UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
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BOSTON, MASSACHUSETTS 02109-3912

FACT SHEET

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

NPDES PERMIT NUMBER: NH0001465

PUBLIC NOTICE START AND END DATES: September 30, 2011 to November 30, 2011

NAME AND MAILING ADDRESS OF APPLICANT:

Public Service of New Hampshire (PSNH)
P.O. Box 330
Manchester, NH 03105-0330

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Merrimack Station
97 River Road
Bow, NH 03301

RECEIVING WATER(S):

Merrimack River (Hydrologic Basin Code: 01070002)

RECEIVING WATER CLASSIFICATION(S): Class B

SIC CODE: 4911 – Electric Power Generation

CURRENT PERMIT	ISSUED:	June 25, 1992
	EXPIRED:	July 31, 1997
	RE-APPLICATION:	March 10, 1997
	SUPPLEMENT TO RE-APPLICATION:	November 1, 2007
	ADDITION TO RE-APPLICATION:	May 5, 2010

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Attachment A: Merrimack Station Map Location
Attachment B: Merrimack Station Site Plan
Attachment C: Merrimack Station Schematic of Water Flow
Attachment D: Clean Water Act NPDES Permitting Determinations for the Thermal Discharge and Cooling Water Intake Structure at Merrimack Station in Bow, New Hampshire
Attachment E: Determination of Technology-Based Effluent Limits for the Flue Gas Desulfurization Wastewater Treatment System at Merrimack Station in Bow, New Hampshire
Attachment F: Merrimack Station Discharge Monitoring Report Summary

1.0 Proposed Action, Type of Facility, and Discharge Location

EPA intends to re-issue a National Pollutant Discharge Elimination System (NPDES) Permit to Public Service of New Hampshire (PSNH), which owns and operates the Merrimack Station electrical generating station. The Station is a four unit electrical generation facility with a total capacity of approximately 520 megawatts (MW). Two units are coal-fired, steam-driven generating units responsible for producing 470 MW. The two remaining units are combustion turbines firing No. 1 fuel oil and account for 50 MW. Unit No. 1 (referred to as MK-1), generates at a rated capacity of 120 MW, began operation in 1960, and Unit No. 2 (referred to as MK-2), generates at a rated capacity of 350 MW, began operation in 1968.

Merrimack Station is located on approximately 400 acres of land in Bow, New Hampshire, with 240 acres directly used by the generating facility. Refer to Attachment A; Map Location of Merrimack Station. The facility consists of the main electrical generating building with associated cooling water intake structures, coal railcar unloading building and coal pile, an administration building, several storage buildings, a coal ash slag pile with a slag processing structure, and a wastewater treatment facility. Refer to Attachment B; Merrimack Station Map Location of Outfalls.

A discharge canal, also referred to as a cooling canal, is located on the station's property and serves as the main conduit for the transport of treated wastewater and once-through condenser cooling water to the Merrimack River. Refer to Attachment C; Schematic of Water Flow Merrimack Station (MS-S-1235). This schematic depicts wastewater routing and discharge points at Merrimack Station. The discharge canal is identified as "Waste Treatment Plant #2" on Attachment C. Several internal outfalls empty directly into this discharge canal. See section 5.4 below for a description of the outfalls. The canal is approximately 4000 feet in length and 15-20 feet in depth.

A series of 216 "power spray modules (PSMs)" are located in the cooling canal. The idea behind the PSMs was that they would be used periodically to spray the heated once-through cooling water into the air after it has entered the canal. The water would then, for the most part, settle back down into the canal prior to discharge. The spraying operation was intended to provide supplementary evaporative cooling for the heated condenser cooling water before it is sent to the Merrimack River. The existing permit requires that the "… power spray module system shall be operated, as necessary, to maintain either a mixing zone (station S-4) river temperature not in excess of 69ºF, or a station N-10 to S-4 change in temperature (Delta-T) of not more than 1ºF when the N-10 ambient temperature exceeds 68ºF." As explained elsewhere in the record for this Draft Permit, the PSMs have proven to be an ineffective technology for cooling the heated effluent.

Merrimack Station discharges pollutants to, and withdraws water for cooling from, the Hooksett Pool section of the Merrimack River. The Hooksett Pool is formed by the upstream Garvin's Falls Dam and the downstream Hooksett Dam and is bordered by the towns of Allenstown and Pembroke on its east bank and Bow on its west bank. Refer to Attachment A for a map of the location of Merrimack Station.

The Station discharges a variety of pollutants to the Hooksett Pool. Currently, steam turbine condenser waste heat is rejected to the Hooksett Pool by means of a once-through cooling water system. Water for this cooling system is withdrawn from the Hooksett Pool by Merrimack Station through two cooling water intake structures. The heated water is then discharged back to the Hooksett Pool through the Station's cooling water discharge canal. The facility's thermal discharges and water withdrawals for cooling are both associated with operation of Merrimack Station's open-cycle cooling system. The facility also discharges pollutants as result of other aspects of its operations.

The pollutants discharged to the canal from the Station originate from the following waste streams:

- once-through cooling water (Outfalls 001 and 002),
- slag sluice water, slag tank overflow (Outfall 003A)
- boiler drains, boiler blowdown, roof drains (Outfall 003A),
- low volume waste (equipment and floor drains, chemical drains, polisher regeneration, demineralizer regeneration, miscellaneous tank drains) boiler gas side water washes, metal cleaning waste (boiler waterside chemical cleaning), ash landfill leachate (Outfall 003B), and
- storm water. (Outfalls 003, 003A and 003B)

Discharges that occur at other locations at Merrimack Station are:

- MK-1 and MK-2 intake screen wash water (Outfall 004A)
- deicing water spray drawn from the fire protection pump overflow to deflect ice away from the intake structures (Outfall 004B),
- MK-1 and MK-2 screenhouse sump dewatering (Outfall 004C) and
- MK-1 and MK-2 Forebay Deicing Water (Outfall 004D).
- MK-1 and MK-2 Cooling Water Intake Structure maintenance sump discharge (Outfalls 5A-D)

Under Sections 301(a), 316 and 402 of the Federal Clean Water Act (CWA), 33 U.S.C. §§ 1311(a), 1326 and 1342, Merrimack Station's pollutant discharges and cooling water withdrawals are prohibited unless authorized by a National Pollutant Discharge Elimination System (NPDES) Permit issued by the U.S. Environmental Protection Agency (EPA). Under the State of New Hampshire Surface Water Quality Regulations, the Station must also obtain authorization from a state permit issued by the New Hampshire Department of Environmental Services (NHDES). Merrimack Station has in the past obtained the necessary federal and state permits.

Merrimack Station's existing NPDES Permit, NH0001465, was issued in June 1992 (effective July 1992) and expired in July 1997. The expired permit (hereafter referred to as the "existing permit") has been administratively extended, however, as per EPA regulations because the permittee filed a complete and timely application for permit reissuance on March 10, 1997. *See* 40 C.F.R. § 122.6.

Additionally, in support of its request for a thermal discharge variance under CWA § 316(a), PSNH submitted the following reports: (1) *Merrimack Station Fisheries Survey Analysis of 1967* *through 2005 Catch and Habitat Data* dated April 2007; (2) *Merrimack Station Thermal Discharge Effects On Downstream Salmon Smolt Migration* dated December 2006; and (3) *A Probabilistic Thermal Model of Merrimack River Downstream of Merrimack Station* dated April 2007. Under CWA § 308(a), EPA sent PSNH an information request dated July 3, 2007, which required the company to provide certain technology and water quality information to facilitate the evaluation of technologies to potentially mitigate Merrimack Station's thermal discharge as well as the adverse impacts (namely, the impingement and entrainment of aquatic organisms) of its Cooling Water Intake Structure (CWIS) operations. PSNH's response, dated November 1, 2007, contained two reports: (1) *Response to United States Environmental Protection Agency CWA § 308(a) Letter, PSNH Merrimack Station Units 1 & 2, Bow, New Hampshire;* and, (2) *Entrainment and Impingement Studies Performed at Merrimack Generating Station from June 2005 through June 2007.*

EPA intends to reissue Merrimack Station's NPDES permit and has prepared a Draft Permit for public review and comment. This Draft Permit proposes, among other things, to require Merrimack Station to substantially reduce its thermal load to the river, as well as to reduce the level of mortality to aquatic organisms from impingement and entrainment by the facility's CWIS. EPA's determinations regarding these requirements pertaining to Merrimack Station's cooling system operations are set forth in a document entitled, "Clean Water Act NPDES Permitting Determinations for the Thermal Discharge and Cooling Water Intake Structure at Merrimack Station in Bow, New Hampshire" (Determinations Document). *See* Attachment D. The Determinations Document is attached to this Fact Sheet and is incorporated by reference. In addition to specifying thermal discharge and cooling water withdrawal limits, the Draft Permit proposes a variety of monitoring requirements, operational requirements, and structural modifications associated with the facility's cooling system and its operations.

Merrimack Station also has, or is proposing to have, a variety of pollutant discharges apart from those associated directly with its cooling system. The Draft NPDES Permit also proposes limits and requirements pertaining to these other discharges. The limits and requirements for these non-cooling system discharges are discussed in this Fact Sheet. One of these non-cooling system discharges bears special mention here. Merrimack Station is proposing to discharge wastewater from a new wet Flue Gas Desulfurization scrubber system to the Hooksett Pool via the Slag Settling Pond and the discharge canal.

The new wastewater discharge from the Flue Gas Desulfurization Wastewater Treatment System FGD WWTS could affect the quality of the discharge of the Slag Settling Pond (Outfall 003A) to the discharge canal (Outfall 003) which could in turn affect the quality of the Merrimack River. This new discharge prompted New Hampshire Department of Environmental Services, Water Division (NHDES-WD) to conduct an antidegradation review to ensure that the provisions of Env-Wq 1708 are met. NHDES requires applicants for new or increased discharges to provide sampling of their discharge and of the river upstream of their discharge during low river flow conditions. This data is used to evaluate the resulting water quality of the river downstream of the discharge. By comparing the resulting downstream water quality with the surface water quality standards, the river's *available* remaining assimilative capacity (ARAC), if any, is determined for each pollutant of concern. "Available" refers to the capacity to assimilate wastewater discharges after holding the required reserve of ten percent of the assimilative capacity pursuant to NH RSA

485-A:13,I(a) and Env-Wq 1705.01. The result of NHDES-WD antidegradation analysis was the development of water quality-based limits for several pollutants discharged from Outfall 003A.

Additionally, EPA conducted a determination of proposed technology-based permit limits for the FGD WWTS effluent discharge (Outfall 003C). These technology-based limits are detailed in a document entitled, "Determination of Technology-Based Effluent Limits for the Flue Gas Desulfurization Wastewater Treatment System at Merrimack Station in Bow, New Hampshire" (FGD WWTS Determinations Document). *See* Attachment E. In addition, this discharge and the limits for it are discussed in more detail below. This document is attached to this Fact Sheet and incorporated herein by reference

Storm water from Merrimack Station discharges either directly to the cooling water canal or first to the Slag Settling Pond and then into the cooling water canal. No storm water at Merrimack Station is discharged directly to the Merrimack River.

2.0 Description of Discharge

A quantitative description of the treatment plant's discharge in terms of recent effluent-monitoring data from the 72-month period, January 2005 through December 2010, is shown in Attachment F. The data is compiled from Discharge Monitoring Reports (DMR) submitted to the EPA and NHDES.

3.0 Receiving Water Description

The Merrimack River is classified by the State of New Hampshire as a Class B water body. Receiving waters designated as Class B in New Hampshire pursuant to RSA 485-A:8 are considered "… as being acceptable for fishing, swimming and other recreational purposes and, after adequate treatment, for use as water supplies."

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 total maximum daily loads (TMDL). The NHDES Water Division classifies the Hooksett Pool of the Merrimack River as impaired. New Hampshire's CWA § 303(d) List of Impaired Waters Assessment Unit ID for this section of the Merrimack River is NHIMP700060802-02. This section is listed as not supporting fish consumption due to elevated mercury levels. The assessment lists atmospheric deposition as a probable source of the impairment. Each Assessment Unit also lists other designated uses such as Aquatic Life, Drinking Water After Adequate Treatment, Primary Contact Recreation, Secondary Contact Recreation, and Wildlife. All these other uses are designated as "Not Assessed." No TMDLs have been developed for this segment of the Merrimack River.

When determining water quality-based pollutant limits for a facility's effluent discharge, consideration is given to the ability of the receiving water to dilute the effluent. The available dilution is determined partly based on water levels during critical low flow river conditions, commonly referred to as the "7Q10." The 7Q10 is the lowest observed mean river flow for seven consecutive days recorded over a 10-year recurrence interval. A river's 7Q10 flow represents a period of relatively low available dilution for that river and is considered the most vulnerable period for a water body, and hence the period when that water body can most readily be affected by a pollutant. The 7Q10 that is applied to determine pollutant loading limits for Merrimack Station is 578.02 cubic feet per second (cfs) or 365.5 millions of gallons per day (mgd).

4.0 Permit Limitations and Conditions

The Draft Permit's proposed effluent discharge and cooling water intake limits, monitoring requirements, and implementation schedules may be found in Part I (Effluent Limitations and Monitoring Requirements) of the Draft Permit.

5.0 Basis of Permit Limits

5.1 General Statutory and Regulatory Background

The CWA prohibits the discharge of pollutants from point sources to waters of the United States without authorization from a National Pollutant Discharge Elimination System (NPDES) permit, unless the CWA specifically exempts a particular type of point source discharge from requiring a permit. The NPDES permit is the mechanism used to apply the CWA's pollution control standards and monitoring and reporting requirements directly to particular facilities. The Draft NPDES Permit for Merrimack Station was developed in accordance with the CWA, EPA regulations promulgated there under, and other applicable federal and state legal requirements. In the development of this Draft Permit, EPA has not only discussed issues and exchanged information with PSNH, but EPA has coordinated and consulted extensively with the NHDES-WD, the New Hampshire Fish and Game Department (NHFGD) and the United States Fish and Wildlife Service (USF&WS). The regulations governing the EPA NPDES permit program are generally found at 40 C.F.R. Parts 122, 124, 125, and 136.

When developing permit limits, EPA must apply both technology-based and water quality-based requirements. To the extent that both may apply, whichever is more stringent governs the permit limits. Put differently, dischargers must satisfy federal technology-based standards at a minimum and must also satisfy any more stringent state water quality-based requirements that may apply. 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, are set out in 40 C.F.R. Part 125, Subpart A. Development of water quality-based permit limits is addressed in, among other provisions, CWA §§ 301(b)(1)(C) and 401, as well as 40 C.F.R. §§ 122.4, 122.44, 124.53 and 124.55.

5.2 Technology-Based Requirements

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) to meet the best practicable control technology currently available standard (BPT) for certain conventional pollutants, the best conventional control technology (BCT) standard for other conventional pollutants, and the best available technology economically achievable (BAT) for toxic and non-conventional pollutants. Merrimack Station is governed by the national effluent limitation guidelines ("NELGs") for the Steam Electric Power Generating Point Source Category found in 40 C.F.R. Part 423.

In general, for facilities like Merrimack Station, technology-based effluent limitations must be complied with 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 any 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.

In the absence of published technology-based ELGs, the permit writer establishes appropriate technology-based effluent limitations (*e.g.*, BAT limits) on a case-by-case basis under CWA § 402(a)(1)(B) using best professional judgment (BPJ). (*See* also 40 C.F.R. § 125.3.)

The Draft Permit's effluent monitoring requirements have been established to yield data representative of the discharges under the authority of CWA §§ 308(a) and 402(a)(2), and according to regulations set forth at 40 C.F.R. § 122.41(j), 122.44(i) and 122.48. The monitoring program in the permit specifies routine sampling and analysis which will provide consistent information on the reliability and effectiveness of the installed pollution abatement equipment. The approved analytical procedures are to be found in 40 C.F.R. 136, unless other procedures are explicitly required in the permit.

5.3 Water Quality-Based Requirements

Water quality-based limitations are required in NPDES permits when limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water quality standards. *See* CWA §§ 301(b)(1)(C) and 401.

State Water Quality Standards provide a classification for all the water bodies in the state and specify the "designated uses" and numeric and narrative water quality criteria that water bodies in each classification should be able to achieve. For example, a water body might be given the "B" classification and the designated uses and numeric and narrative criteria for B waters might include things like maintaining water quality acceptable for fishing, swimming and other recreational purposes (a designated use), prohibiting discharges inimical to aquatic life or to the maintenance of aquatic life (a narrative criterion), and maintaining a dissolved oxygen content of at least 75 percent of saturation (a numeric criterion). State Water Quality Standards also contain antidegradation requirements to ensure, among other things, that once a use is attained, it will not be degraded.

Permit limits must then be devised so that discharges and cooling water withdrawals do not cause violations of these Water Quality Standards. The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that causes or contributes to, or has the "reasonable potential" to cause or contribute to, an excursion above any water quality standard. *See* C.F.R. § 122.44(d)(1)(i). An excursion would occur if the projected or actual in-stream concentration exceeds the applicable criterion. In determining "reasonable potential," EPA considers: (1) existing controls on point and nonpoint sources of pollution; (2) the 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; (3) sensitivity of relevant species to toxicity testing; (4) the statistical approach outlined in *Technical Support Document for Water Quality-based Toxics Controls,* March 1991, EPA/505/2-90-001 in Section 3; and, where appropriate, (5) dilution of the effluent in the receiving water. In accordance with New Hampshire regulations (RSA 485-A:8,VI, Env-Wq 1705.02), available dilution for rivers and streams is based on a known or estimated 7Q10 for aquatic life and human health criteria for non-carcinogens, or the long-term harmonic mean flow for human health (carcinogens only) in the receiving water at the point just upstream of the outfall. Furthermore, 10 percent (%) of the receiving water's assimilative capacity is held in reserve for future needs in accordance with New Hampshire's Surface Water Quality Regulations Env-Wq 1705.01.

