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),

Mount Tom Generating Company, LLC

is authorized to discharge from the facility located at

Mount Tom Generating Station
200 Northampton Street
Holyoke, MA 01040

to the receiving water named **Connecticut River**, a Class B water, in accordance with effluent limitations, monitoring requirements, and other conditions set forth herein.

This permit shall become effective on the first day of the calendar month following sixty (60) days after signature if comments are received. If no comments are received, this permit shall become effective upon the date of signature.

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

This permit supersedes the permit issued on September 18, 1992.

This permit consists of 23 pages in Part I including effluent limitations, monitoring requirements, and state permit conditions, Attachment A – Freshwater Acute Toxicity Test Protocol (February 2011), and 25 pages in Part II, Standard Conditions.

Signed this day of , 2014

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

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

PART I.A. **Effluent Limitations and Monitoring Requirements**

1. During the period beginning on the effective date and lasting through the expiration date, the permittee is authorized to discharge once through, non-contact cooling water from outfall serial number **001** to the Connecticut River. Such discharge shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS		MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE** [1]
Flow, Two pump operation: July and August September to April One pump operation: May 1 to May 24 and June 16 to June 30 May 25 to June 15	 136.8 MGD[2] 133.2 MGD[2] 68.4 MGD[2] No Discharge [2]	 136.8 MGD[2] 133.2 MGD[2] 68.4 MGD [2] No Discharge[2]	Continuous	Recorder [3]
Temperature, Effluent, July - April	*********	102 ^{o}F [4]	Continuous	Recorder
Temperature, Effluent, May-June	*********	109 ^{o}F [4]	Continuous	Recorder
Temperature Rise, delta T: One pump operation Two pump operation	 ********* *********	 32 ^{o}F [4] 20 ^{o}F [4]	Continuous	Recorder
pH Range [5]	6.5 – 8.3 s.u.		1/Week	Recorder
Total Residual Chlorine [6]	0.15 mg/l	0.15 mg/l	1/Week, during chlorination event	Grab

Footnotes are listed on Page 3.

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 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this Class.
c. The discharge shall not cause objectionable discoloration of the receiving waters.
d. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.
e. The results of sampling for any parameter above its required frequency must also be reported.

Footnotes:

1. Samples taken in compliance with the monitoring requirements specified above shall be taken between the point after the NCCW exits the condenser and prior to discharge to Outfall 001. All samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.
2. **One pump operation is defined as the use of one circulating water pump and one river water pump. Two pump operation is defined as the use of both circulating water pumps and one river water pump, with the exception of the period of July and August, during which time the flow limits are 136.8 MGD, and both river water pumps may be used.** For the period of May 25 through June 15, the permittee shall not intake any water through its Cooling Water Intake Structure (CWIS), with the exception for that used for biological monitoring required by this permit or for firefighting or other emergency purposes. For the periods of May 1 through May 24 and June 16 through June 30, the permittee shall operate under one pump operation and be limited to 68.4 MGD.
3. For flow, report the maximum and minimum daily rates and total flow for each operating date. The Flow Rate may be estimated from circulating and river water pump capacity curves and operational hours for the site or calculated based on data logger or other digital means. Attach these data to each Discharge Monitoring Report (DMR) form.
4. Temperature rise, or delta T, is the difference between the intake temperature and the effluent temperature, as recorded by the permittee's computerized system. The daily maximum delta T and effluent temperature limits shall be expressed as 1-hour average temperatures and shall not be exceeded at any time. The maximum 1-hour average delta T and effluent temperatures for each day may be recorded by a data scan, data logger, instruments, or computers and shall be comprised of at least 4 individual readings per hour. For May and June, during one pump operation, the effluent temperature limit is 109 ^{o}F and for the remainder of the year, July through April, the limit is 102 ^{o}F.
5. The pH of the effluent shall be in the range of 6.5 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. This is required for State Certification.
6. Total Residual Chlorine (TRC) may not be discharged from the condenser for more than two (2) hours per day, unless the permittee demonstrates to the EPA and MassDEP that discharge for more than 2 hours is required for adequate macroinvertebrate control. The minimum level (ML) for Total Residual Chlorine (TRC) is defined as 20 ug/l using EPA approved methods found in the most currently approved version of Standard Methods for the Examination of Water and Wastewater, Method 4500 CL-E and G, or USEPA Methods for Chemical Analysis of Water and Wastes, Method 330.5. One of these methods must be used to determine TRC concentration. The ML is not the minimum level of detection, but rather the lowest level at which the entire analytical system shall give recognizable signal and calibration points for a particular TRC method. If EPA approves a more sensitive method of analysis for TRC, the permit may be reopened to require the use of the new method with a corresponding lower ML. When reporting sample data below the ML, see the latest EPA Region NPDES Permit Program Instructions for the Discharge Monitoring Report Forms (DMRs) for guidance. Only chlorine may be used as a biocide. Sampling shall be conducted only during periods of chlorination at the Facility, when chlorine is expected to be present in the discharge. No other biocide shall be used without explicit approval from the Regional Administrator (RA) of Region I of the EPA and the Commissioner of the MassDEP or their designees.

Part I.A. (continued):

2. During the period beginning on the effective date and lasting through the expiration date the permittee is authorized to discharge floor drain and roof drain water, demineralizer regeneration water, pump seal and base drain water, coal pile runoff, nonchemical metal cleaning water, precipitator ash water, air heater wash and furnace wash water, **stormwater associated with lime silo drains in vicinity of the flue gas desulfurization (FGD) system, and bottom ash transport water from Bottom Ash Basin A** from outfall serial number **002 (Special Wastewater Basin discharge)** to the Connecticut River. Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS		MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE** [1]
Flow	0.216 MGD	0.36 MGD	Continuous	Recorder [2]
pH Range [3]	6.5 – 8.3 s.u.		1/Week	Recorder [2]
Total Suspended Solids	30 mg/l	100 mg/l	2/Month	Grab
Total Recoverable Copper	1.0 mg/l	1.0 mg/l	2/Month	Grab
Total Recoverable Iron	1.0 mg/l	1.0 mg/l	2/Month	Grab
Total Recoverable Nickel	1.0 mg/l	2.0 mg/l	2/Month	Grab
Total Recoverable Zinc	1.0 mg/l	2.0 mg/l	2/Month	Grab
Priority Pollutant Scan [4]	Report ug/l	Report ug/l	1/Year	24 Hour Composite [5]
Oil & Grease	15 mg/l	15 mg/l	2/Month	Grab

Footnotes are listed on Page 6 and 7.

WHOLE EFFLUENT TOXICITY [6,7,8,9]				
LC_{50} & NOAEL		Report %	2/Year	24 Hour Composite [5]
Total Residual Chlorine	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Salinity	-------------	Report g/kg	2/Year	24 Hour Composite [5]
pH	-------------	Report SU	2/Year	24 Hour Composite [5]
Total Solids	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Suspended Solids	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Ammonia	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Organic Carbon	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Recoverable Cadmium	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Recoverable Lead	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Recoverable Copper	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Recoverable Zinc	-------------	Report mg/l	2/Year	24 Hour Composite [5]
Total Recoverable Nickel	-------------	Report mg/l	2/Year	24 Hour Composite [5]

Footnotes are listed on Page 6 and 7.

a. The pH shall be in the range of 6.5 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. The pH shall be monitored once per week by grab sample. The minimum and maximum monthly values shall be reported.
b. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.
c. The permittee shall not dilute any components of this discharge as a partial or total substitute for adequate treatment to achieve compliance with the limitations for Outfall 002 shown above.
d. The results of sampling for any parameter above its required frequency must also be reported.
e. There shall be no discharge of chemical metal cleaning wastes from this outfall.

Footnotes:

1. Samples taken in compliance with the monitoring requirements specified above shall be taken between the point after the treated wastewater exits the wastewater sedimentation basin and prior to discharge to Outfall 002. A routine sampling program shall be developed in which samples are taken at the same location, at approximately the same time, and during the same days of every month, whenever feasible. Sampling shall be conducted during periods which are representative of the majority of waste streams being treated, taking into account detention time through the treatment process. Any deviations from the routine sampling program shall be documented in correspondence appended to the applicable discharge monitoring report that is submitted to EPA. In addition, all samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.

2. For flow, report the maximum and minimum daily rates and total flow for each operating date. These data shall be attached to each Discharge Monitoring Report (DMR) form.

3. Required for State Certification.

4. A priority pollutant scan shall be conducted once per year during the second calendar quarter of the year (April through June) and during a period which reflects typical operations of the wastewater treatment plant. The results of this scan shall be submitted with the June DMR. These submittals shall include all test results. The list of parameters to be analyzed may be found in EPA's Form 2C application and includes parameters 1M through 13M, aluminum, and parameters 1V through 31V.

5. Composite samples shall be comprised of at least 24 flow-weighted individual samples taken throughout one full operational day (e.g., 0700 Monday to 0700 Tuesday).

6. The permittee shall conduct acute chronic whole effluent toxicity (WET) tests on samples collected during the months of March and September for each year of the permit. The permittee shall test the fathead minnow, *Pimephales promelas*, and the daphnid, *Ceriodaphnia dubia*. Toxicity testing reporting is due the last day of the month following the month of the test. For example, the March toxicity test results shall be submitted no later than April 30th. The testing schedule is summarized in the table below. The test must be performed in accordance with test procedures and protocols specified in **Attachment A** of this permit and conducted during normal operating conditions.

Test Month:	**Submit Results by:**	**Test Species**	**LC_{50}**	**NOAEL**
March September	April 30th October 31st	*Pimephales promelas* (Fathead Minnow) *Ceriodaphnia dubia* (Daphnid)	Report %	Report %

7. LC_{50} is the concentration of the effluent which causes mortality to 50% of the test organisms. The NOAEL (no observed acute effect level) is defined as the highest effluent concentration at which there is no statistically-significant adverse effect on the survival of the test organisms when compared with the diluent control survival at the time of observation.

8. For each WET test, the permittee shall report on the appropriate DMR, the concentrations of the parameters listed under the WET testing heading in the table on Page 5 that are detected in a 100 % effluent sample. All these aforementioned chemical parameters shall be determined to at least the minimum quantification levels (ML) shown in **Attachment A** on page 7 of 8, or as amended. The permittee should note that all chemical parameter results must still be reported in the appropriate WET test report.

9. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall follow procedures outlined in **Attachment A, Section IV,** of this permit in order to obtain permission to use an alternate dilution water. In lieu of individual approvals for alternate dilution water required **in Attachment A**, the permittee may use the EPA New England guidance document entitled Self-Implementing Alternative Dilution Water Guidance ("Guidance Document") to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. If the Guidance Document is revoked, the permittee shall revert to obtaining approval as outlined in **Attachment A.** The Guidance Document is included as Attachment G of the DMR Instructions on the EPA website at http://www.epa.gov/region1/enforcementandassistance/dmr.html and is not intended as a direct attachment to this permit. Any modification or revocation to the Guidance Document will be transmitted to the permittees as part of the annual DMR instruction package. However, at any time, the permittee may choose to contact EPA New England directly using the approach outlined in **Attachment A.**

Part I.A. (continued):

3. During the period beginning on the effective date and lasting through the expiration date the permittee is authorized to discharge stormwater runoff from yard drains from outfall serial number **003** to the Connecticut River. Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS		MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE** [1]
Flow	*********	Report MGD	1/Month	Estimate [2]
pH Range	6.5 – 8.3 s.u.		1/Month	Grab
Total Suspended Solids	30 mg/l	100 mg/l	1/Month	Grab
Oil & Grease	15 mg/l	15 mg/l	1/Month	Grab

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 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this Class.
c. The discharge shall not cause objectionable discoloration of the receiving waters.
d. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.
e. The results of sampling for any parameter above its required frequency must also be reported.

Footnotes:

1. Samples taken in compliance with the monitoring requirements specified above shall be taken prior to discharge to Outfall 003 and prior to mixing with any other stream. All samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. A representative storm event grab sample shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least twenty four (24) hours after a previously measurable (greater than 0.1 inches) storm event. Grab samples shall be collected within sixty (60) minutes after the initiation of such storm event, if feasible. If there is no storm event that meets this sampling condition for a particular month, the permittee shall report the “no discharge” (NODI) code of “9” on its DMR for that month.

2. An estimate of the total flow from this outfall resulting from the storm event that is sampled for each month shall be reported on the DMR.

Part I.A. (continued):

4. During the period beginning on the effective date and lasting through the expiration date the permittee is authorized to discharge traveling screen wash water, service water tank overflow, and fire pump water from outfall serial number **005** to the Connecticut River. Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS		MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE** [1]
Flow, from all sources Flow, excluding fire pump water	********* *********	1.074 MGD [2] 0.71 MGD	1/Week	Estimate [3]
pH Range	6.5 – 8.3 s.u.		1/Month	Grab

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 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this Class.
c. The discharge shall not cause objectionable discoloration of the receiving waters.
d. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.
e. The results of sampling for any parameter above its required frequency must also be reported.

Footnotes:

1. The water used for the traveling screen washwater shall be comprised of the receiving water only. The permittee may not use any cooling or process water associated with the operation of this facility for the screen wash operation.
2. This flow limit reflects the intermittent use of the fire pump water for deicing purposes at the site and as a backup for the screen wash water pumps. The permittee shall report on the monthly DMR whether fire pump water was a component of the discharge for that month.
3. An estimate of the total daily flow from all sources of water for this outfall shall be reported on the DMRs. During the time period when the traveling screens are in operation, all live fish, shellfish, and other aquatic organisms collected or trapped on the screens shall be returned to the receiving water with minimal stress. All other material, except natural debris (e.g. leaves, grass and twigs), shall be removed from the intake screens and recycled or disposed of in accordance with all existing Federal, State, and/or Local laws and regulations that apply to waste disposal. Such material shall not be returned to the receiving waters.

Part I.A. (continued):

5. During the period beginning on the effective date and lasting through the expiration date the permittee is authorized to discharge stormwater, booster fan drain water associated with FGD system after treatment in an oil/water separator, and baghouse roof drain water associated with the FGD system from outfall serial number **007** to the Connecticut River. Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS		MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE** [1]
Flow	*********	Report MGD	1/Week	Estimate [2]
pH Range	6.5 – 8.3 s.u.		1/Week	Grab
Total Suspended Solids	30 mg/l	100 mg/l	1/Week	Grab
Oil & Grease	15 mg/l	15 mg/l	1/Week	Grab

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 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this Class.
c. The discharge shall not cause objectionable discoloration of the receiving waters.
d. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.
e. The results of sampling for any parameter above its required frequency must also be reported.

Footnotes:

1. Samples taken in compliance with the monitoring requirements specified above shall be taken prior to discharge to Outfall 007 and prior to mixing with any other stream. A routine sampling program shall be developed in which samples are taken at the same location, at approximately the same time, and during the same days of every month, whenever feasible. Sampling shall be conducted during periods which are representative of the majority of waste streams being discharged. All samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.
2. An estimate of the total daily flow from this outfall resulting from all sources shall be reported on the DMRs.

Part I.A. (continued):

6. During the period beginning on the effective date and lasting through the expiration date the permittee is authorized to discharge treated bottom ash transport water from outfall serial number **008 (Bottom Ash Basin A)**, that has been pH adjusted, to the Connecticut River. Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS		MONITORING REQUIREMENTS	
PARAMETER	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE** [1]
Flow	0.25 MGD	0.30 MGD	Daily, When discharging	Estimate [2]
pH Range	6.5 – 8.3 s.u.		2/Month	Grab
Total Suspended Solids	30 mg/l	100 mg/l	2/Month	Grab
Total Recoverable Copper	1.0 mg/l	1.0 mg/l	2/Month	Grab
Total Recoverable Iron	1.0 mg/l	1.0 mg/l	2/Month	Grab
Total Recoverable Nickel	1.0 mg/l	2.0 mg/l	2/Month	Grab
Total Recoverable Zinc	1.0 mg/l	2.0 mg/l	2/Month	Grab
Oil & Grease	15 mg/l	15 mg/l	2/Month	Grab

Footnotes are listed on Page 12

METALS MONITORING				
Total Recoverable Mercury	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Strontium	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Selenium	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Arsenic	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Aluminum	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Boron	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Barium	-------------	Report mg/l	1/Quarter	Grab
Total Recoverable Vanadium	-------------	Report mg/l	1/Quarter	Grab

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 to 8.3 standard units and not more than 0.5 s.u. outside of the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this Class.
c. The discharge shall not cause objectionable discoloration of the receiving waters.
d. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.
e. The results of sampling for any parameter above its required frequency must also be reported.
f. The water from this basin may be discharged to the Special Wastewater Basin followed by the WWTP for treatment if necessary for enhanced treatment of this discharge.
g. The settled solids that collect in this basin must be periodically removed from the basin as necessary and disposed of in accordance with all existing Federal, State, and/or local laws and regulations that apply to waste disposal. Such material shall not be discharged to any receiving water.

Footnotes:

1. Samples taken in compliance with the monitoring requirements specified above shall be taken prior to discharge to Outfall 008. All samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.
2. An estimate of the total daily flow from this outfall shall be reported on the DMRs.

7. 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.

8. Only chlorine may be used as a biocide. No other biocide shall be used without the explicit approval of EPA and the MassDEP.

9. Numerical Effluent Limitations for Toxicants

   EPA or MassDEP may use the results of the 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 § 122.

10. The discharges shall not cause a violation of any applicable water quality standards (WQS) or degrade the aquatic habitat quality.

11. Any change in the location, design or capacity of the present cooling water intake structure, with the exception of those changes required by this permit, shall be approved by EPA's RA and MassDEP's Commissioner or their designated parties.

12. The permittee shall comply with all existing federal, state, and local laws and regulations that apply to the reuse or disposal of solids, such as those which may be removed from the intake structure screens or traveling screens, or from water and waste treatment operations and equipment cleaning. At no time shall these solids be discharged to the Connecticut River.

13. This permit may be modified, revoked or reissued to comply with any applicable effluent standard or limitation issued or approved under Sections 30l(b)(2)(C) and (D), 304(b) (2), and 207(a) (2) of the Act, if the effluent standard or limitation so issued or approved:

   a. contains different conditions or is otherwise more stringent than any effluent limitation in this permit; or

   b. controls any pollutant not limited by this permit.

   If the permit is modified or reissued, it shall be revised to reflect all currently applicable requirements of the Act.

14. Any thermal plume in the receiving water resulting from the discharges from the Facility shall not block or severely restrict fish passage, nor interfere with the spawning of indigenous populations of fish in the receiving water, nor change the balanced indigenous population of the receiving water, and shall have minimal contact with the surrounding shorelines.

15. There shall be no discharge of polychlorinated biphenyl (PCB) compounds. The permittee shall dispose of all known PCB equipment, articles, and wastes in accordance with 40 CFR § 761. The permittee shall certify that this disposal has been accomplished.

16. All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol, and one milligram per liter (l mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR §122.21(g)(7); or

(4) Any other notification level established by the Director in accordance with 40 CFR §122.44(f).

b. That any activity has occurred or will occur which could result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

(1) Five hundred micrograms per liter (500 ug/l);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR §122.21(g)(7); or

(4) Any other notification level established by the Director in accordance with 40 CFR §122.44(f).

c. That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

17. During the period beginning on the effective date of the permit and until the installation of the impingement reduction technology, the permittee shall report all "unusual impingement events" at the Facility. An "unusual impingement event" (UIE) at MTS is defined as the impingement of 25 or more total fish of all species impinged over a twenty four hour period and include fish in the intake channel and traveling screens. Such UIEs will be reported to EPA and MassDEP by telephone no later than twelve (12) hours after the permittee is aware of or has reason to believe an UIE has occurred. If the UIE is observed during weekend, holiday or evening periods, the permittee shall notify the EPA and MassDEP on the next business day. The permittee shall prepare and submit a written report regarding any UIE within ten (10) business days to EPA and MassDEP. The MassDEP and EPA addresses to be used are found in Part I.G. of this permit.

B. UNAUTHORIZED DISCHARGES

The permittee is authorized to discharge only in accordance with the terms and conditions of this permit and only from the outfalls listed in Parts I A.1 through I.A.6 of this permit. Discharges of wastewater from any other point sources not authorized by this permit shall be reported in accordance with Part II Standard Conditions Section D.1.e.(1) of this permit (Twenty-four hour reporting).

C. STORMWATER POLLUTION PREVENTION PLAN

1. The permittee shall develop, implement, and maintain a Stormwater Pollution Prevention Plan (SWPPP) designed to reduce, or prevent, the discharge of pollutants in stormwater to the receiving waters identified in this permit. The SWPPP shall be a written document that is consistent with the terms of this permit. Additionally, the SWPPP shall serve as a tool to document the permittee's compliance with the terms of this permit. Development guidance and a recommended format for the SWPPP are available on the EPA website for the Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activities (http://cfpub.epa.gov/npdes/stormwater/msgp.cfm).

2. The SWPPP shall be developed and certified by the permittee within one hundred and eighty days (180) days after the effective date of this permit. The permittee shall certify that its SWPPP has been completed and signed in accordance with the requirements identified in 40 CFR §122.22. A copy of this certification shall be sent to EPA and MassDEP within thirty (30) days after the certification date.

3. The SWPPP shall be prepared in accordance with good engineering practices and shall be consistent with the general provisions for SWPPPs included in the most current version of the MSGP. In the current MSGP (effective May 27, 2009), the general SWPPP provisions are included in Part 5. Additionally, the permittee shall incorporate into the SWPPP all the specific pollution control activities and other requirements found in the MSGP's Industrial Sector O, Steam Electric Generating Facilities. Specifically, the SWPPP shall document the selection, design, and installation of control measures and contain the elements listed below:

a. A pollution prevention team with collective and individual responsibilities for developing, implementing, maintaining, revising and ensuring compliance with the SWPPP.
b. A site description which includes the activities at the facility; a general location map showing the facility, receiving waters, and outfall locations; and a site map showing the extent of significant structures and impervious surfaces, directions of stormwater flows, and locations of all existing structural control measures, stormwater conveyances, pollutant sources (identified in Part I.C.3.c. below), stormwater monitoring points, stormwater inlets and outlets, and industrial activities exposed to precipitation such as those associated with materials storage, disposal, and material handling.
c. A summary of all pollutant sources, including a list of activities exposed to stormwater, the pollutants associated with these activities, a description of where spills have occurred or could occur, a description of non-stormwater discharges, and a summary of any existing stormwater discharge sampling data.
d. A description of structural and non-structural stormwater controls.
e. A schedule and procedure for implementation and maintenance of the control measures described above and for the quarterly inspections and best management practices (BMPs) described below.

4. The SWPPP shall document the appropriate BMPs implemented or to be implemented at the facility to minimize the discharge of pollutants in stormwater to waters of the United States and to satisfy any non-numeric technology-based effluent limitations included in this permit. At a minimum, these BMPs shall be consistent with the control measures described in the most current version of the MSGP. In the current MSGP (effective May 27, 2009), these control measures are described in Part 2.1.2. Specifically, BMPs must be selected and implemented to satisfy the following non-numeric technology-based effluent limitations:

a. Minimizing exposure of manufacturing, processing, and material storage areas to stormwater discharges.
b. Good housekeeping measures designed to maintain areas that are potential sources of pollutants.
c. Preventative maintenance programs to avoid leaks, spills, and other releases of pollutants in stormwater discharged to receiving waters.
d. Spill prevention and response procedures to ensure effective response to spills and leaks if or when they occur.
e. Erosion and sediment controls designed to stabilize exposed areas and contain runoff using structural and/or non-structural control measures to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants.
f. Runoff management practices to divert, infiltrate, reuse, contain, or otherwise reduce stormwater runoff.
g. Proper handling procedures for salt, materials containing chlorides, or any deicing chemicals that are used for snow and ice control.

5. All areas with industrial materials or activities exposed to stormwater and all structural controls used to comply with effluent limits in this permit, **as well as the road entering the property that runs along the reflecting pool**, shall be inspected, at least once per quarter,

by qualified personnel with one or more members of the stormwater pollution prevention team. Inspections shall begin during the 1st full calendar quarter after the effective date of this permit. EPA considers calendar quarters as follows: January to March; April to June; July to September; and October to December. Each inspection must include a visual assessment of stormwater samples (from each outfall), which shall be collected within the first thirty (30) minutes of discharge from a storm event, stored in a clean, clear glass or plastic container, and examined in a well-lit area for the following water quality characteristics: color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of pollution. The permittee shall document the following information for each inspection and maintain the records along with the SWPPP:

a. The date and time of the inspection and at which any samples were collected;
b. The name(s) and signature(s) of the inspector(s)/sample collector(s);
c. If applicable, why it was not possible to take samples within the first 30 minutes;
d. Weather information and a description of any discharges occurring at the time of the inspection;
e. Results of observations of stormwater discharges, including any observed discharges of pollutants and the probable sources of those pollutants;
f. Any control measures needing maintenance, repairs or replacement; and,
g. Any additional control measures needed to comply with the permit requirements.

6. The permittee shall amend and update the SWPPP within fourteen (14) days of any changes at the facility that result in a significant effect on the potential for the discharge of pollutants to the waters of the United States. Changes which may affect the SWPPP include, but are not limited to, the following activities: a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to the waters of the United States; a release of a reportable quantity of pollutants as described in 40 CFR §302; or a determination by the permittee or EPA that the SWPPP appears to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with industrial activity.

7. Any amended, modified, or new version of the SWPPP shall be re-certified and signed by the permittee in accordance with the requirements identified in 40 CFR §122.22. The permittee shall also certify, at least annually, that the previous year's inspections and maintenance activities were conducted, results recorded, records maintained, and that the facility is in compliance with this permit. If the facility is not in compliance with any aspect of this permit, the annual certification shall state the non-compliance and the remedies which are being undertaken. Such annual certifications also shall be signed in accordance with the requirements identified in 40 CFR §122.22. The permittee shall maintain at the facility a copy of its current SWPPP and all SWPPP certifications (the initial certification, re-certifications, and annual certifications) signed during the effective period of this permit, and shall make these available for inspection by EPA and MassDEP. In addition, the permittee shall document in the SWPPP any violation of numerical or non-numerical stormwater effluent limits with a date and description of any corrective actions taken.

D. COOLING WATER INTAKE STRUCTURE (CWIS) REQUIREMENTS TO MINIMIZE ADVERSE IMPACTS FROM IMPINGEMENT AND ENTRAINMENT

The design, location, construction, and capacity of the permittee's CWIS shall reflect the best technology available (BTA) for minimizing the adverse environmental impacts from the entrainment of fish eggs and larvae, as well as the impingement of adult and juvenile fish, due to the CWIS. The following requirements have been determined by the EPA to represent the BTA for minimizing impingement and entrainment impacts at this facility:

1. Requirements To Meet Impingement Mortality Reduction BTA

a. Install, operate, and maintain wedgewire screens and reduce through screen velocity such that the impingement of juvenile and adult fish is reduced to the maximum extent practicable, consistent with the following requirements:

Install wedgewire screen units with a maximum slot size of 10 millimeters and a design through slot velocity of 0.5 fps or less under all facility operating conditions and all flow conditions, including during periods of minimum ambient source water surface elevation and periods of maximum head loss across the units. The permittee shall verify that the through slot velocity at the face of the wedgewire screen is 0.5 fps or less through measurement or calculation within thirty (30) days of initiation of operation and annually thereafter.

The wedgewire screen units must be positioned as close to the west bank of the Connecticut River and the CWIS as possible, while meeting all operational specifications required by the permit. The wedgewire screen units must be situated in the river to be roughly parallel with the river flow.

The wedgewire screen units shall employ a pressurized system to periodically clear debris from the screens in order to maintain the 0.5 fps or less through slot velocity at all times.

2. Requirements To Meet Entrainment Reduction BTA

a. The permittee shall withdraw no water from the CWIS at MTS for a continuous 22 day period to coincide with the primary fish spawning season in this vicinity of the Connecticut River. This period shall begin on May 25 and end on June 15, inclusive. The permittee may schedule and conduct its annual maintenance shutdown during this period and shall not run any intake water pumps – with the exception of when water must be withdrawn to comply with required environmental monitoring, or for firefighting or other emergency purposes.

b. The permittee shall limit intake and discharge flows during all of the days in the months of May and June when the CWIS is not restricted from withdrawing water as prescribed in Part 1.D.2.a. above. The permittee shall be limited to 68.4 MGD (one pump operation - one river water pump and one circulating water pump) during the entire months of May and June. During the months of May and June, during which the permittee is limited to one pump operation, the applicable effluent temperature limit is 109^{o}F. For the remainder of the year, the effluent temperature limit will remain 102^{o}F.

E. BIOLOGICAL MONITORING

1. The permittee shall conduct entrainment monitoring at the CWIS using the methods described below. This monitoring shall begin during the first full calendar year after the effective date of the permit and be conducted for three (3) consecutive years.

Sampling Frequency

Ichthyoplankton samples shall be collected one day per week during the period of April 15 through July 15, with all samples collected during daylight hours.

System Design and Collection Method

This entrainment sampling shall be accomplished by tapping off the existing cooling water piping. A digital flow meter, a 1,000-liter plastic tank, and 0.333 mm mesh plankton net shall be utilized to construct the sampling system. Approximately 100-200 cubic meters of intake water shall be filtered for each sampling event. At the beginning and end of each entrainment sampling event, the following water quality information shall be measured and recorded from a representative location in the river: temperature, dissolved oxygen, pH, and conductivity.

During those scheduled sampling events when permit requirements at Part 1.D.2.a. do not allow water withdrawal, the facility is allowed to run one river water pump long enough to obtain a representative sample of approximately 100-200 cubic meters of filtered intake water for each sampling event.

Laboratory Processing

Samples shall be processed with the aid of a dissecting microscope. All fish larvae and eggs shall be identified to the lowest practical taxonomic category and enumerated. Specimens of numerically dominant organisms shall be classified as to life stage and a representative number of the larvae will be measured for total length (nearest 0.1 mm). A quality control procedure for all ichthyoplankton sorting shall be followed. This program ensures that the average outgoing quality limit for ichthyoplankton sorting and identification is 90% or greater.

Data Analysis and Reporting

The data collected from the ichthyoplankton entrainment samples shall summarize the number of eggs and larvae per species per sample. The annual entrainment estimates shall be calculated and then converted to “adult equivalent” fish for each species entrained. The report shall include all assumptions, methods, and calculations used to determine the entrainment estimates.

The annual entrainment estimates calculated from data collected after the BTA has been installed shall be compared with the annual entrainment estimates calculated by the permittee from 2008 and 2009 MTS entrainment sampling (before the BTA was installed) to estimate the extent of annual larval entrainment reduction. The permittee shall also calculate entrainment projections assuming 68.4 MGD was withdrawn from the CWIS for the entire months of May and June, with and without the 22 day shutdown. This projection will be evaluated as another estimate of the extent of larval entrainment reduction.

F. REOPENER CLAUSE

1. This permit shall be modified, or alternately, revoked and reissued, to comply with any applicable standard or limitation promulgated or approved under sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

   a. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
   b. Controls any pollutants not limited in the permit.

2. If the biological monitoring required in Part E. indicates that the majority of larvae/organisms entrained through the facility falls outside of the period of May 25 to June 15, during which the permittee may not withdraw any intake water from its CWIS as specificed in Part D above then this permit may be reopened to modify this time period in order to achieve a greater entrainment reduction.

G. MONITORING AND REPORTING

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

   a. Submittal of Reports Using NetDMR

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

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

b. Submittal of NetDMR Opt-Out Requests

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

Attn: NetDMR Coordinator
U.S. Environmental Protection Agency, Water Technical Unit
5 Post Office Square, Suite 100 (OES04-1)
Boston, MA 02109-3912

and

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

c. Submittal of Reports in Hard Copy Form

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

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

Signed copies of all reports or notifications required above, with the exception of DMRs, shall be submitted to the State at the following addresses:

Massachusetts Department of Environmental Protection
Western Regional Office
Bureau of Waste Prevention (Industrial)
436 Dwight Street, 5th Floor
Springfield, MA 01103

and

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

The permittee shall submit the biological monitoring report outlined in Part E. by December 15 as an attachment to the November DMR. This report shall include ichthyoplankton densities and identification, presence of endangered species, and percent reduction estimate from the figures obtained from the permittee's 2008 and 2009 entrainment sampling and as required in Part E.

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

H. 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 CMR 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 an 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.

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 (<u>Ceriodaphnia</u> <u>dubia</u>) definitive 48 hour test.**
- **Fathead Minnow (<u>Pimephales</u> <u>promelas</u>) 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. (<u>Note that EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection.</u>) Grab samples must be used for pH, temperature, and total residual chlorine (as per 40 CFR Part 122.21).

<u>Standard Methods for the Examination of Water and Wastewater</u> 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® or equivalent deionized water and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14.	Dilution series	≥ 0.5, must bracket the permitted RWC
15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution

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

Footnotes:

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

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

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

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

Footnotes:

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

VI. CHEMICAL ANALYSIS

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

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

Notes:

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

VII. TOXICITY TEST DATA ANALYSIS

LC50 Median Lethal Concentration (Determined at 48 Hours)

Methods of Estimation:

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

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

No Observed Acute Effect Level (NOAEL)

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

VIII. TOXICITY TEST REPORTING

A report of the results will include the following:

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

NPDES PART II STANDARD CONDITIONS
(January, 2007)

TABLE OF CONTENTS

PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

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

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

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

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

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

2. Permit Actions

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

3. Duty to Provide Information

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

4. Reopener Clause

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

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

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

5. Oil and Hazardous Substance Liability

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

6. Property Rights

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

7. Confidentiality of Information

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

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

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

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

8. Duty to Reapply

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

9. State Authorities

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

10. Other Laws

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

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

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

2. Need to Halt or Reduce Not a Defense

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

3. Duty to Mitigate

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

4. Bypass

a. Definitions

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

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

b. Bypass not exceeding limitations

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

c. Notice

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

d. Prohibition of bypass

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

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

5. <u>Upset</u>

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. <u>Inspection and Entry</u>

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. <u>Reporting Requirements</u>

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 NO. MA0005339

DATE OF PUBLIC NOTICE: April 11, 2014

NAME AND ADDRESS OF APPLICANT:

Mount Tom Generating Company, LLC
200 Northampton Street
Holyoke, MA 01040

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Mount Tom Generating Station
200 Northampton Street
Holyoke, MA 01040

RECEIVING WATER: Connecticut River (Segment MA34-04)

RECEIVING WATER CLASSIFICATION: Class B (Warm Water Fishery), Combined Sewer Overflows

LATITUDE: 42E 16' 55" N LONGITUDE: 72E 36' 15" W

SIC CODE: 4911 – Electric Services

Table of Contents

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

Mount Tom Generating Company, LLC (Mt. Tom Station) is a pulverized coal-fired steam electric generating station located at 200 Northampton Street (State Route 5) in the city of Holyoke, Massachusetts. The facility is operated by Mount Tom Generating Company, LLC (the Permittee), a subsidiary of GDF Suez Energy North America. The facility has been in operation since 1960 and is a single unit generating station, with a net generating capacity of approximately 147 megawatts (MW). Coal is the primary fuel with light fuel oil being used for ignition purposes. The facility has a coal pile storage area capable of housing an inventory of up to 150,000 tons of coal.

The Permittee has applied to the U.S. Environmental Protection Agency (EPA) for reissuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge treated process wastewater from various facility operations, once-through non-contact cooling water, coal pile runoff, and storm water to the Connecticut River via Outfalls 001, 002, 003, 005, 007, and 008. *See* Figure 1 for a map of the facility location and Figure 2 for the location of the outfalls.

The current permit (1992 Permit) was issued and effective on September 18, 1992, and expired five years from that date, on September 18, 1997. EPA received a completed permit renewal application from the applicant dated March 17, 1997. Since the permit renewal application was deemed timely and complete by EPA, the permit has been administratively continued pursuant to 40 C.F.R. § 122.6.

2. Description of Intake, Treatment System, and Discharges

Mt. Tom Station (MTS) is located at approximately river kilometer 148 on the west bank of the Connecticut River. As part of its electricity generating process, the facility withdraws water from the river for cooling purposes through an 8-foot diameter, 345-foot long below ground concrete intake pipe. There are two, single-speed circulating water pumps that are each rated at 45,000 gallons per minute (gpm), or 64.8 million gallons per day (MGD), as well as two river water pumps rated at 2,500 gpm, or 3.6 MGD, each.

Directly in front of the intake pipe, which is oriented parallel to the river flow, is a series of seven (7) parallel, 4-inch brass vertical bars that are installed in concrete sleeves, with an 8.5 inch space between each bar. This configuration is designed to prevent large debris from entering the cooling water system. This cooling water intake structure (CWIS) extends approximately 30 feet into the river from shore, near the river bottom, on an inside curve of the Connecticut River. There is also a five (5) foot tall sheet pile curtain that was installed about 20 feet in front of the intake structure to direct fish and debris away from the entrance.

An electric fish barrier was installed in 1960 in front of the intake designed to deter fish from entering the intake pipe. This is a Model 2A-240 Electric Fish Control Unit which is classified as a pulse generator that supplies power to an electric fish screen that is comprised of insulated and grounded electrodes submerged in water. An MTS study conducted at EPA's request in 2007 concluded that "the electric barrier is not effective at deterring fish from entering the intake."[Mt Tom Impingement Report, December 2008 Administrative Record)(AR)#28]. Therefore, as of 2010, MTS ceased operating the electric fish barrier. This permit requires the permittee to take other specific measures to minimize adverse environmental impact (AEI) from the impingement of fish and the entrainment of fish eggs and larvae, as discussed in Section 8.7 of the Fact Sheet and specified in Part D of the permit.

Cooling water travels through the intake pipe underground until it reaches the screenwell structure. This structure consists of two (2) bays, each of which has a vertical trash rack and one flow-through traveling screen. The ten-foot wide traveling screens have 3/8-inch openings in the steel mesh and intercept fish and debris that is larger than this size. The design intake velocity at each traveling screen at mean low water level (MLW) is estimated at 1.6 feet per second (fps). MLW is the average height of all low waters recorded at a given location over a 19-year period.

The traveling screens operate upon a signal from a differential pressure switch, which measures the pressure between the upstream and downstream side of the screens. The traveling screens are washed by two, 250 gpm pumps which operate at about 70 pounds per square inch (psi). These pumps withdraw water from the circulating water pump discharge and direct what is categorized as a high pressure spray toward the screens to remove impinged debris and fish. When the screen wash pumps are out of service, water from the fire pump system is used, which has an even higher pressure. Organisms and debris that are removed from the traveling screens are sluiced into a debris trough and ultimately discharged back into the river, at Outfall 005, downstream of the intake pipe and the facility's thermal discharge at Outfall 001.

Downstream of the traveling screen, each bay contains a circulating water pump rated at 45,000 gpm (64.8 MGD) and a river water pump rated at 2,500 gpm (3.6 MGD). The facility uses only one river water pump at a time, so that the design intake flow for MTS totals 92,500 gpm, or 133.2 million gallons per day (MGD), when both circulating water pumps are operating. The number of circulating water pumps operating at any time is influenced by the river water temperature and plant operations.

In addition, a corrugated metal wall was installed downstream of the CWIS and just upstream of the cooling water discharge at Outfall 001 which extends about 20 feet into the river and then bends at a 90^{o} angle and runs parallel to the direction of the river flow for approximately 115 feet. The area within the enclosure is shallow under most river conditions, typically less than 5 feet). The design of the enclosure directs the once through cooling water directly downstream and does not allow the discharge to initially flow outward toward the middle of the river. See Figure 2.

MTS's capacity factor, roughly the percentage of time that the facility operates out of the total time that it could potentially operate, was about 10% for each of the last three years, up through the end of 2013. As recently as 2007 and 2008, the plant's capacity factor was 87% and 81.5%, respectively. This reduction in electricity generation at MTS during the last three years is due to the decreased financial competitiveness of coal-fired units as compared to electric generating facilities that are fueled by natural gas. Coal is usually brought in to the facility by rail, but it may also be delivered by truck. In order to prepare the coal for combustion, the facility uses a process which pulverizes the coal into a powder before it is introduced into the combustion chamber.

All sanitary wastewater generated at the facility is held in one of two (2) septic systems, a holding tank, or a wet well and transported off site as necessary. MTS does not discharge sanitary wastewater to the Connecticut River.

The facility chlorinates the cooling water that runs through the once-through steam condenser to prevent bio-fouling of the heat transfer surfaces. Sodium hypochlorite is used as the source of chlorine for this process. Once the water has passed through the condenser, it is discharged to the Connecticut River. The once-through non-contact cooling water discharge point, Outfall 001, is a submerged discharge under most river conditions and is located along the west bank of the river, approximately 95 meters downstream from the MTS CWIS. As noted above, the point of discharge is bounded by a corrugated metal sheet pile wall. The metal wall is buried in the sediment and rises up above the surface of the river under most river conditions.

The table below lists the discharges from the facility's permitted outfalls, including those from the 1992 permit which have been discontinued:

Table 3 - Outfall Summary

Outfall Serial Number	Description of Discharge
001	Once-through non-contact cooling water – Chlorinated
002	Wastewater treatment system effluent – various waste streams
003	Storm water
004 (inactive)	Storm water – Discontinued in 2010
005	Traveling screen wash water, service water tank overflow
006	Storm water - Reflecting Pool Overflow
007	Storm water – Highway runoff – proposed drain water and oil/water separator effluent related to Flue Gas Desulfurization

	(FGD) operations
008	Bottom Ash Pond overflow and storm water
009, 009A (inactive)	Bottom Ash Pond overflow and storm water – Discontinued 2002
010 (inactive)	Fly Ash Transport Water – Discontinued prior to 2000
011 (inactive)	Fly Ash Transport Water – Discontinued prior to 2000

2.1 Air Emissions Controls

In 2006, MTS was fitted with a Selective Catalytic Reduction (SCR) system to control air emissions of nitrogen oxides in the facility's exit (flue) gases. In February of 2009, pursuant to an administrative consent order (ACO) with the Massachusetts Department of Environmental Protection (MassDEP), MTS installed and activated a Turbosorp™ system to further control the facility's emissions of air pollutants. This system is a type of Flue Gas Desulfurization (FGD) system and will be referred to as such in this fact sheet. This system uses hydrated lime, powdered activated carbon (PAC), and brominated powdered activated carbon (B-PAC) to facilitate the removal of mercury, ash and other pollutants from the air emissions associated with coal combustion at this site. This system also reduces the hydrochloric acid, hydrofluoric acid and sulfuric acid byproducts of combustion.

By letter dated November 17, 2008 (AR#93) to Sharon Demeo of EPA, Tighe and Bond, on behalf of the permittee, requested the authorization to discharge wastewater and storm water flows associated with the operation of this FGD system. These discharges included washwaters from the FGD system's baghouse roof drains and from a proposed oil/water separator collecting water from the FGD system's booster fan drains to Outfall 007. The permittee also proposed to discharge drain water from the lime (calcium carbonate) silos to the wastewater treatment system, which discharges to Outfall 002. This water would contain the lime and ash dust which periodically falls to the ground during operation of the FGD system.

By letter of July 2, 2009 (AR #31), to the permittee, EPA found that wastewater and storm water associated with the operation of the FGD system would include new pollutant discharges which were not considered and not authorized in Mount Tom's existing permit, including mercury, silver, chromium, arsenic, and cadmium. Therefore, since EPA could not modify the permit which was expired at the time, it recommended that the permittee collect any such wastewater and transport it off-site for appropriate treatment and/or disposal. The permittee decided to operate the cleanup of the solids generated by the FGD system as a dry system, which would not result in any new wastewater or storm water discharges.

By letters of February 27, 2013 (AR#207), and July 9, 2013 (AR#220), the permittee again requested authorization to discharge certain storm water and washwaters from the area associated with the FGD system. The Turbosorp® system is characterized as a semi-dry system (EPA FGD Fact Sheet – EPA-452/F-03-034) which does not result in a wastewater stream. However, there are ash and lime residues which build up in the area of the FGD system and have the potential to be carried into the Connecticut River via storm water runoff. Since operation of the FGD system began in 2009, the permittee has routinely swept this area to try to prevent any of the ash and lime residues from being discharged directly to the Connecticut River. The permittee has estimated that this area is swept weekly during normal operations, but has acknowledged that since precipitation events can be more frequent, some of this residue can get carried into grassy areas. This wastewater either infiltrates into the ground or evaporates. As described below in the discussions for Outfalls 002 and 007, this draft permit proposes to authorize the discharge of storm water and wash waters associated with the FGD system area of the facility. With its July 9, 2013, letter, the permittee provided TCLP results for a sample of this residue that would be representative of the solids in wash water and stormwater associated with this area and that is proposed to be discharged to the permitted outfalls. This sampling resulting in non-detectable readings for silver, arsenic, barium, cadmium, chromium, mercury, lead and selenium, with a pH reading of 12.3 s.u.

2.2 Wastewater Treatment Plant

Most of the process wastewaters generated on this site are passed through either the special wastewater basin or the normal wastewater basin for initial settling out of solids, prior to being routed to an equalization basin, followed by treatment at the facility's wastewater treatment plant (WWTP). This system has been in place since 1983 and was designed to removes metals and solid materials (i.e., coal ash, fly ash). The WWTP is designed to operate at approximately 135 gpm and utilizes an alkaline precipitation process with polymer addition to precipitate solids in a gravity settler/thickener. The thickened sludge from this process is pumped to a vacuum filter for dewatering and the remaining sludge is collected in a hopper and periodically transported off site. The pH of the wastewater is neutralized with sulfuric acid or sodium hydroxide and then passed on to a 4.5 million gallon double-lined, wastewater sedimentation basin for additional solids removal prior to discharge. Water from this basin flows out through a fixed pipe overflow through a Parshall flume where flow and pH are measured before being discharged through Outfall 002 to the Connecticut River. Sampling is also conducted here for all other parameters required by the permit, including metals, oil & grease, and TRC. *See* Figure 3 for a water balance diagram of the facility. MTS sends wastewater to the treatment plant from the following processes and sources: chemical cleaning, precipitation wash water, air heater wash water, furnace wash water, coal yard wash water, coal pile runoff, floor and roof drains, demineralizer water, chemical cleaning water, pump seal water, base drain water, bottom ash basin water (new, from Bottom Ash Basin A), turbosorp washwater, ash silo and lime silo drain waters, oil/water separator and booster fan drain water.

During winter months, the permittee sometimes applies diethylene glycol onto its coal handling and conveyance equipment to keep it from freezing. Any stormwater runoff containing this chemical is also directed to the WWTP. The facility uses about 50 gallons of this deicing chemical per year.

3. Receiving Water Description

MTS is situated at approximately river kilometer (km) 148 on the Connecticut River in the City of Holyoke, MA and approximately seven miles upstream of the Holyoke Dam, along a section of the river identified as the Holyoke Pool. The Connecticut River is the longest river in New England, flowing south through Vermont, New Hampshire, Massachusetts, and Connecticut before discharging into Long Island Sound. Numerous tributaries enter the river along its course, including the Millers and Deerfield Rivers upstream of the Holyoke Pool reach.

Outfalls 001, 002, 003, 005, 006, 007, and 008 all discharge to the main stem of the Connecticut River, in a stretch classified by the MassDEP as Segment MA34-04. This segment is designated as a Class B, warm water fishery, combined sewer overflows,[1] by the MassDEP under the Commonwealth of Massachusetts Surface Water Quality Standards (SWQS).[2]

Class B waters are described in the SWQS (314 CMR 4.05(3)(b)) as:

> 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.

Warm water fisheries are defined in the MA SWQS as "waters in which the maximum mean monthly temperature generally exceeds 68°F during the summer months and are not capable of sustaining a year-round population of cold water stenothermal aquatic life" (314 CMR §4.02).[2]

According to the *Connecticut River Watershed 2003 Water Quality Assessment Report*, http://www.mass.gov/eea/agencies/massdep/water/watersheds/water-quality-assessments.html, all of this segment's designated uses were being supported, with the exception of the fish consumption use, due to polychlorinated biphenyls (PCBs) in fish tissue.

Sections 305(b) and 303(d) of the CWA require that States complete a water quality inventory and develop a list of impaired waters. Section 303(d) of the CWA requires States to identify those water bodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of a Total Maximum Daily Load (TMDL) for each pollutant that is prohibiting a designated use(s) from being attained. In Massachusetts, these two evaluations have been combined into an Integrated

---

[1] http:// www.mass.gov/eea/docs/dep/water/laws/i-thru-z/tblfig.pdf
[2] http://www.mass.gov/dep/service/regulations/314cmr04.pdf

List of Waters. The integrated list format provides the status of all assessed waters in a single, multi-part list.

The Holyoke Pool stretch of the Connecticut River is listed on the *Final Massachusetts Year 2012 Integrated List of Waters* [3] as a Category 5 waterbody, which are those classified as "waters requiring a TMDL." The pollutants and conditions contributing to this impairment are as follows: *E. Coli* and PCBs in fish tissue.

MassDEP is required under the CWA to develop a TMDL for a waterbody once it is identified as impaired. A TMDL is essentially a pollution budget designed to restore the health of a water body. A TMDL first identifies the direct and indirect discharges of the problem pollutant in order to determine the maximum amount of pollutant (including a margin of safety) that can be discharged to a specific water body while maintaining compliance with water quality standards. It then outlines a plan to meet the goal. No TMDLs have yet been drafted or finalized for this stretch of the Connecticut River.

