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),

River Terrace Healthcare

is authorized to discharge from the facility located at

1675 Main Street
Lancaster, MA 01523

to receiving water named

North Nashua River – MA81-04
Nashua River Watershed

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

This permit will become effective upon the date of signature.

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

This permit supersedes the permit issued on May 1, 2008

This permit consists of **Part I (**14 pages including effluent limitations and monitoring requirements); **Attachment A** (USEPA Region 1 Freshwater Acute Toxicity Test Procedure and Protocol, February 2011, 8 pages); and **Part II** (25 pages including NPDES Part II Standard Conditions).

Signed this 17th day of June, 2015

/S/SIGNATURE ON FILE

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

/S/SIGNATURE ON FILE_____

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 (which travels via stormdrain)** to the North Nashua River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTIC	**EFFLUENT LIMITS**					**MONITORING REQUIREMENTS [3]**	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
EFFLUENT FLOW[2]	*********	*********	7,500 gpd	*********	Report gpd	CONTINUOUS	RECORDER
BOD_5 [4]	1.9 lb/day	2.8lb/day	30 mg/l	45 mg/l	Report mg/l	1/WEEK	24-HOUR COMPOSITE[5]
TSS [4]	1.9 lb/day	2.8 lb/day	30 mg/l	45 mg/l	Report mg/l	1/WEEK	24-HOUR COMPOSITE[5]
	See PERMIT PARAGRAPH **I.A.1.e** For 85% BOD_5 & TSS Removal Requirement						
pH RANGE[1]	6.5 - 8.3 S.U. (SEE PERMIT PARAGRAPH I.A.1.b.)					1/WEEK	GRAB
ESCHERICHIA COLI [1,6] *(year round)*	*********	**********	126 cfu/100 ml	*********	409 cfu/100 ml	1/WEEK	GRAB
TOTAL PHOSPHORUS[11,12] *(May 1 – October 31)*	*********	**********	1.0 mg/l	*********	Report mg/l	1/MONTH	24-HOUR COMPOSITE[5]
	See FOOTNOTE 12 for **TP monitoring requirement** of ambient/river water from North Nashua River						

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

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS					MONITORING REQUIREMENTS [3]	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
WHOLE EFFLUENT TOXICITY [7, 8, 9]	Acute $LC_{50} \geq 50\%$					1/YEAR	24-HOUR COMPOSITE[5]
Hardness[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Residual Chlorine (TRC)	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Ammonia Nitrogen as N[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Alkalinity	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
pH	*********	*********	*********	*********	Report S.U.	1/YEAR	GRAB
Specific Conductance	*********	*********	*********	*********	Report umhos/cm	1/YEAR	24-HR COMP[5]
Total Solids	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Dissolved Solids	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Organic Carbon	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Recoverable Aluminum[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Recoverable Cadmium[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Recoverable Copper[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Recoverable Lead[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Recoverable Nickel[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
Total Recoverable Zinc[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	24-HR COMP[5]
DILUENT WHOLE EFFLUENT TOXICITY							
Hardness[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Ammonia Nitrogen as N[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Alkalinity	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
pH	*********	*********	*********	*********	Report S.U.	1/YEAR	GRAB
Specific Conductance	*********	*********	*********	*********	Report umhos/cm	1/YEAR	GRAB
Total Organic Carbon	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB

Total Recoverable Aluminum[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Total Recoverable Cadmium[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Total Recoverable Copper[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Total Recoverable Lead[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Total Recoverable Nickel[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB
Total Recoverable Zinc[10]	*********	*********	*********	*********	Report mg/l	1/YEAR	GRAB

Sampling Location: The **effluent** sample (which must be representative of the treated discharge from the facility) shall be taken within the concrete metering building downstream of the Phosphorus Reduction unit and settling tank, but **prior** to both the UV disinfection process and discharge to the municipal stormdrain on Schumacher Rd. The only exception is for the effluent sample for pH and E.coli, which shall be taken within the concrete metering building immediately **after** the UV disinfection process as specified in Footnote #3 (but prior to the discharge to the municipal stormdrain).

Footnotes:

1. Required for State Certification.

2. Report monthly average and the maximum daily flow. The limit is a monthly average limit.

3. Effluent sampling shall be of the discharge and shall be collected at the point specified on page 4. Any change in sampling location must be reviewed and approved in writing by EPA and MassDEP.

   All required effluent samples shall be collected prior to disinfection except pH and *E.coli* which shall be taken after disinfection.

   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. Influent sampling for BOD_5 shall be conducted *before* it enters the septic system (i.e. – at Influent #1, the inlet of the primary tank). Refer to Figure 3 of Fact Sheet for schematic.

5. 24-hour composite samples will consist of at least eight (8) grab samples taken during one consecutive 24 hour period/operating day (e.g. Monday 0700 – Tuesday 0700).

6. The monthly average limit for E. coli is expressed as a geometric mean.

7. The permittee shall conduct acute toxicity tests *one* time per year. The permittee shall test the daphnid, *Ceriodaphnia dubia*. Toxicity test samples shall be collected during the second week of the month of September. The test results shall be submitted by the last day of the month following the completion of the test. The results are due October 30th. The tests must be performed in accordance with test procedures and protocols specified in **Attachment A (Acute Toxicity Test Procedures and Protocol)** of this permit.

Test Dates Same week of each month (i.e. 1st, 2nd, etc.)	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**
September	October 30th	*Ceriodaphnia dubia* (daphnid) See Attachment A	≥ 50%

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

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

10. 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 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.

11. The permittee shall also report the daily chemical dose rate for any chemicals used as part of the phosphorus precipitation system (Wallax unit). This information should be submitted as an attachment to the DMR on a monthly basis.

12. In addition to monitoring and reporting the Total Phosphorus (TP) concentration of the effluent, the permittee will also be required to monitor and report the TP concentration (in mg/l) of *ambient/river water (from the North Nashua River)* at a point immediately *upstream* of the permitted discharge's zone of influence at a safe and reasonably accessible location. Sampling shall be done at a consistent location on a monthly basis during the May 1 – October 31 timeframe. This grab sample shall be taken on the same day as the effluent is sampled.

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 be in the range of 6.5 through 8.3 standard units. There shall be no change from natural background conditions that would impair any designated uses.

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

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

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

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

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

2. All Wastewater Treatment Plants (WWTP) 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:

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

      (2) 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:

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

4. Toxics Control

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

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

5. Numerical Effluent Limitations for Toxicants

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

6. Appropriate Communication with Town of Lancaster

The permittee shall notify the appropriate official from the Town of Lancaster of any significant changes in the quantity or quality of the effluent discharge, which could impact the town's small municipal separate storm sewer system (MS4).

B. UNAUTHORIZED DISCHARGES

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

Notification of SSOs to MassDEP shall be made on its SSO Reporting Form (which includes DEP 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.

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.

3. Infiltration/Inflow Control

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.

4. Annual Reporting Requirement

The permittee shall submit a summary report of activities implemented during the previous calendar year, and that relate to the Operations and Maintenance of the system, to EPA and MassDEP annually by March 31. The summary report shall, at a minimum, include:

a. A description of the staffing levels maintained during the year;
b. A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year;
c. Expenditures for any collection system maintenance activities and corrective actions taken during the previous year;
d. A map with areas identified for investigation/action in the coming year;
e. If treatment plant flow has reached 80% of its design flow based on the annual average flow during the reporting year, or there have been capacity related overflows, submit a calculation of the maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year; and
f. A summary of unauthorized discharges during the past year and their causes and a report of any corrective actions taken as a result of the unauthorized discharges reported pursuant to the Unauthorized Discharges section of this permit.

5. Alternate Power Source

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

D. SLUDGE CONDITIONS

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

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

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

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

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

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

   - General requirements
   - Pollutant limitations
   - Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
   - Management practices
   - Record keeping
   - Monitoring
   - Reporting

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

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

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

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

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

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

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

   a. Name and address of contractor(s) responsible for sludge preparation, use or disposal
   b. Quantity of sludge (in dry metric tons) from the WWTP 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

The monitoring program in the permit specifies sampling and analysis, which will provide continuous information on compliance and the reliability and effectiveness of the installed pollution abatement equipment. The approved analytical procedures found in 40 CFR Part 136 are required unless other procedures are explicitly required in the permit. The Permittee is obligated to monitor and report sampling results to EPA and the MassDEP within the time specified within the permit.

Unless otherwise specified in this permit, the permittee shall submit reports, requests, and information and provide notices in the manner described in this section.

1. Submittal of DMRs Using NetDMR

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

2. Submittal of Reports as NetDMR Attachments

   Unless otherwise specified in this permit, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies. Permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. (See Part I.E.5. for more information on state reporting.) Because the due dates for reports described in this permit may not coincide with the due date for submitting DMRs (which is no later than the 15th day of the month), a report submitted electronically as a NetDMR attachment shall be considered timely if it is electronically submitted to EPA using NetDMR with the next DMR due following the particular report due date specified in this permit.

3. Submittal of Requests and Reports to EPA/OEP

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

   A. Transfer of Permit notice
   B. Request for changes in sampling location
   C. Request for reduction in testing frequency
   D. Report on unacceptable dilution water / request for alternative dilution water for WET testing

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

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

4. Submittal of Reports in Hard Copy Form

   The following notifications and reports shall be submitted as hard copy with a cover letter

describing the submission. These reports shall be signed and dated originals submitted to EPA.

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

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

U.S. Environmental Protection Agency
Office or Environmental Stewardship (OES)
Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

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

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

5. State Reporting

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

MassDEP – Central Region
Bureau of Water Resources
8 New Bond Street
Worcester, MA 01606

Copies of toxicity tests only shall be submitted to:

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

6. Verbal Reports and Verbal Notifications

Any verbal reports or verbal notifications, if required in Parts I and/or II of this permit, shall be made to both EPA and to MassDEP. This includes verbal reports and notifications which require reporting within 24 hours. (As examples, see Part II.B.4.c.

(2), Part II.B.5.c. (3), and Part II.D.1.e.) Verbal reports and verbal notifications shall be made to EPA's Office of Environmental Stewardship at:

U.S. Environmental Protection Agency
Office of Environmental Stewardship
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912
617-918-1510

F. STATE PERMIT CONDITIONS

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

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

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

ATTACHMENT A

USEPA REGION 1 FRESHWATER ACUTE TOXICITY TEST PROCEDURE AND PROTOCOL

I. GENERAL REQUIREMENTS

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

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

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

II. METHODS

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

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

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

III. SAMPLE COLLECTION

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

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

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

IV. DILUTION WATER

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

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

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

and

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

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

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

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

V. TEST CONDITIONS

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

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

1.	Test type	Static, non-renewal
2.	Temperature (°C)	20 ± 1°C or 25 ± 1°C
3.	Light quality	Ambient laboratory illumination
4.	Photoperiod	16 hour light, 8 hour dark
5.	Test chamber size	Minimum 30 ml
6.	Test solution volume	Minimum 15 ml
7.	Age of test organisms	1-24 hours (neonates)
8.	No. of daphnids per test chamber	5
9.	No. of replicate test chambers per treatment	4
10.	Total no. daphnids per test concentration	20
11.	Feeding regime	As per manual, lightly feed YCT and Selenastrum to newly released organisms while holding prior to initiating test
12.	Aeration	None
13.	Dilution water[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q^{R} or equivalent

deionized water and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.

14.	Dilution series	≥ 0.5, must bracket the permitted RWC
15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution series.
16.	Effect measured	Mortality-no movement of body or appendages on gentle prodding
17.	Test acceptability	90% or greater survival of test organisms in dilution water control solution
18.	Sampling requirements	For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples must first be used within 36 hours of collection.
19.	Sample volume required	Minimum 1 liter

Footnotes:

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

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

ATTACHMENT A

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

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

Footnotes:

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

VI. CHEMICAL ANALYSIS

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

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

Notes:

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

VII. TOXICITY TEST DATA ANALYSIS

LC50 Median Lethal Concentration (Determined at 48 Hours)

Methods of Estimation:

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

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

No Observed Acute Effect Level (NOAEL)

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

VIII. TOXICITY TEST REPORTING

A report of the results will include the following:

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

NPDES PART II STANDARD CONDITIONS
(January, 2007)

TABLE OF CONTENTS

PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

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

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

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

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

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

2. Permit Actions

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

3. Duty to Provide Information

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

4. Reopener Clause

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

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

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

5. Oil and Hazardous Substance Liability

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

6. Property Rights

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

7. Confidentiality of Information

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

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

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

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

8. Duty to Reapply

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

9. State Authorities

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

10. Other Laws

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

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

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

2. Need to Halt or Reduce Not a Defense

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

3. Duty to Mitigate

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

4. Bypass

a. Definitions

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

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

b. Bypass not exceeding limitations

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

c. Notice

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

d. Prohibition of bypass

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

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

5. Upset

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

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

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

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

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

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

PART II. C. MONITORING REQUIREMENTS

1. Monitoring and Records

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

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

c. Records of monitoring information shall include:

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

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

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

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

2. Inspection and Entry

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

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

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

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

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

PART II. D. REPORTING REQUIREMENTS

1. Reporting Requirements

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

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

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

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

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

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

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

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

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

e. Twenty-four hour reporting.

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

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

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

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

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

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

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

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

2. Signatory Requirement

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

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

3. Availability of Reports.

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

PART II. E. DEFINITIONS AND ABBREVIATIONS

1. Definitions for Individual NPDES Permits including Storm Water Requirements

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

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

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

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

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

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

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

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

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

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

Construction Activities - The following definitions apply to construction activities:

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

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

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

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

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

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

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

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

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

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

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

Discharge of a pollutant means:

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

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

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

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

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

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

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

EPA means the United States "Environmental Protection Agency".

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NPDES means "National Pollutant Discharge Elimination System".

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

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

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

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

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

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

(a) Sewage from vessels; or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Waters of the United States means:

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

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

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

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

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

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

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

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

(f) The territorial sea; and

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Feed crops are crops produced primarily for consumption by animals.

Fiber crops are crops such as flax and cotton.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Range land is open land with indigenous vegetation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. Commonly Used Abbreviations

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

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

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

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

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES PURSUANT TO THE CLEAN WATER ACT (CWA)

NPDES PERMIT NUMBER: **MA0025763**

PUBLIC NOTICE START AND END DATES: April 10, 2015 – May 9, 2015

NAME AND MAILING ADDRESS OF APPLICANT:

River Terrace Healthcare
1675 Main Street
Lancaster, MA 01523

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

River Terrace Healthcare
1675 Main Street
Lancaster, MA 01523

RECEIVING WATER: **North Nashua River (MA81-04)**
USGS Hydrologic Code #01070004
Nashua River Watershed

RECEIVING WATER CLASSIFICATION: **Class B, Warm Water Fishery**

SIC CODE: **8051 (Skilled Nursing Care Facility)**

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1. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has applied to the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) to reissue its NPDES permit to discharge into the designated receiving waters, namely the North Nashua River. The current permit was issued on March 31, 2008, became effective on May 1, 2008 and expired on April 30, 2013. In accordance with the regulations at 40 CFR 122.6, the current permit will be in effect until the permit is re-issued. The draft permit is conditioned to expire five (5) years from its effective date.

The applicant operates an 82-bed private nursing home with an onsite wastewater treatment facility (WWTF). Since 1983, a contract operator has been retained by River Terrace Healthcare to operate the WWTF.