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 concentrations, 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 are allowed under 40 C.F.R. § 122.44(d)(1) and are implemented under 40 C.F.R. § 122.45(d).

Under CWA § 401, EPA may not issue a NPDES permit unless it first obtains a certification from the state confirming that its Water Quality Standards will be satisfied or the state waives its certification rights. If the state issues a certification with conditions, then the permit must conform to the conditions. If the state denies certification, the permit may not be issued. *See* 33 U.S.C. §§ 1341(a)(1) and (d); 40 C.F.R. §§ 124.53 and 124.55.

As stated above, state Water Quality Standards include: (1) designated uses for a water-body or a segment of a water-body; (2) numeric and/or narrative water quality criteria to protect the designated use(s); and (3) antidegradation requirements. The New Hampshire Surface Water Quality Standards, found at Title L, Chapter 485-A, include these elements and discharges and cooling water withdrawals must be limited to assure that the applicable Water Quality Standards for the receiving waters are satisfied. The state's Water Quality Standards also include requirements for the control of toxic constituents and require that numeric standards developed using EPA CWA Section 304(a) criteria recommendations found in EPA's Gold Book, shall be used unless site-specific criteria are established. EPA has determined that the conditions of the proposed Draft Permit will satisfy New Hampshire Water Quality Standards.

5.4 Outfalls and Descriptions

The following table lists the outfalls as designated in the existing permit as well as the outfalls designated in the Draft Permit. Some outfalls included in the existing permit have been deleted from the Draft Permit (001 and 002), while others have been added (003C, 003D, 004A-D, 005A-D) to reflect anticipated changes at the facility (e.g., the addition of flue gas desulfurization) or use of greater detail to describe an outfall's function.

Table 1: Outfall Discharge Description

Outfall Designation	Average Monthly Flow (MGD)	Outfall Discharge Description
001	69.1 (Max Full Power) 60.9 (Average) Eliminated	Chlorinated once-through cooling water from Unit No. 1 condenser (MK-1). Internal outfall discharges into the discharge canal. Deleted from the Draft Permit since once-through cooling is prohibited.
002	187.2 (Max Full Power) 148.6 (Average) Eliminated	Chlorinated once-through cooling water from Unit No. 2 condenser (MK-2). Internal outfall discharges into the discharge canal. Deleted from the Draft Permit since once-through cooling is prohibited.
003	208.46	Discharge canal combined effluent from internal outfalls. Also referred to as "Waste Treatment Plant No. 2" by the applicant. The power spray modules are located here. Discharges to the Merrimack River. Flow will be reduced with the elimination of Outfalls 001 and 002.
003A	4.00 5.3 (New Limit)	Various wastewater streams including slag sluice settling area drainage, slag tank overflow, yard and roof drains, Unit 1 boiler blowdown, boiler drains, FGD WWTS (Outfall 003C) and treated effluent from Waste Water Treatment Plant No. 1 (Outfall 003B).
003B	Report (New Limit) Relocated from discharge of Slag Settling Pond to Discharge of WWTP No.1	Various wastewater streams considered low volume streams generated during standard plant operations including; demineralizer regenerate, polisher regenerate, chemical drains, floor/equipment drains, boiler gas side water washes, ash landfill leachate. Additionally, wastewater from chemical and non-chemical cleaning of the facility's steam generating equipment operations; 0.3 MGD chemical clean batch discharge once every seven years; 9750 gpd non-chemical clean up to 5 times per year. Internal outfall discharges into the Slag Settling Pond (Outfall 003A)

003C	~~0.07~~ ***Report*** (New ~~Limit~~)	New internal outfall to permit discharge from flue gas desulfurization equipment. Internal outfall discharges into the Slag Settling Pond (Outfall 003A)
003D	1.19 (New limit)	New internal outfall to permit discharge of cooling tower blowdown. Discharges to the cooling canal (Outfall 003)
004A	1.72	MK-1 and MK-2 Screen Wash Water
004B	100 GPD	Fire Protection Overflow and Ice Dam Removal Spray
004C	110 GPD	MK-1 and MK-2 Screenhouse Sump dewatering
004D	1.0	MK-1 and MK-2 Forebay Deicing Water
005A	0.3	MK-1 Cooling Water Intake Structure Maintenance Sump Discharge
005B	0.3	MK-1 Cooling Water Intake Structure Maintenance Sump Discharge
005C	0.3	MK-2 Cooling Water Intake Structure Maintenance Sump Discharge
005D	0.3	MK-2 Cooling Water Intake Structure Maintenance Sump Discharge
006	Eliminated	(Formerly discharged storm water from the facility's Southeast yard area.)

5.4.1 Outfalls 001 and 002 (Discontinued)

In order to meet the Draft Permit's year-round thermal discharge limits, EPA anticipates that PSNH will convert Merrimack Station's cooling system from its current once-through configuration to a closed-cycle configuration. Therefore, the Draft Permit does not include outfalls 001 and 002 (once-through cooling discharges). A new internal outfall, designated as 003D, is placed in the permit with appropriate limits based on the use of wet cooling towers in a closed-cycle system (see below).

5.4.2 Outfall 003, Point Source Discharge to Merrimack River

Outfall 003 is the facility's main point source discharge to the Merrimack River. Outfall 003 is at the end of the station's "Cooling Water Discharge Canal", designated by Merrimack Station as WTP No. 2. The cooling canal is shaped as an elongated "C" and is nearly 4000 feet in length. The first two thirds of the canal are approximately 200 feet wide. The remainder of the canal is just over 70 feet wide. Flow in the canal averages 0.3 ft/sec at the wider section to 1.1 ft/sec at the narrower section. At a Merrimack River level of 190 feet the canal averages 10 feet in depth. The canal is also the discharge point for several internal outfalls as listed below:

- Outfalls 001 and 002 - Condenser cooling water (deleted);
- Outfall 003A the Slag Settling Pond (WTP No. 4), which includes:
    - Storm water;
    - Slag sluice water;
    - Boiler Blowdown (MK-1);
    - Boiler drains:
    - WTP No. 1 - Outfall 003B - Treated metal cleaning waste; and low volume waste during "normal" operation (non-metal cleaning);
    - Flue Gas Desulfurization Wastewater Treatment System - Outfall 003C (future) - Treated FGD WWTS effluent.
- Outfall 003D (future) – Cooling Tower Blowdown

The Draft Permit requires monitoring and compliance with numerical limits applicable to the internal outfalls before they discharge to the cooling water canal. All pollutants in these internal wastewater streams are regulated pursuant to either technology or water quality requirements at the internal outfalls before they are discharged to the cooling water canal.

5.4.3 Outfall 003A - Slag Sluice Settling Pond (Waste Treatment Plant No.4)

As in the existing permit, Outfall 003A is the internal outfall from the slag settling pond to the discharge canal during routine operating periods (i.e., when there is no chemical metal cleaning of the boilers). This same internal outfall is also designated in the existing permit as Outfall 003B during metal cleaning waste operations. (EPA has changed this designation in the Draft Permit, see discussion below). Outfall 003A is situated at the broad-crested weir which discharges to the Cooling Water Discharge Canal, which ultimately discharges to the Merrimack River through Outfall 003.

The Outfall 003A discharge is composed of a number of internal wastewater streams as follows: 1) wastewater from Waste Treatment Plant No.1, which treats, stormwater from roof and yard drains (stormwater), coal pile runoff from a collection sump, flow from various tank maintenance drains, demineralizer regeneration discharges, polisher regeneration discharges, ash landfill leachate, and flows from the hydrostatic relief line; 2) stormwater from yard drains; 3) wastewater from Waste Treatment Plant No.3 (also referred to as the Slag Settling Pond); 4) slag sluice water overflow; and 5) boiler blowdown.

When the flue gas desulfurization (FGD) scrubber system becomes operational –currently expected in 2013—its wastewater stream will be treated (at Waste Treatment Plant No.5) and subsequently discharged to the slag settling pond and ultimately to the discharge canal and the river through 003A. A new internal outfall, 003C, has been established in the Draft Permit (with associated monitoring requirements and numerical limits for certain parameters) to cover the FGD scrubber wastewater discharges. Additionally, when the FGD equipment comes on-line, it will require an average of 1.08 mgd of water to operate. This water will be withdrawn from the Slag Settling Pond, and while most of it (approximately 1.01 mgd) will be lost to evaporation during the FGD treatment process, some will be used in the gypsum making process (approximately 18,150 gpd) and some 70,000 gpd will be treated and returned to the slag settling pond prior to discharge to the canal and the river.

Slag sluice water makes up the majority of flow from outfall 003A. PSNH combusts coal in Merrimack Station's two boilers and then dumps the hot coal ash from the boiler into a slag tank. The slag tank contains quenching water. When the molten ash (i.e., slag) comes in contact with the quenching water, it fractures instantly and crystallizes. The resulting boiler slag is a coarse, hard, black, angular, glassy material, which is transported by the slag sluice water from the boiler building to the Slag Sluice Settling Area (also referred to as Waste Treatment Plant No. 3). Unit 1's Slag Sluice average flow is 2.0 MGD, and Unit 2's Slag Sluice flow is average flow is 4.23 MGD. Merrimack River water is the source of the Slag Sluice water. Although this water is not considered "cooling water", it is withdrawn from the MK-1 and MK-2 cooling water tunnels.

The waste streams and associated average flows for outfall 003A are listed in the table below.

Table 2: Wastewater Discharged through Outfall 003A

003AWASTEWATER SOURCE	AVERAGE FLOW	Continuous or Intermittent
Waste Treatment Plant No.1	83,000 gpd (Total)	46,000 gpd Continuous/ 38,505 gpd Intermittent
- Regeneration Waste, Unit 2	7,150 gpd (25 times/yr)	- Intermittent
- Roof Drains, Unit 2	625 gpd	- Intermittent
- Demineralizer Wastewater	12,940 gpd	- Intermittent
- Gas Side Air Wash, Unit 1 (non-chemical metal cleaning)	6,850 gpd (5 times/yr)	- Intermittent
- Gas Side Ash Wash, Unit 2 (non-chemical metal cleaning)	2,900 gpd (1 time/yr)	- Intermittent
- Water Side Metal Cleaning, Unit 1 (rental frac. tank)	60 gpd (Total 150,000 gal.- 1 time/7 yr)	- Intermittent
- Water Side Metal Cleaning, Unit 2 (rental frac. tank)	60 gpd (Total 150,000 gal.- 1 time/7 yr)	- Intermittent
- Miscellaneous Tank Maintenance Drains	106 gpd	- Intermittent

- Stormwater (pipe trench)	1434 gpd	- Intermittent
- Yard Service Floor Drain Sump	1,000 gpd (2 times/yr)	- Intermittent
- Hydrostatic Relief Line	Unknown	- Intermittent
- Ash Landfill Leachate	5,500 gpd	- Intermittent
- Equipment, Floor Drains, Boiler Sample Drains	46,000 gpd	- Continuous
- Chemical Drains	6,000 gpd	- Continuous
Slag Sluice Settling Area	6.23 mgd	Continuous
Unit 1 & 2 Slag Overflow and Storm Drains	9,400 gpd	Continuous
Unit 1 & 2 Boiler Drains	880 gpd (Total 50,000 gal.- 4 times/ yr)	Intermittent
Roof & Yard Drains	5,000 gpd	Intermittent
Flue Gas Wastewater (future – Waste Treatment Plant No. 5)	70,000 gpd	Continuous
Unit 1 Boiler Blowdown	1,600 gpd	Intermittent
FGD Make-up Water	(1.1) mgd	Continuous
003A TOTAL CONTINIOUS FLOW DISCHARGED	5.3 MGD	

5.4.4 Outfall 003B, Metal Cleaning Discharge

Merrimack Station generates wastewater during (chemical and non-chemical) cleaning of the two boilers and other metal equipment at the facility. The station cleans the "water" side of each boiler once every seven years. The "gas" side is cleaned five times per year on the MK-1 boiler, and one time per year on the MK-2 boiler. This metal cleaning wastewater is discharged along with flows from other sources, after receiving treatment in Waste Treatment Plant No. 1, to the Slag Settling Pond, where it mixes prior to discharge to the canal and the river.

The existing permit requires sampling of chemical metal cleaning wastewater from the discharge of the Slag Settling Pond (i.e., after it has been diluted by other wastestreams within the pond) during times when chemical metal cleaning operations are occurring. For the purpose of these sampling events, the outfall designation for the Slag Settling Pond is changed from 003A to 003B.

As described in more detail later in this Fact Sheet, the existing permit incorrectly applies technology-based limits for both copper and iron to co-mingled, non-similar waste streams at outfall 003B. EPA proposes to correct this error in the Draft Permit.

The existing permit, in effect, allows technology-based limits for copper and iron found in the National Effluent Limitation Guidelines (NELGs) for metal cleaning wastewater discharges by the Steam Electric Power Generating Point Source Category, S*ee* 40 C.F.R. Section 423.12(b)(5), to be met using dilution provided by the Slag Settling Pond water. However, under 40 C.F.R. § 125.3(f), technology-based treatment requirements are not permitted to be satisfied through the use of "non-treatment" techniques such as flow augmentation. Therefore, the Draft Permit discontinues this approach and does not allow dilution within the Slag Settling Pond to be used to satisfy the NELG for metal cleaning wastewater. Rather than changing the outfall designation and effluent limits for the Slag Settling Pond discharge during chemical metal cleaning operations, the Draft Permit applies effluent limits to an internal outfall (new Outfall 003B) to address both the chemical and non-chemical metal cleaning wastewater.

The new internal discharge point (Outfall 003B) is after treatment at Waste Treatment Plant No. 1 and prior to entering Waste Treatment Plant No. 4 (Slag Settling Pond). Effluent limits are applied for the chemical and non-chemical metal cleaning wastewater at this new discharge location. As a result, the metal cleaning wastes must be treated separately and compliance monitoring conducted before this waste stream mixes with any other water at the station (including mixing with other waste streams at Waste Treatment Plant No. 1) and prior to entering the Slag Settling Pond.

Additionally, the Draft Permit specifically lists the known waste streams that are considered metal cleaning wastes (both chemical and non-chemical), pursuant to 40 C.F.R. Part 423. These waste streams include: MK-1 and MK-2 water side boiler cleaning, MK-1 and MK-2 gas side boiler cleaning, MK-1 air heater wash, and precipitator wash.

5.4.5 Outfall 003C, Flue Gas Desulfurization Treatment System Discharge

Merrimack Station is in the process of installing a new FGD scrubber system to control air pollutant emissions. The FGD system, however, transfers some of the pollutants from the Station's air emissions to wastewater. PSNH will treat this wastewater with a new FGD wastewater treatment system ("WWTS") (Waste Treatment Plant No. 5) that would discharge from a new internal outfall location (Outfall 003C) to the Slag Settling Pond. The Draft Permit includes effluent limits for pollutants to be discharged from Merrimack Station's FGD WWTS that will apply at Outfall 003C. EPA has prepared a separate "Determination of Technology-Based Effluent Limits for the Flue Gas Desulfurization Wastewater at Merrimack Station in Bow, New Hampshire" that is appended to, and incorporated by reference in, this Fact Sheet. *See* Attachment E. This Determination Document presents: 1) the legal basis for the FGD-based BAT determination; 2) the rationale for the technology chosen as BAT; 3) the pollutants that will be subject to specified BAT-based limits; and 4) the justification for each technology-based Draft Permit effluent limit for internal Outfall 003C.

The Draft Permit requires compliance monitoring for the limits applicable to outfall 003C prior to the FGD wastewater mixing with any other waste streams and prior to its entering the slag settling pond.

5.4.6 Outfall 003D, Cooling Tower Blowdown

EPA anticipates that PSNH will convert Merrimack Station's current once-through cooling system to a closed-cycle system in order to meet the Draft Permit's thermal discharge and cooling water withdrawal requirements (S*ee* EPA's Determination Document for the Thermal Discharge and Cooling Water Intake Structure).

PSNH submitted preliminary plans for a 14-cell, linear-arranged, mechanical draft cooling tower array for Merrimack Station. As shown on the preliminary installation drawings submitted by the company, the cooling tower blowdown would be directed to the discharge canal.

Therefore, EPA has established a new internal outfall (003D) to account for the discharge from the cooling tower array (cooling tower blowdown). The Draft Permit requires compliance monitoring for this discharge prior to mixing with any other waste streams and prior to entering the canal.