4. Limitations and Conditions

The effluent limitations and all other requirements described herein may be found in the Draft Permit. The basis for the limits and other permit requirements are described below. The Discharge Monitoring Report (DMR) data for the period of October 2008 through October 2013 were s reviewed as part of developing the Draft Permit. This time period is referred to in this Fact Sheet as the "monitoring period".

5. Permit Basis: Statutory and Regulatory Authority

5.1 General Requirements

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

EPA bases NPDES permit limits on applicable technology-based and water quality-based

3 http:// www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf

requirements. Subpart A of 40 C.F.R. Part 125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA-promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA. *See* 40 C.F.R. § 125.3. The development of water quality-based standards is governed by a variety of legal requirements, including CWA §§ 301(b)(1)(C), 303, 401 and 510, as well as 40 C.F.R. § 122.44(d) and Part 131. Permit limits must, at a minimum, satisfy federal technology standards, but also must satisfy any more stringent water quality-based requirements that may apply. Put differently, as between technology-based and water quality-based requirements, whichever is more stringent governs the permit. In addition, when setting permit limits, EPA must consider the requirements in the existing permit in light of the CWA's "anti-backsliding" requirements, which generally bar new a permit from relaxing limits as compared to the limits in an earlier permit, unless a specific anti-backsliding exception applies. *See* 33 U.S.C. § 1342(o); 40 C.F.R. § 122.44(l).

5.2 Technology-Based Requirements

<u>*General*</u>

Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 301(b) and 402 of the CWA *(see also* 40 C.F.R. Part 125, Subpart A). Technology-based limits are set to reflect the pollutant removal capability of particular treatment technologies that satisfy various narrative treatment technology standards set forth in the CWA. These standards, in essence, define different levels of treatment capability. Specifically, pollutant discharges must be limited to a degree that corresponds with the best practicable control technology currently available (BPT) for certain conventional pollutants, the best conventional control technology (BCT) for other conventional pollutants, and the best available technology economically achievable (BAT) for toxic and non-conventional pollutants. *See* 33 U.S.C. §§ 1311(b)(1)(A), (b)(2)(A), (E) and (F); 40 C.F.R. § 125.3(a). For "new sources" of pollutant discharges, *see* 40 C.F.R. §§ 122.2 (definition of "new source) and 122.29(a), discharges of pollutants must be limited to a degree corresponding to the "best available demonstrated control technology" (BADT). *See* 33 U.S.C. §§ 1316(a) and (b).

In general, the statute requires that facilities like MTS comply with technology-based effluent limitations as expeditiously as practicable, but in no case later than March 31, 1989 (see 40 C.F.R. §125.3(a)(2)). Since the statutory deadline for meeting applicable technology-based effluent limits has already passed, NPDES permits must require immediate compliance with any such limits included in the permit. When appropriate, however, schedules by which a permittee will attain compliance with new permit limits may be developed and issued in an administrative compliance order under CWA § 309(a) or some other mechanism.

When EPA has promulgated national effluent limitation guidelines (ELGs) applying the statute's narrative technology standards (such as the BAT standard) to pollutant discharges from a particular industrial category, then those ELGs provide the basis for any technology-based effluent limits included in NPDES permits issued to individual facilities within that industrial category. 33 U.S.C. §§ 1342(a)(1)(A) and (b). *See also* 40 C.F.R. §§ 122.43(a) and (b), 122.44(a)(1) and 125.3. In the absence of a categorical ELG, however, EPA develops technology-based effluent limits by applying the narrative technology standards on a case-by-case, Best Professional Judgment (BPJ) basis. *See* 33 U.S.C. § 1342(a)(1)(B); 40 C.F.R. §§ 122.43(a), 122.44(a)(1), 125.3(c). When developing technology-based effluent limitations, EPA considers the terms of the particular technology standard in question, as specified in the statute and regulations, *id.*, along with a variety of factors enumerated in the statute and regulations for each specific technology standard. *See* 33 U.S.C. § 1314(b); 40 C.F.R. § 125.3(d). In developing ELGs, EPA's analysis is conducted for an entire industrial category or sub-category. In the absence of an ELG, EPA develops technology-based limits on a BPJ basis for a particular permit by conducting the analysis on a site-specific basis. As one court has explained:

> [i]n what EPA characterizes as a 'mini-guideline' process, the permit writer, after full consideration of the factors set forth in section 304(b), 33 U.S.C. § 1314(b), (which are the same factors used in establishing effluent guidelines), establishes the permit conditions 'necessary to carry out the provisions of [the CWA].' § 1342(a)(1). These conditions include the appropriate ... BAT effluent limitations for the particular point source. ... [T]he resultant BPJ limitations are as correct and as statutorily supported as permit limits based upon an effluent limitations guideline.

NRDC v. EPA, 859 F.2d 156, 199 (D.C. Cir. 1988).

ELGs for the Steam Electric Power Generating Point Source Category

EPA promulgated ELGs for the Steam Electric Power Generating Point Source Category (the Steam Electric ELGs) in 1982. *See* 40 C.F.R. Part 423. EPA has proposed regulations to update the Steam Electric ELGs, *see* 78 Fed. Reg. 34432 (June 7, 2013) (Proposed Rule), but these proposed regulations do not govern the permit for MTS as they have not yet been finalized and are not in effect.[4] The provisions of this part are applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. 40 C.F.R. § 423.10. MTS is a member of this

[4] EPA cannot be certain about when the updated Steam Electric ELGs will be finalized and what their provisions will be. This uncertainty is unavoidable because the terms of the final regulations may be changed from those of the proposed regulations after EPA completes its analysis, considers public comments and engages in intra-governmental review, such as with the White House Office of Management and Budget. Furthermore, in this case, the Proposed Steam Electric ELG Rule identified a variety of regulatory options that EPA was considering and the Final Rule could select any of these options, or an entirely different option. In addition, we cannot be certain of when new ELGs will take effect because, although EPA is working toward signing a new Final Rule by May 22, 2014, such targets have had to be pushed back in the past for various reasons. Moreover, there is also always the possibility that litigation over a Final Rule could result in a delay in the new rule taking effect. If the Final Rule is in effect at the time that a new Final Permit is issued to MTS, EPA will apply the Final Rule to the extent appropriate.

industrial category and is covered by these ELGs.

The Steam Electric ELGs, however, establish categorical effluent limitations under the various technology standards for only *some* of the pollutants discharged by facilities in this industry. Where an applicable categorical effluent limitation has been developed, technology-based permit limits would be based on it. For example, the Steam Electric ELGs set BPT standards for certain pollutants contained in low volume wastes, fly ash and bottom ash transport water, metal cleaning wastes, cooling water, and cooling tower blowdown. In addition, the ELGs set BAT standards for certain pollutants in cooling water, cooling tower blowdown, and chemical metal cleaning wastes. When an applicable categorical standard has not been developed, technology-based limits would instead be developed on a BPJ, case-by-case basis. *See* 40 C.F.R. § 125.3(c)(3).

5.3 Draft Permit Water Quality-Based Requirements

Water quality-based limitations are required in NPDES permits when EPA and the State determine that effluent limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water quality standards (WQS). *See* CWA § 301(b)(1)(C), 33 U.S.C. § 1311(b)(1)(C). State WQS consist of three parts: (a) designated uses for a water body or a segment of a water body; (b) numeric and/or narrative water quality criteria sufficient to protect the assigned designated use(s); and (c) antidegradation requirements to ensure that once a use is attained it will not be degraded. The Massachusetts Surface Water Quality Standards (MA SWQS), found at 314 CMR 4.00, include these elements. These standards also include requirements for the regulation and control of toxic constituents and require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site-specific criterion is established. NPDES permit limits must be set to assure that these state WQS requirements will be satisfied in the waters receiving the permitted discharge.

When using chemical-specific numeric criteria to develop permit limits, both the acute and chronic aquatic-life criteria, expressed in terms of maximum allowable in-stream pollutant concentration, are used. Acute aquatic-life criteria are considered applicable to daily time periods (maximum daily limit) and chronic aquatic-life criteria are considered applicable to monthly time periods (average monthly limit). Chemical-specific limits may be set under 40 C.F.R. § 122.44(d)(1) and are implemented under 40 C.F.R. § 122.45(d).

A facility's design flow is used when deriving constituent limits for daily, monthly or weekly time periods, as appropriate. Also, the dilution provided by the receiving water is factored into this process where appropriate. Narrative criteria from the state's water quality standards may apply to require limits on the toxicity in discharges where (a) a specific pollutant can be identified as causing or contributing to the toxicity but the state has no numeric standard, or (b) the toxicity cannot be traced to a specific pollutant.

Water quality-based effluent limitations are established based on a calculated dilution factor derived from the available dilution in the particular receiving water at the point of discharge. Massachusetts SWQS require that the available effluent dilution be calculated based upon the receiving water lowest observed mean river flow for seven consecutive days, recorded over a 10-year recurrence interval, or 7-day, 10-year low flow (7Q10). 314 CMR 4.03(3)(a). Use of the 7Q10 flow allows for the calculation of the available dilution under critical flow (worst-case) conditions, which in turn can be used in the derivation of conservative water quality-based effluent limitations. EPA calculated the 7Q10 for the Connecticut River at Outfalls 001 and 002 based on data from the United States Geological Survey (USGS) low-flow frequency statistics for the USGS gauging station nearest to the Facility along the Connecticut River (station number 01170500 at Montague City, MA[5]). EPA estimated the drainage area for the Facility using the USGS StreamStats for Massachusetts watershed delineation tool.[6] The 7Q10 flow obtained from the USGS was adjusted for the drainage area contributing to Outfall 001. EPA used the permitted flow limits consistent with 1 and 2 pump operation to calculate available effluent dilution. The calculated dilution factor for Outfall 001 was determined to be 8.6:1 at 133.2 MGD (2 pump operation) and 16.7:1 at 68.4 MGD (1 pump operation). *See* Attachment A for these dilution factor calculations for Outfalls 001 and 002.

As stated above, NPDES permits must contain effluent limits more stringent than technology-based limits when necessary to maintain or achieve state WQS. The permit must address any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that causes or has "reasonable potential" to cause or contribute to an excursion above any water quality standard. See 40 C.F.R. §122.44(d)(1). An excursion occurs if the projected or actual in-stream concentration exceeds the applicable criterion or a narrative criterion or designated use is not satisfied. In determining reasonable potential, EPA considers a number of factors, including (a) existing controls on point and non-point sources of pollution; (b) pollutant concentration and variability in the effluent and receiving water as determined from the permit application, monthly DMRs, and State and Federal Water Quality Reports; (c) sensitivity of the species to toxicity testing; (d) known water quality impacts of processes on wastewater; and, where appropriate, (e) dilution of the effluent in the receiving water.

5.4 Section 316(a) of the Clean Water Act

Heat is defined as a pollutant under Section 502(6) of the CWA. 33 U.S.C. § 1362(6). As with other pollutants, discharges of heat (or "thermal discharges") must, in general, satisfy both technology-based standards (specifically, the BAT standard) and any more stringent water quality-based requirements that may apply. With regard to water quality requirements, state WQS typically include numeric temperature criteria, and may also include narrative criteria and designated uses, that apply to particular water body classifications and could necessitate

5 USGS StreamStats National Data Collection Station Report for Station 01170500: http://streamstatsags.cr.usgs.gov/gagepages/html/01170500.htm

6 USGS StreamStats for Massachusetts Interactive Map: http://water.usgs.gov/osw/streamstats/massachusetts.html

restrictions on thermal discharges.

Beyond technology-based and water quality-based requirements, CWA § 316(a), 33 U.S.C. § 1326(a), authorizes the permitting authority to grant a variance under which thermal discharge limits less stringent than technology-based and/or water quality-based requirements may be authorized if the biological criteria of Section 316(a) are satisfied. Furthermore, the Massachusetts SWQS provide the following:

> … alternative effluent limitations established in connection with a variance for a thermal discharge issued under 33 U.S.C. § 1251 [FWPCA, § 316(a)] and 314 CMR 3.00 are in compliance with 314 CMR 4.00. As required by 33 U.S.C. § 1251 (FWPCA, § 316(a)) and 314 CMR 3.00, for permit and variance renewal, the applicant must demonstrate that alternative effluent limitations continue to comply with the variance standard for thermal discharges

314 CMR 4.05(3)(b)(2)(c) (for Class B waters); 314 CMR 4.05(3)(c)(2)(c) (for Class C waters); 314 CMR 4.05(4)(a)(2)(c) (for Class SA waters); 314 CMR 4.05(4)(b)(2)(c) (for Class SB waters); 314 CMR 4.05(4)(c)(2)(c) (Class SC waters). Therefore, thermal discharge limits set pursuant to a variance under CWA § 316(a) are deemed by the state to satisfy Massachusetts SWQS.

To qualify for a variance under CWA § 316(a), a permit applicant must demonstrate to the permitting agency's satisfaction that thermal discharge limits based on technology and water quality standards would be more stringent than necessary to assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife in and on the body of water into which the discharge is made. *See* 33 U.S.C. § 1326(a); 40 C.F.R. §§ 125.70, 125.73(a). The applicant must also show that its requested alternative thermal discharge limits will assure the protection and propagation of the BIP, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected. 40 C.F.R. § 125.73(a). *See also* 33 U.S.C. § 1326(a); 40 C.F.R. §§ 125.73(c)(1)(i). If satisfied that the applicant has made such a demonstration, then the permitting authority may impose thermal discharge limits that, taking into account the interaction of the thermal discharge with other pollutants, will assure the protection and propagation of the BIP. *See* 33 U.S.C. § 1326(a); 40 C.F.R. §§ 125.70, 125.73(a) and (c)(1)(i).

While a new facility obviously must make a *prospective* demonstration that its desired future thermal discharges will assure the protection and propagation of the BIP, a facility with an existing thermal discharge can perform either a prospective or a retrospective demonstration in support of its request for a § 316(a) variance. More specifically, "existing dischargers may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies." 40 C.F.R. § 125.73 (c)(1). Alternatively, even if there has been prior appreciable harm, the applicant may try to show that there will be no such harm going forward. 40 C.F.R. § 125.73 (c)(1)(ii).

As stated above, if the demonstration is satisfactory to the permitting authority, then it may issue a permit with alternative, variance-based thermal discharge limits. If the demonstration fails to support the requested variance-based thermal discharge limits, however, then the permitting authority shall deny the variance request. In that case, the permitting authority shall either impose limits based on the otherwise applicable technology-based and water quality-based requirements or, in its discretion, impose different variance-based thermal discharge limits that are justified by the permit record. *See In re Dominion Energy Brayton Point, LLC (Formerly USGen New England, Inc.) Brayton Point Station*, 12 E.A.D. 490, 500 n. 13, 534 n. 68, 552 n. 97 (EAB 2006). *See also* Section 7 below for further discussion of this matter.

5.5 Requirements for Cooling Water Intake Structures under CWA § 316(b)

CWA § 316(b), 33 U.S.C. § 1326(b), applies due to the permittee's withdrawal of water from the Connecticut River through a cooling water intake structure (CWISs) to be used as cooling water. CWA § 316(b) mandates that any standard set for a point source under CWA §§ 301 or 306 must "require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." This is referred to as the Best Technology Available (BTA) standard. In determining the BTA for CWISs, EPA compares technological alternatives, determines which are feasible and which achieve the greatest reductions in adverse environmental impacts (primarily entrainment and impingement),[7] and considers various additional factors such as an option's cost, non-water environmental effects, and energy effects, and a comparison of its costs and benefits.

At this time, there are no national categorical standards in effect that apply § 316(b) for MTS's CWIS. EPA has proposed regulations to create such categorical standards, *see* 76 Fed. Reg. 22174 (April 20, 2011) (Proposed Rule), but these proposed regulations do not currently govern the permit for MTS as they have not yet been finalized and are not in effect.[8] As a result,

[7] Withdrawals of water from a water body through a CWIS can kill and injure aquatic organisms in the water as a result of *entrainment* and *impingement*. Entrainment occurs when very small organisms in the water, such as fish eggs and larvae, are pulled with the water through the CWIS screens and into the cooling system. The organisms are then subjected to physical impacts, high water temperatures, pressure changes and (potentially) exposure to harmful chemicals, such as chlorine. Impingement occurs when larger aquatic organisms, such as juvenile and adult fish, are caught and held against intake screens until the screens are rotated. Once the screens are rotated, a "fish return system" may be able to safely return the organisms to the water, if a well-designed system is in place and is operated properly.

[8] EPA cannot be entirely certain about when a Final Rule will come into effect and what its provisions will be. The Agency has entered a settlement agreement calling for it to sign the Final Rule by April 17, 2014. *See* http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/upload/amendment5th.pdf. Moreover, after several earlier extensions of time, EPA and the other court parties have agreed that no further extensions will be sought or agreed to. Nevertheless, uncertainty remains unavoidable because the terms of the Final Rule may differ from those of the Proposed Rule after EPA completes its analysis, considers public comments and engages in intra-governmental review, such as with the White House Office of Management and Budget. Furthermore, in this case, the Proposed CWA § 316(b) Rule identified a variety of regulatory options that EPA was considering and the Final Rule could select any of these options, or an entirely different option. In addition, although the Final Rule is slated to be signed

consistent with 40 C.F.R. § 125.90(b), EPA developed technology-based requirements for MTS by applying § 316(b) on a site-specific basis using BPJ. A detailed discussion of the requirements pertaining to this regulation is presented in Section 8.0 of this Fact Sheet.

5.6 Antibacksliding

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 antibacksliding requirements of the CWA. *See* 33 U.S.C. § 1342(o); 40 C.F.R. § 122.44(l). These requirements prohibit new permit conditions from relaxing the requirements of earlier permit conditions, unless certain specified exceptions apply. Therefore, when developing new permit limits, EPA must determine whether the new limits under consideration would be less stringent than the corresponding limits in the prior permit and, if so, whether an exception to the antibacksliding requirements applies.

5.7 Antidegradation

Federal regulations found at 40 C.F.R. §131.12 require states to develop and adopt a statewide antidegradation policy which maintains and protects existing instream water uses and the level of water quality necessary to protect them, and which generally maintains the quality of waters which exceed levels necessary to support propagation of fish, shellfish, and wildlife and to support recreation in and on the water. The Massachusetts Antidegradation Regulations are found at Title 314 CMR 4.04.

5.8 State Certification

Under Section 401(a)(1) of the CWA, 33 U.S.C. § 1341(a)(1), EPA is required to obtain certification from the state in which the discharge is located that the provisions of the new permit will comply with all state water quality standards and other applicable requirements of state law, in accordance with Section 301(b)(1)(C) of the CWA. 33 U.S.C. § 1311(b)(1)(C). *See also* 33 U.S.C. § 1341(d). EPA permits are to include any conditions required in the state's certification as being necessary to ensure compliance with state water quality standards or other applicable requirements of state law. *See* 33 U.S.C. § 1341(d); 40 C.F.R. § 124.55(a)(2). Regulations governing state certification are set out at 40 C.F.R. §§ 124.53 and 124.55. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 C.F.R. § 122.44(d).

---

on April 17, 2014, we cannot be certain of when new ELGs will take effect. We cannot certain of where the Final Rule will set the effective date for the regulations until the Rule is finalized. Furthermore, there is also always the possibility that litigation over a Final Rule could result in a delay in the new rule taking effect. Of course, if the Final Rule is in effect at the time that a new Final Permit is issued to MTS, EPA will apply the Final Rule to the extent appropriate. Moreover, EPA notes that the Proposed Rule called for continued BPJ determinations of the BTA for controlling entrainment by CWISs at plants the size of MTS, and EPA has done a BPJ analysis in support of the Draft Permit.

6. Explanation of Permit's Effluent Limitations

In the text below, EPA details the outfall-by-outfall basis for effluent limits proposed in the Draft Permit for MTS's various discharges. As mentioned above, a summary of recent DMR data for Outfalls 001 and 002 may be found in Tables 1 and 2.

6.1 Outfall 001

6.1.1. Flow Rate

The once-through cooling water that flows through the condenser and associated equipment is discharged through Outfall 001. The flow (in millions of gallons per day) discharged from Outfall 001 is almost exclusively determined by the flow of water withdrawn from the river by the Facility's intake pumps. During roughly the period of the year between October and April, the permittee normally uses only one of its two (2) intake (circulating water) pumps and one of its two (2) river water pumps, as the ambient temperature of the river is low enough that the existing NPDES permit's effluent temperature limit and "delta T" limit can be met with a lower amount of cooling water. During the period of May through September, however, there are times when ambient intake water temperatures are high enough that the permittee must operate both intake water pumps in order both to run its plant efficiently and to meet the permit's effluent temperature and delta T limits. Accordingly, the existing permit limits discharge flow during one pump operation to 68.4 MGD, and during two (2) pump operation to 133.2 MGD. The 1992 permit limited the permittee to a monthly average and daily maximum flow of 70 MGD during one pump operation, but these limits were changed to 68.4 MGD to reflect the estimated flow that can be discharged, based on facility pump curves.

During the month of July 2010, there was a period of a few days (July 21, 22, 26 and 29) with unusually high intake water temperatures (measured as the ambient temperature in the Connecticut River) and the Facility used both river water pumps for certain periods to help ensure compliance with thermal discharge limits. This resulted in an estimated effluent (and intake) flow of approximately 136.8 MGD, a permit limit exceedence. To avoid this situation in the future, the permittee has requested an increase in its daily maximum discharge flow limit from 133.2 MGD to 136.8 MGD for the summer months. Allowing this small amount of additional discharge (and intake) flow – an increase of approximately 2.7 percent – would marginally enhance MTS's ability to generate electricity to meet hot weather peak demand while also satisfying applicable thermal discharge limits in its NPDES permit. By the same token, it would help avoid increased discharge temperatures during a time when aquatic organisms may already be stressed from higher ambient summer river temperatures. In its request to EPA, MTS stated as follows: "[a]s there are times that more cooling water could enhance operations in the summer months, the station would like to request the ability to utilize 2 river water pumps, thus the requested increase to 136.8 MGD from the present limit of 133.2 MGD." AR #207 (Feb. 27, 2013, Letter from MTS to EPA Region 1).

All other things being equal, increased discharge flow would result in decreased maximum discharge temperatures and delta-T's. As a result, EPA's primary concern about approving additional discharge flow in this case is the potential environmental effect of the increased water *withdrawals* that would be associated with that flow. In this regard, EPA's primary concern relates to any increase in entrainment of fish larvae from increased water withdrawals. *See* Section 8.3, below. Entrainment by MTS primarily involves larvae (and not eggs) and occurs primarily (*i.e.*, approximately 94 percent) in May and June, with very small amounts also potentially seen in April and July. *See* Section 8.3.2, below. Based on this site-specific assessment, a small increase in water withdrawal in July and August is not judged to markedly increase the potential for increased entrainment at MTS. Therefore, the Draft Permit has proposed increasing the authorized daily maximum discharge flow to 136.8 MGD for the months of July and August only. EPA has proposed to keep the daily maximum flow limit at 133.2 MGD in the Draft Permit for the rest of the year, with the exception of the months of May and June when the limit is 68.4 MGD. The small increase in authorized discharge flow for July and August may be permitted under certain exceptions to the CWA's anti-backsliding requirements. *See* 40 C.F.R. §§ 122.44(l)(1); 122.62(a)(2) and (5).

6.1.2. Temperature

The existing permit's effluent limit for maximum daily temperature is 102ºF (39.2ºC). The 102ºF discharge limit was deemed to meet the Massachusetts SWQS based on the dilution available at the point of discharge to the river. This conclusion was based on a general thermal analysis using a dilution calculation that was included in the Fact Sheet for the existing permit. In addition to the maximum temperature limit, the existing permit also sets limits for "delta T" (*i.e.*, the difference between the temperature of the water withdrawn from the river for cooling and the temperature of the facility's thermal discharge), with maximum daily values of 32ºF and 20ºF for one pump operation and two pump operation, respectively. These limits were based on the facility's performance history as indicated in operational data, rather than on water quality considerations. The Fact Sheet for the existing permit stated the following:

> [f]or class B warm water fisheries, the standard states that "the temperature shall not exceed 83°F (28.3°C) nor shall the rise resulting from artificial origin exceed 4°F (2.2°C)." The present permit limits the daily maximum temperature to 102°F (39°C). The discharge at this maximum temperature will not violate the water quality standards (see Attachment F for example calculations) and will remain in the proposed Draft Permit. The limits on Delta-T, the difference between the intake and discharge temperatures, are derived from operational data. The warm weather months and cold weather months do have different limits because different pumping capacities were utilized for the cooling water.

Fact Sheet for the existing Permit, p. 4. Data collected during the monitoring period shows that these limits have been complied with: maximum daily effluent temperatures have ranged from 50ºF to 99.6ºF; and under one pump operation, the delta T averaged 15.0ºF, with a high of 30ºF, while for two pump operation, the average and high values were 14.3ºF and 20ºF, respectively.

The permittee requested a § 316(a) variance in its permit application. Given that the existing permit's thermal discharge limits are based on state WQS, EPA and MassDEP first evaluated whether MTS could comply with the WQS with such a temperature limit going forward. As part of its evaluation, EPA thermally mapped the discharge in the Connecticut River under summer conditions (EPA; August 14, 2010; AR# 34,35). EPA also required the permittee to submit information predicting the impact of the thermal discharge on the Connecticut River using an accepted mixing zone model under a number of scenarios with various combinations of MTS operating conditions and environmentally sensitive river conditions (EPA §308 Letter, AR #41 And Updated Modeling Runs, e-mail of 1/17/14). The permittee submitted the results of 20 CORMIX thermal mixing model runs to EPA (Kleinschmidt, May 2011, AR#42, Kleinschmidt February 5, 2014).

This new thermal data was far more comprehensive than what was developed at the time of the 1992 permit. This new data was used by MassDEP and EPA to evaluate the thermal discharge from Outfall 001. In a report from MassDEP to EPA, and citing the more detailed thermal discharge information, the Commonwealth determined that the MTS thermal discharge did not meet the SWQS, including that it did not comply with the state's mixing zone criteria.

Given the state's determination that the discharge did not meet the SWQS, EPA next pursued an evaluation of the MTS thermal discharge under CWA § 316(a). Ultimately, EPA decided that it could issue a permit authorizing the requested new, maximum daily thermal discharge limit of 109ºF for May and June under a CWA § 316(a) variance. Central to EPA's decision to approve this increase, however, is that the increased maximum discharge temperature limit is linked with a much lower intake flow restriction for these two (2) months. As a result, the overall heat load to the river would not be higher despite the permitted increase in maximum temperature during these months. EPA's decision in this regard is discussed below in Sections 7 and 8. The existing permit's maximum daily temperature limit of 102ºF was retained for the other ten months of the year.

EPA's CWA § 316(a) variance analysis and determination is set forth below in Section 7 of the Fact Sheet. In this discussion, EPA explains its conclusion that these thermal limits will assure the protection and propagation of a balanced, indigenous community of shellfish, fish, and wildlife in and on the Connecticut River. It should also be understood that EPA is authorized to increase the maximum temperature limit for May and June pursuant to a CWA § 316(a) variance due to an exception to the antibacksliding requirements of the CWA and EPA regulations. 33 U.S.C. 1342(o)(2)(D); 40 C.F.R. § 122.62(a)(5).

Beyond the maximum daily temperature discharge limits, the new draft permit retains the existing permit's delta T limits of 32ºF under one pump operation and 20ºF under two pump operation. As indicated above, these values are based upon, and are consistent with, the operational data from the monitoring period.

6.1.3. Total Residual Chlorine

Chlorine can be extremely toxic to aquatic life. The permittee doses intake water with sodium hypochlorite (chlorine), as authorized by the permit, to control for biological growth (biofouling) in its plant equipment. The existing permit also authorizes the use of Acti-Brom® for biofouling, but the permittee discontinued use of this compound and only uses sodium hypochlorite. The only corrosion control chemicals used at the facility are used in a closed bearing cooling water system which does not contribute to wastewater discharges. The facility's condenser tubes are mainly stainless steel and brass and are periodically manually cleaned with brushes or scrapers.

As explained above, in setting permit limits, EPA must consider technology-based requirements, water quality-based requirements, and anti-backsliding requirements and permit limits must satisfy all three. As a 147 MW power plant, MTS is subject to the ELGs' BAT effluent limitations for total residual chlorine (TRC) set forth at 40 C.F.R. § 423.13(b). The ELG sets a concentration-based limit of 0.20 mg/l of TRC in once-through cooling water. In addition, the ELG prohibits the discharge of TRC from any one generating unit for more than two (2) hours per day, unless the discharger demonstrates that more than two hours is needed to control macroinvertebrates. The ELG permits simultaneous multi-unit chlorination.

Turning to water quality-based limits, EPA's freshwater water quality criteria for total residual chlorine (TRC) established pursuant to Section 304(a) of the Clean Water Act (*National Recommended Water Quality Criteria*: 2002 (EPA-822-R-02-047) are 11 ug/l for protection from chronic toxicity, and 19 ug/l for protection from acute toxicity. The 7Q10 dilution, which is calculated in Attachment A, multiplied by the chronic and acute criteria, provides the appropriate WQ-based TRC limits as shown below:

Daily Maximum WQ limit (2 pump operation): 19 ug/l * 8.6 = 160 ug/l = 0.16 mg/l

Monthly Average WQ limit (1 pump operation): 11 ug/l * 16.3 = 180 ug/l = 0.18 mg/l

The 1992 permit limited the use of Total Residual Oxidants (TRO), the general term for anti-biofouling chemicals, to two (2) hours per day with an effluent limit of 0.15 mg/l. This limit is more stringent than both the technology-based and water quality-based limits identified above, and it was established as a state certification requirement. *See* Fact Sheet for 1992 Permit, p. 3. *See also* 40 C.F.R. § 124.55(a)(2).

Effluent data indicates that TRO levels (essentially representing TRC) have averaged 0.066 mg/l during the monitoring period, with one exceedence of the 0.15 mg/l limit at 0.18 mg/l. The permittee typically doses 8 times per day for 15 minutes during the summer months in order to comply with the two hours per day limit. In the winter, when biological growth is reduced, the permittee reduces the dosage time to about 10 minutes.

For the new draft permit, the effluent limit parameter will be expressed as “total residual chlorine,” rather than TRO, because MTS only uses only hypochlorite for biofouling control. Based on anti-backsliding, the new Draft Permit retains the existing permit’s effluent limit of 0.15 mg/l for TRC. In addition, on the basis of antibacksliding and the ELGs, the new draft permit retains the above-described limits on chlorine dosing. As indicated above, the effluent data from the facility demonstrates that MTS can meet these limits.

6.1.4. pH

The existing permit’s limit on the pH of discharges from Outfall 001 is based on the Massachusetts SWQS. Fact Sheet for Existing Permit, p. 4. The permit condition states that discharge pH must “not vary by more than 0.5 units from that of the natural river,” but does not state a specific numeric range for the pH of discharges from Outfall 001.

During the monitoring period, pH has ranged from 6.68 to 8.4 s.u. The Massachusetts SWQS for Class B waters, found at 314 CMR 4.05(3)(b)(3), require a pH from 6.5 to 8.3 standard units and not more than 0.5 units outside of the natural background range. The SWQS also prohibit any changes to background conditions that would impair the receiving water’s designated uses. Therefore, the new draft permit includes numeric limits and narrative restrictions to limit the pH of discharges consistent with the SWQS. The pH monitoring frequency has been changed from twice per month to once per week to obtain more representative sampling.

6.2 Outfall 002

As described in Section 2.2 above, the MTS WWTP receives and treats a variety of types of wastewater generated by MTS. The WWTP receives wastewater from the following processes and sources at MTS: chemical cleaning, precipitation wash water, air heater wash water, furnace wash water, coal yard wash water, coal pile runoff, floor and roof drains, demineralizer water, chemical cleaning water, pump seal water, base drain water, bottom ash basin water (proposed, from Bottom Ash Basin A), turbosorp washwater, ash silo and lime silo drain waters, oil/water separator and booster fan drain water. *See* Figure 3 for a water balance diagram of the facility. These wastes include “low volume waste”, “nonchemical metal cleaning waste” (as defined in the ELG), and other types of pollutants.

6.2.1. Flow

Outfall 002 discharges effluent from the MTS WWTP. Effluent flow from Outfall 002 is limited to a monthly average of 0.216 MGD and a daily maximum of 0.36 MGD. These limits are based on the WWTP’s design flows. The flow from Outfall 002 has averaged 0.072 MGD during the monitoring period, with a high value of 0.326 MGD and no permit exceedences.

As noted earlier, the permittee has now proposed to direct drain water from the lime (calcium carbonate) silo area to the WWTP. This water would contain the lime and ash dust which periodically falls to the ground during operation of its Turbosorp® flue gas desulfurization air pollution control system. EPA has determined that the existing permit's limits for the WWTP are sufficient to control the discharge of pollutants from this waste stream because the WWTP has excess capacity available and the WWTP can effectively treat these flows. Therefore, the new Draft Permit authorizes this additional waste stream. In its July 9, 2013, letter (AR# 220), the permittee estimated the daily maximum flow of washwater and storm water associated with the FGD system to be just under 20,000 gallons per day when operating. This is the estimated additional flow that would be directed to the WWTP.

6.2.2. Total Suspended Solids (TSS)

Controlling total suspended solids (TSS) in the WWTP discharge is important for several reasons, including that they could possibly contain concentrations of metals that have not fully precipitated out of the waste stream during treatment. In addition, controlling TSS will also help to limit turbidity in the WWTP discharge, which should, in turn, help the permittee meet the permit's narrative water quality-based requirement that "[t]he discharge shall not cause visible discoloration or turbidity in the receiving waters which would impair the uses designated by the classification of the receiving waters." 1992 Permit, Condition I.A.9.

TSS is a conventional pollutant. *See* 33 U.S.C. § 1314(b)(4)(A); 40 C.F.R. § 401.16. Existing point sources discharging conventional pollutants are subject to effluent limitations based on the "best conventional pollutant control technology" (BCT) standard, which were to have been satisfied by March 31, 1989. *See* 33 U.S.C. §§ 1311(b)(2)(E); 40 C.F.R. § 125.3(a)(2)(ii).

The Steam Electric ELGs do not, however, prescribe effluent limitation guidelines under the BCT standard. Instead, EPA "reserved" the development of BCT guidelines. 40 C.F.R. § 423.14. In the absence of ELGs, EPA applies the BCT standard on a BPJ basis. *See* 40 C.F.R. §§ 125.3(a)(2)(ii), 125.3(c)(2), 125.3(d)(2).

The CWA and EPA regulations set forth a number of factors that EPA must consider in determining the BCT. These factors are the same as those specified above with regard to the BPT standard, with the addition of two comparative cost factors, one of which involves "the reasonableness of the relationship between the cost of attaining a reduction in effluent and the effluent reduction benefits derived." *See* 33 U.S.C. § 1314(b)(4)(B); 40 C.F.R. § 125.3(d)(2). As discussed above, EPA derives technology-based BPJ limits by considering the appropriate factors on a site-specific basis. In addition, EPA's manual for permit writers provides further guidance about how to develop technology-based requirements on a BPJ basis. *See* Office of Wastewater Management, U.S. Environmental Protection Agency, "NPDES Permit Writers' Manual" (Permit Writers' Manual) (September 2010). The Permit Writer's Manual identifies a wide array of materials that may be used to inform BPJ determinations and to help derive BPJ-based permit limits. These materials include items such as the following: (1) an existing ELG for an analogous industrial category; (2) an NPDES permit for a similar facility or discharge; (3) technical guidance documents pertaining to the development of technology and water-quality-based limits; and (4) permit compliance data. Effluent limits may be transferred from these sources to the permit at hand, or new limits may be developed after appropriate analysis.

The existing permit includes TSS limits of 30 mg/l and 100 mg/l, respectively, for the monthly average and daily maximum. The permit's Fact Sheet, p. 4, indicated that the limits were based on the Steam Electric ELGs. These same TSS values are included in the ELGs for low volume waste sources under both the BPT standard, 40 C.F.R. § 423.12(b)(3), and the BADT standard (for new sources), 40 C.F.R. § 423.15(c).[9] The WWTP receives wastewater from a number of low volume waste sources at MTS.[10] (The BADT standard is the most stringent technology standard.) During the monitoring period, TSS effluent values have averaged 2.64 mg/l, with a high reading of 21.8 mg/l. There have been no permit limit exceedences.

EPA has decided to retain the existing permit's effluent limits for TSS. EPA makes this decision in reliance on several factors. First, these limits continue to reflect the Steam Electric ELGs for low volume wastes under both the BPT and the BADT standards, while EPA has reserved the development of BCT limitations. Second, MTS's effluent data shows that it can easily meet these limits. Third, EPA sees no reason not to apply these limits in light of its consideration of the BCT factors discussed above. Fourth, EPA has applied these same limits in other NPDES permit limits for power plants. *See* Draft Permit for General Electric Aviation (NPDES Permit No. MA0003905), § I.A.4, p. 21; Draft Permit for Merrimack Station (NPDES Permit No. NH0001465), § I.A.2, p. 4. Finally, retaining these limits is consistent with the CWA's antibacksliding requirements.

6.2.3. Metals

The Steam Electric ELGs define "metal cleaning wastes" as "any wastewater resulting from cleaning any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning." 40 C.F.R. § 423.11(d). This definition encompasses wastewater generated from cleaning metal process equipment, whether such cleaning is carried out by chemical or nonchemical means.

---

[9] EPA notes that its recent Proposed Rule to modify the Steam Electric ELGs does not propose changes to the standards for low volume waste. 78 Fed. Reg. .34,553-34,543.

[10] The ELGs define "low volume waste" as follows:

> . . . wastewater from all sources except those for which specific limitations are otherwise established in this part. Low volume wastes sources include, but are not limited to: wastewaters from wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes are not included.

40 C.F.R. § 423.11(b).

The ELGs define "chemical metal cleaning waste" as "any wastewater resulting from cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning." 40 C.F.R. § 423.11(c). The term "nonchemical metal cleaning waste" is also used in the ELGs, but it is not expressly defined. Specifically, the ELGs state that EPA has "reserved" the development of BAT ELGs for nonchemical metal cleaning waste. 40 C.F.R. § 423.13(f). Although the regulations do not expressly define "nonchemical metal cleaning waste," the definitions of metal cleaning waste and chemical metal cleaning waste make clear that nonchemical metal cleaning waste is any wastewater resulting from the cleaning *without chemical cleaning compounds* of metal process equipment. Nonchemical metal cleaning wastes may include wastewater from a variety of sources, including nonchemical process equipment washing operations such as air heater wash, boiler wash, furnace wash, fan wash, precipitator wash, and combustion air heater wash.

It should also be understood that metal cleaning wastes are distinct from low volume wastes, as discussed further above. These two different types of pollutants are addressed by separate provisions of the ELG regulations. *See, e.g.*, 40 C.F.R. §§ 423.11(b), (c) and (d), 423.13(f). The waste sources listed as examples of low volume wastes include a variety of types of process and treatment system wastewaters, but do not include wastewater generated from washing metal process equipment.[11]

The ELGs establish BPT daily maximum and 30-day average limits of 1.0 mg/l for both total copper and total iron in discharges of "metal cleaning waste." These BPT limits apply to discharges of chemical and nonchemical metal cleaning wastes because, as stated above, both are included within the definition of "metal cleaning waste." 40 C.F.R. § 423.12(b)(5), 423.11(d). Thus, any discharges of chemical or nonchemical metal cleaning wastes by MTS would, at a minimum, be subject to the ELGs' BPT limits of 1.0 mg/l (maximum and 30-day average limits) for both total copper and total iron.

The ELGs also prescribe BADT and BAT effluent limitations for *chemical* metal cleaning wastes from "new sources" and facilities that are *not* new sources, respectively. 40 C.F.R. §§ 423.13(e), 423.15(d). For facilities that are not new sources, the ELGs set BAT daily maximum and 30-day average limits of 1.0 mg/L for both total copper and total iron in discharges of chemical metal cleaning wastes. 40 C.F.R. § 423.13(e). For facilities that *are* new sources, the ELGs again set daily maximum and 30-day average BADT standards for chemical metal cleaning wastes of 1.0 mg/L for both total copper and total iron, but also include daily maximum and 30-day average limits for both Total Suspended Solids (TSS) and Oil & Grease (O&G). 40 C.F.R. § 423.15(d). Thus, the ELGs set the same effluent limitations (i.e., daily maximum and 30-day average limits

[11] MTS discharges several waste streams that can be classified as "low volume wastes," as defined above. These low volume wastes include wastewaters from floor drains, roof drains, demineralizer regeneration, and pump drains, as shown in Figure 3. These waste streams are directed to either the normal wastewater basin or the special wastewater basin for initial settling of solids, and eventually they are directed to the wastewater treatment plant, via an equalization tank if necessary, where treatment is provided, as described in Section 2.0, prior to discharge through Outfall 002 to the Connecticut River. *See also* Section 6.2.2 immediately above.

of 1.0 mg/l for both total copper and total iron) under the BPT standard (for metals in chemical and nonchemical metal cleaning wastes) and the BAT and BADT standards (for metals in chemical metal cleaning wastes). The ELGs expressly reserved development of BAT and BADT standards for nonchemical metal cleaning wastes. *See* 40 C.F.R. §§ 423.13(f), 423.15(f).

MTS has informed EPA that it does *not* discharge chemical metal cleaning wastes. (September 3, 2013, e-mail from Jim Merchant, First Light, LLC, to George Papadopoulos, EPA, AR# 222). Although boiler cleaning wastes, including the rinse waters associated with such streams, are generated at the facility, these waters are routed to frac tanks and subsequently hauled off-site for disposal. Therefore, the Draft Permit for MTS does not propose to authorize any discharge of chemical metal cleaning wastes and does not set limits for such pollutants.[12]

MTS does discharge nonchemical metal cleaning waste, including boiler wash, furnace wash, precipitator wash, and air heater wash wastewater discharges. EPA needs to determine technology-based limits for these pollutants. MTS is not a "new source" and, therefore, is not subject to BADT standards. Its discharges of nonchemical metal cleaning waste are, however, subject to BPT and BAT standards. Since EPA has "reserved" specification of categorical BAT NELGs for nonchemical metal cleaning wastes, EPA will determine the BAT for controlling these discharges at MTS on a case-by-case, BPJ basis, and then set technology-based effluent limits corresponding to that BAT.[13] *See* 33 U.S.C. § 1342(a)(1)(B); 40 C.F.R. §§ 423.15(e) 125.3(c)-(d), 122.43(a), 122.44(a)(1), 122.1(b)(1).

CWA § 301(b)(2)(A) defines the BAT for an industrial category as "the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants …." 33 U.S.C. § 1311(b)(2)(A). *See also* 40 C.F.R. §§ 125.3(a)(2)(iii) and (iv). According to the CWA's legislative history, the "best available" technology refers to the "single best performing plant in an industrial field" in terms of its ability to reduce pollutants discharges. *See* 45 Fed. Reg. 68333. Consistent with the statute and the legislative history, when determining BAT effluent limitations on a categorical or case-by-case, BPJ basis, EPA considers the pollutant reduction capability of

---

[12] If MTS wants to discharge chemical metal cleaning wastes in the future, it will need to request and obtain authorization from EPA before commencing any such discharge. In response, EPA would consider any such request and, as appropriate, apply applicable technology-based effluent limits consistent with the ELGs and 40 C.F.R. § 125.3. EPA would also determine whether water quality-based permit requirements would be needed.

[13] While the ELGs do not set categorical BAT limitations for nonchemical metal cleaning wastes, EPA confirmed that the BAT standard applies to nonchemical metal cleaning wastes by expressly reserving the development of BAT limitations for those wastes. In the preamble to the Steam Electric Power Plant ELGs, promulgated in 1982, EPA explained that it was "reserving" the specification of BAT standards for nonchemical metal cleaning wastes because it believed that it had insufficient information regarding (a) the potential for differences between the inorganic pollutant concentrations found in the nonchemical metal cleaning wastes of oil-burning and coal-burning power plants, and (b) the cost and economic impact that would result from requiring the entire industrial category to ensure that nonchemical metal cleaning wastes satisfy the same limits that had been set for chemical metal cleaning wastes. 47 Fed. Reg. 52297 (Nov. 19, 1982). These industrial category-level uncertainties do not preclude EPA from determining a facility-specific BAT for a particular permit.

alternative technologies. Consistent with the statute and regulations, EPA also considers the following factors: (i) the age of the equipment and facilities involved; (ii) the process employed; (iii) the engineering aspects of the application of various types of control techniques; (iv) process changes; (v) the cost of achieving such effluent reductions; and (vi) non-water quality environmental impact (including energy requirements). *See* CWA § 304(b)(2) and 40 C.F.R. § 125.3(d)(3). In addition, according to 40 C.F.R. § 125.3(c)(2), when determining technology-based requirements on a site-specific, BPJ basis, EPA also considers the "appropriate technology for the category of point sources of which the applicant is a member, based on all available information," and "any unique factors relating to the applicant."

In addition, as explained further above, EPA's manual for permit writers provides further guidance about how to develop technology-based requirements on a BPJ basis. *See* Office of Wastewater Management, U.S. Environmental Protection Agency, "NPDES Permit Writers' Manual" (Permit Writers' Manual) (September 2010). The Permit Writer's Manual identifies a wide array of materials that may be used to inform BPJ determinations and to help derive BPJ-based permit limits. These materials include items such as the following: (1) an existing ELG for an analogous industrial category; (2) an NPDES permit for a similar facility or discharge; (3) technical guidance documents pertaining to the development of technology and water-quality-based limits; and (4) permit compliance data. Effluent limits may be transferred from these sources to the permit at hand, or new limits may be developed after appropriate analysis.

EPA has made a new BPJ BAT determination to support technology-based effluent limits for the Draft Permit to control discharges of nonchemical metal cleaning waste by MTS. Specifically, EPA has decided that at the present time the BAT for controlling nonchemical metal cleaning waste discharges by MTS is a combination of pH adjustment, settling basins for solids removal, and chemical precipitation for metals removal. Based on this technology, EPA is proposing in the Draft Permit that MTS meet daily maximum and 30-day average limits of 1.0 mg/l for total copper and total iron in nonchemical metal cleaning wastes.

EPA recognizes that these limits are the same as the existing BPT limits in the ELGs and believes this is appropriate because the BAT-based effluent limits for nonchemical metal cleaning waste discharges at MTS should be at least as stringent as the applicable BPT limitations for such nonchemical metal cleaning wastes. Furthermore, the BADT standards also include the same limitations for copper and iron.[14]

Beyond consideration of these BPT and BADT standards, EPA has also considered the BAT factors, as discussed below.

(i) Age of the equipment and facilities involved

[14] EPA also notes that while it has not based the BPJ-derived BAT limits proposed here on the Agency's pending Proposed Rule to update the Steam Electric ELGs, the BAT limits proposed here are consistent with the BAT limitations for nonchemical metal cleaning waste in the Proposed Rule. *See* 78 Fed. Reg. 34,534 (§ 423.13(f)(1)).

In determining the BAT for MTS, EPA accounted for the age of equipment and the facilities involved. MTS's turbine came online in 1960 and the WWTP began operation in 1983. As indicated below, MTS already treats its nonchemical metal cleaning wastes in the WWTP. There is nothing about the age of the equipment and facilities involved that would preclude, or substantially increase the cost of, continuing to use of the same or similar technology to treat nonchemical metal cleaning wastes at the facility.

(ii) Process employed

In determining the BAT for MTS, EPA considered the process employed at the facility. MTS is a fossil fuel-burning, steam-electric power plant with the primary purpose of generating electrical energy. Treating nonchemical metal cleaning wastes does not prevent the permittee from maintaining its primary production processes. The facility already treats nonchemical metal cleaning waste generated as a result of operations at the facility using pH adjustment, settling basins for solids removal, and chemical precipitation for metals removal. This treatment process can be, and already is, applied to nonchemical metal cleaning wastes. Moreover, this system will be capable of meeting the proposed effluent limits.

(iii) Engineering aspects of the application of various types of control techniques

Technologies to treat nonchemical metal cleaning wastes for copper and iron are in wide use at large steam-electric power plants around the country. Typically, this treatment process entails pH adjustment, metal coagulation and solids removal. This is fairly straightforward, standard technology applied to treat many types of wastewaters containing metals. Under the BPT standards, EPA requires nonchemical metal cleaning wastes to receive the same level of treatment as chemical metal cleaning wastes. Both must meet mass-based limits equivalent to concentration-based limits of 1.0 mg/L for total copper and total iron.

As mentioned above, technology to treat nonchemical metal cleaning wastewater already exists at MTS. Specifically, this wastewater is, and can continue to be, treated prior to discharge using pH adjustment and solids removal within neutralization and waste tanks/basins. Using this technology, MTS should be able to meet the proposed BAT limits for copper and iron.

(iv) Process changes

EPA has also evaluated the process changes associated with treatment of nonchemical metal cleaning wastes. As discussed, nonchemical metal cleaning wastes are already, and can continue to be, treated using existing technology at the plant. In addition, since metal waste treatment is a separate process from power generation, the treatment of nonchemical metal cleaning wastewater does not impact power generating operations at the Station.

(v) Cost of achieving effluent reductions

EPA does not expect any significant additional costs from the proposed BAT limits since MTS already treats nonchemical metal cleaning waste using the same technology and to the same level at its WWTP.