The facility ultimately discharges the treated effluent to the North Nashua River via a storm drain on Schumacher Road in Lancaster, MA. Refer to Figure 1 (attached) for a map of the facility and its discharge location. According to a discussion with the facility operator during the site visit on September 29, 2014, the Town of Lancaster is aware of this discharge into the municipal separate storm sewer system (MS4). Since this treated discharge from River Terrace Healthcare is being authorized under a separate NPDES permit, it is not considered an illicit discharge to Lancaster's small MS4.[1] However a condition has been added to this permit to ensure that the facility communicates with the Town of Lancaster regarding any changes or concerns with its discharge, which could impact the Town's small MS4.

2. Description of Discharge

The current discharge from the wastewater treatment facility consists of treated domestic wastewater. The treatment facility is designed to treat a maximum daily wastewater flow of 11,000 gallons per day (gpd), and an average daily flow of 7,500 gpd. As seen in Figure 2 (attached), the sources of the wastewater include sanitary/building (approximately 50%), laundry (40%), and kitchen (10%) waste.

A summary of the discharge in terms of significant effluent parameters, based on discharge monitoring reports (DMRs) submitted for July 31, 2009 through June 30, 2014, is summarized in Appendix A to this fact sheet. Effluent and available ambient metals data from Whole Effluent Toxicity (WET) testing is found in Appendix B.

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1 Part 2.3.4.1 "Definitions and Prohibitions" of Illicit Discharge Detection and Elimination (IDDE) Program under the draft 2014 MA MS4 General Permit provides the definition of an illicit discharge to a municipal separate storm sewer system. The draft 2014 MA MS4 General Permit is available at the following website: http://www.epa.gov/region1/npdes/stormwater/ma/2014DraftMASmallMS4GeneralPermit.pdf . According to Part 2.3.4.1.1, one exception includes "discharges authorized under a separate NPDES permit that authorize a discharge to the MS4." This exception applies to the treated effluent from River Terrace Healthcare covered under this permit.

3. Receiving Water Description

The North Nashua River, in the vicinity of the discharge, is classified in the Massachusetts Surface Water Quality Standards (MA SWQS) at 314 CMR 4.00 as a Class B, warm water fishery.

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

Section 303(d) of the CWA requires states to identify those waterbodies that are not expected to meet surface water quality standards after the implementation of technology- based controls and, as such, require the development of total maximum daily loads (TMDL).

The River Terrace Healthcare WWTF discharges to segment MA81-04 of the North Nashua River. The segment begins at the Leominster Water Pollution Control Facility in Leominster, MA and continues 10.4 miles downstream to the confluence with the Nashua River in Lancaster, MA. The segment is classified as impaired and requiring the development of a TMDL. The listed impairments in the Massachusetts 2012 Integrated List of Waters[2] (2012 Integrated List) for this segment are: Taste and Odor; and Escherichia coli (*E. coli*).

Since the last permit issuance, MassDEP prepared an updated assessment report, Nashua River Watershed, 2003 Water Quality Assessment Report[3] which was released in 2008 (Table 1). MassDEP water quality assessment reports summarize the current state of waterbodies in a watershed and include the results of water quality sampling, which provide a basis for assessing the status of designated uses as defined in the MA SWQS (310 CMR 4.00) and ultimately support the compilation of the 2012 Integrated List.

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2 Division of Watershed Management, MassDEP, 2012, Massachusetts Year 2012 Integrated List of Waters, Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b) and 303(d) of the Clean Water Act, p. 161.

3 MassDEP, Division of Watershed Management, 2008, Nashua River Watershed, 2003 Water Quality Assessment Report, Report Number 81-AC-4.

Table 1: Summary of Use Assessment for MA81-04 - North Nashua River

Designated Use	Use Assessment	Alert
Aquatic Use	Support	Yes (elevated total phosphorus concentrations and low RBP III metrics)
Fish Consumption	Not Assessed	No
Primary Contact	Impaired	
Secondary Contact	Impaired	
Aesthetics	Impaired	

From MassDEP, 2008, Nashua River Watershed 2003 Water Quality Assessment Report, pp. 59-60.

The impairments of segment MA81-04 are primarily related to *E. coli* levels. Data were collected by MassDEP and the Nashua River Watershed Association. Geometric means ranged from 155 to 339 CFU/100 m, which violates the primary contact standard of 126 CFU/100 ml. MassDEP also made aesthetic field observations between 2001 and 2004 that noted septic or effluent odors at nearly every visit. These odors were determined by MassDEP to impair the aesthetic use, primary use and the secondary use[4].

River segments MA81-05, MA81-06 (including the Pepperell Pond Impoundment) and MA81-07 are located *downstream* of the River Terrace Healthcare discharge and are categorized in the 2012 Integrated List as impaired waters requiring a TMDL.
The impairments are nutrient enrichment, organic enrichment, and low dissolved oxygen. The excess nutrient is phosphorus. In 2007, MassDEP submitted the Draft Nashua River, Massachusetts, Total Maximum Daily Load for the Nutrient Phosphorus[5] for EPA approval. The TMDL recommended control measures that included phosphorus limits in NPDES permits and WWTP operational improvements. EPA recommended that MassDEP address numerous issues before submitting a final TMDL for EPA approval. A final TMDL was submitted in December 2013, but has not yet been approved by EPA[6]. Segment MA81-04 was not listed on the 303(d) for nutrients.

3.1 Available Dilution

Water quality-based limits are established with the use of a calculated available dilution. MA SWQS at 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 seven (7) consecutive days, occurring over a 10-year recurrence interval. The 7Q10 and plant design flow are used to calculate available effluent dilution. The plant flow for the River Terrace Healthcare WWTF is 7,500 gpd (or 0.0116 cfs).

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4 Ibid, p.60.

5 MassDEP, 2007, Draft Nashua River, Massachusetts, Total Maximum Daily Load for the Nutrient Phosphorus, MassDEP DWM TMDL, Report # 81-TMDL-2007-2.

6 MassDEP, 2013, Final Nashua River, Massachusetts, Total Maximum Daily Load for Nutrient Phosphorus, MassDEP DWM TMDL, Report #81-TMDL-4, CN 305.2

The closest United States Geological Survey (USGS) streamflow gaging station to the permitttee is USGS Gage #01094500, North Nashua River near Leominster. The gage is located approximately three miles upstream from the ultimate point of discharge from the facility's WWTF into the North Nashua River. It should be noted that the gage is located downstream of the West Fitchburg, East Fitchburg and Leominster WWTF discharges. (The West Fitchburg WWTF ceased discharging in May 2010 and all flows were diverted to the East Fitchburg WWTF). Together, the East Fitchburg and Leominster plants represent a high percentage of the receiving water low flow under 7Q10 conditions. Therefore these values were taken into account, as described below.

In order to determine the 7Q10 flow just upstream of the River Terrace Healthcare *discharge*, EPA first determined the 7Q10 at the USGS *gage*. EPA then subtracted the upstream dry weather *wastewater flows* from the estimated 7Q10 in order to determine the *non-wastewater* baseflow of the river. Using this value, a flow factor was calculated for the upstream drainage area by dividing the non-wastewater flow by the drainage area at the gage.

The non-wastewater baseflow upstream of River Terrace Healthcare was then estimated by multiplying the flow factor by the drainage area upstream of River Terrace Healthcare. Finally, the 7Q10 flow upstream of the River Terrace Healthcare discharge was calculated by adding the calculated non-wastewater flow and the dry weather discharge flow of both East Fitchburg and Leominster WWTFs. The calculations for the 7Q10 and the treatment plant dilution factor are shown below. The 7Q10 for the permitted discharge is 28.149 cfs while the dilution factor is 2428.

The 7Q10 flow, as calculated using EPA's DFLOW tool, at the Leominster gage is 26.2 cfs, based on records for 1991-2014. As was done in other permits involving the Nashua River (e.g. Leominster Water Pollution Control Facility, NPDES #MA0100617), a recent period of record was used, rather than the entire period of record beginning in 1935, because of the need to use relatively current dry weather treatment plant flows in the calculations. More recent data is more reflective of the current conditions of a watershed, which can be impacted by an increase in the level of impervious cover, a change in water withdrawals or wastewater flows, or climate change. According to the USGS, the drainage area for the gage is 110 square miles. According to the StreamStat tool, the estimated drainage area upstream of the River Terrace Healthcare discharge is 128 square miles.

Calculation for (Non–WWTP Flow) Baseflow at the USGS Gage in Leominster:

= [7Q10 of Gage] – [contributing flows (from upstream WWTFs)]
= 26.2 cfs – 14.29 cfs = **11.91 cfs**

Where: 7Q10 at the USGS Gage 01094500 (1991-2014) = **26.2 cfs**

Contributing Flows from upstream WWTFs (Lowest average dry weather effluent flows from the WWTFs upstream of the USGS gage from June to September, 2010-2014):

Fitchburg East:	5.4 MGD	8.36 cfs
Leominster:	3.83 MGD	5.93 cfs
Total	9.23 MGD	**14.29 cfs**

Calculation for Flow Factor:

Flow Factor (FF) = Baseflow per square mile of gage drainage area:
=11.91 cfs/110 square miles
= **0.108 cfs/sq mi**

Where: Baseflow at USGS Gage in Leominster (calculated above) = 11.91 cfs

Drainage area for gage (according to USGS) = 110 sq. miles

Calculation for 7Q10 at Permitted Discharge (QP):

QP = DAP * FF - ∑intakes + ∑discharges

QP = (128 sq mi * 0.108 cfs/sq mi) – 0 cfs +14.29 cfs
= **28.149 cfs**

Where: Drainage Area upstream of River Terrace Healthcare (DAP) = 128 sq mi (According to Streamstat tool)

Flow Factor (calculated above) = 0.108 cfs/sq mi

∑intakes = 0 cfs

∑discharges = Contributing flows from Leominster and Fitchburg East WWTFs
=14.29 cfs

Calculation for Dilution Factor:

$$\text{Dilution Factor} = \frac{\text{7Q10 + plant design flow}}{\text{plant design flow}}$$
= (28.149 + 0.0116 cfs)/(0.0116 cfs)
= **2427.6**

It should be noted that the dilution factor presented in the 2008 issuance of this permit was inadvertently miscalculated. The 2008 fact sheet reported a dilution factor of 6,734, which was based on the incorrect conversion of the 7Q10 from 32.8 cfs to 50.5 MGD. The correct conversion would have provided a 7Q10 of 21.199 MGD, which would then yield a dilution factor of 1,827 (instead of 6,734.) Although this is a significant difference, it does not affect the proposed permit limitations for this reissuance of the permit which are based on the calculations presented in this factsheet.

4. Limitations and Conditions

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

5. Permit Basis: Statutory and Regulatory Authority

The Clean Water Act (CWA) prohibits the discharge of pollutants to waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit unless such a discharge is otherwise authorized by the CWA. An NPDES permit is the mechanism used to implement technology and water quality-based effluent limitations and other requirements, including monitoring and reporting requirements. This draft NPDES permit was developed in accordance with the various statutory and regulatory requirements established pursuant to the CWA and any applicable State regulations. The regulations governing the EPA NPDES permit program are generally found at 40 CFR Parts 122, 124, 125, and 136.

EPA is required to consider technology and water quality requirements when developing permit effluent limits. Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 402 and 301 (b) of the CWA. For publicly owned treatment works (POTWs), technology based requirements are effluent limitations based on secondary treatment requirements of Section 301(b)(1)(B) of the CWA as defined in 40 CFR 133.102.

EPA has not promulgated effluent guidelines for privately owned treatment facilities treating domestic wastewater. In accordance with Section 401(a) of the CWA and regulations at 40 CFR 125.3 (c), EPA has made a best professional judgment (BPJ) determination to use the secondary treatment requirements for publicly owned treatment works (POTWs) set forth at 40 CFR Part 133 as the appropriate technology-based effluent limits. The treatment technologies applied to this wastewater are the same as those used at POTWs and the wastewater characteristics are also very similar.

EPA regulations require NPDES permits to contain effluent limits more stringent than technology-based limits where more stringent limits are necessary to maintain or achieve federal or state water quality standards.

Under Section 301(b)(1)(c) of the CWA, discharges are subject to effluent limitations based on water quality standards and to the conditions of state certification under Section 401 of the CWA. Receiving stream requirements are established according to numerical and narrative standards adopted under State and/or Federal law for each stream use classification. Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts. The Commonwealth of Massachusetts has a similar narrative criteria in its water quality regulations that prohibits such discharges (see 314 CMR 4.05(5)(e)). The draft permit does not allow for the addition of chemicals in amounts, which would produce a toxic effect to aquatic life. The MA SWQS (314 CMR 4.00) also requires that EPA criteria, established pursuant to Section 304 (a) of the CWA, shall be used unless a site specific criteria is established. The state will limit or prohibit discharges of pollutants to surface waters to assure that surface water

quality standards of the receiving waters are protected and maintained, or attained.

Pursuant to CFR § 122.44 (d), permittees must achieve water quality standards established under Section 303 of the CWA, including state narrative criteria for water quality. Additionally, under 40 CFR § 122.44 (d)(1)(i), "Limitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard." In determining reasonable potential, EPA considers existing controls on point and non-point sources of pollution, variability of the pollutant in the effluent, sensitivity of the species to toxicity and, where appropriate, the dilution of the effluent in the receiving water.

The general conditions of the permit are based on 40 CFR 122.41 and consist primarily of management requirements common to all permits. 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 122.41G), 122.44(i), and 122.48.

5.1 Anti-Backsliding

Effluent limits based on technology, water quality, and state certification requirements must meet anti-backsliding provisions found under section 402 (o) and 303 (d) of the CWA, as described in 40 CFR 122.44 (1). A permit may not be renewed, reissued, or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirements of the CWA. EPA's anti-backsliding provisions restrict the relaxation of permit limits, standards, and conditions. Therefore effluent limits in the reissued permit must be at least as stringent as those of the previous permit. This draft permit does not include any effluent limitations that are less stringent than the previous permit.

5.2 Anti-Degradation

In accordance with regulations found at 40 CFR Section 131.12, MassDEP has developed and adopted a statewide antidegradation policy to maintain and protect existing in-stream water quality. The Massachusetts Antidegradation Policy is found at 314 CMR 4.04. No lowering of water quality is allowed, except in accordance with the antidegradation policy. EPA believes that the antidegradation policy has been met because the permit is being reissued with allowable discharge limits as or more stringent than the current permit with the same parameter coverage.

6. Explanation of the Permit's Effluent Limitations

6.1 Facility Description

The applicant operates an 82-bed private nursing home with an onsite wastewater treatment facility (WWTF). Since 1983, a contract operator has been retained by River Terrace Healthcare to operate the WWTF.

The wastewater treatment system was upgraded in 2001. Upgrades to the facility included the installation of a Bioclere two-stage biological treatment system (Model30/24), one 4,000 gallon

flow equalization tank, one Wallax (Model W-30 or equal) phosphorus precipitation system, one UV disinfection unit (Model Tipton WW-UV-1M2 or equal), and an ultrasonic flow meter. A UV unit replaced a chlorine disinfection system.

Kitchen flows are pretreated via the grease trap before entering a 20,000 gallon septic tank, where it is mixed with laundry and sanitary wastewater from the healthcare facility, as well as sludge and recycled process wastewater from the Bioclere and Wallax units. The discharge from the septic tank is then conveyed to the Bioclere units for biological treatment. The wastewater then flows to a 4,000 gallon equalization tank and is subsequently processed by the Wallax unit, which is a phosphorus precipitation system. From there, the discharge enters the metering building where disinfection by a UV unit occurs. Refer to Figure 2 for a flow diagram of the facility's system.

