decision to maintain the current discharge flow limits as required under the Framework. No increase in discharge to the surface waters should be considered without the town demonstrating that a proposed increase of the wastewater discharge would be in compliance with applicable water quality requirements for the Concord River, that it would not cause or contribute to a violation of water quality standards, and that no feasible alternatives exist to the proposed wastewater discharge increase. Effluent-dominated river flows continue to be a concern in terms of public health and the health of aquatic life. It is clear from the foregoing reports (see, e.g., Figure 2, 2009 *Summary Report*) that between May 2004 and December 2008 there have been large seasonal variations in the effluent discharged by the Concord WWTP. Flows have often doubled from the low flow (around 0.8 mgd in the summer) to the high

(around 1.6 mgd in the spring). For this permit it would be useful to report actual monthly average flows at the WWTP as well. The actual monthly average provides information about the plant that is lost in a rolling average, particularly about seasonal trends which may be associated with infiltration/inflow, tourism, school year, etc. that may be useful for planning purposes.

RESPONSE C1:

Regarding monthly flow reporting, both the draft and final permits require that the permittee report average monthly flow for each month, in addition to the 12-month rolling average and the maximum daily flow.

We agree that drinking water planning and conservation should be considered in any potential wastewater flow increase, because groundwater pumping lowers the water table and takes water that would have replenished headwater streams and the Concord River. Furthermore, infiltration and inflow continue to be an issue. I/I elimination can both offset the need for a wastewater flow increase and restore flow to headwater streams.

COMMENT C2:

We support the inclusion of reporting on Di(2-ethylhexyl)phthalate, a carcinogen and endocrine disruptor.

The reporting requirement for this pollutant is welcome in order to start to better understand the degree of threat to human health and aquatic life that it may posed in this ecosystem.

RESPONSE C2:

Comment noted for the record.

COMMENT C3:

We support an aluminum limit that will protect aquatic life due to the documented high aluminum concentrations in the discharge.

Aluminum can be highly toxic to aquatic life and discharge permits must contain limits that protect aquatic life using established criteria. Massachusetts lacks site-specific criteria so national criteria must be used until such time as state criteria are promulgated. It is important to closely monitor instream and effluent aluminum concentrations due to possible increases in alum use with the new tertiary treatment systems being used in Concord and upstream. See comment 5(d) below, regarding calculations.

RESPONSE C3:

Comment noted for the record. The permittee will continue to measure and report upstream aluminum concentrations as part of the quarterly whole effluent toxicity testing;

therefore, any increase in background concentrations will be accounted for in the next permit reissuance.

COMMENT C4:

More information is needed on efforts to minimize wastewater generation through water conservation, water reuse, and I/I removal.

The 2004 CWMP and the subsequent reports contained very little information on the many ways to minimize water use and wastewater generation. The opportunities and examples of water reuse and conservation, for example, have increased since the CWMP was prepared. These opportunities are unlikely to be adopted by new developments or redevelopment unless there is significant pressure to do so. Package treatment plant technologies have been improved for clustered and other smaller systems. The opportunities for continued I/I removal need to be described fully as groundwater appears to have a significant impact on wet season wastewater flows. Collection system mapping, O&M planning, and annual reporting as required in the draft permit are important and will contribute useful information. There should be a special focus on reducing seasonal high flows.

RESPONSE C4:

EPA agrees and has expressed similar sentiments in our response to Comment A1. We believe that by continuing to reduce I/I and water use, the Town can at least minimize, if not avoid, the need for additional groundwater or point source discharges.

COMMENT C5:

The following total phosphorus discharge concentration limits do not ensure the attainment of the water quality standards established for Class B waters, as required by the Clean Water Act: Total Phosphorus (TP) 200 μg/L average monthly concentration (April 1-Oct. 31); Total Phosphorus (TP) 1,000 μg/L average monthly concentration (Nov. 1-March 31).

There are several problems with the way the phosphorus limits were calculated: the method used to determine the upstream concentration, the standard that was used, and the impacts of winter limits. As a result, the draft permit's TP discharge limits do not ensure the attainment of the Class B water quality standards established for the Concord River, as required by section 301(b)(1)(C) of the Clean Water Act and 40 CFR § 122.4(d).

The method used to calculate the total phosphorus limit is flawed because it uses the median phosphorus concentration at Lowell Road in Concord[8] (2009 and 2010) at 45 μg/L (Fact Sheet p. 10). However, water quality standard excursions do not occur on the basis of a median concentration. They occur when the concentration reaches its

[8] Two OARS sampling sites are Lowell Road bridge in Concord (CND-161) and Lowell Street in Billerica (CND-045). The site citation in the Fact Sheet should be corrected to avoid confusion.

maximum which is during critical low flow conditions, e.g., 7Q10 flows. In September 2010 the TP concentration at Lowell Road (upstream of the Concord WWTP) had reached 80 μg/L, nearly double the 45 μg/L mean used in the calculations. The 45 μg/L concentration is itself nearly double the instream TP concentration characteristic of a healthy, relatively unimpacted river or stream in this ecoregion (see below). The total phosphorus concentration recorded during the lowest flow period or 7Q10 should be used. The 7Q10 must also be correctly calculated based on accurate assessment of flow sources.

The correct criteria must also be selected in order to be protective of designated uses. The EPA has the authority and responsibility to interpret narrative standards (e.g., the Mass. nutrient standard) and establish water quality-based limits in waters where standards are not met but there is no TMDL or site-specific criterion, as is the case for the Concord River.[9] The most current and site-specific information should be used, as described below.

The Concord plant discharges directly into a river that is impounded downstream by the Talbot Dam in Billerica. In the case of impounded water bodies, the EPA's Gold Book standard is that total phosphorus should not exceed 25 μg/L or 50 μg/L, depending whether or not the influence of the impoundment reaches the regulated discharge point.[10] However the calculations in the Fact Sheet use the 100 μg/L TP criterion for a free-slowing river, which they should not. Regarding the summer ("seasonal") phosphorus limits in the draft permit, the most current and site-specific EPA guidance documents and reports support TP limits in the range of 20 μg/L to 24 μg/L, as follows.

In 2000, EPA issued its recommended nutrient criteria or "reference conditions" for river and streams located in Ecoregion XIV, which includes all of Massachusetts and three Level III sub-ecoregions.[11] EPA's Level III sub-ecoregion 59, also known as the Northeastern Coastal Zone, includes the Concord River watershed. The recommended TP criterion or reference condition for this sub-ecoregion is 23.75 μg/L (hereafter rounded to 24 μg/L).[12] This criterion was empirically derived to represent conditions of surface waters that are minimally impacted by human activities and protective of aquatic life and recreational uses.[13]

In 2003, the New England Interstate Water Pollution Control Commission (NEIWPCC) published a study, conducted by ENSR, of instream nutrient concentrations for New England rivers and streams.[14] This EPA-funded report, which included phosphorus concentrations measured in Massachusetts rivers and streams in 1994-1998, confirmed

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[9] 40CFRi122.44(d)(1)(vi).
[10] Discharges to impounded rivers and lakes require more stringent criteria than discharges to free-flowing rivers. *Quality Criteria for Water 1986*, EPA (EPA "Gold Book").
[11] *Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria; Rivers and Streams in Nutrient Ecoregion XIV*, US EPA, Office of Water, EPA 822-B-00-022, December 2000, AR Index Reference II.F.4.a.
[12] *Ibid*., page 15, Table 3a.
[13] Based on the 25th percentile of all nutrient data assessed from Level III, sub-ecoregion 59.
[14] *Collection and Evaluation of Ambient Nutrient Data for Rivers and Streams in New England, Data Synthesis Report, Final Report*, NEIWPCC, September 2003, AR Index Reference II.E.7.c.

the earlier recommendations of EPA's 2000 guidance document. Specifically, the more comprehensive phosphorus data set analyzed by ENSR for the Northeastern Coastal Zone (EPA sub-region 59) showed that in minimally impacted rivers and streams, the expected total phosphorus concentration would be in the range of 20 μg/L–22 μg/L,[15] slightly less than the 24 μg/L total phosphorus criterion recommended in EPA's 2000 guidance document.

A higher winter limit of 1,000 μg/L TP is shown to be insufficiently protective by the US Army Corps of Engineers (ACOE) study of the contribution of sediments impounded by dams on the Assabet River to water quality impairment due to phosphorus recycling by the sediments.[16] The study showed that phosphorus discharged from wastewater treatment plants during the winter was likely to be taken up by sediments and subsequently released to fuel aquatic plant growth in the next growing season. The study recommended reducing winter total phosphorus limits below 1,000 μg/L at the Assabet River municipal WWTPs:

"This study also resulted in significant findings regarding the seasonality of sediment phosphorus flux. An additional consideration to meet the TMDL target of 90% reduction in sediment phosphorus flux is winter phosphorus discharge limits for at [sic] WWTFs. Based on results of this modeling effort, it was concluded that winter limits for the WWTFs, below the current planned limit of 1 mg/L would contribute significantly to the reduction in sediment phosphorus flux.[17]

The study did not specify what the lower winter limits should be. Because the Concord WWTP is discharging to a river with an impoundment downstream created by a dam, similar to the Assabet River, these results would be applicable.