5.4.7 Outfall 004, Screen Wash, Fire Pump, Sumps, and De-icing

The existing permit states that this outfall is actually a combination of five different discharge pipes that transport the following types of wastewater: 1) traveling screen wash water; 2) fire pump overflow discharge; 3) screen house floor sump discharges; 4) heated, re-circulated water from the condensers; and 5) roof drain discharges. The Draft Permit takes a revised approach to these wastewater streams and discharge pipes, identifying each outfall individually and assigning each its own new, unique outfall designation number. The new designations are as follows: 1) Outfall 004A - traveling screen wash water; 2) Outfall 004B - fire pump overflow discharge; 3) Outfall 004C - screen house floor sump discharges; and 4) Outfall 004D – heated, re-circulated water from the condensers. Each new outfall has associated sampling and reporting requirements, as discussed in section 5.6.6 below. The roof drain discharges have been eliminated from the permit. EPA has visually inspected Unit 2's CWIS twice, and has determined that including these roof drains as part of Outfall 004's discharge is not appropriate. These roof drains convey rain water from the CWIS roof and drain it to the ground. The roof drains do not constitute a point source with a direct discharge to the Merrimack River. Accordingly, the roof drains have not been included as an authorized, regulated discharge in the Draft Permit.

The traveling screen wash water is pumped from the CWIS wet well and sprayed on the trash racks to remove vegetation and aquatic organisms from the traveling screens. The pumps used for this purpose are also used to dewater the wet well during prolonged maintenance of the generating units.

The fire protection systems also draw water from the CWIS wet well. The fire protection pump periodically discharges water to relieve pressure spikes that occasionally occur in the systems' piping. During the winter, predominately from mid-December through mid-March, the fire protection pump overflow is directed to the river area just in front of the intakes. This jet of water is used to prevent large chunks of river ice from colliding with and damaging the trash racks.

The two CWIS facilities have a floor sump which collects water from leaks and water drained from piping runs that are undergoing repairs.

During intermittent periods in the winter months, warmed water is pumped from the discharge of both Units' condensers to the screen house bays to prevent ice buildup. The warmed water is discharged through submerged diffusers located in front of each CWIS's trash racks. This discharge was inadvertently omitted from the existing permit. EPA corrects this omission in the Draft Permit by adding the deicing discharge as outfall 004D.

5.4.8 Outfall 005, Intake Screen House Maintenance Sump Pumps

The existing permit states that outfall 005, similar to outfall 004, is comprised of 4 different outfall pipes. Taking a similar approach to that outlined above for Outfall 004, the Draft Permit gives each pipe its own unique outfall designation, as follows: 1) Outfalls 005A and B – MK-1 Maintenance Sump; and 2) Outfalls 005C and D – MK-2 Maintenance Sump.

During extended maintenance outages a coffer dam is installed to isolate the wet well from the screen house forebay. After the wet well is dewatered by the screen wash pumps, inspection and repair of the cooling water pump vanes and related equipment can occur. Water that leaks in from the Merrimack River drains to two floor sumps. Water in these sumps is pumped back to the Merrimack River by the intake screen house maintenance sump pumps.

5.5 Pollutant Discharges of Concern and Adverse Cooling Water Intake Effects

EPA has reviewed analytical data from the permittee's renewal application, relevant water quality classification information (CWA § 303(d) lists), NELGs, water quality criteria and other technical information, and has identified the following pollutant discharges of concern and adverse cooling water intake effects.

5.5.1 Heat

Merrimack Station currently operates a "once-through" cooling system from which it discharges a large amount of waste heat directly to the Merrimack River. This waste heat is discharged with condenser cooling water via internal outfalls 001 (Unit 1 condenser) and 002 (Unit 2 condenser) and through the discharge canal and Outfall 003. Additionally, Merrimack Station discharges heated effluent in front of the cooling water intake structures (Draft Permit outfall designation 004D) to prevent ice buildup during cold weather.

5.5.2 Chlorine

Power plants generally use an oxidant to prohibit the growth of organisms on the condenser tubes. In Merrimack Station's case, the oxidant used is chlorine. Chlorine is primarily discharged through internal outfalls 001 and 002, before discharge through outfall 003. EPA anticipates that the station will install and operate cooling towers to control its thermal discharges and cooling water withdrawals to comply with its new NPDES permit. Even after closed cycle cooling is installed, chlorine discharges will likely continue because chlorine is also commonly used to control biofouling in cooling towers.

5.5.3 Oil and Grease

Oil and Grease has the potential to be discharged to the Merrimack River from a variety of sources at the plant.

5.5.4 Total Suspended Solids (TSS)

As with oil and grease, TSS has the potential to be discharged from a variety of sources at the plant.

5.5.5 Metals and Arsenic (Metalloid)

A variety of metals, including Arsenic (a metalloid), Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Selenium and Zinc, may be present in the wastewater from the FGD scrubber system. Additionally, copper and iron may be present in wastewater from metal cleaning operations. Cooling tower maintenance chemicals also have the potential to contain trace amounts of metals.

5.5.6 Toxics

Merrimack Station uses a variety of chemicals in varying concentrations during the routine operation of the facility. These chemicals, either individually or based on their interaction could produce toxicity in the discharge.

5.5.7 pH

The discharge from Merrimack Station has the potential to affect the pH of the receiving water.

5.5.8 Priority Pollutants

EPA anticipates that Merrimack Station will meet the Draft Permit's thermal and flow limits by employing cooling towers. Cooling tower maintenance chemicals have the potential to contain priority pollutants (including chromium and zinc).

5.5.9 PCBs

Although PCBs are no longer commonly used in transformer fluid, the NELGs at 40 C.F.R. Part 423 prohibit the discharge of PCBs at power plants.

5.5.10 Chloride

The new FGD scrubber wastewater stream has the potential to discharge chloride to the Merrimack River.

5.5.11 Adverse Environmental Impact(s) from the Cooling Water Intake Structure

Merrimack Station's CWIS causes "adverse environmental impacts" when aquatic organisms are entrained or impinged by the CWIS as water is withdrawn from the Merrimack River to be used for cooling by the power plant. See Clean Water Act NPDES Permitting Determinations for the Thermal Discharge and Cooling Water Intake Structure at Merrimack Station in Bow, New Hampshire, Chapter 11 (Attachment D).

5.6 Derivation of Permit Limits and Requirements

5.6.1 Outfall 003A (Internal Outfall, Slag Settling Pond Discharge)

The present permit imposes limits at Outfall 003A for Total Suspended Solids (TSS), Oil and Grease, Total Recoverable Copper, and Total Recoverable Iron. TSS, Total Recoverable Iron and Oil and Grease are limited in accordance with the technology-based limits from 40 C.F.R. §423.12(b)(4), while the Total Recoverable Copper limit is based on water quality considerations. The measurement and reporting of pH is also a condition of the permit.

The existing permit designates two outfalls at the single discharge point of the Slag Settling Pond (Wastewater Treatment Plant No.4): Outfall 003A and Outfall 003B. At Outfall 003A, the above-described effluent limits are applied, while at Outfall 003B, a technology-based limit for iron in the metal cleaning wastes are applied based on the 40 C.F.R. §423.12(b)(5). (The water quality derived limit for copper in the existing permit continues to be applied when Outfall 003A becomes Outfall 003B). The Slag Settling Pond outfall designation changes from Outfall 003A, "normal operations," to Outfall 003B when treated metal cleaning waste effluent is discharged from Waste Treatment Plant No.1. The Slag Settling Pond wastewater is comprised of a variety of dissimilar wastewater streams that commingle in the pond; therefore, the metals limits applied at Outfall 003B are currently being applied to the commingled waste streams being discharged from the Slag Settling Pond to the discharge canal.

The Steam Electric Power Plant NELGs, *See* 40 C.F.R. Part 423, require that when separately regulated waste streams (i.e., "waste streams from different sources") are combined for treatment or discharge, each waste stream must independently satisfy the effluent limitations applicable to it. *See* 40 C.F.R. §§ 423.12(b)(12), 423.13(h). *See also* 40 C.F.R. § 125.3(f) (technology-based treatment requirements may not be satisfied with "'non-treatment'" techniques such as flow augmentation). Thus, it is not acceptable to determine compliance for different wastewater streams after they have been mixed (or diluted) with each other, unless the effluent limits applicable to them are the same. *See* 40 C.F.R. § 122.45(h) (internal waste streams).

The metal cleaning wastes may not be combined with the ash and low volume wastes prior to compliance monitoring because the metal cleaning wastes are subject to additional effluent limitations for copper and iron. Monitoring of metal cleaning wastes must be conducted separately from monitoring of any ash transport and low volume waste streams. Accordingly EPA has relocated Outfall 003B to the discharge pipe of Waste Treatment No.1. (Note: See Section 5.6.2 Outfall 003B (Internal Outfall; Metal Cleaning) for a detailed explanation of the regulatory requirements for relocated Outfall 003B.)

5.6.1(a) Flow

The projected wastewater discharge volume (or flow) from Outfall 003A is found in the facility's permit renewal application (Form 2C). PSNH submitted this information to EPA on May 5, 2010, and the projected flows include those from the FGD scrubber project. The flows projected from Outfall 003A are decreased in comparison to the monthly average flow reported in PSNH permit reapplication because make-up water for the new FGD system will be withdrawn from the Slag Settling Pond. The new flows contained in the Draft Permit are:

	Maximum daily (mgd)	Max 30-day average (mgd)
Flow (proposed):	13.0	5.3

Accordingly, the Draft Permit contains these flow limits at 003A.

5.6.1(b) Total Suspended Solids

As previously discussed, various internal wastewater streams at Merrimack Station are treated and discharged through Outfall 003A during routine or normal operations. The primary wastewater stream is the slag sluice water, while treated low volume waste streams and stormwater are also discharged through Outfall 003A. Slag sluice water is considered "ash transport water" pursuant to the NELGs found at 40 C.F.R. Part 423. These technology-based effluent guidelines contain the same TSS (as well as oil and grease) limits for both low volume waste streams and ash transport water.

Stormwater is also discharged directly to the Slag Pond, and indirectly after treatment at Waste Treatment Plant No.1. EPA's multi-sector general stormwater permit does not contain benchmark values for TSS. Since some stormwater flow is treated by Merrimack Station at Waste Treatment Plant No.1 (which also treats low volume wastes) and other stormwater flows go directly to Waste Treatment Plant No. 4 (which treats the slag sluice water), all stormwater at the plant is treated to the same technology standard as ash transport water (which is the same as slag sluice water) and low volume wastes. The TSS concentrations discharge from Outfall 003A average 5.6 mg/l, and have not exceeded 19.2 mg/l. Further, the Draft Permit contains the same TSS limits as the existing permit. The TSS limits are further carried over from the existing permit in accordance with antibacksliding requirements found in 40 C.F.R. §122.44(l).

Therefore, the Draft Permit contains the following technology-based limits for TSS at Outfall 003A based on the NELGs:

	Maximum daily (mg/l)	Max 30-day average (mg/l)
TSS (proposed):	100	30

5.6.1(c) Oil and Grease

As with the derivation of TSS limits, Oil and Grease limits are technology-based and are derived from the limitations specified in the NELGs and are, also, carried over from the existing permit in accordance of 40 C.F.R.§ §122.44(l):

	Maximum daily (mg/l)	Max 30-day average (mg/l)
Oil and Grease (proposed):	20	15

It is noted that the majority of waste water contributing to the slag pond includes metal cleaning wastes, low volume wastes and ash transport water, as defined in 40 C.F.R. 423.11. The Steam Electric Power Generating Point Source Category ELG's set "best practicable control technology currently available" (BPT) limits for low volume and ash transport waste streams; while the more stringent "best conventional pollutant control technology" (BCT) limits are reserved. *See* 40 C.F.R. §§ 423.12 and 423.14. If appropriate, in the absence of BCT limits, the permitting authority must establish BCT limits on a BPJ basis. EPA's NPDES Permit Writers' Manual (Office of Wastewater Management (September 2010)) recommends that permit writers to derive BPJ limits by (1) transferring numerical limitations from an existing source (*e.g.*, a similar NPDES permit or an existing ELG), or (2) developing new numeric limitations. In this case, EPA considered all the relevant factors and determined that the most appropriate BCT limits for low volume and ash transport waste streams are the existing BPT limits in 40 C.F.R. 423.12. Further, effluent limitations based on BCT may not be less stringent than the limitations based on BPT. Thus, BPT effluent limitations guidelines are a "floor" below which BCT effluent limitations guidelines cannot be established.

5.6.1(d) pH

The Draft Permit continues the pH as a "report only" requirement from the existing permit. Minimum and maximum pH values are to be reported monthly. Given that Merrimack Station's wastewater discharges are expected to change in a variety of significant ways – in light of the expected installation of closed-cycle cooling and a new FGD scrubber system – EPA considers it especially important to continue to monitor pH at this outfall since it's unclear how the changes may affect the end-of-pipe pH before the discharge enters the Merrimack River.

5.6.1(e) Metals (Copper, Iron, Aluminum, Arsenic, Mercury, Selenium) and Chloride

The existing permit limits Copper to 0.20 mg/l and Iron to 1.0 mg/l at internal outfall 003A. The Draft Permit contains a revised limit for Copper (see below) but proposes to eliminate the Iron limit. The Draft Permit also contains limits for Aluminum, Arsenic, and Mercury at Outfall 003A. The limits on these metals are based on the NHDES's water quality-based "antidegradation" review. See State of New Hampshire Surface Water Quality Regulations Section Env-Wq 1708. The antidegradation review was conducted in response to the proposed wastewater discharge associated with the installation of the new FGD. The State's antidegradation review is part of the Administrative Record for this Draft Permit. (Note: EPA has also developed technology-based Draft Permit limits for wastewater discharges from the FGD system. These limits are discussed in section 5.6.3 below).

Copper

The existing permit contains a water quality-based average monthly and maximum daily at Outfall 003B of 0.077 mg/l for copper. The existing permit's Fact Sheet explains that since copper is discharged into the Slag Settling Pond during chemical cleaning operations, the possibility exists that it could be released from the Pond at times other than cleaning periods. This could occur due to re-suspension of copper from the sediment or through conditions of low pH, when copper would have the potential to go back into solution and be discharged from the Slag Settling Pond. It is improper in this circumstance to have two outfall designations for a single discharge; the Slag Settling Pond. Essentially, the treated effluent from Waste Treatment Plant No. 1 is using the dilution provided by the Slag Settling Pond as part of the treatment process. This is not allowed. See Section 5.6.2 Outfall 003B (Internal Outfall, Metal Cleaning).

The Draft Permit alters this water quality-based limit from the existing permit on the basis of the antidegradation review conducted on the Hooksett Pool by NHDES. The NHDES antidegradation review determined that the relevant portions of the Merrimack River have assimilative capacity for copper, but that there is a need for both monthly average and daily maximum copper limits in the permit. Copper is the only pollutant identified during the state's antidegradation review that requires a maximum daily limit.

A monthly average limit of 0.027 mg/l is necessary to ensure that, at worst, the discharge would only cause an insignificant (<20%) lowering of water quality in the Merrimack River. A maximum daily limit of 0.083 mg/l is also required to ensure that the acute water quality criterion for copper is met at Outfall 003A's anticipated maximum daily discharge flow of 13 mgd.

It is noted that the maximum daily limit of 0.083 mg/l contained in the Draft Permit is less stringent than the existing permit's maximum daily limit of 0.077 mg/l. Anti-backsliding regulations contained in 40 C.F.R. § 122.44(l) require that a reissued permit contain effluent limits that must be at least as stringent as the limits contained in the previous permit. However, an exception in the anti-backsliding regulation is allowed if information is not available at the time of permit issuance and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. See 40 C.F.R. § 122.44(l)(2)(B)(1). The Draft Permit alters this water quality-based limit from the existing permit on the basis of the antidegradation review conducted on the Hooksett Pool by NHDES. The information that was not available is the NHDES antidegradation which leads to the development of Outfall 003A effluent limitations based on extensive sampling of both the Merrimack River and the Slag Settling Pond's effluent. That review determined that the relevant portions of the Merrimack River have assimilative capacity for copper and that the Merrimack Station effluent discharge would only cause an insignificant (<20%) lowering of water quality in the Merrimack River. This new information, the NHDES antidegradation review, provides the basis to allow the less stringent maximum day copper limit of 0.083 mg/l.

Iron

The existing permit has a daily maximum iron limit of 1.0 mg/l at internal Outfall 003A. The Fact Sheet for the existing permit states that "… iron is present in the intake/receiving waters as well as the slag settling pond discharge during chemical cleaning operations. EPA concludes that the iron (whether from intake water or chemical cleaning operations) in the Slag Settling Pond can be treated using hydroxide precipitation to levels set forth in the regulations. ... The effluent limits for total iron based on ELGs are 1.0 mg/l, average monthly and 1.0 mg/l daily maximum; respectively."

As discussed previously and in more detail in Section 5.6.2, the NELGs for the Steam Electric Power Generating Point Source Category do not place iron limits on discharges of fly ash transport or low volume wastewater, which is the vast majority of wastewater discharged from the Slag Settling Pond. As previously explained, the existing permit and Fact Sheet incorrectly imposed technology-based iron limits for metal cleaning waste at the discharge of the Slag Settling Pond. The iron limits should have been imposed at the discharge of Waste Treatment Plant No.1 before the effluent entered the Slag Settling Pond. This error is corrected in the Draft Permit. Finally, the NHDES antidegradation study determined that iron concentrations discharged from the Slag Settling Pond have no reasonable potential to use more than twenty percent of the available remaining assimilative capacity of the Merrimack River. See NHDES Antidegradation Study October 4, 2010. Based on the above considerations, EPA has eliminated the iron limits at the Slag Settling Pond's discharge.

Aluminum

A monthly average limit for aluminum of 1.0789 mg/l is necessary to ensure that Outfall 003A's discharge only causes an insignificant (<20%) lowering of water quality in the Merrimack River.