6.2 Derivation of Effluent Limits under the Federal CWA and/or the Commonwealth of Massachusetts' Surface Water Quality Standards

6.2.1 Effluent Flow

The proposed effluent flow limit is based upon the design flow of the upgraded system. The draft permit retains the average monthly flow limit of 7,500 gpd. Flow is to be measured continuously and the permittee is required to report both the average monthly and maximum daily flow for each month.

A review of DMR data shows that the reported average monthly flows have ranged between 3,834 and 7,232 gpd with an average of 6,040 gpd.

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

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

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

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

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

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

6.2.2. Conventional Pollutants

6.2.2.1 Biological Oxygen Demand (BOD_5)/ Total Suspended Solids (TSS)

As described in Section 5, EPA has made a BPJ determination to use the POTW technology-based limits found at 40 CFR Part 133 in establishing appropriate technology-based limits for this facility. Under Section 301(b)(1)(B) of the CWA, POTWs must have achieved effluent limitations based on secondary treatment by June 1, 1977. The secondary treatment requirements are set forth in 40 CFR Part 133.

The secondary treatment limitations for both Biological Oxygen Demand (BOD_5) and Total Suspended Solids (TSS) are a monthly average concentration of 30 mg/l and a weekly average concentration of 45 mg/l. These effluent limitations for BOD_5 and TSS concentration are the same as those found in the existing permit. The monitoring frequency of once per week also remains the same. Maximum daily BOD_5 and TSS shall be monitored and reported as stated in the draft

permit.

The mass-based limits for both BOD_5 and TSS are based on the 7,500 GPD (or .0075 MGD) design flow.

Calculations of maximum allowable loads for average monthly and average weekly BOD_5 and TSS are based on the following equation:

$$L = C * DF * 8.34$$ where:

L = Maximum allowable load in lbs/day
C = Maximum allowable effluent concentration for reporting period in mg/l.
DF = Annual average design flow of facility (MGD)
8.34 = Factor to convert effluent concentration in mg/l and design flow in MGD to lbs/day.

L = (Concentration limit) [30] X (design flow) [0.0075] X (Constant) [8.34] = **1.9 lb/day**
L = (Concentration limit) [45] X (design flow) [0.0075] X (Constant) [8.34] = **2.8 lb/day**

There was one (1) exceedance of both the average monthly and average weekly limit (both concentration and mass-based limit) of BOD_5 from July 2009 to June 2014. There was also one exceedance of both the average monthly and average weekly limit of TSS during this time period. See Appendix A for BOD_5 and TSS data reported by the permittee on their monthly discharge monitoring reports.

6.2.2.2 Eighty-Five Percent (85%) BOD_5 and TSS Removal Requirement

The provisions of 40 CFR §133.102(a)(3), (4) and (b)(3) requires that the 30-day average percent removal for BOD_5 and TSS be not less than 85%. Based upon BPJ, conditions imposed on similar privately owned treatment works and EPA's definition of secondary treatment [see 40 CFR 133], this requirement was included in the current permit and is maintained in the proposed permit. As discussed below, a condition has been added to the proposed permit (Footnote 4 in Part I of permit) to specify the *location* where the influent must be sampled.

A review of DMR data shows that the BOD_5 and TSS removal percentages average 88% and 87%, respectively. Analysis of the data (Appendix C) also indicates that the facility failed to meet the 85% BOD_5 removal threshold 11 times and the 85% TSS removal level 11 times. This compliance issue was discussed during the September 29, 2014 site visit of the River Terrace Healthcare WWTF. Two potential explanations were discussed. The removal percentages might be low because the wastewater (which consists of 50% building waste, 40% laundry waste and 10% kitchen waste) is highly diluted. Also, the influent for the BOD_5 and TSS had routinely been sampled *after* it left the septic system (i.e. - after some treatment occurred).

Upon request, the facility conducted additional sampling during the month of October 2014 at both the inlet of the primary tank (Influent #1) and the outlet of the primary tank (Influent #2), with the latter being the location historically tested by the facility. Refer to Figure 3 to see a

schematic of these locations. These BOD_5 and TSS values were compared against the effluent, which was tested at the same time. Based on the preliminary data, EPA has added a permit condition that the influent be sampled *before* it enters the septic system (i.e. – at Influent #1, the inlet of the primary tank) because this will provide a more accurate representation of the amount of BOD_5 and TSS present before any treatment commences. Although a discussion about sampling at a manhole before the inlet of the primary tank occurred, that location was not selected because it did not represent 100% of the wastewater volume due to the configuration of the facility's system.

6.2.2.3 pH

The draft permit includes pH limits that are at least as stringent as the requirements sets forth at 40 CFR §133.102(c) and the MA SWQS for Class B waters at 314 CMR 4.05 (4)(b)(3). Class B waters must maintain a pH range of 6.5 through 8.3 standard units (S.U.)with not more than 0.5 S.U. outside of the receiving water background range. The water quality standards also require there be no change from background conditions that would impair any use assigned to this class. The monitoring frequency for this parameter is weekly.

A review of DMR data submitted between July 2009 and June 2014 shows that there have been two (2) months with violations of the minimum pH limit, but no violations of the maximum pH limit. Based on the DMR data, the pH values have ranged from 5.9-7.88 S.U. See Appendix A for recent pH data submitted on the facility's DMRs.

6.2.2.4 Bacteria (*E.coli*)

Revisions to the MA SWQS were approved by EPA in September of 2007. These revisions included a change to the Class B bacteria water quality criteria from fecal coliform to *E. coli*. The current permit acknowledged this change by including a compliance schedule. Under the permit, the fecal coliform limitations and monitoring requirements expired one year from the permit's May 1, 2008 effective date. Since then, the *E.coli* limitations and monitoring requirement have been in effect.

This draft permit maintains the same *E.coli* limitations and monitoring requirement as the current permit. The monthly average limit proposed in the draft permit is 126 colony forming units (cfu) per 100 ml, and is expressed as a monthly geometric mean. The daily maximum limit proposed in the draft permit is 409 cfu/100 ml; this represents the 90% distribution of the geometric mean of 126 cfu/100 ml). The *E. coli* monitoring frequency proposed in the draft permit is once per week and the limits are in effect year-round.

During the September 29, 2014 site visit of the River Terrace Healthcare facility, EPA discovered that the facility has still been testing for fecal coliform instead of *E.coli*. Once informed that this was in violation of the current permit, the facility willingly agreed to begin testing for *E.coli* immediately.

Appendix A summarizes the bacteria data (only fecal coliform data was available) that was submitted on the facility's DMRs from July 2009 through June 2014. The monthly geometric

mean fecal coliform bacteria discharge ranges from 0 to 2044 cfu/100 ml. The maximum daily value reported for fecal coliform bacteria was 9700 cfu/100 ml. A comparison of these values to the fecal coliform limits that were effective for the first year of the current permit indicates four (4) violations of the fecal coliform requirements.

6.2.3. Non-Conventional Pollutants

6.2.3.1 Total Phosphorus (TP)

Phosphorus is an essential nutrient for plant growth but excessive amounts of phosphorus in a water body has the potential to accelerate stream eutrophication. This can be characterized by excessive plant growth, low dissolved oxygen and, large diurnal swings in dissolved oxygen in the water body.

The MA SWQS, 314 CMR 4.00, do not contain numerical criteria for total phosphorus. The narrative criteria for nutrients is found at 314 CMR 4.05(5)(c). It states that "all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00." 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 and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses."

EPA has produced several guidance documents that contain recommended total phosphorus criteria for receiving waters. The *1986 Quality Criteria for Water* ("Gold Book"[7]) recommends in-stream phosphorus concentrations of 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impounds, and 0.025 mg/l within a lake or reservoir.

More recently, EPA has released "Ecoregional Nutrient Criteria," established as part of an effort to reduce problems associated with excess nutrient in water bodies in specific areas of the country. The published criteria represent conditions in waters in each specific ecoregion which are minimally impacted by human activities and thus representative of waters without cultural eutrophication. The River Terrace Healthcare WWTF is within Ecoregion XIV, Eastern Coastal Plain. The recommended total phosphorus criteria for this ecoregion is 24 ug/l (0.024 mg/l) and can be found in *Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV*[8], published in December 2000.

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7 EPA, 1986, 1986 Quality Criteria of Water, EPA 440-5-86-001.
8 EPA, 2000, Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Nutrient Ecoregion XIV, EPA 822-B-00-022.

In developing NPDES permit limits, EPA prefers to use the Gold Book criteria because these are effects-based criteria (i.e. a concentration at which one would expect eutrophication to occur) rather than the Ecoregion criteria, which are reference-based (i.e. a concentration typically found in unimpacted waters). The effects-based approach is taken because it is often more directly associated with an impairment to a designated use (i.e. fishing, swimming), whereas the use of the reference-based criteria could result in a limit more stringent than necessary to achieve water quality standards.

The effects-based Gold Book threshold is a general target applicable in free-flowing streams. As the Gold Book notes, there are natural conditions of a water body that can result in either increased or reduced eutrophication response to phosphorus inputs; in some waters more stringent phosphorus reduction may be needed, while in some others a higher total phosphorus threshold could be assimilated without inducing a eutrophic response. With respect to such factors that can reduce susceptibility, the Gold Book identifies morphometric features (steep banks, great depths and substantial flows), limitation by nutrients other than phosphorus, reduced light penetration where waters are highly laden with natural silts or color, or other naturally occurring phenomena that limit plant growth. EPA is not aware of evidence that any of these factors are reducing eutrophic response in the North Nashua River downstream of the discharge.

In 2007, MassDEP submitted a draft TMDL for phosphorus in the Nashua River. The TMDL was developed to address nutrient-related impairments in the Nashua River because Segments MA81-**05**, MA81-**06** (including Pepperell Pond Impoundment) and MA81-**07** were included on the MassDEP Category 5 list of impaired waters for nutrient enrichment, organic enrichment and low dissolved oxygen. The draft TMDL recommends that discharge limits be established for *major* wastewater treatment facilities (WWTFs) based on model results indicating that point sources have a greater effect than non-point sources during summer low-flow conditions[9]. However, River Terrace Healthcare's WWTF (which is located in Segment MA81-**04** of the North Nashua River) was *not* included in the TMDL because it is not considered a major facility. However, the East Fitchburg and Leominster WWTFs, which are upstream of River Terrace Healthcare, were two of the major WWTFs included in the draft TMDL.

These two POTWs represent a high percentage of the receiving water flow in Segment MA81-04 of the Nashua River (as previously described in Section 3.1). These larger treatment plants (with design flows in MGD) are several orders of magnitude larger than the River Terrace Healthcare facility, which has a design flow of 7,500 gpd and a dilution factor of over 2400.

As a result of stricter total phosphorus limits for these two major WWTFs in the upstream portion of the North Nashua River, progress is starting to be made in reducing TP concentrations in their discharges. After a 2007 Administrative Order (AO) to the City of Leominster, the Leominster Water Pollution Control Facility completed construction of their upgraded facility in October 2011 and has been achieving their TP limit since it went into effect in April 2012. A NPDES permit was issued to the East Fitchburg WWTF on July 22, 2010 that also included more stringent total phosphorus effluent limits during the growing season. That facility has not yet completed an upgrade to meet the limit.

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9 MassDEP, 2007, p.6, Nashua River, MA TMDL for Nutrient Phosphorus, Report #81-TMDL-2007-2.

As further efforts are made by these facilities upstream of the River Terrace Healthcare WWTF, reductions in the TP concentration of the North Nashua River are anticipated. Based on water quality data (n = 44) collected by MassDEP between 2005 - 2012, the average TP concentration of the North Nashua River at station NN12 in Lancaster, MA was calculated to be 0.111 mg/l. This monitoring station is located downstream of the Leominster WWTF and approximately 3 miles upstream of the River Terrace Healthcare site. The data was collected as part of MassDEP's Strategic Monitoring and Assessment for River basin Teams (SMART) monitoring program. However since efforts to decrease TP in the North Nashua River (including the 2011 upgrade to the Leominster WWTF) are so recent and additional progress is expected to continue over time, the ambient TP concentration is expected to decrease. Based on a very limited data set (i.e. the 6 data points from the aforementioned MassDEP SMART monitoring conducted in 2012), the average TP concentration in the North Nashua River was calculated to be 0.082 mg/l. This suggests a decline in the ambient TP concentration in this section of the North Nashua River although a much more robust data set would be necessary before making any definite conclusions.

The current permit for River Terrace Healthcare includes a total phosphorus effluent limitation of 1.0 mg/l for the May 1 – October 31st timeframe. According to the 5 years' worth of DMR data submitted by the permittee, an average TP concentration of 0.96 mgl/ was reported as the total phosphorus monthly average during the May 1 – October 31st periods. The data showed that there were five (5) months of violations of the limit. These violations all occurred during 2010 when a component (the tipping tray) of the Wallax Phosphorus removal unit was broken. The operator of the WWTF had the component repaired and the facility has not reported any additional violations of the TP limit since 2010. (If the DMR data from the 2010 timeframe was excluded from analysis, the resulting TP monthly average would be 0.52 mg/l).) See Appendix A for recent TP data submitted on the facility's DMRs.

EPA evaluated the projected instream concentration under current permit limits for the River Terrace Healthcare WWTF using the mass-balance water quality equation, below:

Mass Balance Water Quality Equation: $Q_dC_d+Q_sC_s=Q_rC_r$

After rearranging the equation to solve for Cr (resultant TP concentration below the facility), the formula becomes:

$$C_r = \frac{Q_dC_d+Q_sC_s}{Q_r}$$

Where:

- Qd = Effluent Flow (Design Flow = 7,500 gpd = 0.0116 cfs)
- Cd = Effluent TP concentration in mg/l (The current permit TP limit of 1.0 mg/l was used to determine whether this limit is still appropriate)
- Qs = 7Q10 of North Nashua River (upstream flow of 28.149 cfs)
- Cs = Upstream TP concentration (0.1 mg/l)

Qr = Stream flow downstream, after discharge (Qr =Qd + Qs = 28.1606 cfs)

Assuming that the upstream concentration of the North Nashua River is 0.1 mg/l (meets the "Gold Book" criteria for total phosphorus and is consistent with the current average concentration of 0.082 mg/l) and the effluent limit is 1.0 mg/l (the current TP permit limit for River Terrace Healthcare WWTF), the TP concentration downstream from the facility would be 0.10037 mg/l. This indicates a very small impact (0.000371 mg/l or 0.371 ug/l) on the TP concentration of the North Nashua River, especially considering the larger TP loadings from the major POTWs in the Nashua River. To further illustrate this point, EPA calculated the assumed TP mass loading (in lbs/day) for the North Nashua River immediately upstream of the River Terrace Healthcare facility (15.165 lbs/day) and compared it to the projected TP mass loading contributed by the facility's discharge (0.063 lbs/day). (The calculations are included in Appendix D). This further suggests that that the TP loading contributed by River Terrace Healthcare's wastewater treatment facility is very small (approximately 0.41%, or less than one half of a percent) of the upstream load of total phosphorus in this segment of the North Nashua River.