The foregoing point to a course of action supported by the data from the EPA Ecoregion study, the NEIWPCC study and the ACOE study: the agencies need to define and establish more stringent winter and growing season phosphorus limits that will allow the river to meet water quality standards.

RESPONSE C5:

Background Phosphorus Concentration

If data shows that background concentrations during dry weather conditions were appreciably higher than during other times of the year, it is true that these values should be used as the basis for calculating effluent limitations. However, in this case, the limit is relatively insensitive to the background concentration given the low limit already in place and the relatively high dilution factor for the discharge. As shown below in the figure below (using the revised 7Q10 calculated in Response to Comments Appendix A), the

[15] *Ibid*. pages 6-12, Table 6-4.
[16] *Assabet River Massachusetts: Sediment and Dam Removal Feasibility Study*, US Army Corps of Engineers, September 2010.
[17] The current, Phase 1, permits limits for Total Phosphorus are: 1,000g/L (Nov.-March), 100 g/L (April-Oct).

background concentration would have to be about 87 µg/L for the 200 µg/L (0.2 mg/l) limit not to be protective of water quality standards, meaning that using a background of 80 µg/L would not change the finding that the 200 µg/L limit is protective. Looking at this another way, at a discharge concentration of 200 µg/L and at full design flow, the discharge raises the instream concentration by a little more than 10 µg/L.

Calculation of Upstream Phosphorus Concentration That Would Make Existing Phosphorus Limit Not Protective of Water Quality

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall	=	100 ug/L
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	200 µg/L
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	
Q_r	=	Streamflow below outfall	=	18 MGD (effluent + upstream)

Therefore,

$$Cs = \frac{Q_rC_r - Q_dC_d}{Q_s}$$

$$C_r = \frac{(18\ MGD \times 100\ \mu g/L) - (1.2\ MGD \times 200\ \mu g/L)}{18\ MGD}$$

$$= 87\ \mu g/L$$

Also, instream data from OARS and EPA seem to show that the implementation of low phosphorus limits in upstream Assabet River permits has resulted in declining concentrations of phosphorus in the Concord River. For this reason, historic upstream data is of limited use in determining current upstream conditions.

Selection of Phosphorus Criteria

In setting the phosphorus limit for Concord WWTF, EPA employed the *Gold Book* recommended concentration (0.1 mg/l) rather than the more stringent ecoregional criteria or the draft New England-wide value. The *Gold Book* value is based on effects as opposed to the ecoregion criterion, which was developed on the basis of reference conditions. EPA opted for the effects-based approach because it is often more directly associated with an impairment to a designated use (*i.e.* fishing, swimming). The effects-based approach provides a threshold value above which adverse effects (*i.e.*, water quality impairments) are likely to occur. It applies empirical observations of a causal

variable (*i.e.*, phosphorus) and a response variable (*i.e.*, chlorophyll *a*) associated with designated use impairments. Reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregion class. Specifically, reference conditions presented are based on the 25th percentile of *all* nutrient data, including a comparison of reference conditions for the aggregate ecoregion versus subecoregions. *See* Ecoregional Nutrient Criteria, page vii. They are a quantitative set of river characteristics (physical, chemical and biological) that represent minimally impacted conditions. Thus, while reference conditions, which reflect minimally disturbed conditions, may meet the requirements necessary to support designated uses, they may also *exceed* the water quality necessary to support such requirements.

Regarding the Talbot Dam in Billerica, the impoundment created by the dam is a small, run-of-the-river impoundment. EPA does not believe that this reach of the Concord River merits the application of the Gold Book criteria intended for lakes, reservoirs, and impoundments.

Winter Phosphorus Limits

It is true that the Army Corps of Engineers recommended winter phosphorus limits lower than 1,000 µg/L for the Assabet River WWTPs. EPA is examining the possibility of lowering winter phosphorus limits in Assabet River POTW permits at the next reissuance.

The Concord River, however, is different from the Assabet in that it has fewer impoundments and few point sources, and also has more flow to assimilate nutrients from point sources. It is anticipated, moreover, that ongoing WWTP improvements in the Assabet will confer benefits to the Concord River through lower instream phosphorus concentrations. After reviewing water quality data collected during the upcoming permit cycle, EPA will consider whether to lower winter phosphorus limits for Concord POTW permits at the next reissuance.

COMMENT C6:

The pH range limit for the Concord WWTP is the same as the limit in its current permit (6.0-8.3 su). This limit does not conform to the state water quality standard for a Class B waterway, which is 6.5-8.3 su. However the water quality regulations (314 CMR 4.03(2)) allow the Department to "recognize a limited area or volume of a waterbody as a mixing zone for the initial dilution of a discharge. Waters within a mixing zone may fail to meet specific water quality criteria provided the following conditions are met: (a) Mixing zones shall be limited to an area or volume as small as feasible. There shall be no lethality to organisms passing through the mixing zone as determined by the Department…" The Fact Sheet states the deviation from the "customary" limit has not resulted in any observed "adverse effects due to occasional low pH in the discharge." The Fact Sheet does not provide calculations showing the size of the mixing zone. We are concerned that this approach puts the burden of proof on some party to observe and prove an ill effect, when the research has already been done to set a protective standard. The Fact Sheet does not explain what the "operational considerations" are that should be

considered. If the town is interested in having this exceptional limit, then a good case should be made and backed up with data. It should be noted that WWTPs on the Assabet River WWTPs have the 6.5-8.3 su pH range in their permits.

RESPONSE C6:

The pH standard is for the receiving water and not necessarily the effluent, however, standard practice for POTW permits has been to require that the pH limit range match the pH range of the criteria in the receiving water classification. In some instances, EPA has allowed a different pH range where there is sufficient dilution, The allowable limit range is constrained by the EPA secondary treatment range for pH of 6.0 - 9.0 SU. See 40 C.F.R. §133.102.

After further examination of the upstream data collected during WET tests, it appears that the Concord River upstream of the Concord WWTP discharge does not always meet the 6.5 minimum pH specified in the Massachusetts Water Quality Standards (314 CMR 4.00). Also, the alkalinity of the receiving water is low (under 20 mg/L)[18] at times, meaning that the water has little buffering capacity against acidic inputs.

Table 3. Average Upstream pH and Alkalinity from Concord WWTP WET tests

Date	Alkalinity (mg/L)	pH
Sep-09	28	6.63
Dec-09	19.6	7.23
Mar-10	16.6	6.79
Jun-10	31.3	6.6
Sep-10	40.7	7.1
Dec-10	15	6.83
Mar-11	12.5	6.73
Jun-11	31	7
Sep-11	26.7	6.3
Dec-11	19.3	6.5
Mar-12	23.3	7.1

Because it is not clear that the Concord River has sufficient buffering capacity to assimilate low-pH discharges without a violation of water quality standards, EPA has decided to change the minimum pH limit to 6.5 until the Town can demonstrate to EPA that lower-pH effluent does not have the potential to cause a violation of water quality standards in the Concord River. Such a demonstration would need to include several samples and examine water quality impacts year-round.

[18] http://www.water-research.net/Watershed/alkalinity.htm

COMMENT C7:

Massachusetts Water Quality Standards require the use of the 7Q10 flow in pollutant loading calculations for determining dilution. The 7Q10 calculation is critical to the accurate determination of appropriate discharge limits. The 7Q10 calculation required several adjustments to ascertain the flow at the discharge point. The calculations of 7Q10 in the Fact Sheet are not clear and are difficult to interpret. We request that a clearer calculation of the 7Q10 be provided so that we may properly assess its accuracy.

RESPONSE C7:

Water quality-based limitations are established with 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 for the Concord River at the Concord WWTF has been calculated as 16.8 MGD (20.1 cfs) as described below.

The Concord treatment plant discharge is located between USGS gages in Maynard MA and Lowell MA. To obtain an estimate of a 7Q10 flow at a point between these two USGS gages, the drainage areas (DA) between them must be calculated and other flows included or excluded as explained below. All drainage area values for the locations below are estimated from USGS topographic maps and the USGS gazetteer of 1984 for the Merrimack River, in which the SUASCO (Sudbury-Assabet-Concord) river basin is included. The streamflows were determined using DFlow 3.1b, a streamflow modeling computer program.

Lowell, MA USGS gage (01099500), 7Q10 for 4/1/1993 – 3/31/2012 (20 years): **28.0 cfs** (drainage area = 400 mi^2)

Maynard, MA USGS gage (01097000), 7Q10 for 4/1/1993 – 3/31/2012 (20 years): **11.1 cfs** (drainage area = 114 mi^2)

The first step in estimating the 7Q10 upstream of the discharge is to calculate the watershed flow factor. The flow factor is an estimate of the non wastewater flows generated by the watershed per unit area during 7Q10 periods. It has been calculated using the 7Q10s and drainage areas at the Lowell and Maynard gages, the dry weather flows from the POTWs between the gages, and the direct drinking water withdrawal by the Town of Billerica.