(vi) Non-water quality environmental impacts (including energy requirements)

Finally, EPA has considered the non-water quality environmental impacts associated with the treatment of nonchemical metal cleaning wastes, including energy consumption, air emissions, noise, and visual impacts at MTS. In particular, EPA believes that the permittee will continue to treat the nonchemical metal cleaning wastes with a similar amount of energy usage, air emissions and noise as presently occurs at the facility. As previously stated, non-chemical wastes are, and can continue to be, treated using the facility's existing treatment technology. EPA has determined the non-water environmental impacts from the steps needed to comply with the BAT effluent limits would be negligible.

Therefore, EPA has established the following BAT limits for non-chemical metal cleaning wastes at MTS for Outfall 002:

	Maximum daily (mg/l)	Max 30-day average (mg/l)
Copper, Total	1.0	1.0
Iron, Total	1.0	1.0

EPA also finds support for these limits in other permits it has issued to power plants. *See* Draft Permit for Merrimack Station (NPDES Permit No. NH0001465), § I.A.3; Final Permit for Canal Station (NPDES Permit No. MA0004928), § I.A.5. Furthermore, effluent data collected at MTS during the monitoring period show that the facility can meet the proposed BAT limits. Copper was detected only occasionally but at levels below the permit limits, and while iron was detected most months, it was again at levels within the permit limits.

Finally, the existing MTS permit also has technology-based daily maximum and 30-day average effluent limits of 1.0 for both total copper and total iron. Thus, the proposed BAT limits here are consistent with the CWA's antibacksliding requirements.

EPA also determined that these technology-based limits are more stringent than limits based on WQS would be and, therefore, should be included in the permit. The following is a calculation of the WQS-based limits that would apply for copper for Outfall 002:

Water Quality-Based Total Copper limits that would apply to Outfall 002

$$e^{(X [\ln(h)] + Y)} *$$

Where:

	Chronic*	Acute*
X=	0.8545	0.9422
Y=	-1.702	- 1.70

ln = natural logarithm
Estimated hardness of Connecticut River = 50 mg/l as $CaCO_3$ **

* *National Recommended Water Quality Criteria: 2002* (EPA-822-R-02-047).
** 2003 Connecticut River Water Quality Assessment Report, MassDEP, 2008

Thus;

e(.8545 [(ln50)] -1.702)	e(.9422 [(ln50)] -1.70) =
5.2 ug/l	7.3 ug/l

To determine the applicable WQS-based effluent limits, the following dilution factors were used, as calculated in Attachment A:

Monthly Average Flow – 5290; Daily Maximum flow - 3170

WQS-Based Limits:

Monthly Average (chronic)	Daily Maximum (acute)
5290 (5.2) = 27,500 ug/l = 27.5 mg/l	3170 (7.3) = 23,100 ug/l = 23.1 mg/l

Therefore, since the monthly average and daily maximum technology-based limits for total copper are 1.0 mg/l and are more stringent than the WQS-based limits, the technology-based limits are included in the Draft Permit. Since copper has a more stringent WQ criterion than iron, WQS-based limits for iron would be even less stringent than those for copper. Therefore, EPA again includes the technology-based limits for iron.

The existing permit also includes effluent limits for total nickel and total zinc, based on the Massachusetts water quality certification under CWA § 401. These limits prohibit discharges of either metal at a level greater than a monthly average of 1.0 mg/l and a daily maximum of 2.0 mg/l. EPA has retained these limits in the new Draft Permit in order to comply with state water quality requirements and antibacksliding restrictions. With regard to these metals, EPA also notes that nickel was not detected in sampling during the monitoring period and that zinc was occasionally detected, but at levels below the permit limits.

There could also be other metals associated with the variety of waste streams contributing flow to the WWTP that have not been fully evaluated to date. (See EPA – 821-R-13-003, April 2013.) Therefore, the Draft Permit proposes to require a once-per-year metals scan to determine whether any additional metals are present in the treated discharge from Outfall 002 and if so, to support a determination of whether any additional permit limits are needed. Depending on the results of these scans and evaluations, new limits could be added to the permit based on a permit modification or at the time of the permit's next renewal.

Finally, since these waste streams are intermittent, the Draft Permit calls for sampling to be conducted during periods representative of the majority of waste streams being treated, taking into account detention time through the treatment process.

6.2.4. pH

The existing permit requires that the effluent pH for Outfall 002 be within a range of 6.0 to 9.0 s.u. During the monitoring period, the effluent pH has ranged from 7.63 to 8.08 s.u., with no values outside the permitted range. Therefore, it is evident that MTS's existing WWTP and treatment methods, including pH adjustment, are capable of meeting the existing permit limit.

The Fact Sheet for the existing permit, *see* p. 4, states that the pH limits are based on the Massachusetts SWQS and the state's water quality certification under CWA § 401(a)(1). For Class B waters, such as the stretch of the Connecticut River relevant to this permit action, the water quality criteria in the Massachusetts SWQS currently require the following with regard to pH:

> Shall be in the range of 6.5 through 8.3 standard units and not more than 0.5 units outside of the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this Class.

314 CMR 4.05(3)(b)((3). To be sure that the narrative aspects of the state's water quality criterion are met, EPA believes it should add language to the new Draft Permit stating that "discharges shall not cause receiving water pH to vary by more than 0.5 units outside of the natural background range or change natural background conditions in a way that would impair any uses assigned to Class B waters." (As mentioned above, this language is included for Outfall 001 as well.) This language was not included in the existing permit.

EPA notes that a pH range of 6.0 to 9.0 s.u. is the range required in BPT standards in the Steam Electric ELGs, as well as in the more stringent BADT standard for new sources. *See* 40 C.F.R. §§ 423.12(b)(1) and 423.15(a). There is no BAT ELG for pH, and, as explained above, there are no BCT ELGs at all, as EPA has reserved their development. *See* 40 C.F.R. §§ 423.13 and 423.14. Given that pH is a conventional pollutant, a technology-based standard for pH would need to be developed by applying the BCT standard on a BPJ basis in accordance with the methods discussed farther above. EPA determines that BPJ-based BCT limits for pH for MTS would be a range of 6.0 to 9.0 s.u. This conclusion is based on the limitations in the BPT and BADT ELGs, as mentioned above, as well as the data showing that the facility is capable of meeting such limits with its existing technology.

Given that the water quality-based limits are more stringent than the technology-based limits, the former will be used in the permit. EPA also notes that these limits will satisfy antibacksliding requirements as they are equivalent to or more stringent than the limits in the existing permit.

Whole Effluent Toxicity (WET) Testing

EPA's Technical Support Document for Water Quality-Based Toxics Control, March 1991, EPA/505/2-90-001, recommends using an "integrated strategy" containing both pollutant-specific (chemical) approaches and whole effluent (biological) toxicity approaches to better control toxics in effluent discharges. Pollutant-specific approaches, such as those in EPA’s Gold Book (ambient water quality criteria) and state regulations, address individual pollutants, whereas whole effluent toxicity (WET) approaches evaluate, in effect, interactions between pollutants, *i.e.*, the "additive," "antagonistic" and/or "synergistic" effects of combinations of pollutants. In addition, WET analyses can reveal the presence of an unknown toxic pollutant. Region I adopted this "integrated strategy" on July 1, 1991, for use in permit development. EPA Region I has used this strategy to protect aquatic life and human health in a manner that is cost-effective as well as environmentally protective.

Section 101(a)(3) of the CWA states a nation goal of prohibiting the discharge of toxic pollutants in toxic amounts. The Massachusetts SWQS , in effect, prohibit such discharges, by stating that "all surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." 314 CMR 4.05(5)(e). The NPDES regulations at 40 C.F.R. § 122.44(d)(1)(v) require whole effluent toxicity (WET) limits in a permit when a discharge has a "reasonable potential" to cause or contribute to an instream excursion above the State’s narrative criterion for toxicity.

Sections 402(a)(2) and 308(a) of the CWA authorize EPA to establish toxicity testing requirements and toxicity-based permit limits in NPDES permits. Section 308 specifically states that biological monitoring methods may be required when needed to carry out the objectives of the Act. Under certain narrative State water quality standards and Sections 301, 303, and 402 of the Clean Water Act, EPA and the States may establish toxicity-based limits to implement the narrative “no toxics in toxic amounts” criterion.

The regulations at 40 C.F.R. Part 122.44(d)(ii) state that:

> [w]hen determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution the variability of the pollutant or pollutant parameter in the effluent, the

sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.

The EPA and MassDEP believe that the complexity of the wastewater from this discharge is such that whole effluent toxicity testing and limitations are required to identify, evaluate and address any potential water quality impacts.

There are several different waste streams that converge at the WWTP, including the new washwaters and stormwater runoff from the FGD equipment area, and there is limited data on the individual chemical characteristics of these waste streams. These discharges are likely to be variable in quality and could potentially contain metals and other pollutants that individually could be toxic to aquatic life. However, it is not possible based on current information to determine whether or not the combination of these pollutants, and their subsequent dilution with other internal streams, would result in toxic effects upon discharge. WET testing is conducted to assess whether an effluent contains a combination of pollutants which produces toxic effects. WET testing and WET limits are used in conjunction with pollutant specific effluent limits to control the discharge of toxic pollutants.

EPA presently has inadequate information to support a determination of whether this discharge has a "reasonable potential" to cause or contribute to an excursion of the Commonwealth's narrative water quality criterion. In order to obtain such information, EPA has included a WET testing requirement in the Draft Permit for Outfall 002. This approach is consistent with that recommended in Technical Support Document for Water Quality-based Toxics Control, March 1991, EPA/505/2-90-001, p. 60. The permittee shall report the results of acute WET tests twice per year using the freshwater species Daphnid, *Ceriodaphnia dubia* and the Fathead Minnow, *Pimephales promelas*. A 24-hour composite sample is the required "sample type" for WET testing. Pursuant to EPA Region 1 policy and MassDEP’s Implementation Policy for the Control of Toxic Pollutants in Surface Waters (February 23, 1990), discharges having a dilution ratio of greater than 100:1 require acute toxicity testing two times per year. As discussed in the metal limits section above, the dilution of Outfall 002 at maximum design flow is 3170.

If the WET tests indicate a toxicity problem, the Regional Administrator and the Commissioner may decide to modify the permit. Any such modifications may include the addition of WET limits and/or additional pollutant limits to adequately protect receiving water quality during the remainder of the permit term. WET test results under the new permit will be considered "new information not available at the time of permit development". Therefore, the permitting authority would be allowed to use this information as a potential basis for modifying the existing permit. *See* 40 C.F.R. §122.62(a)(2).

6.3 Outfall 003

Discharges from this outfall are comprised of stormwater from yard drains on the site. For the monitoring period, the permittee did not report any discharge from this outfall. In the 1997 permit re-application, the permittee reported that the discharge previously occurred and was sampled during the month of August 1991 with no TSS or oil & grease being detected. Since this is still considered an active stormwater outfall discharging to the Connecticut River, however, EPA has retained the existing permit limits in the new Draft Permit. These limits are 15 mg/l for oil and grease, 30 and 100 mg/l for daily maximum and 30-day average TSS limits, respectively, a pH range of 6.5 – 8.3 S.U., and a flow monitoring requirement.

6.4 Outfall 004

The existing permit authorizes MTS to discharge stormwater from yard drains in the vicinity of the main facility building through Outfall 004. After installation of the FGD scrubber system in 2009, as mentioned earlier, fine particles associated with operating this system were passing through to the outfall and resulting in violations of the existing permit's TSS limits. The permittee was unable to settle out these solids in the series of infiltration areas lying prior to the outfall. In 2010, two (2) locations along the path of this discharge were plugged and there is no longer a direct discharge possible from this outfall pipe. Since that time, there has been no reported discharge through Outfall 004 and the permittee has stated that the plugs will remain permanently in place. The stormwater that previously discharged to this outfall now infiltrates into the ground. The permittee has requested that Outfall 004 be removed from this permit and EPA agrees that this makes sense. Therefore, the Draft Permit does not authorize discharge from Outfall 004 and all monitoring requirements for Outfall 004 have been eliminated.

6.5 Outfall 005

Outfall 005 conveys an intermittent discharge consisting of water from the traveling screen washing operations, service water tank overflow water, and fire pump water. The service water tank is used as a source for various washing operations on the site. As noted earlier, the traveling screen washwater is taken off the downstream (heated) side of the circulating water pumps (AR #15). The fire pump water is used for deicing purposes on the site as well as for a backup to the traveling screen wash pumps when more pressure is needed to dislodge heavier or more entrenched debris.

During the monitoring period, Outfall 005 flow has averaged 0.079 MGD with a high reading of 0.374 MGD with no permit exceedences. The flow limits for this outfall were established at 1.074 MGD for all sources of wastewater, and at 0.71 MGD for discharges excluding the fire pump water. The pH of this discharge has ranged from 6.08 to 7.9 s.u., with one exceedence of the permitted range of 6.5 – 8.3 s.u. The pH limited range of 6.5 – 8.3 s.u. will remain in the permit. The phrase in the existing permit "unless due to natural causes," referring to pH levels falling outside of the permitted range, has been replaced with language requiring that the pH be not more than 0.5 s.u. outside of the natural background range, which is consistent with the MA SWQS.

6.6 Outfall 006

Outfall 006 is the discharge point for any overflow from a stormwater collection basin or pond known as the "reflecting pool" and located along the side of the access road leading into the MTS facility. *See* Figure 2. This basin is not in the vicinity of any industrial activity. *See* Existing Permit, § I.A.4; Existing Permit Fact Sheet, p. 6. The existing permit sets a daily maximum flow limit of 0.144 MGD and a pH range of 6.5 – 8.3 s.u. for any discharges from Outfall 006, and also requires monitoring and reporting of the volume and pH of any such discharges. The data indicates, however, that Outfall 006 only discharged during one month out of the entire monitoring period because MTS only reported effluent data for this outfall for December 2012.

In the new Draft Permit, EPA is proposing to eliminate Outfall 006. As a result, no discharges of pollutants from this outfall would be authorized. EPA believes this makes sense given the rarity of discharges from this outfall during the monitoring period. Moreover, the pond is not in the vicinity of any industrial activity. Should any discharges from 006 occur, monitoring data from other outfalls discharging stormwater, such as Outfalls 003, 007, and 008, will provide reasonably representative data for stormwater discharges from this site.

EPA recognizes that Outfall 006 has a hydraulic connection to the Connecticut River and that various materials are delivered to MTS along this access road, but any concerns about possible discharges from Outfall 006 are best addressed by the permittee's Stormwater Pollution Prevention Plan (SWPPP), as required in Part I.C of the new Draft Permit. The SWPPP must include, among other things, requirements for the permittee to identify and assess potential sources of stormwater contamination at the Facility, and then to develop and implement Best Management Practices (BMPs) for minimizing the discharge of pollutants in stormwater runoff. In addition, the Draft Permit specifically calls for the permittee to inspect and assess the area around the reflecting pond as well as the stormwater in the pond.

6.7 Outfall 007

Under the existing permit, discharges from this outfall were to be comprised solely of stormwater runoff and the permittee was required to sample for flow, pH, oil & grease, and TSS. There were no DMR data submitted during the permit term as the permittee did not witness any flow to this outfall. At the same time, the permittee noted to EPA during a December 2011 site inspection that there is the potential for some off-site stormwater to enter this outfall from an adjacent roadway. Therefore, the permittee is required to sample at a location which does not include such off-site runoff.

This new Draft Permit proposes to authorize the addition to Outfall 007 of wastewater associated with the FGD system mentioned earlier. These new wastewaters are booster fan drain water that has been treated through an oil/water separator and baghouse roof drain water. EPA believes that the existing permit's limits for TSS (30 mg/l and 100 mg/l), oil & grease (15 mg/l), and pH (6.5 – 8.3 s.u.) should adequately control the new discharges. *See* Existing Permit, § I.A.3. Therefore, these permit limits are maintained in the Draft Permit. *See* Draft Permit, § I.A.5.

6.8 Outfalls 008 and 009

Background Regarding Discharges of Bottom Ash

Bottom ash is a byproduct of the coal combustion process. As such, it is considered a type of coal combustion residual (CCR). Bottom ash collects in the bottom of a power plant's boiler. This bottom ash may contain various pollutants and at some facilities water is used to transport the bottom ash (and water) to an impoundment. Impoundments that receive wastes resulting from coal combustion, such as bottom ash, may, in turn, have discharges of wastewater containing a variety of pollutants, including toxic pollutants. These discharges could cause water quality problems if they are not managed and controlled properly. NPDES permits must address any such wastewater discharges. *See, generally,* 78 Fed. Reg. 34,432, 34,453 (June 7, 2013) (Proposed Rule) (general discussion of bottom ash transport water).

The existing Steam Electric ELGs set BPT effluent limitations for TSS and O&G in discharges of, among other things, bottom ash transport water. *See* 40 C.F.R. § 423.12(b)(4). In addition, the ELGs set the same effluent limitations under the BADT standard for TSS and O&G in bottom ash transport water discharges by "new sources." *See* 40 C.F.R. § 423.15(f). Other than TSS and O&G, the existing ELGs do not set limits for other constituents in bottom ash transport water. Moreover, the existing ELGs do not specify any BAT limitations for bottom ash transport water.

EPA is currently working on new ELGs for controlling wastewater discharges from the steam electric industry. The Proposed Rule was published on June 7, 2013. 78 Fed. Reg. 34,432 (June 7, 2013). The Proposed Rule presents, among other things, a number of options for setting BAT effluent limitations to control discharges of bottom ash transport water. EPA indicates that it is considering these options and seeks comments on them. *See* 78 Fed. Reg. 34,457 – 34,458, 34, 461 – 34,462. These options range from setting BAT limits at the same level as the existing BPT limits, to setting them to require "no discharge" of bottom ash transport water. *Id.* The Proposed Rule is not yet in effect, however, and, as a result, it does not control the limits set in this new Draft Permit. The current deadline by which EPA expects to sign a final action concerning a Final Rule for the new Steam Electric ELGs is September 30, 2015. *See* EPA website (http://water.epa.gov/scitech/wastetech/guide/steam-electric/proposed.cfm#consent) (last visited on April 8, 2014).

In the absence of BAT effluent limitations in the currently effective ELGs, any BAT limits on bottom ash transport water discharges must be set on a BPJ basis.

Limits on Bottom Ash Transport Water Discharges at MTS

The existing MTS permit authorizes the discharge of stormwater and bottom ash transport water from Outfalls 008 and 009, which are associated with Bottom Ash Basin A and Bottom Ash

Basin B, respectively. At MTS, this bottom ash has been collected by water and conveyed in an above-ground pipeline to the bottom ash basins, which have intermittently discharged to the Connecticut River.

In 2001, MassDEP issued an Administrative Consent Order (ACO) to the owner of the facility at that time, the Holyoke Water Company, to eliminate discharges to *groundwater* from these unlined basins. As a result, the permittee installed an impermeable liner in Bottom Ash Basin A. Construction spoils from the Bottom Ash Basin A work were then used to fill in and effectively cap in place the material in Bottom Ash Basin B. Since that time, no bottom ash has been directed to Basin B and none will be in the future. Moreover, there have been no discharges from Outfall 009 since that time. Therefore, the new Draft Permit proposes not to retain Outfall 009 and not to authorize any discharges from that outfall. The discharge from Bottom Ash Basin A remains, however, and effluent limits must be developed to control it.

Bottom Ash Basin A is designed for the gravity sedimentation of solids with the effluent being intermittently discharged to the Connecticut River via Outfall 008. According to a recent report from the permittee's consultant, bottom ash water is transferred to Bottom Ash Basin A for 1 to 2 hours twice per day at a rate of between 800 to 1200 gallons per minute (gpm) during normal station operations. (Tighe and Bond, AR#110) Discharges from Bottom Ash Basin A occur intermittently. When the solids in this basin reach a specified level, MTS contracts to have them dredged out of the basin and taken off-site for disposal.

The existing Permit limits discharges of TSS, O&G, copper, iron, nickel, and zinc from Outfall 008 at levels identical to the existing permit's limits for Outfall 002, as described in Section 6.2 above. The TSS and O&G limits are based on the BPT standards in the Steam Electric ELGs, while the metals limits are based on requirements of the state's water quality certification of the permit under CWA § 401(a)(1). In addition, the pH range of the discharge is limited to 6.5 to 8.3 s.u., consistent with the Massachusetts SWQS. Finally, discharge flow from Outfall 008 is limited to a monthly average of 0.25 MGD and a daily maximum of 0.30 MGD, as described above.

Discharges of wastewater from Bottom Ash Basin A occur only intermittently. During the monitoring period, discharges were recorded for most months, but there were no permit violations for any parameters. Daily maximum flow was recorded in the range of 0.01 to 0.29 MGD. Moreover, for copper, nickel, and zinc, all results were reported as "non-detect." For iron, many values were non-detect, while detected values were at concentrations of up to 0.3 mg/l. O&G readings were mostly non-detects, with the highest reading at 1.7 mg/l. The pH level ranged from 6.6 to 7.59 mg/l and TSS levels ranged from 0.5 to 14.4 mg/l.

In a treatability study for bottom ash basin water conducted on behalf of the permittee (Tighe and Bond, AR#110), several metals were found to be present in sedimentation column testing, with the water in this column representing water which could potentially be discharged to Outfall 008. Specifically, detectable levels of iron, aluminum, strontium, boron, and barium were present, even after a seven-day settling time. This indicates that these metals could potentially be discharged through Outfall 008, despite a settling time of up to seven days. In addition, detectable levels of aluminum, arsenic, barium, nickel, selenium, mercury and other metals were found in analysis of samples of sediment from the ash basin that the permittee furnished to EPA (FAX transmission from Jim Merchant to Sharon Zaya, May, 2003, AR#142).

Before discussing the Draft Permit's proposed effluent limits for Outfall 008, EPA notes that the permittee has requested permission to transfer bottom ash water through a bypass line directly from Bottom Ash Basin A to the Special Wastewater Basin (SWB). This would allow MTS the flexibility to treat wastewater from Bottom Ash Basin A in the WWTP prior to discharge to the Connecticut River through Outfall 002. The permittee indicated that it anticipates that the requested diversion of wastewater would rarely occur. The WWTP would provide more effective treatment of the Bottom Ash Basin wastewater than it would receive if it is discharged directly to Outfall 008, and the WWTP has some amount of spare capacity. As a result, EPA has not only agreed to allow the permittee to send wastewater from Basin A to the SWB if the WWTP is operating sufficiently below capacity, but the Draft Permit proposes to require the permittee to transfer wastewater from Bottom Ash Basin A to the SWB and WWTP to the extent practicable. Although discharges from Bottom Ash Basin A have been intermittent and have met existing permit limits, EPA concludes on the basis of the facts discussed above that it is appropriate to maximize the treatment provided to this wastewater to the extent practicable. This diverted water shall not cause any numeric limits or narrative standards of the permit to be violated. As part of satisfying this requirement, the permittee would need to assure that treatability for all other waste streams being treated at the WWTP would not be compromised and that this additional flow would not cause any effluent violations at Outfall 002.

EPA has determined on a BPJ basis that that BAT limits for bottom ash transport water discharges from Bottom Ash Basin A and Outfall 008 will be the same as the current BPT effluent limitations in the ELGs and the current limits in the existing permit for this discharge. Furthermore, these same effluent limits are also in the BADT effluent limitations for bottom ash transport water discharges from new sources. In other words, the new Draft Permit proposes to retain the existing permit's limits on TSS and O&G on a technology basis. While EPA has reserved the development of BCT limitations, EPA also sees no reason not to apply these limits in light of its consideration of the BCT factors discussed above. Moreover, MTS's effluent data shows that it can easily meet these limits.

As discussed in the preamble to the Proposed Rule for the new Steam Electric ELGs, "well designed and well-operated [surface impoundments] can effectively remove suspended solids, including pollutants such as particulate forms of certain metals when associated with the suspended solids." 78 Fed. Reg. 34,461 – 34,462. In this case, the levels of metals found in the sediment and the dearth of metals found in the intermittent wastewater discharges from Outfall 008 suggest that the sedimentation basin is operating effectively. EPA recognizes that a surface impoundment is not designed to remove dissolved metals from wastewater, *id.*, but again the low levels of metals detected in the intermittent discharges from 008 suggest that this is not a problem at MTS. EPA recognizes that there are power plants that handle their bottom ash without any wastewater discharges in various ways, *see* 78 Fed. Reg. at 34,449, 34,462, but the

Agency is not clear on whether any of these technologies or operational modes would be suitable or appropriate for a power plant of MTS's relatively small size and intermittent operations. EPA welcomes comments on this issue, in terms of what technologies could possibly be retrofitted at MTS, whether such retrofit would be appropriate and what effluent limits would be associated with such a retrofit. EPA also considered the BAT factors discussed above (*e.g.,* cost, non-water quality effects and energy requirements), and sees no reason in light of these considerations for not retaining the existing permit's limits as the BAT limits.

The new Draft Permit also proposes to retain the same discharge flow limits, based on the permittee's estimated flow rate out of this basin as described above. In addition, the pH range of 6.5 – 8.3, which is based on the Massachusetts SWQS, is proposed to be retained as required by past State certifications. Furthermore, the Draft Permit proposes to retain the effluent limits for total nickel, total zinc, iron, copper and O&G, based on the Massachusetts water quality certification under CWA § 401, and based on anti-backsliding requirements.

Additionally, EPA is requiring that the permittee collect quarterly discharge data on the following pollutants based on their presence in the treatability study and soil metals analytical data referenced above: arsenic, mercury, selenium, aluminum, strontium, vanadium, boron, and barium. These data can be used to ensure that the discharge from 008 does not have the reasonable potential to violate MA WQS. The results of this analysis could be used to support future permitting determinations and even, depending on what the results show, permit modifications, as appropriate. Finally, in light of the considerations noted above, EPA is also considering requiring whole effluent toxicity testing for discharges from Outfall 008. The Agency welcomes comments on this issue as well.

6.9 Outfalls 010 and 011

As noted in Section 2 above, these outfalls have been discontinued and removed from the Draft Permit. These outfalls had formerly discharged flyash transport water from the two (2) flyash basins on the southern portion of this site. These flyash ponds have not been used for many years and all flyash generated at the facility is removed from the site.

7. Analysis of Thermal Discharge Limits for Outfall 001

As discussed above, in developing thermal discharge limits for this permit, EPA and MassDEP must consider applicable technology-based requirements, water quality-based requirements, and the applicant's CWA §316(a) demonstration submitted in support of its request for a §316(a) variance. Specifically, the permittee requested a §316(a) variance in its supplemental application submittal (AR #11) that was submitted on May 31, 2000.

7.1 Technology-Based Requirements

Turning first to technology standards, the statute classifies heat as a "nonconventional" pollutant subject to BAT standards. *See* 33 U.S.C. §§ 1311(b)(2)(A) and (F). *See also* 33 U.S.C. §§ 1311(g)(4), 1314(a)(4) and 1362(6). As noted above, the ELGs for the Steam Electric Power Generating Point Source Category, which are found at 40 C.F.R. Part 423, apply to MTS because this facility meets the ELG's definition of a steam electric power plant. This definition covers facilities that, among other things, burn a fossil fuel (coal, oil, gas) as its fuel source. Since the Steam Electric ELGs do not include categorical standards for thermal discharge, the permit writer is authorized under Section 402(a)(1)(B) of the CWA and 40 C.F.R § 125.3 to establish technology-based thermal discharge limits by applying the BAT standard on a case-by-case, BPJ basis.

With regard to technologies for reducing thermal discharges, EPA is aware that closed-cycle cooling towers, if available for use at the site, would substantially reduce thermal discharges from a facility like MTS. Therefore, thermal discharge limits based on this technology would be substantially more stringent than the limits based on the open-cycle cooling system that characterizes MTS' present operation. EPA has considered closed-cycle cooling in the analysis found below.

In setting a BAT effluent limit on a BPJ basis, EPA considers the relative capability of available technological alternatives and seeks to identify the best performing technology for reducing pollutant discharges (i.e., for approaching or achieving the national goal of eliminating the discharge of pollutants). In addition, before determining the BAT, EPA also considers the following factors: (1) the age of the equipment and facilities involved; (2) the process employed; (3) the engineering aspects of the application of various control techniques; (4) process changes; (5) the cost of achieving such effluent reduction; and (6) non-water quality environmental impacts (including energy requirements); as well as the appropriate technology for the category or class of point sources of which the applicant is a member based upon all available information; and any unique factors relating to the applicant. *See* 33 U.S.C. § 1314(b)(2)(B); 40 C.F.R. §§125.3(c)(2)(i) and (ii), and 125.3(d)(3). EPA has considered each of these factors in the context of this BPJ determination of the BAT for controlling thermal discharges at MTS.

"Open-cycle" (or "once-through") cooling systems typically produce the highest levels of thermal discharges (and water withdrawals), as compared to closed-cycle or partially closed-cycle systems. MTS currently operates with an open-cycle cooling system and, as a result, the entire volume of the facility's cooling water (and thus the entire amount of waste heat) is discharged to the receiving water. "Closed-cycle" cooling systems reduce thermal discharges (and cooling water withdrawals). In a closed-cycle system, cooling water is used to condense the steam, but rather than discharge the heated water, a cooling system is used to remove most of the waste heat from the cooling water – typically dissipating the heat to the atmosphere through a cooling tower of some type – so that the water can be reused for additional cooling.[15]

---

[15] Cooling towers can also be used in a "helper tower" configuration, which involves using cooling towers to "chill"

Given that MTS is an existing facility that would require retrofitting to achieve technologically-driven improvements, EPA has looked to the existing steam electric facilities that have achieved the greatest reductions in thermal discharges through technological retrofits. As a general matter, the best performing facilities in terms of reducing thermal discharges at existing open-cycle cooling power plants are those facilities that have converted from open-cycle cooling to closed-cycle cooling using some type of "wet" cooling tower technology. Converting to closed-cycle cooling can reduce heat load to the receiving water by 95% or more.[16] EPA's research has identified a number of facilities that have made this type of technological improvement. *See Draft Permit Determinations Document for Brayton Point Station NPDES Permit*, at pp. 7-37 to 7-38; *Responses to Comments for Brayton Point Station NPDES Permit*, at p. IV-115.

EPA has determined that converting MTS's cooling system to a closed-cycle system using wet, mechanical draft cooling towers would be the BAT for the reduction of thermal discharges at the Facility. As part of its determination of the BTA for MTS's CWISs under CWA § 316(b), EPA evaluated alternative cooling system technologies in light of their feasibility and the various factors listed above (e.g., cost, engineering considerations). (*See* Section 8.7.2. and 8.8 below). EPA relies upon and incorporates by reference that analysis here. *See. e.g., In re Dominion Brayton* Point, 12 E.A.D. at 538-548. At MTS, with a wet cooling tower system, the remaining discharge volume (consisting of cooling tower blowdown) would be discharged to the Connecticut River, subject to specific effluent limits. The highest volume of this discharge would be up to approximately 1.5 MGD in the summer months, at a temperature of 98°F, assuming an intake temperature of 82°F. This would represent a greater than 97% reduction in flow volume and heat load from the current two pump operation at a delta T of 20°F.

However, EPA has concluded, based on a CORMIX analysis provided by the permittee (discussed in Section 7.3 below) and in consideration of the aquatic community present at the discharge location, that the discharge of non-contact cooling water (NCCW) at the limits set forth in the new draft permit based on use of an open-cycle cooling system will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in the segment of the Connecticut River affected by the discharge. Thus, technology-based temperature limits based on the installation and operation of a full scale closed-cycle cooling system at MTS would be more stringent than necessary to satisfy the standard of CWA § 316(a) for the protection of aquatic life. EPA, therefore, has granted a variance from technology-based temperature limits under Section 316(a) of the CWA.

---

the heated water prior to discharge, but does not involve reusing the cooling water. Therefore, this approach does not reduce cooling water withdrawals.

[16] Retrofitting all four generating units at Brayton Point Station in Massachusetts has reduced the heat load to Mount Hope Bay (the receiving water) by approximately 96%.

7.2 Water Quality-Based Requirements

Water quality-based requirements would be based on the Massachusetts SWQS's numeric and narrative temperature criteria, consideration of designated and existing uses, and the State's antidegradation and mixing zone policies. The state's SWQS classify the Connecticut River as a Class B warm water fishery and, accordingly, prohibit discharges from causing ambient water temperatures to exceed either a daily maximum of 83°F (28.3°C) or a rise in receiving water temperature due to a discharge of more than 5°F (2.8°C), based on the minimum expected flow for the month.

At the current level of operation, however, MTS's thermal discharge cannot always meet the numeric temperature criteria of the MA SWQS throughout the receiving water (see Table 1). In a report from MassDEP to EPA, the state determined that the MTS thermal discharge from Outfall 001 does not meet SWQS because, as reported by MassDEP:

> "In each of the modeled plume scenarios, at least one, and sometimes both, MA Surface Water Quality numerical criteria for temperature in Class B warm waters (the classification of the Connecticut River) are violated. These criteria are: a) 83°F (28.3°C) in warm water fisheries; and b) the rise in temperature due to a discharge shall not exceed 5°F (2.8°C) in rivers and streams designated as warm water fisheries (based on the minimum expected flow for the month)" (MassDEP, March 18, 2014, AR#221)

In addition, the MTS thermal discharge does not meet the state's Mixing Zone Criteria because, as stated by MassDEP:

> "In addition, certain of the scenarios violate that aspect of the MA Mixing Zone Policy which states that there shall be no acute toxicity within the mixing zone. A very small zone of acute toxicity to alosid (genus *Alosa*) juveniles (specifically, blueback herring, alewives and American shad) is expected near to the discharge during the summer when ambient water temperature is high, due to the facility's high delta temperature and alosid physiological responses to high delta temperatures." (MassDEP, March 18, 2014, AR#221)

The data and analysis to support these determinations are presented in Section 7.3.3.1, below. Having explained why MTS's thermal discharge would not satisfy the above-discussed temperature criteria of the Massachusetts SWQS, EPA hastens to point out that the state's SWQS also provide that *any discharge determined to qualify for a thermal discharge variance under CWA § 316(a) is automatically deemed to satisfy the state's SWQS*. This is discussed in § 5.4 above. Thus, if EPA decides to grant a thermal discharge variance from technology and water quality standards, the SWQS expressly provide that the discharge authorized under CWA § 316(a) variance is deemed to satisfy the SWQS. 314 CMR 4.05(3)(b)(2)(c) (for Class B waters).

7.3 §316(a) Demonstration

According to CWA Section 316(a), as codified at 40 C.F.R. 125 subpart H, thermal discharge effluent limits in permits may be less stringent than those required by technology-based and water quality-based requirements if the discharger demonstrates that such limits meeting those requirements would be more stringent than necessary to assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish, and wildlife in and on the water body receiving the thermal discharge. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of the BIP.

For its evaluation of MTS's §316(a) demonstration, EPA considered the suite of available information including 1) a thermal plume study conducted in the summer of 1974 (Massachusetts Division of Fisheries and Game (MAF&G), 1974, AR#1); 2) an EPA thermal mapping field effort conducted in the summer of 2010 (Attachment B, EPA Aug 14, 2010; 3) multiple CORMIX modeling analyses submitted to EPA by the permittee beginning in 2011; and 4) information on the assemblage of fish species in the affected area of the Connecticut River and their thermal sensitivities.

7.3.1. 1974 Thermal Discharge Analysis

A thermal plume study of the MTS discharge was conducted in 1974 by the MAF&G (MAF&G, 1974, AR#1). EPA determined that this study was of minimal use as part of a current MTS §316(a) demonstration. The thermal monitoring for this study was performed in June of 1974, when the MTS delta T was 13°F and the maximum discharge temperature was 81°F. Monitoring performed in August of 1974 recorded a delta T of 15°F and a maximum discharge temperature of 92°F. Because these values are well below the maximum permitted values under the 100% MTS generating conditions (delta T of 32°F under one pump operation and 20°F under two pump operation, with a maximum discharge temperature of 102°F), the thermal discharge analysis did not consider a reasonable "worst-case" impact to the receiving water. Due to these inadequacies, EPA's analysis focused on more recent data that better represent the current and worst-case operation conditions at MTS.

7.3.2. 2010 EPA Thermal Mapping Data

Temperature measurements were taken by EPA staff on August 14, 2010, from 12:00 PM through 4:00 PM (EPA, Aug 14, 2010; AR# 34 & 35). At the time temperatures were taken, the Facility was discharging non-contact cooling water at a rate of 133.2 million gallons per day (MGD). The Facility's reported intake temperature was approximately 80°F and the reported discharge temperature was approximately 86°F during the river monitoring. The reported delta T of approximately 6°F is well below the maximum permitted delta T of 20°F and is not representative of a "worst case" discharge to the receiving water. This one day "snap shot" of the thermal influence of the MTS discharge is of limited value as part of a §316(a) demonstration, because it did not reflect conditions approaching the permitted delta T or maximum discharge temperatures. The data were used, however, to "ground truth" or assist in calibrating the mixing zone model that was ultimately used to support a meaningful §316(a) demonstration.

7.3.3. CORMIX Thermal Modeling

CORMIX, an EPA-supported mixing zone model, is commonly used for the assessment of regulatory mixing zones associated with continuous point source discharges. The model emphasizes the role of boundary interaction to predict steady-state mixing behavior and plume geometry. MTS used CORMIX to predict thermal plume geometry and mixing behavior for a suite of thermal effluent conditions and river parameters.

In an information request letter dated February 15, 2011, subsequently amended April 22, 2011, EPA required the permittee to conduct a detailed thermal plume analysis. In response, the permittee submitted its "Response to EPA Information Request," which included sixteen CORMIX model depictions under various flows, temperatures, and ambient conditions (Kleinschmidt; May 2011). In particular, the 2011 model was based on facility testing conducted by the permittee in 2011. The permittee used the formula for heat load below:

Where Q = Heat Load, British Thermal Units (BTU)/hour
Cp = Heat Capacity (Specific Heat) of water = 1.0 BTU/pound- ^{O}F
m = mass of water = cooling water flow rate (MGD) x density of river water = cooling water flow rate (MGD) x 8.34 pounds/gallon
ΔT = discharge temperature - intake temperature, ^{O}F , hourly average .

The Heat Load was calculated on an hourly basis using the following equation:

$$Q = Cpm(\Delta T)/24 \text{ hours}$$

The testing indicated that the maximum thermal load that could be delivered to the receiving water when the generating station was at 100% generating capacity was approximately 6.3 x 10^8 BTU/hr , based on a discharge of heated water at a rate of approximately 70 MGD with a delta T of up to 26°F (under one pump operation). A discharge of heated water at a rate of 133.2 MGD with a delta T of up to 13°F (under two pump operation) resulted in a slightly lower heat-load of approximately 6.0 x 10^8. Therefore, all sixteen of the 2011 CORMIX model scenarios were run at less than the maximum permitted conditions. These permitted conditions are defined by a delta T of 32°F under one pump operation and 20°F under two pump operation. These maximum permitted conditions represent in a "worst case" thermal heat-load to the Connecticut River ranging from 7.8 x 10^8 BTU/hr under one pump operation and 9.2 x 10^8 BTU/hr under two pump operation. These worst-case heat loads are substantially greater than the maximum modeled heat-load of 6.3 x 10^8 BTU/hr.

In addition, EPA reviewed daily delta T and discharge information from Outfall 001 and determined that plant operation on January 19, 2010, and February 7, 2010, reflected a delta T of

28°F and flow of 68.4 MGD. In this case, the facility operation resulted in a heat-load of 6.6 x 10^8 BTU/hr. There is also an August 31, 2010, report of 133.3 MGD with a corresponding delta T of 16°F, resulting in a heat-load of 7.4 x 10^8 BTU/hr. The review of facility operation data suggests that operating conditions in 2010 resulted in an actual heat-load to the river substantially greater than the maximum predicted heat-load of 6.3 x 10^8 BTU/hr used in the 2011 CORMIX model runs. Because both the permitted and operating conditions indicate that the facility is capable of producing flows, delta Ts, and corresponding heat-loads higher than those used in the 2011 model, EPA concluded that the 2011 CORMIX modeling runs were likely to underestimate thermal impacts to the Connecticut River and could not be used to support a credible §316(a) demonstration.

EPA requested that MTS perform four additional modeling runs (runs 17-20) under representative spring and summer ambient river conditions and using model parameters that more closely reflected permitted flows and delta Ts (e-mail from J. Nagle, EPA to C. Tomichek, Kleinschmidt, January 16, 2014; MTGS Thermal Plume Modeling Parameters; AR#219). “Spring” conditions assume an expected Connecticut River flow of 15,000 cfs and a relatively warm, late-spring ambient river temperature of 77°F. The spring river profile was chosen because spawning migration of important anadromous fish species, as well as early life stages of fish, are present in the vicinity of the MTS thermal plume during this time period. “Summer” conditions reflect an expected Connecticut River late summer flow of 3,000 cfs and a relatively warm, late-summer ambient river temperature of 83°F. The late summer river profile was chosen as a measure of conservatism in the analysis because low river flows and high ambient river temperatures will maximize stress to the resident species in the vicinity of the MTS thermal plume during this time period. The relatively high ambient river temperatures chosen by EPA for the modeling runs were selected to build an additional margin of reasonable conservatism into the model output. These parameters are summarized in Table 4 below.

These simulations, which are run at somewhat higher discharge flows than can be achieved by MTS’s pumps, reflect a higher heat-load to the river and, therefore, also contribute to a more conservative analysis of the thermal influence of the facility on the Connecticut River.

Table 4 - CORMIX Model Simulation Summary

Model	Flow (MGD)	Delta T (°F)	Heat-load (BTU/hr)	River Conditions
17	70	32	7.8 x 10^8	Spring
18	140	20	9.7 x 10^8	Spring
19	70	32	7.8 x 10^8	Summer
20	140	20	9.7 x 10^8	Summer

7.3.3.1 General Model Output Information

Each of the four model simulations are presented in a “Plan View” (Attachments C, D, E and F) as well as a longitudinal profile (Attachment G). Different colors represent various ranges of temperature differences above ambient river conditions. Each plume is superimposed on a map of the Connecticut River and is defined by the model as the area predicted to have a temperature increase of 1.5°F or greater than the ambient river temperature selected for a particular model run (spring or summer scenario). Table 5 (Modeled Thermal Plume Summary Information) includes data on the areas of the plumes at selected delta T ranges and provides a means to compare the basic characteristics of each predicted plume. These CORMIX models have been calibrated using Connecticut River water temperatures and MTS thermal plume profiles recorded in the field. EPA is satisfied that these modeling results provide a reasonable representation of the Outfall 001 discharge under the prescribed conservative parameters. That said, it must be understood that the following discussion is based on model results that predict *expected* river conditions rather than on actual thermal conditions measured in the river.

Table 5 Modeled Thermal Plume Summary Information.

Model Output:	1	2	3	4
	70 MGD (spring) ambient river temp 77°F	140 MGD (spring) ambient river temp 77°F	70 MGD (summer) ambient river temp 83°F	140 MGD (summer) ambient river temp 83°F
% of plume with Δ T ≤ 5 °F	82.2%	89.5%	73.5%	82.8%
Surface area of plume with Δ T≤ 5 °F (acres)	1.6	2.0	4.3	5.9
Maximum temp of that portion of the plume with Δ T ≤ 5 °F (°F)	82.0	82.0	88.0	88.0
% of plume with Δ T > 5 °F	17.8%	10.5%	26.5%	17.2%
Surface area of plume with Δ T >5 °F (acres)	0.3	0.2	1.5	1.2
% of plume with temp ≤ 83°F	90.0%	95.9%	-----	-----
Surface area of plume with temp ≤ 83°F	1.7	2.1	-----	-----
Surface area of plume with temp > 83°F (acres)	0.2	0.1	-----	-----
Surface area of plume with maximum temp (acres)	0.0002	0.0002	0.1	0.4
Maximum temp range reached in plume in °F	99.3 - 97.3	95.1 – 93.1	101.8 – 99.8	94.8 – 92.8

Total length of entire plume (m)	685	747	1,219	1,285
Total width of entire plume (m)	96	108	163	182
Total surface area of entire plume (acres)	1.9	2.2	5.8	7.1
Total surface area of river associated with plume (acres)	39.8	43.7	73.2	73.5

7.3.3.2 Spring Model Outputs

Model Output 1

Attachments C and G predict the maximum thermal plume discharged when MTS is at 100% generating capacity consistent with one pump operation during the spring spawning season. According to the model, the plume is approximately 685 meters long, 96 meters wide at its widest point, and covers a surface area of about 1.9 acres. The total bank-to-bank surface area of the river associated with the length of the plume is about 39.8 acres (see Table 5 - Thermal Plume Summary Information). In other words, the plume covers only about five percent of the surface area of the river segment adjacent to the plume. The plume remains along the west bank of the river and the plume width does not extend out to the midpoint of the river. The model predicts that approximately 82% of the surface area of the plume will be at or below 5°F above ambient river conditions. This area of the plume is consistent with the SWQS criterion for the rise in temperature due to a discharge. 314 CMR 4.05(3)(b)(2)(a). The area of the plume that meets the maximum instream water temperature criterion of 83ºF in the SWQS is predicted to be 90%, a surface area of 1.7 acres. Conversely, approximately 18% of the plume's surface area exceeds the 5ºF instream delta T criterion and only 10 % (0.2 acres) exceeds the maximum temperature criterion. The maximum temperature in the plume is predicted to be from 99.3 to 97.3ºF. Prolonged exposure to this temperature range may be lethal to aquatic organisms, but this area is associated only with the discharge water where it first meets the receiving water. The surface area of this water is extremely small (approximately 0.0002 acres).

The warmer, less dense water of the thermal plume quickly floats to a thickness of approximately one meter along the surface as it moves downstream, mixes with the Connecticut River and dissipates. As stated above, the plume does not reach out to the midpoint of the river. Moreover, the buoyant characteristics of this discharge substantially limit the area of near-shore benthic habitat exposed to elevated water temperature and this buoyancy also prevents the discharge from impacting the deeper, channelized portions of the Connecticut River.

Model Output 2

Attachments D and G predict the maximum thermal plume discharged when MTS is at 100% generating capacity consistent with two pump operation during the spring spawning season.

According to the model, the plume is approximately 747 meters long, 108 meters wide at its widest point, and covers a surface area of about 2.2 acres. The total bank-to-bank surface area of the river associated with the length of the plume is about 43.7 acres (see Table 5 - Thermal Plume Summary Information). This predicted plume, which has roughly the same dimensions as the one pump spring plume of Model Output 1, also remains along the west bank of the river. The plume width does not extend out to the midpoint of the river and the model predicts that approximately 89% of the surface area of the plume will be at or below 5°F above ambient river conditions. This area of the plume is consistent with the SWQS criteria for the rise in temperature due to a discharge. Approximately 11% of the surface area of the plume exceeds the delta T SWQS criteria. Almost 96% of the plume will be below a maximum temperature of 83ºF, which meets the maximum in-stream water temperature criterion The maximum temperature in the plume is predicted to range from 95.1 to 93.1ºF. Prolonged exposure to this temperature range may be lethal to aquatic organisms, but this area is associated only with the discharge water where it first meets the receiving water. The surface area of this water is extremely small (approximately 0.0002 acres).

As before, the warm, less dense water of the thermal plume quickly floats to a thickness of approximately one meter along the surface as it moves downstream, mixes with the Connecticut River and dissipates. As mentioned previously, the buoyant characteristic of this discharge substantially limits the area of near-shore benthic habitat exposed to the elevated water temperature and this buoyancy also does not allow the discharge to impact the deeper, channelized portions of the Connecticut River.

Spring Model Discussion

Based on these plume predictions, the spring thermal plume generated by one pump and two pump operation at MTS are generally similar. The one pump plume is predicted to have a higher delta T (from about 7.5 to 9.5°F) for a slightly longer distance at the surface, close to the point of discharge. However, this small area adjacent to the west bank of the river is not likely to be encountered by large numbers of migrating species. (As discussed below, migrating fish tend to keep to the deeper channel in the center or far side of the river.) The overall surface areas of the two plumes are generally similar (1.9 acres for one pump operation and 2.2 acres for two pump operation) and neither plume is expected to block the passage of spawning anadromous fish species that are either moving upstream in the main channel of the river or returning downstream after spawning has been completed.

An examination of the Plan View of Attachments C and D show that only a small area of the plume (approximately 0.2 to 0.3 acres) has a temperature with a delta T greater than 5°F and an absolute temperature greater than 83°F during the warmest part of the spring. In the event that juvenile or adult fish moving upstream come in contact with the thermal plume, it is likely that they will first encounter the downstream edges of the plume at the surface, once the warmer water has undergone mixing with the receiving water. The downstream edge of the plume retains temperatures only about 1.5ºF degrees above ambient conditions. The width and depth of the Connecticut River in this area (the spring plumes are predicted to occupy only about 5% of the bank-to-bank surface area of the river over their downstream distance) will allow juvenile and adult resident and anadromous fish species to avoid the thermal plume without impeding their movement upstream. American shad, a representative important anadromous species (RIS) in the Holyoke Pool, is also among the most sensitive species to temperature. Juvenile American shad can detect and avoid rapid temperature increases of 7.2°F (4°C) above ambient (Klauda et al. 1991). Shad and other anadromous species less sensitive to temperature would likely be able to avoid these predicted plume temperatures without appreciable harm. Since temperatures continue to increase as the plume is tracked upstream, it is unlikely that juvenile or adult fish would continue to swim upstream into this shallow, narrow area and be exposed to the initial, higher temperature portion of the thermal plume. In addition, as noted by MassDEP (AR#221), American shad and other alosids are known to move both upstream and downstream primarily along the deeper central channel of the river rather than near the facility.