As previously mentioned, more stringent TP limits for major WWTFs along the North Nashua River are relatively new and they are continuing to make progress on achieving their limits. As these on-going efforts *upstream* of River Terrace Healthcare's WWTF are made to meet the necessary TP criteria (i.e. achieve the 0.1 "Gold Book" criteria), it is EPA's belief that River Terrace Healthcare's effluent discharge will be consistent in maintaining the standard, as well. Therefore this draft permit will maintain the current average monthly total phosphorus limit of 1.0 mg/l during the growing season of May 1 – October 31. It also includes the same reporting requirements for the maximum daily total phosphorus concentration during the same timeframe. However, a new condition has been added to the draft permit. The WWTF will also be required to monitor and report the TP concentration of the North Nashua River (ambient water) immediately upstream of their facility on a monthly basis during the May 1 – October 31 timeframe. (EPA believes this requirement is necessary to further understand the facility's impact on the TP concentration in the river.) If this or future water quality information shows that more stringent limits are necessary to achieve water quality standards, the permit may be re-opened and a more stringent limit proposed in a permit modification.

6.2.3.2 Metals

Certain metals in water can be toxic to aquatic life. There is a need to limit toxic metal concentrations in the effluent where aquatic life may be impacted. Although the current permit does not include effluent limits for any metals, reasonable potential was conducted for aluminum, copper, lead, nickel, and zinc to determine if any new limits were necessary. Specifically, an evaluation of the concentration of these metals in the facility's effluent (from Whole Effluent Toxicity reports submitted between October 2008 and October 2012) was done to determine reasonable potential for effluent discharges to cause exceedances of the respective water quality criteria. (Refer to Appendix B for the available WET testing metals data). Reasonable potential was not performed for cadmium or chromium because the majority of the limited data points (n=4 and n=5, respectively) were non-detect values.

Metals may be present in both dissolved and particulate forms in the water column. Extensive studies suggest that it is the dissolved fraction that is biologically available, and therefore, presents the greatest risk of toxicity to aquatic life inhabiting the water column. (Water Quality Standards Handbook: Second Edition, Chapter 3.6 and Appendix J, EPA 1994 [EPA 823-B-94-05a]. Also see: http://www.epa.gov/waterscience/standards/handbook/chapter03.html#section6). As a result, water quality criteria are established in terms of dissolved metals. However, regulations at 40 CFR 122.45(c) require, with limited exceptions, that metals limits in NPDES permits be expressed as total recoverable metals. This accounts for the potential for a transition from the particulate to dissolved form as the effluent mixes with the receiving water (*The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (USEPA 1996 [EPA-823-B96-007]).

Table 2 (below) presents the acute and chronic total recoverable criteria for the metals, as well as the relevant equations used to calculate the criteria. For metals with hardness-based water quality criteria, such as lead, nickel, and zinc, the criteria are determined using the equations in EPA's *National Recommended Water Quality Criteria: 2002*[10], using the appropriate factors for the individual metals. Because the reasonable potential analysis is performed using dilution under 7Q10 conditions, a projected hardness under 7Q10 conditions is calculated using the same mass balance equation and the median hardness of the effluent (77.6 mg/l) and upstream receiving water (57.9 mg/l), for a calculated hardness of 57.9 mg/l.

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

Where:

Qd = Effluent Flow (Design Flow = 7,500 gpd = 0.0116 cfs)
Cd = Effluent hardness (Median hardness = 77.6 mg/l)
Qs = 7Q10 of North Nashua River (upstream flow of 28.149 cfs)
Cs = Upstream hardness (57.9 mg/l)
Qr = Stream flow downstream, after discharge (Qr =Qd + Qs = 28.1606 cfs)

$$C_r = \frac{(0.0116 \text{ cfs})(77.6) + (28.179 \text{ cfs})(57.9 \text{ mg/l})}{28.1606 \text{ cfs}}$$

$$= 57.9$$

Although the criteria for copper is also hardness dependent, the 2007 revision to the MA SWQS includes a *site specific criteria* for copper in the Nashua River in Table 28 (314 CMR 4.05(5)(e)), which was approved by EPA. These criteria have been developed in instances where national criteria are invalid due to site-specific physical, chemical or biological considerations, and do not exceed the safe exposure levels determined by toxicity testing. MassDEP has adopted an acute site specific criterion of 25.7 ug/l and a chronic criterion of 18.1 ug/l for *dissolved* copper in the North Branch of the Nashua River. Each criterion (in *dissolved* form) was divided by the 0.960 conversion factor for copper to obtain the criterion in *total recoverable* form. As highlighted in

10 EPA, 2002, National Recommended Water Quality Criteria; http://www.epa.gov/waterscience/criteria/wqctable/

Table 2, the acute and chronic total recoverable criteria for copper are 26.77 ug/l and 18.85 ug/l, respectively. The downstream hardness did not need to be calculated for aluminum because its criteria is not hardness dependent.

Table 2: Acute and Chronic Total Recoverable Criteria for Select Metals

Metal	Parameters				Total Recoverable Criteria	
	m_a	b_a	m_c	b_c	Acute Criteria (CMC)[1] (ug/L)	Chronic Criteria (CCC)[2] (ug/L)
Aluminum	—	—	—	—	750	87
Copper	—	—	—	—	26.77 [3]	18.85 [3]
Lead	1.273	-1.46	1.273	-4.705	40.72	1.59
Nickel	0.846	2.255	0.846	0.0584	295.5	32.85
Zinc	0.8473	0.884	0.8473	0.884	75.41	75.41

[1] Acute Criteria (CMC) = $\exp\{m_a * \ln(\text{hardness}) + b_a\}$

[2] Chronic Criteria (CCC) = $\exp\{m_c * \ln(\text{hardness}) + b_c\}$

[3] Site specific criteria for the Nashua River --- See 314 CMR 4.06, Table 28

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 equation was used to project in-stream metal concentrations downstream from the discharge.

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

After rearranging the equation to solve for C_r (resultant pollutant concentration, in ug/l), the formula becomes:

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

Where:

Q_d = Effluent Flow (Design Flow = 7500 gpd = 0.0116 cfs)
C_d = Effluent metals concentration in ug/l (**maximum** reported[11])
Q_s = 7Q10 of North Nashua River (streamflow upstream = 28.149 cfs)
C_s = Median upstream metals concentration in ug/l
Qr = Stream flow downstream, after discharge (Qd + Q_s = 28.1606 cfs)

Reasonable potential is then determined by comparing this resultant in-stream concentration

[11] Note that for sample sizes less than 10, the maximum reported effluent value is used for C_d. For samples sizes of 10 or greater, the 95th percentile of the effluent is calculated and used for C_d in determining reasonable potential.

(Cr) for both acute and chronic conditions with the criteria for each metal. 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 (Cd) using the criterion as the resultant in-stream concentration (Cr). See Table 3 below for the results of this analysis.

Table 3: Results of Mass Balance Equation and Comparison to Water Quality Criteria

Metal	Qd	Cd[1] (max)	Qs	Cs[2] (Median)	Qr = Qs + Qd	Cr = (QdCd+QsCs)/ Qr	Total Recoverable Criterion		Reasonable Potential	Limit = (Qr*Criteria-Qs*Cs)/Qd	
	cfs	ug/l	cfs	ug/l	cfs	ug/l	Acute (ug/l)	Chronic (ug/l)	Cr > Criteria	Acute (ug/l)	Chronic (ug/l)
Aluminum	0.0116	153	28.149	84.5	28.1606	84.5	750	87	No	N/A	N/A
Copper		70		7.5		7.53	26.77	18.85	No	N/A	N/A
Lead		1		2		2	40.72	1.59	Yes[3]	N/A	N/A
Nickel		3		2		2.00	295.50	32.85	No	N/A	N/A
Zinc		50		16.5		16.5	75.41	75.41	No	N/A	N/A

1 Values represent the *maximum* measured concentration (in ug/l) from the 5 annual toxicity measurements from the 2008-2012 WET testing noted above (see Attachment B).

2 *Median* upstream data taken from the available WET testing results on the North Nashua River (ambient water) just upstream of the River Terrace Healthcare WWTF (see Appendix B).

3 Although the downstream concentration (C_r) for lead was determined to be above the chronic criterion, there is no reasonable potential for River Terrace Healthcare's WWTF to cause or contribute to that exceedance because the maximum reported effluent value was below the criterion.

As indicated in the table above, based on the maximum measured effluent concentrations and median upstream concentrations there is no reasonable potential (for either acute or chronic conditions) that the discharge of aluminum, copper, nickel, or zinc will cause or contribute to an exceedance of the applicable water quality criteria. As stated in Footnote 3 of Table 2, although the downstream concentration (C_r = 2 ug/l) for lead was determined to be above the chronic criterion (1.59 ug/l), there is no reasonable potential for River Terrace's WWTF to cause or contribute to that exceedance because the maximum reported effluent value (C_d = 1.0 ug/l) was below the criterion. No limit is necessary because the chronic criterion for lead was exceeded upstream already (C_s = 2.0 ug/l); the effluent (C_d) did not "contribute" to the exceedance because it was less than the criterion.

Because of the small sample size (n=5), EPA performed additional statistical analyses of the effluent metals data to determine whether increased sampling should be included for any metal to ensure a more robust data set for the next permit issuance. Using a

methodology from the *Technical Support Document for Water Quality-based Toxics Control*[12] ("the TSD"), EPA calculated a projected *upper bound* of effluent concentrations based on a statistical analysis of the facility's effluent data from its whole effluent toxicity tests and used this value to estimate a downstream concentration for each metal analyzed. The statistical analysis used on the effluent data accounts for the fact that maximum measured concentration may not correspond to the true upper bound of effluent concentrations, particularly for small samples sizes (n<10) as are available here. This analysis accounts for the uncertainty that arises from small sample sizes by characterizing the maximum measured concentration as a percentile of the underlying distribution at a particular confidence level, then scaling that number upward by a "multiplying factor" in order to project an upper bound (95th percentile) concentration at that confidence level. EPA uses a 95 percent confidence level for this characterization. Refer to Appendix E for the details of this statistical derivation and Appendix F for the Metals Reasonable Potential Analysis (using this additional statistical approach). The resulting effluent concentration for each metal was put into the same mass balance described above and compared to the respective criteria. This is summarized in the Table 4 below.

Table 4: Results of Mass Balance Equation and Comparison to Water Quality Criteria Using Method in Appendix D

Metal	Qd	Cd[1] (Upper Bound)	Qs	Cs[2] (Median)	Qr = Qs + Qd	Cr = (QdCd+QsCs)/Qr	Total Recoverable Criterion		Criteria Exceeeded?
	cfs	ug/l	cfs	ug/l	cfs	ug/l	Acute (ug/l)	Chronic (ug/l)	Cr > Criteria
Aluminum	0.0116	351.9	28.149	84.5	28.1606	84.6	750	87	N
Copper		161		7.5		7.56	26.77	18.85	N
Lead		2.3		2		2.00	40.72	1.59	Yes
Nickel		6.9		2		2.00	295.50	32.85	No
Zinc		115		16.5		16.5	75.41	75.41	No

[1] Values calculated using procedures in Appendix D, using the five annual toxicity measurements from the 2008 – 2012 WET testing noted above.
[2] Median upstream data taken from WET testing results on North Nashua River (ambient water) just upstream of the River Terrace Healthcare WWTF

As shown in Table 4, the *upper bound* concentration of the effluent data (as opposed to the *maximum* measured concentration used in Table 3) does not result in an exceedance of water quality criteria in the receiving water for aluminum, copper, nickel, or zinc. Based on this statistical analysis, EPA can say with certainty (95 percent confidence) that the data excludes the potential for an exceedance

12 EPA, March 1991, (Appendix E), Technical Support Document for Water Quality-based Toxics Control, EPA/505/2-90-001.

of water quality criteria for those metals. Also although the downstream concentration (C_r = 2 ug/l) for lead was determined to be above the chronic criterion (1.59 ug/l), EPA does not expect there to be reasonable potential for this metal given the high level of dilution (over 2000) for the facility. Also, the limited data points used in this statistical analysis did not include any *current* ambient metals data that would reflect the recent upgrades upstream of the facility (i.e. upgrade by Leominster WWTF). Therefore the current monitoring and reporting for all metals will continue to be required as part of the WET testing requirement of this permit. The facility must collect current ambient data using at least the minimum quantification level shown in Attachment A of the permit. If this future data suggests reasonable potential to cause or contribute to an exceedance of a water quality standard, then metal limits will be included in the next reissuance of the permit.

6.2.3.3 Ammonia-Nitrogen

During the last reissuance of the permit, a public comment regarding potential ammonia concentrations was submitted. The current permit does not have a limit for ammonia-nitrogen, due to the extremely high dilution factor (e.g., over 2000) for the facility. A reasonable potential analysis was performed for ammonia-nitrogen for this reissuance of the permit to confirm that the discharge did not cause or contribute to ammonia toxicity. EPA's analysis indicates that the discharge does not have reasonable potential to cause or contribute to a violation of the water quality criteria for ammonia. Therefore no ammonia limit is present in this draft permit.

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 can also lower dissolved oxygen levels by conversion to nitrate/nitrate, which consumes oxygen. Although ammonia is not a metal, it can be toxic. Therefore the general reasonable potential methodology discussed in Section 6.2.3.2 (Metals), which includes the use of the mass balance equation, was applied to this parameter. Refer to Appendix B which also summarizes the WET testing ammonia data.

The water quality criteria for ammonia are pH and temperature dependent, with the most stringent criteria at higher pH and temperatures. Using the highest pH data from the facility's toxicity tests (7.5 S.U.) and assuming a conservative instream temperature of 26°C (78.8°F), the chronic criteria for fish (early life stages present) is 2.08 mg/l (2080 ug/l) as a 30-day average concentration. (*1999 Update of Ambient Water Quality Criteria for Ammonia*, USEPA December 1999, EPA-822-R-99-014])[13]. Because this is a 30-day average criterion, dilution is appropriately calculated using a 30Q10 receiving water flow (instead of the 7Q10 flow which would be used for the acute criterion). The 30Q10 flow, as calculated using EPA's DFLOW tool, at the Leominster gage (closest USGS gage to facility) was 30.4 cfs. Using a similar methodology as discussed in Section 3.1 to adjust for the Fitchburg East and Leominster WWTF flows, the 30Q10 receiving water flow upstream of the *actual facility* was calculated to be 33.04 cfs. Refer to Appendix G for the supporting calculations for the 30Q10.

As in Section 6.2.3.2, the mass balance equation was rearranged to solve for C_r (resultant pollutant concentration, in ug/l).

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

Where:

Q_d = Effluent Flow (Design Flow = 7500 gpd = 0.0116 cfs)
C_d = Effluent metals concentration in ug/l (maximum reported)
Q_s = 30Q10 of North Nashua River (streamflow upstream =33.04 cfs)
C_s = Median upstream metals concentration in ug/l

13 EPA did issue its final *Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater* in 2013. However, the 2013 recommended ammonia criteria has not yet been adopted by MassDEP. Therefore the criteria from the 1999 document remains effective until more recent criteria are adopted.

Q_r = Stream flow downstream, after discharge (Qd + Q_s = 33.0516 cfs)

Table 5 represents the results of the mass balance equation and comparison to water quality chronic criterion for ammonia. Based on the maximum measured effluent concentration and median upstream concentration, there is no reasonable potential that the discharge of ammonia will cause or contribute to an exceedance of the applicable water quality criterion. The *acute* water quality criterion for ammonia is higher (e.g., 13300 ug/l, assuming pH of 7.5 S.U. and salmonids present) than the *chronic* water quality criterion. Since there is no reasonable potential for the stricter chronic ammonia criterion, there is no reasonable potential for the acute ammonia criterion.