Flow factor calculation for the stretch of river between Maynard and Lowell gages:

400 square miles -114 square miles = **286 mi^2**

1) Low flow attributable to this stretch of river:

28.0 cfs -11.1 cfs – 10.0 cfs* + 9.1 cfs** = **16.0 cfs**

2) Flow factor for this stretch of river:

16.0 cfs / 286 square miles = **0.056 cfs/sq. mile**

Using the flow factor, the watershed area between the Concord discharge and the Maynard gage and the other estimated flows, the 7Q10 at the Concord discharge is then estimated as follows:

Estimated 7Q10 flow at Concord WWTF: (drainage area at Concord WWTF = 345 mi^2)

11.1 cfs + 2.05 cfs*** + (345 mi^2 -114 mi^2) 0.056 = **26.1 cfs = 16.8 MGD**

Available Dilution

Dilution Factor = (Facility Flow + 7Q10)/Facility Flow
Dilution Factor = (1.2 MGD + 16.8 MGD)/1.2 MGD = **15**

*This is the sum of the average effluent flow from the four WWTPs between the Maynard gage and the Lowell gage for the period of June to Sept of 2010-2012, reflecting the low flow season over that period.

- Maynard WWTP: 1.7 cfs
- MCI Concord WPCF: 0.35 cfs
- Concord WWTF: 1.7 cfs
- Billerica WWTF: 6.2 cfs

**Since the Town of Billerica has a water withdrawal from the Concord River, the average daily withdrawal for the period of June to September for 2010 of 5.84 MGD (9.1 cfs) has been added to the flow factor.

***This is the sum of the average effluent flow from the two WWTPs below the Maynard gage and upstream of the Concord WWTF.

Note that the calculated 7Q10 is lower than that used in the draft permit, but the only change has been to the aluminum effluent limit. Also refer to Response C8 for a discussion of the updated reasonable potential calculation.

COMMENT C8:

Metals—The method of calculating Aluminum and Copper concentrations is flawed
The Fact Sheet shows that the calculations of metals and phosphorus did include a "background" level in the receiving water, which is an improvement over past permits. However, the dilution calculations were faulty because an annual median value for flow, rather than 7Q10 conditions, was used to calculate the background level of the pollutants in the receiving water. This is not appropriate, as the 7Q10 conditions are the critical conditions when flow from the Assabet River, in particular, can be highly effluent-

dominated. By using median background concentrations, EPA has failed to demonstrate that Concord's aluminum limit is low enough to meet water quality standards, *which apply under 7Q10 conditions.* The draft permit does not contain a copper limit, yet the EPA has failed to demonstrate that Concord does not need a copper limit. Since EPA used a median background concentration for copper to represent a 7Q10 condition, there *is* reasonable potential for Concord's discharge to violate acute and/or chronic criteria for copper. The permit thus fails to prove that there is no reasonable potential for the discharge to cause or contribute to violation of water quality criteria for metals. In addition, there is no evidence that correct calculations were done for the other priority pollutants. This should be done using the correct background and 7Q10 factors to ensure that there should not be limits included in the permit for these pollutants.

RESPONSE C8:

The NPDES Permit Writers Manual encourages the use of actual ambient data to estimate background concentrations of pollutants (see page 6-19). The manual also emphasizes that the data be "reliable" and also states, as an example, that the "permit writer might use the maximum measured background concentration or, perhaps, an average of measured concentrations as the critical condition."

In this case, the available upstream data is from receiving water analysis done in conjunction with Whole Effluent Toxicity tests. While EPA believes that this data is generally reliable, we recognize that it has not been historically collected using the best sampling and analysis techniques and is apt to include outliers (As an example from the Concord WWTF WET tests is the December 2010 background aluminum result, 565 µg/L, which is more than double the next highest measurement). Therefore, EPA chose to use the median background metals value, a representation of the central tendency of the data (similar to the average), a decision consistent with the Permit Writers Manual.

The commenter is correct that the fact sheet did not provide a reasonable potential analysis for most of the priority pollutants. Effluent analysis performed for the permit application revealed detectable amounts of aluminum, copper, DEHP, nickel and zinc. No other priority pollutants were detected in the effluent. Reasonable potential analyses for aluminum, copper, and DEHP were included in the fact sheet, and analyses for nickel and zinc are presented in Appendix A to this Response to Comments. No reasonable potential was found for the discharge of any of these metals to cause or contribute to a violation of water quality standards. These findings were also true using the revised 7Q10 (see Response to Comments Appendix A).

COMMENT C9:

Nitrogen—May need to be considered in light of new information
Nitrogen reporting has been eliminated from the draft permit. If nitrogen is found to pose a threat to designated uses in the Concord River, the Merrimack River, or where the Merrimack discharges into the Atlantic Ocean, this should be reassessed.

RESPONSE C9:

A monitoring requirement for total ammonia nitrogen was inadvertently omitted from the draft permit table. This requirement has been restored in the Final Permit.

The comment also seems to imply that total nitrogen monitoring was removed from the draft permit. The current permit contains no total nitrogen monitoring, therefore it was not "eliminated from the draft permit." EPA has no information that nitrogen is a concern where the Merrimack River meets the Atlantic Ocean,

COMMENT C10: CONCLUSIONS

The proposed draft permit has several good components and points the way to a much-needed integrated approach to water resources investments and management. However, it does not meet the requirements of the Clean Water Act due to calculations that 1) do not properly reflect the impounded nature of sections of the Concord River, or 2) are either incorrect or unclear relative to instream pollutant concentrations, mixing zones, and dilution flows, particularly during the critical low flow periods. In addition, the growing body of research on the effects of winter-time nutrient loading of sediment on growing season nutrient recycling should be utilized.

RESPONSE C10:

Responses to the issues raised in the conclusion can be found in the responses to the commenter's detailed comments. Specifically, see Response C5 for a discussion of upstream phosphorus concentrations used in calculating the effluent limit, the attainment of Gold Book criteria in downstream impoundments, and phosphorus winter limits; see Response C7 for a discussion of available dilution; and see Response C8 for a discussion of upstream metals concentrations used in calculating aluminum and copper limits.

COMMENTS FROM THE NATIONAL PARK SERVICE

OPENING COMMENT:

Thank you for the opportunity to comment on the recently issued draft NPDES permit MA0100668 for the Town of Concord Wastewater Treatment Plant. The National Park Service is especially interested in this draft permit because it applies to a facility that discharges directly into the part of the Concord River that has been designated as a Wild and Scenic River.

As you know, 29 miles of the Sudbury Assabet and Concord Rivers have been nationally designated as part of the Wild and Scenic River System. The National Park Service as the administering agency is responsible for long term protection and stewardship of the rivers' 'outstandingly remarkable resources' including scenic, historic, cultural, recreational and ecological values. One of the greatest threats to these resources is impaired water quality, especially due to high nutrient loads. Section 7 of the Wild and Scenic Rivers Act gives the National Park Service the responsibility to evaluate this

permit to ensure the proposed discharge will not adversely affect the resource values for which the river was designated.

Following are our comments.

RESPONSE TO OPENING COMMENT:

EPA acknowledges the comment. We are confident that the limits in the final permit will support the many functions and values that the Concord River provides.

COMMENT D1:

EPA and DEP have included some new and important requirements in this permit which reflect the state of our rivers and help to protect water quality as well as human health. This is the first time that the permit for Concord recognizes that Billerica, downstream, uses the Concord River as a public water supply. It is correct to identify this as part of a Class B Water Quality Standard, and the permit must be written accordingly. This is also the first time that a requirement to monitor phthalate has been included in Concord's permit, an important addition because of the potential health effects (both as a carcinogen and as an endocrine disrupter), especially to residents of Billerica who will drink Concord River water. Phthalate may also affect the resident aquatic fauna. Recognition of the integrated nature of our water resources, and the potential for new contaminants to be present are critical to protecting natural resources and human health.

We support the decision not to grant a flow increase to the Town of Concord at this time. Not only is the planning to justify an increase incomplete, but there is also some uncertainty surrounding the flow numbers presented in the Fact Sheet. Based on figures provided in the Fact Sheet, if septage and I/I are subtracted from the 1.06 MGD current average flow, the wastewater generated per capita is 131 gallons per person per day. This is a high number, considering that the per person target for water use is 65 gallons per person per day and may suggest that there is room for more conservation efforts before a flow increase is considered.

RESPONSE D1:

Thank you for the comment. Regarding per capita usage, Massachusetts water utilities report their per capita usage to MassDEP, and in 2011, Concord reported 63 residential gallons per capita per day (RGPCD), below the 65 gpd standard.

Wastewater flows are not an accurate reflection of residential water use in Concord. First, the sewer system serves only 35% of the town, while the water system serves 95% of the town[19]. Furthermore commercial and municipal users of the sewer system contribute disproportionately high flows to the sewer system compared to residential users. Table 1 shows the data used to calculate Concord's RGPCD.

[19] http://www.concordma.gov/Pages/ConcordMA_Water/index

Concord, MA Residential Water Use Data, 2011 (Data provided to MassDEP)

Residential gallons per person per day = annual residential water use / population served x 365 days

= 368,135,000 gallons / 15,935 people x 365 days

= 63 gallons per person per day

We agree that now is not the right time to grant Concord WWTF a flow increase. An increase in design flow at the facility may be reflected in the Town's permit only after their facility's CWMP has been approved, it has been shown that the Class B water quality standards can be achieved at the increased flow, and that the increased discharge can be authorized under the MassDEP antidegradation policy. None of these steps has yet occurred, and therefore the final permit does not include a flow increase.