As juvenile and adult shad travel downstream after spawning, any fish that move toward the inside curve of the river and approach the west bank immediately downstream of Outfall 001 may come in contact with the edge of the thermal plume at the surface. Again, only a small area of the plume, close to the point of discharge, would be above a delta T of 7ºF. A corrugated 115 foot (35 meter) long metal wall channels the thermal discharge downstream along the shallow west bank of the Connecticut River and restricts the exposure of aquatic organisms to the highest temperatures in the thermal plume. Any contact with parts of the plume containing a delta T over 5ºF would likely be brief, since the part of the plume with those characteristics is relatively small. Shad and other anadromous species moving downstream would likely be able to avoid these predicted plume temperatures without appreciable harm.

Thermal impacts to anadromous species' early life stages that could potentially be drifting near the area where the MTS thermal plume is located during the spring spawning season (May and June) would likely be minimal for several reasons, based on the spring CORMIX models. First, free floating larval stages of anadromous fish species would be expected to be drifting in the stronger current near the middle of the river or along the east bank due to the influence of the upstream bend in the river (Kynard et.al., 2003). The months that early life stages are most likely to be present (May and June) are also among those with the highest average river flows (30,000 cfs in May and 15,000 cfs in June between 2000 and 2004). Second, as mentioned previously for adult and juvenile free swimming life stages, larvae that drifted toward the west bank would likely be blocked from drifting into the highest plume temperatures by the corrugated metal wall. Due to the high flows, in combination with the metal wall that minimizes the potential for contact with the highest plume temperatures, larvae are most likely to be exposed only to the edge of the well mixed thermal plume that, according to field measurements and model predictions, does not extend far into the river from the west bank. Furthermore, any exposure would be brief due to the relatively small size of the plume. Such a brief exposure is unlikely to adversely affect the development of this life stage of the anadromous species.

7.3.3.3 Summer Model Outputs

Model Output 3

Attachments E and G depict the maximum thermal plume discharged when MTS is at 100% generating capacity consistent with one pump operation during the low flow summer period. According to the model, the plume is approximately 1,219 meters long and 163 meters wide at its widest point, and covers a surface area of about 5.8 acres. This plume is about four times as long and about three times the area of the one pump model run during spring conditions. The total bank-to-bank surface area of the river associated with the length of the plume is about 73.2 acres (see Table 5 - Thermal Plume Summary Information). Thus, the plume covers about 8% of this total surface area.

While still generally in contact with the west bank of the river, the surface area of this plume moves further toward the middle of the river than the two spring model predictions. The plume width extends past the midpoint of the river surface, but as the plume spreads out toward the middle of the river, it is predicted to be close to the surface of the river and "float" over the denser, cooler water of the river channel. Approximately 73% of the plume is predicted to be at or below 5°F above ambient river conditions. This area of the plume is consistent with the SWQS criterion for the rise in temperature due to a discharge, while approximately 27% would exceed the criterion. The maximum predicted temperature in the plume is from 101.8 to 99.8°F. Prolonged exposure to this temperature range may be lethal to aquatic organisms, but this area is associated only with the discharge water where it first meets the receiving water. The surface area of this water is approximately 0.1 acres. The buoyant thermal plume is equal to a thickness of about one meter along the surface soon after it is discharged, but the thickness increases to approximately 1.5 m and retains a delta T of approximately 3°F above ambient river conditions as it mixes with river water. Because the river level is lower in summer than under high flow, spring conditions, the plume is predicted to be closer to shallower, near-shore areas of benthic habitat. However, the thermal plume is still not predicted to impact the deeper, cooler, channelized portions of the Connecticut River.

Model Output 4

Attachments F and G predict the maximum thermal plume discharged when MTS is at 100% generating capacity consistent with two pump operation during the low flow summer period. According to the model, the plume is approximately 1,285 meters long and 182 meters wide at its widest point, and covers a surface area of about 7.1 acres. The total bank-to-bank surface area of the river associated with the length of the plume is about 73.5 acres (see Table 5 - Thermal Plume Summary Information). Thus, the plume covers about 10% of this total surface area. While still generally in contact with the west bank of the river, the surface area of this plume moves further into the river than the two spring model predictions.

This plume occupies the largest surface area of the four model results, but the percentage of the plume predicted to be at or below approximately 5°F above ambient river conditions (approximately 83%) is greater than that predicted for one pump operation (approximately 73%). The plume is predicted to be about 20% larger in surface area compared with the one pump model run during summer conditions. The maximum predicted temperature in the plume is from 94.8 to 92.8°F. Prolonged exposure to this temperature range may be lethal to aquatic organisms and while this temperature range is slightly lower than the one pump summer operation plume, it covers about four times the surface area (0.4 acres) associated with the discharge water where it first meets the receiving water. The plume width extends past the midpoint of the river surface, but as the plume spreads out toward the middle of the river, it is predicted to be close to the surface of the river and to “float” over the denser, cooler water of the river channel. Fish passage would not be compromised by a predicted increase in the width of the plume at the surface.

As mentioned previously, the predicted plume would cover approximately 10% of the surface area of the affected area of the river, but approximately 83% of the surface plume is predicted to be at or below approximately 5°F above ambient river conditions. This is consistent with the SWQS for the rise in temperature due to a discharge Approximately 17% of the plume would exceed that criterion. The buoyant thermal plume quickly floats to a thickness of approximately one meter along the surface soon after it is discharged, but the thickness of the plume increases to approximately a meter and a half as it mixes downstream and retains a delta T of approximately 3°F above ambient river conditions. Because the river level is lower in summer than under high flow, spring conditions, this plume is also predicted to be closer to shallower, near-shore areas of benthic habitat. However, the thermal plume does not reach the deeper, cooler, channelized portions of the Connecticut River.

Summer Model Discussion

As discussed in Section 7.3.5.1 below, free swimming resident and anadromous adult and juvenile fish are not expected to come in contact with the warmest portion of the plume because as these organisms travel downstream, they are blocked from direct contact with these areas by the metal wall enclosing the discharge. Also, fish moving upstream will likely swim below or around the thermal plume when they encounter their thermal avoidance temperature and will bypass the furthest upstream portions of the plume that are predicted to have incrementally increasing temperatures. In addition, the summer thermal plumes are not predicted to reach the deeper, cooler, channelized portions of the Connecticut River that likely serve as a thermal refuge for resident species during the warmest periods of the summer.

Resident fish species documented in the Connecticut River (see Section 7.3.4.2 below) include bluegill. Bluegill adult and juvenile life stages are reported to survive a short-term maximum temperature of 95°F during the summer months. The short-term maximum temperature for survival for adult and juvenile life stages of another resident species, largemouth bass, is 93°F during the summer (EPA Quality Criteria for Water 1986; Goldbook). An inspection of Attachments E and F shows that approximately one fifth of the one pump thermal plume, spanning from the point of discharge, has a temperature greater than approximately 93°F and an associated delta T greater than 10°F. Only approximately one tenth of the two pump thermal plume, spanning from the point of discharge, has a temperature greater than approximately 93°F and an associated delta T greater than 10°F. In order to minimize the potential for a larger temperature zone that may compromise survival for resident species, EPA has judged that the predicted thermal plume resulting from two pump operation during the summer is more protective of resident and anadromous fish species in the Holyoke Pool. The end of pipe discharge temperature of 115°F that could be associated with one pump operation in the summer (before mixing with the receiving water) will not be allowed as a maximum discharge permit limit.

7.3.4. Connecticut River - Holyoke Pool Characterization

MTS is located in the Connecticut River Valley eco-region, which has relatively rich floodplain soils and level terrains with some higher ridges. The river at MTS is wide with fairly deep water, fine sediments and extensive floodplains where flooding occurs annually. Sediment characteristics in this reach of the river include mean grain size ranging from 0.16 to 0.82 mm, percent silt/clay ranging from about 7% to just less than 1%, and percent organic content that ranges from 1.6% to 0.5% (HWP, 1997) (Kleinschmidt, May 2011).

7.3.4.1 Benthic Aquatic Organisms

There are seven species of freshwater mussels present in this area of the river. These include the Eastern elliptio, triangle floater, Eastern floater, Alewife floater, tidewater mucket, Eastern lampmussel, and the yellow lampmussel (Nedeau 2008). Of these, the triangle floater and the tidewater mucket are listed as species of special concern in Massachusetts and the yellow lampmussel is listed as endangered in Massachusetts (Nedeau 2008). None are federally listed species. Benthic invertebrate sampling was conducted in the immediate area of MTS as part of the Holyoke Dam relicensing in August 1995 and May 1996. The infaunal communities consist of a variety of organisms including a number of different species of worms, midges, mayflies, and stoneflies (HWP 1997). (Kleinschmidt May 2011).

7.3.4.2 Fish Assemblage

No recent studies have been performed by the permittee to characterize the balanced indigenous population of fish in the vicinity of MTS. In order to document the fish assemblage in the Holyoke Pool, EPA reviewed a number of reports that documented the presence of fish in the vicinity of MTS and the Connecticut River in general. These reports included the 1974 Thermal Plume Study (MAF&G, 1974, AR#1), a 1995 resident fish survey done for the relicensing of the Holyoke Hydroelectric Project (Northeast Utility Service Company (NUSC), November 1995), and fish impingement data collected at MTS from July 2006 through July 2008 (Kleinschmidt, December 2008) and ichthyoplankton entrainment data collected at MTS from October 2008 through September 2010 (Kleinschmidt, November 2010). Table 6 below summarizes this information.

- Table 6 - Holyoke Pool Species List

Species	1974 Study (MAF&G)	1995 Study Holyoke (NUSC)	2006-2008 Impingement Study (MTS)	2009 – 2010 Entrainment Study (MTS)
American eel	j, a	C	√	
American shad	j, a	O	√ (young of year)	
Atlantic salmon			√ (smolt)	
Banded killifish		C		
Black crappie	j, a		√	l
Blacknose dace			√	
Blueback herring		O		e, l[x]
Bluegill	j, a	C, j	√	l
Brown bullhead	j, a			
Calico bass	j, a			
Carp	j, a	R		e, l
Chain pickerel			√	
Channel catfish	j, a	O	√	
Common shiner			√	l[z]
Fallfish		R	√	
Gizzard shad		R	√	l
Golden shiner			√	l[z]
Largemouth bass	j, a	O, j		l
Northern pike				
Pumpkinseed	j, a	C, j	√	l
Redbreast sunfish		O, j		
Redfin pickerel			√	
Rock bass		O, j	√	
Sea lamprey	j, a	R	√	e, l
Shortnose sturgeon			√	
Smallmouth bass	j, a	O, j	√	l
Spottail shiner	j, a	R	√	l[z]
Striped bass				
Tesselated darter		R		l
Walleye				
White crappie	j, a		√	
White perch	j, a	C		l
White sucker	j, a		√	l
Yellow bullhead				
Yellow perch	j, a	R	√	l

a = adult fish; j = juvenile fish; l = larval life stage; e = egg;
R = rare; O = occasional; C = common; A = abundant; √ = present; [x] = IDed as herring sp.
[Z] = identified as shiner sp.

The 1974 report documented adult and juvenile fish that were collected upstream and downstream of MTS during the period of July and August of 1974. Electrofishing and gillnetting were the two collection methods used. The species collected are included in Table 6 above. The report characterized the fish assemblage as follows:

> "The resident species of the Holyoke Pool are primarily lake and pond species living in a modified riverine environment. They generally occupy relatively quiet areas out of the strong current".
>
> "Anadromous species, particularly American shad and blueback herring, must pass the plant in going to and from spawning areas above. Their juveniles produced above the plant, must pass it during emigration and, in fact, large numbers of them occupy this reach of the river during the summer" (MAF&G 1974).

The 1995 Study collected adult and juvenile fish at six stations in the Holyoke Pool. Data in Table 6 include fish collected only at the sampling station, located just upstream of the facility. Collection methods included beach seining, electrofishing, gillnetting, and the use of minnow traps. This study collected 19 species of fish in the vicinity of MTS. Common species included American eel, banded killifish, bluegill, pumpkinseed and white perch. The study concluded that the Connecticut River in the Holyoke Project reach was made up of a highly diverse fish community consisting of resident species and diadromous species (Northeast Utility Service Company (NUSC), November 1995).

The MTS Impingement Study, conducted from 2006 to 2008, collected impinged fish at the MTS CWIS once a week for a 24 hour period, excluding facility outages. The study recorded a total of 335 fish over the two year period. Twenty two species were observed, including yellow perch, white sucker, spottail shiner, bluegill, gizzard shad, common shiner and Atlantic salmon. The impinged fish were predominantly, but not exclusively, resident species. Young-of-year American shad and Atlantic salmon smolt, both of which are anadromous species, were also noted in the sampling.

The MTS Entrainment Study, (Mount Tom Generating Station Ichthyoplankton Data Report, AR#33) collected two entrainment samples from the once-through cooling water each week from March through September of each year [one during daylight hours and another at night (at least ½-hour after sunset)]. From October through February, one daytime sample was collected at bi-weekly intervals. A relatively small number of blueback herring, carp and sea lamprey eggs were collected, as well as larvae from at least fourteen species (some specimens could only be identified to genus). In Year 1 of the study, samples were dominated by shiners, which accounted for 28 percent of the total catch. Tessellated darter was the second most abundant taxonomic category (20.7 percent of total), followed by sea lamprey (16.9 percent), herring species (12.6 percent), white sucker (7.4 percent), and common carp (7.1 percent). The Year 2 annual entrainment estimate was dominated by common carp, which accounted for 46.7 percent of the total larval catch. Herring species (15.9 percent of total) were the second most abundant taxonomic category entrained, followed by shiner species (12.7 percent), gizzard shad (7.5 percent) and tessellated darter (5.2 percent).

7.3.4.3 Migrating Fish Passage

The Connecticut River extends approximately 148 km from its mouth in Long Island Sound to the river reach adjacent to MTS. The Holyoke Dam, approximately eleven kilometers downstream of MTS, is the first dam encountered by anadromous fish migrating upstream from Long Island Sound. Fish passage facilities at the Holyoke Dam provide for upstream and downstream passage of anadromous, catadromous (American eel have been documented passing the dam, but are not included in Table 7) and resident fish. Once migrating fish move upstream from the Holyoke Dam, they pass MTS. Fish passage facilities are in place at the Turners Falls Project at river km 192, the next upstream dam that migrating species encounter on the main stem of the Connecticut River.

Fish are counted at the Holyoke Dam as they move upstream each year during the spawning season. Table 7 - Holyoke Dam Fish Passage - shows the number of fish from seven different species that have migrated upstream past the Holyoke Dam each year from 1965 through 2012. Attachments H, I, and J (Blueback Herring, American Shad and Total Fish, respectively) chart the trends in fish passage of selected species and the total number of all species each year.

EPA has noted the low numbers of blueback herring passing the Holyoke Dam since 2002. The potential influence of the thermal discharge from MTS on this negative trend is discussed in Section 7.3.4.5, below.

Table 7 - Holyoke Dam Fish Passage

Year	American Shad	Atlantic Salmon	Blueback Herring	Striped Bass	Sea Lamprey	Gizzard Shad	Shortnose Sturgeon	Total
1965	33,896		53		26			33,975
1966	16,212		54		2			16,268
1967	19,484		336		46			19,866
1968	24,693							24,693
1969	45,349		10,000					55,349
1970	65,751		1,900					67,651
1971	52,719		302					53,021
1972	25,572		188					25,760
1973	25,104		302					25,406

1974	53,147		504					53,651
1975	114,132	1	1,600		23,000			138,733
1976	346,185	1	4,700		32,000			382,886
1977	196,311	1	33,000		52,000			281,312
1978	143,336	23	38,000		43,000			224,359
1979	254,894	19	40,000	103	31,000			326,016
1980	376,757	119	198,000	148	34,000			609,024
1981	376,639	316	419,733	510	53,549			850,747
1982	294,606	11	570,083	128	26,297			891,125
1983	527,508	23	442,313	226	29,252			999,322
1984	496,389	66	449,178	57				945,690
1985	481,589	285	632,255	369	40,308			1,154,806
1986	352,112	259	517,520	187	20,010			890,088
1987	276,837	207	358,607	521	22,553			658,725
1988	294,157	72	343,363	256	15,912			653,760
1989	353,880	80	286,325	900	15,364			656,549
1990	363,999	187	394,128	998	22,245			781,557
1991	523,046	152	411,108	169	40,854	490		975,819
1992	721,336	368	312,884	336	27,567	1,140		1,063,631
1993	340,351	167	108,214	191	22,820	327		472,070
1994	181,073	256	31,766	159	30,026	164		243,444
1995	190,082	150	112,131	1292	18,332	2,065		324,052
1996	273,695	202	55,040	529	44,914	1,078	16	375,474
1997	299,448	94	63,945	679	32,377	2,081		398,624
1998	311,704	197	11,170	492	98,690	1,087	11	423,351
1999	193,782	91	2,699	860	21,084	35,072	1	253,589
2000	228,390	76	9,588	474	24,045	37,737		300,310
2001	280,871	41	10,605	1152	58,221	5,498	4	356,392
2002	377,402	43	1,950	1,086	78,906	3,018		462,405
2003	286,814	28	1,392	883	53,030	859		343,006
2004	191,555	45	151	256	59,461	279		251,747
2005	116,517	131	534	231	28,134	126	1	145,674
2006	154,745	115	21	142	17,636	134	2	172,795
2007	158,812	104	69	241	39,932	67		199,225
2008	153,149	81	84	617	57,049	127	5	211,112
2009	160,669	61	40	671	18,996	68		180,505
2010	164,439	41	76	298	39,782	371	5	205,012
2011	244,189	72	138	183	19,136	423	4	264,145
2012	490,431	29	39	336	14,089	337	5	505,266

7.3.4.4 Balanced Indigenous Population

EPA reviewed the fish assemblage and migrating fish passage information included above. The expected assemblage of resident and diadraomous fish are represented in the Holyoke Pool. The presence of eggs, larvae, juvenile and spawning adult life stages of a number of fish species denote a diverse biotic community that has the capacity to sustain itself through cyclic seasonal changes. Fish species from all parts of the food chain are also present. This information does not indicate that the Holyoke Pool is dominated by pollution tolerant species. While the decline in blueback herring spawning is noteworthy and is discussed further below, EPA judges the overall Holyoke Pool fish community to reflect a balanced indigenous population (BIP).

7.3.4.5 Other Impacts to Connecticut River Fish Species

Under CWA § 316(a) guidelines, EPA considers the cumulative impact of a thermal discharge together with all other significant impacts on the species affected. *See* 40 C.F.R. § 125.73. This section lists some of the impacts encountered by fish species in the Connecticut River in addition to the potential impact from the thermal discharge at MTS.

- The New England District Army Corps of Engineers (ACOE) conducts a hopper dredging operation in the river called the Connecticut River Federal Navigation Project. This action has been ongoing since the 1960’s and continues today. Dredging occurs early every year. Increased turbidity, resuspension of pollutants, benthic habitat disruption and possible direct fish mortality are all impacts from this maintenance dredging effort.

- There are 65 major dams on the main stem of the Connecticut River and its tributaries. This list includes the Holyoke Hydroelectric Project, seven miles downstream from MTS. This dam has interfered with the natural upstream and downstream migration of Connecticut River diadromous species for 150 years. Although fish passage modifications have been added to the Holyoke Dam, these features are not fully effective for all migratory fish species. In addition to disrupting fish migration, dams on the main stem and tributaries of the river (Turners Falls Dam, Vernon, Bellows Falls and Northfield, among others) disrupt the natural flow of the river, changing the river from a lotic (river-like) environment to a more lentic (lake or impoundment-like) environment. This can shift the assemblage of fish species present in the river. High river discharges of brief duration to control flooding during the spawning season can disrupt spawning efforts.

- Commercial and recreational fishing along the East Coast and in the Connecticut River increases mortality on fish populations. The Connecticut River is an important corridor for migratory movements of various species that are targeted by fishing effort. These species include American eel (*Anguilla rostrata*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissim*a), and striped bass (*Morone saxatilis*).

- Table 7 and Attachment H reflect the low numbers of blueback herring passing the Holyoke Dam since 2002. A number of factors are likely contributing to this drop in migration, including mortality from fishing effort, natural predation, poor recruitment from weak year classes, and spring river flows (dam releases) that were not compatible with optimum herring spawning efforts. It is unlikely, however, that the thermal plume from MTS is a contributor to the observed drop in blueback herring migration for the following reasons. First, thermal tolerance literature indicates that American shad may be more sensitive to temperature than blueback herring (Mirant Kendall Fact Sheet, NPDES# MA0004898), but shad migration past the Holyoke Dam has not shown the same decline since 2002. Also, the Holyoke Dam is approximately seven miles downstream from MTS and, according to CORMIX predictive model information under spring conditions, the thermal plume would be fully mixed and undetectable that far downstream from the thermal discharge. Lastly, MTS has not been operating near its full capacity over the past several years, further reducing the level of the thermal discharge (*see* Section 2). While the thermal plume from MTS is not likely a contributing factor to this decline (*see also* Section 7.3.3.3 above), this trend must be considered as EPA proposes suitably protective limits for all aspects of the Draft Permit.

- Heavy anthropogenic usage of the Connecticut River and development along the waterfront has likely affected anadromous and resident fish species. Construction sites often result in excessive water turbidity, which could influence spawning and/or foraging ability. Industries along the Connecticut River include or have included in the past, hydroelectric and other energy generating facilities, an armory, firearms factory, industrial mills and various other industrial pursuits. In addition, pulp mill, silvicultural, agricultural, and sewer discharges, as well as a combination of non-point source discharges, can promote high biological demand, contain pollutants, and degrade water quality. Point source discharges (i.e., municipal wastewater, paper mill effluent, and industrial waste water) and compounds associated with discharges (i.e., metals, dioxins, dissolved solids, phenols, and hydrocarbons) can all combine to affect overall water quality in the river.

- The New England Interstate Water Pollution Control Commission issued a report in 1998 on water quality threats. This report indicated that the Connecticut River had several major water quality issues. These included toxins such as PCBs; combined sewer overflows (CSOs) which can cause poor water quality conditions in urban areas after storm events; and non-point source pollution. All four of the states that share the Connecticut River have public health advisories regarding the consumption of fish caught in the river (NH and VT: mercury; MA and CT: mercury and PCBs). The Connecticut River Watershed Council has also identified acid rain and atmospheric deposition of mercury and other contaminants as a problem throughout the watershed.

- Coal tar deposits released into the sediment of the Connecticut River potentially may have affected spawning success, egg survival and/or larval development and foraging activities of organisms associated with benthic habitat, including the shortnose sturgeon

(Kocan, et al., 1993). Coal tar contains toxic Polycyclic Aromatic Hydrocarbons (PAHs) that are known to be carcinogenic. There are several known coal tar contaminated sites below the Holyoke Dam that have only recently begun to be cleaned up. It is likely that these sites, as well as any other similar sites, have had adverse effects on fish species present in the area over the years.

- A number of invasive species are known to exist in the watershed. Some have been introduced to the Connecticut River watershed inadvertently by humans, while others have been purposefully introduced. These species include non-native fish, common reed, purple loosestrife, Eurasian milfoil, water chestnut, mute swans, Asiatic clams, and wooly adelgids. The potential for these species to affect anadromous and resident fish populations is currently unknown.

7.3.5. Thermal Discharge Impacts to Federally Protected Species

EPA, in coordination with the National Marine Fisheries Service (NMFS), has determined that the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) is present in the Holyoke Pool. EPA is undertaking a formal consultation with NMFS under Section 7 of the Endangered Species Act regarding potential effects of the MTS permitting action on the shortnose sturgeon. Section 12 of this Fact Sheet contains detailed information to support this consultation. The following discussion was taken from information assembled in the Shortnose Sturgeon Biological Assessment (BA; EPA, May 2011) referenced in Section 12.

7.3.5.1 Adults

Shortnose sturgeon are benthic fish that are primarily found in the deep channel sections of large rivers. This species is not expected to spend long periods of time at the surface, where the buoyant thermal plume from MTS has been documented. Furthermore, if shortnose sturgeon travel to forage in the shallow, sandy areas of the west bank of the Connecticut River directly downstream of the MTS thermal discharge, they would likely avoid water temperatures above 82.4°F (Indian Point Thermal Plume, NMFS, June 30, 2011). According to CORMIX modeling predictions, even with a high ambient river temperature of 77°F during the spring, only a relatively small surface area of the west bank (approximately 0.3 acres; approximately 18 % of the total plume area) would have temperatures at or above 82.4°F. The small area that would be avoided by shortnose sturgeon is not considered high quality benthic habitat for typical shortnose sturgeon prey.

As the thermal plume moves downstream, it mixes with the flow of the Connecticut River, resulting in lower delta Ts and absolute temperatures. Since shortnose sturgeon are expected to exhibit avoidance behavior at the downstream edges of the thermal plume when they first encounter temperatures of 82.4°F, they are unlikely to travel upstream into the warmer areas of the plume. Therefore, shortnose sturgeon would not be expected to swim upstream into the plume and reach the small area close to the point of discharge that may have temperatures that exceed either the lethal temperature limit for the species (94.6°F) or the level at which acute effects on the shortnose sturgeon have been reported limit (82.4 – 92.7°F). (Dadswell et al., 1984)

Shortnose sturgeon cannot access the warmest portions of the thermal discharge while foraging downstream along the west bank due to the corrugated metal wall that extends from the west bank just above the discharge point and runs parallel to the direction of the river flow. See Section 2.0 of the Fact Sheet for a complete description of this enclosure. This wall isolates the Outfall 001 discharge on two sides, preventing upstream and mid-river contact for a distance of approximately 115 feet. Thus, the structure blocks organisms from directly swimming into the portion of the thermal plume with the highest delta T.

During summer months, shortnose sturgeon adults must cope with the physiological stress of elevated ambient water temperatures. Flourney et al. (1992) suspected that, during these periods, shortnose sturgeon congregate in river regions which support conditions that relieve physiological stress (i.e., in cool, deep thermal refuges). In the Connecticut River upstream of the Holyoke Dam, shortnose sturgeon congregate near Deerfield, MA during the warm summer months. This area, approximately 27 river miles upstream from MTS, is likely a cool, deep thermal refuge for shortnose sturgeon. If present at all in the vicinity of MTS in the summer, shortnose sturgeon would likely be located in the deep, cooler channel of the river. The thermal plume is not predicted to make contact with this habitat of the river and was not detected in the river channel during summer river monitoring (EPA, August 14, 2010).

7.3.5.2 Eggs and larvae

Shortnose sturgeon spawning has been documented near Montague, Massachusetts, on the Connecticut River. This is greater than 20 miles upstream from MTS. Sturgeon eggs are demersal and adhesive, and are not expected to drift the more than 20-mile distance downstream to come in contact with the MTS thermal plume.

While shortnose sturgeon larvae are not generally thought to disperse far downstream from their spawning grounds, under certain conditions they have the potential to drift over 20 miles downstream to the area of the MTS thermal plume (Julie Crocker, NMFS May 27, 2008, e-mail to John Nagle, EPA). NMFS predicted that the larvae may be present in the months of May and June (letter from Patricia Kurkul, NMFS to David Webster, EPA, August 5, 2008). Free floating larval stages of shortnose sturgeon would be expected to be drifting throughout the water column in the stronger current near the middle of the river or along the east bank (opposite bank from the MTS thermal discharge). This is largely due to the influence of the bend in the river just upstream from MTS (Kynard et.al., 2012). Any larvae that drifted toward the west bank would be blocked from drifting into the warmer, less mixed, initial flow of the discharge by the corrugated metal enclosure. Some larvae may briefly encounter the edge of the thermal plume once it has begun mixing with the Connecticut River. The edge of the plume has been predicted to have delta Ts in the range of 1.5°F to 3°F above ambient river conditions at the surface. An encounter with this section of the thermal plume is not likely to adversely affect the development of this life stage of shortnose sturgeon.

7.3.5.3 Conclusion

Based on the BA and Supplemental BA, which will be submitted to NMFS shortly, EPA has made the determination that the MTS thermal discharge is not likely to adversely affect any of the lifestages of shortnose sturgeon in the action area. The impacts, if any, will be insignificant or discountable. As discussed in Section 12.0 of this Fact Sheet, EPA is engaged with NMFS in pre-consultation under Section 7 of the Endangered Species Act related to this permit action.

7.4 Determination under CWA § 316(a)

MTS has requested a thermal discharge variance under CWA § 316(a) to renew the thermal discharge limits in its existing NPDES permit. EPA has determined on a site-specific, BPJ basis that converting MTS's cooling system to closed-cycle cooling would represent the BAT for controlling thermal discharges at the Facility, and that effluent limits based on this technology would be more stringent than the limits requested by the applicant. The MassDEP has also determined that the thermal discharge limits requested by the applicant would neither satisfy applicable water quality criteria throughout the affected portion of the Connecticut River, nor qualify for authorization under a mixing zone under the SWQS. Therefore, a CWA § 316(a) variance will be required to authorize the thermal discharge limits requested by MTS.

After completing an analysis of the issues, EPA has determined that it can grant a thermal discharge variance under CWA § 316(a) to authorize the thermal discharge limits proposed in the new Draft Permit for MTS. From this analysis, EPA has concluded that thermal discharge limits based on technology and water quality standards would be "more stringent than necessary to assure the pro[t]ection and propagation of a balanced indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made …." 33 U.S.C. § 1326(a). Moreover, EPA has identified alternative thermal discharge limits that, taking cumulative impacts into account, "will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water." *See also* 40 C.F.R. § 125.73(a). EPA also notes that, as explained further above, the Massachusetts SWQS provide that "alternative effluent limitations established in connection with a variance for a thermal discharge issued under 33 USC § 1251 (FWPCA, § 316(a)) and 314 CMR 3.00 are in compliance with 314 CMR 4.00." 314 CMR § 4.05(4)(b)(2)(c).

Based on the analysis presented above, EPA's Draft Permit includes a maximum daily temperature limit of 102°F from July through April, along with a maximum daily delta T of 32°F under one pump operation (with a discharge flow limit of 68.4 MGD) and a maximum daily delta T of 20°F under two pump operation (with a discharge flow limit of 133.2 MGD, with the exception of July and August, when the flow limit is 136.8 MGD as discussed in Section 6.1.1). In addition, the Draft Permit proposes to authorize a maximum daily temperature limit of 109°F during the spawning season of May and June in order to make possible a corresponding permit requirement restricting MTS to one pump operation (and a discharge flow of 68.4 MGD) during that time period so as to minimize entrainment impacts (see Section 8 of this Fact Sheet). EPA's analysis concludes that the aquatic community in the Holyoke Pool is likely to experience an overall benefit as a result of the spring time flow reduction at the intake, despite any nominal thermal impacts resulting from the potential discharge of heated effluent at a higher maximum temperature.

EPA sets forth below some of the key findings that have supported the CWA § 316(a) variance determination described above.

- CORMIX modeling results (Section 7.3.3) show that the size, shape and magnitude of the maximum predicted thermal plume will not appreciably harm the resident and anadromous species present in the Holyoke Pool during the critical spring spawning season. The projected spring plume is generally restricted to the west bank of the river, is confined to the surface and remains in the near-field. Areas of the plume with temperatures which may expose fish to acute effects or cause avoidance of the area are minimal and associated with the area immediately downstream of the discharge. This part of the plume is sufficiently small to allow fish species to avoid exposure.

- The projected spring plume does not reach the midline of the river on the surface, nor does it reach the deeper channel of the main stem of the river. These characteristics support the determination that the passage of resident and diadromous fish species will not be impeded by the thermal plume during the spring spawning season. Therefore, a zone of passage will be maintained that will provide for the normal movement of populations of important species, dominant species of fish, and economically important (commercial or recreational) species of fish, shellfish, and wildlife.

- Modeling results further demonstrate that two pump operation during the warm summer season results in a predicted thermal plume that will not appreciably harm fish species during this stressful time of low river flows and elevated ambient river temperatures. The summer plume is also confined to the surface and does not degrade the deep, cooler riverine habitat used as a thermal refuge by resident species. As with the spring plumes, areas of the plume with temperatures which may expose fish to acute effects or cause avoidance are minimal and associated with the area immediately downstream of the discharge. This part of the plume is sufficiently small to allow fish species to avoid exposure.

- The summer two pump thermal plume is mostly associated with the west bank of the Connecticut River downstream from the MTS facility for a maximum predicted distance of about 200 meters. The plume, as mentioned previously, is generally confined to the surface and does not persist in the benthic habitat. This area downstream of the discharge is relatively shallow and sandy. It is not considered to be unique or rare aquatic habitat.

- A corrugated metal wall encloses the point of discharge (Outfall 001) on the upstream side and the east side of the discharge area, forming a 115 foot long discharge canal. Any drifting eggs or larvae that float toward the west bank are blocked from drifting into the highest plume temperatures and potentially suffering acute effects. This wall also minimizes the potential for swimming organisms traveling downstream along the west bank to encounter the highest plume temperatures and suffer acute effects as well.

- Based on the discussion in Section 7.3.5, adverse impacts, if any, from the thermal plume to the federally protected shortnose sturgeon will be discountable or insignificant.

- The position of the thermal plume and Outfall 001 discharge on the inside bend in the river provide protection for the downstream drift of free floating organisms as well as free swimming fish species. (Kynard et.al., 2012)

Based on this information, EPA is proposing to grant a thermal discharge variance under CWA § 316(a) to authorize the thermal discharge limits included in the new Draft Permit for MTS.

Again, EPA concludes that the discharge of NCCW, associated with the delta T limits, maximum temperature limits and discharge rate limitations of the Draft Permit, will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in the Holyoke Pool.

As noted in Section 5.6 above, to the extent that the permit's thermal discharges limits are considered less stringent than the corresponding limits in the existing permit, those limits may be authorized under an exception the CWA's antibacksliding requirements because those limits are being authorized under a CWA §316(a) variance. 33 U.S.C. § 1342(o)(2)(D); 40 C.F.R. § 122.44.(l)(2)(i)(D).

8. Cooling Water Intake Structure, CWA Section 316(b)

With any NPDES permit issuance or reissuance, EPA is required to evaluate or re-evaluate compliance with applicable standards, including the technology standard specified in Section 316(b) of the CWA for cooling water intake structures (CWIS). Section 316(b) requires that:

> [a]ny standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

33 U.S.C. § 1326(b). The operation of CWISs can cause or contribute to a variety of adverse environmental effects, such as killing or injuring fish larvae and eggs entrained in the water

withdrawn from a water body and sent through the facility's cooling system, or by killing or injuring fish and other organisms by impinging them against the intake structure's screens. CWA § 316(b) applies if a point source discharger seeks to withdraw cooling water from a water of the United States through a CWIS. CWA § 316(b) applies to this permit due to the presence and operation of a CWIS at MTS.

8.1 Introduction and Regulatory Background

In the absence of applicable regulations, EPA has made § 316(b) determinations on a case-by-case basis using best professional judgment (BPJ), for both new and existing facilities with regulated CWISs. In December 2001, EPA promulgated new, final § 316(b) regulations that provide specific technology-based requirements for *new* facilities of any kind with a CWIS with an intake flow greater than two (2) MGD. 40 C.F.R. Part 125, Subpart I; 66 FR 65255 (Dec. 18, 2001) (Final Phase I Rule). The Phase I rule is in effect but does not apply to this permit because MTS is not a new facility.

In July 2004, EPA published final regulations applying § 316(b) to large, *existing* power plants (Phase II rule), defined in 40 C.F.R. § 125.91 as existing point sources employing CWISs that withdraw at least 50 MGD from a water of the United States and generate and transmit electric power as their primary activity. Following litigation that resulted in the remand to EPA of many of the rule's provisions, *see Riverkeeper, Inc. v. U.S. EPA*, 475F.3d 83 (2d Cir. 2007); *rev'd in part, Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 226-227 (2009), the Agency suspended the Phase II rule in July 2007. 72 Fed. Reg. 37107 (July 9, 2007). The suspension left only 40 C.F.R. § 125.90(b) in effect, which provides that in the absence of applicable categorical standards, BTA determinations are to continue being made on a case-by-case, BPJ basis.

On June 16, 2006, EPA published the Phase III rule, which established categorical requirements for new offshore oil and gas extraction facilities that have a design intake flow threshold of greater than 2 MGD, but dictated that the BTA would be determined on a case-by-case, BPJ basis for existing electrical generation facilities with a design intake flow less than 50 MGD and existing manufacturing facilities. 71 FR 35006 (June 16, 2006). In 2009, EPA petitioned the United States Court of Appeals for the 5th Circuit (5th Circuit) to remand those provisions of the Phase III rule that established 316(b) requirements for existing electrical generators with a design intake flow less than 50 MGD and at existing manufacturing facilities on a case-by-case basis using BPJ. On July 23, 2010, the 5th Circuit issued a decision upholding EPA's rule for new offshore oil and gas extraction facilities. Further, the Court granted the request by EPA and environmental petitioners to remand the existing facility portion of the rule back to the Agency for further rulemaking. *ConocoPhillips Co. v. U.S. EPA*, 612 F.3d 822, 842 (5th Cir. 2010).

On April 20, 2011, EPA published new proposed regulations to apply CWA § 316(b) to CWISs at existing power plants and manufacturers, and to new units at existing facilities. 76 FR 22174-22288 (April 20, 2011) (Proposed Rule). This Proposed Rule, if it were effective, would apply to this permit because MTS is an existing power plant. The Final Rule has yet to be issued, however. Of course, EPA recognizes that the Agency's is currently planning to issue the Final Rule on April 17, 2014, *see http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/index.cfm*, but has decided against delaying publishing this draft permit to await the Final Rule for several reasons. First, the proposed deadlines for issuing the Final Rule have slipped in the past for a variety of reasons. Second, as the above-discussed history of the Phase I, II and III Final Rules indicates, CWA § 316(b) regulations have consistently been the subject of litigation and in some cases those Final Rules have not gone into effect. Therefore, delaying the BPJ permit determination would delay the entire permit, including its other important provisions, with no guarantee that a Final Rule will soon be in effect and remain in effect. Finally, it should be understood that while EPA is making a BPJ determination of the BTA pursuant to 40 C.F.R. § 125.90(b), EPA also notes that EPA's Proposed Rule under CWA § 316(b) also calls for BPJ determinations of the BTA for facilities such as MTS. *See* 76 Fed. Reg. 22174, 22283 (April 20, 2011) (proposed 40 C.F.R. § 125.94(c)). Therefore, EPA's approach to the BTA determination here appears to be consistent with the direction identified by EPA in the Proposed Rule.

8.1.1. Methodology for the BPJ Application of CWA § 316(b)

Neither the CWA nor EPA regulations dictate a specific methodology for developing BPJ-based limits under § 316(b). In the preamble to the proposed regulations for CWISs at existing facilities, EPA indicates that the Agency has broad discretion in determining the "best" available technology for minimizing adverse environmental impact (AEI) (See 76 Fed. Reg. 22196). EPA has read CWA § 316(b) to intend that entrainment and impingement be regarded as "adverse impacts" that must be minimized by application of the BTA.

EPA has looked by analogy to factors considered in the development of effluent limitations under the CWA and EPA regulations for guidance concerning additional factors to consider in making a BTA determination under CWA § 316(b). In setting effluent limitations on a site-specific BPJ basis, EPA considers a number of factors specified in the statute and regulations. *See, e.g.*, 33 U.S.C. §§ 1311(b)(2)(A) and 1314(b)(2); 40 C.F.R. § 125.3(d)(3).[17] These factors include: (1) the age of the equipment and facilities involved, (2) the process employed, (3) the engineering aspects of applying various control techniques, (4) process changes, (5) cost, and (6) non-water quality environmental impacts (including energy issues). The CWA sets up a loose framework for assessing these statutory factors in setting BAT limits.[18] It does not require their comparison,

---

[17] *See also NRDC v. EPA*, 863 F.2d at 1425 ("in issuing permits on a case-by-case basis using its 'Best Professional Judgment,' EPA does not have unlimited discretion in establishing permit limitations. EPA's own regulations implementing [CWA § 402(a)(1)] enumerate the statutory factors that must be considered in writing permits.").

[18] *BP Exploration & Oil, Inc.*, 66 F.3d at 796; *Weyerhauser v. Costle*, 590 F.2d 1011, 1045 (D.C. Cir. 1978) (citing Senator Muskie's remarks on CWA § 304(b)(1) factors during debate on CWA).

merely their consideration.[19] [I]n enacting the CWA, Congress did not mandate any particular structure or weight for all of these factors. Rather, it left EPA with discretion to decide how to account for these factors, and how much weight to give each factor.[20] In sum, when EPA considers the statutory factors in setting BAT limits, it is governed by a standard of reasonableness.[21] It has "considerable discretion" in evaluating the relevant factors and determining the weight to be accorded to each in reaching its ultimate BAT determination.[22] One court has summarized the standard for judging EPA's consideration of the statutory factors in setting BAT effluent limits as follows: "[s]o long as the required technology reduces the discharge of pollutants, our inquiry will be limited to whether the Agency considered the cost of technology, along with other statutory factors, and whether its conclusion is reasonable."[23]

Thus, in determining the BTA for this permit, EPA has the discretion to consider the above-listed factors and to decide how to consider and weigh them in making its decision. Again, the factors from the effluent limitation development process are not strictly applicable as a matter of law to a BTA determination under § 316(b) because they are not specified in § 316(b). Nevertheless, EPA has looked to the effluent limitation development process for guidance and will consider these factors, and perhaps other factors, to the extent the Agency deems them relevant to its determination of the BTA. Ultimately, EPA's determination of the BTA must be reasonable.

According to 40 C.F.R. § 125.3(c)(2), a BPJ-based BAT analysis also should consider the

---

[19] *Weyerhauser*, 590 F.2d at 1045 (explaining that CWA § 304(b)(2) lists factors for EPA "consideration" in setting BAT limits, while CWA § 304(b)(1) lists both factors for EPA consideration and factors for EPA "comparison" -- *e.g.*, "total cost versus effluent reduction benefits" -- in setting BPT limits). *See also EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 74, 101 S.Ct. 295, 300, 66 L.Ed.2d 268 (1980) (noting with regard to BPT that "[s]imilar directions are given the Administrator for determining effluent reductions attainable from the BAT except that in assessing BAT total cost is no longer to be considered in comparison to effluent reduction benefits").

[20] *BP Exploration & Oil, Inc.*, 66 F.3d at 796; *Weyerhauser v. Costle*, 590 F.2d at 1045.

[21] *BP Exploration & Oil*, 66 F.3d at 796; *Am. Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1051 (1975), *modified in other part*, 560 F.2d 589 (3d Cir. 1977), *cert. denied*, 435 U.S. 914 (1978).

[22] *Texas Oil & Gas Ass'n*, 161 F.3d at 928; *NRDC v. EPA*, 863 F.2d at 1426. *See also Weyerhauser*, 590 F.2d at 1045 (discussing EPA's discretion in assessing BAT factors, court noted that "[s]o long as EPA pays some attention to the congressionally specified factors, the section [304(b)(2)] on its face lets EPA relate the various factors as it deems necessary").

[23] *Assn of Pacific Fisheries v. EPA*, 615 F.2d 794, 818 (9th Cir. 1980) (industry challenge to BAT limitations for seafood processing industry). *See also Chemical Manufacturers Assn (CMA) v. EPA*, 870 F.2d 177, 250 n.320 (5th Cir. 1989), *citing* Congressional Research Service, *A Legislative History of the Water Pollution Control Act Amendments of 1972* at 170 (1973) (hereinafter "*1972 Legislative History*") (in determining BAT, "[t]he Administrator will be bound by a test of reasonableness."); *NRDC v. EPA*, 863 F.2d at 1426 (same); *American Iron & Steel Inst.*, 526 F.2d at 1051 (same).

"appropriate technology for the category of point sources of which the applicant is a member, based on all available information," and "any unique factors relating to the applicant." MTS is a steam electric plant which employs a CWIS system associated with power generation, which is the most common type of facility with case-by-case determinations of § 316(b) requirements in Region 1. As such, the appropriate technology for MTS may not be the same as that for other steam electric power plants with different facts.

Because a BPJ-based application of CWA § 316(b)'s BTA standard is conducted on a case-by-case, site-specific basis, EPA must evaluate whether the technologies under consideration are practicable (or feasible) for use at MTS. In other words, although a technology works at one facility, it might not actually be feasible at another due to site-specific issues (*e.g.,* space limitations). Thus, a technology that works at another facility but is not feasible at MTS would not be the BTA for this permit. Conversely, a feasible technology for MTS might not be feasible for another facility.

Finally, as also indicated above, the United States Supreme Court has held that EPA is authorized, though not statutorily required, to consider a comparative assessment of an option's costs and benefits in determining the BTA under CWA § 316(b). *Entergy,* 556 U.S. at 222-226, *rev'g in part, Riverkeeper,* 475F.3d 83. As the Supreme Court explained, in its determination, "EPA sought only to avoid extreme disparities between costs and benefits." *Entergy*, 556 U.S. at 224. As the Court also explained, EPA had for decades engaged in this type of cost/benefit comparison using a "wholly disproportionate test" to ensure that costs were not unreasonable when considered in light of environmental benefits.[24] *Id.* at 1509 (citing *In re Public Service Co. of New Hampshire*, 1 E. A. D. 332, 340 (1977); *In re Central Hudson Gas and Electric Corp.*, EPA Decision of the General Counsel, NPDES Permits, No. 63, pp. 371, 381 (July 29, 1977)). In *Public Service*, EPA's Administrator stated that "I do not believe that it is reasonable to interpret Section 316(b) as requiring the use of technology whose cost is wholly disproportionate to the environmental benefit to be gained." In *Central Hudson, id.*, EPA's then General Counsel stated that:

> ... EPA must ultimately demonstrate that the present value of the cumulative annual cost of modifications to cooling water intake structures is not wholly out of proportion to the magnitude of the estimated environmental gains (including attainment of the objectives of the Act and § 316(b)) to be derived from the modifications.

The relevant "objectives of the Act and § 316(b)," as referred to in *Central Hudson,* include minimizing AEI resulting from the operation of CWISs, restoring and maintaining the physical and biological integrity of the Nation's waters, and achieving, wherever attainable, water quality providing for the protection and propagation of fish, shellfish and wildlife, and providing for

---

[24] As the Court described, in developing the Phase II Rule, EPA had (for the first time) used a "significantly greater than test." The Court also indicated that either test was permissible under the statute. 129 S.Ct. at 1509.

recreation, in and on the water. 33 U.S.C. §§ 1251(a)(1) and (2), 1326(b).

8.1.2. State Water Quality Standards

In addition to satisfying technology-based requirements, NPDES permit requirements for CWISs must also satisfy any more stringent provisions of state water quality standards (WQS) or other state legal requirements that may apply, as well as any applicable conditions of a state certification under CWA § 401. *See* CWA §§ 301(b)(1)(C), 401(a)(1), 401(d), 510; 40 C.F.R. §§ 122.4(d), 122.44(d). *See also* 40 C.F.R. § 125.84(e). This means that permit conditions for CWISs must satisfy numeric and narrative water quality criteria and protect designated uses that may apply from the state's WQS.

The CWA authorizes states to apply their WQS to the effects of CWISs and to impose more stringent water pollution control standards than those dictated by federal technology standards.[25] The United States Supreme Court has held that once the CWA § 401 state certification process has been triggered by the existence of a discharge, then the certification may impose conditions and limitations on the activity as a whole – not merely on the discharge – to the extent that such conditions are needed to ensure compliance with state WQS or other applicable requirements of state law.[26]

With respect to cooling water withdrawals, both sections 301(b)(1)(C) and 401 authorize the Region to ensure that such withdrawals are consistent with state WQS, because the permit must assure that the overall "activity" associated with a discharge will not violate applicable WQS. *See PUD No. 1*, 511 U.S. at 711-12 (Section 401 certification); *Riverkeeper I*, 358 F.3d at 200-202; *In re Dominion Energy Brayton Point, LLC*, 12 E.A.D. 490, 619-41 (EAB 2006). Therefore, in EPA-issued NPDES permits, limits addressing CWISs must satisfy: (1) the BTA standard of CWA § 316(b); (2) applicable state water quality requirements; and (3) any

---

[25] The regulation governing the development of WQS notes that "[a]s recognized by section 510 of the Clean Water Act, States may develop water quality standards more stringent than required by this regulation." 40 C.F.R. § 131.4(a). The Supreme Court has cited this regulation in support of the view that states could adopt water quality requirements more stringent than federal requirements. *PUD No. 1 of Jefferson County v. Wash. Dep't of Ecology*, 511 U.S. 700, 705 (1994). *See also* 33 U.S.C. § 1370; 40 C.F.R. § 125.80(d). *See also* 40 C.F.R. § 125.80(d); *Riverkeeper, Inc. v. U.S. Environmental Protection Agency*, 358 F.3d 174, 200-201 (2d Cir. 2004) ("*Riverkeeper I*").