Table 5: Results of Mass Balance Equation and Comparison to Water Quality Chronic Criterion for Ammonia

Parameter	**Qd**	**Cd[1] (max)**	**Qs**	**Cs[2] (Median)**	**Qr = Qs + Qd**	**Cr = (QdCd+QsCs)/Qr**	**Criterion**	**Reasonable Potential**	**Limit = (Qr*Criterion -Qs*Cs)/Qd**
	cfs	**ug/l**	**cfs**	**ug/l**	**cfs**	**ug/l**	**Chronic (ug/l)**	**Cr > Criterion**	**Chronic (ug/l)**
Ammonia	0.0116	12000	33.04	100	33.0516	104.18	2080*	No	N/A

1 Value represent the *maximum* measured concentration (in ug/l) from the 5 annual toxicity measurements from the 2008-2012 WET testing. See Attachment B.
2 *Median* upstream data taken from the available WET testing results on the North Nashua River (ambient water) just upstream of the River Terrace Healthcare WWTF (See Appendix B). For data points that were non-detect, used half of each non-detect value in order to perform median calculation.
* Based on pH of 7.5 and Temp. of 26°C

The permittee tested for ammonia-nitrogen once a year in coordination with their WET testing requirement. Ammonia-nitrogen values for the discharge ranged from 3.49 – 12 mg/l, with an average of 8.64 mg/l. As previously mentioned, the dilution factor for this facility is well over 2,000: 1 As in Section 6.2.3.2, additional statistical analysis (as further explained in Appendix D) was performed because of the small sample size of the ammonia values (n = 5). See Appendix G for additional details of the reasonable potential analysis for ammonia.

Table 6 represents the results of the mass balance equation and comparison to the chronic water quality criterion for ammonia (using the method in Appendix D.) The *upper bound* concentration of the effluent data (as opposed to the *maximum* measured concentration used in Table 5) does not result in an exceedance of the chronic water quality criteria in the receiving water. In other

words, the **C_r** for ammonia did not exceed the applicable criterion. Based on this statistical analysis, EPA can say with certainty (95 percent confidence) that the data excludes the potential for an exceedance of water quality criteria for ammonia. The current monitoring and reporting for ammonia will continue to be required as part of the WET testing. However, no additional monitoring requirement is deemed necessary at this time.

Table 6: Results of Mass Balance Equation and Comparison to Chronic Ammonia Water Quality Criteria

Using Method in Appendix D

Parameter	**Qd**	**Cd[1] (Upper Bound)**	**Qs**	**Cs[2] (Median)**	**Qr = Qs + Qd**	**Cr = (QdCd+QsCs)/Qr**	**Criterion**	**Criterion Exceeded?**
	cfs	**ug/l**	**cfs**	**ug/l**	**cfs**	**ug/l**	**Chronic (ug/l)**	**Cr > Criteria**
Ammonia	0.0116	27600	33.04	100	33.0516	109.65	2080	No

[1] Value calculated using procedures in Appendix D (Upper Bound, 95th percentile), using the five annual toxicity measurements from the 2008-2012 WET testing. See Appendix G.

[2] Median upstream data taken from WET testing results on North Nashua River just upstream of the River Terrace Healthcare WWTF. For data points that were non-detect, used half of each non-detect value in order to perform median calculation.

6.2.4 Whole Effluent Toxicity (WET)

Under Section 301(b)(1) of the CWA, discharges are subject to effluent limitations based on water quality standards. The MA SWQS at 314 CMR 4.05(5)(e), including the following narrative statement and require that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria:

All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife.

EPA Region I has developed a toxicity control policy that requires wastewater treatment facilities to perform toxicity testing for state certification. Based on the potential for toxicity resulting from this discharge, and in accordance with EPA regulation and policy, the draft permit includes acute toxicity limitations and monitoring requirements. (See also Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants, 50 Fed. Reg. 30, 784 (July 24, 1985) and EPA's Technical Support Document for Water Quality Based Toxics Control, EPA/505-90-001.) The frequency and the type of WET test depend on the dilution ratio and risk factor.

Pursuant to EPA Region I policy, discharges having a dilution ratio of greater than 100: 1, as is the case with River Terrace Healthcare, require acute toxicity testing once per year with the LC_{50} at 50%. The LC_{50} is the concentration of the effluent that causes mortality to 50% of the test organisms. The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analyses; (2) bioavailability of pollutants after discharge is best measured by toxicity testing including any synergistic effects of pollutants; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in conjunction with pollutant specific control procedures to control the discharge of toxic pollutants.

The draft permit requires that the permittee conduct an acute WET testing on Outfall 001 effluent **and** ambient river water (the diluent) once per year, as in the current permit. Each test must be conducted using the test species *Ceriodaphnia dubia* (daphnids) in accordance with EPA Region 1 protocol to be found in permit Attachment A, Freshwater Acute Toxicity Test Procedures and Protocol. The protocol also specifies an LC_{50} limit of 50% for a facility with a dilution factor greater than 100. As in the current permit, the test will be conducted during the month of September.

A review of 5 years of WET results shows consistent compliance with the acute limit. As seen in Table 7, there were no violations.

Table 7: Whole Effluent Toxicity Tests Results

Date	LC50 - Acute
10/28//09	100%
9/30/10	100%
9/27/11	100%
10/3/12	90%
8/29/13	100%

7. Operation and Maintenance of the Sewer System

The permit standard conditions for 'Proper Operation and Maintenance' are found at 40 CFR § 122.41(e). These require proper operation and maintenance of permitted wastewater systems and related facilities to achieve permit conditions. Similarly, the permittee has a "duty to mitigate" as stated in 40 CFR § 122.41(d). This requires the permittee to take all reasonable steps to minimize or prevent any discharge in violation of the permit which has the reasonable likelihood of adversely affecting human health or the environment. EPA and MassDEP have included specific operation and maintenance requirements for the wastewater treatment plant and include requirements for adequate staffing, preventative maintenance, infiltration and inflow (I/I) control, and alternate power needed at pump stations. New requirements, including collection system mapping and a wastewater treatment facility assessment, have been added to the draft permit.

However since the permittee is not a POTW and has a less extensive collection system than a typical POTW, EPA has not included in the draft permit the standard collection system operation and maintenance requirements that are currently included in POTW permits.

8. Sludge Information and Requirements

The draft permit requires that the permittee comply with all existing federal and state laws that apply to sewage sludge use and disposal practices and with the CWA Section 405(d) technical standards (see 40 CFR Section 503) and that it submit an annual reports describing its sludge disposal practices. Sludge from the River Terrace Healthcare WWTF is currently sent to the Fitchburg Wastewater Treatment Facility for disposal. Because the final disposal of the permittee's sludge is done by others, the permittee is not currently subject to the requirements of 40 CFR Section 503. However, if the ultimate sludge disposal method changes, the permittee is responsible for complying with the applicable state and federal requirements.

The draft permit requires the permittee to submit an annual report by February 19th of each year for the previous calendar year, addressing the various sludge reporting requirements as specified in the guidance document for the chosen method of sludge disposal.

9. Essential Fish Habitat

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.(1998), EPA is required to consult with the National Marine Fisheries Service (NMFS) if EPA's actions or proposed actions that it funds, permits, or undertakes "may adversely impact any essential fish habitat" (16 U.S.C. § 1855(b). The Amendments broadly define EFH as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. § 1802(10). "Adverse impact" means any impact which reduces the quality and/or quantity of EFH (50 CFR § 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 (50 CFR § 600.910(a)).

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. A NOAA Fisheries website (See http://www.nero.noaa.gov/hcd/webintro.html) contains maps of designated EFH. In some cases, a narrative identifies rivers and other waterways that should be considered EFH due to present or historic use by federally managed species such as Atlantic salmon. (See http://www.greateratlantic.fisheries.noaa.gov/hcd/salmon.pdf).

EPA's review of available EFH information did *not* specifically indicate that the North Nashua River is designated EFH for any federally managed species. Thus, EPA has determined that EFH consultation with NMFS is not required.

However, it should be noted that the North Nashua River flows into the Nashua River. The Nashua River ultimately empties into the Merrimack River in Nashua, New Hampshire. The Merrimack River has been designated EFH for the Atlantic Salmon *(Salmo salar).* Only juvenile and adult life stages of the Atlantic salmon are expected to inhabit freshwater areas of the Merrimack River. In further defining Atlantic salmon EFH in the Merrimack River watershed, NOAA included all aquatic habitats in the watersheds of the Merrimack River, including all *tributaries* to the extent that they are currently or were *historically* accessible for salmon migration (NOAA, 1998). Since the Nashua River is a tributary to the Merrimack River, EPA has taken the additional step of providing reasons as to why this permit activity would not be likely to affect EFH (if taken in the broader context of "all tributaries" to the Merrimack River.) Such reasons include:

- This is a reissuance of an existing NPDES permit with the same or stricter effluent limits.
- The quantity of the discharge from the WWTF is only 7,500 gpd and receives advanced treatment.
- Acute toxicity testing on *Ceriodaphnia dubia* is required annually and the recent toxicity results are in compliance with permit limits.
- The permit prohibits the discharge from causing a violation of state quality

standards.

- The permit prohibits the discharge of pollutants or combination of pollutants in toxic amounts.
- The draft permit contains limits for BOD_5, TSS, and total phosphorus;
- After conducting Reasonable Potential analysis for aluminum, copper, and ammonia, EPA concluded that the discharge does **not** have reasonable potential to cause or contribute to a violation of the water quality criteria for these parameters.

EPA believes that the conditions and limitations contained within the proposed permit adequately protect aquatic life. Accordingly, EPA has determined that a formal consultation with NMFS is not required.

10. Endangered Species Act

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended (the "Act"), grants authority to and imposes requirements upon federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and the habitats of such species that have been designated as critical ("critical habitat").

Section 7(a)(2) of the Act requires every federal agency in consultation with and with the assistance of the Secretary of the Interior, to ensure 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) administers Section 7 consultations for freshwater species. The National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

EPA utilized the Environmental Conservation Online System Information, Planning, and Conservation (ECOS-IPaC) mapping tool, available at http://ecos.fws.gov/ipac/, to determine if any federally listed species or designated critical habitats under USFWS' jurisdiction existed in the action area. According to the "Official Species List" generated by the tool, no federally threatened/endangered species or critical habitat (under USFWS' jurisdiction) existed in the vicinity of the action area for this NPDES permit. Therefore, no consultation with USFWS under the Endangered Species Act is required.

EPA also reviewed available information to determine if any federally listed species or designated critical habitats under NMFS' jurisdiction existed in this permit's action area. No such species or critical habitat were identified specifically for the North Nashua River (in the Nashua River Watershed). However, it should be noted that the federally endangered Shortnose Sturgeon (*Acipenser brevirostrum*), listed since 1967, and the five distinct population segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), listed in 2012, have been documented in portions of the Merrimack River. The shortnose sturgeon has been identified in the lower mainstem Merrimack River (below the Essex Dam in Lawrence, MA) to the River's mouth (in Essex county). Atlantic sturgeon have been identified in the Merrimack River, particular in the lower estuarine portion which is used as a nursery area (Atlantic Sturgeon Status Review Team,

2007). The North Nashua River flows into the Nashua River, which is a tributary to the Merrimack River. However according to recent electronic communication from NMFS (Protected Resources Division), "Any action in the Nashua River would not pose any threat to either sturgeon species in the Merrimack River." As such, EPA has determined that no consultation with NMFS under the Endangered Species Act is required.

11. Unauthorized Discharges

The permit authorizes discharges only from the outfall listed in Part I.A.1. in accordance with the terms and conditions of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs), are not authorized by this permit and shall be reported to EPA and MassDEP in accordance with Section D.1.e.(1) of the General Requirements 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 online at http://www.mass.gov/eea/agencies/massdep/service/approvals/sanitary-overflow-bypass-backupnotification.html.

12. Monitoring and Reporting

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

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

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

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

13. State Certification Requirements

EPA may not issue a permit unless MassDEP either certifies that the effluent limitations contained in this permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards or waives its right to such certification. EPA has requested that MassDEP certify the permit. Under Section 401 of the CWA, EPA is required to obtain certification from the state in which the discharge is located which determines that all water quality standards, in accordance with Section 301(b)(1)(C) of the CWA, will be satisfied. Regulations governing state certification are set forth in 40 CFR §124.53 and §124.55. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 CFR §122.44(d). EPA expects that the draft permit will be certified.

14. Public Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Office of Ecosystem Protection, Attn: Karen Mateleska, 5 Post Office Square, Suite-100, (OEP06-1), Boston, Massachusetts 02109-3912 or via email to mateleska.karen@epa.gov. The comments should reference the name and permit number of the facility for which they are being provided.

Any person, prior to such date, may submit a request in writing to EPA and the State's Agency for a public hearing to consider the draft permit. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty 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, EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period and after a public hearing, if such a hearing is held, EPA will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within thirty (30) days following the notice of the final permit decision, any interested person may submit a petition for review of the permit to EPA's Environmental Appeals Board consistent with 40 CFR § 124.19.

15. EPA and MassDEP Contacts

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

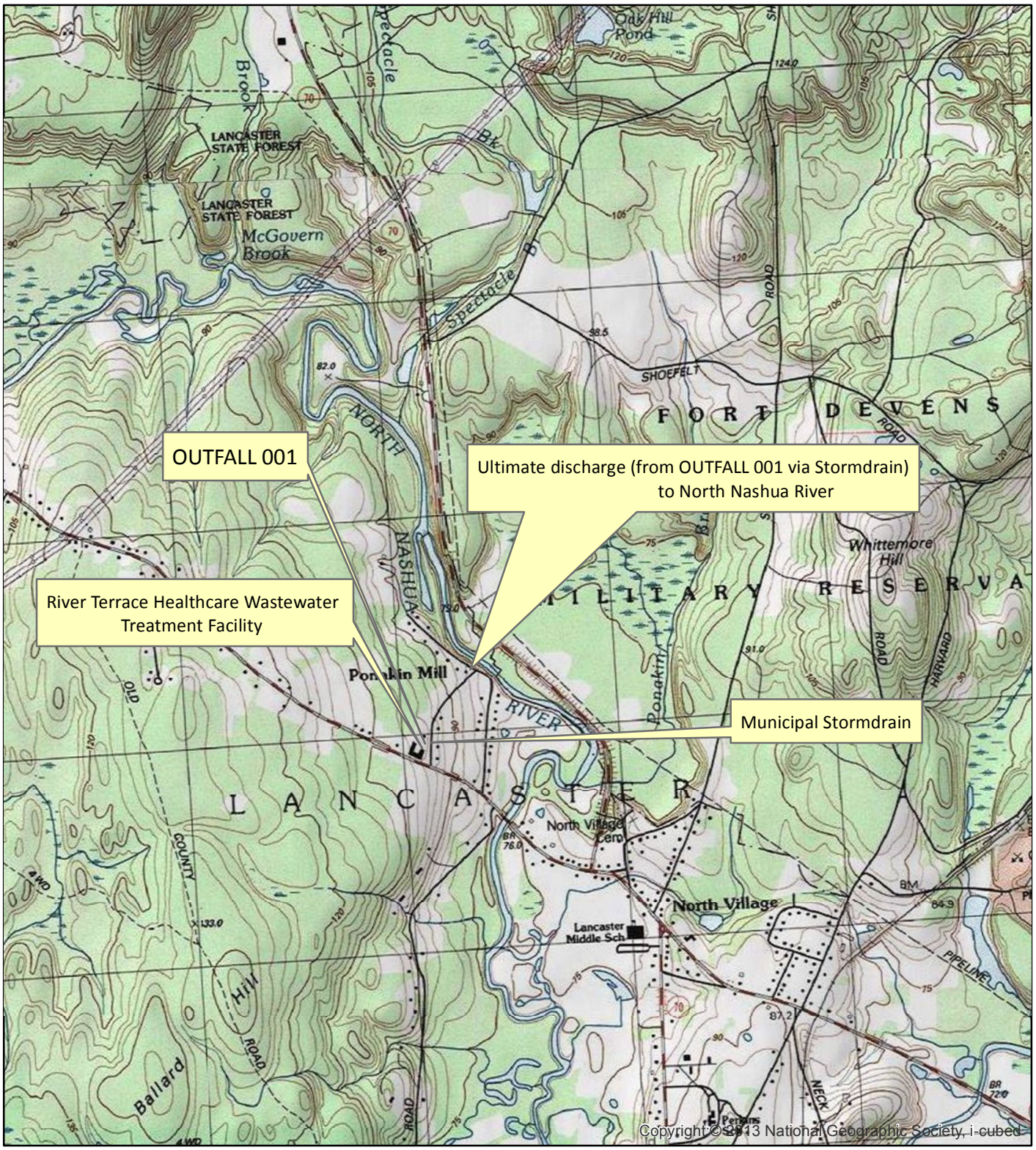
Karen Mateleska
U.S. Environmental Protection Agency
Office of Ecosystem Protection

