Public Service of New Hampshire

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The Northeast Utilities System

By Overnight Mail

September 10, 2010

Mr. Damien Houlihan
Office of Ecosystem Protection
U.S. Environmental Protection Agency
One Congress Street, Mail Code CIP
Boston, MA 02114-2023

Re: Public Service Company of New Hampshire
Schiller Station, Portsmouth, New Hampshire
National Pollutant Discharge Elimination System Permit No. NH0001473
Response to Information Request in support of NPDES Permit Reissuance

Dear Mr. Houlihan:

Public Service Company of New Hampshire (PSNH) is providing herein thermal discharge information in support of the renewal of NPDES Permit No. NH0001473 for Schiller Station in accordance with the Environmental Protection Agency's May 4, 2010, Clean Water Act Section 308 Information Request, as clarified and amended by EPA's June 1, July 13, and August 10, 2010 letters. The enclosed report, dated September 2010, was prepared for PSNH by Enercon Services, Inc.

Additional supplemental information requested in the Section 308 Information Request will be provided in a timely manner under separate cover.

Please call Allan Palmer (603-634-2439) if you have any questions or need additional information.

Very truly yours,

William H. Smagula

William H. Smagula, P.E.
Director – Generation

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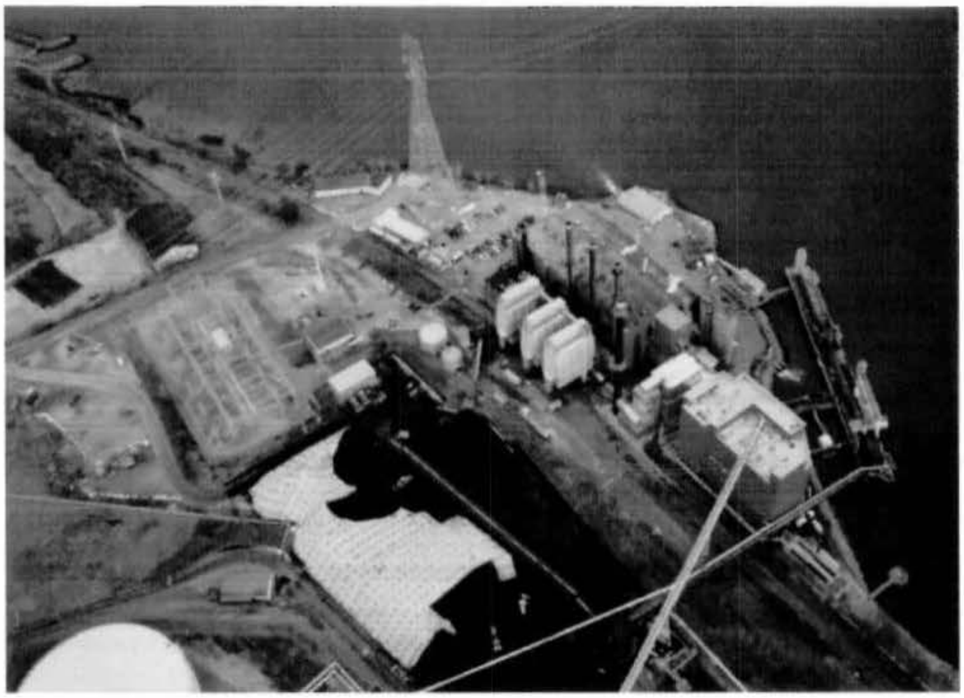
RESPONSE TO ENVIRONMENTAL PROTECTION AGENCY'S INFORMATION REQUEST FOR NPDES PERMIT RE-ISSUANCE

PSNH SCHILLER STATION PORTSMOUTH, NEW HAMPSHIRE



Prepared for
Public Service Company of New Hampshire

Prepared by:

Enercon Services, Inc.
500 TownPark Lane, Suite 275
Kennesaw, GA 30144

September 2010

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List of Attachments

1 Background, Introduction, and Scope

Public Service Company of New Hampshire's (PSNH's) Schiller Station electrical generating facility in Portsmouth, New Hampshire is seeking a renewal of its existing National Pollutant Discharge Elimination System permit (NPDES Permit NH0001473). To support development of the Station's NPDES permit renewal, the United States Environmental Protection Agency (EPA) issued an information request letter to PSNH under Section 308 of the Clean Water Act (CWA) regarding the Station's compliance with CWA §316(b), 33 U.S.C. §1326(b) (§308 Letter). In the §308 Letter, EPA requested certain technology information from PSNH to support EPA's development of the new permit for Schiller Station. In October 2008, PSNH submitted a response (2008 Response) [Ref. 4.2] prepared by Enercon Services, Inc. (ENERCON) and Normandeau Associates, Inc. (Normandeau).

EPA issued a follow-up information request (IR) in May 2010 [Ref. 4.1] pertaining to the thermal component of the cooling water at Schiller Station. Therefore, this Report provides thermal discharge calculations to characterize 1) the thermal component of all internal waste streams, not including condenser cooling, and 2) the thermal component of once-through condenser cooling water that is discharged to the Piscataqua River.

2 Thermal Discharge Analysis – Internal Waste Streams

2.1 Information Request

The EPA letter [Ref. 4.1] requests the following:

Please characterize the thermal component of all internal waste streams to which heat is or may be added from facility operations (e.g. boiler blowdown and equipment cooling). This characterization does not apply to Units' 4, 5, or 6 condenser cooling water, but does apply to Units' 4, 5, and 6 equipment cooling and boiler blowdown, as well as any other waste stream at Schiller Station to which heat is or may be added from facility operations. The units of the thermal component shall be characterized in terms of British Thermal Units (BTUs) per unit of time. Please provide the total daily heat load, the total monthly heat load, and the total yearly heat load for every waste stream to which heat is or may be added from Station operations, before mixing with any other waste stream. PSNH may estimate these values if actual measures are not available.