[26] *PUD No. 1*, 511 U.S. at 711-12. holds that "in setting discharge conditions to achieve WQS, a state can and should take account of the effects of other aspects of the activity that may affect the discharge conditions that will be needed to attain WQS. The text [of CWA § 401d)] refers to the compliance of the applicant, not the discharge. Section 401(d) thus allows the State to impose "other limitations" on the project in general to assure compliance with various provisions of the Clean Water Act and with "any other appropriate requirement of State law." For example, a state could impose certification conditions related to CWISs on a permit for a facility with a discharge, if those conditions were necessary to assure compliance with a requirement of state law, such as to protect a designated use under state WQS. *See id.* at 713 (holding that § 401 certification may impose conditions necessary to comply with designated uses).

applicable conditions of a state certification under CWA § 401. The standards that are most stringent ultimately determine the Final Permit limits.

MassDEP has designated this stretch of the Connecticut River a Class B Water. Though the standard for Class B waters does not include any specific numeric criteria that apply to cooling water intakes, it is nevertheless clear that MassDEP must impose the conditions it concludes are necessary to protect the designated uses of the receiving water, including that it provide good quality habitat for fish and other aquatic life and a recreational fishing resource. See 314 CMR 4.05(4)(b). In addition, 314 CMR 4.05(1) of the Massachusetts WQS provides that each water classification "is identified by the most sensitive, and therefore governing, water uses to be achieved and protected." This means that where a classification lists several uses, permit requirements must be sufficient to protect the most sensitive use. Finally, 314 CMR 4.05(3)(b)(2)(d) for Class B waters states "in the case of a CWIS regulated by EPA under 33 USC § 1251 (FWPCA, §316(b)), the Department has the authority under 33 USC § 1251 (FWPCA, §401), M.G.L. c. 21, §§ 26 through 53 and 314 CMR 3.00 to condition the CWIS to assure compliance of the withdrawal activity with 314 CMR 4.00, including, but not limited to, compliance with narrative and numerical criteria and protection of existing and designated uses."

In summary, the Massachusetts WQSs apply to CWISs and MTS's permit requirements must be sufficient to ensure that the facility's CWIS neither causes nor contributes to violations of the WQS and will satisfy the terms of the state's water quality certification under CWA § 401. EPA anticipates that the MassDEP will provide this certification before the issuance of the Final Permit.

8.2 Effects of Cooling Water Intake Structures

Section 316(b) of the CWA addresses the adverse environmental impact of CWIS at facilities requiring NPDES permits. The principal adverse environmental impacts typically associated with CWISs evaluated by EPA are the *entrainment* of fish eggs, larvae, and other small forms of aquatic life through the plant's cooling system, and the *impingement* of fish and other larger forms of aquatic life on the intake screens.

Entrainment of organisms occurs when a facility withdraws water into the CWIS from an adjacent water body. Fish eggs and larvae and other planktonic organisms in the water are typically small enough to pass through intake screens and become entrained along with the cooling water drawn into the facility. *See* 76 Fed. Reg. 22197). As a result, the organisms are subjected to death or damage due to high velocity and pressure, increased temperature, and exposure to chemical anti-biofouling agents.[27] The number of organisms entrained is dependent upon the volume and velocity of cooling water flow through the plant and the concentration of organisms in the source water body that are small enough to pass through the screens of CWIS. The extent of entrainment can be affected by the intake structure's location, the characteristics of

[27] EPA 2011. Environmental and Economic Benefits Analysis of the Proposed Section 316(b) Existing Facilities Regulation: Section 2.3 CWIS Impacts to Aquatic Ecosystems. EPA. March 28, 2011.

the biological community in the water body, the characteristics of any intake screening system used by the facility, and by season. Entrainment and impingement impacts could also be reduced by controlling the timing and frequency of water withdrawals from rivers in light of the aquatic organisms present in the water body at particular times. For example, in temperate regions, the number of eggs and larvae peak in rivers during spring (when many riverine fishes reproduce), and the entrainment potential during the remainder of the year may be minimal (EPA Technical Development Document for the Phase I Rule, Chapter 5, 2001).

Impingement of organisms occurs when a facility draws water through its CWIS and organisms too large to pass through the screens, and unable to swim away, become trapped against the screens and other parts of the intake structure. *See* 76 Fed. Reg. 22197. Impinged organisms may be killed, injured or weakened, depending on the nature and capacity of the plant's filter screen configuration, cleaning and backwashing operations, and any fish return system used to return organisms back to the source water. In some cases, contact with screens or other equipment can cause an organism to lose its protective slime and/or scales, or suffer other injuries, which may eventually result in mortality. Upon being returned to a body of water, injured or disoriented organisms may be more susceptible to predation. *See* 66 FR 65263 (Preamble to Phase I Rule).

The quantity of organisms impinged is a function of the intake structure's location and depth, the velocity of water drawn to the entrance of the intake structure (approach velocity) and through the screens (through-screen velocity), the seasonal abundance of various species of fish, and the size of various fish relative to the size of the mesh of any intake barrier system (e.g., screens). For migratory fish using the Connecticut River, the CWISs pose multiple threats to single populations in that organisms may be exposed to entrainment mortality as eggs and larvae and impingement mortality as juveniles and adults. It should be noted that this discussion focuses on fish because more information is available on CWIS impacts to fish, but CWISs can also harm other types of organisms (*e.g.*, shellfish).

The most direct impact of impingement and entrainment mortality is the loss of large numbers of aquatic organisms, including fish, benthic invertebrates, phytoplankton, fish eggs and larvae, and other susceptible organisms. EPA believes that reducing impingement and entrainment mortality will contribute to the health and sustainability of fish populations by lowering the total mortality rate for these populations. In some cases, these losses may contribute to impacts to threatened and endangered species, indigenous populations of aquatic organisms, and a reduction in ecologically critical aquatic organisms, including important elements of an ecosystem's food chain. For instance, because predation rates are often linked to concentrations of prey, reductions in a prey fish from impingement and entrainment mortality may indirectly result in reductions to predator species or increases to species in apparent competition (Brauer, 2000). In addition, impingement and entrainment mortality can diminish a population's compensatory reserve, which is the capacity of a species to increase survival, growth, or reproduction rates in response to environmental variability, including temperature extremes, heavy predation, disease, or years of low recruitment.[28]

For commercially and recreationally important fish stocks, impingement and entrainment mortality represent an additional source of mortality to populations that may currently be harvested at unsustainable levels. Although reductions in impingement and entrainment mortality may be small in magnitude compared to fishing pressure and often difficult to measure due to the low statistical power of fisheries surveys, a reduction in mortality rates on overfished populations is likely to increase the rate of stock recovery (Northeast Fisheries Science Center, 2005). Thus, reducing impingement and entrainment mortality may lead to more rapid stock recovery, a long-term increase in commercial fish catches, increased population stability following periods of poor recruitment, and, as a consequence of increased resource utilization, an increased ability to minimize the invasion of exotic species. Finally, fish and other species affected directly and indirectly by CWISs can provide other valuable ecosystem goods and services, including nutrient cycling and ecosystem stability.

8.3 Biological Impacts of Cooling Water Intake Structures

8.3.1. Impingement Impacts and Studies at MTS

Impingement of organisms occurs at MTS when water is drawn into the facility through the CWIS and organisms become trapped against the traveling screens. While it is important to understand an intake structure's potential to impinge organisms, it is also important to assess the capability of the intake system's design and operation to effectively return impinged organisms back to the receiving waters alive and uninjured. As noted earlier, the permittee uses traditional traveling screens and a high pressure water spray from a water supply containing waste heat of up to 32ºF above ambient river water to wash off any impinged fish. These fish are deposited in a trough along with debris for transport back to the river.

The return trough is mostly uncovered, runs for about 300 feet, and may include a drop of several feet onto a rocky shoreline depending on the water level in the river. During the impingement study, MTS observed the condition of fish impinged on the screens and estimated impingement survival. For those estimates based on a count of more than 10 individuals, initial survival ranged from 0 to 38% with an average survival of about 13%. However, because the study did not account for mortality experienced as fish are transported through the fish return trough, which EPA concludes is in poor condition and is unlikely to safely return fish to the receiving water, EPA assumes that 100% of the fish that are impinged on the traveling screens will experience mortality.

Weekly impingement sampling at the MTS CWIS was conducted between July 2006 and July 2008 (Mt Tom Station Impingement Report, December 2008, AR#28). Impingement was

[28] EPA. Environmental and Economic Benefits Analysis for Proposed Section 316(b) Existing Facilities Rule. March 28, 2011. EPA 821-R-11-002.

recorded in each month of the year with the highest values over both years in December, March, and April. Five species comprised more than 66% of the total impingement over the two year study, including yellow perch (21.4%), white sucker (14.3%), spottail shiner (12.2%), bluegill (9.5%), and gizzard shad (8.9%). Other notable species impinged included juvenile American shad (5.1%) and Atlantic salmon smolts (4.2%). No shortnose sturgeon were impinged during either year of the study.

Based on continuous facility withdrawal and extrapolating from this sampling, it is estimated that 572 fish would have been impinged between July 2006 and June 2007 and 1,695 between July 2007 and July 2008, with an average of 1,133 fish per year.

8.3.2. Entrainment Impacts and Studies at MTS

As discussed above, entrainment occurs when small organisms in the water column, such as early life stages of fish and invertebrates, are pulled through the openings in the traveling screen into the plant's cooling system. A two year entrainment study was conducted from October 2008 through September 2010 (Mount Tom Generating Station Ichthyoplankton Data Report, AR#33). Over the two years of the study, MTS collected only 10 eggs in entrainment samples, which comprised less than 0.3% of the total entrainment. (This could be due to the presence of nest building species and demersal eggs, which are less likely to be entrained.) Given that few eggs are likely to be entrained at this facility, EPA focuses its evaluation and discussion of entrainment and technologies for MTS on larvae.

Entrainment of larvae was strongly dependent on season and entrained larvae were collected only in April through August of 2009, and May through July of 2010. Peak entrainment in both years was during June. In the 2009 sampling year, approximately 89% of the total entrainment occurred in May and June. In the 2010 sampling year, 99.9 % of the total entrainment occurred during the months of May and June.

In 2009, entrainment was dominated by shiners (28.0%), tessellated darter (20.7%), sea lamprey (16.9%), herring species (American shad and blueback) (12.6%), white sucker (7.4%), and common carp (7.1%). In 2010, entrainment was dominated by common carp (46.7%), herring (15.9%), shiners (12.7%), gizzard shad (7.5%), and tessellated darter (5.2%). No shortnose sturgeon eggs or larvae were collected in entrainment samples during either year.

Based on monthly larval entrainment levels submitted by MTS, EPA estimated the number of larvae that would be entrained if the facility withdrew at the maximum permitted rate of 133.2 MGD in May, June and July at 6.8 million larvae in 2009 and 16.6 million larvae in 2010, with an average of 11.7 million entrained larvae over the two years. In the absence of a site-specific study to investigate the potential survival of entrained ichthyoplankton at MTS, EPA assumes 100% mortality for the early life stages as they travel through the plant and are subject to thermal and mechanical forces.

8.3.3. Summary

Limited biological monitoring suggests that operation of the MTS CWIS has the capacity to result in an annual impingement mortality of around 1,700 adult and juvenile fish and an annual entrainment mortality of more than 16 million larvae. Impingement occurs at MTS at all times of the year, while entrainment occurs primarily in May and June. MTS currently entrains early life stages of blueback herring and American shad, which are of particular biological interest due to declining populations in New England. No shortnose sturgeon, an endangered species, were impinged or entrained during the two-year entrainment and impingement studies, but MTS has in the past impinged individuals of this species (see Section 7.3.5). In summary, based on the available biological monitoring data, the operation of the MTS CWIS causes adverse environmental impacts (AEI) which must be minimized by implementation of the BTA described in this permit.

8.4 Assessment of Cooling Water Intake Structure Technologies

8.4.1. Existing Cooling Water Intake Structure Technology

This section evaluates MTS's existing CWISs and discusses potentially available technological alternatives for ensuring that the location, design, construction, and capacity of the CWIS reflects the BTA for minimizing adverse environmental impacts, as required by CWA § 316(b). This discussion considers engineering, environmental, economic, and other issues related to each alternative and concludes with EPA's determination of the CWIS BTA for this permit renewal.

In addition to focusing on the degree to which technologies or operational measures could minimize entrainment and impingement, EPA also evaluated additional factors that are considered by EPA in the analogous exercise of determining BAT effluent standards. *See* CWA § 304(b)(2)(B); 40 C.F.R. § 125.3(d)(3). These factors include: (1) the age of the equipment and facilities involved, (2) the process employed, (3) the engineering aspects of applying various control techniques, (4) process changes, (5) cost, and (6) non-water quality environmental impacts (including energy issues). Where applicable, the consideration of these factors for each potential impingement and entrainment technology is discussed below.

As explained in more detail below, there is a range of alternatives for minimizing the AEI of CWISs. Each available alternative has advantages and disadvantages, both inherent to the technology and as applied specifically at MTS, and no one alternative commends itself as perfect, proven, and fully protective of the environment. For this analysis, EPA has considered the permit record, including the many recent submittals made by the permittee, such as its May 2011 responses to EPA' s CWA § 308(a) information request letter, its CWIS Information Document (MTS Report; 2008), and an additional MTS Response to an EPA data request (e-mail from C. Tomichek to J. Nagle; August 29, 2013). EPA used the information included in these documents, among other information, to further the analysis and screening necessary to determine the best site-specific technology available to minimize the AEI from MTS's CWIS. The inclusion of estimated performance and cost information from the permittee in this attachment does not necessarily signify that EPA concurs with the information included in the reports. In some cases, when no cost information was provided by MTS, EPA developed estimated cost information to allow for comparison among technologies.

Based on review of existing technology and biological monitoring data, EPA concludes that MTS's present CWIS does not meet CWA § 316(b)'s BTA standard for minimizing AEI due to impingement and entrainment. The current CWIS configuration is essentially original to the plant. While EPA finds that the CWIS is currently in a suitable location, it was not designed to minimize impingement or entrainment mortality and EPA finds that it fails to do so in practice.

8.4.1.1 Existing Traveling Screens

The intake channel leads to two bays, each equipped with vertically rotating, ¾-inch-mesh, traveling screens. A high pressure (70 psi) spray wash is used to remove any trapped organisms from the intake screens. When this spray wash system is not being used, a fire hose may be used, which likely operates at an even higher pressure for short periods of time. (*See* description of traveling screens in Section 2.0 of this Fact Sheet.) Due to the relatively coarse size of the screen mesh, this design technology is entirely ineffective for preventing entrainment, as fish larvae and eggs, and other tiny organisms, will pass through the screen openings. Any entrained organisms are then assumed to suffer mortality as they pass through the plant.

A low enough intake velocity can ensure that adult and juvenile fish of many species would be able to escape the influence of the intake and not become impinged. From its research, as discussed in the preamble to the Phase I Rule, *see* 65 Fed. Reg. 49,087-49,088, EPA derived a protective through-screen velocity 0.5 feet per second (fps). Indeed, many of the species and life stages of fish that were evaluated were found to be able to swim against a velocity as high as 1.0 fps, however, a more conservative through-screen velocity threshold of 0.5 fps protected 96% of tested fish. Moreover, using a more conservative limit is particularly appropriate because it may provide a margin of safety for circumstances in which screens become occluded by debris during the operation of a facility, resulting in increased through-screen velocity through the portions of the screen that remain open to intake flow.

The intake velocity at the entrance to the MTS intake pipe in the river varies between 2.1 and 4.1 fps depending on whether the facility is operating with one or two pumps, while the design through-screen velocity at each traveling screen is estimated to be 1.6 fps when the corresponding pump is in operation. Therefore, the current intake velocity consistently exceeds the protective velocity of 0.5 fps under either pumping configuration.

8.4.1.2 Electric Fish Barrier

As noted in Section 2.0 of this Fact Sheet, an electric fish barrier was installed in 1959 in front of the river intake to deter fish from entering the intake pipe. This fish barrier has not been electrified since 2010, as an impingement study by MTS found that it was ineffective for keeping fish from entering the CWIS.

8.4.1.3 Existing Fish Return System

EPA must assess the capability of the intake system's design and operation to effectively return impinged organisms back to the receiving waters alive and uninjured. These organisms and debris are directed toward the Connecticut River via a partially covered sluiceway, followed by an open, wooden trough that discharges onto a gully formed in the ground that is layered with polyethylene-type liner material, followed by a concrete trough. The concrete trough terminates at a concrete drain that discharges to an underground pipe that leads to the bank of the river.

As noted earlier, high pressure spray washes are used to remove any trapped organisms from the intake screens. Fish and any debris washed off the screens are sent through the fish return system described above. At the end of that system, depending on the water level in the river, the fish either fall a short distance to the river, fall several feet through the air before hitting the river, or fall onto a rocky shoreline. In addition, MTS uses its heated cooling water for the high pressure spray wash. This water is heated up to 32ºF above ambient river water temperatures and may also contain chlorine. Thus, impinged organisms may be harmed by the velocity, temperature and chemical quality of the spray wash water. Furthermore, impinged organisms must travel a long distance in an uncovered trough, which leaves them at risk to predation. As a result of all these problems with the current fish return system, the majority of impinged organisms are believed to suffer mortality in the process of getting washed off the screens and transported back to the river. Therefore, the existing fish return system does not minimize impingement or impingement mortality and is not considered part of the BTA for this permit.

8.5 Location, Construction, Design and Capacity of the CWIS

As discussed above, CWA § 316(b) requires that the location, construction, design and capacity of a facility's CWIS reflect the BTA for minimizing adverse environmental impacts. These four elements of a CWIS are discussed below. In this context of this permit, "construction" refers to any construction effects associated with any modifications to the existing CWIS at MTS. Rather than present a separate section on "construction," EPA will fold discussion of that element into its discussion of the other three elements (*i.e.*, location, design and capacity).

8.5.1. Location (and Construction)

The location of a CWIS in the waterbody can be an important factor influencing the extent of its adverse environmental impacts. In some cases, impingement and entrainment rates can be reduced by locating (or *re*-locating) the intake in an area of relatively less biological productivity. For example, moving an intake from a near-shore estuarine environment to an offshore location could reduce adverse environmental impact (AEI).

EPA evaluated the location and depth of the MTS CWIS in the water body (*e.g.*, proximity to a shoreline), to determine if it meets the BTA standard under CWA § 316(b).
The MTS CWIS is located near the western shore of the Connecticut River mainstem, on the inside of an S-curve. The intake structure extends approximately 30 feet into the river from shore, near the river bottom. The water depth in this area is approximately 15 feet at mean low water (MLW), considerably shallower than the main channel of the river.

The location of MTS's CWIS on the shallower, western bank of the river may help to reduce entrainment. Lower densities of free floating larvae would be expected on the inside bend of the river as compared with the far bank of the river and the middle part of the river's channel. This is due to the effect of the curve of the river at this location on the downstream movement of river water, which is believed to transport larvae and eggs toward the middle and eastern side of the river. (Kynard, et. al. 2003)

In addition, the existing location may tend to reduce impingement. A study by Kynard, et. al. (2003), in the vicinity of the MTS discharge indicated that adult fish abundance tended to increase toward the (main) channel. Moreover, migrating anadromous species are expected to be found primarily in close proximity to the deeper, main channel of the river.

For the reasons above, EPA has determined that the current location of MTS's CWIS satisfies the BTA standard of CWA§ 316(b).

8.5.2. Design (and Construction)

Section 316(b) requires that the CWIS's design reflect the BTA for minimizing impingement and entrainment. This refers to the design of the intake itself or its associated technologies that may be employed to minimize adverse impacts (*e.g.*, screening mechanisms, fish return systems). Design modifications at an existing CWIS could also entail construction impacts.

8.5.2.1 Expanded Intake at River

This technological option would involve increasing the opening of the CWIS at the river. Provided the same volume of water is being withdrawn, a larger opening would result in a reduced water withdrawal velocity at the intake in the river. In theory, the opening could be sized to result in a water withdrawal velocity of 0.5 fps or less. This would not, however, result in a similar through-screen velocity at MTS because the water would still have to travel through a narrower pipe before reaching the screens. Therefore, while fish would be better able to avoid entering the intake, those that did might still be unable to avoid being impinged on the screens.

MTS's analysis of this option did not include consideration of adding a barrier to prevent fish from entering the larger intake opening at the river. Without a physical barrier, fish will continue to be able to enter the intake pipe and, as mentioned above, potentially become impinged on the traveling screens at the end of the pipe. EPA regards this to be a significant limitation of an approach that solely involved expanding the intake to reduce water withdrawal velocity. As a result, Ristroph screens and an improved fish return system (discussed below) would likely be necessary complements to any expanded intake. MTS estimates that this technology will reduce impingement by 80% and reduce mortality of any impinged fish by 40%, assuming that improved screens and a fish return system are part of the design. These reductions estimated by MTS are due mainly to the lower intake velocities which would allow fish to avoid the initial influence of the intake. This technology would not have a measurable impact on ichthyoplankton entrainment. Furthermore, expansion of the intake opening would involve construction impacts and benthic disturbance in the Connecticut River.

The permittee estimated a capital cost of $6 million to expand the intake and a cost of an additional $11.7 million in lost generation during construction. The annualized cost over 30 years was calculated by EPA to be approximately $1 million per year (2014 dollars). Since an improved screen and upgraded fish return system is included as part of this technology (Section 8.5.2.3), the annualized cost of installing the improved screen and upgraded fish return system ($249,100) has been included in the cost of the expanded intake. Although the total cost of this option is significant and impacts would be expected from construction, this technology will be further considered as a possible component of the BTA for this permit due to the potential for impingement mortality reductions.

8.5.2.2. Upgrade Fish Return System

Upgrading a fish return system prevents neither entrainment nor impingement, but it can help reduce mortality to impinged organisms by safely returning them to the aquatic environment. Many site-specific issues must be taken into consideration when designing and operating a fish return system (FRS) to minimize adverse impacts to fish by a particular CWIS. Some basic components of an effective FRS include 1) a traveling screen designed to minimize stress to impinged fish; 2) a low-pressure spray wash system that uses ambient temperature, de-chlorinated water to dislodge fish from the traveling screen with a minimum of damage; 3) a sluiceway with no sharp angles or protrusions that may damage fish tissue; 4) a mechanism to reduce or eliminate predator access to the return system; 5) a design that returns fish safely to the water, rather than causing them to free-fall substantial distances onto the ground or into the shallow water, depending on river levels; and 6) a design that returns organisms to the water at a location safe from re-impingement and any severe water temperatures associated with the thermal discharge.

8.5.2.2.1 Fish Return Spray Wash and Sluiceway

In order to upgrade the current fish return spray wash and sluiceway at MTS to satisfy the BTA standard, at a minimum, the following improvements would be necessary: (1) the sluiceway must be covered and modified to reduce the threat of predation and improve fish transport to the river; (2) the spray wash must be changed to a low pressure spray, (3) the temperature of the spray wash water must be closer to ambient temperature (it is presently taken from the heated discharge as discussed in Section 2.0 of this Fact Sheet and may be up to 32°F higher than the ambient river water temperature); and (4) the spray wash water must not include harmful concentrations of chemicals, such as chlorine.

The capital cost for upgrading the current MTS fish return sluiceway and spray wash system to satisfy the characteristics listed above is estimated to be approximately $175,000 per year (2014 dollars annualized over 30 years, assuming a discount rate of 7.6%). This cost includes two new screen wash pumps and motors; a one-foot diameter buried HDPE pipe extending from the return trough at the substation fence to the riverbank, at which point the exposed portion of the pipe will be constructed of steel and extend to the river side of the existing sheetpile wall of the discharge area. Engineering, permitting and construction costs were also included in this estimate. Annual O&M costs are not expected to be different than what is currently incurred by the station for operation of the existing screen wash pumps and fish return sluice.

8.5.2.2.2 Ristroph Traveling Screens With Fish Return System

As EPA stated above, an effective fish return system includes traveling screens designed to minimize stress to impinged fish. Therefore, EPA requested that MTS evaluate upgrading its traveling screens.

The existing traveling screens at MTS do not have Ristroph-type fish handling buckets or a dedicated fish return system. (In other words, MTS's fish return system also carries debris washed from the screens.) "Ristroph traveling screens" have been used successfully at power plants in estuarine, river and ocean settings. This type of screen system typically has screen lips that are enlarged and cup shaped so that fish carried up the screen face during screen rotation are submerged in water and gently washed into the fish return using a low pressure spray. The spray is directed either from within the screen outward or from outward toward the screen face. Newer Ristroph screens use a smooth mesh (flat wire) screen and a canted non-metallic basket formed to significantly reduce vortexing, resulting in less injury to fish, though through-screen velocity will slightly increase with this design. These features make the Ristroph-type bucket more fish friendly and likely increase fish survival after impingement. Ristroph traveling screens are designed to operate continuously if the fish return system is to function properly.

For certain species, including a number that are particularly susceptible to impingement at MTS, an EPRI (2003a) study found *initial* survival after contact with the traveling screens to be very high under nearly all screen design and operating conditions. With the use of Ristroph-type modifications, even greater survival was found for these species. This study found that juvenile and adult white perch, yellow perch, catfish, striped bass, spottail shiner, pumpkinseed, American shad and gizzard shad had high initial survival rates.

While this may indicate that these species could initially survive being impinged at MTS, their ultimate survival depends on the nature of their experience after initial contact with the screens. Moreover, MTS also impinges species that may be less hardy than the species listed above (*e.g.*, blueback herring). Indeed, the permittee has estimated relatively low survival for impinged fish even prior to exposing the fish to MTS's deficient fish return sluiceway (as discussed above). Despite initial survival, mortality may occur as a result of prolonged exposure on a traveling screen or harm that occurs during removal from the screen by a high-pressure, high-temperature, chlorinated spray wash and/or during transport through the fish return system.

Survival rates for impinged fish at MTS could be improved by upgrading the traveling screens with Ristroph-type fish buckets and by installing the proposed new 500-foot-long fish return sluiceway and the two new low pressure spray pumps described in Section 8.5.2.2.1. MTS estimated that upgrading the traveling screens and fish return sluiceway would result in approximately a 40% reduction in impingement mortality.

The capital cost of retrofitting Ristroph screens for MTS's two traveling screens would be approximately $2,000,000. This cost is based on the installation of new screens with fish buckets, a modified spray wash system, and an improved 500-foot-long flume that would be more likely to safely return fish (and debris) to the river. O&M costs would be approximately $144,000 per year based on full load plant operation. These costs were not reduced to account for current fish screen O&M costs.

This retrofitting might or might not require a short-term shutdown and the permittee did not provide an estimate for the length of any such shutdown or for any revenue that would be lost during such a shutdown. It is EPA's opinion that such a retrofitting could be done in one intake bay at a time during a time of year when one pump operation is employed, so that any shutdown could be avoided. In the case where the permittee proposed to expand the intake for installation of a new Ristroph screen design, EPA estimated that a shutdown of up to eight weeks might be needed. This period would entail six weeks of lost revenue during construction, with the two additional weeks coinciding with the Facility's regularly scheduled annual outage. This shutdown period was estimated to result in lost generation revenues of approximately $5.9 million, assuming operation at closer to full load instead of the 10-15% capacity factor of the last few years.

EPA converted the estimated total cost for the above-described improved screening and fish return system over its 30-year life to an annualized cost in 2014 dollars of approximately $250,000 per year, assuming a discount rate of 7.6%.

8.5.2.2.3. Dual-flow Traveling Screens

Dual-flow traveling screens have more available through-flow screen area for a given intake flow than standard, single through-flow traveling screens. Dual-flow screens are oriented parallel to the direction of intake flow and use an "outside- to-inside" (or inside-to-outside) flow pattern to ensure that debris is always kept on the upstream side of the screen. The interior space between the upward and downward moving screen panels is closed off on the upstream side, so that screened water exits toward the pump (downstream side of screen). In this manner, both sides of the screen are filtering flow and debris, and fish that are larger than the traveling screen mesh will not be carried over into the pump.

Dual-flow traveling screens equipped with fish buckets, and twice as wide as the existing through-flow traveling screens, were analyzed. Costs were estimated assuming that there was sufficient space available between the existing screen location and the curtain wall to modify the screenwell structure to accommodate the larger screens. Capital costs for this option were estimated to be about $4,757,000, while a six-week shutdown for installation of the expanded intake was estimated to result in lost generation revenues of approximately $5.9 million, assuming operation at closer to full load instead of the 10-15% capacity factor of the last few years. This assumes the circulating water pumps could continue to operate until the sheet pile side walls are installed. O&M costs for the dual-flow screens would be similar to the costs for Ristroph-type screens described above.

Upgrading the existing traveling screens would not be expected to reduce entrainment impacts or to lower the intake velocity to 0.5 fps. Although both options have the potential to be moderately effective in reducing impingement mortality, only the Ristroph screen option (without an expanded intake structure) will be considered further as a potential component of the BTA at MTS. The cost of this option is substantially lower than the dual flow screen option, which would also have potentially greater construction impacts associated with enlarging the screenwell structure.

8.5.2.2.4 Wedgewire Screens

A wedgewire screen uses a “v” or wedge-shaped wire welded to a framing system to form a slotted screening element.[29] The screen is composed of wedge-wire loops welded at the apex of their triangular cross section to supporting axial rods, presenting the base of the cross section to the incoming flow (Pagano et al, 1977). Wedgewire screens are also referred to as profile screens or Johnson screens.

Wedgewire screens have demonstrated an ability under certain conditions to reduce both entrainment and impingement. Wedgewire screens seek to reduce entrainment and impingement both by physically excluding organisms from entering the CWIS and by using the sweeping

[29] Taft, E.P. 2000. Fish protection technologies: a status report. Environmental Science & Policy Volume

action of currents present in the source water body to move organisms safely away from the CWIS.

When organisms in the water body from which water is being withdrawn are larger than the mesh size of the screen, those organisms are physically excluded from being entrained. Thus, the screens block the organisms from being taken with the water out of the water body and sent through the CWIS and into the power plant's cooling system. In addition, by maintaining a low through-slot velocity, because of the screen's cylindrical configuration, organisms are allowed to escape the wedgewire screen's flow field (Weisberg et. al., 1984). For wedgewire screens to be effective, sufficient ambient current must be present in the source water body to move eggs, larvae and other life stages of aquatic organisms, as well as debris, away from the screens and the CWIS (*See* EPA Technical Development Document for the Final Section 316(b) Phase II Rule, Feb. 12, 2004 p. A-13).

The mesh size of a wedgewire screen can range from 10 mm to as low as 0.5 mm. Small slot-size (0.5 to 3 mm) wedgewire screens have been used or tested at a number of facilities, including Chalk Point Station, Charles Point Recovery Facility, Oyster Creek Nuclear Generating Station, and Arbuckle Hydroelectric Station, as well as in controlled laboratory studies (EPRI, 2008). Studies of wedgewire screens suggest that they may under some conditions (*e.g.*, mesh size smaller than the size of the eggs and/or larvae in the source water body) be able to exclude small eggs and larvae from entrainment. Yet, a mesh size small enough to exclude the smallest egg present still may not be enough because the combination of a soft bodied organism with sufficient intake velocity can result in eggs and larvae larger than the mesh size being pulled through the screen and entrained (EPRI 2003). Field and laboratory studies suggest that 0.5 mm mesh retained significantly more eggs and larvae than 1.0 mm mesh (ESEERCO 1981, EPRI 2005, EPRI 2008).

It is also essential to recognize the difference between excluding eggs and larvae from being entrained and providing for their survival. Although survival is the critical measure of success, it is extremely difficult to assess when evaluating the effectiveness of a screening technology, such as wedgewire screens. To effectively reduce adverse environmental impacts associated with entrainment (i.e., mortality), eggs and larvae excluded from the intake by a fine-mesh screen must also survive any *impingement* on those screens and be safely returned to the aquatic habitat. If egg and larval mortality by entrainment is simply replaced with mortality by impingement, the cause of the CWIS's adverse environmental impact will have been shifted from entrainment to impingement, but the adverse impact of mortality to aquatic organisms will not have been reduced.

Unfortunately, the tiny eggs and larvae that are entrained through coarse mesh screens, such as are currently in use at MTS, are at a high risk of being killed if they are instead impinged on a fine-mesh wedgewire screen. The egg and larval life stages of fish are or can be quite fragile. While the fate of eggs and larvae following any impingement on fine-mesh screens determines the ultimate success or failure of the technology, EPA is unaware of studies that have evaluated the survival of eggs and larvae exposed to wedgewire screens. In laboratory tests described in one paper, impingement of eggs and larvae excluded from entrainment by 0.5 mm wedgewire screens was generally low (less than 13 percent for eggs and less than 9 percent for winter flounder and rainbow smelt larvae) (EPRI 2003).

The few survival studies that have been conducted have been tested with fine-mesh (0.5 mm) traveling screens (which are different from wedgewire screens). In these studies, survival is species- and life stage-specific, is influenced by intake velocity, and can be poor for fragile species. In one study of a prototype screen, initial and latent survival of larvae was generally low (less than 20%) (Taft et al. 1981). High mortality was also observed in laboratory and field studies for winter flounder, alewife, bay anchovy, and common carp larvae, regardless of velocity or impingement duration (ESEERCO 1981, EPRI 2007, EPRI 2008). The limited results available suggest that, for some species, larval survival on fine mesh screens may be poor.

On the other hand, initial survival of fish *eggs* in the Taft et al. study (1981) was 100% for some species (e.g., weakfish, black drum, Southern Kingfish, silver perch) and 40 to 75% for other species (anchovy, herring, sardine, croaker). Hatchability and latent survival did not differ between test and control samples, suggesting that latent impacts of impingement on fine-mesh screens by fish eggs may be minimal. Similarly, initial and latent survival of decapod zoea was high in both test and control samples, suggesting that mortality of crustacean larvae from fine mesh screens may be low (Taft et al. 1981). The results of the limited available survival data suggest that while larvae are unlikely to survive impingement on fine mesh screens, this technology may effectively reduce mortality for eggs and crustacean larvae.

Beyond the issue of impinging larvae and/or eggs, reducing wedgewire screen slot sizes increases the potential for clogging of the screen openings. Screens could be clogged by debris in the river and/or by biological growth on the screen mesh. Such clogging would decrease the performance of the screens, may increase through-screen velocity through-screen velocity at some spots on the screens, and would likely require additional cost to remove biological growth, aquatic organisms and debris from the screens. One way to potentially minimize such debris loading is to incorporate some type of compressed air system into the design of the screens to periodically blow off the debris. Another concern about screens with smaller slot sizes is that additional or larger screen units or cylinders will be needed to ensure sufficient intake flow rates. As a result, there may inadequate space available in the river for the necessary screens, and the screen installation may interfere with navigation or other uses of the river.

EPA evaluated using wedgewire screens at MTS based on the BAT factors. The age of the MTS power plant or CWIS equipment would not preclude installing new wedgewire screens. New wedgewire screens would essentially take the place of the existing traveling screens, which are original to the facility. Upgrading such old equipment would not be inappropriate. Using wedgewire screens would not change the process of generating electricity, but MTS has estimated that there could be a period of up to twelve weeks during installation of the screens when the facility might need to forego revenue from electricity generation.

There are engineering challenges associated with this technology at MTS for entrainment reduction. An analysis for installation of 0.5-mm cylindrical wedgewire screens at MTS revealed that six, 7-foot diameter, 25-foot long wedgewire screens would be required to effectively screen eggs and larvae. This configuration would also achieve a through-screen velocity of 0.5 fps to minimize impingement. A low through-screen velocity to allow fish to escape impingement is particularly important with wedgewire screens because unlike traveling screens, wedgewire screens do not include a method of safely removing impinged fish. For these screens, a water depth of at least 14 feet would be needed (with a 7-foot clearance on all sides) and since the depth of the Connecticut River in front of the CWIS entrance is only 15 feet at Mean Low Water, the screens would need to be installed farther offshore in deeper areas to ensure submersion during low flow periods. The screen footings would have direct impacts on the benthic habitat and could directly impact benthic organisms, including freshwater mussels. For example, installation of these screens in the river could impact the benthic habitat of the state-protected yellow lampmussel. It also could adversely affect water quality by increasing turbidity. Placement of the screens may also result in changes in the hydrology in this segment of the river. If cylindrical wedgewire screens are installed farther offshore from the Facility, the screens would be closer to the river channel which could impact navigation and may expose more organisms to the CWIS, as a study performed by Kynard et al. (2003) in the vicinity of MTS indicated that fish abundance increases toward the main channel.

To reduce entrainment and meet the 0.5 fps goal for through-screen velocity, MTS would need to install many large screens with a 0.5 mm or 1.0 mm slot size. EPA has determined that this technology will not be considered further for entrainment reduction due to uncertainties regarding a number of potential problems: 1) uncertainty regarding the potential clogging of the screens and maintenance costs associated with clearing any such clogging; 2) uncertainty regarding the ultimate survival of larvae that may get impinged by the wedgewire screens; and 3) uncertainty regarding the additional impacts associated with a large number of screens needing to be deployed further into the main channel of the river.

However, if wedgewire screens are to be designed mainly for impingement reduction at MTS, the permittee has estimated that it would require only four (4) cylindrical wedgewire screens with a slot size of 10 mm to accommodate the 133.2 MGD flow and achieve a through-screen velocity of 0.5 fps or less. MTS estimates that wedgewire screens with these characteristics would nearly eliminate impingement (96% or greater reduction in impingement). With a mesh size of 10 mm, the reduction in entrainment of Connecticut River ichthyoplankton would be negligible, as EPA assumes this mesh size to be largely ineffective for reducing entrainment. These screen cylinders would have a diameter of 4.5 feet and require a depth of water of about 10 feet for installation. EPA will consult with the National Marine Fisheries Service prior to permit issuance regarding potential impacts of this permitting action on the shortnose sturgeon. EPA will also consult with the U.S. Army Corps of Engineers regarding navigational issues.

If the wedgewire screens had to be installed in the main channel of the river, installation impacts would likely be greater. To the extent that the wedgewire screen cylinders can be kept to a diameter of 4.5 feet, which could be installed in 10 feet of water, it would be expected that installation could be closer to the intake area along the shore. The optimal location for a wedgewire screen installation would have to have to be determined after considering the tradeoffs of keeping them closer to the intake but nevertheless placing them at a location where there would be sufficient sweeping flow.

The cost of installing four, 10-millimeter wedgewire screen cylinders was estimated by MTS to be $4 million (in 2011 dollars; August 2013 MTS Submittal), which includes a compressed air system designed to periodically activate to remove debris from the face of the screens. The permittee estimated a twelve week shutdown to install these screens, representing a potential revenue loss of over $11 million. Although this revenue loss figure assumes full generating capacity operation, as noted earlier, the capacity factor in recent years has been far below that level and the permittee could also install the screens during fall or spring when generation is reduced and could consider installation during its 2-3 week maintenance shutdown period. Either of these approaches could significantly reduce such revenue losses.

Finally, EPA also notes that the annualized cost of wedgewire screens provided by the permittee includes a twelve week shutdown during construction, with the resulting loss in generation estimated at over $11,000,000. It is unlikely that wedgewire screen installation in the river would be allowed to take place during the spring spawning season, when increased turbidity from construction activities would likely have a negative impact on migrating fish and early life stages present in the river at that time. Therefore, no part of the installation of this technology would be able to incorporate the scheduled spring outage at MTS, which would have reduced the lost generation cost by two weeks.

Installation of 10-mm wedgewire screens is expected to nearly eliminate impingement, but not to reduce entrainment mortality. Since this technology will nearly eliminate impingement and its costs are moderate compared to other options, this technology will be further considered as a potential part of the BTA for minimizing impingement mortality at MTS.

8.5.2.2.5 Aquatic Filter Barrier

Barrier net systems are typically comprised of nets anchored in front of an intake to passively filter water and exclude organisms larger than the mesh size of the net. These systems include simple static nets as well as more specialized filter fabric nets known as “aquatic filter barriers” (AFBs). Both technologies seek to minimize entrainment by having a mesh size small enough (*e.g.*, 0.5 mm) to effectively exclude most eggs and larvae, and to minimize impingement by having through-screen velocities low enough (*i.e.*, less than 0.5 fps) to protect most life stages and species of aquatic organisms. As with wedgewire screen systems, a major issue for AFBs is whether or not eggs and larvae that are blocked from being entrained actually survive being impinged by the AFB. An AFB may also incorporate a compressed air system for clearing debris from the barrier net to help maintain its performance. These systems would be expected to work best in an environment with minimal debris loading and sufficient sweeping flow in the river to move organisms away from the AFB, but not having such high energy that the AFB might be dislodged or damaged.

One type of AFB that was considered by MTS is the Gunderboom® MLES™ (Marine Life Exclusion System) which consists of a two-layer, full-depth fabric filter that is installed around the entrance to a CWIS to physically exclude organisms from entering the cooling system. The fabric curtain is typically suspended by floatation billets on the surface and anchored into the substrate of the source water body. Since the surface area of the fabric curtain is much larger than a typical intake screen, water velocity through the curtain is substantially less than the velocity near the intake structure. Gunderboom aims to design MLESs with an intake volume of approximately 7 gpm per square foot of fabric. The design intake velocity would determine the amount of fabric or size of the net required. Sediments and microorganisms that inevitably become entrapped in the fabric can be removed with an integrated compressed air system, which routinely releases bursts of compressed air along the base of the curtain to free the entrapped materials.

There are different types of anchoring systems available to use and site-specific conditions would dictate the appropriate type of system to use. In areas with ecologically sensitive bottom habitats, helical-type anchors would be preferred over concrete blocks since the former impose essentially no footprint on the river bottom; however, site-specific conditions such as high water velocities and excessive debris loading may preclude their use. Regardless of the type of anchor used, the system typically consists of one anchor placed every 30 feet on both the inside and outside of the fabric layers.

To EPA's knowledge, there are only a limited number of AFB systems installed at various types of facilities for entrainment reduction (*e.g.*, NYC Waterfalls exhibit, Lovett Generating Station, and Taunton Water Development Project), but some results of monitoring studies suggest that the technology may be able to effectively minimize entrainment. Studies conducted in 2000, with a fabric pore size of 0.5 mm, indicated that the Gunderboom was approximately 80 percent effective in reducing overall entrainment (USEPA 2005). Studies at Lovett Station indicate that entrainment, primarily of post-yolk sac larvae, was reduced by between 73 percent (in 2004) and 92 percent (in 2005) for all species (ASA 2004). None of these studies, however, to EPA's knowledge, determined the rate of ultimate survival by the eggs and larvae excluded from entrainment by these installations. Excluding organisms may not be enough to minimize adverse environmental impacts of the CWIS. As with wedgewire screens, a sufficient ambient flow should be present so that eggs and larvae may be swept away from the net and entrainable organisms do not accumulate at the face of the technology where they may suffer mortality due to impingement, predation, and competition for food, as well as may clog up portions of the net. *See* Henderson, et al. 2001. This could be a particular problem in a tidal situation where waters wash back and forth, rather than flowing past as in a river environment. At the same time, however, excessive river flows (or tidal action at marine locations) could be detrimental to the stability/durability of these nets and their anchoring systems.

Gunderboom was contacted to provide an estimate of the size and cost of the AFB that would be required to prevent entrainment at the MTS CWIS. Based on a mesh size of 0.5 mm, a design intake flow of 92,500 gpm (133.2 MGD), and a water depth of 20 feet, the fabric length would need to be approximately 800 feet long. The estimated total cost of an MLES at MTS is $2.2 million, based on a phased approach to implementation, which includes design concept, field data acquisition, final detailed engineering, fabrication/procurement, installation, and integrative commissioning. The estimated annual O&M costs range from $325,000 - $450,000, assuming a six-month seasonal deployment and includes annual deployment and removal. Based on information from Gunderboom, the MLES base structure has a life expectancy of about seven to ten years. The fabric curtain is designed so that individual panels can be removed and replaced as necessary, but in general, the fabric has a life expectancy of three to five years.

A recent entrainment monitoring study completed in 2010 (Kleinschmidt 2010) at MTS indicated that more than 99 percent of the entrainment occurred during the period of May to July. Assuming that the effectiveness of the Gunderboom system would be similar to that demonstrated at the Lovett site, seasonal deployment of this system at MTS during this three-month period could potentially reduce annual entrainment by 80 percent.

In-water studies of the Gunderboom have revealed, however, that fouling is an issue. Velocity hot spots can form as the result of fouling and lead to planktonic organisms being pinned to the mesh causing egg and larval mortality. As a fouling community develops on the barrier, a predatory community can become established, which feed on weak swimming or non-swimming eggs and larvae, also increasing mortality. (Henderson et. al., 2001). It is not known whether the variation in flows of a river as large as the Connecticut River would have impacts on the durability of the AFB, although it would be installed along the shallower area around the intake and not subject to the swifter currents of the main channel.

Due to the limited performance data associated with this type of AFB and the potential for net clogging and dislodging due to river currents, in addition to the relatively high upfront costs and ongoing maintenance costs, this technology alternative will not be considered further for BTA at MTS.

The installation of a standard barrier net was also considered by MTS. A mesh size of 3/8-inch was evaluated for MTS and is reflected in the costs below. Ultimately, the mesh size selected must be able to exclude the fish most likely to be impinged at MTS, but be large enough that biofouling and debris loading do not become unmanageable, thereby adding significantly to O&M costs. Low to moderate river currents may assist in dislodging debris that accumulates on nets, which could reduce O&M costs, but excessively high currents could cause maintenance problems. A more detailed analysis of mesh size and the practical constraints of deployment would be performed if this type of net was considered an option for BTA.

MTS evaluated a barrier net approximately 172 feet long and 20 feet deep, with a 3/8-inch mesh pore size (9.5 mm). Based on a barrier net with these characteristics, MTS cites an EPA study that estimated a through-net velocity of 0.06 fps. MTS would need to evaluate specific conditions at the site which could result in a higher TSV, but presumably much lower than 0.5 fps. Installation of this technology would involve construction and benthic disturbance in the

Connecticut River in front of the CWIS. MTS estimates a reduction in impingement of 100%, but at the pore size indicated, no reduction in entrainment is expected. EPA agrees with this assessment. The cost (including capital and O&M expenses) of installing two barrier nets between evenly spaced pilings and two spare replacement nets was estimated by MTS at an annual cost of $108,726 in 2014 dollars, assuming a 9 year expected life of the barrier nets and a discount rate of 7.6%. The net would be installed between evenly spaced pilings for added support due to river currents. Based on operating experience of an installed barrier net in the Connecticut River upstream of MTS, the estimated O&M cost to clean the nets and replace a portion of the nets each year is included in the estimate. This takes into account high levels of leaf debris in the river during the fall. The O&M cost is also based on operation for 240 days/year to account for ice formation in the river during the winter months and high spring flows. MTS did not evaluate O&M costs for durations longer than 240 days/year, but EPA assumes that such costs would be higher to deal with ice formation. Installing a barrier net does not require a plant shutdown so there would not be any revenue loss associated with reduced generation.

Despite the potential clogging and dislodging of the net due to river currents, a standard barrier net would take up a much smaller area than the AFB considered above and would cost considerably less to deploy and operate. However, since the standard barrier net would not be employed during the winter months, impingement would still be occurring during this period and as noted above, entrainment would not be reduced. Therefore, due to the uncertainties with the stability of these nets and their relatively limited environmental benefits, they have been screened out for further consideration for BTA for this permit.

8.5.3 Capacity

"Capacity" refers to the volume and velocity of water being withdrawn by a given CWIS. Capacity is another important factor in assessing the biological impacts of a CWIS. CWA § 316(b) requires that the capacity of CWISs reflect the BTA for minimizing adverse environmental impacts.

The volume of water withdrawn has a direct influence on the numbers of organisms entrained, especially with regard to pelagic (free-floating) eggs and larvae. *See, e.g.*, 66 Fed. Reg. 65273, 65277 (Dec. 18, 2001). Capacity can also affect the rate of impingement because a reduction in the volume of water withdrawn through a particular CWIS will, all other things being equal, reduce the through-screen velocity at the CWIS. As a result, a reduction in water withdrawals, either through the implementation of closed-cycle cooling or reduced pumping, is one of the most effective methods for reducing entrainment. Reducing intake flow proportionally decreases entrainment by reducing the number of organisms exposed to entrainment, whereas other technologies designed to physically exclude organisms or to re-deposit them away from the intake still expose eggs and larvae to the CWIS and potential injury or mortality. In this case, EPA evaluated the availability of capacity reductions, either through conversion to closed-cycle cooling or through seasonal or year-round flow reductions, for minimizing entrainment. Seasonal flow reductions may be environmentally beneficial if the presence of entrainable and/or impingeable aquatic organisms varies with the season. Impingement may also be reduced if the flow reduction results in lower through-screen velocities (to 0.5 fps or less), or if the decrease in flow results in a diminished area in front of the intake with velocities that adult and juvenile fish cannot swim away from.

MTS withdraws water from the Connecticut River for cooling water at a maximum design flow of 133.2 MGD and operates what is classified as a traditional “once-through” or “open-cycle” cooling water system. As noted earlier, MTS has two (2) 45,000 gpm circulating water pumps and two (2) 2,500 gpm river water pumps, and the number of circulating water pumps operating at any one time is influenced by river water temperature and plant operations.

8.5.3.1 Alternative Sources of Water (Grey Water)

A local and available source of grey water could be considered as a total or partial substitute for a facility’s withdrawals of cooling water from a water body. According to MTS, the closest potential source of such grey water is at the Holyoke Water Pollution Control Facility (HWPCF), which discharges up to 17.5 MGD of treated sanitary effluent and is 8.3 miles downstream of MTS. In theory, this facility could provide about 13% of the flow currently removed from the river by MTS from May through October and approximately 25% of the flow removed from November through April. EPA estimates that using water from the HWPCF could reduce the “through screen” velocity at the bar screen intake at the river intake point to 1.5 fps (November-April) and 3.5 fps (May – October).