COMMENT D2: Phosphorus

There is no TMDL for phosphorus in the Concord River, although the river is impaired by phosphorus and listed in Category 5 of the Impaired Waters List. When water quality standards are not being met, The Clean Water Act (Section 301(b)(1)(C)) states that instead of a technology based effluent limit, a more stringent water quality based limit should be applied in order to comply with standards. Because Massachusetts does not yet have numeric criteria for phosphorus, a water quality based limit must employ 'best professional judgment' and depend on other guidance and relevant studies to determine appropriate phosphorus limits for effluent discharges. The Fact Sheet only refers to the Gold Book, published in 1986, as guidance for establishing a numeric limit for phosphorus, although more recent work is more relevant. In 2000, EPA published Ecoregion Nutrient Criteria and suggested numeric phosphorus criteria for this ecoregion and this type of slow moving river system, ranging from 0.1mg/l to 0.02 mg/l. The most recent EPA funded analysis, done by Mitchell, Liebman, Ramseyer and Clark (2004) utilizing the most current data and having been subjected to quality assurance measures suggests the need for even more conservative concentrations (0.020 -0.022 mg/l). In light of this growing body of information, a total phosphorus limit of 0.2 mg/l as proposed in this permit is inadequate to meet standards, and in fact the target in-stream concentration should be 0.02 mg/l, an order of magnitude lower than the Gold Book value, to protect and restore water quality in the Concord River.

RESPONSE D2:

Please see Response C5.

COMMENT D3:

While behavior of phosphorus during the winter in the Concord River is not known, studies on the Assabet indicate that the phosphorus discharged in the winter does not

flush through the system, but may adhere to sediment to become available in the next growing season. Limited winter flushing is likely in the Concord River too, given its low energy due to a modest gradient and impoundment behind the Talbot Dam in Billerica. Because the river is designated as impaired, with phosphorus found to be one of the sources of its impaired status, a conservative stance should be taken on winter limits. The Wayland WWTP permit sets a precedent in rivers with excess phosphorus, and a limit of 0.1 mg/l should be applied in this case as well.

RESPONSE D3:

See Response C5.

Regarding the comparison to the Wayland limit, it has been established that "[p]ermits are issued on an individual basis, taking into account individual differences as appropriate." *In re City of Attleboro*, NPDES Appeal Nos. 08-08 & 08-09, slip op. at 36 (EAB Sept. 15, 2009); *see also In re City of Port St. Jo*e, 7 E.A.D. 275, 304 n.44 (EAB 1997). There are significant differences between this permit and the permit issued to the Town of Wayland for its publicly owned treatment works. Among these differences are that the discharges are to different receiving waters with different characteristics and that the Wayland discharge was a recommenced discharge, with questions related to antidegradation (specifically, whether a sufficient number of failing septic systems within the Town had been connected to the treatment plant to offset the pollutant loads authorized by the permit). In sum, these differences supported a more stringent effluent phosphorus limit in the Wayland permit than is necessary here.

COMMENT D4:

There are other concerns about the phosphorus limit's appropriateness. The Fact Sheet explains how the 'background' phosphorus concentration was determined using OARS data that was averaged over two years of monthly sampling. Using a median of annual flow data dampens the extremes, most importantly the low flows. In order to make a reasonable approximation of 7Q10 conditions, having highly diluted spring, early summer (and even autumn of some years) concentrations included appreciably underestimates the concentration in the Concord River prior to the town's discharge during 7Q10 flows. The OARS data for July and August, which comes closest to the 7Q10 flow though still above, suggests the 0.53 mg/l median annual flow, used in the calculations is an inaccurate representation of the conditions during the summer by 40-50%. If this calculation is too optimistic and there are actually higher concentrations in the receiving water, the river faces accelerated eutrophication, depressed dissolved oxygen, limited light penetration, a larger load of organic material and nutrients in the river sediments. The receiving water concentration should be recalculated using the phosphorus average from the low flow months only.

RESPONSE D4:

See Response C5.

COMMENT D5: Aluminum

The calculation for background levels of aluminum is flawed in the same way described above. Median flows do not approximate the low flow conditions of 7Q10 when the impact of the effluent is greatest.

If the Assabet WWTP facilities are using increased amounts of alum in their recent upgrades to reach enhanced P removal, historical concentrations of background aluminum may not reflect the recent conditions of a river system with far more advanced nutrient removal facilities discharging. We hope the background aluminum concentrations in the next few years can be tracked as the full complement of upstream wastewater dischargers institute advanced nutrient removal. Should there be an increase in background levels due to an increase from upstream discharges, the aluminum limit in this permit should be revisited.

RESPONSE D5:

See Response C8.

COMMENT D6: Copper

Elevated concentrations of copper can be highly toxic to an aquatic ecosystem. The calculation used to ascertain the probability of copper in the effluent being above chronic or acute limits contains the same flaws in the determination of background levels as found in the phosphorus and aluminum numbers. It is essential to use the in-stream value from low flow conditions--not a median of concentrations seen during a range of seasonal flows. The results of the dilution water analysis from the WET testing was not provided in the permit package to allow a comparison of the copper concentration used to assess the potential for a copper exceedance and the concentration found in dilution water from a September WET tests from a year with September flow close to the 7Q10 flow for this discharge. It is the background concentration during a low flow time that has the potential to better capture the probability of the discharge being above chronic or acute toxicity levels.

RESPONSE D6:

The dilution water copper data used in the draft permit is shown below. For the same reasons as with aluminum, EPA chose to use the median background copper result rather than the maximum result. As discussed in Response C8, this decision is consistent with the EPA Permit Writer's Manual.

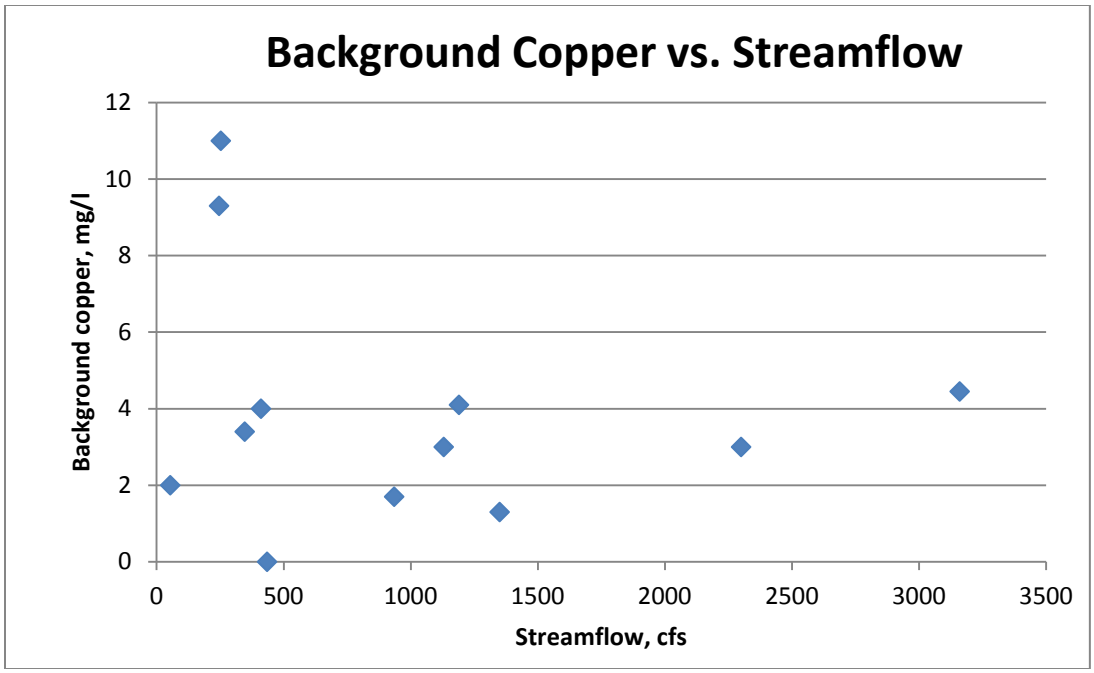


Table 3. Comparison of Background Copper Concentration and Streamflow

Date	Concentration, µg/L	Streamflow, cfs
3/10/2008	4.45	3160
6/18/2008	3.4	347
9/8/2008	4.1	1190
12/8/2008	1.7	935
3/18/2009	1.3	1350
6/10/2009	9.3	246
9/14/2009	<10	435
12/7/2009	3	1130
3/8/2010	3	2300
6/7/2010	4	411
9/13/2010	2	54
12/13/2010	11	253
Average	4.3	
Median	3.4	

EPA examined the relationship between background copper levels and streamflow to determine if the background level used to calculate the permit limit is representative of 7Q10 conditions. As the chart above shows, none of the data was collected at 7Q10 flow (28 cfs), and there is only a weak correlation between streamflow and background copper concentrations. At the lowest streamflow, 54 cubic feet per second (cfs), the background copper concentration was 2 µg/L, close to the value (3 µg/L) used in the reasonable potential analysis in the draft permit.