Arsenic

The antidegradation calculations performed by NHDES conclude that there can be no increase in arsenic loadings relative to the human health criterion for fish consumption. NHDES calculated a monthly average limit at Outfall 003A that will hold the mass load to that being discharged now, as follows:

$$Q_e \times C_e = Q_f \times C_f$$

Where:

Qe	Outfall 003A Average Discharge Flow (Existing); 6.33 mgd
Ce	Outfall 003A Maximum Arsenic Concentration Discharged (Existing); 0.0019 mg/l
Qf	Outfall 003A Average Future Discharge Flow (Future); 5.29 mgd
Cf	Outfall 003A Maximum Arsenic Concentration Discharged (Future); Unknown

Solving for the future arsenic concentration discharged from Outfall 003A to hold the current load:

$$C_f = \frac{(Q_e \times C_e)}{Q_f}$$

$$C_f = \frac{(6.33 \times 0.0019)}{5.29}$$

Cf = 0.002266 mg/l

(In addition, EPA has determined that a technology-based average monthly and daily maximum arsenic limit is necessary at Outfall 003C. Outfall 003C is the outfall from the FGD wastewater treatment system that discharges into the Slag Settling Pond, while Outfall 003A is the outfall that discharges from the Slag Settling Pond to the discharge canal.)

Mercury

The NHDES antidegradation analysis and calculations conclude that there is assimilative capacity for mercury remaining in the relevant portion of the Merrimack River, and that there is no reasonable potential that a discharge from the FGD wastewater treatment system, or the Slag Settling Pond, would cause a violation of state water quality standards (i.e., that a discharge would use up more than 20% of the ARAC for either the aquatic life criteria or the human health criteria).

However, all New Hampshire surface waters are listed as being impaired for mercury due to fish tissue concentrations that have led to a state -wide fish consumption advisory. Therefore, a permit limit is needed to ensure that the loading of mercury in the discharge will not increase. It should also be noted that mercury levels in New Hampshire's surface water have, in large part, been attributed to atmospheric deposition fueled by air emissions of mercury by coal-burning power plants both inside and outside of New Hampshire. Within New Hampshire, the state legislature has responded to this problem by requiring installation of the wet FGD scrubber system at Merrimack Station to reduce in-state air emissions of mercury. This, however, transfers mercury from air emissions to water discharges, thus requiring the water discharges to be properly controlled. In addition, air emissions controls are also being required outside of New Hampshire, which should help to reduce atmospheric deposition and make progress toward achieving ambient water quality standards. Steps are being taken in this regard by many states, such as those in New England, and by the federal government.

Since the existing load (0.000315 lbs/day) must be held, based on all of New Hampshire's surface waters being listed as impaired by mercury due to fish tissue concentrations, a new limit for outfall 003A of 0.0000071 mg/l is necessary.

Selenium

The NHDES antidegradation calculations show there is remaining assimilative capacity for selenium in the relevant portion of the Merrimack River and that there is no reasonable potential for state water quality standards to be violated for outfall 003A as it exists now. NHDES has determined that due to uncertainty regarding selenium levels in the FGD WWTS discharge, a limit of 0.0571 mg/l may be needed to ensure that the discharge only causes an insignificant (<20%) lowering of water quality in the Merrimack River.

EPA has decided to impose the limit from the NHDES antidegradation review of maximum daily limit of 0.0571 mg/l. Selenium is extremely toxic to water fowl and fish, severely hampering their ability to reproduce. EPA has included a selenium limit in the Draft Permit to insure that the Merrimack River's assimilative capacity for selenium is not exceeded.

(In addition, EPA has determined that a technology-based average monthly and daily maximum selenium limit is necessary at Outfall 003C. Outfall 003C is the outfall from the FGD wastewater treatment system that discharges into the Slag Settling Pond, while Outfall 003A is the outfall that discharges from the Slag Settling Pond to the discharge canal.)

Chloride

Based on current information, New Hampshire’s antidegradation review indicates that there is no reasonable potential for the existing discharge to cause a violation of the chronic aquatic life criterion for chloride. EPA has included a monitoring requirement for chloride in the Draft Permit at Outfall 003A, however, due to the uncertainty about future effluent quality that results from the major changes in wastewater that are anticipated at Merrimack Station. As discussed in section 5.6.3 (Outfall 003C – Internal Outfall, Flue Gas Desulfurization Wastewater), a technology-based limit for chloride has been imposed at outfall 003C.

5.6.2 Outfall 003B (Internal Outfall, Metal Cleaning)

Segregation of Metal Cleaning Wastewater Stream (New Outfall 003B)

According to PSNH, Merrimack Station’s Slag Settling Pond currently receives the following wastewater streams: slag (bottom ash) transport wastewater, overflow from slag tanks, stormwater from miscellaneous yard drains, boiler blow-down, chemical metal cleaning effluent, and other miscellaneous flows and low volume wastes, including chemical drains, equipment and floor drains, demineralizer regeneration wastes, miscellaneous tank maintenance drains, pipe trench stormwater, ash landfill leachate, and yard service building floor drain sump flows. The FGD wastewater will also be discharged to this pond after receiving treatment. All these different waste streams combine in the pond prior to being discharged to Merrimack Station’s discharge canal and, from there, to the river.

Under the current permit, as previously indicated, effluent limits are applied at the point of discharge from the Slag Settling Pond to the discharge canal. The existing permit gives this single discharge point two outfall designations: outfall 003A and outfall 003B. At outfall 003B, technology-based limits for copper and iron in the metal cleaning wastes are applied based on the NELGs. At outfall 003A, the other applicable effluent limits are applied. As described above, the wastewater from the Slag Settling Pond is comprised of a variety of dissimilar wastewater streams that have been commingled in the pond. Thus, the metals limits applied at Outfall 003B are currently being applied to the commingled waste streams being discharged from the Slag Settling

Pond to the discharge canal. EPA has concluded that this approach is inappropriate and must be corrected.

The Steam Electric Power Plant NELGs, *See* 40 C.F.R. Part 423, require that when separately regulated waste streams (i.e., "waste streams from different sources") are combined for treatment or discharge, each waste stream must independently satisfy the effluent limitations applicable to it.[1] 40 C.F.R. §§ 423.12(b)(12), 423.13(h). *See also* 40 C.F.R. § 125.3(f) (technology-based treatment requirements may not be satisfied with "'non-treatment'" techniques such as flow augmentation). Thus, it is not acceptable to determine compliance for different wastewater streams after they have been mixed (or diluted) with each other, unless the effluent limits applicable to them are the same. *See* 40 C.F.R. § 122.45(h) (internal waste streams).

The low volume and ash wastes may be combined prior to sampling for compliance because the effluent limitations for these two waste streams are the same. Similarly, the chemical and nonchemical metal cleaning wastes may be combined prior to compliance monitoring because they are subject to the same limitations.

The metal cleaning wastes may not, however, be combined with the ash and low volume wastes prior to compliance monitoring because the metal cleaning wastes are subject to additional effluent limitations for copper and iron. Applying the copper and iron limit of 1.0 mg/l to the combined waste streams from the Slag Settling Pond would potentially allow the permittee to 1) comply by diluting the metal cleaning waste stream rather than treating it, and 2) discharge a total mass of copper and iron in excess of that authorized by the NELGs. In addition, if metal cleaning wastes are greatly diluted, removal of the pollutant metals in the metal cleaning wastes becomes more difficult and less efficient.

Given that the existing permit applies technology-based limits for both copper and iron to the co-mingled, non-similar waste streams at outfall 003B, EPA has concluded that these limitations were incorrectly applied in the current permit. EPA proposes to correct the error in the Draft Permit.[2] Either the metal cleaning wastewater must be separately monitored for compliance with copper and iron limitations, or a combined waste stream formula must be developed for the commingled waste stream. EPA does not, however, currently have sufficient information to derive a combined waste stream limit. Therefore, the Draft Permit proposes, in effect, to segregate the metal cleaning wastewater from the other wastewater streams by applying limits for the metal cleaning wastes at a new, separate compliance point (again referred to as Outfall 003B) located *before* mixing with other wastewater flows in the Slag Settling Pond.

In other words, EPA's Draft Permit proposes to require (a) that the chemical and nonchemical metal cleaning wastes both be discharged from outfall 003B subject to the 1.0 mg/L limits for

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[1] The BPT NELGs set copper and iron limits for both chemical and nonchemical metal cleaning wastes, while the BAT NELGs set limits only for the chemical metal cleaning wastes. As discussed in detail farther below, this leaves EPA to determine BAT limits for the nonchemical metal cleaning wastes on a BPJ basis.

[2] The law is clear that when an administrative agency recognizes that it has made an error, it should correct that error. *See Southwestern Penn. Growth Alliance v. Browner*, 121 F.3d 106, 115 (3d Cir. 1997); *Davila-Bardales v. I.N.S.*, 27 F.3d 1, 5 (1st Cir. 1994); *Puerto Rico Cement Co. v. EPA*, 889 F.2d 292, 299 (1st Cir. 1989).

total copper and total iron, and (b) that compliance monitoring for these two types of metal cleaning wastes occur at a new internal Outfall 003B re-located to a point after treatment but before discharge to the Slag Settling Pond and commingling with the other waste streams. Furthermore, the Draft Permit allows bottom ash sluice water, low volume waste, episodic stormwater, treated FGD wastewater, and treated metal cleaning wastewater then to be combined in the Slag Settling Pond and discharged through outfall 003A subject to the relevant effluent limits other than the technology-based copper and iron limits.

Development of BAT Effluent Limit for Nonchemical Metal Cleaning Wastes Based On BPJ

As discussed above, Merrimack Station discharges many different types of waste streams, including "nonchemical metal cleaning wastes," "chemical metal cleaning wastes," "low volume wastes," and heated cooling water (which carries waste heat).[3] Nonchemical metal cleaning wastes may include wastewater from a variety of sources such as the following nonchemical metal process equipment washing operations: air pre-heater wash, SCR catalyst wash, boiler wash, furnace wash, stack and breeching wash, fan wash, precipitator wash, and combustion air heater wash. As discussed above, the nonchemical metal cleaning wastes are currently combined with several of the Station's low volume wastes prior to being discharged to the Slag Settling Pond, and they also are mixed with other wastes in the pond.

EPA has promulgated NELGs for the "Steam Electric Power Generating Point Source Category," the point source category which applies to Merrimack Station. *See* 40 C.F.R. Part 423. These NELGs define "metal cleaning wastes" as:

> any wastewater resulting from cleaning [with or without chemical cleaning compounds] 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). Thus, this regulation defines *metal cleaning waste* to include *any* wastewater generated from *either the chemical or nonchemical cleaning of metal process equipment*. In addition, the regulations 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." EPA also uses, but does not expressly define; the term "nonchemical metal cleaning waste" in the regulations when it states that it has "reserved" the development of BAT NELGs for such wastes. 40 C.F.R. § 423.13(f). While the regulations provide no definition of "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 of metal process equipment without using chemical cleaning compounds.

Finally, the regulations define "low volume waste" as follows:

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[3] *Cf.* 42 Fed. Reg. 15690, 15693 (Mar. 23, 1977) (Interim Regulations, Pretreatment Standards for Existing Sources, Steam Electric Generating Point Source Category) (listing the different types of wastewaters discharged by power plants as follows: metal cleaning wastes (without distinguishing between chemical and nonchemical metal cleaning wastes); cooling system wastes; boiler blowdown; ash transport water; and low volume waste)

> . . . 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 waste sources listed as examples of low volume wastes include various process and treatment system wastewaters and do not include wastewater generated from washing metal process equipment. Therefore, low volume wastes are distinct from metal cleaning wastes.

The NELGs 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." On the face of the regulations, these limits apply to both 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, the facility's nonchemical metal cleaning wastes are, at a minimum, subject to NELGs' BPT limits of 1.0 mg/l (maximum and 30-day average limits) for both total copper and total iron.

The NELGs also 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 waste*, 40 C.F.R. § 423.13(e), while indicating that EPA has "reserved" specification of BAT NELGs for nonchemical metal cleaning waste. 40 C.F.R. § 423.13(f). While the regulations do not set categorical BAT limitations for nonchemical metal cleaning waste, by expressly reserving the development of BAT limitations, EPA's regulations confirm that the BAT standard applies to nonchemical metal cleaning wastes. EPA explained in the preamble to the Steam Electric Power Plant NELGs, promulgated in 1982, that it was "reserving" the specification of BAT standards for nonchemical metal cleaning wastes because it felt 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. *See* 47 Fed. Reg. 52297 (Nov. 19, 1982).

When EPA has promulgated NELGs applying the statute's narrative technology standards to a particular industrial category's pollutant discharges, then those NELGs provide the basis for the discharge limits included in the 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 NELG, however, EPA develops NPDES permit limits by applying the statute's narrative technology standards (such as the BAT standard) on a case-by-case, BPJ basis. *See* 33 U.S.C. § 1342(a)(1)(B) and (b)(1)(A); 40 C.F.R. §§ 122.43(a), 122.44(a)(1), 125.3 and 122.1(b)(1).[4] According to 40 C.F.R. § 125.3(c)(2), in

[4] *See Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 928-29 (5th Cir. 1998) ("In situations where the EPA has not yet promulgated any [effluent limitation guidelines] for the point source category or subcategory, NPDES permits must incorporate 'such conditions as the Administrator determines are necessary to carry out the provisions of the Act.' 33

determining BAT requirements, EPA should consider 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."[5]

CWA § 301(b) sets forth in narrative form the technology standards that pollutant discharges must satisfy and the deadlines by which compliance with them must be achieved. Effluent limitations based on application of the BAT standard were to be achieved no later than March 31, 1989. 33 U.S.C. § 301(b)(2). *See also* 40 C.F.R. §§ 125.3(a). According to the CWA's legislative history, "best available" technology refers to the "single best performing plant in an industrial field." *See* 45 Fed. Reg. 68333.[6] EPA also considers the following specific factors in determining the BAT: (i) age of the equipment and facilities involved; (ii) process employed; (iii) 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 impacts (including energy requirements). *See* CWA § 304(b)(2) and 40 C.F.R. § 125.3(d)(3).

EPA has determined that the BAT-based effluent limits for nonchemical metal cleaning waste discharges at Merrimack Station should be at least as stringent as the applicable BPT limitations for such nonchemical metal cleaning wastes. Therefore, for this Draft Permit, EPA has determined, based on its Best Professional Judgment, which nonchemical metal cleaning wastes at Merrimack Station should be subject to concentration-based effluent limits of 1.0 mg/L for total copper and total iron. EPA's consideration of the above-listed factors is discussed below.

(i) Age of the equipment and facilities involved

In determining BAT for Merrimack Station, EPA accounted for the age of equipment and the facilities involved. Merrimack Units 1 and 2 first came online in 1960 and 1968, respectively. Merrimack Station is equipped with waste treatment tanks and has been performing treatment of chemical metal cleaning wastes consisting of boiler chemical cleaning wastewater. There is nothing about the age of the equipment and facilities involved that would preclude the use of the same or similar technology to treat nonchemical metal cleaning wastes at the facility. Merrimack Station may, however, need to reroute some existing piping, at some expense, to comply with the new requirements. Based on our knowledge of the flow volumes involved and the nature of the site, EPA would expect any re-piping expenses to be modest.

U.S.C. 1342(a)(1). …. In practice, this means that the EPA must determine on a case-by-case basis what effluent limitations represent the BAT level, using its 'best professional judgment.' 40 C.F.R. § 125.3(c)-(d). Individual judgments thus take the place of uniform national guidelines, but the technology-based standard remains the same."); *Trustees. for Alaska v. EPA*, 749 F.2d 549, 553 (9th Cir. 1984) (same for BCT).

[5] EPA is not aware, and the Company has not identified, any unique factors applicable to the facility that would impact the selection of the BAT in this case. EPA has taken into account site-specific factors in the course of discussing the six BAT considerations below.

[6] *See also Texas Oil & Gas Ass'n*, 161 F.3d at 928 (quoting *CMA v. EPA*, 870 F.2d at 226); *CMA v. EPA*, 870 F.2d at 239; *Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985); *Ass'n of Pacific Fisheries*, 615 F.2d at 816-17; *American Meat Inst. v. EPA*, 526 F.2d 442, 463 (7th Cir. 1975).

(ii) Process employed

In determining the BAT for Merrimack Station, EPA considered the process employed at the facility. Merrimack Station steam-electric power plant generates 470 MW or electrical energy through fossil fuel combustion. Treating nonchemical metal cleaning wastes to the same level as chemical metal cleaning wastes will not prevent the permittee from maintaining its primary production processes. The facility already treats chemical metal cleaning waste generated as a result of operations at the facility. Chemical metal cleaning wastewater (specifically boiler cleaning) is treated prior to discharge using neutralization tanks for pH adjustment and settling basins for solids removal. This treatment process can also be applied to nonchemical metal cleaning wastes.

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

Technologies to treat 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.[7] The NPDES permit for the Mystic Station power plant in Everett, Massachusetts, for instance, requires nonchemical metal cleaning wastes to receive the same level of treatment as chemical metal cleaning wastes and both must meet mass-based limits equivalent to concentration-based limits of 1.0 mg/L for total copper and total iron. *See* Mystic Station NPDES Permit No. MA0004740.