EPA estimates that the use of grey water would likely reduce entrainment by approximately 13% from May through October, assuming that entrainment reductions would be proportional to the reduction in intake flow. Since there is no entrainment projected from November through April, however, entrainment would be unaffected by reduced water withdrawals during this time period. EPA concludes that there would be negligible impingement reduction from these flow reductions since the through-screen velocity would still be considerably higher than 0.5 fps and would not reduce the influence of the CWIS.

One challenge facing this approach to reducing intake flows is the logistical difficulty related to the construction of a water transport pipe to connect MTS and the HWPCF. Also, the discharge of grey water at 102°F could possibly increase the potential for additional primary productivity in the river in the vicinity of the MTS discharge due to the combination of heat and nutrients that would characterize the discharge.

No cost information is provided for the construction and operation of this technology, although installation of a pipeline of the required size and length would likely be very expensive. Because use of grey water is not likely to substantially minimize either impingement or entrainment mortality, not to mention the uncertainties about how such an option might be implemented, EPA does not consider this technology to be a component of the BTA for MTS.

8.5.3.2 Closed-Cycle Cooling

Converting a power plant's cooling system from open-cycle cooling to closed-cycle cooling recirculates cooling water and can reduce cooling water intake volumes by up to 96 to 98 percent and, therefore, directly reduce the number of organisms entrained by the CWIS by the same proportion (66 FR 65273). As a result, converting to this technology is the most effective means of reducing entrainment and impingement by an open-cycle system without requiring significant reductions in electrical generation (66 FR 65273).

MTS evaluated the use of mechanical draft and natural draft cooling towers. The former use fans to cool heated cooling water, while the latter use convection/evaporation to do so. According to MTS, appropriately sized natural draft towers for handling a particular amount of cooling water would cost considerably more to construct and operate than appropriately sized mechanical draft cooling towers. In addition, MTS reports that the overall cost of natural draft towers to serve MTS would be expected to be higher than that the cost of mechanical draft towers. Although no specific cost estimates for natural draft towers were included in the permittee's analysis, this technology was were ruled out by MTS as oversized for this intake flow and because mechanical draft towers would be preferred given that they are less expensive and provide similar reductions in entrainment and impingement mortality. Based on discussion with EPA, MTS provided the following information regarding the option of installing and operating mechanical draft cooling towers at the site.

MTS estimated the year-round volume and thermal and chemical characteristics of cooling tower discharges. Inflow requirements and discharge characteristics for a cooling tower system were provided from a vendor for the two extreme cases of summer and winter. That is, minimum cooling tower flow was based on January and February conditions, while maximum cooling tower flow was based on summer conditions consistent with July, August and September flow rates. Because MTS was initially designed and operated as a base-load plant, it was assumed that plant generation would be at or near full capacity (*i.e.*, 100% output).[30]

The cooling tower configuration evaluated by MTS assumed the use of 21 cooling tower cells. During summer operation, all 21 cells would be used to maintain operation of the plant while meeting permit limits. During the winter, operation of at least 11 of the 21 cells would be necessary to support operation of the plant at 100% output. During the shoulder seasons of spring and fall, the number of cells would be based on expected river water temperature and historical plant flow requirements and is estimated as shown below.

The amount of river water used by the cooling tower cells is dependent upon plant capacity, river water inlet temperature, river water composition, ambient air temperature, wet bulb temperature and the number of cooling tower cells operating. In order to provide reasonable estimates for

[30] It should be understood that MTS has requested a permit that would authorize the facility to continue to withdraw river water and discharge heat and other pollutants at the levels that it has in the past when operating as a base-load facility. MTS has not proposed restrictions based upon discharge and withdrawals reductions associated with reduced generation.

river water flow, the outflow water temperature was defined as remaining constant (98°F) and the number of cells being used was selected based on river water temperature.

Month	Number of Cooling Tower Cells	Estimated Intake Flow (MGD)	Estimated Discharge Flow (MGD)
January	11	1.48	0.75
February	11	1.48	0.75
March	11	1.48	0.75
April	12	1.70	0.87
May	14	1.97	1.01
June	19	2.68	1.37
July	21	2.95	1.10
August	21	2.95	1.10
September	21	2.95	1.10
October	17	2.39	1.22
November	11	1.48	1.22
December	11	1.48	1.22

These data assume approximately two cycles of concentration and minimal sediment amounts in the intake water. The chemical characteristics of the discharge water have not been specifically examined, as the type of treatment required depends on the composition of the intake water. In general, chemicals such as chlorine (or other biocides) may be added to cooling tower systems for the following reasons:

- Mitigation of biofouling in cooling tower water and on heat exchanger surfaces;
- Mitigation of deposition of suspended matter on heat exchanger surfaces;
- Corrosion control of wetted system materials; and
- Minimization of scaling by precipitated salts on heat exchanger surfaces.

Depending on the composition of the make-up water, the resulting chemistry of the circulating water may have corrosive properties, which can be mitigated by maintaining a sufficient concentration of corrosion inhibitor within the system. The most common corrosion inhibitors in use are phosphates, which inhibit both corrosion and scale formation. Depending on the method of treatment chosen for application in the MTS closed cycle cooling system, slightly elevated levels of chemicals used to inhibit corrosion and scale formation may be present in the discharge water.

The following table provides information regarding the volume and temperature of intake and discharge water under the two seasonal scenarios based on the permittee's consultation with a vendor of cooling tower systems:

Parameter	Summer	Winter
Intake water temperature	82°F	50°F
River flow	5,000 cfs (3220 MGD)	20,000 cfs (12,900 MGD)
Total evaporation and drift losses	1.44 MGD	0.72 MGD
Total blowdown	1.51 MGD	0.76 MGD
Total intake flow	2.95 MGD	1.48 MGD
Total discharge	1.51 MGD	0.76 MGD
Discharge temperature	98°F	98°F

EPA evaluated the availability of closed-cycle cooling at MTS based on BAT factors. The installation of cooling towers would alter the cooling process by dissipating heat through evaporative cooling, which would then allow the facility to recirculate its cooling water. The additional cooling tower blowdown discharge of up to 1.5 MGD (summer) would likely require chemical treatment and additional effluent limitations. The permittee would have to modify its pump house to install a new set of pumps to withdraw make-up water. In addition to an estimated $4,000,000 loss of revenue from facility shutdowns during construction of cooling towers, there would also be an energy penalty associated with the use of cooling towers, as the permittee would need to devote some of its electricity to operating the fans, pumps, and other equipment associated with operating the towers. The permittee estimated a capital cost of $58.4 million for these towers in 2008 ($64.8 million in 2014 dollars) and ongoing O&M costs of $5.3 million per year in 2008 ($5.9 million in 2014 dollars) (Kleinschmidt, January 2008). The permittee subsequently submitted an annualized cost of approximately $5.5 million in 2011 dollars, which included capital and O&M costs over the life of the cooling towers, assuming a discount rate of 7.6%. This translates to $5.9 million in 2014 dollars.

Another issue to be considered is where the cooling towers would be sited at MTS. MTS proposed that a cooling tower installation would be located in an area previously used for the disposal of coal ash and other debris. As noted earlier, this area must be capped under an ACO with the MassDEP. The engineering feasibility of siting the cooling towers in this area while also ensuring that these prior disposal areas are capped according to the ACO would require further evaluation. The operation of cooling towers could also potentially present non-water quality environmental impacts, such as from sound emissions or from the development of fog plumes or icing issues. These issues would need to be further evaluated before making any final decision that this technology would be the BTA for MTS.

Converting the cooling system to closed-cycle cooling using mechanical draft cooling towers is one of the most costly options evaluated, but it will be considered further as the potential BTA for this permit because it would nearly eliminate impingement and entrainment by MTS's CWIS. Converting to closed-cycle cooling would reduce the through-screen velocity at the projected intake flow level to approximately 0.08 fps, which would nearly eliminate impingement. Moreover, it is estimated that the reduction in permitted flow from 133.2 MGD to 3 MGD during May, June, and July (when 99% of entrainment is expected to occur) would reduce entrainment by nearly 98%. (In addition, this technology would also greatly reduce thermal discharges.)

8.5.3.3 Variable Frequency Drive

The use of variable frequency drives (VFD) for controlling motor speed, and thereby controlling pump flow, is a potential method of reducing cooling water flow at times of low to moderate load operation. Given that entrainment can be reduced in proportion to intake flow reductions, a percentage reduction in flow from using VFDs would lead to a commensurate reduction in entrainment. If such reduced flow also led to reduced intake velocity, then impingement would also be reduced as a result of using VFDs. Indeed, according to MTS, using a VFD system to control the rate of cooling water used at the facility *would* reduce impingement by reducing the approach velocity of the CWIS. (As noted earlier, the intake velocities at the bar screens are estimated to be 2.1 fps during one pump operation and 4.1 fps during two pump operation. Furthermore, the intake velocity is estimated to be 1.6 fps at the traveling screens.)

In order for VFDs to provide an environmental benefit, however, a facility must be pumping more water than it needs because it uses single-speed pumps. In such a case, VFDs could enable a facility to reduce water withdrawals by better matching intake volume to the facility's actual need for cooling water.

With regard to MTS, it should be understood at the outset that, as required by the existing NPDES permit, MTS already reduces its water withdrawals by approximately half by switching to one pump operation from November through May. This reduces adverse environmental effects by cutting water withdrawals and better matches the facility's withdrawals with its actual cooling water needs. (Running one pump instead of two also reduces operating costs.) In addition, given that MTS carries out its two-week annual maintenance shutdown in May, which is part of the peak entrainment season of May through July, no cooling water is withdrawn during these two weeks and VFDs would provide no additional environmental benefit during those two weeks. Furthermore, given that in recent years MTS has been called upon to generate electricity far less frequently than in the past, the Facility has often not been withdrawing any water at all.

Beyond these considerations, however, MTS did not provide the percentage of excess pump capacity available for each month, if any, during times that the Facility is operating. In other words, when only one circulating water pump is being used, MTS has not indicated whether it could operate with intake flows significantly less than the permitted 68.4 MGD. Similarly, when the Facility's two circulating water pumps are being used, MTS has not indicated whether it could operate with significantly less cooling water than the currently permitted capacity of 133.2 MGD while also generating electricity and meeting permitted thermal discharge limits.

EPA currently believes that when MTS is generating electricity either during the one pump or two pump operational periods, it would be unable to reduce intake flow significantly below the currently permitted levels without compromising either plant efficiency, the plant's ability to stay within permitted maximum temperature and delta T limits, or both. DMR data indicates that when the plant is operating, it generally does so within a few degrees of its permitted delta T limits, which suggests that little excess pump capacity exists at MTS. As a result, EPA currently concludes that using VFDs would not result in meaningful environmental benefits at MTS. EPA is continuing, however, to evaluate this issue, especially in light of MTS's lower level of operations in recent years. EPA welcomes comments on this and any other issue related to the potential for using VFDs at MTS. Some additional points related to the possibility of using VFDs at MTS are discussed below.

A shift to VFDs would raise certain technical issues. For example, when considering installing VFDs, one must evaluate whether the reduction in motor speed would impact pump performance sufficiently to necessitate installation of a new pump. Needing a new pump would increase the cost and logistical demands of moving to VFDs. In addition, installing VFDs on the circulating water pumps would require temporarily disabling these pumps during the final tie-in of the VFDs. In its evaluation, MTS assumed that in order to avoid necessitating a plant outage, only one circulating water pump at a time would be removed from service during installation of the VFDs and that the work would be accomplished during a period when the plant is able to operate with only one pump. If installing VFDs, this approach appears sensible to EPA.

With regard to the cost of this option, MTS did not provide an estimated cost for installing VFDs alone. As mentioned above, additional cost would be incurred if one or two of the Facility's pumps needed to be replaced. Pump costs vary significantly depending on capacity and materials. In 2008, MTS estimated capital costs of $800,000 (equivalent to $887,700 in 2014 dollars) for new pumps (excluding motors) if it needed to replace the circulating water pumps to meet flow reduction measures. A detailed analysis would be needed to determine if adding VFDs would necessitate replacement of either or both of MTS's circulating water pumps. Finally, it should also be noted that moving to VFDs would result in energy and cost savings by enabling the Facility to throttle down on its pumping when water needs were lower.

Based on the above analysis, EPA has decided not to consider VFDs further as a potential BTA for MTS primarily because there does not appear to be enough excess pump capacity available that VFDs would result in a significant reduction in entrainment and impingement while also enabling the Facility to meet permitted temperature limits under typical operating conditions. As noted above, however, EPA is still considering this option and welcomes comments concerning it.

8.5.3.4 Seasonal Outage with Flow Reduction

As discussed above, entrainment is primarily a problem at MTS during May through July (94% of MTS entrainment occurs during May and June, while 99% occurs from May through July), while impingement is a year-round concern. The objective of this option is to reduce entrainment and impingement impacts by requiring reduced water withdrawals at particular times of year by requiring either one pump operations or the scheduling of the facility's annual maintenance outage during those times

Currently, MTS typically operates with one pump at an intake flow of 68.4 MGD during November through April, and typically operates with two pumps at an intake flow of 133.2 MGD during May through October, when necessary due to high intake temperatures. In addition, MTS schedules an annual two-week outage for maintenance during which there is no intake flow.

EPA requested that MTS evaluate the feasibility of the following options: (1) limiting intake flow to the equivalent of one pump operation all year, and (2) limiting intake flow to one pump operation during the peak entrainment period of May and June, in combination with scheduling a longer annual maintenance outage also to occur during with the peak entrainment period.

Maintenance outages are periodically conducted on the facility's boiler, turbine generator, and associated equipment. Such shutdowns for MTS are typically scheduled for a 2-week period and have generally been conducted in early May in recent years. Scheduling maintenance outages during peak entrainment periods could substantially minimize entrainment impacts because entrainment monitoring has indicated that, on average, 94% of annual entrainment occurs during May and June.

If MTS were to shut down and withdraw no water from the river during the months of May and June, EPA determined that entrainment could be reduced by as much as 94%. However, MTS would not be able to generate any electricity during this period, which could potentially result in substantial financial losses to the facility. EPA estimated the maximum losses at approximately $5.9 million per year. This estimate is based on cost information provided to EPA in an e-mail and attachment from the permittee's consultant (Kleinschmidt, August 29, 2013). This cost is based on foregone revenue for only six weeks, as a maintenance outage of two weeks is already scheduled each year by MTS and would be unrelated to the requirement to stop withdrawing water in May and June.

The precise extent of the losses that MTS would experience from a required extended outage would depend on the degree to which MTS would otherwise be generating and selling electricity during the period of time in question. While MTS once operated as a base-load facility, in recent years it has operated at a much lower capacity.[31] Moreover, May and June are generally non-peak demand months. Therefore, there is some chance that an extended outage during those months would only interfere with operations to a limited degree. On the other hand, EPA cannot be certain that this would be the case, as MTS could operate more if there were shifts in the current relative prices of various fuel types (*e.g.*, coal, oil and gas), if there was an exceptionally hot May or June resulting in increased demand for electricity, or if other major generators had outages that led to MTS being needed to generate electricity.

If MTS were required to extend its annual two week shutdown by one week (resulting in a three-week shutdown), and to schedule the shutdown during the peak entrainment period, the facility would operate with no intake flow for 22 days during the months of May and June. This would amount to a 36% flow reduction as compared to the amount of water that MTS would withdraw from the river during those two months if it ran 100% of the time.

[31] EPA recognizes that MTS's delisting bid was accepted for 2016-17 by the Independent System Operator (ISO), but this does not by itself mean that MTS will not generate electricity during that time period or beyond. Whether and to what extent MTS generates electricity will be determined by other factors.

MTS also evaluated the potential to limit water withdrawals to 68.4 MGD, commensurate with one pump operation, either annually or limited to the months of May and June. Because the facility already operates at 68.4 MGD during the months of November through April, a year-round limitation on intake flow commensurate with one pump operation would reduce flows from 133.2 MGD to 68.4 MGD (a 49% flow reduction) for the period of May through October. Combined with the flow reduction gained by scheduling the annual 3-week shutdown during May and June, a year-round flow limit equivalent to one pump operation would result in flow reduction of 55% for the period from May through October. A 3-week shutdown and limiting the permittee to one pump operation during the months of May and June would reduce flow by 67% during these months, as compared to two pump operation and no shutdown.

According to the MTS 2008 Report and an additional submittal from the permittee (Kleinschmidt August 29, 2013, AR #251), under the one pump operating conditions outlined above, plant electric generation would be reduced by approximately 15% in May, 21% during the months of June and September and approximately 37% during the months of July and August. MTS estimated that this drop in production would cost the plant approximately $4 million per year in lost revenue (2014 dollars). The yearly cost estimate related to maintaining one pump operation in May and June while still meeting delta T and maximum temperature discharge limits are based on the lost revenue due to reduced plant output. Assuming a revenue rate of $0.04/kWh, the annual revenue loss estimate for one pump operation in May and June is approximately $1.55 million (2014 dollars).

Because the facility already shuts down for two weeks in spring, additional projected revenue losses (*i.e.*, May and June one pump operation revenue loss combined with the revenue loss from a shut down) are based on extending the annual outage by one additional week, rather than a total of three weeks in lost revenue. In both cases, revenue losses are consistent with past generating conditions when MTS was operating at an average year round capacity factor of 70-80%, as compared to the capacity factor of 10-15% for the period of 2010 – 2013. Based on this reduced capacity, effective costs for lost generation are likely (but not certain) to be substantially lower than these projected costs.

There are potential thermal impacts associated with limiting flow during the spring and summer months below the current intake flow of 133.2 MGD. The maximum discharge temperature could potentially increase to as high as 109°F for the months of May and June, unless the permittee cut back on generation to meet the effluent permit limit of 102°F. During the summer months when ambient river temperatures are highest, limiting intake flow to 68.4 MGD could result in a delta T of 32°F and a maximum discharge temperature of 115°F. *See* Section 6.3.3.3. (discussing impacts of increasing discharge temperatures).

In an e-mail from Chris Tomichek (Kleinschmidt) to John Nagle of EPA (Mt. Tom Analysis e-mail attachment August 29, 2013) it was proposed that the permittee could schedule its annual maintenance shutdown (usually a two week event) and extend it an additional week to comprise a 3-week period from May 25 through June 15. During this time period, the facility would essentially eliminate any intake of water. Based on a review of entrainment data collected at MTS, the permittee estimated that this action would reduce entrainment by approximately 73%.

Entrainment reductions were calculated for one pump operation year-round and one pump operation in May and June. Both of these scenarios assume that larval entrainment is reduced by an amount proportional to the reduction in water flow. Entrainment reductions were calculated based on the average of the two years of entrainment data collected at the facility in 2009 and 2010. MTS estimated the reduction in entrainment from the seasonal outage combined with one pump operation during the months of May and June at approximately 83.5%. Since, on average, approximately 6% of the entrainment during the two year period occurred outside of May and June, a modest additional entrainment reduction benefit would result from extending the flow limitation of 68.4 MGD to July through October. However, any flow reduction commensurate with one pump operation is not judged to markedly reduce impingement mortality in this case because the withdrawal through-screen velocity would remain 2.1 fps at the intake and 1.6 fps at the traveling screens. When the facility is shutdown, the through-screen velocity would be zero, resulting in a corresponding absence of impingement. However, on average, less than 8% of annual impingement occurs during this period, so the reduction would likely be minimal.

Although the permittee has indicated that operating at an intake flow commensurate with one pump operation could result in revenue losses, EPA will further consider a seasonal outage combined with flow reductions as potentially part of the BTA at MTS due to the expected substantial reductions in entrainment that could be achieved.

8.6 BTA Determination

In the text above, EPA has, among other things, evaluated technological options for reducing entrainment and impingement at MTS. As part of this analysis, EPA “screened out” certain technological approaches from further evaluation. Here EPA considers the remaining technologies, including their costs and environmental benefits in order to determine the BTA for this CWIS.

Initially, EPA concludes that the current location, design, construction, and capacity of the CWIS do not reflect the BTA for minimizing AEI. This conclusion is based on the Agency’s evaluation of existing technology at MTS, current levels of entrainment and impingement, and the estimated degree to which other available technologies could reduce mortality to aquatic organisms from entrainment and impingement at a reasonable cost.

As described in detail in the preceding discussion of technologies, EPA determined that, other than converting to closed-cycle cooling using mechanical draft cooling towers, none of the available technologies would by themselves be able to substantially reduce both entrainment and impingement mortality at MTS. Therefore, EPA determined the BTA for reducing impingement mortality separately from the determination of the BTA for reducing entrainment.

8.6.1. Impingement

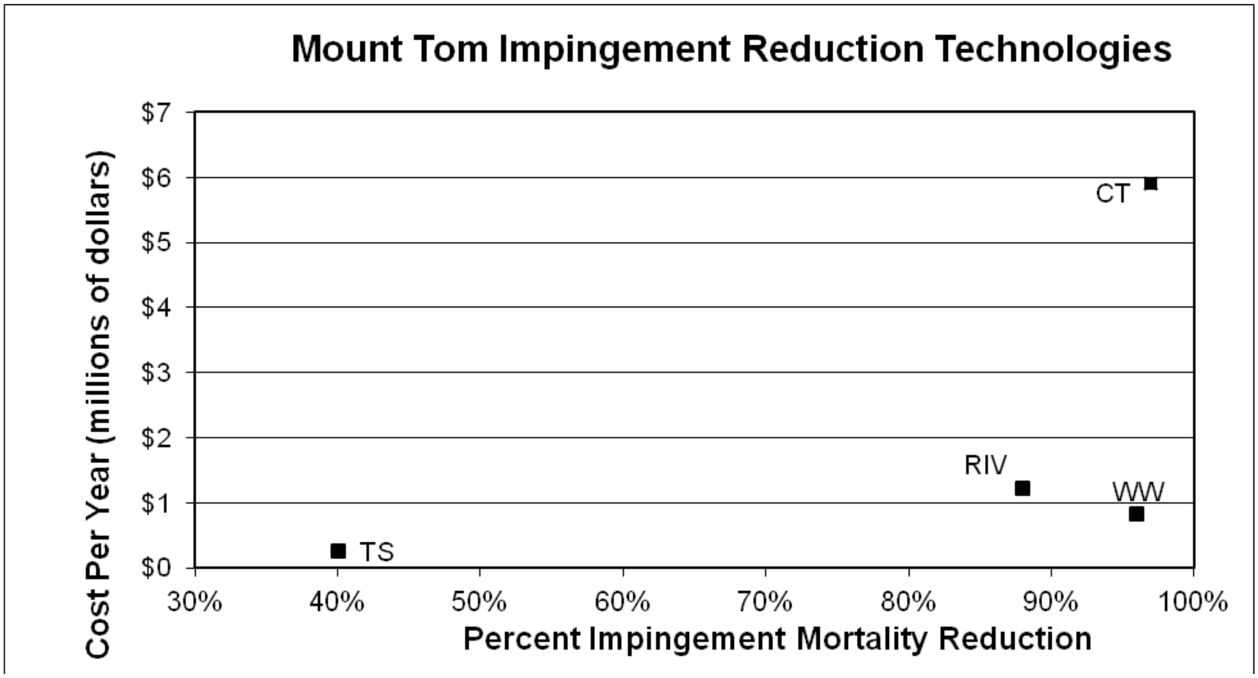
In determining the BTA for minimizing impingement mortality caused by the MTS CWIS, four available technology options stood out for consideration: (1) converting to closed-cycle cooling using wet mechanical draft cooling towers; (2) upgrading to Ristroph traveling screens and installing a new fish return trough; (3) installing coarse-mesh wedgewire screens; or (4) expanding the Facility's river intake. Unless otherwise noted, EPA estimated the annualized cost (in 2014 dollars) based on capital and O&M costs provided by MTS in the Cooling Water Intake Structure Information Document (January 2008), a supplemental MTS Response to an EPA Information Request (May 2011), and an additional MTS Response to an EPA data request (August 2013). The costs and impingement mortality benefits of the available technologies are presented in Table 8 and Figure 4.

Table 8 - Comparison of annualized cost and degree of impingement mortality reduction for MTS's existing CWIS and four technological options.

	Technology Acronym	Annualized Cost[1]	Annual fish impingement mortality[2]	Estimated reduction in impingement Mortality[3]	Estimated number of fish survive[2]
Current Operation/Technology	--	$0	1,133	0.0%	0
Mechanical Draft Cooling Towers	CT	$5,909,700	------	97.0%	1,099
Upgrade Traveling Screens and Fish Return System	TS	$249,100	------	40.0%	453
Wedgewire Screen Cylinders	WW	$830,900	------	96.0%	1,088
Expanded River CWIS	RIV	$1,215,900	------	88.0%	997

[1] Costs include capital and operation/maintenance costs in 2014 dollars, annualized over the 30-year life of the cooling towers, upgraded fish return system, and expanded river intake structure. The capital and operation/maintenance costs are annualized over the 20-year life of the cylindrical wedgewire screens. The capital and operation/maintenance costs are annualized over a 9 year life of the barrier nets (original net and two spares). These cost projections assume a discount rate of 7.6% pre-tax nominal value.
[2] Based on study as discussed in Section 8.3.1
[3] Based on Kleinschmidt January 2008 Report

Figure 4. Comparison of annualized cost and percent reduction in impingement mortality for four technologies available for use at MTS.



A coarse-mesh (10 mm) wedgewire screen is projected to achieve a 96% reduction in impingement (based on a design through-screen velocity of no greater than 0.5 fps) at an annualized cost of about $831,000 (over the 20-year life of the technology). This technology is expected to be effective for reducing impingement due to a low through-screen velocity coupled with the strong sweeping currents in the Connecticut River. Expanding the CWIS at the river to reduce the through-screen velocity to no more than 0.5 fps is estimated by MTS to reduce impingement by approximately 88%, but this option is more costly than wedgewire screens. It is assumed that wedgewire screens achieve somewhat greater impingement reductions than the expanded CWIS because wedgewire screens exclude fish from swimming into the CWIS, whereas with the expanded intake some fish are likely to swim through the bar racks and into the CWIS despite the reduced intake velocity. In light of these considerations, EPA has determined that wedgewire screens are preferred over the option of expanding the CWIS at the river.

Upgrading the traveling screen and fish return system is less costly than wedgewire screens, but is only estimated to achieve a 40% reduction in impingement mortality (by improving survival following impingement on the screens). In other words, fish will still be exposed to the high velocities at the intake pipe in the river and will likely become impinged on the screens. This technology focuses on trying to improve survival of fish following impingement, rather than preventing impingement in the first place, as wedgewire screens are likely to do. Comparing the two technologies, wedgewire screens cost more than the traveling screen and fish return upgrade, but are estimated to nearly eliminate impingement, compared to a predicted reduction in impingement mortality of only 40% for the traveling screens. EPA recognizes that the option of upgrading the traveling screens and fish return system has a lower cost per fish saved, but given that the wedgewire screen option is predicted to save more than twice as many fish at an affordable cost, it remains preferred by EPA as the BTA for reducing impingement mortality.

Finally, closed-cycle cooling is estimated to be capable of reducing impingement by 97% at an estimated annualized cost of approximately $5,900,000 in 2014 dollars, which includes capital and O&M costs. Cooling towers are expected to be only very slightly more effective for reducing impingement mortality than wedgewire screens (a 97% reduction versus a 96% reduction) but at an annualized cost that is seven times higher. Whether or not this type of cost difference would be warranted by ecological benefits in a particular case would depend on the facts of that case, but in this case, based on current information, EPA does not think the additional costs are warranted. [32]

Based on the evaluation herein, EPA has determined that wedgewire screens are the BTA for reducing impingement mortality at MTS. This technology is expected to nearly eliminate impingement mortality of juvenile and adult fish – thus saving approximately 1,100 fish per year going forward – at an affordable and relatively low cost, as compared to other technologies that achieve similar impingement mortality reduction benefits. Given the existing impacts of impingement at MTS, and the ineffectiveness of the current technology for preventing impingement mortality (*i.e.*, impingement survival rates are poor for the existing technology), EPA concludes that the cost of upgrading to a superior technology is warranted by the estimated benefits.

8.6.2. Entrainment

In determining the BTA for entrainment for the MTS CWIS, four available technology options stood out for consideration: (1) converting to closed-cycle cooling using wet mechanical draft cooling towers; (2) mandating year-round capacity reduction (one-pump operation) and the scheduling of the Facility's annual maintenance outage during the peak entrainment period (*i.e.*, a "seasonal outage"); (3) May and June capacity reduction (one-pump operation) and seasonal outage; or (4) seasonal outage for May and June. EPA estimated the annualized cost (in 2014 dollars) based on capital costs and operational and maintenance costs provided by MTS in the Cooling Water Intake Structure Information Document (January 2008), a supplemental MTS Response to an EPA Information Request (May, 2011) and an additional MTS Response to an EPA data request (August, 2013), unless otherwise noted. The costs and comparative benefit to entrainment for the available technologies is presented in Table 9 and Figure 5.

---

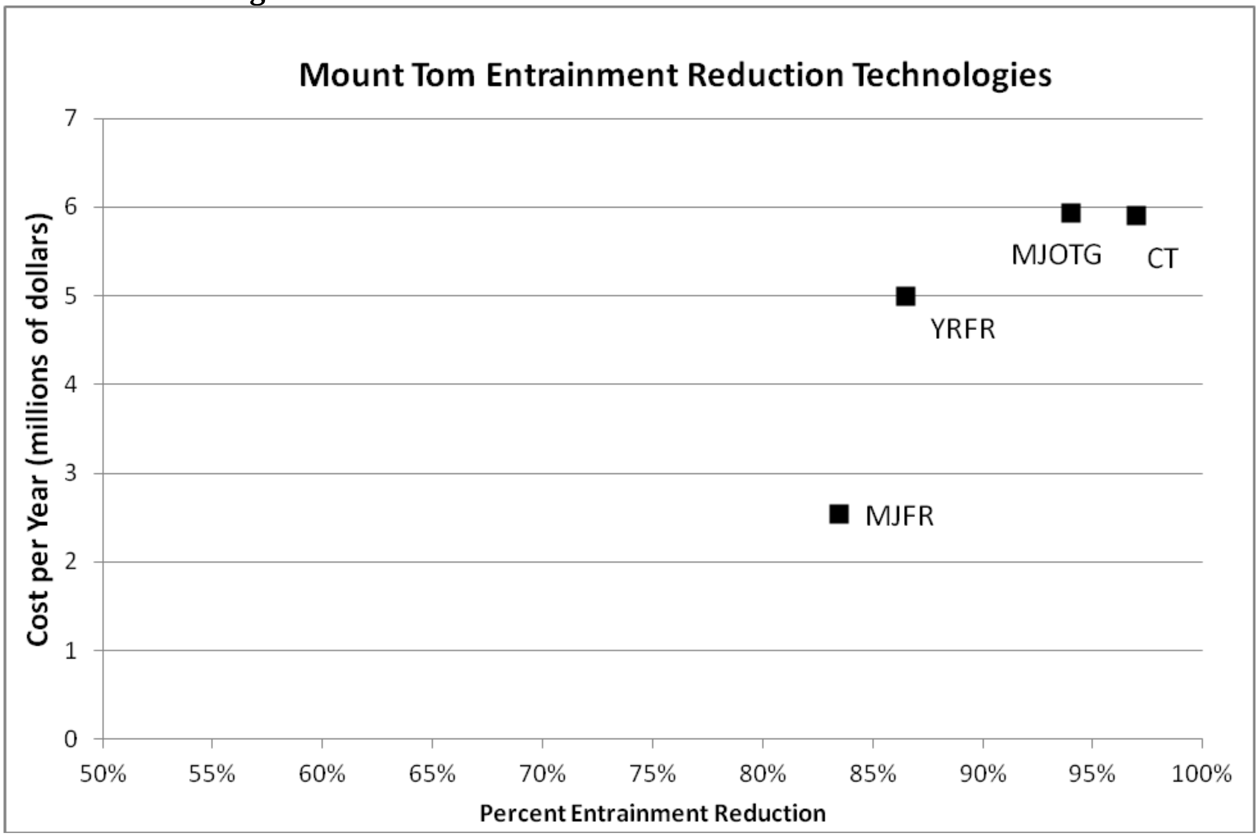
[32] Put differently, EPA does not think the increased costs would be reasonable in light of the tiny predicted margin of increased benefits that would be involved. In this case, EPA concludes that such additional costs would be wholly disproportionate to, and therefore, by definition, significantly greater than, the additional benefits.

Table 9. Comparison of annualized cost and entrainment for existing technology and four additional available technologies at MTS.

Technology	Technology Acronym	Annualized Cost[1]	Number of larvae entrained per year[2]	Estimated reduction in entrainment	Estimated larval survival[2]
Current Operation/Technology		$0	11,693,000	0.0%	0
Mechanical Draft Cooling Towers	CT	$5,909,700	-----------	97.0%[3]	11,342,210
Year Round Flow Reduction w/Three Week Outage	YRFR	$4,987,900	-----------	86.5%[4]	10,114,445
May and June Flow Reduction w/ Three Week Outage	MJFR	$2,537,900	-----------	83.5%[4]	9,763,655
May and June Eight Week Outage	MJOTG	$5,927,000	-----------	94.0%[2]	10,991,420

[1] Costs include capital and operation/maintenance costs in 2014 dollars, annualized over the 30-year life of the cooling towers, flow reduction, and expanded river intake structure. These cost projections assumes a discount rate of 7.6% pre-tax nominal value.
[2] Based on study as discussed in Section 8.3.2
[3] Based on Kleinschmidt/First Light January 2008 Report
[4] Based on Kleinschmidt/First Light 8/29/13 Report and EPA estimates based on Kleinschmidt Nov. 2010 Report

Figure 5. Comparison of annualized cost and percent reduction in entrainment for available technologies at MTS.



Requiring a 3 week shutdown in late May through early June and limiting MTS to one pump operation during this two month period (MJFR) is estimated to reduce entrainment by 83.5%, according to the permittee at a substantially lower cost than the other available options. In comparison, requiring MTS to operate one pump year-round (essentially extending the prior option's one pump operation requirement from May and June all the way through October, since MTS already operates one pump from November through April) (YRFR) would only reduce entrainment by approximately 3% more than the prior option. This relatively small incremental reduction in entrainment, even with a 67% incremental additional reduction in flow during July through October, is due to the strong seasonality of entrainment at MTS. On average, 94% of entrainment at the Facility occurs during the months of May and June. In this case, the higher cost of year-round one pump operation is not warranted by the limited incremental benefit to entrainment.

In addition, operating with one pump during the summer months would likely cause MTS to increase its maximum discharge temperature, which could possibly cause permit violations and further stress aquatic organisms in the immediate area downstream of the discharge. (See discussion in Section 7.3.3.3 of this Fact Sheet). Alternatively, MTS would have to limit operation during these months, which could result in a larger reduction in generation at greater cost to the permittee.

Based on comparison of the available options and the corresponding reduction in entrainment, EPA concludes that the cost of a 3-week shutdown from late May to early June, combined with limiting flow equivalent to one-pump operation from November through June, would be warranted by the substantial reduction in entrainment for this technology.

Mechanical draft cooling towers are projected to achieve the greatest reduction in entrainment by reducing intake flow at the facility by 97%, but at the highest cost. Indeed, this option costs more than twice as much as the option requiring a 3-week outage and one pump operation in May and June, which is estimated to reduce entrainment by 83.5%. In addition, the permittee has identified feasibility issues associated with the available location for constructing cooling towers. The permittee has stated that the northern portion of the site is potentially available for construction of cooling towers, but that this portion of the site contains coal ash and trash which needs to be capped as directed by the MassDEP. In order to place cooling towers in this location, the permittee would need work with the MassDEP in order to assure that the areas that are capped would also be able to accommodate the construction of cooling towers.

Requiring an 8 week shutdown for the months of May and June is estimated to achieve a 94% reduction in entrainment, but at a cost approaching that for the closed-cycle cooling option. The efficacy of this shutdown is due to the highly seasonal nature of entrainment at MTS, as described above. As between these two options, EPA concludes that the closed-cycle cooling option would be favored because it would also reduce impingement by 97% based on the reduction in through-screen velocity at the traveling screens. In contrast, an outage for the months of May and June would only reduce impingement by, on average, about 8% because although the through-screen velocity would be zero when the facility is shutdown, it would remain high during the rest of the year. At MTS, between 3% and 12% of impingement occurred during the months of May and June in the 2-year study, while impingement was most common in December, March, and April.

Based on the above, analysis, EPA concludes that the option requiring a 3-week shutdown and one pump operation during May and June is the BTA for minimizing entrainment. It is estimated to reduce entrainment by 83.5%, which EPA regards to be a very substantial reduction. While the closed-cycle cooling option is estimated to reduce entrainment by a somewhat greater degree (i.e., by 97%), it would do so at a substantially greater estimated cost ($5,909,700 vs. $2,537,900). Based on the facts of this case, including the nature of the specific entrainment problem presented at MTS, EPA does not believe that the substantially greater capital costs associated with the closed-cycle option are warranted by the relatively modest increase in entrainment reductions. EPA could reach a different conclusion in a different case in which the entrainment impacts were even more serious than those presented at MTS.

8.6.3. Conclusion

EPA has discussed the benefits of reducing entrainment and impingement above. EPA also concludes that the greater the reduction in these adverse impacts, the greater the benefits that will be achieved. That said, the Agency does not have any data in this case to indicate that there is a threshold for impact reduction below which ecological gains will be forfeited, or above which there would be no difference. On one hand, MTS typically withdraws less than 1.4% of the average daily mean flow of the Connecticut River, or about 11.6% of daily mean flow under worst-case summer (7Q10) flow conditions. On the other hand, based on yearly monitoring, EPA estimated that at the permitted intake flow more than 1,600 juvenile and adults could be impinged (July 2007 through July 2008 MTS monitoring; Section 8.3.1) and more than 16 million larvae (2010 MTS monitoring; Section 8.3.2) could be entrained in a given year. EPA concludes that this represents a high level of unnecessary mortality in a productive river of public importance that is subject to cumulative stresses from, among other sources, municipal stormwater runoff, industrial discharges, and flow alterations.

As a result, EPA has determined that BTA is a combination of coarse-mesh wedgewire screens to minimize impingement, combined with an intake flow commensurate with one pump operation in May and June and an annual 3-week maintenance outage from May 25 through June 15. MTS estimates that the combination of wedgewire screens and 67% flow reduction in May and June, when entrainment peaks, will result in approximately a 96% reduction in impingement and an 83.5% reduction in entrainment compared to the current levels of impingement and entrainment. EPA has concluded that, at this time, neither the incrementally higher annualized costs of cooling towers (7 times more than wedgewire screens and more than twice the cost of the May-June flow reduction and 3-week outage) nor the 8-week outage for May and June (at more than twice the cost of the May-June flow reduction and 3-week outage) are warranted by the incrementally greater reductions in impingement or entrainment.

As discussed earlier in this document, the CWA does not *require* EPA to compare the costs and benefits of the options being considered as the possible BTA under CWA § 316(b). *Entergy,* 556 U.S. at 222-226. The statute does, however, give EPA the *discretion* to consider such cost/benefit comparisons in the process of determining the BTA, and EPA has done so for many years as part of its consideration of cost. *Id.* Neither statute, nor regulations, nor guidance document dictates precisely how such cost/benefit comparisons should be conducted. EPA makes reasonable efforts to make as complete an assessment as it can of the costs and benefits at issue, so that it can factor them into its evaluation. As discussed farther above, and as referenced by the United States Supreme Court, EPA seeks to compare the cost of BTA options with "the magnitude of the estimated environmental gains (including attainment of the objectives of the Act and § 316(b)) to be derived from the modifications." *Id.* at 225 (quoting, *Central Hudson,* Decision of the General Counsel, No. 63, at p. 381). The relevant "objectives of the Act and § 316(b)," as referred to in *Central Hudson,* include minimizing AEI resulting from the operation of CWISs, restoring and maintaining the physical and biological integrity of the Nation's waters, and achieving, wherever attainable, water quality providing for the protection and propagation of fish, shellfish and wildlife, and providing for recreation, in and on the water. 33 U.S.C. §§

1251(a)(1) and (2), 1326(b).

Reducing mortality from impingement and entrainment by MTS's CWIS will directly increase the number of recreational and forage fish (eggs, larvae, juveniles and adults), as well as other types of aquatic organisms found in the river (e.g., invertebrates). The greater the reductions, the more likely it is that they will contribute to increased populations of juvenile and adult fish. Yet, reducing the loss of eggs and larvae due to entrainment is valuable in and of itself because of the role they play at the base of the food web and other benefits that they may provide, such as contributing to species' compensatory reserve. Moreover, reducing impingement losses directly contributes to increased abundance of adult fish, which are also important to the food web as well as providing a recreational resource in the Connecticut River and other connected water bodies.

Beyond these direct benefits to aquatic life, reducing entrainment and impingement is also likely result in additional indirect benefits to the ecosystem and the public's use and enjoyment of it. Examples of such indirect benefits could include increasing recreational and educational opportunities, increasing or maintaining biological diversity, and contributing to healthier populations of resident and migratory birds and other terrestrial wildlife reliant on the river's aquatic organisms for food.

In addition to these direct and indirect benefits of increasing fish populations for the Connecticut River ecosystem, fish populations generate a multitude of ecosystem services. Many of these ecosystem services have no direct market value and occur at regional spatial scales over the long term, making them difficult to monetize or even quantify. However, the potential benefits of increasing fish populations in terms of their functional role in natural ecosystems cannot be overlooked, and, at a minimum, these ecosystem services should be considered qualitatively.

Thus, in addition to food production, fish populations can control the growth of algae and macrophytes, supply recreational opportunities, regulate food web dynamics, recycle nutrients, serve as active and passive links between ecosystems, and maintain species and genetic biodiversity (Holmlund and Hammer 1999). Biodiversity has recently emerged as a critical measure of ecosystem resilience. Systems with high biodiversity tend to be more stable and have enhanced primary and secondary productivity, as well as lower rates of collapse of commercially important fish and invertebrate taxa over time (Worm et al. 2006). Low phenotypic diversity (i.e., the physical expression of a fish genotype), which can be a result of loss of a percentage of the population (such as through mortality associated with a CWIS), can decrease equilibrium catch and effort levels used by regulatory agencies to set quotas for commercial fishing stocks (e.g., through fishery management plans). Overestimating the maximum sustainable yield based on a conventional growth model in populations with low levels of phenotypic variance may lead to overharvesting and potentially collapse the stock (Akpalu 2009).

The predominant benefits to be obtained in this case include non-market (*e.g.*, recreational opportunities), indirect (*e.g.*, ecosystem services), and non-use benefits (*e.g.*, "existence values," "bequest values"). EPA did not attempt to develop a monetized estimate of the full benefits that would accrue to society from the above-discussed impingement mortality reductions from the preferred BTA – such as by undertaking a stated preference study to estimate non-use benefits – because EPA decided that doing so would be prohibitively difficult, time-consuming and expensive for this permit.[33] No such complete monetized estimate is readily available and it would take many months and substantial cost to attempt to develop such an estimate, even if suitable method for doing so could be agreed upon.

A complete assessment of benefits would consider commercial use values, recreational use values, non-use values and ecological benefits. While estimating the commercial use value of fish that would be saved by a particular option can be fairly straightforward, commercial use values are not expected to be significant in this case. Recreational use values are likely to be more significant in this case, but estimating such values can be complex, costly and time-consuming. Moreover, the largest component of the total benefit of saving fish in this case, is likely to be found in the ecological benefits and non-use values arising from saving those organisms. Yet, attempting to develop a monetized estimate of such ecological and non-use values is even more challenging than addressing recreational use values. In both cases, specialized expertise in natural resource economics and modeling would be needed that EPA Region 1 does not have on staff to apply on a permit-by-permit basis. It could take years to develop this type of complete monetized benefits estimate and it could cost hundreds of thousands of dollars in contractor support. EPA does not have such resources to apply to this permit.

Moreover, in EPA's view, it would be unreasonable to spend those kinds of public resources in this case. This decision is only for a single permit, MTS is a facility of only moderate size, and MTS has been operating less and less in recent years. Moreover, EPA can consider the benefits of reducing entrainment and impingement mortality *quantitatively* simply in terms of the number of organisms saved by the various options, and EPA can assess the overall benefit of saving these organisms on a qualitative basis. Considering benefits qualitatively is appropriate when monetized estimates of the full benefits of an action are not available. *See, e.g., Entergy*, 556 U.S. at 224; *EPA Guidelines for Preparing Economic Analyses* (EPA 2000a). This is a better approach than ignoring those benefits or pretending that they do not exist. Just as EPA considers the cost of technological options, it is important that the Agency also assess and consider the benefits of these options in as complete a way as possible.

Therefore, in this case, EPA has quantitatively considered the number of organisms that would be saved by the reduced entrainment and impingement mortality achieved by the various options. Installing the wedgewire screens (with 10 mm mesh) can save more than 1,000 fish per year in

---

33 EPA also notes that efforts by the Agency to develop monetized estimates of these sorts of non-use values have proven highly controversial. *See, e.g.,* Logan, Lee, "Power Sector Seeks Host Of Late Changes To Delayed Cooling Water Rule," *Inside EPA* (Jan. 23, 2014). This is not to say that EPA would not or should not undertake such an analysis in appropriate cases just because it would likely be met with opposition from some interested parties. Rather, it is to underscore both the potential difficulties of pursuing such an analysis and the fact that completing such an analysis would be unlikely to resolve all controversies over the value of reducing entrainment and impingement. Instead, the analysis itself would likely become a new bone of contention.

the affected segment of the Connecticut River from being unnecessarily killed by impingement by MTS's CWIS. Requiring the 3-week shutdown and one pump operations in May and June can save nearly ten million fish larvae.

EPA also qualitatively considered the value of the Connecticut River's aquatic organisms that the BTA options will protect from entrainment and impingement. Minimizing impingement and entrainment by the MTS CWIS would have many ecological benefits for the Connecticut River ecosystem. Several recreationally important species are among the species commonly impinged and/or entrained by MTS, including American shad, blueback herring, yellow perch, and Atlantic salmon. As mentioned above, regional populations of shad, blueback herring and Atlantic salmon have all declined in the relatively recent past. Furthermore, endangered shortnose sturgeon inhabit the river and could potentially be at risk for entrainment or impingement, though none were found to have been impinged or entrained during the two-year impingement and entrainment data collection efforts described farther above in this document.

The Connecticut River is a major multi-state waterway that flows through New Hampshire, Vermont, Massachusetts and Connecticut before reaching the sea at Long Island Sound. Major public conservation efforts have been undertaken to protect and preserve the river and its aquatic organisms. Overall costs are not easily calculated for fish restoration efforts in the Connecticut River. However, over the past 40 years, it has been estimated that approximately $ 200 million has been spent by State and Federal agencies and the power industry to re-establish Atlantic Salmon and improve fish passage in the Connecticut River (Waldman, J, *Running Silver,* in press, 2014). Particular efforts have been made to protect and restore fish, such as the American shad, as well as others, through the construction and monitoring of fish ladders and the institution of fish stocking programs. Increases in forage fish and invertebrate populations may also benefit recreationally and ecologically important fish species, as well as resident and migratory birds and other terrestrial wildlife (including State-listed threatened and endangered species), by increasing prey abundance. Anadromous species could also benefit from changes to MTS's CWIS. EPA notes that river herring have experienced declining populations in recent years, and minimizing adverse impacts to these populations is fundamental to their recovery. In fact, river herring is listed as a Species of Concern by the National Oceanographic and Atmospheric Administration (NOAA), and the Massachusetts Division of Marine Fisheries (MassDMF) provides further protection for river herring through a moratorium on the direct harvest, possession, and sale of river herring extended through 2014.

MassDEP has designated the relevant segment of the Connecticut River a Class B water. Class B "waters are designated as a habitat for fish [and] other aquatic life." 314 C.M.R. 4.05(3)(b). Massachusetts has indicated that this designated use means that B waters are intended to provide, at a minimum, a good quality, healthful fish habitat (as opposed to a habitat of only minimal or low quality).[34] Class B waters are also designated to provide a recreational fishing resource. Though the standard for Class B waters does not include any specific numeric criteria that apply

34 By contrast, the state's WQS require Class A waters to provide "excellent" quality habitat for fish. 314 C.M.R. 4.05(4)(a).

to cooling water intakes, it is nevertheless clear that permits must include any conditions necessary to protect the designated uses of the river, including that it provide good quality habitat for fish and other aquatic life and a recreational fishing resource. In addition, 314 C.M.R. Section 4.05(1) of the Massachusetts WQS provides that each water classification "is identified by the most sensitive, and therefore governing, water uses to be achieved and protected." This means that where a classification lists several uses, permit requirements must be sufficient to protect the most sensitive use. Moreover, the Massachusetts SWQS expressly provide that CWIS requirements in permits must be adequately stringent to achieve "compliance with narrative and numerical criteria and protection of existing and designated uses" for Class B waters. 314 CMR 4.05(3)(b)(2)(d).