5 Post Office Square, Suite-100 (OEP06-1)
Boston, MA 02109-3912
Telephone: (617) 918-1651, FAX: (617) 918-0651
Email: mateleska.karen@epa.gov

Claire Golden
Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program
205B Lowell Street
Wilmington, Massachusetts 01887
Telephone: (978) 694-3244, FAX: (978) 694-3498
Email: claire.golden@state.ma.us

April 2015
Date

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



Scale 1 : 25,614

0 500 Meters

0 1,000 2,000 Feet

Regulated Facilities: EPA

FIGURE 1
RIVER TERRACE HEALTHCARE
Wastewater Treatment Facility
NPDES Permit No. MA0025763

Lancaster, MA

EPA

4/1/2015

FIGURE 2: Flow Line Drawing of River Terrace Healthcare Wastewater Treatment Facility

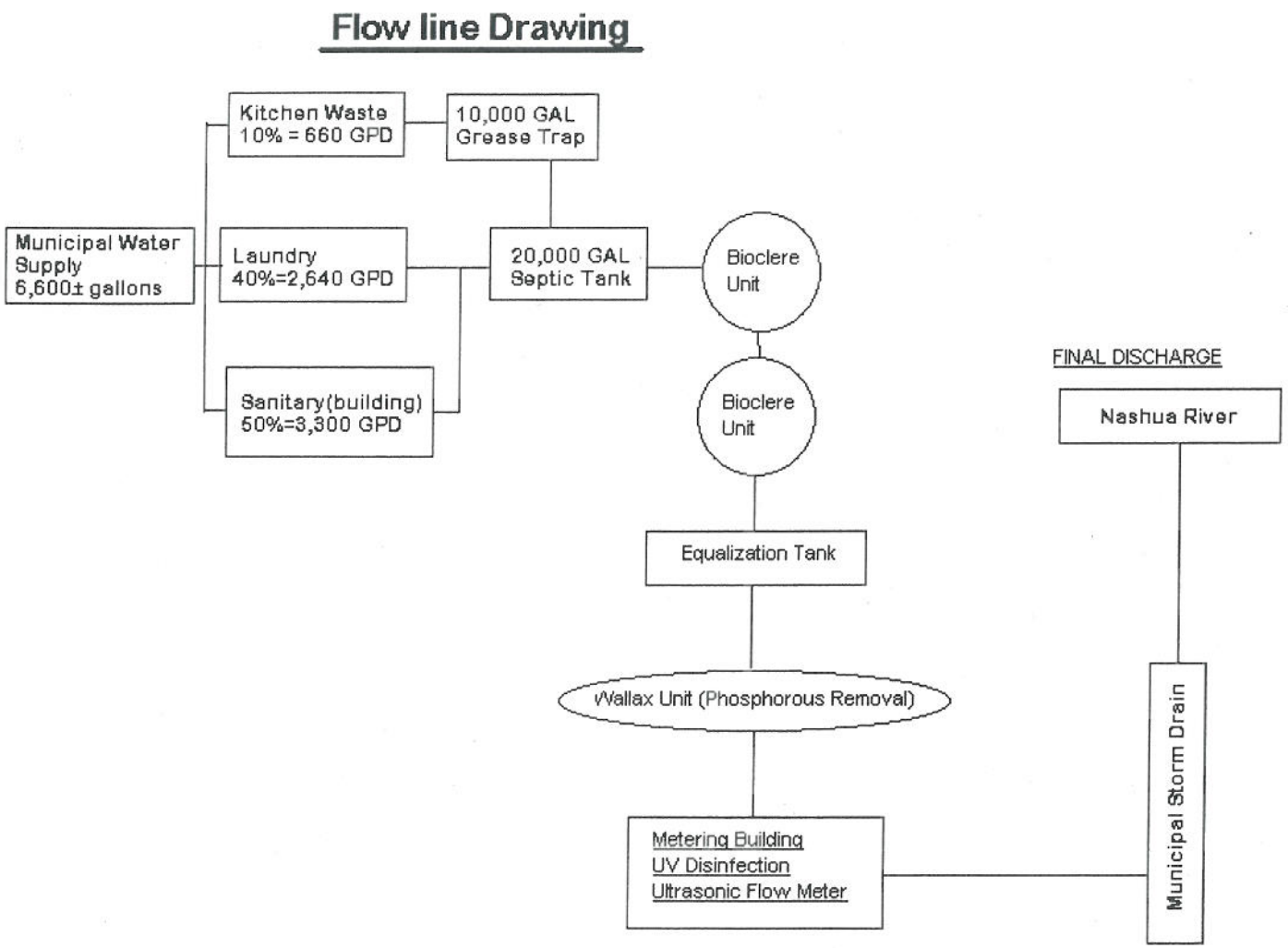
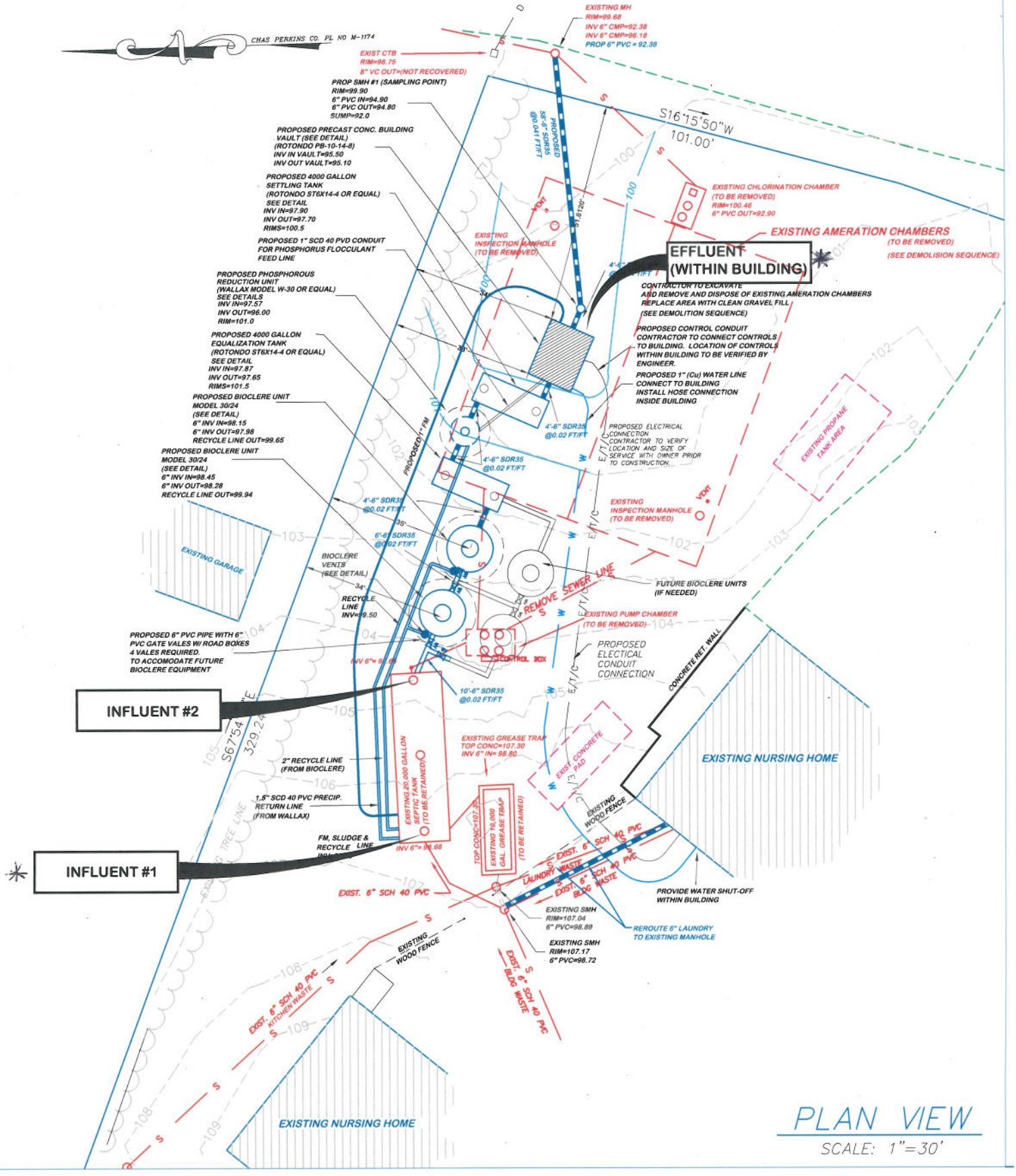


FIGURE 3: Schematic of Influent and Effluent Testing Locations for 85% BOD_5 & TSS Removal Requirement



Appendix A: River Terrace Healthcare - Discharge Monitoring Data

(July 2009 - June 2014)

MONITORING PERIOD END DATE	Flow (gal/d)	Flow (gal/d)	BOD, 05 day, 20 C (mg/l)	BOD, 05 day, 20 C (mg/l)	BOD, 05 day, 20 C (mg/l)	BOD, 05 day, 20 C (lbs/d)	BOD, 05 day, 20 C (lbs/d)
	Monthly Average	Daily Maximum	Daily Maximum	Weekly Average	Monthly Average	Weekly Average	Monthly Average
07/31/2009	6917.	7305.	18.	12.5	12.5	.72	.72
08/31/2009	6847.	7235.	21.	14.08	14.08	.8	.8
09/30/2009	6678.	7254.	22.	15.2	15.2	.85	.85
10/31/2009	6150.	7135.	12.	10.4	10.4	.58	.58
11/30/2009	6467.	8753.	190.	53.93	53.83	2.9	2.9
12/31/2009	6724.	8095.	43.	21.7	21.7	1.22	1.22
01/31/2010	5880.	6933.	17.	12.23	12.23	.6	.6
02/28/2010	6230.	8233.	14.	10.27	10.27	.54	.54
03/31/2010	7173.	8997.	12.	4.	4.	.24	.24
04/30/2010	6360.	7226.	12.	6.84	6.84	.41	.41
05/31/2010	6015.	7771.	6.3	1.58	1.58	.08	.08
06/30/2010	6427.	7771.	18.	8.75	8.75	.45	.45
07/31/2010	6187.	8177.	0	0	0	0	0
08/31/2010	6425.	8663.	20.	15.	15.	.77	.77
09/30/2010	6450.	7311.	50.	24.5	24.5	1.25	1.25
10/31/2010	6320.	7136.	18.	9.08	9.08	.46	.46
11/30/2010	6231.	7244.	21.	16.	16.	.82	.82
12/31/2010	6252.	7246.	20.	12.55	12.55	.64	.64
01/31/2011	6021.	7535.	19.	10.6	10.6	.54	.54
02/28/2011	5959.	7058.	18.1	9.03	9.03	.46	.46
03/31/2011	6250.	8322.	33.	20.5	20.5	1.05	1.05
04/30/2011	6170.	7166.	14.	9.25	9.25	.47	.47
05/31/2011	6166.	6909.	6.7	6.03	6.03	.31	.31
06/30/2011	5966.	6452.	55.	23.	23.	1.18	1.18
07/31/2011	6823.	7456.	73.	27.75	27.75	1.42	1.42
08/31/2011	5964.	6850.	16.	11.77	11.77	.59	.59
09/30/2011	5964.	7015.	16.	13.03	13.03	.35	.65
10/31/2011	6051.	7120.	15.	10.83	10.83	.55	.55
11/30/2011	5682.	7925.	26.	18.	18.	.86	.86
12/31/2011	5483.	6735.	17.	14.6	14.6	.82	.82
01/31/2012	5466.	6577.	34.	23.9	23.9	1.51	1.5
02/29/2012	5998.	7120.	50.2	30.	30.	1.5	1.5
03/31/2012	5742.	6627.	43.	23.	18.	1.6	1.6
04/30/2012	5316.	6105.	37.5	15.16	15.16	.77	1.
05/31/2012	5982.	6815.	0	0	0	0	0
06/30/2012	6592.	7214.	10.	6.25	6.25	.34	.22

MONITORING PERIOD END DATE	Flow (gal/d)	Flow (gal/d)	BOD, 05 day, 20 C (mg/l)	BOD, 05 day, 20 C (mg/l)	BOD, 05 day, 20 C (mg/l)	BOD, 05 day, 20 C (lbs/d)	BOD, 05 day, 20 C (lbs/d)
	Monthly Average	Daily Maximum	Daily Maximum	Weekly Average	Monthly Average	Weekly Average	Monthly Average
07/31/2012	6833.	7414.	16.7	7.8	7.8	.49	.49
08/31/2012	6697.	7446.	16.7	4.18	4.18	.23	.23
09/30/2012	6386.	7814.	0	0	0	0	0
10/31/2012	6105.	7125.	7.3	4.6	4.63	.24	.24
11/30/2012	4139.	4726.	0	0	0	0	0
12/31/2012	4440.	6070.	16.2	4.05	4.05	.15	.15
01/31/2013	6938.	10172.	15.2	12.	12.03	.7	.7
02/28/2013	7130.	8825.	13.	10.93	10.93	.6	.64
03/31/2013	7232.	9912.	7.7	7.01	7.	.042	.42
04/30/2013	6766.	7925.	14.1	8.95	8.95	.5	.51
05/31/2013	7092.	8246.	16.	11.1	11.1	.66	.66
06/30/2013	6401.	7201.	6.6	3.28	3.28	.17	.17
07/31/2013	6401.	7201.	7.7	4.47	4.47	.2	.2
08/31/2013	5812.	6255.	18.	11.5	11.5	.5	.56
09/30/2013	5737.	6944.	6.6	2.5	2.53	.12	.12
10/31/2013	5939.	6633.	7.14	2.85	2.85	.14	.14
11/30/2013	4817.	5633.	7.1	5.5	5.5	.26	.26
12/31/2013	5526.	6669.	6.	4.5	4.5	.15	.15
01/31/2014	5435.	6330.	17.	7.2	7.2	.38	.38
02/28/2014	5662.	6875.	20.	17.	17.	.8	.8
03/31/2014	5177.	6634.	17.	14.5	14.5	.52	.52
04/30/2014	4625.	6205.	5.	4.3	4.3	.17	.17
05/31/2014	3834.	6214.	7.	6.	6.07	.14	.19
06/30/2014	3940.	5620.	10.5	4.3	4.3	.14	.14
Minimum	3834.00	4726.00	0.00	0.00	0.00	0.00	0.00
Maximum	7232.00	10172.00	190.00	53.93	53.83	2.90	2.90
Average	6039.87	7259.58	20.94	11.33	11.25	0.58	0.60
Standard Deviation							
# Measurements	60.00	60.00	60.00	60.00	60.00	60.00	60.00
# Exceeds Limits				1	1	1	1