COMMENT D7: pH

The pH range for this wastewater treatment plant is a continuation of the limits in the existing permit. The range has a lower limit than the state water quality standard for a Class B waterway, though the Fact Sheet does not explain why this variance is necessary. There is variability in the pH found in the effluent, though the Fact Sheet does not provide insight into the root cause of this variability. All the other wastewater treatment plants in the watershed are required to meet the 6.5-8.3 SU Class B range in their permits, a compelling case to allow this inconsistency in the watershed should be explained.

RESPONSE D7:

See Response C6.

COMMENT D8: 7Q10

The low flow calculations are difficult to understand, at best. It appears that some of the numbers and/or what the numbers represent are transposed. A map would be helpful as well. More explanation would be really helpful.

RESPONSE D8:

See Response C7.

COMMENTS FROM THE SUDBURY, ASSABET, AND CONCORD WILD AND SCENIC RIVER STEWARDSHIP COUNCIL (RSC)

Thank you for the opportunity to comment on the recently issued draft NPDES permit MA0100668 for the Town of Concord Wastewater Treatment Plant. The Sudbury, Assabet and Concord Wild and Scenic River Stewardship Council (RSC) is especially interested in this draft permit because it applies to a discharge directly into that part of the Concord River that has been designated as a Wild and Scenic River.

In 1999, 29 miles of the Sudbury, Assabet and Concord Rivers were designated, and became a part of the federal wild and scenic river system. The RSC was created as part of the legislation to advise the National Park Service on long term protection and stewardship of the rivers and their outstanding resources including scenic, historical, cultural, recreational and ecological values. The RSC is comprised of the eight shoreline communities along the wild and scenic segment, Sudbury Valley Trustees, OARS for the Sudbury, Assabet and Concord Rivers, SUASCO Watershed Community Council, the Commonwealth and the federal government. The RSC provides a significant and important local perspective to the issues facing the rivers. One of the highest priorities for the RSC is the threat posed to the rivers from impaired water quality, and the consequent impacts to recreation, scenery and ecology of the rivers. It is in this light that the RSC offers the following comments.

COMMENT E1:

The Concord River is on the List of Impaired Waters in Massachusetts, in part due to high phosphorous levels and excessive plant growth. Although a TMDL has not been completed, there is data that supports that the river is not meeting Class B Water Quality Standards. The Clean Water Act Section 301 (b)(1)(C) requires water quality based effluent limits for wastewater treatment plants when water quality standards are not being met in the receiving water. A technology based limit of 0.2 mg/l, as proposed in the draft permit, is not appropriate and regulators must determine a more protective limit to bring waters into compliance with water quality standards.

Using EPA's own studies (Mitchell, Liebman, Ramseyer and Clark (2004)), a phosphorous limit of 0.02 mg/l, an order of magnitude below the proposed limit, should be imposed in order to protect and restore water quality. Concord has recently constructed a new treatment plant with state of the art technology that allows the plant to achieve very low phosphorus levels. Setting an appropriate limit should not require additional construction.

RESPONSE E1:

See Response C5.

COMMENT E2:

While behavior of phosphorus during the winter in the Concord River is not known, studies on the Assabet indicate that the phosphorus discharged in the winter does not flush through the system, but adheres to the sediment to become available during the next growing season. Limited winter flushing is likely in the Concord River too, due to its modest gradient and slow moving water. Because the river is designated as impaired by phosphorus, a conservative stance should be taken on winter limits. The Wayland WWTP permit sets a precedent in rivers with excess phosphorus, and a limit of 0.1 mg/L during the winter months should be applied in this case as well.

RESPONSE E2:

Regarding winter phosphorus limits, see Response C5. Regarding the comparison to the Wayland limit, see Response C3.

COMMENT E3:

Throughout the permit, estimation of low flow conditions and corresponding background contamination levels are flawed. The draft permit uses a median annual flow as a basis from which to determine background levels of aluminum, copper and phosphorus. Because median flows, which include high spring flows as well as high inflow and infiltration rates, may dampen true low flow conditions, these background level contaminants may be underestimated. The results of this error have been carried through

subsequent calculation to determine the appropriate level of these contaminants in the effluent. Because of this flawed calculation, limits may not be protective.

RESPONSE E3:

See Responses C7 and C8.

COMMENT E4:

The pH range for this plant is a continuation of the limits in the existing permit. The range has a lower limit than the state water quality standard for a Class B waterway although the Fact Sheet does not explain why this is necessary, except to state that there are operational considerations. This should be explained more fully. It seems a questionable precedent to allow discharges outside of water quality standards even if there is no apparent problem based on existing data.

RESPONSE E4:

See Response C6.

COMMENT E5:

The 7Q10 flow calculations are not straight forward and should be explained more clearly. A map which indicates gages and also other flow contributors would be helpful.

RESPONSE E5:

See Response C7.

COMMENT E6:

This permit takes a broader view of the integrated nature of our water resources, and EPA and DEP should be commended for this. Billerica, also a part of the Wild and Scenic River, utilizes the Concord River as a public drinking water supply. Recognizing this, and setting effluent limits and monitoring requirements accordingly, are good steps towards protecting human health as well as natural resources.

RESPONSE E6:

The comment is noted for the record.

APPENDIX A

7Q10

Water quality based limitations are established with a calculated available dilution. Title 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 for the Concord River at the Concord WWTF has been calculated as 16.8 MGD (26.1 cfs) as described below.

The Concord treatment plant discharge is located between USGS gages in Maynard MA and Lowell MA. To obtain an estimate of a 7Q10 flow at a point between these two USGS gages, the drainage areas (DA) between them must be calculated and other flows included or excluded as explained below. All drainage area values for the locations below are estimated from USGS topographic maps and the USGS gazetteer of 1984 for the Merrimack River, in which the SUASCO (Sudbury-Assabet-Concord) river basin is included. The streamflows were determined using DFlow 3.1b, a streamflow modeling computer program.

Lowell, MA USGS gage (01099500), 7Q10 for 4/1/1993 – 3/31/2012 (20 years): **28.0 cfs** (drainage area = 400 mi^2)

Maynard, MA USGS gage (01097000), 7Q10 for 4/1/1993 – 3/31/2012 (20 years): **11.1 cfs** (drainage area = 114 mi^2)

The first step in estimating the 7Q10 upstream of the discharge is to calculate the watershed flow factor. The flow factor is an estimate of the non wastewater flows generated by the watershed per unit area during 7Q10 periods. It has been calculated using the 7Q10s and drainage areas at the Lowell and Maynard gages, the dry weather flows from the POTWs between the gages, and the direct drinking water withdrawal by the Town of Billerica.

1) The watershed area between the two gages is:

Area at the Lowell gage – area at the Maynard gage

400 square miles -114 square miles = **286 mi^2**

2) Non wastewater 7Q10 flow between gages:

7Q10 at Lowell gage – 7Q10 at Maynard gage – wastewater flow from POTWs between the gages + water withdrawal by Billerica

28.0 cfs -11.1 cfs – 10.0 cfs* + 9.1 cfs** = **16.0 cfs**

*This is the sum of the average effluent flow from the four WWTPs between the Maynard gage and the Lowell gage for the period of June to Sept of 2010-2012, reflecting the low flow season over that period.

**Since the Town of Billerica has a water withdrawal from the Concord River, the average daily withdrawal for the period of June to September for 2010 of 5.84 MGD (9.1 cfs) has been added to the flow factor.

- Maynard WWTP: 1.7 cfs
- MCI Concord WPCF: 0.35 cfs
- Concord WWTF: 1.7 cfs
- Billerica WWTF: 6.2 cfs

3) Flow factor for this stretch of river:

Non wastewater 7Q10 between gages/watershed area between gages:

16.0 cfs / 286 square miles = **0.05594 cfs/sq. mile**

Using the flow factor, the watershed area between the Billerica discharge and the Maynard gage and the other estimated flows, the 7Q10 at the Billerica discharge is then estimated as follows:

4) Estimated 7Q10 flow at Concord WWTF: (watershed drainage area at Concord WWTF = 345 mi^2)

7Q10 at Maynard gage + wastewater flow from POTWs below the Maynard gage but upstream of Concord discharge + non wastewater flow generated by watershed

11.1 cfs + 2.05 cfs*** + (345 mi^2 -114 mi^2) 0.05594 = **26.1 cfs (16.8 MGD)**

***This is the sum of the average effluent flow from the three WWTPs below the Maynard gage and upstream of the Concord WWTF (Maynard and MCI Concord).

<u>The dilution factor can then be calculated using the discharge design flow and the receiving water 7Q10:</u>

Dilution Factor = (Facility Flow + 7Q10)/Facility Flow
Dilution Factor = (1.2 MGD + 16.8 MGD)/1.2 MGD = **15**

Total Phosphorus

The Massachusetts Surface Water Quality Standards at 314 CMR 4.00 (MA SWQS) do not contain numerical criteria for total phosphorus. The narrative criterion for nutrients is found at 314 CMR 4.05(5) (c), which states that, "unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses…"

The MA SWQS also require that "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,… to remove such nutrients to ensure protection of existing and designated uses." (314 CMR 4.05(5)(c)). The Massachusetts Department of Environmental Protection (MassDEP) has established that a monthly average total phosphorus limit of 0.2 mg/l (200 μg/l) represents highest and best practical treatment (HBPT) for Publicly Owned Treatment Works (POTWs).