In light of the public importance attributed to these ecological resources, it would be anomalous for the NPDES permit to allow MTS to kill large numbers of the river's fish, at various life stages, by entrainment and impingement by a CWIS and cooling water system that has essentially no effective means of preventing either entrainment or impingement mortality and that has been allowed to operate essentially without modification or limitation for approximately 50 years. Technology and/or operational restrictions are available to reduce these entrainment and impingement losses.

In summary, achieving substantial reductions in impingement and entrainment by MTS's CWIS will increase the number of recreational and forage fish (eggs, larvae, juveniles and adults), as well as invertebrate species in the affected segment of the Connecticut River. These improvements are also likely to contribute to increased populations of adult fish. In turn, reducing adverse impacts from impingement and entrainment could provide a number of direct, indirect, and non-use benefits both within the River and could benefit residents of multiple states. Benefits may also include, for example, preservation of habitat for migratory birds and other terrestrial animals dependent on the river's aquatic organisms, enhanced recreational opportunities, including bird watching, fishing, and kayaking. While EPA has not developed a monetized estimate of these benefits, the value to the public of the Connecticut River ecosystem and its natural resources is evident from the federal, state and public efforts to protect these public natural resources. Moreover, substantially reducing entrainment and impingement will contribute to "attainment of the objectives of the Act and § 316(b)," including (a) minimizing adverse environmental impacts from cooling water intake structures, (b) restoring and maintaining the physical and biological integrity of the Nation's waters, (c) achieving, wherever attainable, water quality providing for the protection and propagation of fish, shellfish and wildlife, and (d) providing for recreation, in and on the water.

Compliance with the BTA measures for minimizing impingement and entrainment by MTS will come close to eliminating the unnecessary mortality to millions of aquatic organisms in the affected segment of the Connecticut River. This mortality is unnecessary in that MTS could continue to generate electricity by implementing the selected BTA measures. There is nothing inherent in MTS's process for generating electricity that requires this mortality. It is a function of the way that MTS operates and the limits of its existing technology. The Facility's CWIS and fish return system have not been significantly upgraded, if they have been upgraded at all, since their original installation some 50 years ago. Making the proposed upgrades will also be consistent with the Massachusetts SWQS which, as discussed above, designate this area as a Class B water which is supposed to provide a fish habitat of good quality. Furthermore, implementing the proposed BTA measures could potentially prevent MTS from killing individual members of a number of particularly important species, such as the endangered shortnose sturgeon, and other important species such as the American shad, the Atlantic salmon and the blueback herring. Protecting other species may also have important ecological significance for the food web in the river.

EPA concludes that the costs of the BTA options are moderate but warranted for MTS.

8.7 Permit Requirements for BTA

8.7.1. Wedgewire screens

The permittee is required to install, operate, and maintain wedgewire screens and reduce through screen velocity to reduce the impingement of juvenile and adult fish to the maximum extent practicable, consistent with the following requirements:

The wedgewire screen units shall have a maximum slot size of 10 millimeters and a design through slot velocity of 0.5 fps or less under all facility operating conditions and all flow conditions, including during periods of minimum ambient source water surface elevation and periods of maximum head loss across the units. The wedgewire screen units shall employ a pressurized system to periodically clear debris from the screens. The permittee shall verify that the through slot velocity at the wedgewire screen intake is 0.5 fps or less through measurement or calculation.

The wedgewire screen units must be positioned as close to the west bank of the Connecticut River and the CWIS as possible, while meeting all operational specifications required by this permit, the conditions of any other permits for the equipment, and assuring that the equipment performs as designed. The wedgewire screen units must be oriented in the river to be roughly parallel with the river flow to maximize the natural, downstream sweeping effect of the current.

Regarding the wedgewire screens, the permittee shall address all necessary permitting or other approvals with the National Marine Fisheries Service (NMFS) and the Army Corps of Engineers (ACOE) to schedule a favorable time for installation and to minimize impacts during construction and installation. In addition, EPA will work with MTS and, as appropriate, the ISO to determine a time for any necessary downtime of the power plant that will minimize any effects on the adequacy of the region’s supply of electricity. However, this may not be an issue given that, as discussed above, the ISO recently approved the MTS’s delist bid.

8.7.2. Scheduled Plant Outages

The permittee shall withdraw no water from the CWIS at MTS for a continuous 22-day period within the May and June fish spawning season in the Connecticut River in this vicinity. Specifically, beginning on May 25 and ending on June 15, inclusive, the permittee shall not operate any intake water pumps – with the exception of when water must be withdrawn to comply with required environmental monitoring, or for firefighting or other emergency events. The permittee may also schedule and conduct its annual facility maintenance shutdown during this period.

As discussed earlier, the months of May and June represent the period of highest larval entrainment. This period coincides with period when the majority of ichthyoplankton (mostly larvae) are believed to be present in this stretch of the Connecticut River based on historical biological monitoring at MTS and West Springfield Station (WSS). The biological monitoring requirement specified below will provide confirmation that the majority of entrainable organisms are in the vicinity of MTS during the period of May and June. Based on past entrainment studies, the permittee has estimated that conducting its annual maintenance shutdown during this period would result in a 73% decrease in entrainment at the facility. Information submitted by the permittee shows that 99 % of all entrainment occurs during May to July (Kleinschmidt – May 2011 submittal, page 24).

8.7.3. Flow Reductions

The permittee shall limit intake and discharge flows during all of the days in the months of May and June when the CWIS is not restricted from withdrawing water as prescribed in Section 8.7.2 above. Specifically, the permittee shall be limited to withdrawing 68.4 MGD (one pump operation - one river water pump and one circulating water pump) during the periods of May 1 through May 24 and June 16 to June 30.

9. Storm Water Pollution Prevention Plan (SWPPP)

MTS stores and handles numerous chemicals on its property which could result in the discharge of pollutants to the Connecticut River either directly or indirectly through storm water runoff. Operations include one or more of the following activities from which there is or could be site runoff: materials handling and storage; chemical handling and storage; coal processing, handling and storage; and FGD operations. To control these and other activities and operations which could contribute pollutants to waters of the United States, potentially violating the MA SWQS, the Draft Permit requires that the permittee implement and maintain a SWPPP containing best management practices (BMPs) appropriate for this facility [*see* Sections 304(e) and 402(a)(1)(B) of the CWA and 40 C.F.R. § 125.103(b)].[35]

[35] NPDES permits may require BMPs on a case-by-case basis in accordance with CWA § 304(e) and 40 C.F.R. §

The goal of the SWPPP is to reduce or prevent the discharge of pollutants through the storm water drainage system. The SWPPP requirements in the Draft Permit are intended to provide a systematic approach by which the permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) it uses to achieve compliance with the conditions of the permit. The SWPPP shall be prepared in accordance with good engineering practices and identify potential sources of pollutants which may reasonably be expected to affect the quality of storm water discharges associated with industrial activity at the facility. The SWPPP supports the permit's numerical effluent limitations and is an enforceable element of the permit.

Implementation of the SWPPP involves the following four main steps:

(1) Forming a team of qualified facility personnel who will be responsible for developing and updating the SWPPP and assisting the plant manager in its implementation;
(2) Assessing potential storm water pollution sources;
(3) Selecting and implementing appropriate management practices and controls for these potential pollution sources; and
(4) Periodically re-evaluating the SWPPP effectiveness at preventing storm water contamination and complying with the various terms and conditions of the Permit.

To minimize preparation time, the permittee's SWPPP, may reflect pertinent requirements from other environmental management or pollution control plans, such as, for example, a Spill Prevention Control and Countermeasure (SPCC) plan under Section 311 of the CWA and 40 C.F.R. Part 112 or a Corporate Management Practices plan. The permittee may incorporate any part of such a plan into the SWPPP by reference, but any provision from another plan that is being incorporated by reference into the SWPPP must be attached to the SWPPP so that it is immediately available for review and inspection by EPA and MassDEP personnel. Although relevant portions of other environmental plans, as appropriate, can be built into the SWPPP, ultimately however, it is important to note that the SWPPP must be a comprehensive, stand-alone document. Thus, to repeat, any provision from another plan that is being incorporated by reference into the SWPPP must be physically attached to the SWPPP.

A copy of the most recent SWPPP shall be kept at the facility and be available for inspection by EPA and MassDEP. The Draft Permit requires the permittee to develop and implement a SWPPP no later than one hundred and eighty (180) days after the permit's effective date. The SWPPP supports the permit's numerical effluent limitations and the SWPPP will be equally as enforceable as those numerical limits and other requirements of the permit. *See* Draft Permit, Part I.C. (SWPPP requirements).

The permit requires that the permittee incorporate into its SWPPP all specific pollution control

---

125.103(b) when necessary to carry out the provisions of the statute under CWA § 402(a)(1). In the context of the SWPPP, BMPs should generally include processes, procedures, schedules of activities, prohibitions on practices, and other management practices that will prevent or reduce the discharge of pollutants in storm water runoff.

activities and other requirements found in the existing Multi-Sector General Permit's (MSGP) provisions for "Industrial Sector O, Steam Electric Generating Facilities." *See* *http://www.epa.gov/npdes/pubs/msgp2008_finalpermit.pdf* (web address for locating the MSGP, Subpart O, last visited on April 4, 2014).[36] The permittee shall, in particular, ensure that the coal pile area and those areas on the site impacted by FGD operations are specifically considered and addressed in the design and implementation of the SWPPP.

10. Biological Monitoring Program

The Draft Permit proposes a biological monitoring program to confirm that entrainable life stages of fish (primarily larvae) are largely present in the river during the period of April 15 through July 15 of each year. (As discussed farther above, existing data indicates that 94% of the fish larvae are found in the relevant segment of the river during May and June.) This biological monitoring program is outlined in Part 1.E. of the Draft Permit and focuses on icthyoplankton monitoring. The Draft Permit prescribes biological monitoring that the permittee must conduct through the first three years of this permit. The goals and objectives of this biological monitoring are (1) to expand the recent biological studies, conducted between 2006 and 2010 by the permittee; (2) to confirm the relative peaks of overall ichthyoplankton densities during the planned intake flow reductions required from May 1 to June 30, and (3) to determine whether the BTA is meeting the entrainment mortality reduction required by the permit. The required ichthyoplankton entrainment monitoring is also intended to contribute to estimates of the percent reduction in entrainment that will be experienced at the facility during the required maintenance shutdown period of May 25 through June 15, and during the remainder of the months of May and June when the facility is required to operate with one pump.

The Draft Permit also includes a reopener clause in Part I.F., which authorizes adjustments to the maintenance shutdown period if this biological monitoring shows a different period of peak larval density.

11. Essential Fish Habitat (EFH) Determination

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 Fisheries Services (NMFS) if EPA's action or a proposed action that it funds, permits, or undertakes, may adversely affect any essential fish habitat (EFH). The Amendments broadly define "essential fish habitat" as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. §1802 (10)). "Adversely affect" means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. §600.910(a)). Adverse effects may

---

[36] The currently effective MSGP was issued by EPA in 2008. EPA issued a new Draft MSGP in September 2013 and is currently considering public comments. *See* *http://cfpub.epa.gov/npdes/stormwater/msgp.cfm* (web address for the MSGP, last visited on April 4, 2014).

include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species fecundity), and site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

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

This section of the Connecticut River which encompasses the action area of MTS is located near Holyoke, Massachusetts, at river km 148, approximately 11 river kilometers upstream of the Holyoke Dam. It is part of River Segment MA34-04 and is classified in the Massachusetts Surface Water Quality Standards, 314 CMR 4.06, as a Class B warm water fishery. As described farther above, Class B waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other crucial functions, and for primary and secondary contact recreation.

The Atlantic salmon (*Salmo salar)* is the only managed species with designated EFH in the Connecticut River. Atlantic salmon are expected to be present during one or more lifestages within the action area of MTS. Although the last remnant stock of Atlantic salmon indigenous to the Connecticut River is believed to have been extirpated over 200 years ago, an active effort has been underway throughout the Connecticut River system since 1967 to restore this historic run (HG&E/MMWEC, 1997). As a result, Atlantic salmon may pass in the vicinity of the MTS intake and outfalls either during the migration of juveniles downstream to Long Island Sound or during the return of adults to upstream areas. The area influenced by the operation of MTS is the mainstem of the Connecticut River. The mainstem of a river is not, however, considered suitable for Atlantic salmon spawning. Instead, spawning is likely to occur in tributaries where the appropriate gravel or cobble riffle substrate can be found.

EPA has determined that the limits and conditions contained in this Draft Permit will minimize adverse effects to Atlantic salmon EFH for the following reasons:

- This is an action to reissue MTS's existing NPDES permit and the new Draft Permit proposes more stringent conditions in a number of respects than are in the existing permit;
- The dilution factor for MTS's thermal discharge from Outfall 001 varies from 8 to 16, while the dilution factor for all of the Facility's other outfalls is very high (ranging from 1,069:1 to 3188:1);
- Even under worst case conditions of maximum thermal discharge from MTS and low river flow, there is a large zone of passage for migrating Atlantic salmon that is unaffected by the discharge;
- The Draft Permit requires acute toxicity tests on daphnids *(Ceriodaphnia dubia)* will be required twice per year;
- The Draft Permit prohibits the discharge of pollutants, or combination of pollutants, in toxic amounts;

- The Draft Permit prohibits violations of the state water quality standards;
- The Draft Permit sets limits for chlorine, iron, copper, zinc, and nickel which are technology-based, more stringent than water quality-based limits. In addition, the permit requires a priority pollutant scan for the WWTP discharge.
- Consistent with CWA § 316(b)'s best technology available (BTA) standard, the Draft Permit imposes new requirements on MTS's withdrawals of water from the Connecticut River. Based on these requirements, little or no future impingement of Atlantic salmon is expected. In addition, operational limitations in the permit are expected to achieve major reductions in entrainment, but no entrainment of Atlantic salmon eggs or larvae is expected in any event given the location of the Facility's cooling water intake structure. Past entrainment data has not shown any entrainment of the early life stages of Atlantic salmon.
- The effluent limitations and conditions in the Draft Permit were developed to be protective of all aquatic life.

EPA believes that the conditions and limitations contained within the Draft Permit adequately protect all aquatic life, including designated EFH species in the receiving water, and that further mitigation is not warranted. Should adverse impacts to EFH species be detected as a result of this permit action, or if new information is received that changes the basis for EPA's conclusions, NMFS will be contacted and EFH consultation will be re-initiated.

As the federal agency charged with authorizing the discharge from this facility, EPA has submitted the Draft Permit and Fact Sheet, along with a letter under separate cover, to the NMFS Habitat Division for their review.

12. Endangered Species Act (ESA)

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

EPA has reviewed the listing of federal endangered or threatened species of fish, wildlife, and plants to determine if any listed species might potentially be impacted by the reissuance of this NPDES permit. Two protected fish species inhabit the Connecticut River, the Atlantic sturgeon (*Acipenser oxyrinchus*) and the shortnose sturgeon (*Acipenser brevirostrum*). Both species are under the jurisdiction of NMFS.

12.1 Atlantic Sturgeon

During the ongoing consultation between EPA and NMFS regarding protected species issues in the Connecticut River, NMFS announced its final decision to list five distinct population segments (DPSs) of Atlantic sturgeon (*Acipenser oxyrinchus*) under the Endangered Species Act. The Chesapeake Bay, New York Bight, Carolina, and South Atlantic populations of Atlantic sturgeon are listed as endangered, while the Gulf of Maine population is listed as threatened (January 31, 2012).

The following information was taken primarily from a letter dated December 19, 2011, from Patricia Kurkul, NMFS, to John Nagle, EPA, related to ESA Section 7 consultation for the permit reissuance of the Chicopee, MA, Wastewater Pollution Control Facility ("WPCF"):

> Atlantic sturgeon have some potential to travel up the mainstem of the Connecticut River into the state of Massachusetts. Atlantic sturgeon are a long-lived, late maturing, estuarine-dependent, anadromous species, feeding primarily on benthic invertebrates (ASSRT, 2007). They have been historically reported in the Connecticut River as far upstream as Hadley, MA. However, significant evidence that Atlantic sturgeon moved past Enfield, CT into the upper Connecticut River was previously rare since this species tends to remain in the lower river in the range of the salt wedge (River Mile 6 – 16; Savoy and Shake, 1993). In 2006, an adult Atlantic sturgeon was observed in the spillway lift at the Holyoke dam, providing some indication that this species may move further upstream into the freshwater reaches of the Connecticut River. However, extensive sampling and the lack of any strong evidence of Atlantic sturgeon spawning indicates that the presence of this species in the vicinity of the [Chicopee WPCF Discharge] discharge is unlikely.

MTS is approximately 7 miles (11 km) upstream of the Holyoke Dam and approximately 12 miles (19 km) upstream of the Chicopee facility discussed in the paragraph above. Consistent with this information, and based on the normal distribution of the species, it is highly unlikely that Atlantic sturgeon would be present in the vicinity of the MTS intake or discharges. Therefore, consultation with NMFS under Section 7 of the ESA is not required for Atlantic sturgeon.

12.2 Shortnose Sturgeon Inter-Agency Coordination

In a September 11, 2007, letter EPA requested information from MTS to support the reissuance of the station's NPDES permit. Among other information, EPA requested MTS to conduct ichthyoplankton sampling in the mainstem of the Connecticut River in the vicinity of the MTS to determine the types of species, and abundance of early life stages (ELS), of fish that drift past the facility's CWIS. EPA required this sampling pursuant to Section 308 of the Clean Water Act.

Following discussions with NMFS regarding the sampling plan, NMFS sent EPA a letter dated October 5, 2007, that expressed concern that that the proposed ichthyoplankton sampling might result in the capture and handling of ELS of shortnose sturgeon. NMFS stated that this occurrence would constitute a "take' as defined by the ESA. As such, NMFS recommended that a formal Section 7 consultation be completed for shortnose sturgeon before sampling could be performed in the months of May and June.

As part of this letter, NMFS further stated that EPA's reissuance of the NPDES permit for MTS would also require a formal consultation for shortnose sturgeon under Section 7 of the ESA. As part of this consultation, EPA prepared a Biological Assessment (BA) and submitted it to NMFS on May 25, 2012.

NMFS reviewed the BA and provided EPA with a list of follow-up questions on June 28, 2012. In communications with NMFS, EPA addressed these questions by August 13, 2013, but has continued to consult with NMFS. In an e-mail to EPA, dated August 13, 2013, NMFS indicated that it viewed the information exchanged between the two agencies as of that time to be part of the pre-consultation process.

As of the current date, EPA has submitted the Draft Permit and Fact Sheet to NMFS and a supplemental BA is being developed that will be submitted shortly, as part of the Section 7 consultation process for shortnose sturgeon in the action area of MTS.

13. Monitoring and Reporting

The permit's monitoring requirements have been established to yield data representative of the facility's pollutant discharges under the authority of Sections 308(a) and 402(a)(2) of the CWA and consistent with 40 C.F.R. §§ 122.41 (j), 122.43(a), 122.44(i) and 122.48. The monitoring program in the permit requires routine sampling, analysis and data submission which will provide EPA and MassDEP with ongoing, representative information on the levels of regulated constituents in the wastewater discharge streams. The approved analytical procedures are found in 40 C.F.R. Part 136 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. Timely reporting is essential for the regulatory agencies to expeditiously assess compliance with permit conditions.

The Draft Permit includes new provisions related to DMR submittals to EPA and the State. The Draft Permit requires that, no later than one year after the effective date of the permit, the Permittee submit all monitoring data and other reports required by the permit to EPA using NetDMR, unless the Permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt-out request"). In the interim (until one year from the effective date of the permit), the Permittee may either submit monitoring data and other reports to EPA in hard copy form or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit DMRs electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing hard copy forms under 40 C.F.R. § 122.41 and § 403.12. NetDMR is accessed from the following url: http://www.epa.gov/netdmr. Further information about NetDMR, including contacts for EPA Region 1, is provided on this website.

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

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

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

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

14. State Certification Requirements

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection (MassDEP) certifies that the effluent limitations included in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate the Massachusetts Surface Water Quality Standards. The MassDEP has reviewed the Draft Permit and advised EPA that the limitations are adequate to protect water quality. EPA has requested permit certification by the State pursuant to 40 C.F.R. §124.53 and expects the Draft Permit will be certified.

15. Public Comment Period, Public Hearing, and Procedures the Final Decision

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to George Papadopoulos, U.S. EPA, Office of Ecosystem Protection, Industrial Permits Section, Mailcode OEP 06-1, 5 Post Office Square, Suite 100, Boston, Massachusetts 02109-3912.

Prior to such date, any person may submit a written request for a public hearing to consider the Draft Permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. EPA will consider any request for a hearing and may decide to hold a public hearing if the criteria stated in 40 C.F.R. § 124.12 are satisfied. In reaching a final decision on the Draft Permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period and any public hearings that may be held, the EPA will issue a Final Permit decision and forward a copy of the final decision, including responses to any significant comments, to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the Final Permit decision, any interested person may submit a petition for review of the permit to EPA’s Environmental Appeals Board consistent with 40 C.F.R. § 124.19.

16. EPA and MassDEP Contacts

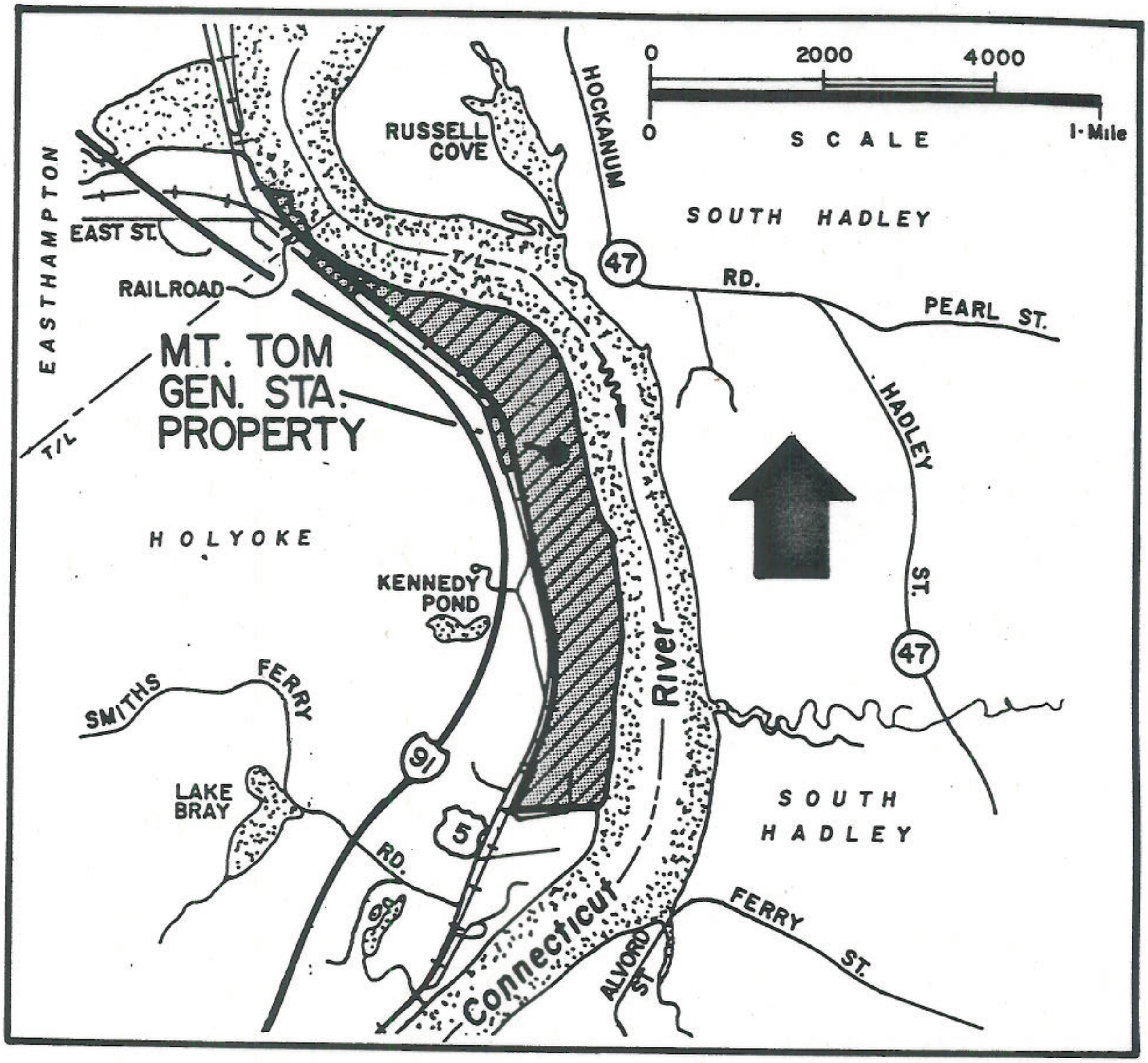
Additional information concerning the Draft Permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays, from the EPA and MassDEP contacts below:

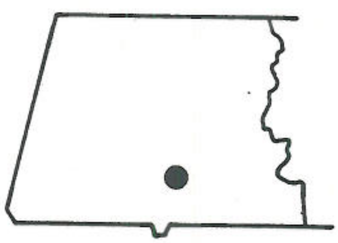
George Papadopoulos, Industrial Permits Section
5 Post Office Square - Suite 100 - Mailcode OEP 06-1
Boston, MA 02109-3912
Telephone: (617) 918-1579 FAX: (617) 918-0579

Cathy Vakalopoulos, Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program
1 Winter Street, Boston, Massachusetts 02108
catherine.vakalopoulos@state.ma.us
Telephone: (617) 348-4026; FAX: (617) 292-5696

April 9, 2014
Date

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





SITE MT. TOM GENERATING STATION

TOWN HOLYOKE , MASSACHUSETTS

SCALE 1" = 2000'

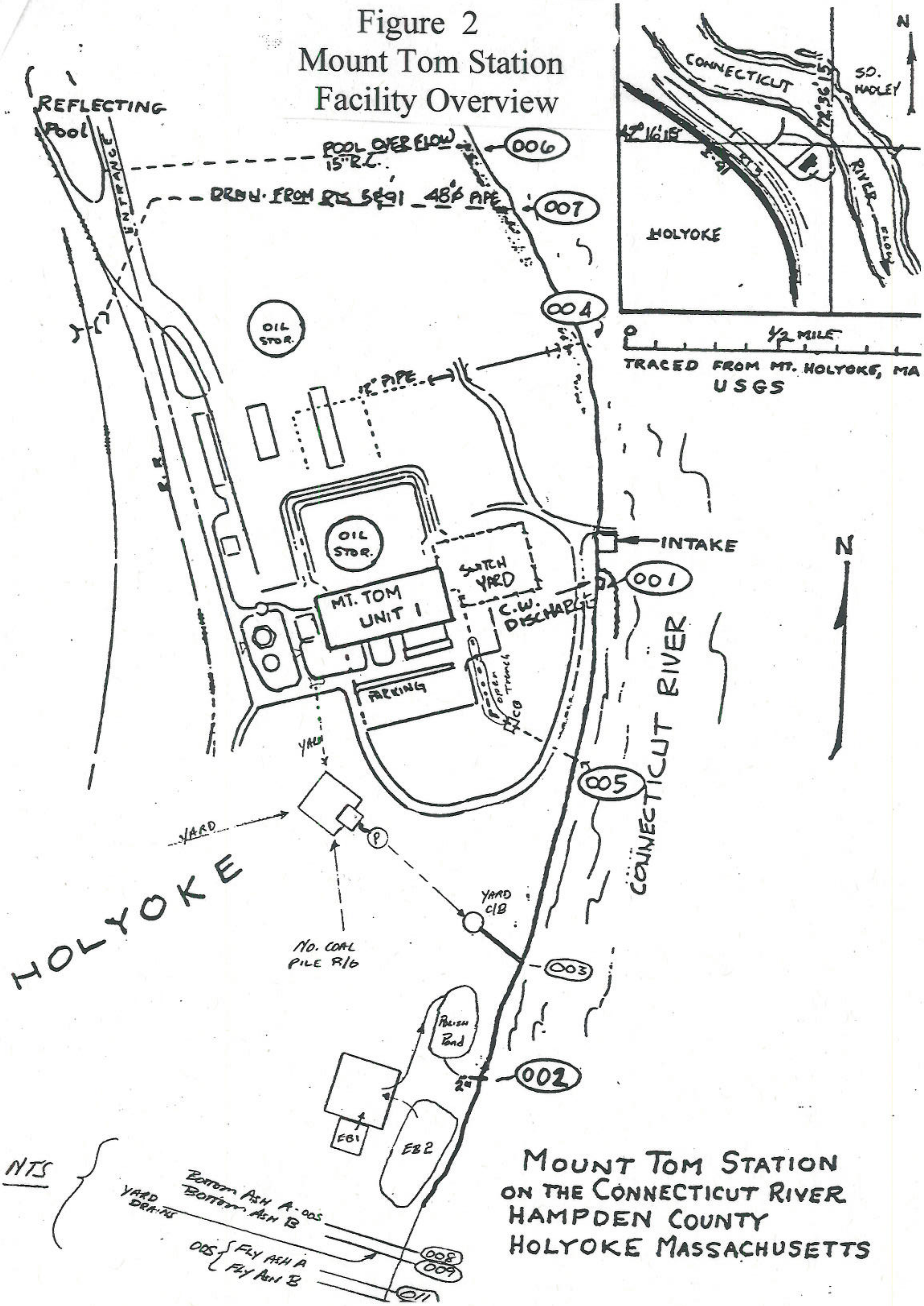
LOCATION OF MT. TOM GENERATING STATION

HOLYOKE , MASSACHUSETTS

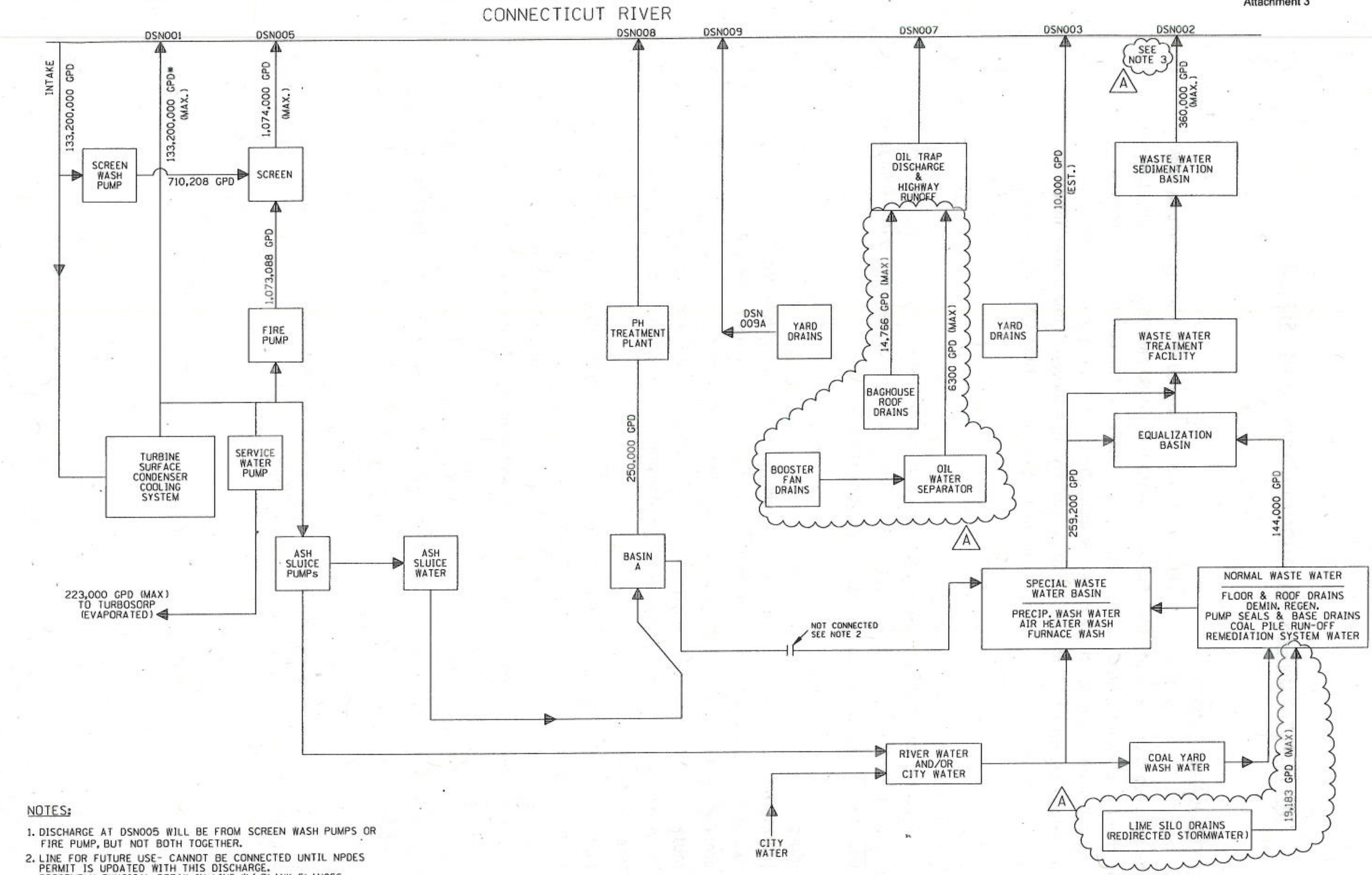
KEY MAP - FIGURE 1

DRAWN BY: E.W.K.
DATE: 05/29/1991
N.U.S.CO.
REAL ESTATE DEPT.

Figure 2
Mount Tom Station
Facility Overview



Attachment 3



NOTES:

1. DISCHARGE AT DSN005 WILL BE FROM SCREEN WASH PUMPS OR FIRE PUMP, BUT NOT BOTH TOGETHER.
2. LINE FOR FUTURE USE- CANNOT BE CONNECTED UNTIL NPDES PERMIT IS UPDATED WITH THIS DISCHARGE. PRESENTLY PHYSICAL BREAK IN LINE W/ BLANK FLANGES.
3. LIME SILO AREA DRAINAGE NOW DISCHARGED TO DSN002 ALSO FLOW REDUCED BY BOOSTER FAN AREA & BAGHOUSE ROOF DRAINS NOW DISCHARGE TO DSN007.

A

* FLOW WHEN FIRE PUMP, REFLECTING POOL AND ASH SLUICE PUMPS ARE OUT OF SERVICE.

* * FLOW OF 250,00 GPD WILL BE FROM DSN008 OR DSN005, NOT BOTH TOGETHER

Figure 3
Mount Tom Station
Water Balance Diagram

Table 1

MOUNT TOM GENERATING COMPANY - MA0005339

Outfall Serial Number 001 - Monthly Reporting

Monitoring Period End Date	Flow Rate- 2 pump operation		Flow Rate- 1 pump operation		Delta T - 2 pump operation	Delta T - 1 pump operation	Effluent temperature	pH	Total Residual Oxidants	
	MGD	MGD	MGD	MGD	º F	º F	º F	s.u.	mg/l	mg/l
	Monthly Average	Daily Max	Monthly Average	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Monthly Average	Daily Max
Oct-08	124.3	133.2	55.4	68.4	20	27	81	7.3	0.07	0.15
Nov-08			68.5	71.3	20	27	74	7.2	0.07	0.13
Dec-08			68.4	68.4	20	0	66	7.2	0.07	0.11
Jan-09			68.4	68.4	20	28	62	7.3	0.08	0.15
Feb-09			67.3	68.4	20	25	59	7.3	0.07	0.14
Mar-09			59.5	68.4		25	61	7.3	0.08	0.14
Apr-09	56.4	63.8	65.5	68.4	11	18	71	7.4	0.07	0.15
May-09	55.5	69.3	7.8	44.2	15	13	76	7.4	0.03	0.05
Jun-09	81.4	133.2	39	68.4	16	14	84	7.4	0.05	0.11
Jul-09	69.7	105.4	32.9	68.4	14	14	88	7.3	0.06	0.14
Aug-09	85.9	133.2	34	68.4	15	17	95	7.4	0.08	0.15
Sep-09			17.4	17.9		1	71	8.4		
Oct-09			9.2	9.2		0	50	7.3		
Nov-09	33.8	97.2	47.8	68.4	18	22	68	7.4		
Dec-09	8.3	8.3	63.6	68.4	18	27	70	7.3	0.07	0.13
Jan-10			65	68.4		29	62	7.4	0.07	0.14

Feb-10			68.4	68.4		28	61	7.4	0.08	0.14
Mar-10			61.7	68.4		20	60	7.3	0.09	0.14
Apr-10	15.6	15.6	11.5	21.6	1	2	53	7.6		
May-10	84.1	133.2	29.4	67.1	16	18	87	7.6	0.04	0.13
Jun-10	96.4	133.2	30.3	68.4	15	16	92	7.4	0.05	0.15
Jul-10	115	136.8	19.3	32.9	16	15	97	7.3	0.06	0.09
Aug-10	73.2	133.3	34.2	68.4	16	16	95	7.5	0.07	0.09
Sep-10	92.2	133.2	33.6	68.4	15	15	94	7.7	0.08	0.13
Oct-10			28.8	68.4		6	76	7.4	0.08	0.14
Nov-10	12.4	12.4	58.5	68.4	14	15	63	7.4	0.07	0.11
Dec-10			55.9	68.4		22	60	7.3	0.07	0.14
Jan-11			55.6	68.4		30	64	7.3	0.11	0.14
Feb-11			52.6	68.4		30	57	7.3	0.09	0.12
Mar-11			27.5	68.4		16	53	7.4	0.05	0.1
Apr-11			68.3	68.4		13	60	7.3	0.05	0.07
May-11			29.7	29.7		2	62	7.2	0.03	0.05
Jun-11	114	133.2	36.8	36.8	13	7	84	7.3	0.03	0.06
Jul-11	105.1	133.2	20.4	45.7	14	14	96	7.3	0.06	0.09
Aug-11	47.8	62.2	27.5	64.9	13	14	87	7.3	0.05	0.09
Sep-11			42.2	58		11	79	7.2	0.08	0.1
Oct-11										
Nov-11			38.7	66.5		15	63	7.5	0.1	0.11
Dec-11			51.8	68.4		17	57	7.2	0.1	0.14
Jan-12			36.2	68.4		14	59	7.4	0.09	0.14
Feb-12			30.7	35.9		3	55	7.5	0.1	0.11
Mar-12	2.5	2.5	48.6	68.4	13.6	13.6	66.2	7.4	0.15	0.15
Apr-12			44.4	69.8		14	69		0.02	0.02
May-12	13.1	20.8	33.1	68.3	9.9	12.1	80.7	7.4	0.03	0.04
Jun-12	43.5	133.2	34	68.4	15.9	19.6	94.1	7.1	0.04	0.05
Jul-12	44.6	133.2	53.7	68.4	15.4	13.7	99.6	7.9	0.035	0.06
Aug-12	27.4	133.2	8.6	68.4	13.8	17.7	97.6	7.6	0.05	0.07
Sep-12	22.9	133.2	5.6	68.4	14.7	8.9	88.2	7.15	0.04	0.07
Oct-12	4.4	129.9	0.2	2.3	0	0	69.9			
Nov-12			19.9	68.5		25.9	67.1	7	0.03	0.07
Dec-12			22	68.8		24.4	63.7	7.19	0.06	0.14

Jan-13			20.1	68.5		23	59	6.84	0.04	0.09
Feb-13			18.5	68.5		22.8	60.1	6.9	0.05	0.08
Mar-13			18.2	68.4		23	62	6.68	0.05	0.05
Apr-13			1	1.4		1.9	59.5			
May-13	105	126.8	12.6	31.9	12.5	8.6	74.4	7.6	0.13	0.18
Jun-13	132.6	132.6	41.7	68.4	11.3	13.4	84.4	7.1	0.06	0.1
Jul-13	118.8	132.3	4	17.6	13.6	0.3	94.1	7.08	0.04	0.05
Aug-13			1	2.7		1.2	72.9	7.63		
Sep-13	8.4	116.3	3.1	68.4	10.8	12.5	88.1	7.2	0.03	0.05
Oct-13	0.6	2.6	0.6	2.6			68.7	7.3		
1992 Permit Limits	133.2 MGD	133.2 MGD	70 MGD	70 MGD	20 ^{o}F	32 ^{o}F	102 ^{o}F	Monitor	0.15 mg/l	0.15 mg/l
Minimum	0.6	2.5	0.2	1.4	0	0	50	6.68	0.02	0.02
Maximum	132.6	136.8	68.5	71.3	20	30	99.6	8.4	0.15	0.18
Average	59.8	98.9	35.2	56.6	14.3	15	72.9	7.34	0.066	0.11
Measurements	30	30	60	60	59	59	60	57	52	52

- There was no data reported by permittee where there are blank entries

Table 2

MOUNT TOM GENERATING COMPANY - MA0005339

Outfall Serial Number 002 - Monthly Reporting

Monitoring Period End Date	Effluent Flow		Total Suspended Solids		Oil & Grease		pH	
	MGD	MGD	MGD	MGD	mg/l	mg/l	s.u.	s.u.
	Monthly Average	Daily Max	Monthly Average	Daily Max	Daily Max	Daily Max	Minimum	Maximum
Oct-08	0.188	0.229	1.65	2.4	0	0	7.1	7.1
Nov-08	0.082	0.255	5.7	8.7	0	0	7.1	7.1
Dec-08	0.115	0.269	8.3	13.9	0	0	8.1	7.2
Jan-09	0.121	0.24	3.23	4	0	0	6.9	7.2
Feb-09	0.119	0.199	2.4	3.2	0	0	7	7.1
Mar-09	0.094	0.228	2.65	4.2	1	2	7.1	7.3
Apr-09	0.09	0.252	6.9	7.8	0.4	0.8	7.3	7.6
May-09	0.058	0.227	2.5	2.6	0.25	0.5	7.1	7.6
Jun-09	0.085	0.243	2.4	4	0.25	0.5	7	7.4
Jul-09	0.152	0.285	1.6	2	0.25	0.5	6.9	7.3
Aug-09	0.152	0.285	1.6	2.2	0	0	7	7.1
Sep-09	0.061	0.233	0	0	0	0	7.1	7.2
Oct-09								
Nov-09	0.069	0.237	0.9	1.3	0	0	7	7.1

Dec-09	0.114	0.279	4.5	5.7	0	0	6.8	7.3
Jan-10	0.065	0.263	4.05	5.8	0.25	0.5	7.1	7.3
Feb-10	0.071	0.237	2.15	2.7	0	0	6.9	7.2
Mar-10	0.094	0.218	4.45	5	0	0	6.8	6.8
Apr-10	0.017	0.167	6	6.2	0.65	0.8	6.9	7.2
May-10	0.053	0.174	2.05	2.2	0	0	6.8	7.1
Jun-10	0.106	0.235	3.45	4.2	0.25	0.5	6.8	7.2
Jul-10	0.087	0.231	2.6	2.9	0.3	0.6	6.9	7
Aug-10	0.099	0.218	1.7	2.6	0.25	0.5	7.1	7.1
Sep-10	0.098	0.269	2.25	2.6	0.35	0.7	6.9	7.1
Oct-10	0.079	0.326	1.05	1.2	0	0	7.2	7.6
Nov-10	0.092	0.23	0.55	0.6	0	0	6.6	6.8
Dec-10	0.082	0.221	2.15	2.2	0	0	6.6	6.8
Jan-11								
Feb-11	0.111	0.211	2.7	3.7	0	0	6.5	6.6
Mar-11	0.064	0.226	5.65	5.8	0	0	7.1	7.4
Apr-11	0.044	0.214	6.35	7.2	0	0	6.7	6.8
May-11								
Jun-11	0.074	0.195	1.7	1.8	0	0	7.3	7.3
Jul-11								
Aug-11	0.098	0.261	1.9	2.5	0	0	7.2	7.7
Sep-11	0.024	0.179	7	7.7	0	0	7.1	7.1
Oct-11	0.05	0.212	1	1.5	0	0	7.5	7.5
Nov-11	0.051	0.222	1.45	1.5	0	0	6.9	7
Dec-11								
Jan-12	0.055	0.198	1.6	2.4	0	0	7.3	7.4
Feb-12								
Mar-12								
Apr-12	0.012	0.099	1.7	1.7	0	0	7.2	7.4
May-12	0.041	0.144	0.6	1.2	0	0	7.3	7.41
Jun-12	0.022	0.091	2.4	2.8	0	0	7.58	8.16
Jul-12	0.025	0.105	1.3	1.4	0	0	8.27	8.5
Aug-12	0.035	0.107	1.8	1.8	0	0	8.24	8.42
Sep-12	0.117	0.201	1.2	1.6	0	0	6.78	7.2
Oct-12	0.128	0.185	0.3	0.5	0	0	6.94	7.1

Nov-12	0.052	0.164	0	0	0	0	6.55	6.68
Dec-12	0.028	0.198	0.9	1.2	0	0	6.42	6.9
Jan-13	0.069	0.216	1.7	1.8	0	0	6.58	6.87
Feb-13	0.005	0.021	1.3	1.6	0	0	6.3	6.3
Mar-13	0.04	0.17	2	3	0	0	6.35	7.12
Apr-13	0.043	0.194	2.2	2.4	0	0	6.99	7.1
May-13	0.002	0.012	11.5	21.8	0	0	7.12	7.34
Jun-13	0.048	0.232	1.4	1.6	0	0	7.28	7.35
Jul-13	0.041	0.207	1	1.4	0	0	7.4	7.64
Aug-13	0.01	0.106	1.3	1.4	0	0	7.58	7.63
Sep-13								
Oct-13	0.06	0.205	1.6	3.2	0	0	7.3	7.3
1992 Permit Limits	0.216	0.360	30	100	15	15	6.0	9.0
Minimum	0.005	0.012	0	0	0	0	6.3	6.3
Maximum	0.188	0.326	11.5	21.8	0.65	0.80	8.27	8.5
Average	0.072	0.204	2.64	3.48	0.079	0.15	---	---
Measurements	53	53	53	53	53	53	53	53

- There was no data reported by permittee where there are blank entries

MOUNT TOM GENERATING COMPANY - MA0005339 Outfall Serial Number 002 - Monthly Reporting								
Monitoring Period End Date	Total Iron		Total Nickel		Total Copper		Total Zinc	
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	Monthly Average	Daily Max	Monthly Average	Daily Max	Monthly Average	Daily Max	Monthly Average	Daily Max
Oct-08	0.13	0.25	0	0	0	0	0	0
Nov-08	0.16	0.19	0	0	0	0	0	0
Dec-08	0.33	0.36	0	0	0	0	0.01	0.01
Jan-09	0.33	0.36	0	0	0	0	0.01	0.01
Feb-09	0.42	0.51	0	0	0	0	0.01	0.01
Mar-09	0.18	0.23	0	0	0	0	0	0
Apr-09	0.21	0.23	0	0	0	0	0.01	0.02
May-09	0	0	0	0	0	0	0	0
Jun-09	0	0	0	0	0.01	0.02	0	0
Jul-09	0	0	0	0	0	0	0	0
Aug-09	0.11	0.12	0	0	0	0	0	0
Sep-09	0	0	0	0	0	0	0	0
Oct-09								
Nov-09	0.12	0.13	0	0	0	0	0	0
Dec-09	0.16	0.19	0	0	0	0.03	0	0
Jan-10	0.21	0.21	0	0	0.02	0.03	0	0
Feb-10	0.17	0.19	0	0	0	0	0	0
Mar-10	0.26	0.26	0	0	0	0	0	0
Apr-10	0.37	0.37	0	0	0	0	0.01	0.01

May-10	0	0	0	0	0	0	0	0
Jun-10	0	0	0	0	0	0	0	0
Jul-10	0.12	0.12	0	0	0	0	0	0
Aug-10	0.08	0.15	0	0	0	0	0	0
Sep-10	0	0	0	0	0	0	0	0
Oct-10	0.06	0.11	0	0	0	0	0	0
Nov-10	0.06	0.11	0	0	0	0	0	0
Dec-10	0.12	0.13	0	0	0	0	0	0
Jan-11								
Feb-11	0.28	0.31	0	0	0.01	0.02	0	0
Mar-11	0.48	0.49	0	0	0.03	0.03	0	0
Apr-11	0.14	0.28	0	0	0	0	0	0
May-11								
Jun-11	0.21	0.21	0	0	0	0	0	0
Jul-11								
Aug-11	0	0	0	0	0	0	0	0
Sep-11	0.52	0.57	0	0	0	0	0	0
Oct-11	0.14	0.18	0	0	0	0	0	0
Nov-11	0	0	0	0	0	0	0	0
Dec-11								
Jan-12	0	0	0	0	0	0	0	0
Feb-12								
Mar-12								
Apr-12	0	0	0	0	0	0	0	0
May-12	0	0	0	0	0	0	0	0
Jun-12	0.62	1.24	0	0	0	0	0.005	0.1
Jul-12	0	0	0	0	0	0	0	0
Aug-12	0	0	0	0	0	0	0	0
Sep-12	0	0	0	0	0	0	0.01	0.02
Oct-12	0	0	0	0	0	0	0	0
Nov-12	0	0	0	0	0	0	0	0
Dec-12	0.11	0.21	0	0	0	0	0	0
Jan-13	0.38	0.39	0	0	0.02	0.02	0.02	0.02
Feb-13	0.15	0.15	0	0	0	0	0.035	0.06
Mar-13	0.22	0.33	0	0	0	0	0.015	0.02

Apr-13	0.13	0.13	0	0	0	0	0	0
May-13	0	0	0	0	0	0	0	0
Jun-13	0.07	0.13	0	0	0	0	0.01	0.01
Jul-13	0	0	0	0	0	0	0	0
Aug-13	0	0	0	0	0	0	0	0
Sep-13								
Oct-13	0	0	0	0	0	0	0	0
1992 Permit Limits	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0
Minimum	0	0	0	0	0	0	0	0
Maximum	0.62	1.24	0	0	0.03	0.03	0.035	0.06
Average	0.133	0.167	0	0	0.002	0.003	0.0027	0.0054
Measurements	53	53	53	53	53	53	53	53

- There was no data reported by permittee where there are blank entries

Attachment A: Calculation of 7Q10 and Dilution Factors

Estimated 7Q10 at Outfall 001

Nearest U.S. Geological Gauging Station = 01170500 (@ Connecticut River at Montague City)

7Q10 $Flow_{@Connecticut}$ = 1,690 cubic feet per second (cfs)

7Q10 Flow at Outfall 001 is given by the ratio of the drainage area to the known $7Q10_{@\ Connecticut}$ such that:

$$\frac{7Q10_{@\ Connecticut}}{Drainage\ Area_{@\ Connecticut}} = \frac{7Q10_{@Outfall001}}{Drainage\ Area_{@Outfall001}}$$

Drainage $Area_{@\ Connecticut}$ = 7,860 square miles (mi^2)

Drainage $Area_{@Outfall001}$[1] = 8,240 mi^2

$7Q10_{@Outfall001} = Q_R$

Therefore:

$$\frac{1{,}690\ cfs}{7{,}860\ mi^2} = \frac{Q_R}{8{,}240\ mi^2}$$

And:

$$Q_R = 1{,}690\ cfs * \frac{8{,}240\ mi^2}{7{,}860\ mi^2} = 1{,}772\ cfs\ \ (1{,}143\ MGD)$$

Dilution Factor (2 pump operation)

Dilution Factor $= [Q_R + (Q_P * 1.55)]/ (Q_P * 1.55)$
$= 1{,}772 / (133.2*1.55) =$ **8.6**

Where:

Q_R = Estimated 7Q10 for the receiving water at Outfall 001 = 1,772 cfs
Q_P = Maximum design flow rate for Outfall 001 = 133.2 MGD
1.55 = Factor to convert MGD to cfs.