MONITORING PERIOD END DATE	pH (s.u.)	pH (s.u.)	Phosphorus, Total, mg/l	Fecal coliform, thermotol, MF, MTEC	Fecal coliform, thermotol, MF, MTEC
	Minimum	Maximum	Monthly Average	MO GEO	Daily Maximum
07/31/2009	7.31	7.88	.1	57.5	230.
08/31/2009	7.28	7.65	.02	2044.	9700.
09/30/2009	7.28	7.65	.38	2.5	10.
10/31/2009	7.23	7.42	.	75.	300.
11/30/2009	7.15	7.45		187.	610.
12/31/2009	7.11	7.28		114.	570.
01/31/2010	7.17	7.31		142.5	290.
02/28/2010	7.1	7.3		130.	370.
03/31/2010	7.12	7.39		5.	10.
04/30/2010	7.1	7.26		4.	20.
05/31/2010	7.04	7.23	1.15	11.5	46.
06/30/2010	6.95	7.15	1.46	430.	1700.
07/31/2010	5.9	7.22	6.04	120.	470.
08/31/2010	6.7	7.1	3.62	44.	190.
09/30/2010	6.1	6.8	4.53	.	.
10/31/2010	6.7	7.1	.	.	.
11/30/2010	6.7	7.1		.	.
12/31/2010	6.5	7.1		.	.
01/31/2011	6.6	7.1		.	.
02/28/2011	6.7	7.1		.	.
03/31/2011	6.5	6.9		.	.
04/30/2011	6.5	7.		40.	70.
05/31/2011	6.5	7.	.11	70.	210.
06/30/2011	6.5	7.1	.04	124.	400.
07/31/2011	6.8	7.1	.39	47.5	140.
08/31/2011	6.5	7.3	.4	23.3	70.
09/30/2011	6.83	7.5	.66	9.78	270.
10/31/2011	6.52	7.31	.73	4.25	17.
11/30/2011	7.	7.3		72.2	230.
12/31/2011	6.97	7.22		91.	340.
01/31/2012	6.6	7.6		22.	100.
02/29/2012	7.	7.6		.	.
03/31/2012	6.8	7.2		57.5	230.
04/30/2012	7.	7.1		.	.
05/31/2012	6.9	7.3	.85	5.6	10.
06/30/2012	6.8	7.5	.46	76.2	180.
07/31/2012	6.5	7.2	.46	112.	320.
08/31/2012	7.	7.4	.87	92.	240.
09/30/2012	6.9	7.6	.8	76.	190.
10/31/2012	7.	7.4	.73	108.	180.
11/30/2012	7.	7.3		294.	600.
12/31/2012	6.8	7.3		43.	110.

MONITORING PERIOD END DATE	pH (s.u.)	pH (s.u.)	Phosphorus, Total, mg/l	Fecal coliform, thermotol, MF, MTEC	Fecal coliform, thermotol, MF, MTEC
	Minimum	Maximum	Monthly Average	MO GEO	Daily Maximum
01/31/2013	6.8	7.3		.	.
02/28/2013	6.8	7.1		2.4	12.
03/31/2013	6.9	7.2		10.	50.
04/30/2013	6.9	7.5		40.	180.
05/31/2013	6.9	7.3	.96	.	.
06/30/2013	6.8	7.2	.22	10.	50.
07/31/2013	6.8	7.2	.32	10.	20.
08/31/2013	6.8	7.2	.32	10.	10.
09/30/2013	6.8	7.2	1.	62.	180.
10/31/2013	6.7	7.	.53	.	.
11/30/2013	6.8	7.8		.	.
12/31/2013	6.6	7.5		100.	202.
01/31/2014	6.8	7.1		.	.
02/28/2014	6.8	7.1		.	.
03/31/2014	6.8	7.3		.	.
04/30/2014	6.8	7.4		20.	200.
05/31/2014	7.	7.6	.73	5.	200.
06/30/2014	6.6	6.99	.8	20.	200.
Minimum	5.90	6.80	0.00	0.00	0.00
Maximum	7.31	7.88	6.04	2044.00	9700.00
Average	6.82	7.28	0.96	83.75	328.78
Standard Deviation					
# Measurements	60.00	60.00	29.00	60.00	60.00
# Exceeds Limits	2	0	5	4	4

MONITORING PERIOD END DATE	Total Suspended Solids (TSS) (mg/l)	Total Suspended Solids (TSS) (mg/l)	Total Suspended Solids (TSS) (mg/l)	Total Suspended Solids (TSS) (lbs/d)	LC50, Acute, Ceriodaphnia (%)
	Daily Maximm	Weekly Average	Monthly Average	Weekly Average	Daily Minimum
07/31/2009	18.	11.5	11.5	.66	
08/31/2009	5.5	4.5	4.5	.26	
09/30/2009	7.	4.45	4.45	.25	100
10/31/2009	6.		4.67	.26	
11/30/2009	280.	72.5	72.5	3.91	
12/31/2009	8.5	4.7	4.7	.26	
01/31/2010	4.	3.	3.	.15	
02/28/2010	7.	4.33	4.43	.23	
03/31/2010	3.	2.67	2.67	.16	
04/30/2010	5.	2.34	2.34	.14	
05/31/2010	20.	10.5	10.5	.54	
06/30/2010	15.	9.75	9.75	.5	
07/31/2010	19.	12.63	12.63	.65	
08/31/2010	13.	9.5	9.5	.49	
09/30/2010	22.	10.7	10.7	.55	100
10/31/2010	7.3	6.7	6.7	.22	
11/30/2010	19.	8.08	8.08	.41	
12/31/2010	11.	10.58	10.58	.53	
01/31/2011	8.5	4.7	4.7	.24	
02/28/2011	4.	2.	2.	.28	
03/31/2011	5.	1.25	1.25	.06	
04/30/2011	15.	7.5	7.5	.38	
05/31/2011	6.	3.33	3.33	.17	
06/30/2011	42.	11.75	11.75	.6	
07/31/2011	12.	5.25	5.25	.27	
08/31/2011	48.	20.	20.	.99	
09/30/2011	8.	7.	7.	.35	100
10/31/2011	37.	10.25	10.25	.52	
11/30/2011	19.	9.5	9.5	.45	
12/31/2011	7.	1.75	1.75	.1	
01/31/2012	61.	27.6	27.6	1.5	
02/29/2012	26.	18.	18.	.9	
03/31/2012	23.	18.	18.	.9	
04/30/2012	57.	19.8	19.8	1.01	
05/31/2012	10.	3.33	3.33	.32	
06/30/2012	12.	4.	4.	.22	
07/31/2012	12.	4.	4.	.25	
08/31/2012	12.	3.	3.	.17	
09/30/2012	0	0	0	0	90
10/31/2012	0	0	0	0	
11/30/2012	0	0	0	0	
12/31/2012	9.	2.2	2.25	.08	
01/31/2013	5.	1.2	1.25	.07	

MONITORING PERIOD END DATE	Total Suspended Solids (TSS) (mg/l)	Total Suspended Solids (TSS) (mg/l)	Total Suspended Solids (TSS) (mg/l)	Total Suspended Solids (TSS) (lbs/d)	LC50, Acute, Ceriodaphnia (%)
	Daily Maximm	Weekly Average	Monthly Average	Weekly Average	Daily Minimum
02/28/2013	0	0	0	0	
03/31/2013	0	0	0	0	
04/30/2013	17.	4.2	4.25	.2	
05/31/2013	9.	5.	5.	.3	
06/30/2013	12.	4.25	4.25	.22	
07/31/2013	7.	4.3	4.33	.23	
08/31/2013	5.	1.6	1.6	.08	
09/30/2013	0	0	0	0	100
10/31/2013	0	0	0	0	
11/30/2013	0	0	0	0	
12/31/2013	0	0	0	0	
01/31/2014	8.3	2.66	2.66	.14	
02/28/2014	0	0	0	0	
03/31/2014	0	0	0	0	
04/30/2014	0	0	0	0	
05/31/2014	0	0	0	0	
06/30/2014	0	0	0	0	
Minimum	0.00	0.00	0.00	0.00	90.00
Maximum	280.00	72.50	72.50	72.50	100.00
Average	16.12	6.71	6.69	3.52	98.00
Standard Deviation					
# Measurements	60.00	60.00	60.00	60.00	5.00
# Exceeds Limits	0.00	1.00	1.00	1.00	0.00

Appendix B: Whole Effluent Toxicity Test Metals (& Ammonia) Data

Test Date	Hardness (as $CaCO_3$)		Aluminum		Cadmium		Chromium		Copper	
	Effluent (mg/l)	Ambient (mg/l)	Effluent (ug/l)	Ambient (ug/l)	Effluent (ug/l)	Ambient (ug/l)	Effluent (ug/l)	Ambient (ug/l)	Effluent (ug/l)	Ambient (ug/l)
10/8/2008	78.7	67.4	35	78	<.2 (ND)		<1 (ND)		36	28
10/29/2009	78.2	31.1	56	72	<.2 (ND)		<1 (ND)		52	3
10/1/2010	77.1	65.2	36	91	<.2 (ND)		1		70	8
9/29/2011	76	24	35	100	<.5 (ND)	<.5 (ND)	<2 (ND)	<2 (ND)	42	7
10/3/2012	77.6	57.9	153		<4 (ND)				45	
Median[1]	77.6	57.9	36	84.5					45	7.5

[1] Used ½ of each non-detect value to calculate median

Test Date	Lead		Nickel		Zinc		Ammonia	
	Effluent (ug/l)	Ambient (ug/l)	Effluent (ug/l)	Ambient (ug/l)	Effluent (ug/l)	Ambient (ug/l)	Effluent (ug/l)	Ambient (ug/l)
10/8/2008	<1 (ND)	6	<4 (ND)	<4 (ND)	16	41	12000	4200
10/29/2009	1	2	2	2	50	14	9800	<100 (ND)
10/1/2010	1	2	3	3	30	19	10000	390
9/29/2011	0.6	2	<2 (ND)	<2 (ND)	18	8	7900	<100 (ND)
10/3/2012	<10 (ND)		<100 (ND)		<180 (ND)		3490	<200 (ND)
Median[1]	1	2	2	2	30	16.5	9800	100

Appendix C: Summary of River Terrace Healthcare WWTF's BOD_5/TSS Removal

(DMR Data from July 2009 to June 2014)

Formula for Percent (%) Removal: $\frac{\text{(Monthly Average Influent Concentration) – (Monthly Average Effluent Concentration)}}{\text{(Monthly Average Influent Concentration)}} \times 100$

% Removal for BOD_5:

Date	Monthly Average Influent (mg/l)	Monthly Average Effluent (mg/l)	Percent Removal (%)
Effluent Limit			85%
07/31/2009	205.00	12.50	94
08/31/2009	216.00	14.08	93
09/30/2009	295.00	15.20	95
10/31/2009	147.50	10.40	93
11/30/2009	200.75	53.83	73
12/31/2009	250.00	21.70	91
01/31/2010	142.00	12.23	91
02/28/2010	220.00	10.27	95
03/31/2010	173.33	4.00	98
04/30/2010	228.00	6.84	97
05/31/2010	171.75	1.58	99
06/30/2010	143.50	8.75	94
07/31/2010	200.00	0.00	100
08/31/2010	180.00	15.00	92
09/30/2010	190.00	24.50	87
10/31/2010	150.00	9.08	94
11/30/2010	146.00	16.00	89
12/31/2010	132.50	12.55	91
01/31/2011	165.00	10.60	94

02/28/2011	400.50	9.03	98
03/31/2011	103.00	20.50	80
04/30/2011	47.50	9.25	81
05/31/2011	43.33	6.03	86
06/30/2011	142.75	23.00	84
07/31/2011	62.00	27.75	55
08/31/2011	56.00	11.77	79
09/30/2011	75.03	13.03	83
10/31/2011	84.50	10.83	87
11/30/2011	103.00	18.00	83
12/31/2011	105.10	14.60	86
01/31/2012	93.80	23.90	75
02/29/2012	101.90	30.00	71
03/31/2012	29.00	18.00	38
04/30/2012	109.80	15.16	86
05/31/2012	77.00	0.00	100
06/30/2012	53.70	6.25	88
07/31/2012	67.13	7.80	88
08/31/2012	61.00	4.18	93
09/30/2012	73.80	0.00	100
10/31/2012	82.40	4.63	94
11/30/2012	69.18	0.00	100
12/31/2012	125.13	4.05	97
01/31/2013	122.80	12.03	90
02/28/2013	120.00	10.93	91
03/31/2013	127.25	7.00	94
04/30/2013	100.20	8.95	91
05/31/2013	107.80	11.10	90
06/30/2013	111.75	3.28	97
07/31/2013	70.60	4.47	94
08/31/2013	76.00	11.50	85
09/30/2013	125.00	2.53	98
10/31/2013	61.30	2.85	95

11/30/2013	560.00	5.50	99
12/31/2013	106.00	4.50	96
01/31/2014	119.60	7.20	94
02/28/2014	17.00	17.00	0
03/31/2014	97.20	14.50	85
04/30/2014	132.00	4.30	97
05/31/2014	77.30	6.07	92
06/30/2014	130.00	4.30	97
Minimum	**17.00**	**0.00**	**0**
Maximum	**560.00**	**53.83**	**100**
Average	**133.08**	**11.25**	**88**
N =	**60**	**60**	**60**

% Removal for TSS:

Date	Influent Monthly Average (mg/l)	Effluent Monthly Average (mg/l)	Percent Removal (%)
Effluent Limit			85%
07/31/2009	190.00	11.50	94
08/31/2009	364.00	4.50	99
09/30/2009	907.50	4.45	100
10/31/2009	170.00	4.67	97
11/30/2009	309.00	72.50	77
12/31/2009	2820.00	4.70	100
01/31/2010	78.00	3.00	96
02/28/2010	190.00	4.43	98
03/31/2010	196.67	2.67	99
04/30/2010	196.60	2.34	99
05/31/2010	505.50	10.50	98
06/30/2010	66.00	9.75	85
07/31/2010	663.50	12.63	98
08/31/2010	79.00	9.50	88
09/30/2010	104.75	10.70	90