The current permit contains the HBPT limit of 0.2 mg/l (200 μg/l) from April through October and a limit of 1 mg/l the rest of the year. From January 2009 through December 2010, there were no violations of the total phosphorus limit.

EPA calculated the downstream phosphorus concentration with the existing 0.2 mg/l permit limit for Concord WWTP to verify that the existing limit is sufficiently protective of designated uses. The upstream concentration, 45 μg/l, is the median phosphorus concentration reported for the Concord River at Lowell Street, Concord by the Organization for the Assabet River (OARS) in 2009 and 2010[1]. As the calculation below shows, the existing limit results in a downstream phosphorus concentration of 55 μg/l during 7Q10 conditions, lower than the Gold Book criteria of 100 μg/l.

[1] http://www.oars3rivers.org/sites/default/files/Data-2009-2010-Appendix-II.pdf

Downstream Phosphorus Concentration

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	200 µg/l
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	45 µg/l
Q_r	=	Streamflow below outfall	=	18 MGD (effluent + upstream)

Therefore,

$$C_r = \frac{(1.2\ \text{MGD} \times 200\ \mu\text{g/l}) + (16.8\ \text{MGD} \times 45\ \mu\text{g/l})}{18\ \text{MGD}}$$

$$= \mathbf{55\ \mu g/l} < 100\ \mu\text{g/l (Gold Book criterion)}$$

The average monthly total phosphorus limit remains at 200 µg/l from April 1st through October 31st. From November 1st through March 31st, the average monthly limit remains at 1 mg/l. Sampling frequency will be once per month.

The final permit also requires Concord WWTP to report daily alum, magnetite, and polymer dosing levels with the DMR. The CoMag process allows for rapid changes in phosphorus removal by adjusting the dosing levels of the chemicals used in the process. The rationale for this requirement is that reporting of dosing level will provide verification that nutrient removal occurs throughout the month without more frequent effluent monitoring.

Aluminum

Aluminum, in the form of alum or other compounds, is a commonly used chemical additive in wastewater treatment to remove phosphorus. The release of metals such as aluminum into the environment can result in levels that are highly toxic to aquatic life. Therefore, it is necessary to evaluate the downstream effects of discharges of aluminum from wastewater treatment plants. Water quality-based effluent limitations are imposed on dischargers when it is determined that limitations more stringent than technology-based limitations are necessary to achieve or maintain the water quality standards in the receiving water (40 CFR § 122.44(d)(1)). Such determinations are made when EPA finds that there is reasonable potential for the discharge to cause or contribute to an instream

excursion above a water quality criterion contained within applicable state water quality standards (40 CFR § 122.44(d)(1)(i)).

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

The MA SWQS include requirements for the regulation and control of toxic constituents and also require that EPA-recommended criteria established pursuant to Section 304(a) of the CWA be used unless site-specific criteria are established (314 CMR § 4.05(5)(e)). Massachusetts has not adopted site-specific criteria for aluminum. Therefore, the freshwater criteria for aluminum found in the *National Recommended Water Quality Criteria*: *2002* (US EPA 2002 [EPA-822-R-02-047]), which are an acute concentration of 750 µg/l and a chronic concentration of 87 µg/l, apply in Massachusetts.

The potential for discharges of aluminum from the Concord WWTP to cause or contribute to an excursion above water quality criteria was determined by statistically projecting the maximum concentration of the pollutant in the discharge assuming a lognormal distribution. A histogram of the effluent data verified this assumption. EPA projected the maximum effluent concentration as 4,411 µg/l (4.4 mg/l) by calculating the 99^{th} percentile measurement of the existing effluent data set from January 2009 through January 2011 (n=25). The 95^{th} percentile concentration, 2,720 µg/l (2.7 mg/l), was also calculated for comparison with the chronic WQC (see Fact Sheet Appendix C).

The projected pollutant level was then inserted into a steady-state mixing equation to determine if it could cause or contribute to an excursion from water quality standards under critical conditions. The median aluminum level reported in the 2008-2010 WET test dilution samples, 75 µg/l, was used in this analysis.

As shown in the boxes below, the projected maximum aluminum effluent of 4,411 µg/l results in a receiving water concentration of 364 µg/l during critical conditions, below the acute criterion of 750 µg/l. A concentration of 2,720 µg/l, the 95^{th} percentile concentration, results in a receiving water concentration of 25 µg/l, above the chronic criterion of 87 µg/l. Therefore, there is reasonable potential for the discharge to cause or contribute to an excursion of the chronic water quality standard for aluminum.

Reasonable Potential Analysis for Aluminum

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	4,411 µg/l
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall	=	18 MGD (effluent + upstream)

Therefore,

$$Cr = \frac{(1.2\ MGD \times 4{,}411\ \mu g/l) + (16.8\ MGD \times 75\ \mu g/l)}{18\ MGD}$$

= **364 µg/l** < 750 µg/l (acute criterion)

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an excursion from the acute water quality criterion for aluminum.

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	2,720 µg/l
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall	=	18 MGD (effluent + upstream)

Therefore,

$$C_r = \frac{(1.2\ MGD \times 2{,}720\ \mu g/l) + (16.8\ MGD \times 75\ \mu g/l)}{18\ MGD}$$

= **251 µg/l** > 87 µg/l (chronic criterion)

Therefore, there **is reasonable potential** for the discharge to cause or contribute to an excursion from the chronic water quality criterion for aluminum.

The effluent limits calculated below will result in attainment of water quality criteria downstream of the facility during critical conditions. The limit was calculated using the same steady state model that was used in determining reasonable potential, but setting the

downstream concentration equal to the applicable water quality criteria and solving for the effluent concentration.

Monthly Average Aluminum Limit

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

Where

C_d	=	Discharge concentration =	?	
C_r	=	Concentration below outfall	=	87 µg/l (chronic criterion)
Q_d	=	Discharge flow	=	1.2 MGD
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	75 µg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	18 MGD

$$C_d = \frac{(18\ \text{MGD})(87\ \mu\text{g/l}) - (16.8\ \text{MGD})(75\ \mu\text{g/l})}{1.2\ \text{MGD}}$$

$$= \mathbf{255\ \mu g/l}$$

The draft permit therefore includes an average monthly limit of 255 µg/l and a requirement to report the maximum daily effluent concentration. The proposed monitoring frequency is once per month. If the facility monitors at this frequency, the single sample must be reported as both the monthly average and the daily maximum. If Concord WWTP chooses to sample more often than once per month, the average of the samples must be reported as the monthly average, and the highest sample of the month reported as the daily maximum.

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 does not contain a limit for ammonia. DMR data show that effluent ammonia levels range from 0.49 mg/l to 2.81 mg/l (see Fact Sheet Appendix A).

EPA ammonia criteria recommend using the 30Q10 conditions (the lowest 30-day average daily flow with a 10-year expected recurrence interval) rather than the 7Q10 for setting ammonia limits. Interpolation of flow records for USGS Gages in Maynard and Lowell indicates that the 30Q10 is 23 cfs. The 30Q10 and dilution factor calculations are presented below.

Given the dilution factor of 21 during 30Q10 conditions, no reasonable potential for an exceedance of water quality standards exists (see calculations below). The draft permit carries forward the monitoring requirements of once per week from June 1- September 30 and twice per month from October 1 – May 31.

Summer (April 1st – October 31st) 30Q10 Calculations

Lowell, MA USGS gage (01099500), 30Q10 for 4/1/1993 – 3/31/2012 (20 years): **41.8 cfs** (drainage area = 400 mi^2)

Maynard, MA USGS gage (01097000), 30Q10 for 4/1/1993 – 3/31/2012 (20 years): **16.4 cfs** (drainage area = 114 mi^2)

Flow factor calculation for main stretch of river between Maynard and Lowell gages:

400 square miles -114 square miles = 286 sq. mi. [(Lowell gage DA) - (Maynard gage DA) = (DA between Maynard and Lowell)]

Low flow attributable to this stretch of river:

41.8 cfs -16.4 cfs -10 cfs* + 9.1 cfs** = 24.5 cfs

Flow factor for this stretch of river:

24.5 cfs / 286 square miles = **0.086 cfs/sq. mile**

Estimated 30Q10 flow at Concord WWTF: (drainage area at Concord WWTF = 345 mi^2)

16.4 cfs + 2.05 cfs *** + (345 mi^2 - 114 mi^2) 0.086 = **38.3 cfs**

*This is the sum of the average effluent flow from the four WWTPs between the Maynard gage and the Lowell gage for the period of June to Sept of 2010-2012, reflecting the low flow season over that period.

- Maynard WWTP: 1.7 cfs
- MCI Concord WPCF: 0.35 cfs
- Concord WWTF: 1.7 cfs

- Billerica WWTF: 6.2 cfs

**Since the Town of Billerica has a water withdrawal from the Concord River, the average daily withdrawal for the period of June to September for 2010 of 5.84 MGD (9.1 cfs) has been added to the flow factor.

***This is the sum of the average effluent flow from the two WWTPs below the Maynard gage and upstream of the Concord WWTF.