As mentioned above, technology to treat chemical metal cleaning wastewater already exists at Merrimack Station. Specifically, this wastewater is treated prior to discharge using pH adjustment and solids removal within neutralization and waste tanks/basins. The Station can utilize the same treatment technologies at the facility to meet the proposed BAT standards for copper and iron for nonchemical metal cleaning wastewater. In order to employ this existing treatment capability, some wastewater streams would need to be redirected before and during metal cleaning treatment. Because this effluent stream is currently commingled with low volume wastes, it must be segregated before treatment or a combined waste stream formula could potentially be applied. From an engineering standpoint, the waste segregation proposed for the Draft Permit could be accomplished with scheduling changes and the facility's existing treatment technology. In other words, Merrimack Station could change the timing of nonchemical cleaning operations to coincide with either chemical cleaning operations or outages.

(iv) Process changes

EPA has also evaluated the process changes associated with treatment of nonchemical metal cleaning wastes. As discussed, nonchemical metal cleaning wastes can be treated using existing

[7] See pages 441-455 of the Final Development Document for Effluent Limitations Guidelines and Standards and Pretreatment Standards for the Steam Electric Point Source Category, November, 1982, for treatment technologies for metal cleaning wastes.

technology currently in use at the plant. Since metal cleaning wastewater 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 acknowledges that waste stream segregation and additional treatment of the nonchemical metal cleaning wastes could be accomplished, but that it may require some engineering modifications and associated expenditures. However, EPA believes that these costs are relatively modest and that PSNH can afford these expenditures given that Merrimack Station is a profitable, baseload power plant. In addition, should the Company choose to pursue either the "scheduling changes" or the "combined waste stream formula" options, the costs required to comply with the permit limits could be still less. EPA recognizes that more substantial costs may result from steps needed to comply with the new thermal discharge limits and with CWA § 316(b) requirements, but concludes that it is feasible for the Facility to assume the total costs.

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

Finally, EPA considers the non-water quality environmental impacts associated with the treatment of nonchemical metal cleaning wastes, including energy consumption, air emission, noise, and visual impacts at Merrimack Station. In particular, EPA believes that the permittee should be able 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, the metal cleaning waste segregation proposed for the Draft Permit could be accomplished with scheduling changes and the facility's existing treatment technology. Moreover, EPA understands that the annual volume of nonchemical metal cleaning waste water to be considerably less than the chemical metal cleaning wastewater already generated at the site. In addition, EPA does not expect any change in the visual impacts of the plant from the redirection of waste streams. EPA has determined that the non-water environmental impacts from the steps needed to comply with the BAT effluent limits would be negligible.

As previously discussed in this section, the low volume and ash wastes may be combined prior to sampling for compliance because the oil and grease and TSS effluent limitations for these two waste streams are the same. Similarly, the chemical and nonchemical metal cleaning wastes may be combined prior to compliance monitoring because they are subject to the same oil and grease and TSS limitations. Since all these waste streams have the same effluent limitations, the point of compliance can be located after the last point of treatment for oil and grease and TSS; the Slag Settling Pond. The Draft Permit contains a report only for oil and grease and TSS at Outfall 003B. The metal cleaning wastes may not, however, be combined with the ash and low volume wastes prior to compliance monitoring because the metal cleaning wastes are subject to additional effluent limitations for copper and iron. Therefore, EPA has included the requirements described below in the Draft Permit to address metal cleaning wastewater.

Metal cleaning wastes (chemical and non-chemical) must be treated prior to mixing with any other waste streams. Dilution of metal cleaning wastes is prohibited prior to treatment. Metal cleaning wastes must be sampled prior to mixing with any other waste stream and prior to entering the Slag Settling Pond (Waste Treatment Plant No. 4). As previously explained Outfall 003B has been relocated to the effluent discharge pipe of Waste Treatment Plant No. 1 from the discharge of the Slag Settling Pond (Outfall 003A). Fourteen of the sixteen identified discharges to Waste Treatment Plant No. 1 are intermediate. Since Outfall 003B is a new internal discharge for a waste treatment plant receiving many intermediate discharges, there is no historical flow data to categorize the average monthly and daily maximum flows. EPA has decided that the Draft Permit should only require the monthly average and maximum daily flows to be reported. For the next permit cycle, when sufficient data has been gathered, EPA will determined if a flow limit for Outfall 003B is warranted. EPA considers this approach appropriate since, among other reasons, Outfall 003B's limits are not water quality-based; instead they are technology-based limits. (The derivation of water quality-based limits would depend on the discharge's flow rate.)

	Maximum daily (mg/l)	Max 30-day average (mg/l)
Oil and Grease	Report	Report
TSS	Report	Report
Copper, Total	1.0	1.0
Iron, Total	1.0	1.0
Flow, gpd	Report	Report

5.6.3 Outfall 003C (Internal Outfall, Flue Gas Desulfurization Wastewater)

EPA has developed technology-based effluent limits for Merrimack Station's flue gas desulfurization (FGD) wastewater treatment system (WWTS) to be applied at a new internal outfall location (Outfall 003C). These effluent limits are based on EPA's BPJ application of the BAT standard for the control of pollutants discharged from Merrimack Station's FGD WWTS. EPA's BPJ analysis is presented in the FGD WWTS Determinations Document, which is attached hereto as incorporated herein by reference. *See* Attachment E. This Determinations Document explains: 1) the legal basis for the BAT determination; 2) the rationale for the technologies chosen as the BAT; 3) the selection of pollutants to be addressed by the BAT-based limits; and 4) the justification for each draft effluent limit for internal outfall 003C. The Draft Permit requires that internal outfall 003C samples be collected before the FGD waste stream mixes with any other waste streams and prior to entering the Slag Settling Pond (Waste Treatment Plant No. 4).

The discharge from the FGD WWTS is proposed as an intermittent 70,000 gpd batch discharge. ~~**Therefore, the permit contains a daily maximum flow limit of 70,000 gpd, as well as a monthly average flow limit of 70,000 gpd.**~~

The following table lists the Draft Permit's technology-based effluent limits for Outfall 003C:

Parameter	003C Draft Permit Limits (Average Monthly)	003C Draft Permit Limits (Maximum Daily)
Arsenic	8 μg/l	15 μg/l

Boron	Report; µg/l	Report; µg/l
Cadmium	Report; µg/l	50 µg/l
Chromium	Report; µg/l	10 µg/l
Copper	8 µg/l	16 µg/l
Iron	Report; µg/l	**~~Report; µg/l~~**
Lead	Report; µg/l	100 µg/l
Manganese	Report; µg/l	3000 µg/l
Mercury	**~~0.022~~** ***Report;*** µg/l	**~~0.055~~** ***0.014*** µg/l
Selenium	10 µg/l	19 µg/l
Zinc	12 µg/l	15 µg/l
BOD_5	Report; mg/l	Report; mg/l
Chlorides	Report; mg/l	18,000 mg/l
Nitrogen	Report; mg/l	Report; mg/l
Phosphorus	Report; mg/l	**~~Report; mg/l~~**
TDS	Report; mg/l	**~~Report;~~** ***35,000*** mg/l

5.6.3.1 Comparison of Outfall 003C Effluent Limits to Outfall 003A Effluent Limits

While EPA has determined the technology-based effluent limits for pollutants discharged from the FGD WWTS (applied at Outfall 003C), NHDES has determined, through its antidegradation review, water quality-based limits necessary for several of these same pollutants (primarily to be applied at Outfall 003A). As discussed below, for certain constituents, EPA has conducted an analysis to compare the water quality-based limits and the technology-based limits. More specifically, EPA performed a mass balance analysis to compare Outfall 003A's water quality-based limits to Outfall 003C's BPJ technology-based effluent limits. This analysis was conducted to ensure the FGD WWTS treated effluent pollutant concentrations did not cause the water quality-based effluent limits at Outfall 003A to be exceeded.

The wet FGD scrubber system is a significant addition to Merrimack Station. The FGD wastewater treatment technologies are fairly new and evolving, and EPA has yet to develop NELGs (i.e., industrial category-wide technology-based limitations) for FGD WWTS effluent. Merrimack Station’s future FGD WWTS effluent has yet to be fully characterized and has the potential to adversely affect the Merrimack River’s water quality.

As the basis of its water quality-based limits, the NHDES conducted an antidegradation review, to ensure adequate protection of the river’s water quality even after the addition of the new FGD

WWTS effluent discharges. *See* Env-Wq 1708. This analysis assessed the potential effect on the river's water quality from the various pollutants expected to be in the FGD WWTS effluent. This analysis involved sampling to determine background concentrations of pollutants in the Merrimack River, as well as pollutant concentrations in Outfall 003A's current effluent. Using the data for the Outfall 003A effluent and the Merrimack River, NHDES did a mass balance and conducted a reasonable potential analysis to determine whether a specific pollutant had a reasonable potential to adversely affect the Merrimack River's water quality. For those pollutants that had reasonable potential to exceed water quality standards, NHDES proposed a water quality-based limit at Outfall 003A. NHDES antidegradation analysis did not directly impose effluent limits on pollutants in the FGD WWTS discharge. The water quality-based limits on the Slag Settling Pond's discharge, though, do set a "ceiling" or a maximum concentration for certain pollutants in the Slag Settling Pond. The FGD's WWTS, then, needs to treat these pollutants in its effluent to a level that does not cause pollutant concentrations in the Slag Settling Pond to exceed NHDES water quality-based derived effluent limits. Similarly, EPA's BPJ derived technology-based limits have to be set at a level that will not allow an increase of pollutant concentrations in the Slag Settling Pond that will cause Outfall 003's effluent to exceed NHDES water quality-based limits.

NHDES antidegradation review analyzed the potential for pollutants of concern that are likely to be present in the FGD WWTS. The pollutants of concern are aluminum, antimony, arsenic, beryllium, cadmium, chromium III, chromium VI, copper, iron, lead, manganese, nickel, selenium, silver, thallium, zinc, chlorides, ammonia (as N) and nitrates (as N). Five rounds of sampling of the Merrimack River and six rounds of sampling of Outfall 003A's effluent were analyzed for the pollutants of concern.

NHDES determined that four pollutants – aluminum, arsenic, copper and mercury – required water quality-based limits at Outfall 003A. EPA determined three of the previous four pollutants - arsenic, copper and mercury - required technology-based effluent limits at Outfall 003C. As previously mentioned, EPA conducted an analysis of the FGD WWTS treated effluent pollutants that did not cause the water quality-based effluent limits at Outfall 003A to be exceeded. EPA analysis focused on the pollutants of concern - cadmium, chromium (Total), iron, lead, manganese, selenium, zinc, chlorides and nitrogen (Total) - that the NHDES antidegradation analysis determined had no reasonable potential to exceed water quality standards.

In order to compare the water quality- and technology-based limits, EPA conducted a mass balance analysis to determine a water quality-based limit that would apply at Outfall 003C that would be equivalent to the water quality-based limits set by NHDES for cadmium, chromium (Total), lead, selenium, zinc, and manganese at Outfall 003A. (EPA did not apply a mass balance analysis for nitrogen (Total), chlorides and iron. Refer to EPA's discussion of those pollutants later in this section). The calculated water quality limit at 003C that is higher than the technology based effluent limit, would then demonstrate the technology-based limit has no potential to cause the water quality-based limit at Outfall 003A to be exceeded. The comparison of metals limits is presented below, with the caveat that EPA did not determine a BAT limit for aluminum. A limit for aluminum was not developed because EPA does not consider it a pollution of concern for the FGD WWTS effluent discharge. Outfall 003A, therefore, will have a water quality-based limit while Outfall 003C will not have a technology based limit.

Some of the water quality limits developed by the NHDES antidegradation analysis are expressed as dissolved metals. All metals limits in a NPDES permit must be expressed as "total recoverable metals" in accordance 40 C.F.R. §122.45 (c). For any of the Outfall 003C's water quality based limits that were expressed as dissolved metals, the water quality limit was converted to total recoverable metals by applying the metal conversion factors found in Env-Wq 1703.23.

Pollutants with No Reasonable Potential to Exceed New Hampshire Water Quality Standards

The NHDES antidegradation analysis determined discharges from Outfall 003A of antimony, beryllium, cadmium, chromium III, chromium VI, iron, lead, manganese, nickel, selenium, silver, thallium, zinc, ammonia (as N) and nitrates (as N) had no reasonable potential to cause the Merrimack River to exceed the state water quality standards. Discharges of each of these pollutants would utilize an insignificant, less than 20 per cent, portion of the ARAC. See Env-Wq 1708.09(c)(4). Accordingly, NHDES did not set water quality-based permit limits for these pollutants to be applied at Outfall 003A.

EPA does not regard the FGD WWTS effluent to be a source of antimony, beryllium, nickel, silver, or thallium. Therefore, no technology-based limits have been determined for these pollutants. EPA does, however, consider cadmium, chromium (Total), iron, lead, manganese, selenium, zinc, chlorides and nitrogen (Total) to be pollutants of concern contained in the FGD WWTS effluent; therefore, technology-based effluent limits have been developed, and/or reporting requirements specified, for these pollutants. Even though these pollutants do not have water quality-based limits, the technology-based limits at Outfall 003C still need to be sufficiently restrictive so as not to allow the pollutants concentration levels discharged from Outfall 003A to use more than 20 per cent of the ARAC of the Merrimack River. EPA has used a mass balance analysis to determine the maximum FGD WWTS effluent concentration that would use less than 20% of the ARAC.

Cadmium

NHDES antidegradation analysis calculated a limit of 9.8 µg/l for cadmium that would use less than 20 per cent of the ARAC of the Merrimack River, and concluded there was no reasonable potential for Outfall 003A's discharge to cause the Hooksett Pool to exceed water quality requirements for cadmium. EPA does consider, though, that cadmium is a pollutant of concern in Outfall 003C's effluent; therefore, the following analysis is performed to determine the equivalent FGD WWTS water quality-based effluent concentration that would use less than 20% of the ARAC.

Chromium

The NHDES antidegradation analysis sampled for both chromium (+3) and chromium (+6) in Outfall 003A's effluent. No chromium (+6) was detected; therefore, the assumption is made that all the total chromium is represented by chromium (+3). NHDES antidegradation analysis calculated a limit of 307.4 µg/l of chromium (+3) would use less than 20 per cent of the ARAC of the Merrimack River. NHDES concluded there was no reasonable potential for Outfall 003A's discharge to cause the Hooksett Pool to exceed water quality requirements for chromium (+3). EPA does consider, though, that chromium is a pollutant of concern contained in Outfall 003C's effluent; therefore, the following analysis is performed to determine the equivalent FGD WWTS water quality-based effluent concentration that would use less than 20% of the ARAC.

Lead

NHDES antidegradation analysis calculated a limit of 5.4 µg/l for lead that would use less than 20 per cent of the ARAC of the Merrimack River, and concluded there was no reasonable potential for Outfall 003A's discharge to cause the Hooksett Pool to exceed water quality requirements for lead. EPA does, however, consider lead to be a pollutant of concern in Outfall 003C's effluent; therefore, the following analysis is performed to determine the equivalent FGD WWTS water quality-based effluent concentration that would use less than 20% of the ARAC.

Selenium

With regard to selenium, the NHDES antidegradation analysis stated the following:

> "[s]elenium was identified as a pollutant likely to be present at elevated concentrations in FGD system effluent. The NHDES antidegradation calculations show there is assimilative capacity for selenium and no reasonable potential for a limit to be violated for outfall 003A as it exists now. However, NHDES has determined that a limit of 0.0571 mg/l may be needed to ensure that the discharge only causes an insignificant (<20%) lowering of water quality in the Merrimack River. This is due to the uncertainty as to the effluent concentration achievable with the new FGD WWTF which is reportedly between 3 and 9 mg/l….."

Ultimately, the NHDES proposed including monitoring requirements for selenium in the new permit and modifying the permit to add an effluent limit if the data collected showed that there was a reasonable potential the discharges above the 57.1 µg/l value. For its part, EPA considers selenium to be a pollutant of concern in Outfall 003C's effluent; therefore, the following analysis is performed to determine the equivalent FGD WWTS water quality-based effluent concentration that would use less than 20% of the ARAC.

Zinc

The NHDES antidegradation analysis also sampled for zinc, and calculated a limit of 434.4 µg/l that would use less than 20 per cent of the ARAC of the Merrimack River. NHDES concluded there was no reasonable potential for Outfall 003A's discharge to cause the Hooksett Pool to exceed the state's water quality standards for zinc. EPA does, however, consider zinc to be a pollutant of concern in Outfall 003C's effluent; therefore, the following analysis is performed to determine the equivalent FGD WWTS water quality-based effluent concentration that would use less than 20% of the ARAC.

Manganese

The NHDES antidegradation analysis calculated a limit of 952.9 µg/l for manganese that would use less than 20 per cent of the ARAC of the Merrimack River, and concluded there was no reasonable potential for Outfall 003A's discharge to cause the Hooksett Pool to exceed state water quality standards for manganese. PSNH has reported that the FGD WWTS can treat manganese to a level of 3000 µg/l. Since the FGD WWTS has not been characterized for manganese, the EPA has imposed 3000 µg/l as a limit for manganese at Outfall 003C; therefore, the following analysis is performed to determine the equivalent FGD WWTS water quality-based effluent concentration that would use less than 20% of the ARAC.