10/31/2010	56.75	6.70	88
11/30/2010	60.50	8.08	87
12/31/2010	60.00	10.58	82
01/31/2011	93.25	4.70	95
02/28/2011	384.50	2.00	99
03/31/2011	28.25	1.25	96
04/30/2011	10.50	7.50	29
05/31/2011	32.00	3.33	90
06/30/2011	265.50	11.75	96
07/31/2011	65.75	5.25	92
08/31/2011	41.25	20.00	52
09/30/2011	41.00	7.00	83
10/31/2011	10.25	10.25	0
11/30/2011	30.75	9.50	69
12/31/2011	42.80	1.75	96
01/31/2012	53.60	27.60	49
02/29/2012	60.70	18.00	70
03/31/2012	52.30	18.00	66
04/30/2012	45.00	19.80	56
05/31/2012	77.00	3.33	96
06/30/2012	46.70	4.00	91
07/31/2012	37.00	4.00	89
08/31/2012	39.75	3.00	92
09/30/2012	59.25	0.00	100
10/31/2012	55.00	0.00	100
11/30/2012	68.50	0.00	100
12/31/2012	85.75	2.25	97
01/31/2013	95.75	1.25	99
02/28/2013	34.00	0.00	100
03/31/2013	0.00	0.00	0
04/30/2013	52.00	4.25	92
05/31/2013	92.20	5.00	95
06/30/2013	126.50	4.25	97
07/31/2013	106.30	4.33	96
08/31/2013	50.70	1.60	97

09/30/2013	41.50	0.00	100
10/31/2013	36.30	0.00	100
11/30/2013	480.00	0.00	100
12/31/2013	56.00	0.00	100
01/31/2014	185.40	2.66	99
02/28/2014	100.00	0.00	100
03/31/2014	45.00	0.00	100
04/30/2014	162.00	0.00	100
05/31/2014	60.00	0.00	100
06/30/2014	162.00	0.00	100
Minimum	0.00	0.00	0.00
Maximum	2820.00	72.50	100
Average	177.16	6.68	87
N =	60	60	60

Appendix D: Calculation of Projected TP Mass Loading

Mass Loading Calculation:

L = C * DF * 8.34

Where:

L: Maximum Allowable load in lbs/day

C: Maximum Allowable Effluent Concentration for reporting period in mg/L

DF: Design flow of facility in million gallons per day (MGD)

8.34: Factor to convert effluent concentration in mg/l and design flow in MGD to lbs/day

Mass Balance Equation: $Q_d C_d + Q_S C_S = Q_r C_r$

Where:

Qd: Effluent Flow **(Design Flow = .0075 MGD = 7500gpd = 0.0116 cfs)**

Cd: Effluent TP concentration in mg/l (**Current permit TP limit of 1.0 mg/l**: Used to determine whether this limit is still appropriate)

Qs: 7Q10 of North Nashua River **(Upstream flow = 18.184MGD = 28.149 cfs)**

Cs: Upstream TP concentration **("Gold Book" value: 0.1 mg/l)**

Qr: Stream flow downstream, after discharge **(Qr =Qd + Qs = 18.192MGD = 28.1606 cfs)**

Upstream Load of Total Phosphorus (Upstream of River Terrace Healthcare WWTF):

L = C * DF * 8.34

L = Cs * Qs* 8.34

L = 0.1 mg/l * 18.184 MGD * 8.34

L = 15.165 lbs/day of TP

Projected Load of Total Phosphorus (from River Terrace Healthcare WWTF Discharge):

L = C * DF * 8.34

L = Cd * Qd * 8.34

L = 1.0 mg/l * .0075MGD * 8.34

L = 0.063 lbs/day of TP

% Mass Load of TP from Discharge/Upstream Load: [(.063 lbs/day)/(15.165 lbs/day)] X 100

=0.4124%

APPENDIX E – STATISTICAL ANALYSIS FOR METALS EFFLUENT DATA

In order to account for the uncertainty that arises from small sample sizes (n<10), EPA uses a methodology from the *Technical Support Document for Water Quality-based Toxics Control* ("the TSD") to calculate a projected upper bound of effluent concentrations based on a statistical analysis of the facility's effluent data. As the statistical parameters of the sample distribution may differ from the underlying population, this approach determines a projection of the possible upper bound effluent concentration at the 95th percentile with a 95 percent confidence level, assuming a lognormal distribution of the underlying sample population. This 95th percentile projected upper bound represents a conservative estimate of the possible upper bound concentration based on a limited dataset. Where this upper bound concentration would not result in an exceedance of water quality criteria in the receiving water, EPA can say with certainty (95 percent confidence) that the data excludes the potential for an exceedance. Where that is not the case, EPA requires additional monitoring to better characterize the effluent.

The statistical analysis characterizes the maximum measured concentration as a percentile of the underlying distribution at a particular confidence level, then scaling that number upward by a "multiplying factor" in order to project an upper bound concentration at that confidence level. For sample datasets with less than 10 data points, EPA uses the 95th percentile with a 95 percent confidence level to characterize the upper bound concentration.

The formula for characterizing a maximum measured concentration as a percentile is:

$$p_n = (1 - \text{confidence level})^{1/n}$$

This formula gives the lowest percentile that a maximum measurement may correspond to, given a specific confidence level (EPA uses the 95 percent confidence level). For example, where n=4, we can be 95 percent confident that the maximum measurement represents at least the 47th percentile of the underlying distribution, since:

$$p_n = (1 - 0.95)^{1/4} = 0.473.$$

TSD at 52. It should be noted that this represents the lower end of the 95 percent confidence interval. Because of the uncertainty due to the small sample size there is a significant range in interpretation of the maximum; where n=4 we can be 95 percent confident that the maximum value represents somewhere between the 47th and 99th percentile of the underlying distribution.

The calculated percentile is then scaled up to a projected upper bound based on a selected probability basis (here the 95th percentile). The scaling factor (or "multiplying factor") is the ratio between the 95th percentile and the calculated percentile in a lognormal distribution with a particular coefficient of variation. These are calculated as follows:

$$\text{Multiplying factor} = C_{95} / C_{pn}; \text{ where}$$

$$C_{95} = \exp(1.645\sigma - 0.5\sigma^2);$$

$$C_{pn} = \exp(z_{pn} \times \sigma - 0.5\sigma^2);$$

z_{pn} = z-score of the calculated percentile
σ^2 = variance of the log-transformed data = ln (CV^2 + 1)
CV = coefficient of variation

The *TSD* recommends use of a coefficient of variation of 0.6 where sample size is less than 10. Thus for n=4 the multiplying factor (for 95-percent confidence level and 95th percentile probability basis) is:

p_n = 0.473
z_{pn} = -0.068
C_{95} = 2.135
C_{47} = 0.826

Multiplying factor = 2.6

In practice this process is implemented using tables set forth in *TSD*, chapter 3 and box 3-2, as follows:

Step 1) The maximum effluent value of the samples is determined.
Step 2) Coefficient of variation (CV) = 0.6, for less than 10 samples
Step 3) The multiplying factor (MF) is determined using table 3-2 in the TSD, based on the number of samples in the data set and a CV of 0.6.
Step 4) The 95th percentile projected upper bound is the maximum effluent value multiplied by the MF.

Appendix F: Metals Reasonable Potential Analysis (Using Additional Statistical Approach)

ALUMINUM Reasonable Potential Analysis:

(no Non-Detects, <10 Data Points - assumed Lognormal distribution)

Date	Al (ug/L)
10/8/2008	35
10/29/2009	56
10/1/2010	36
9/29/2011	35
10/3/2012	**153**

Al - (Lognormal distribution assumed)

Estimated Daily Maximum Effluent Concentration		
k = number of daily samples =	5	
Max Concentration	153.00	
cv(x)= Coefficient of Variation* =	0.6	
95th percentile multiplication factor**	2.3	
Daily Max Estimate = Max*95th percentile multiplication factor**		
Estimated Daily Max 95th Percentile =	**351.9000**	**ug/L**
Estimated Daily Max including Dilution Factor =	**351.9000**	**ug/L**

*Conservative estimate of CV. See Box 3-2 in Technical Support Document for Water Quality Based Toxics Control. (Also presented on pg. 3 of this Appendix).

**Multiplication factor from Table 3-2 in Technical Support Document for Water Quality Based Toxics Control (Also presented on pg 5. of this Appendix).

COPPER Reasonable Potential Analysis:

(no Non-Detects, <10 Data Points - assumed Lognormal distribution)

Date	Cu (ug/L)
10/8/2008	36
10/29/2009	52
10/1/2010	**70**
9/29/2011	42
10/3/2012	45

Cu - (Lognormal distribution assumed)

Estimated Daily Maximum Effluent Concentration		
k = number of daily samples =	5	
Max Concentration	70.00	
cv(x)= Coefficient of Variation* =	0.6	
95th percentile multiplication factor**	2.3	
Daily Max Estimate = Max*95th percentile multiplication factor**		
Estimated Daily Max 95th Percentile =	**161.0000**	**ug/L**
Estimated Daily Max including Dilution Factor =	**161.0000**	**ug/L**

*Conservative estimate of CV. See Box 3-2 in Technical Support Document for Water Quality Based Toxics Control. (Also presented on pg. 3 of this Appendix).

**Multiplication factor from Table 3-2 in Technical Support Document for Water Quality Based Toxics Control (Also presented on pg. 5 of this Appendix).

Reasonable Potential Analysis for LEAD, NICKEL, and ZINC:

Since < 10 data points each AND included Non-Detects, permit writer followed protocol Box 3-2 "Determining 'Reasonable Potential' for Excursions above Ambient Criteria Using Effluent Data Only" (page 53) **of the *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001; March 1991).** Table 3-2, referenced in Box 3-2, is found on page 54 of the aforementioned ***Technical Support Document*** (and also included below).

Box 3-2: Determining "Reasonable Potential" for Excursions Above Ambient Criteria Using Effluent Data Only

EPA recommends finding that a permittee has "reasonable potential" to exceed a receiving water quality standard if it cannot be demonstrated with a high confidence level that the upper bound of the lognormal distribution of effluent concentrations is below the receiving water criteria at specified low-flow conditions.

Step 1: Determine the total number of total observations ("n") for a particular set of effluent data (concentrations or toxic units [TUs]), and determine the highest value from that data set.

Step 2: Determine the coefficient of variation for the data set. For a data set where n<10, the coefficient of variation (CV) is estimated to equal 0.6, or the CV is calculated from data obtained from a discharger. For a data set where n>10, the CV is calculated as standard deviation/mean (See Figure 3-1). For less than 10 items, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

Step 3: Determine the appropriate ratio from Table 3-1 or 3-2.

Step 4: Multiply the highest value from a data set by the value from Table 3-1 or 3-2. Use this value with the appropriate dilution to project a maximum receiving water concentration (RWC).

Step 5: Compare the projected maximum RWC to the applicable standard (criteria maximum concentration, criteria continuous concentration, or reference ambient concentration). EPA recommends that permitting authorities find reasonable potential when the projected RWC is greater than an ambient criterion.

By following this process, the C_d (Upper Bound Limit) for each of the three metals was determined. The values are highlighted below:

	Max Effluent Value	# of Samples (n)	Coefficient of Variation	Multiplying Factor	Cd (Upper Bound – 95th)
Lead	1	5	0.6	2.3	2.3
Nickel	3	5	0.6	2.3	6.9
Zinc	50	5	0.6	2.3	115

Table 3-2. Reasonable Potential Multiplying Factors: 95% Confidence Level and 95% Probability Basis

Number of	Coefficient of Variation																			
Samples	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
1	1.4	1.9	2.6	3.6	4.7	6.2	8.0	10.1	12.6	15.5	18.7	22.3	26.4	30.8	35.6	40.7	46.2	52.1	58.4	64.9
2	1.3	1.6	2.0	2.5	3.1	3.8	4.6	5.4	6.4	7.4	8.5	9.7	10.9	12.2	13.6	15.0	16.4	17.9	19.5	21.1
3	1.2	1.5	1.8	2.1	2.5	3.0	3.5	4.0	4.6	5.2	5.8	6.5	7.2	7.9	8.6	9.3	10.0	10.8	11.5	12.3
4	1.2	1.4	1.7	1.9	2.2	2.6	2.9	3.3	3.7	4.2	4.6	5.0	5.5	6.0	6.4	6.9	7.4	7.8	8.3	8.8
5	1.2	1.4	1.6	1.8	2.1	2.3	2.6	2.9	3.2	3.6	3.9	4.2	4.5	4.9	5.2	5.6	5.9	6.2	6.6	6.9
6	1.1	1.3	1.5	1.7	1.9	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.5	4.7	5.0	5.2	5.5	5.7
7	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9
8	1.1	1.3	1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	3.9	4.0	4.2	4.3
9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9
10	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.2	2.3	2.4	2.6	2.7	2.8	3.0	3.1	3.2	3.3	3.4	3.6
11	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.3
12	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.0
13	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.5	2.6	2.7	2.8	2.9
14	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.6	2.7
15	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5
16	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4
17	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.3
18	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2
19	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1
20	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0

Appendix G: Calculation of 30Q10 and Reasonable Potential for Ammonia

Calculation for 30Q10:

Calculation for (Non – WWTP Flow) Baseflow at the USGS Gage in Leominster:

= [30Q10 of Gage] – [contributing flows (from upstream WWTFs)]
= 30.4 cfs – 14.29 cfs = **16.11 cfs**

Where: 30Q10 at the USGS Gage 01094500 (1991-2014) = **30.4 cfs**

Contributing Flows from upstream WWTFs (Lowest average dry weather effluent flows from the WWTFs upstream of the USGS gage from June to September, 2010-2014):

Fitchburg East:	5.4 MGD	8.36 cfs
Leominster:	3.83 MGD	5.93 cfs
Total	9.23 MGD	**14.29 cfs**

Calculation for Flow Factor:

Flow Factor (FF) = Baseflow per square mile of gage drainage area:
=16.11 cfs/110 square miles
= **0.1465 cfs/sq mi**

Where: Baseflow at USGS Gage in Leominster (calculated above) = 16.11 cfs

Drainage area for gage (according to USGS) = 110 sq. miles

Calculation for 30Q10 at Permitted Discharge (QP):

$$QP = DAP * FF - \sum intakes + \sum discharges$$

$$QP = (128 \text{ sq mi} * 0.1465 \text{ cfs/sq mi}) - 0 \text{ cfs} + 14.29 \text{ cfs}$$
$$= 33.041$$

Where: Drainage Area upstream of River Terrace Healthcare (DAP) = 128 sq mi (According to Streamstat tool)

Flow Factor (calculated above) = 0.146 cfs/sq mi

∑intakes = 0 cfs

∑discharges = Contributing flows from Leominster and Fitchburg East WWTFs
=14.29 cfs

Ammonia Reasonable Potential Analysis (Additional Statistical Approach)

(no Non Detect, <10 Data Points - assumed Lognormal distribution)

Date	Ammonia (ug/L)
10/8/2008	**12000**
10/29/2009	9800
10/1/2010	10000
9/29/2011	7900
10/3/2012	3490

Ammonia - (Lognormal distribution assumed)

Estimated Daily Maximum Effluent Concentration

k = number of daily samples =	5	
Max Concentration	12000.00	
cv(x)= Coefficient of Variation* =	0.6	
95th percentile multiplication factor**	2.3	
Daily Max Estimate = Max*95th percentile multiplication factor**		
Estimated Daily Max 95th Percentile =	**27600.0000**	**ug/L**
Estimated Daily Max including Dilution Factor =	**27600.0000**	**ug/L**

*Conservative estimate of CV. See Box 3-2 in Technical Support Document for Water Quality Based Toxics Control. (Also presented on pg. 3 of Appendix F).

**Multiplication factor from Table 3-2 in Technical Support Document for Water Quality Based Toxics Control (Also presented on pg 5. of Appendix F).