Design Flow Dilution:

Design Flow = 1.2 MGD x 1.55[(c)] cfs/MGD = 1.9 cfs

$$\frac{\text{Design flow + 30Q10 flow}}{\text{Design flow}} = \frac{\text{1.9 cfs + 38.3 cfs}}{\text{1.9 cfs}} = \mathbf{21} = \text{Dilution Factor}$$

Reasonable Potential Analysis for Summer Ammonia Discharges

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

Q_d = effluent flow, i.e. facility design flow	=	1.2 MGD
C_d = effluent pollutant concentration	=	2.47 mg/l (projected highest data point)
Q_s = 30Q10 flow of receiving water	=	38.3 cfs = 24.7 MGD
C_s = upstream concentration	=	0 mg/l
Q_r = receiving water flow = $Q_s + Q_d$	=	1.2 MGD + 24.7 MGD = 25.9 MGD
C_r = receiving water concentration	=	?

$$C_r = \frac{(1.2 \text{ MGD} \times 2.47 \text{ mg/l}) + (24.7 \text{ MGD} \times 0 \text{ mg/l})}{25.9 \text{ MGD}}$$

C_r = 0.11 mg/l < 3.62 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.

found in surface waters. Copper is a micronutrient at low concentrations and is essential to virtually all plants and animals. At higher concentrations copper can become toxic to aquatic life.

An examination of Concord WWTP's whole effluent toxicity (WET) testing data shows effluent copper concentrations ranging from non-detect to 16 µg/l (see Fact Sheet Appendix A).

The *National Recommended Water Quality Criteria*: *2002* (US EPA 2002 [EPA-822-R-02-047]) includes copper criteria for the protection of aquatic life. These criteria are hardness-based. The calculations below estimate hardness in the receiving water downstream of the facility, which is then used to establish the applicable copper criteria. The hardness data used in the calculations are from Concord WWTP's Whole Effluent Toxicity (WET) test reports from March 2008 through December 2010. The hardness values used in this calculation are the median hardness values measured in the treatment plant discharge and the upstream receiving water during this period. Hardness data used to calculate the criteria are included in Fact Sheet Appendix F.

Hardness Analysis

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	86 mg/l
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	55 mg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	18 MGD

Therefore,

$$C_r = \frac{(1.2\ \text{MGD} \times 87\ \text{mg/l}) + (16.8\ \text{MGD} \times 50\ \text{mg/l})}{18\ \text{MGD}}$$

$$= 57\ \text{mg/l}$$

1. Acute Criteria (Total Recoverable) = $\exp\{m_a [\ln(h)] + b_a\}$ = **8.24 µg/l**

Where:

m_a = Pollutant-specific coefficient = 0.9422
b_a = Pollutant-specific coefficient = -1.700
ln = Natural logarithm
h = hardness of the receiving water = 57 mg/l

---

2. Chronic Criteria (Total Recoverable) = $\exp\{m_c [\ln(h)] + b_c\}$ = **5.77 µg/l**

Where:

m_c = Pollutant-specific coefficient = 0.8545

b_c = Pollutant-specific coefficient = -1.702
ln = Natural logarithm
h = hardness of the receiving water = 57 mg/l

EPA used information from the quarterly WET tests to perform a Reasonable Potential Analysis to determine the potential for discharges of copper from the Concord WWTP to cause or contribute to an excursion above water quality criteria. First, EPA projected the maximum effluent concentration as 46.40 µg/l by calculating the 99th percentile measurement the effluent data from March 2008 through December 2010. EPA then calculated the 95th percentile concentration, 27.82 µg/l, to characterize the maximum monthly average concentration (see Fact Sheet Appendix F).

Background conditions in the Concord River were determined from the median of the WET chemistry dilution water samples from March 2008 through December 2010. The projected pollutant levels were then inserted into a steady-state mixing equation to determine if the discharge could cause or contribute to an excursion from water quality criteria under critical conditions.

As shown in the box below, the projected maximum copper effluent concentration of 46.40 µg/l results in a downstream receiving water concentration of 5.89 µg/l, below the acute criteria of 8.24 µg/l. A concentration of 27.82 µg/l, the 95th percentile concentration, results in a receiving water concentration of 4.6 µg/l, below the chronic criterion of 5.77 µg/l. Therefore, there is no reasonable potential for the discharge to cause or contribute to an excursion of either the acute or chronic water quality standard for copper.

Reasonable Potential Analysis for Copper – Acute

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	46.40 µg/l
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	3 µg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	18 MGD

Therefore,

$$C_r = \frac{(1.2 \text{ MGD} \times 46.40 \text{ µg/l}) + (16.8 \text{ MGD} \times 3 \text{ µg/l})}{18 \text{ MGD}}$$

$$= \mathbf{5.89} < 8.24 \text{ µg/l (acute criterion)}$$

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an excursion from the acute water quality criterion for copper.

Reasonable Potential Analysis for Copper – Chronic

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	27.82 µg/l
Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	3 µg/l
Q_r	=	Streamflow below outfall (effluent + upstream)	=	18 MGD

Therefore,

$$C_r = \frac{(1.2 \text{ MGD} \times 27.82 \text{ µg/l}) + (16.8 \text{ MGD} \times 3 \text{ µg/l})}{18 \text{ MGD}}$$

= **4.6 µg/l** < 5.77 µg/l (chronic criterion)

Therefore, there is **no reasonable potential** for the discharge to cause or contribute to an excursion from the chronic water quality criterion for copper.

Because there is no reasonable potential for an excursion from water quality standards from copper discharges from Concord WWTP, the draft permit does not contain copper limits. The permittee will continue to monitor for copper as part of the quarterly whole effluent toxicity testing.

Nickel and Zinc

The facility's effluent concentrations (from Attachment B) 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 Recommended Water Quality Criteria (see table below). The downstream hardness was calculated to be 57 mg/l as CaCO3, using a mass balance equation with the design flow, receiving water 7Q10, an upstream median hardness of 55 mg/l as CaCO3 and an effluent median hardness of 86 mg/l as CaCO3 (see Copper discussion, above). The following table presents the factors used to determine the acute and chronic total recoverable criteria for each metal:

Metal	Parameters				Total Recoverable Criteria	
	ma	ba	mc	bc	Acute Criteria (CMC) (ug/L)	Chronic Criteria (CCC) (ug/L)
Nickel	0.846	2.255	0.846	0.0584	287.28	31.94
Zinc	0.8473	0.884	0.8473	0.884	73.31	73.31

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.

$$Q_d C_d + Q_S C_S = Q_r C_r$$

rewritten as:

$$C_r = \frac{Q_d C_d + Q_S C_S}{Q_r}$$

where:

Qd = effluent flow (design flow = 1.2 mgd = 1.9 cfs)
Cd = effluent metals concentration in µg/L (95th percentile)
QS = stream flow upstream (7Q10 upstream = 26.1 cfs)
CS = background in-stream metals concentration in µg/L (median)
Qr = resultant in-stream flow, after discharge (QS + Qd = 35.9 cfs)
Cr = resultant in-stream concentration in µg/L

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 nickel and zinc.

Metal	Qd	Cd[1] (95th Percentile)	Qs	Cs[2] (Median)	Qr = Qs + Qd	Cr = (QdCd+QsCs) /Q_R	Criteria		Reasonable Potential
	cfs	µg/L	cfs	µg/L	cfs	µg/L	Acute (µg/L)	Chronic (µg/L)	Cr > Criteria
Nickel	1.9	7.7	34	2.4	35.9	2.68	287.28	31.94	N
Zinc		52.68		12.4		14.5	73.31	73.31	N

[1] Values calculated using 12 quarterly toxicity measurements from the 2008-2010 WET tests.
[2] Median upstream data taken from Whole Effluent Toxicity (WET) testing on the Concord River just upstream of the Concord WWTP.

Di(2-ethylhexyl) Phthalate

Di(2-ethylhexyl) phthalate (also known as DEHP) is used in the production of polyvinyl chloride (PVC). It is commonly detected in the environment due to the widespread use of plastic products, though it is only slightly soluble in water and is broken down quickly in the presence of oxygen.

DEHP was detected in pollutant scans of Concord WWTP effluent conducted for the NPDES reissuance application.

Table 1. DEHP Levels in Concord WWTP Effluent

Date	Concentration
4/19/2010	<10 µg/l *
6/21/2010	11 µg/l
8/22/2010	19 µg/l
5/31/2011	6.6 µg/l

* not detected in laboratory analysis

The human health criteria for DEHP are 1.2 µg/L for consumption of water and organism, and 2.2 µg/L for organism only. The water and organism criterion applies when the water body is used for drinking water and animals from the water body are consumed. The organism-only criterion applies when animals from the water body are consumed. The drinking water MCL (Maximum Contaminant Level) for DEHP is 6 µg/L. The reason for the apparent discrepancy in these numbers is that cost and laboratory detection limits are considered in the determination of MCLs, while human health criteria do not account for either.

As of 2010 (the most recent report available online), the Town of Billerica, which uses the Concord River as a drinking water source, did not detect DEHP in its drinking water. Because the Concord River is a drinking water source for towns downstream, the water and organism criterion was used to determine whether an effluent limit would be needed under the MA SWQS and the Clean Water Act.