<u>Analysis for FGD WWTS Effluent Pollutants Using Less Than 20% of ARAC</u>

The equivalent water quality-based FGD WWTS effluent concentration[8] that would use less than 20% of the ARAC for either the aquatic life criteria or the human health criteria for cadmium, chromium, lead, selenium, zinc, and manganese is developed from the following mass balance formula:

$$(\mathrm{C_{SSP-WQ\ LIMIT}})(\mathrm{Q_{SSP(F)}}) = (\mathrm{C_{SSP-MAX\ CONC}})(\mathrm{Q_{SSP(P)}}) - (\mathrm{C_{SSP-MAX\ CONC}})(\mathrm{Q_{FGD\ MAKE-UP}}) + (C_{\mathrm{FGD\ WWTS}})(Q_{\mathrm{FGD\ WWTS}})$$

Rearranging:

$$\mathrm{C_{FGD\ WWTS}} = \frac{(\mathrm{C_{SSP-WQ\ LIMIT}})(\mathrm{Q_{SSP(F)}}) - (\mathrm{C_{SSP-MAX\ CONC}})(\mathrm{Q_{SSP(P)}}) + (\mathrm{C_{SSP-MAX\ CONC}})(\mathrm{Q_{FGD\ MAKE-UP}})}{Q_{\mathrm{FGD\ WWTS}}}$$

Where:

$C_{FGD\ WWTS}$	FGD WWTS Mass Balance Determined Effluent Concentration; Unknown, µg/l
$C_{SSP\text{-}WQ\ LIMIT}$	Outfall 003A Water Quality Limit (Average Monthly); µg/l Cd; 9.8 µg/l, Cr 307.4 µg/l, Pb 5.4 µg/l, Se 57.1 µg/l, Zn; 434.4 µg/l, Mn; 952.9 µg/l
$Q_{SSP(F)}$	Outfall 003A (Slag Settling Pond) Discharge (Future); 5.3 MGD.
$C_{SSP\text{-}MAX\ CONC}$	Outfall 003A Maximum Pollutant Concentration Sampled at Outfall 003A; µg/l Cd; 0.1857 µg/l, Cr 163 µg/l, Pb 1.06 µg/l, Se 1.5 µg/l, Zn; 18.58 µg/l, Mn; 55 µg/l
$Q_{SSP(P)}$	Outfall 003A (Slag Settling Pond) Discharge (Present); 6.3 MGD
$Q_{FGD\ MAKE\text{-}UP}$	FGD Make-up Water; 1.08 MGD

[8] EPA notes that, since the make-up water for the FGD system is drawn from the Slag Settling Pond, the FGD WWTS is also removing certain pollutants from the Slag Settling Pond itself. This will potentially result in a net reduction of certain pollutants being discharged from Outfall 003A.

$Q_{FGD\ WWTS}$	FGD WWTS Effluent Discharge; 0.07 MGD

A comparison of the resulting water quality-based limits to the technology-based effluent limits for cadmium, chromium, lead, selenium, zinc, and manganese is presented in the table below.

Pollutant (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Lead (µg/l)	Selenium (µg/l)	Zinc (µg/l)	Manganese (µg/l)
Outfall 003A Max. Conc. to Use Less <20% ARAC	9.8	307.4	5.4	57.1	434.4	952.9
Outfall 003C WQ-Based Limit (Total Recoverable Metals)	728.1	23153	329	4211.43	31504.75	68046.71
Outfall 003C-Technology Based Limit	50	10	100	19	15	3000
Outfall 003A Water Quality-Based Limits Are Not Caused to Exceed by Technology-Based Limits						

Thus, the technology-based effluent limits for Outfall 003C for cadmium, chromium, iron, lead, selenium, zinc and manganese will not cause the water quality-based limits at Outfall 003A to be exceeded.

<u>Nitrogen</u>

The NHDES antidegradation analysis compared ammonia and nitrate in the current discharge from 003A to the State's water quality criteria and found no reasonable potential for either of these criteria to be exceeded. In order to characterize the nitrogen content and concentrations of the various wastewater streams at Merrimack Station, EPA has required monitoring of Total Nitrogen at Outfall 003C and Ammonia Nitrogen and Nitrogen at Outfall 003.

Discharges of Ammonia Nitrogen and Nitrogen can contribute to the depletion of a water body's dissolved oxygen levels. This can, in turn, cause a variety of adverse water quality and habitat effects. The U.S. Army Corps of Engineers is working on a dissolved oxygen model for the Merrimack River. The results of this modeling analysis could lead to the conclusion that nitrogen limits are needed in Merrimack Station's NPDES permit. In that case, new limits could be added through a permit modification or the next time the permit is reissued.

<u>Chlorides</u>

In Merrimack Station's wet limestone forced oxidation FGD system, limestone slurry is sprayed into an absorber (or scrubber) unit where it comes in contact with flue gas from the boiler. This contact removes pollutants, of which chlorides are a component, from the flue gas. The chloride concentration level that ultimately enters the FGD WWTS depends on the coal's chloride content and coal burn rate. The slurry is re-circulated back in to the absorber (with the addition of some fresh slurry), while a portion of the slurry is pumped to a hydroclone (or "purged"). The hydroclone separates gypsum crystals from the slurry's liquid content. The gypsum crystals are sent back to the absorber, while the liquid component, containing chlorides, enters the FGD WWTS.

With respect to chlorides, NHDES's antidegradation analysis states that "[t]here is no reasonable potential for the existing discharge to cause a violation of the chronic aquatic life criteria for chloride. Similar to selenium, however, chloride was identified as a pollutant likely to be present at elevated concentrations in FGD system effluent. Due to the uncertainty as to the effluent quality, NHDES has determined that it would be appropriate to require monitoring for chloride." EPA, though, has made a BPJ determination, based on PSNH expectation that the FGD WWTS effluent discharge would have a chlorides concentration of 18,000 mg/l, to impose a limit of 18,000 mg/l at Outfall 003C.

<u>Iron</u>

The NHDES antidegradation analysis calculated a limit of 9671 µg/l for iron that would use less than 20 per cent of the ARAC of the Merrimack River, and concluded that there was no reasonable potential for Outfall 003A's discharge to cause the Hooksett Pool to exceed the state's water quality standards for iron.

Ferric chloride is added to FGD's physical/chemical treatment process to co-precipitate various heavy metals. EPA generally does not set effluent limits for parameters, in this case iron in the form of ferric chloride, that are used as wastewater treatment chemicals.

5.6.4 Outfall 003D (Internal Outfall, Cooling Tower Blowdown)

EPA anticipates that PSNH will convert Merrimack Station's current once-through cooling system to a closed-cycle system in order to meet the Draft Permit's thermal discharge and cooling water intake flow requirements. The rationale for these requirements is found in EPA's Determination Document for the Thermal Discharge and Cooling Water Intake Structure. Therefore, EPA has established a new internal outfall (003D) for the wastewater discharge from the anticipated cooling towers (i.e., for the cooling tower blowdown).

In response to an EPA CWA Section 308 information request, PSNH submitted preliminary plans for a 14-cell, linear-arranged, mechanical draft cooling tower array for Merrimack Station. As shown on these preliminary installation drawings, the cooling tower blowdown would be directed to the discharge canal.

Cooling tower blowdown is limited, in part, by technology-based NELGs found in 40 C.F.R. §423.13(d)(1). The NELGs limit discharges of free available chlorine (FAC) and prohibit the discharge of any of the 126 priority pollutants (no detectable amounts), except total chromium and total zinc, as a result of using cooling tower maintenance chemicals. Additionally, the NELGs specify that neither FAC nor total residual chlorine may be discharged from any unit for more than two hours in any one day, and not more than one unit in any plant may discharge chlorine at any one time. (The NELGs allow for an exception to this requirement if the utility can demonstrate that the units in a particular location cannot operate at or below this level of chlorination). Accordingly, the Draft Permit contains a prohibition on the time allowed for chlorination (2 hours) and specifies that multi-unit chlorination is prohibited.

Therefore, consistent with the NELGs for cooling tower blowdown found at 40 C.F.R. § 423.13(d)(1), the Draft Permit includes a limit of 0.2 mg/l of free available chlorine on a daily average basis, and a limit of 0.5 mg/l of free available chlorine on a maximum basis ("instantaneous maximum"). These limits apply to the blowdown waste stream, prior to mixing with any other waste stream. In addition, consistent with the NELGs at 40 C.F.R. § 423.13(d)(1), the Draft Permit prohibits the discharge of any of the 126 priority pollutants contained in cooling tower maintenance chemicals in detectable amounts, except for chromium and zinc. For these metals, the NELGs provide technology-based limits based on the BAT standard, S*ee* 40 C.F.R. § 423.13(d)(1), and EPA has included these limits in the Draft Permit, as presented below. The NELGs allow, at the permitting authority's discretion, the use of engineering calculations (i.e., a mass balance which shows that any priority pollutants contained in cooling tower chemicals would not be detectable in the final discharge) to show compliance with the prohibition on the discharge of priority pollutants.

EPA has determined that the waste heat rejected, i.e. the Btu load, to the Merrimack River by the plant must comply with the BAT technology standard. EPA developed the BAT requirements using Best Professional Judgment (BPJ). *See* Sections 7 and 9 of the Determination Document for the Thermal Discharge and Cooling Water Intake Structure. Therefore, the following limits on the discharge of heat, expressed in millions of British thermal units per month (MBtu/month), have been applied to outfall 003D in the Draft Permit:

Month	Maximum Heat Load (MBtu/Month)
January	6846
February	5605
March	7417
April	7200
May	6156
June	4058
July	3260
August	3388
September	4389

October	5941
November	7784
December	6910
Yearly Total	94,703

The Btu load is a function of the cooling towers blowdown rate and the temperature difference between the cooling tower makeup water drawn from the Merrimack River and the cooling tower blowdown. *See* Merrimack Station Draft Permit Footnote 16, page 22 (Equation for calculating daily heat load discharged to the Merrimack River). The values will then be summed to determine the total monthly heat load.

The Draft Permit's non-thermal limits and conditions for internal outfall 003D are in accordance with 40 C.F.R. §423.13(d)(1):

	Instantaneous Max. (mg/l)	Average (mg/l)
Free Available Chlorine	0.5	0.2

	Maximum daily (mg/l)	Max 30-day average (mg/l)
126 Priority Pollutants	No Detectable Amount	No Detectable Amount
Chromium, Total	0.2	0.2
Zinc, Total	1.0	1.0
Flow, MGD	1.2	Report

5.6.5 Outfall 003 (Point Source Discharge to Merrimack River)

As previously explained in this Fact Sheet, outfall 003 is the facility's main direct point source discharge to the Merrimack River, and the existing permit allows internal outfalls 001 and 002 (once-through cooling water) to discharge through it. Since the Draft Permit discontinues the permitted use of outfalls 001 and 002, while adding several new internal outfalls (003B (as modified), 003C and 003D), several changes to the existing permit's conditions are necessary.

Flow

The existing permit contains a discharge flow limit of 265.3 MGD (monthly average) and 275.4 MGD (daily maximum). The Draft Permit contains average monthly and daily maximum flow limits at all internal outfalls. Therefore, a flow limit is not necessary for outfall 003. EPA has replaced the existing permit's flow limit with a "report" only requirement. The permittee may sum the flows for the internal outfalls and report this value. The sum of the internal outfall flow values will be far below the existing permitted flow at 003, due to the discontinued use of once-through cooling water.

Oil and Grease

The existing permit requires the permittee to report a daily maximum oil and grease value, based on monthly sampling. A review of DMR data indicates non-detectable values of oil and grease at this outfall. The Draft Permit contains appropriate technology-based oil and grease limits at internal outfalls. EPA believes compliance with the internal oil and grease limits will ensure protection of the Merrimack River from elevated levels. Therefore, EPA has removed the daily reporting requirement for outfall 003 from the permit.

Dissolved Oxygen

The existing permit requires the permittee to maintain a minimum of 75% saturation of Dissolved Oxygen (DO) in the effluent at outfall 003.

For the past five years, the average DO level for samples taken at Merrimack Station has been 88.4% saturation with a variance of 2.5%. *See* Attachment F; Discharge Monitoring Report Summary. The DO sampling results show no reasonable potential to drop below New Hampshire's water quality standard of 75% DO saturation for Class B waters. The Draft Permit requires significant reductions of heat discharges (i.e., by approximately 95%). Since the amount of oxygen that will dissolve in water is a function of temperature, reducing the heat load to the river can only serve to improve DO levels. This fact, together with the data indicating that present conditions do not adversely affect DO levels, indicates that it is appropriate to discontinue the existing permit's DO limit. Therefore, EPA has removed this requirement from the Draft Permit.

Total Residual Oxidants

The biocide employed at Merrimack Station is chlorine. The existing permit imposes a water quality-based acute limit (daily maximum) of 0.026 mg/l at outfall 003, and technology-based requirements applied at outfalls 001 and 002 that limit chlorination to no more than two hours in any one day and set a limit of 0.2 mg/l on discharges of Total Residual Oxidants (TROs). As previously discussed, the Draft Permit discontinues the permitted use of outfalls 001 and 002 (once-through cooling). The Draft Permit places a technology-based Free Available Chlorine limit on internal outfall 003D. Therefore, it is necessary to determine whether a water quality-based limit at outfall 003 is still necessary to control the discharge of chlorine from the station. In other words, EPA must decide whether the technology-based chlorine requirements are sufficiently stringent to protect water quality.

First for this determination a water quality-based total residual chlorine limit must be calculated for Outfall 003. This is accomplished through use of a mass balance equation recognizing that Outfall 003's flow now consists only of the combination of discharges from Outfalls 003A (Slag Settling Pond) and 003D (Cooling Tower Blowdown). The effluent discharges of Outfalls 001 and 002 have been eliminated consistent with the use of closed-cycle cooling at Merrimack Station. It should be noted that Outfall 003A's flow rate was taken from PSNH's May 5, 2010, revision to the application for renewal of Merrimack Station's NPDES permit. Outfall 003D's flow rate was obtained from PSNH's November 2007 response to an EPA information request. Concentration data used is from field sampling data gathered for the NHDES-directed FGD WWTS antidegradation study. The equations and calculations for the mass balance analysis are presented below.

$$Q_{003}C_{003} + Q_{MR}C_{MR} = Q_r(0.9 \times C_r)$$

Where:

Q_{003}	$Q_{003} = Q_{003A}$ (Slag Settling Pond; max. flow) + Q_{003D} (Cooling Tower Blowdown) Q_{003} = 13.0 mgd + 1.19 mgd Q_{003} = 14.19 mgd
C_{003}	Outfall 003 Acute Total Residue Chlorine Limit; Unknown mg/l
Q_{MR}	Merrimack River 7Q10; 365.5 mgd
C_{MR}	Background Chlorine Concentration for Merrimack River; 0.001 mg/l (assumed)
0.9	10% Reserve of NH Rivers' Assimilative Capacity (*See* Env-Wq 1705.01)
Q_r	Q_r = Resultant Merrimack River Flow Downstream of Outfall 003 (Since water is drawn from the Merrimack River by the Station and ultimately returned to the river, The net Merrimack River flow is not increased.) Q_r = 379.7 mgd
Cr	Chlorine Acute Water Quality Limit; 0.019 mg/l (*See* Env-Wq Table 1703.1)

Rearranging to solve for C_{003}:

$$C_{003} = \frac{[Q_r(0.9 \times C_r) - Q_{MR}C_{MR}]}{Q_{003}}$$

$$C_{003} = \frac{[(379.69)(0.9 \times 0.019) - 365.5 \times 0.001)]}{14.19}$$

$$C_{003} = 0.43 \text{ mg/l}$$

The preceding calculation shows that in order not to exceed the acute water quality limit for Total Residual Chlorine; Outfall 003 would require an acute chlorine limit of 0.43 mg/l.
It is noted that the present permit has water quality-based total residual oxidant limit for Outfall 003 of 0.026 mg/l. Since the Draft Permit requires the installation of closed cycle cooling or its equivalent the once through cooling water flow discharged from Outfalls 001 and 002 have been eliminated. The elimination of a volume of once through cooling water of over 300 mgd is

reflected in the chlorine concentration that can be discharged from Outfall 003. A lower discharge flow from Outfall 003, as compared to the much greater flow of the Merrimack River, provides more dilution for chlorine. Chlorine concentrations discharged from Outfall 003, then, can be as high as 0.43 mg/l without adversely affecting the water quality of the Merrimack River.
The next step in the analysis is to determine the highest Total Residual Chlorine that can be discharged from Outfall 003D that will not result in Outfall 003's chlorine concentration exceeding 0.43 mg/l. This determination is accomplished by solving a mass balance equation:

$$Q_{003A}C_{003A} + Q_{003D}C_{003D} = Q_{003}C_{003}$$

Where:

Q_{003A}	Outfall 003A Maximum Flow; 13 mgd Note: Maximum flow is used since chlorination is limited to 2-hours per day; therefore only an acute limit is calculated.
C_{003A}	Outfall 003A Chlorine Concentration; ≤ 0.05 mg/l Note: Chlorine concentration value from PSNH NPDES reapplication.
Q_{003D}	Outfall 003D Projected Flow; 1.19 mgd
C_{003D}	Outfall 003D Chlorine Concentration; Unknown mg/l
Q_{003}	Outfall 003 Maximum Flow; 14.19 mgd.
C_{003}	Max. Chlorine Concentration; 0.43 mg/l.