For one pump operation, the dilution factor is calculated as follows:

1772/(68.4*1.55) = **16.7**

[1] Estimated drainage area at Outfall 001 determined using USGS StreamStats in Massachusetts mapping tool at http://water.usgs.gov/osw/streamstats/massachusetts.html

Dilution Factor (WWTP effluent – Outfall 002)

Dilution Factor at Daily Maximum Flow

$$= [Q_R + (Q_P * 1.55)]/ (Q_P * 1.55)$$

$$= 1,772 / (0.36 * 1.55) = \mathbf{3170}$$

Where:

Q_R = Estimated 7Q10 for the receiving water at Outfall 001 = 1,772 cfs
Q_P = Daily Maximum flow rate for Outfall 002 = 0.36 MGD
1.55 = Factor to convert MGD to cfs.

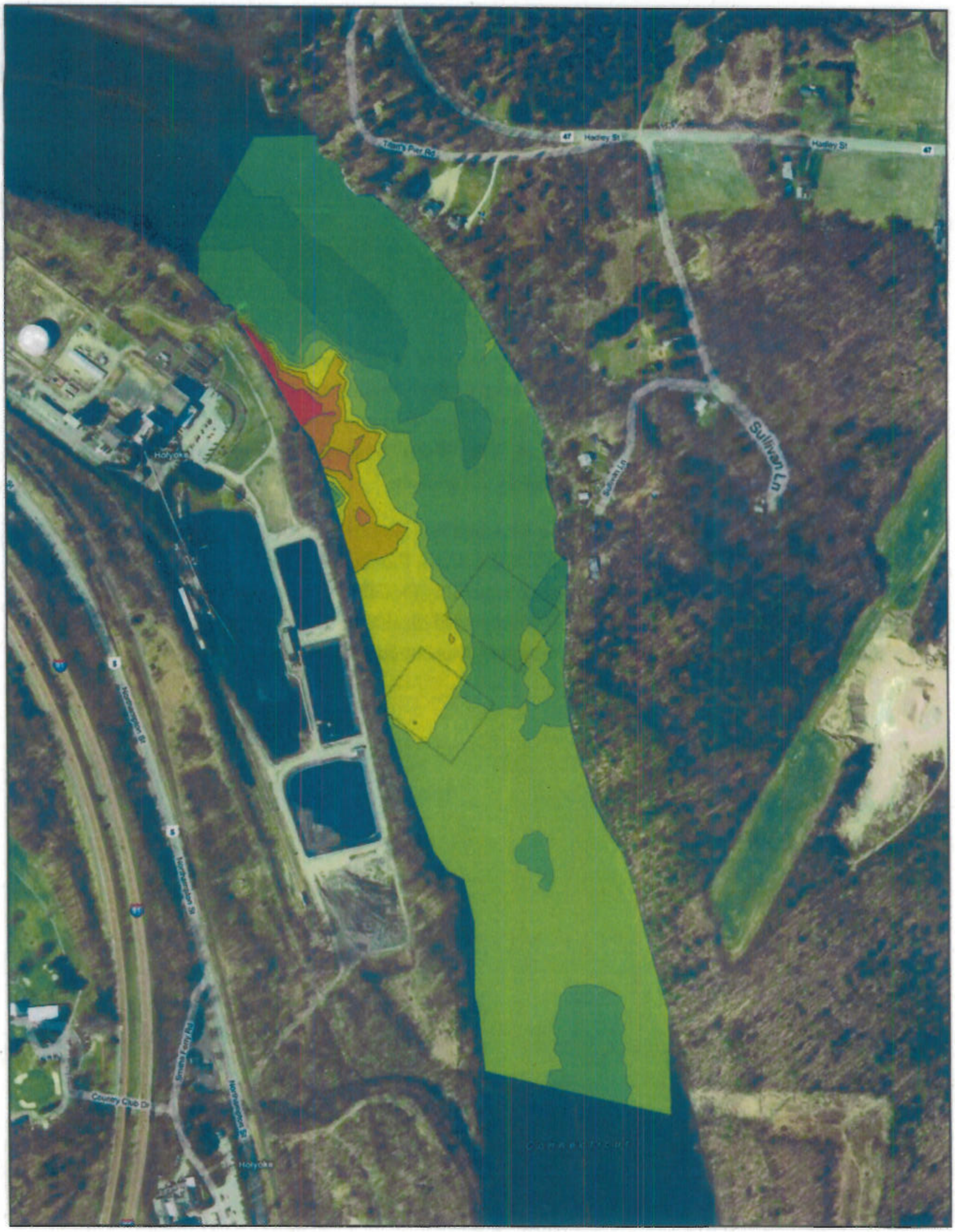
For the monthly average permitted flow, the dilution factor is calculated as follows:

1772/(0.216 * 1.55) = **5290**

Attachment B - EPA Thermal Mapping Field Effort

Two maps depicting temperature differences in the area of the thermal plume of Mount Tom Generating Station (MTGS) in the Holyoke Pool of the Connecticut River, at river kilometer 148, in Holyoke, Massachusetts. The "Shallow" thermal plume map represents temperatures taken at a depth of approximately 0.4 meters. The "Deep" thermal plume map represents temperatures taken at a depth of approximately 2.2 meters.

Temperature measurements were taken by EPA staff on August 14, 2010, from 12:00 noon through 4:00 PM. At the time temperatures were taken, the facility was discharging non-contact cooling water at a rate of 133.2 million gallons per day (MGD). The facility's reported intake temperature was approximately 80°F and the reported discharge temperature was approximately 86°F during the time period when river sampling was conducted.



0 270 540 810 1,080 Feet

Shallow Temp (c)

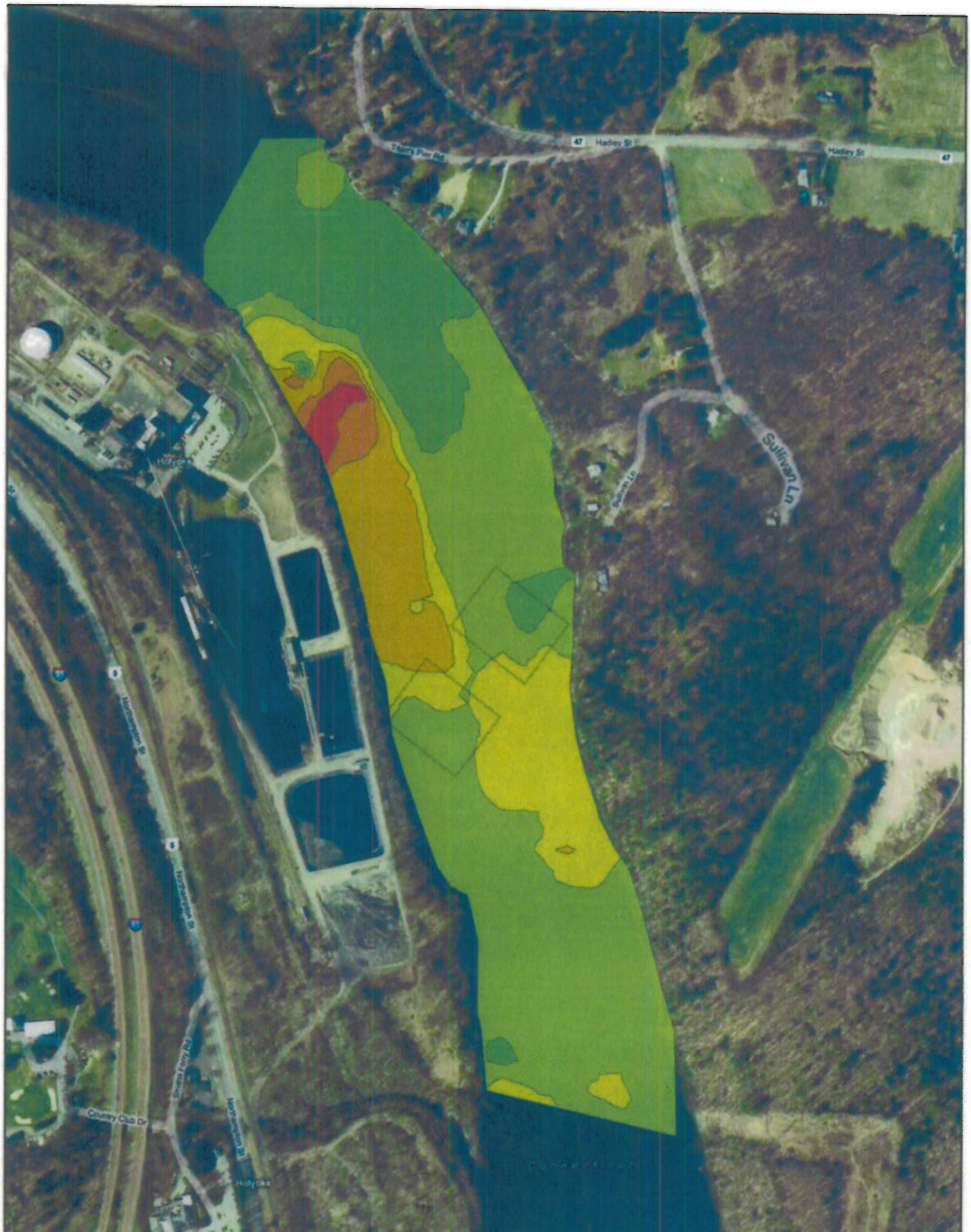
25.5 to 26
26.1 to 26.5
26.5 to 27
27.1 to 27.5
27.6 to 28
28.1 to 28.5
28.6 to 29
29.1 to 29.5
29.6 to 30.17

Mt. Tom Station Thermal Plum- Shallow

DRAFT

EPA

Date: 11/4/2010 Map Tracker 7147



0 270 540 810 1,080 Feet

Deep Temp (c)

- 26.1 to 26.5
- 26.5 to 27
- 27.1 to 27.5
- 27.6 to 28
- 28.1 to 28.5
- 28.6 to 29
- 29.1 to 29.5

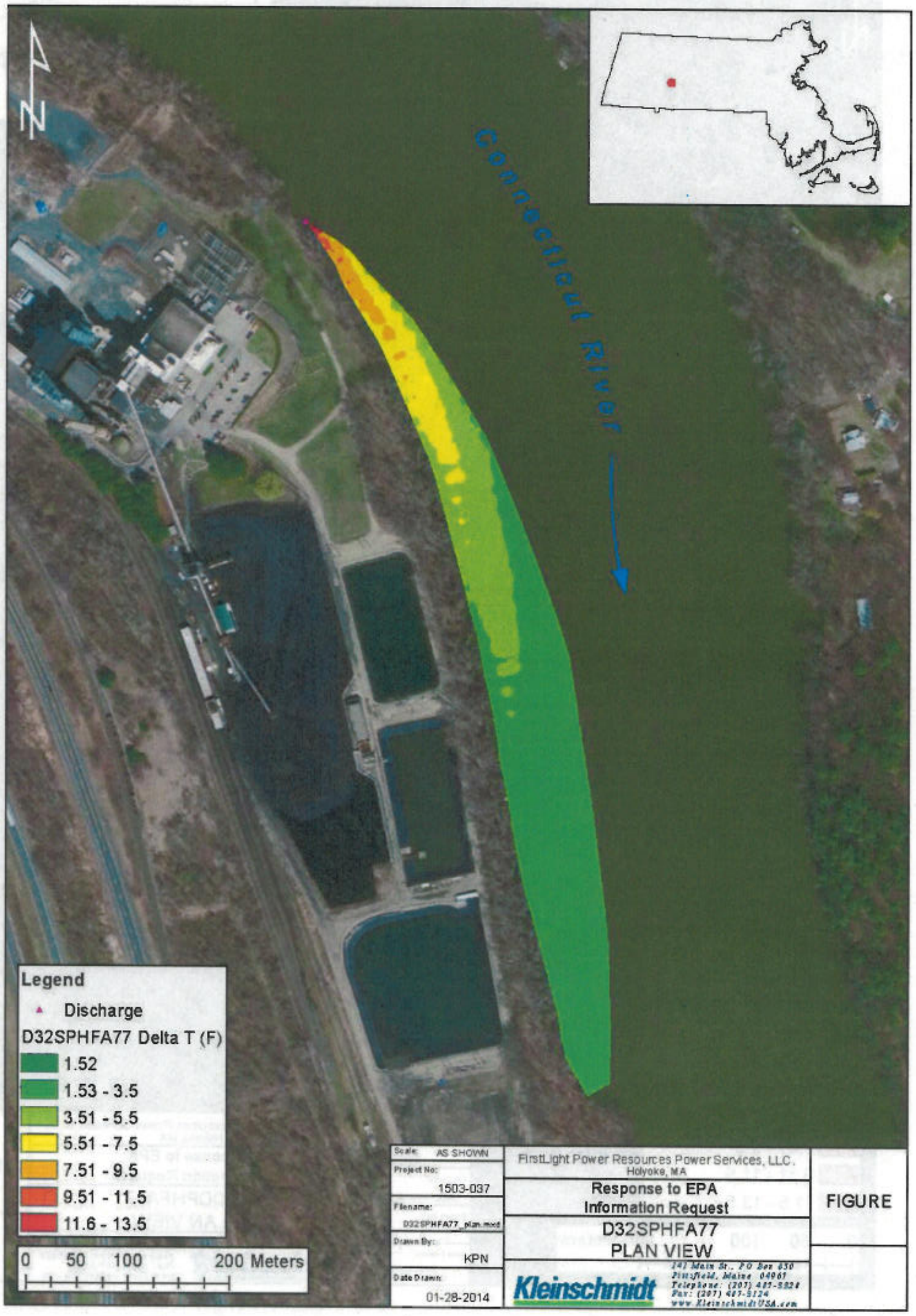
Mt. Tom Station Thermal Plum- Deep

DRAFT

EPA

Date: 11/4/2010 Map Tracker 7147

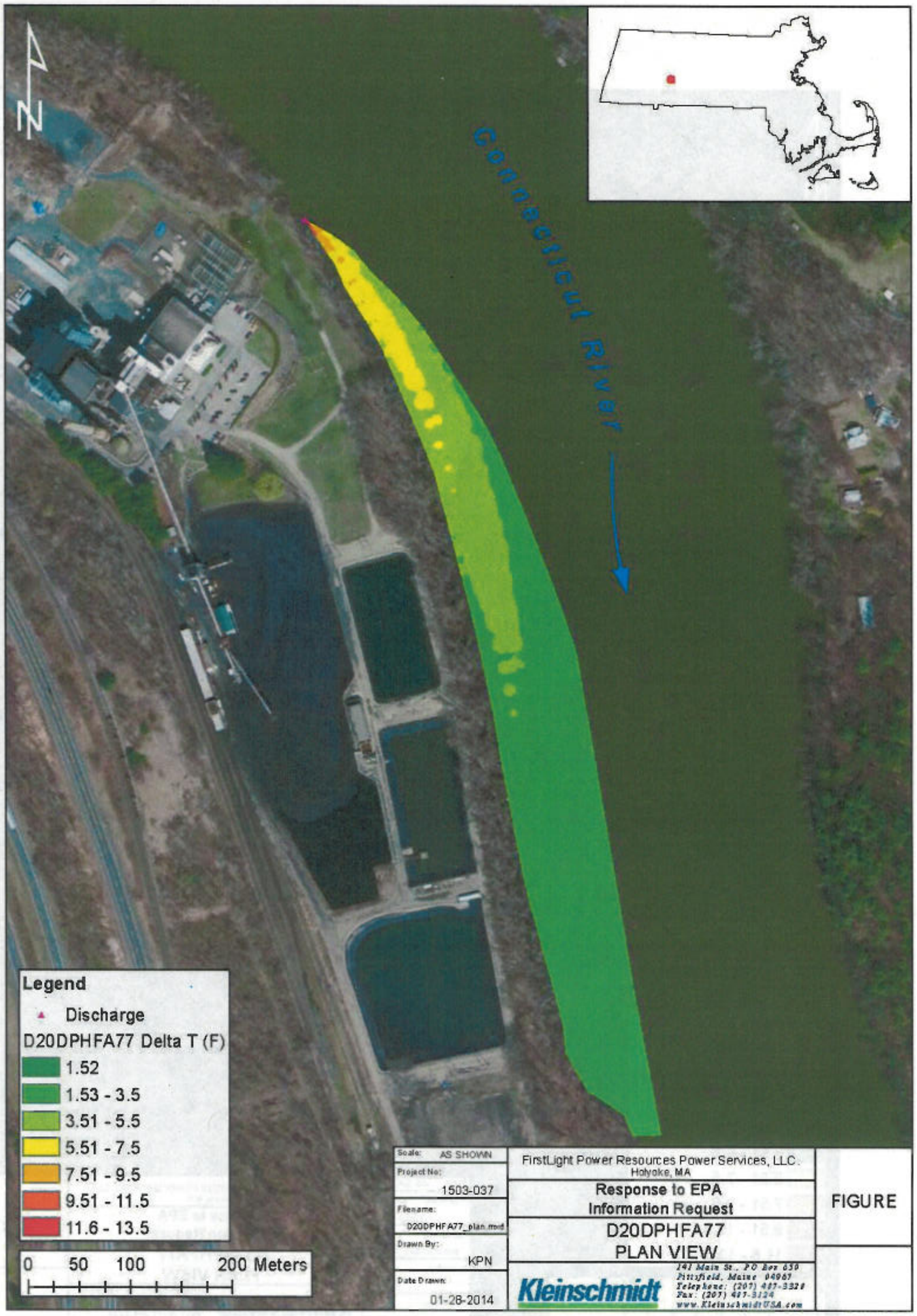
Attachment C - CORMIX Model Simulation - 70 MGD Discharge Spring Plan View (February 5, 2014)



D32DPHFA77 PLAN VIEW

Mt. Tom Thermal Plume CORMIX Study - Model Scenarios						
Run Scenario	Delta T (deg F)	Pump Flow (MGD)	River Flow (cfs)	Ambient Water (deg F)	Effluent Temp (deg F)	Name
17	32	70	15,000	77	109	D32DPHFA77
18	20	140	15,000	77	97	D20DPHFA77
19	32	70	3,000	83	115	D32SPLFA83
20	20	140	3,000	83	103	D20DPLFA83

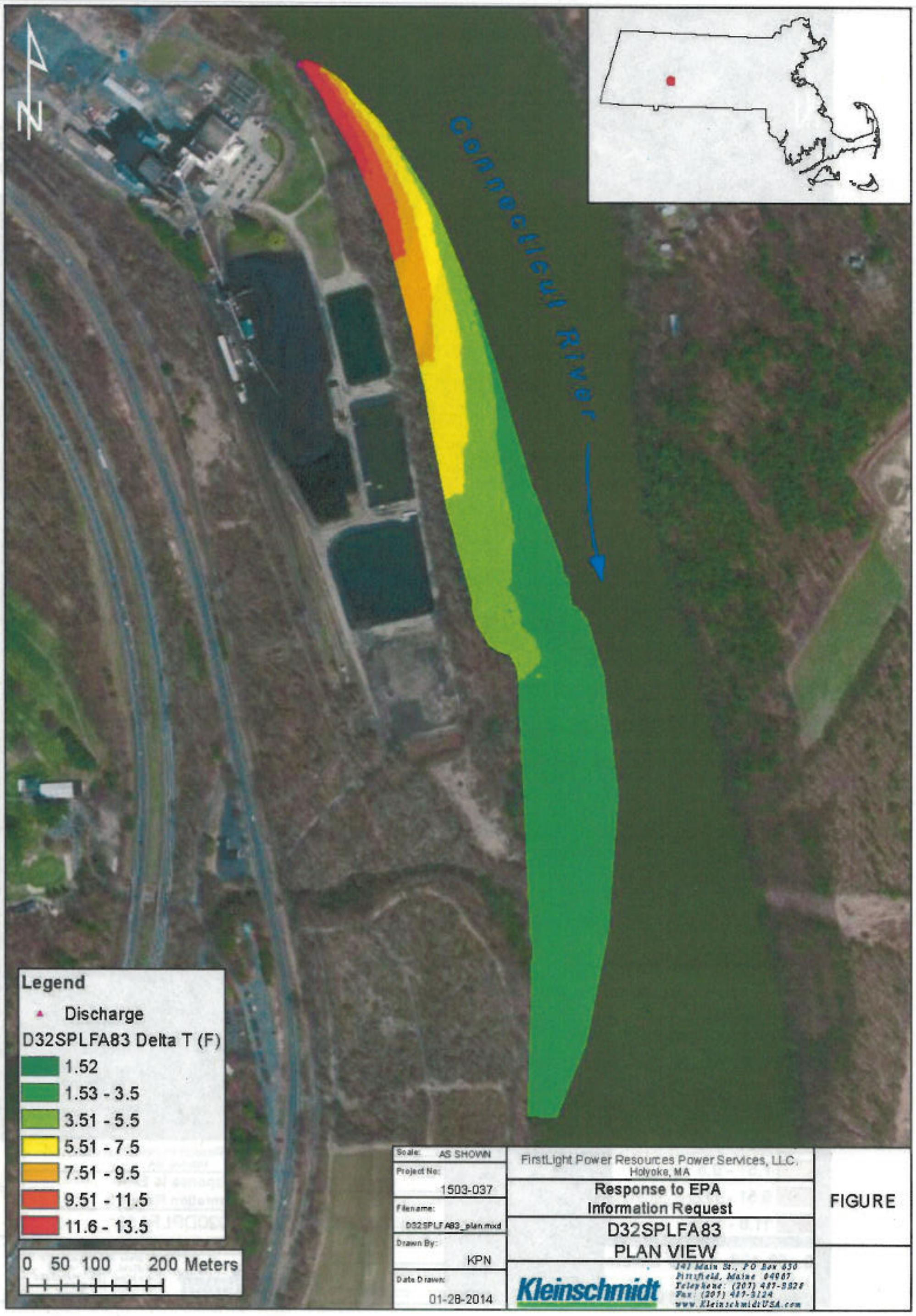
Attachment D - CORMIX Model Simulation - 140 MGD Discharge Spring
Plan View (February 5, 2014)



D20DPHFA77 PLAN VIEW

Mt. Tom Thermal Plume CORMIX Study - Model Scenarios						
Run Scenario	**Delta T (deg F)**	**Pump Flow (MGD)**	**River Flow (cfs)**	**Ambient Water (deg F)**	**Effluent Temp (deg F)**	**Name**
17	32	70	15,000	77	109	D32DPHFA77
18	20	140	15,000	77	97	D20DPHFA77
19	32	70	3,000	83	115	D32SPLFA83
20	20	140	3,000	83	103	D20DPLFA83

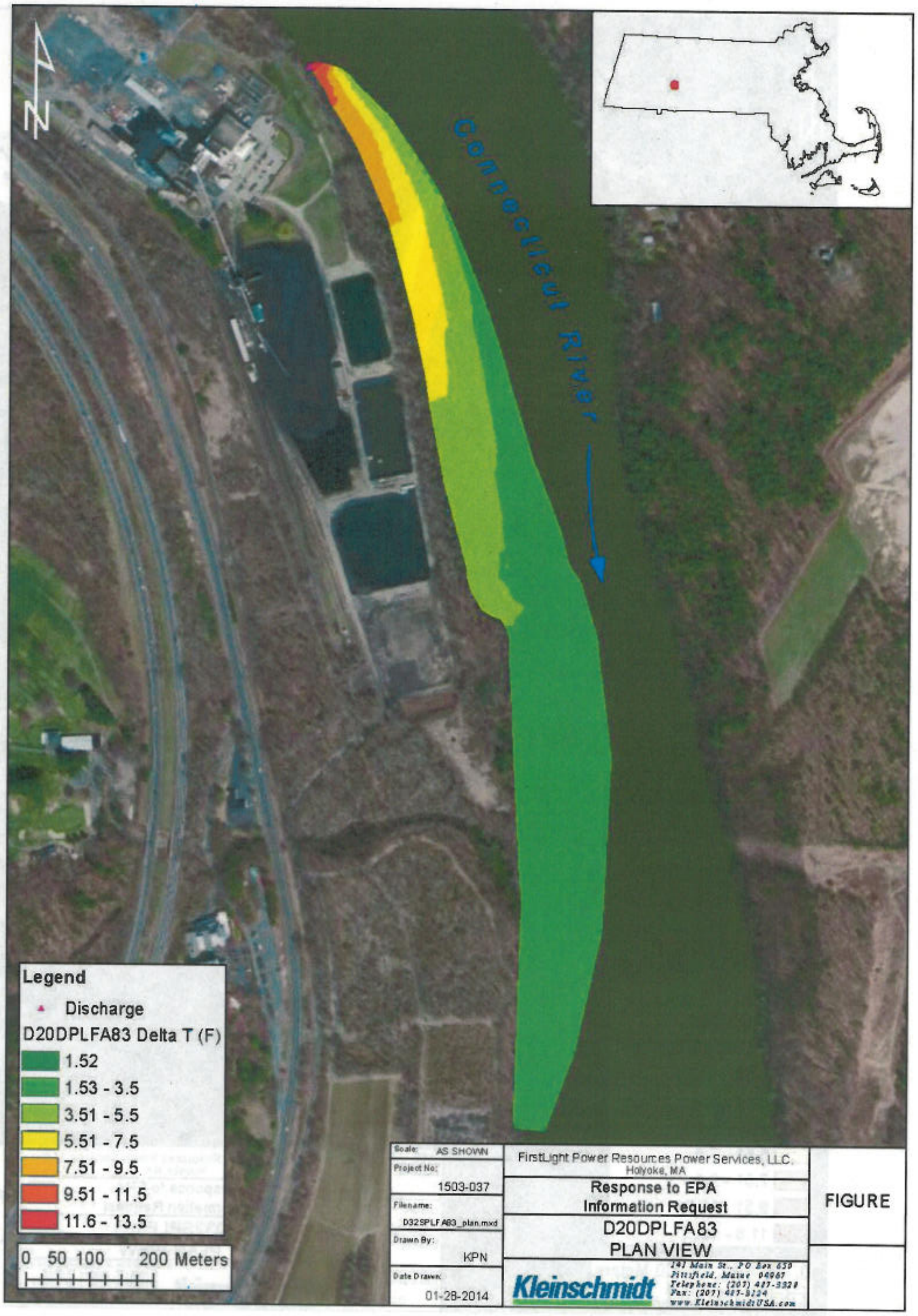
Attachment E - CORMIX Model Simulation - 70 MGD Discharge Summer
Plan View (February 5, 2014)



D32SPLFA83 PLAN VIEW

Mt. Tom Thermal Plume CORMIX Study - Model Scenarios						
Run Scenario	**Delta T (deg F)**	**Pump Flow (MGD)**	**River Flow (cfs)**	**Ambient Water (deg F)**	**Effluent Temp (deg F)**	**Name**
17	32	70	15,000	77	109	D32DPHFA77
18	20	140	15,000	77	97	D20DPHFA77
19	32	70	3,000	83	115	D32SPLFA83
20	20	140	3,000	83	103	D20DPLFA83

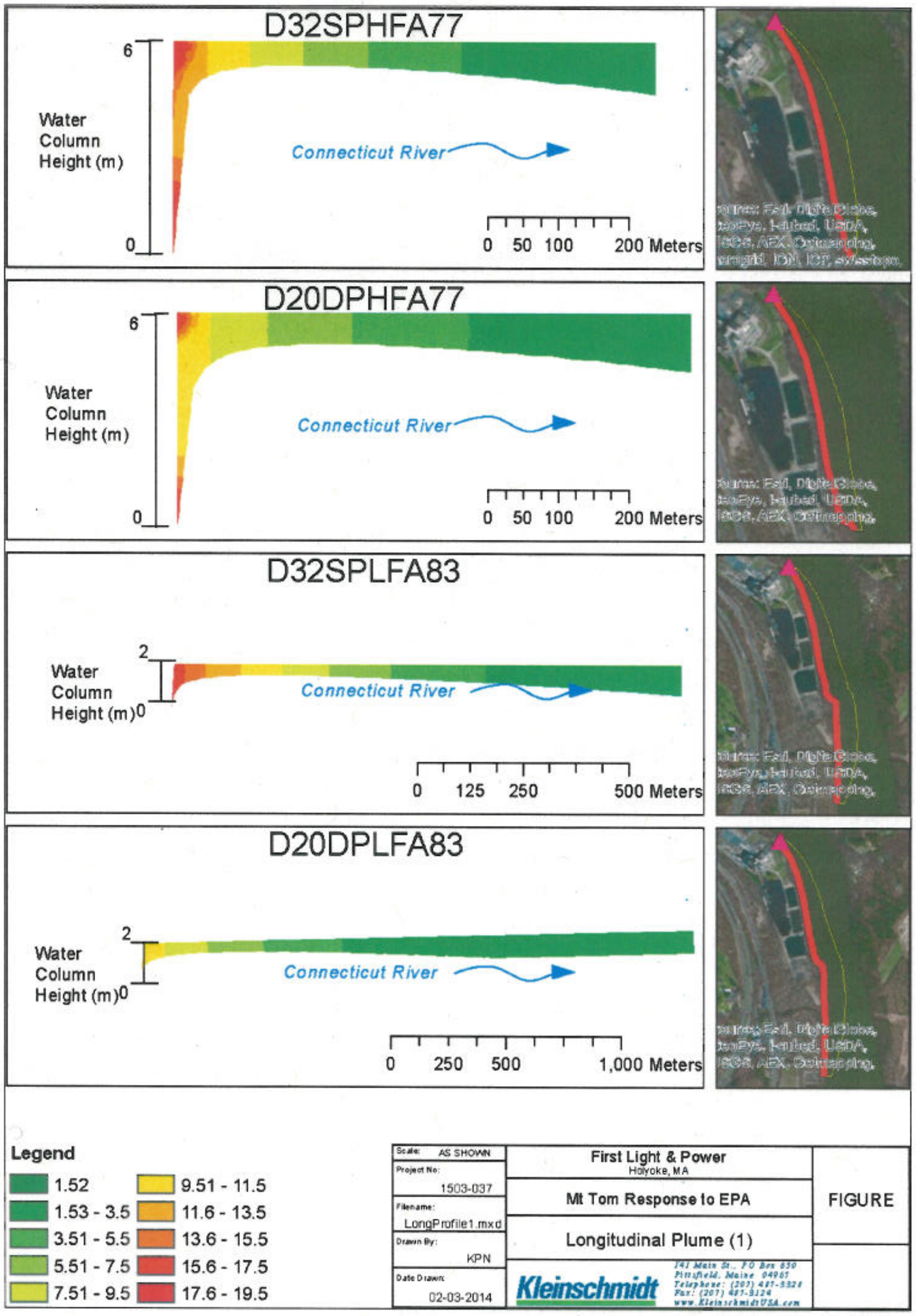
Attachment F - CORMIX Model Simulation - 140 MGD Discharge Summer
Plan View (February 5, 2014)



D20DPLFA83 PLAN VIEW

Mt. Tom Thermal Plume CORMIX Study - Model Scenarios						
Run Scenario	**Delta T (deg F)**	**Pump Flow (MGD)**	**River Flow (cfs)**	**Ambient Water (deg F)**	**Effluent Temp (deg F)**	**Name**
17	32	70	15,000	77	109	D32DPHFA77
18	20	140	15,000	77	97	D20DPHFA77
19	32	70	3,000	83	115	D32SPLFA83
20	20	140	3,000	83	103	D20DPLFA83

Attachment G - CORMIX Model Simulations - Longitudinal Views of All Four Runs (February 5, 2014)



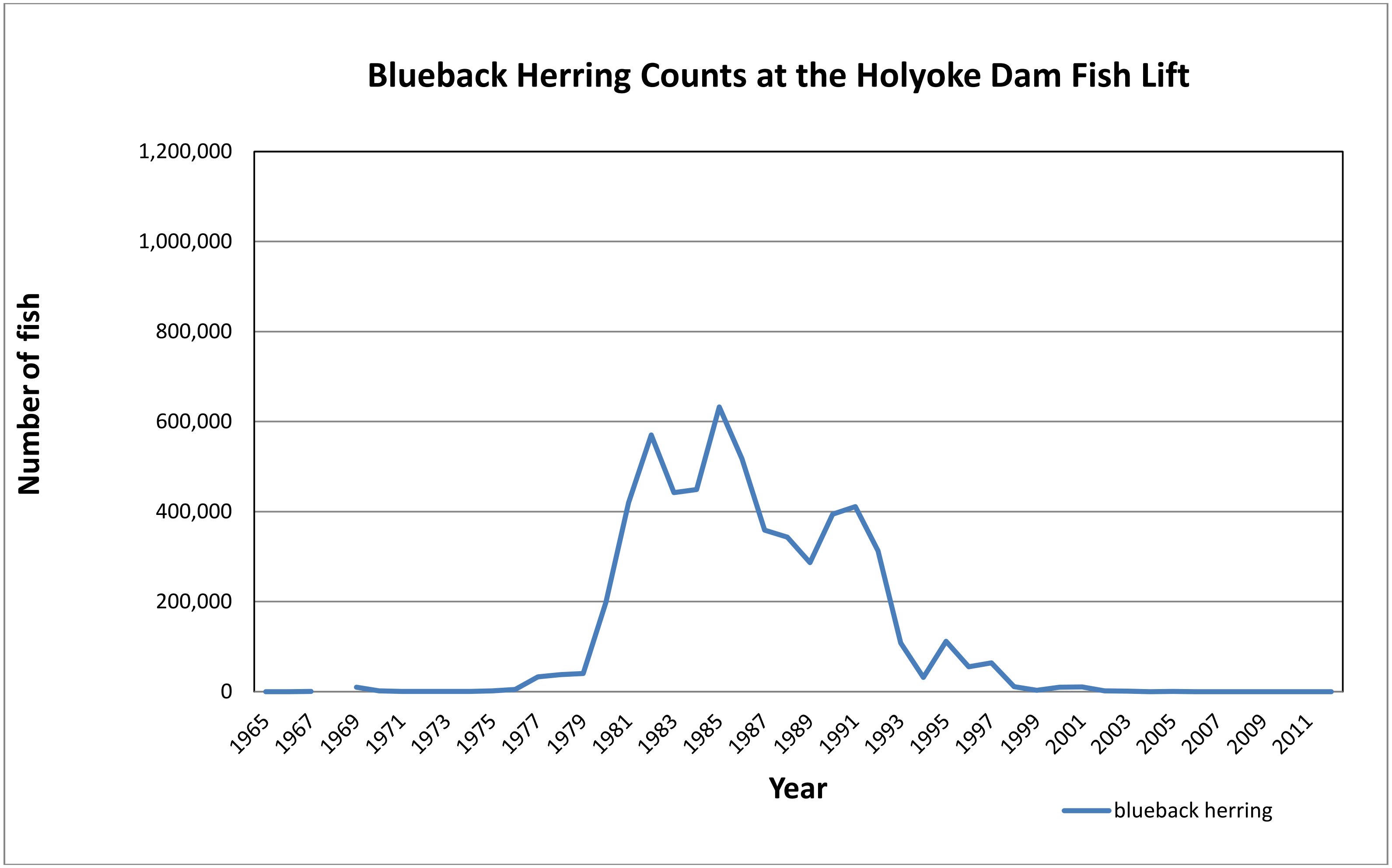
LONGITUDINAL PROFILES

Mt. Tom Thermal Plume CORMIX Study - Model Scenarios						
Run Scenario	**Delta T (deg F)**	**Pump Flow (MGD)**	**River Flow (cfs)**	**Ambient Water (deg F)**	**Effluent Temp (deg F)**	**Name**
17	32	70	15,000	77	109	D32DPHFA77
18	20	140	15,000	77	97	D20DPHFA77
19	32	70	3,000	83	115	D32SPLFA83
20	20	140	3,000	83	103	D20DPLFA83

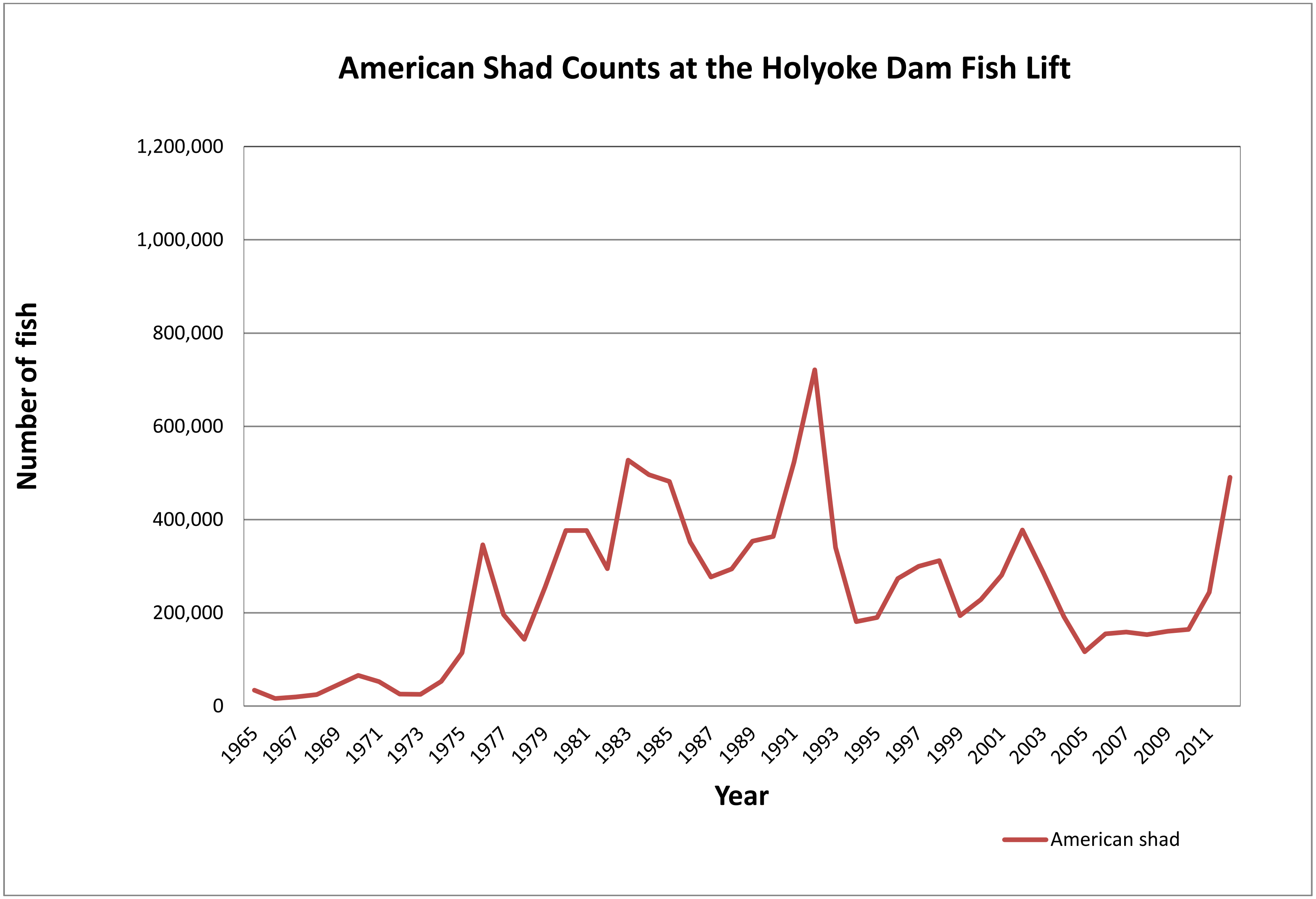
Attachments C, D, E, F and G (Page 2) - CORMIX Model Simulations Delta T, Discharge Flow, River Flow, Ambient Water Temperature and Effluent Temperature Legend (February 5, 2014)

Mt. Tom Thermal Plume CORMIX Study - Model Scenarios						
Run Scenario	**Delta T (deg F)**	**Pump Flow (MGD)**	**River Flow (cfs)**	**Ambient Water (deg F)**	**Effluent Temp (deg F)**	**Name**
17	32	70	15,000	77	109	D32DPHFA77
18	20	140	15,000	77	97	D20DPHFA77
19	32	70	3,000	83	115	D32SPLFA83
20	20	140	3,000	83	103	D20DPLFA83

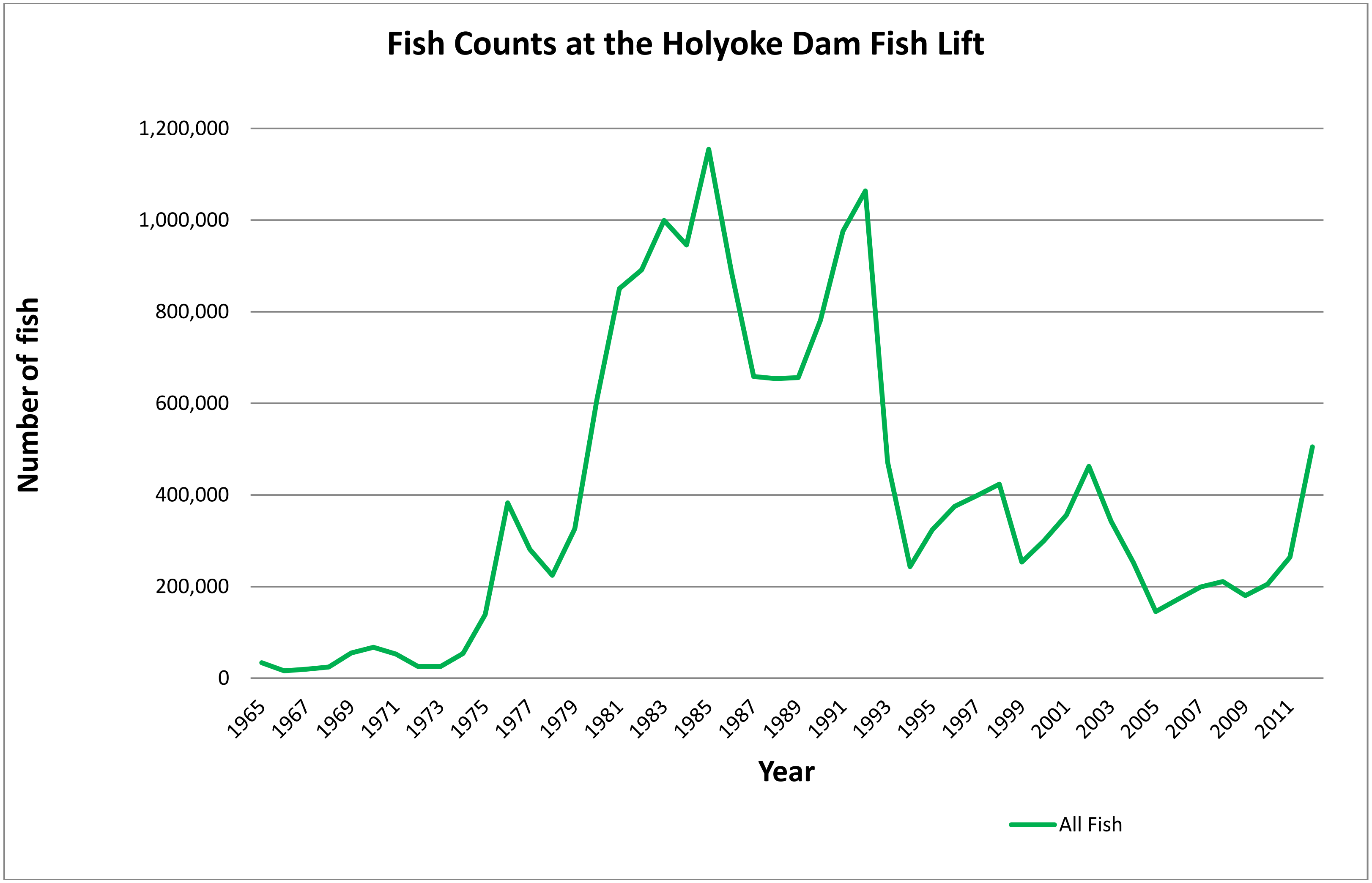
Fact Sheet Attachment H



Fact Sheet Attachment I



Fact Sheet Attachment J



MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
COMMONWEALTH OF MASSACHUSETTS
1 WINTER STREET
BOSTON, MASSACHUSETTS 02108

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ECOSYSTEM PROTECTION
REGION I
BOSTON, MASSACHUSETTS 02109

JOINT PUBLIC NOTICE OF A DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE INTO THE WATERS OF THE UNITED STATES UNDER SECTION 301 AND 402 OF THE CLEAN WATER ACT (THE "ACT"), AS AMENDED, AND REQUEST FOR STATE CERTIFICATION UNDER SECTION 401 OF THE ACT.

DATE OF NOTICE: April 11, 2014

PERMIT NUMBER: **MA0005339**

PUBLIC NOTICE NUMBER: MA-010-14

NAME AND MAILING ADDRESS OF PERMITTEE:

Mount Tom Generating Company, LLC
200 Northampton Street
Holyoke, MA 01040

NAME AND ADDRESS OF THE FACILITY WHERE DISCHARGE OCCURS:

Mount Tom Generating Station
200 Northampton Street
Holyoke, MA 01040

RECEIVING WATER: **Connecticut River**
{USGS Hydrologic Code #01080206 – Connecticut River Basin}

PREPARATION OF THE DRAFT PERMIT:

The U.S. Environmental Protection Agency, (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) have cooperated in the development of a permit for the above identified facility. The effluent limits and permit conditions imposed have been drafted to assure that State Water Quality Standards and provisions of the Clean Water Act will be met. EPA has formally requested that the State certify this draft permit pursuant to Section 401 of the Clean Water Act and expects that the draft permit will be certified.

INFORMATION ABOUT THE DRAFT PERMIT:

A fact sheet or a statement of basis (describing the type of facility; type and quantities of wastes; a brief summary of the basis for the draft permit conditions; and significant factual, legal and policy questions considered in preparing this draft permit) and the draft permit may be obtained at no cost at: http://www.epa.gov/region1/npdes/draft_permits_listing_ma.html or by writing or calling EPA's contact person named below:

George Papadopoulos, US EPA
5 Post Office Square
Suite 100 (OEP 06-1)
Boston, MA 02109-3912
Telephone: (617) 918-1579

The administrative record containing all documents relating to this draft permit is on file and may be inspected at the EPA Boston office mentioned above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except holidays.

PUBLIC COMMENT AND REQUEST FOR PUBLIC HEARING:

All persons, including applicants, who believe any condition of this draft permit is inappropriate, must raise all issues and submit all available arguments and all supporting material for their arguments in full by **May 10, 2014**, to the U.S. EPA, George Papadopoulos, 5 Post Office Square, Suite 100, Mailcode OEP 06-1, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing to EPA and the MassDEP for a public hearing to consider this 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 forty five days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on this draft permit the Regional Administrator will respond to all significant comments and make the responses available to the public at EPA's Boston office.

FINAL PERMIT DECISION AND APPEALS:

Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the final permit decision any interested person may submit petition to the Environmental Appeals Board to reconsider or contest the final decision.

David Ferris, Director
MASSACHUSETTS WASTE WATER PROGRAM
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

Ken Moraff, Director
OFFICE OF ECOSYSTEM PROTECTION
ENVIRONMENTAL PROTECTION AGENCY