To determine whether an effluent limit is necessary, EPA conducted a Reasonable Potential Analysis to assess the likelihood that the effluent caused or contributed to an exceedance of water quality standards under harmonic mean flow. Critical conditions are considered to be 7Q10 streamflow with the facility operating at design capacity. EPA could not project the 99% or 95% percentile concentration, because at least ten samples are necessary to confirm that the data are lognormally distributed. Therefore, EPA used the highest observed effluent concentration. Finally, because DEHP breaks down quickly in the presence of oxygen, EPA assumes that the upstream concentration of DEHP is zero.

Because human health criteria apply over a 70-year period, the MA SWQS at say that, "[f]or rivers and streams and waters whose flows are regulated by dams or similar structures, human health based criteria may be applied at the harmonic mean flow." [314 CMR 4.03(3)(d)] The harmonic mean flow is defined at 314 CMR 4.02 as "[a] longterm flow value calculated by dividing the number of daily flows analyzed by the sum of the reciprocals of those daily flows." The harmonic mean flow at the Assabet River in Maynard gage (as calculated by DFlow 3.1b) is 82 cfs, and 271 cfs in Lowell. Because both of these flows are approximately 7 times the 7Q10 flow, it is doubtful that there is reasonable potential to exceed the human health criterion at harmonic mean flow.

Because we assume there is no DEHP upstream of the Concord WWTF, one can calculate what the dilution factor would need to be for there to be reasonable potential for DEHP.

Since

$$Q_sC_s + Q_dC_d = Q_rC_r$$

Where

C_r	=	Concentration below outfall		
Q_d	=	Discharge flow	=	1.2 MGD
C_d	=	Discharge concentration	=	19 µg/l

Q_s	=	Upstream flow	=	16.8 MGD
C_s	=	Upstream concentration	=	0 µg/l
Q_r	=	Streamflow below outfall	=	18 MGD (effluent + upstream)

Since $C_s = 0$, $Q_sC_s = 0$.

Then,

$$Q_dC_d = Q_rC_r$$

Because the dilution factor = $(Q_s + Q_d)/Q_d$ and $Q_s + Q_d = Q_r$,

the dilution factor = Q_r/Q_d

So, $C_d = Q_rC_r/Q_d = DF \times C_r$

$$C_d = DF \times C_r$$

And $DF = C_d/C_r$

Thus, when the upstream concentration is zero, the dilution factor must be lower than the ratio between the highest effluent concentration and the water quality criterion for there to be reasonable potential.

In this case,

C_d = 19 µg/L (highest effluent concentration)
C_r = 1.2 µg/L (water quality criterion)

C_d/C_r = 19 µg/L /1.2 µg/L = 15.8

Therefore, the harmonic mean flow dilution factor would need to be 15.8 or less for there to be reasonable potential for the Concord WWTF discharge to cause an exceedance of the human health water quality criterion for DEHP. Because the harmonic mean flows of both the Maynard and Lowell gages are at least 7 times that of the 7Q10 for each gage, reasonable potential does not exist.

Because there is not reasonable potential at this time for the effluent to cause or contribute to an exceedance of the human health criteria for DEHP, the draft permit does not include a limit for this pollutant. However, the permittee is required to monitor for and report DEHP concentrations in the effluent. Monitoring frequency will be once per calendar quarter. Because the detection level of DEHP can vary widely, if DEHP is not detected in the effluent, Concord WWTP must report the detection level of the analysis

with the DMR. This requirement will help EPA determine if water quality standards are being met and assist in future permit limit development, if needed.

Outfall 001 – Whole Effluent Toxicity

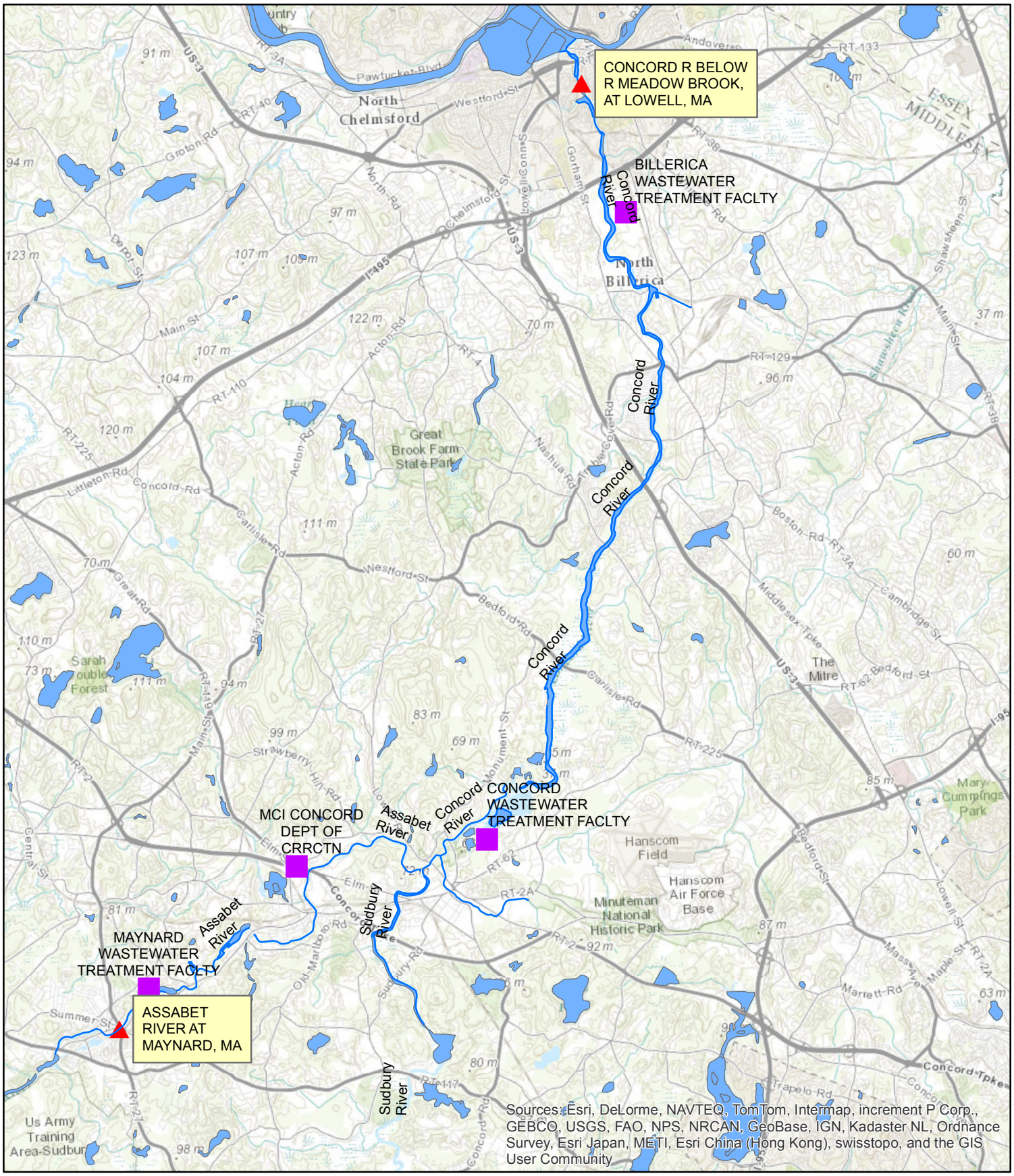
Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The MA SWQS require that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria: All surface waters 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. Pursuant to EPA Region 1 and MassDEP policy, discharges having a dilution ratio between 10:1 and 20:1 require an acute toxicity limit of LC50 >100% and chronic toxicity testing four times per year. (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 current permit requires acute and chronic toxicity tests to be performed four times each year; in March, June, September, and December. The current permit also requires that the LC50 concentration exceed 100% effluent (i.e. 100% of effluent not cause mortality in more than 50% of test organisms), and that the Chronic C-NOEC (concentration of effluent that produces significant chronic effects in the test organism) be reported. From March 2008 through December 2010, there was one violation of the acute toxicity limit in June 2008, when the LC50 was 62% effluent.

The final permit reduces the frequency of whole effluent toxicity tests from quarterly to twice yearly. The permittee is required to conduct chronic and acute toxicity tests using the species *Ceriodaphnia dubia*, only. The acute toxicity endpoint, expressed as LC50, must equal or exceed 100% effluent. The reporting requirement for chronic toxicity is carried forward into the final permit. The tests must be performed in accordance with the test procedures and protocols specified in **Permit Attachment A**. The tests will be conducted twice per year, during the following months: March and September.

The final permit also requires reporting of certain metals in the 100% effluent sample. These are parameters that the permittee already measures and reports as part of the WET test. The requirement to report the parameters on the DMR will add these data to the compliance database and facilitate reasonable potential analyses for future permits.



Legend

Wastewater Treatment Facilities

USGS Streamgages

STATION_NM

ASSABET RIVER AT MAYNARD, MA

CONCORD R BELOW R MEADOW BROOK, AT LOWELL, MA

N

0 1 2 4 Miles

Figure 1
Concord WWTF
MA0100668 Response to Comments
7Q10 Map

EPA