Rearranging to solve for C_{003D}:

$$C_{003D} = \frac{Q_{003}C_{003} - Q_{003A}C_{003A}}{Q_{003D}}$$

$$C_{003D} = \frac{(14.19)(0.43) - (13)(0.05)}{1.19}$$

$$C_{003D} = 4.6 \text{ mg/l}$$

The above analysis shows that a maximum Total Residual Chlorine level of 4.6 mg/l could be permitted at Outfall 003D while maintaining suitable water quality.

It is recognized when chlorine is added to water as a biocide a percentage of the chlorine is deactivated by sunlight, experiences reduction by chemical reactions, converted to less active forms of chlorine by substances in the water, or is taken up in the biocide mechanisms. Whatever uses up the chlorine to make it ineffective is called the chlorine demand. The remaining chlorine is accounted for as Total Residual Chlorine. Total Residual Chlorine is a measure of the Combined Available Chlorine and the Free Available Chlorine after the demand has been met. While this Total Residual Chlorine value can remain the same, the ratio of all the chlorine compounds that make up this value can vary depending on the pH. A chlorine biocide produces hypochlorous acid (HOCl) and hypochlorite ion (OCl-). Free Available Chlorine consists of HOCl and OCl-. At a pH of 7.3 there are roughly equal amounts of HOCl and OCL-. For a pH less than 7.3 there is greater concentrations of HOCl, and for a pH higher than 7.3 the OCl- is higher. Combined Available Chlorine is Free Available Chlorine which has reacted with ammonia in the water to produce chloramines. Chloramines also have biocide properties.

Free Available Chlorine, which is a subset of Total Residual Chlorine, is limited to an instantaneous maximum value of 0.5 mg/l at outfall 003D. Based on the various chemicals added to a cooling tower for water treatment, it would be difficult to predict that the Free Available Chlorine instantaneous limit of 0.5 mg/l can be used to determine that the Total Residual Chlorine concentration in Outfall 003D's effluent did not exceed 4.6 mg/l. If Outfall 003D's chlorine concentration does exceed Total Residual Chlorine 4.6 mg/l, this can cause Outfall 003 Total Residual Chlorine concentration to exceed a water quality limit of 0.43 mg/l. The Draft Permit removes Outfall 003's Total Residual Chlorine limit because, based on the analysis and factors discussed above, there is no reasonable potential for an in-stream excursion of chlorine above the water quality standards. The Draft Permit, however, does require monitoring of Total Residual Chlorine at Outfall 003 for one year after the issue of the Final Permit. If the Total Residual Chlorine effluent concentrations demonstrate a reasonable potential to exceed the 0.43 mg/l water quality limit for chlorine, the permit may be modified or, alternatively, revoked and reissued to incorporate additional testing requirements and specific Total Residual Chlorine limits.

pH

The Draft Permit retains the pH limits from the existing permit range of 6.5-8.0 standard units (s.u.). The facility's internal outfalls are subject to technology-based limits, but these limits (range of 6 -9 s.u.) are less stringent for pH than the water quality-based limits. Therefore, it is necessary to maintain the final end-of-pipe effluent pH limits range of 6.5 to 8.0 to ensure that the discharge continues to meet the NH DES water quality standards for pH unless the permittee can demonstrate to NHDES-WD: (1) that the range should be widened due to naturally occurring conditions in the receiving water or (2) that the naturally occurring receiving water pH is not significantly altered by the permittee's discharge. The scope of any demonstration project must receive prior approval from NHDES-WD. In no case, shall the above procedure result in pH limits outside the range of 6.0 – 9.0 SU, which is the federal effluent limitation guideline regulation for pH for the Steam Electric Generating Point Source Category and is found in 40 C.F.R. §3 423.12(b)(1).

Whole Effluent Toxicity

EPA's Technical Support Document for Water Quality-based Toxics Control, EPA/505/2-90-001, March 1991, recommends using an "integrated strategy" containing both pollutant-specific (chemical) approaches and whole effluent toxicity (biological) approaches to control toxic pollutants in effluent discharges entering the nation's waterways. EPA-New England adopted such an "integrated strategy" on July 1, 1991, for use in permit development and issuance. These approaches are designed to protect aquatic life and human health. Pollutant-specific approaches, such as those in the Gold Book and State regulations, address individual chemicals, whereas the whole effluent toxicity (WET) approach evaluates interactions between pollutants, thus rendering an "overall" or "aggregate" toxicity assessment of the effluent. Stated differently, WET testing can reveal the "Additive" and/or "Antagonistic" effects of individual chemical pollutants, while pollutant-specific approaches do not. In addition, the presence of any unknown toxic pollutants may be indicated and evaluated by WET testing. Therefore, both pollutant-specific and WET testing is needed.

Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts, and New Hampshire law states that "all waters shall be free from toxic substances or chemical constituents in concentrations or combinations that injure or are inimical to plants, animals, humans, or aquatic life ...." (N.H. RSA 485-A:8, VI and the N.H. Code of Administrative Rules, PART Env-Wq 1703.21(a)). The federal NPDES regulations at 40 C.F.R. §122.44(d)(1)(v) require whole effluent toxicity limits in a permit when a discharge has a "reasonable potential" to cause or contribute to an excursion above a state's narrative criterion for toxicity.

Typically, where EPA believes toxicity testing and limits are appropriate and necessary as described in the previous paragraph, the type of toxicity testing (acute and/or chronic) and the effluent limitation (LC50 and/or C-NOEC) are established based on the available dilution. The LC50 is defined as the concentration of toxicant, or in this draft permit as percentage of effluent, that would be lethal to 50% of the test organisms during a specific time period. The C-NOEC (Chronic-No Observed Effect Concentration) is defined as the highest concentration effluent to which organisms are exposed in a life cycle or partial life cycle test, which causes no adverse effect on growth, survival or reproduction where the test results (growth, survival and/or reproduction) exhibit a linear dose-response relationship. In those instances where these test results do not exhibit a linear dose-response relationship, the permittee is required to report the lowest concentration where there is no observable effect.

In Merrimack Station's case, based on a recalculated acute dilution factor (DF_a) and chronic dilution factor (DF_c) of:

$$\mathrm{DF} = \frac{(0.646)(7Q10)(0.9)}{(Q_{MR})}$$

$$DF_a = \frac{(0.646)(578.02)(0.9)}{14.2} = 23.67 \qquad DF_c = \frac{(0.646)(578.02)(0.9)}{6.52} = 51.7$$

Where:

DF	Dilution Factor (DF); Acute or Chronic
0.646	Conversion Factor; cubic feet per second (CFS)to millions of gallons per day (mgd)

7Q10	The lowest average flow which occurs for 7 consecutive days on an annual basis with a recurrence interval of once in 10 years on average. Merrimack River 7Q10 at Merrimack Station; 578.02 cfs
0.9	10% of water body's assimilative capacity held in reserve. *See* Env-Wq 1705.01
Q_{MR}	Merrimack Station Outfall 003 permitted flow; 14.2 mgd (max day), 6.5 mgd (ave monthly)

the WET permit limit for LC50 would be 100% and C-NOEC would be report. The WET testing would use the species Daphnid (Ceriodaphnia dubia) and Fathead Minnow (Pimephales promelas).

Substantial changes to Merrimack Station's current operations are necessary in order for the station to meet the Draft Permit's heat and flow limits. The potential toxicity of the facility's remaining discharges cannot be known at this point, although EPA believes it is relatively low, based on the re-calculated dilution factor and knowledge of other power plants using cooling towers (such as Newington Power). However, in order to properly evaluate the station's discharge going forward, EPA has included a "report only" WET test result (quarterly).

The quarterly sampling for the WET test requirement shall be collected and tests completed during the calendar quarters ending in March 31st, June 30th, September 30th and December 31st each year. Results are to be submitted to the EPA and the NHDES by the 15th day of the month following the end of the quarter sampled. For example, tests results for the quarter beginning on April 1st and ending June 30th are due by July 15th.

As a special condition of this Draft Permit, the frequency of testing may be reduced if authorized by a certified letter from the EPA. This permit provision anticipates that the permittee may wish to request a reduction in WET testing. After completion of a minimum of four consecutive WET tests, all of which must be valid tests and must demonstrate compliance with the permit limits for whole effluent toxicity, the permittee may submit a written request to EPA seeking a review of the toxicity test results. EPA will review the test results and other pertinent information to make a determination of whether a reduction in testing is justified. The frequency of toxicity testing may be reduced to as little as one test per year. The permittee is required to continue testing at the frequency specified in the permit until the permit is either formally modified or until the permittee receives a certified letter from the EPA indicating a change in the permit conditions. This special condition does not negate the permittee's right to request a permit modification at any time prior to the permit expiration.

Alternatively, if toxicity is found, monitoring frequency, testing requirements and effluent limits may be increased or altered. The permit may also be modified or, alternatively, revoked and reissued to incorporate additional toxicity testing requirements or chemical-specific limits. The results of these future toxicity tests would be considered "new information not available at permit development;" therefore, this information could provide the basis for modifying the permit under 40 C.F.R. §122.62(a)(2).

This Draft Permit requires the reporting of selected parameters determined from the chemical analysis of the WET test 100% effluent samples. Specifically, parameters for ammonia nitrogen as nitrogen, hardness, and total recoverable aluminum, cadmium, copper, chromium, lead, nickel, and zinc are to be reported on the appropriate Discharge Monitoring Reports for entry into the EPA's Integrated Compliance Information System (ICIS) (Note: ICIS is a secure system only available to EPA and state users. The public can access compliance monitoring and enforcement data through the Enforcement and Compliance History Online (ECHO)). EPA - New England does not consider these reporting requirements an unnecessary burden as the reporting of these constituents is already required with the submission of each toxicity report (*See* Draft Permit, ATTACHMENT A, page A-8).

5.6.6 Outfall 004 (Traveling Screen Wash Water, CWIS Floor Sumps, CWIS Forebay Deicing Discharge, Fire Main Overflow).

This outfall is the combination of flows from the following sources: traveling screen wash water (1.72 mgd), floor sumps (110 gpd), roof drains (27 gpd), fire main pipe overflow (0.72 mgd), equipment deicing steam (100 gpd), deicing headers (21 mgd, 90 days per year), and ice dam removal spray (0.3 mgd). As discussed in section 5.4.7, the existing permit allowed one outfall designation for the 5 distinct outfall pipes. EPA is now assigning individual outfall designations for each pipe in this Draft Permit, with appropriate limits and conditions. This is discussed below.

Outfall 004A - Unit 1 and Unit 2 Traveling Screens Wash Water

Pumps are used to draw the traveling screen wash water from the CWIS wet well. This water is sprayed on the trash racks to remove vegetation and aquatic organisms from the traveling screens. The pumps are also used to dewater the wet well during prolonged periods of generating unit maintenance. Since the water for the traveling screen wash is drawn directly from the CWIS wet well, it is essentially unadulterated Merrimack River water. The existing permit's requirement to report daily maximum flow and pH is carried over to the Draft Permit.

Outfall 004B - Fire Main Pipe Overflow and Ice Dam Removal Spray

The fire protection system also draws its water from the CWIS wet well. The fire protection pump periodically discharges water to relieve pressure spikes that occasionally occur in the system's piping. During the winter, predominately from mid-December through mid-March, the fire protection pump overflow is directed to the river area just in front of the intakes. This jet of water is used to deflect large pieces of river ice from colliding with and damaging the trash racks.

As with the screen wash water, the fire protection system water is drawn from the CWIS wet well and is essentially unadulterated Merrimack River water. There is a possibility, however, that this water could become contaminated from oil and grease contained in the fire protection pumps. The existing permit allowed for daily visual inspection in lieu of sampling for oil and grease, and a grab sample was only required if the results of this visual inspection identified an oil sheen. The existing permit did not, however, require the permittee to record the results of these visual inspections. Therefore, it is presently unclear to EPA how this requirement was carried out or what the inspections revealed. Accordingly, the Draft Permit replaces these requirements with a requirement to sample the discharge and record and report the results to EPA and NHDES.

Additionally, the requirement to report the estimated total annual maximum flow and pH is carried over from the existing permit.

Outfall 004C - Floor Sumps

The two CWISs have a floor sump which collects water from leaks and water drained from piping runs that are undergoing repairs. Water draining to these sumps comes from the CWIS wet well. Water running across the floor could entrain any oil and grease that may be on the floor, and the discharge from the sump pumps could also be polluted by oil and grease leaking from the pumps.

As explained above, the existing permit only required a visual inspection for oil and grease. This has been replaced with a sampling and reporting requirement in the Draft Permit. Sampling is required once per quarter. Additionally, the requirement to report the estimated total annual maximum flow and pH is carried over from the existing permit.

Outfall 004D - Deicing Headers

Throughout the winter months, warmed water is intermittently pumped from the discharge of both generating units' condensers to the screen house bays to prevent ice buildup. The warmed water is discharged through submerged diffusers located in front of each CWIS's trash racks. Approximate flow volumes at maximum operation for once-through cooling are approximately 8 MGD for Unit 1 and 13 MGD for Unit 2.

This discharge was inadvertently not included in the existing permit. The warmed water is taken from piping that carries the condenser discharges to either Outfall 001 or 002. The heated (and chlorinated) water is considered a discharge of pollutants to waters of the United States and, therefore, needs to be permitted under the NPDES program. Therefore, EPA has included appropriate limits and monitoring requirements for this discharge, as discussed below. Additionally, the requirement to report the estimated total annual maximum flow and pH is carried over from the existing permit.

Chlorine

Merrimack Station injects chlorine two hours per day into its condensers. The chlorine injection is used as a biocide treatment to prevent organisms from growing on the condenser tubes. Any organisms entering the screen house bay could be adversely affected by the deicing water if it contained elevated levels of chlorine. The Draft Permit has a requirement for Outfall 004D that during chlorination of the condensers the each screen house traveling screen shall be continuously rotated to reduce the amount of time impinged organisms are subjected to high levels of chlorine. The Draft Permit also provides the option of employing an alternative water source that is not chlorinated for screen washing or dechlorinate the screen wash water. deicing water discharge must be secured. Additionally, the screen house bay deicing discharge will include requirements to monitor pH and report the maximum annual daily flow.

Deicing Header's Heat Load

It is necessary to keep the cooling water intakes free of ice during cold weather for Merrimack Station to operate. EPA has included a requirement that the deicing water discharge to the CWIS forebays not discharge into the Merrimack River.

Additionally, EPA is requiring that this discharge meet the NHDES thermal mixing zone requirements, thereby ensuring that the discharge meets water quality standards for heat. These requirements specify that: the thermal plume from outfall 004D shall (a) not block zones of fish passage, (b) not change the balanced, indigenous population of organisms utilizing the receiving water, (c) have minimal contact with the surrounding shorelines, and (d) not cause acute lethality to swimming or drifting organisms. *See* Env-Wq 1707.2.

Flow

Merrimack Station's current once-through cooling operation draws in a maximum flow of 200,150 gpm. During the winter months recirculated water from the condenser is discharged into the intake forebays at 14,590 gpm to prevent ice accumulation. The de-icing discharge represents 7.29% of the Merrimack Station's intake flow. The conversion to closed-cycle cooling will reduce the average intake water flow to 9,930 gpm. Based on this decrease in water use at Merrimack Station, it is appropriate to decrease the amount of deicing header water discharged to the forebays. Applying, then, the same percentage as under current conditions, with 7.29% of the intake flow to be used for deicing, the Draft Permit has a deicing flow discharge limit of 1.0 MGD.

Discontinued - Unit 2 CWIS Structure Roof Drains

The existing permit included the roof drains from Unit 2's CWIS as part of Outfall 004. EPA has visually inspected Unit 2's CWIS twice, and has determined that including these roof drains as part of Outfall 004's discharge is not appropriate. These roof drains convey rain water from the CWIS roof and drain it to the ground. The roof drains do not constitute a point source with a direct discharge to the Merrimack River. Accordingly, the roof drains have been removed as a component of Outfall 004's discharge.

5.6.7 Outfall 005 (Maintenance Sumps)

Intake Screen House Maintenance Sump Pumps

During extended maintenance outages a coffer dam is installed in either the MK-1 or MK-2 CWIS to isolate the wet well from the screen house forebay. After the wet well is dewatered by the screen wash pumps, inspection and repair of the cooling water pump vanes and related equipment can occur. Water that leaks in from the Merrimack River drains to two floor sumps in each intake screen house. Water in these sumps, up to 300,000 gpd, is pumped to the Merrimack River by the intake screen house maintenance sump pumps. It is possible that this sump water could become contaminated with oil and grease from the intake screen house maintenance sump pumps. The existing permit called for an analysis only if sheen of oil and grease was visible on inspection. As explained above, this requirement has been replaced in the Draft Permit with a requirement to sample and report the results for oil and grease. Additionally, the requirement to report the estimated total annual maximum flow and pH is carried over from the existing permit.

5.6.8 Cooling Water Intake Structure Requirements Under CWA § 316(b)

EPA has determined that significant changes to Merrimack Station's current CWIS operation are necessary to satisfy CWA § 316(b)'s, 33 U.S.C. § 1326(b), requirement that the location, construction, design and capacity of the facility's CWIS reflect the Best Technology Available for minimizing adverse environmental impacts (BTA). EPA presents the basis for its BTA determination in Section 12 of EPA's Determination Document for the Thermal Discharge and Cooling Water Intake Structure. The Draft Permit specifies the following requirements based on EPA's determination of the BTA at Merrimack Station:

- that Units 1 and 2 limit intake flow volume to a level consistent with operating in a closed-cycle cooling (CCC) mode from, at a minimum, April 1 through August 31 of each year (1.77 MGD for Unit 1, 4.20 MGD for Unit 2);
- during any periods that Units 1 and 2 are operating in an open-cycle mode, new travelling screens (or screen inserts) employing all the features of a modified Ristroph, MultiDisc, or WIP screen design shall be installed and operated for the CWISs. At a minimum, these screens shall have:
  - A mesh size no greater than 3/8-inch using smooth-woven screen mesh to minimize fish de-scaling; and
  - Fish buckets that provide a hydraulically stable "stalled" fluid zone that attracts fish, prevents injury to the fish while in the bucket, and prevents fish from escaping the bucket.
- that a low-pressure ($\leq$10 psi) spray wash system be used for each travelling screen to remove fish prior to high-pressure washing of the screens for debris removal;
- that the location of the low-pressure spray systems shall be optimized to transfer fish gently to the return sluice;
- that travelling screens be operated continuously;
- that a new fish return sluice with the following features be installed for each CWIS:
  - Maximum water velocities of 3-5 ft/s within the sluice;
  - A minimum water depth of 4-6 inches at all times;
  - No sharp-radius turns (i.e., no turns greater than 45 degrees);
  - A point of discharge to the river that is slightly below the low water level at all times;
  - A removable cover to prevent access by birds, etc;
  - Escape openings in the removable cover along the portion of the sluice that could potentially be submerged; and,
  - A slope not to exceed a 1/16 foot drop per linear foot, unless the plant can demonstrate that this is not feasible.
- that the fish return sluice will be in place and operational at all times.

It is important to note here that the above-described CWIS-related requirements are separate from the restrictions on Merrimack Station's thermal discharge. Nevertheless, steps to comply with the thermal discharge requirements may affect the approach to complying with the CWIS requirements. Specifically, EPA expects that Merrimack Station will satisfy the thermal load restrictions by employing wet, mechanical draft cooling towers year-round. In that case, the facility would more than satisfy the above-described CWIS requirements (by achieving a year round reduction in cooling water withdrawals consistent with closed-cycle cooling). In other words, by meeting the BAT thermal discharge requirements using mechanical draft cooling towers, the facility would also satisfy the intake flow restrictions under CWA § 316(b). The interaction of the new draft permit's requirements for thermal discharges and water withdrawals for cooling are discussed in greater detail in Section 13 of EPA's Determination Document for the Thermal Discharge and Cooling Water Intake Structure.

5.6.9 Biological Monitoring Program

BAT- based temperature limits under CWA §§ 301 and 304 developed by EPA for this permit are based on Merrimack Station operating both units in closed-cycle cooling mode year-round. EPA also determined under CWA § 316(b) that the BTA for reducing adverse environmental effects associated with this plant's CWISs is to reduce water withdrawals from the Merrimack River to a level consistent with operating both units in a closed-cycle cooling mode from April 1 through August 31. Since the BAT requirements will likely result in the year-round operation of closed-cycle cooling for both units, and this should reduce thermal discharges, as well as entrainment and impingement, by approximately 95 percent or more, EPA has concluded that the existing permit's routine biological monitoring will no longer be needed, except for "unusual impingement events," and has designed the Draft Permit accordingly (*See* Section 5.6.10).

5.6.10 Unusual Impingement Events

The Draft Permit requires that the permittee report all "unusual impingement events" at the plant. An "unusual impingement event" is defined as the impingement of fish above normal, historical rates (i.e., number of fish per 8-hours). The Draft Permit requires that the travelling screens for Units 1 and 2 be rotated and visually inspected at least every eight hours while the unit's circulation pumps are operated.

If the permittee observes on the travelling screens, or estimates, based on temporally-limited observations, 40 or more impinged fish within an 8-hour period, the permittee is required to notify EPA and NHDES by telephone within 24 hours. The permittee will then be required to run the affected travelling screens continuously until the impingement rate drops below 5 fish per hour.

In addition, PSNH is required to submit a written confirmation report to EPA and NHDES within five business days. These oral and written reports must include the following information:

- All dead fish shall be enumerated and recorded by species. Report the species, size ranges, and approximate number of organisms involved in the incident. In addition, from a representative sample of 25 percent of each fish species killed, up to a maximum of 25 total fish specimens from each species, impinged fish shall be measured to the nearest centimeter total length.
- The time and date of the occurrence.
- The operational mode of the specific system that may have caused the occurrence.
- The opinion of the permittee as to the reason the incident occurred.

- The remedial action that the permittee recommends to reduce or eliminate this type of incident in the future.

This requirement has not changed from the existing permit; however, the impingement of 40 fish in an 8-hour period is expected to be rare since the plant will be operating in closed-cycle cooling mode, which should greatly reduce impingement

6.0 Essential Fish Habitat (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. Section 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Service (NMFS) if EPA's action, or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat (EFH). The 1996 Amendments broadly define EFH as waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Adverse impact means any impact which reduces the quality and/or quantity of EFH. Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. EFH is only designated for fish species for which federal Fisheries Management Plans exist. EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999.

Description of Proposed Action

The NPDES permit for Merrimack Station, a power plant that has been operating since 1960, has expired. This proposed action renews the discharge permit consistent with the requirements of the CWA. Details of this permit renewal can be found in this fact sheet, the draft permit, and the accompanying determination documents.

EFH Species

Anadromous Atlantic salmon (*Salmo salar*) are the only federally-managed species believed to be present within the Hooksett Pool of the Merrimack River. Its presence is largely limited to the period of out-migration during mid-to-late spring when Atlantic salmon smolt head from upstream rearing habitat down to the sea. Atlantic salmon are currently prevented from accessing Hooksett Pool during their in-migration from the sea due to a series of dams. Moving upstream from the mouth of the Merrimack River in Newburyport, MA, the first three dams on the river are located at Lawrence, MA, Lowell, MA and Manchester, NH, respectively, and all have fish ladders installed. Most in-migrating Atlantic salmon are collected by the USFWS at the first dam in Lawrence, Massachusetts. Salmon captured in Lawrence are currently used as broodstock at the Nashua Federal Fish Hatchery. The Atlantic salmon fry that are bred at the hatchery are stocked in rearing habitat located in upper portions of the Merrimack River's main stem, and its tributaries.

The Hooksett Pool is not considered by state or federal fishery biologists to be suitable spawning or rearing habitat for juvenile Atlantic salmon due to the slow current velocities, which are characteristic of a river impoundment, and the warm summer water temperatures. No direct stocking of either Atlantic salmon fry or broodstock (for a limited sport fishery) typically occurs in Hooksett Pool, according to the USFWS (personal communications). Atlantic salmon smolts are expected to actively transit the Hooksett Pool during the spring period of relatively cold water temperatures and high river flow, and may be foraging as they migrate. While the Hooksett Pool is not high quality habitat for Atlantic salmon, or other salmonids, it is nevertheless a critical conduit between upstream juvenile rearing habitat and the ocean, to where these anadromous fish migrate in order to grow and mature. Landlocked Atlantic salmon, which are genetically similar to anadromous Atlantic salmon, do not migrate to the sea and are not federally-managed. As such, landlocked salmon habitat would not be considered EFH. Landlocked salmon are not typically stocked or found in Hooksett Pool, preferring more suitable conditions associated with deeper lakes.

Analyses of Potential Effects

Merrimack Station's impacts on resident and migratory fish species, including Atlantic salmon, are discussed in detail in the permit's determination document. Since smolts represent the only life stage of Atlantic salmon expected to be found in the area potentially affected by the plant (i.e., Hooksett Pool), this life stage is the focus of the EFH analysis.

Merrimack Station has the potential to impact Atlantic salmon smolts through the following:

1. Impinging smolts on the travelling screens of the plant's two cooling water intake structures (CWISs);
2. Causing thermal stress associated with exposure to the plant's heated cooling water discharge;
3. Reducing foraging opportunities through entrainment of aquatic organisms, and
4. Impairing water quality from the discharge of pollutants other than heat.

1. Impingement

Some power plants, such as Merrimack Station, utilize a once-through cooling water system that requires large volumes of water to condense steam in the plant's condensers. In such a system the water is taken from a water body and any very small organisms, such as fish eggs and larvae, in the water are drawn into the plant's cooling system along with the water and killed (this process is referred to as "entrainment"). At the same time, larger organisms may also be drawn into the CWIS (along with the cooling water) and caught on the intake screens (this process is referred to as "impingement"). Impingement may kill or injure the affected organisms in a variety of ways. Injury to impinged organisms can be avoided or minimized if a well-designed system is used for gently and safely removing the organisms from the screens and returning them to the water body.

Atlantic salmon are not expected to be present in the Hooksett Pool as eggs or larvae. Therefore, entrainment is not a major concern for this species. Juveniles (smolts, specifically) could potentially enter the plant's intakes, however, and be injured or killed as a result of being impinged on the screens designed to filter debris and fish before the water enters the plant's cooling system.

Salmon smolts are typically two to three years old before they begin their seaward migration, and are known to be fairly strong swimmers (S*ee* Table 7.1 in the Determinations Document for a comparison of mean critical swimming velocities of Atlantic salmon and intake velocities at Merrimack Station.). Since smolts are naturally attracted to flow, which normally directs them downstream towards the sea, they may intentionally swim into the intake structures. This, however, has never been documented at Merrimack Station, according to EPA's records. River flow velocities during the period when smolts would likely be transiting Hooksett Pool (late April to late May) are usually higher than the plant's intake velocities. Therefore, the capacity of plant's intakes to be an attractive flow for smolts may be minimal. Further, the plant did not report capturing any Atlantic salmon during a two-year impingement study, from June 2005 to June 2007.

While there is some potential to impinge Atlantic salmon smolts at Merrimack Station, the Draft Permit requires that intake flow volumes and velocities be significantly reduced commensurate with the operation of closed cycle cooling. This reduction in intake flow volumes will also result in a reduction in intake velocities to approximately one-third that of the existing intake velocities (0.5 fps vs. 1.5 fps). Therefore, whatever impingement potential existed for Atlantic salmon smolts under current operations will be dramatically reduced under the proposed Draft Permit requirements. In addition, should smolts become impinged despite the low intake velocities, the Draft Permit requires upgrades to the plant's fish return system that are designed to return impinged fish safely to the river (*See* Section 5.6.8 of this Fact Sheet, or Section 12 of the Determinations Document).

2. <u>Thermal Stress</u>

In general, Merrimack Station's thermal discharges to the Hooksett Pool add heat to the water and increase its temperatures, thus reducing habitat quality. More specifically, EPA conducted a detailed analysis of Merrimack Station's thermal impacts on resident and anadromous fish found in Hooksett Pool, which can be found in Section 5 of the Determinations Document. Potential impacts specific to Atlantic salmon are discussed in Sections 5.6.3.3c and 8.3.2.4a. While potential impacts related to the plant's thermal plume from impedance to smolt migration are possible, particularly towards the end of the migration period, studies conducted by PSNH during 2003 and 2005 suggest that delays in smolt migration are not likely to occur as a result of the plume. River flows are typically high enough and water temperatures low enough, during the spring outmigration that thermal impedance is generally not expected to occur. In addition, the plume tends to remain near-surface which should allow the passage of smolts beneath the plume, if they need to avoid it.

Under the draft permit, the plant's thermal plume will be greatly diminished so that even under unusually low river flow conditions, there will not be a thermal barrier to smolt passage, even near the surface.

3. <u>Reduction in Forage</u>

Atlantic salmon smolts may be foraging while they migrate downstream to the sea. Juvenile Atlantic salmon typically feed on aquatic and terrestrial insects while in freshwater (Hartel, *et al*.

2002. See Determination Document Reference List, Section 14). In May, when smolts are most likely to be transiting through the Hooksett Pool, Merrimack Station normally withdraws from three to eight percent of the available river flow. Aquatic insects, and other free-swimming or drifting organisms on which smolt forage, are also withdrawn from the river. While the abundance of such forage organisms may be greater in the section of Hooksett Pool above the intake structures compared to the section below, this has not been studied. Even if it were true, the significance of this difference on Atlantic salmon smolt is unclear. Many aquatic insects are benthic, and as such are less likely to be pulled into the intake structures. Furthermore, it is unlikely that smolts remain in the Hooksett Pool long enough for them to be adversely affected by a reduction in forage opportunity in the lower half of the pool.

While the possible reduction in foraging opportunities for or the impacts of any such reductions on, Atlantic salmon smolt is not well-understood, the intake flow reduction associated with the Draft Permit (approximately 95 percent reduction from the existing flow) will dramatically reduce any potential adverse impacts related to forage reduction.

4. Impairment of Water Quality

The discharge of regulated pollutants other than heat also can adversely affect aquatic organisms such as Atlantic salmon smolts. Since a migrating smolt's duration of exposure to pollutants discharged from Merrimack Station is fairly brief, however, acute effects would be of greater concern than chronic effects. The Draft Permit has been revised as necessary to ensure that all pollutant limits (e.g., metals, chlorine) are sufficiently stringent to meet water quality criteria. Indeed, many of the effluent limits are based on applicable technology standards which are more stringent than water quality-based limits would be. Additionally, acute and chronic toxicity testing on Fathead Minnow (*Pimephales promelas*) and Daphnid (*Ceriodaphnia dubia)* is required four (4) times per year.

5. Conclusions

It is EPA's opinion that the conditions and limitations contained within the Draft Permit adequately protect all aquatic life, including Atlantic salmon, the only species in this segment of the Merrimack River with an EFH designation. Impacts associated with this facility to the EFH species, its habitat and forage, have been minimized to the extent that no significant adverse impacts are expected. Therefore, further mitigation is not warranted. Should adverse impacts to EFH be detected as a result of this permit action, or if new information is received that changes the basis for EPA's conclusions, EPA will contact NMFS and consultation will be re-initiated.

7.0 Endangered Species Act (ESA)

Section 7(a) of the Endangered Species Act of 1973, as amended, grants authority to, and imposes requirements upon, 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 Secretary of Interior or Commerce, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The U.S. Fish and Wildlife Service (USFWS) typically administer Section 7 consultations for fresh water species, and NMFS administers consultations for marine species and anadromous fish.

EPA has reviewed current protected species information provided by NMFS and USFWS (collectively referred to as "the Services") to assess the possible presence of listed species in this area. Based on this review, EPA has concluded there are no federally-listed endangered or threatened species present in the area of the Merrimack River where Merrimack Station discharges pollutants and withdraws water for cooling, namely the Hooksett Pool. As a result, EPA concludes that this permitting action will have no effect on any listed species or the critical habitat of any listed species. EPA will seek the Services' concurrence with its conclusion.

8.0 Monitoring and Reporting

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

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

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit DMRs electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 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 New Hampshire.

The Draft Permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR, no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA and NHDES 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 or to NHDES.

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

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

9.0 State Certification

EPA may not issue a permit unless the state water pollution control agency with jurisdiction over the receiving water(s) either certifies that the effluent limitations and/or conditions contained in the permit are stringent enough to assure, among other things, that the discharge will not cause the receiving water to violate state's surface water quality regulations or waives its right to certify as set forth in 40 C.F.R. §124.53. *See also* 33 U.S.C. § 1341(a)(1).

Upon public notice of the draft permit, EPA is formally requesting that the State's certifying authority make a written determination concerning certification. The State will be deemed to have waived its right to certify unless certification is received within 60 days of receipt of this request.

The NHDES-WD, Wastewater Engineering Bureau is the certifying authority. EPA has discussed this Draft Permit with the staff of the Wastewater Engineering Bureau and expects that the Draft Permit will be certified. Regulations governing state certification are set forth in 40 C.F.R. §§124.53 and 124.55.

The State's certification should include the specific conditions necessary to assure compliance with applicable provisions of the Clean Water Act, §§208(e), 301, 302, 303, 306 and 307 and with appropriate requirements of State law. In addition, the State should provide a statement of the extent to which each condition of the Draft Permit can be made less stringent without violating the requirements of State law. Since certification is provided prior to permit issuance, failure to provide this statement for any condition waives the right to certify or object to any less stringent condition which may be established by EPA during the permit issuance process following public noticing as a result of information received during that noticing. If the State believes that any conditions more stringent than those contained in the Draft Permit are necessary to meet the requirements of either the CWA or State law, the State should include such conditions and, in each case, cite the CWA or State law reference upon which that condition is based. Failure to provide such a citation waives the right to certify as to that condition.

Reviews and appeals of limitations and conditions attributable to State certification shall be made through the applicable procedures of the State and may not be made through the applicable procedures of 40 C.F.R. Part 124.

10.0 Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to John Paul King, U.S. EPA, Office of Ecosystem Protection**,** Industrial Permits Branch, OEP06-01, 5 Post Office Square, Boston, Massachusetts 02109-3912. Based on the significant change in the Draft Permit's limitations and requirements when compared to the present permit, and the complex CWA issues associated with the Draft Permit's limits for thermal discharges, cooling water withdrawals and pollutant discharges from the FGD scrubber system, the EPA perceives there will be multiple requests for a public hearing. Accordingly, concurrent with the public comment period, the EPA shall schedule a public hearing in accordance with 40 C.F.R. § 124.12. In reaching a final decision on the Draft Permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

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

11.0 EPA Contact

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

John Paul King
U.S. Environmental Protection Agency
Office of Ecosystem Protection
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109-3912
Telephone: (617) 918-1295 FAX: (617) 918-0295
E-mail: king.john@epa.gov

September 27, 2011

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