2.2 Engineering Response

As shown in Attachment 1 and discussed in the 2008 Response [Ref. 4.2], up to 950 gpm (1.4 MGD) of cooling water is available for the cooling water heat exchangers. To determine the heat load discharged by the Station (not including condenser cooling water), Equation 2.1 was used.

$$Q = c_p \times \rho \times q \times dt \qquad (2.1)$$

where,

Q = Heat Load (Btu/day)

c_p = Specific Heat of Water (Btu / °F × lb)

ρ = Density (lb/gal)

q = Volumetric Flow Rate (gpm)

$dt = T_{in} - T_{out}$ = Temperature Rise across Station (°F)

For Schiller Station, the heat loads were calculated using a density of 8.54 lb/gal and c_p of 0.94 Btu/°F×lb (see Attachment 1). Schiller Station supplied eight years (2000-2007) of measured discharge flow rate data for Units 4, 5, and 6. This data was used in the 2008 Response [Ref. 4.2] and is identical to that provided for NPDES permit compliance. Note that the flowrate available for the internal waste stream (950 gpm) makes up less than 1.1% of Schiller Station's overall flow.

In order to determine the historic heat load, Equation 2.1 was used in conjunction with the historic daily increase in cooling water temperature and the actual historic flow rate (2000 – 2007). The average daily historical heat load was determined to be approximately 28.9 MBtu/day. Based on the maximum temperature rise of 25°F permitted by the Station's NPDES Permit [Ref. 4.3], the maximum heat load was also calculated using Equation 2.1. Table 2.1 shows both the historic and maximum postulated monthly and annual heat loads for cooling water (not including condenser cooling water) at Schiller Station. The maximum daily heat load was determined to be approximately 274.5 MBtu/day[1]. Note that this maximum heat load calculation is based on the stated design criteria and bounds the historical maximum heat loads at Schiller Station.

Table 2.1 Historic and Maximum Heat Loads for Cooling Water, Non-Condenser Cooling

Month	Historic* (MBtu)	Maximum (MBtu)
January	982	8,511
February	891	7,756
March	857	8,511
April	508	8,236
May	855	8,511
June	928	8,236
July	949	8,511
August	964	8,511
September	849	8,236
October	867	8,511
November	895	8,236
December	997	8,511
Annual	10,543	100,277

*Calculated using eight years (2000-2007) of historical flow rates and river water temperatures

The historic annual heat load due to the internal waste stream (10,543 MBtu) was calculated to be less than 0.2% of the combined historic annual heat load calculated for the condenser cooling of all three Units (see Table 3.1 in Section 3). Similarly, the maximum annual heat load due to the internal waste stream was calculated to be less than 1.2% of the combined maximum annual heat load calculated for the condenser cooling of all three Units (see Table 3.2 in Section 3).

[1] The daily historical and maximum heat loads were determined by dividing the annual historical and maximum heat loads provided in Table 2.1 by 365.25 (to account for leap years).

3 Thermal Discharge Analysis – Once-Through Condenser Cooling Water

3.1 Information Request

The EPA letter [Ref. 4.1] requests the following:

Please characterize the thermal component of once-through cooling water to which heat is or may be added from the condenser operation of Units 4, 5, and 6 and that is discharged to the Piscataqua River. The units of the thermal component shall be characterized in terms of British Thermal Units (BTUs) per unit of time. Please provide the total daily heat load, the total monthly heat load, and the total yearly heat load for each unit.

3.2 Engineering Response

As shown in Attachment 1 and discussed in the 2008 Response [Ref. 4.2], up to 28,200 gpm (40.6 MGD) of cooling water is available for once-through condenser cooling at Unit 4 and up to 29,000 gpm (41.8 MGD) of cooling water is available for once-through condenser cooling at both Units 5 and 6.

In order to determine the average historic heat load, Equation 2.1 was used in conjunction with the historic daily increase in cooling water temperature and the historic flow rate (2000 – 2007). Table 3.1 shows the historic monthly and annual heat loads for once-through condenser cooling at Schiller Station. The average daily historic heat loads were determined to be approximately 6107.0 MBtu/day at Unit 4, 6176.5 MBtu/day at Unit 5, and 6546.5 MBtu/day at Unit 6[2].

[2] The average daily historic heat loads were determined by dividing the annual historic heat loads provided in Table 3.1 by 365.25 (to account for leap years).

Table 3.1 Historic Heat Loads* for Once-Through Condenser Cooling Water

Month	Unit 4 (MBtu)	Unit 5 (MBtu)	Unit 6 (MBtu)
January	207,782	201,495	212,188
February	188,452	174,434	202,280
March	181,336	159,807	150,497
April	107,968	173,237	146,908
May	180,508	167,754	157,814
June	196,223	173,360	203,831
July	200,733	191,348	223,800
August	204,261	189,576	226,841
September	179,653	189,263	212,290
October	183,435	200,332	220,601
November	189,365	211,484	213,793
December	210,864	223,870	220,275
Annual	2,230,579	2,255,962	2,391,120

*Calculated using eight years (2000-2007) of historical flow rates and river water temperatures

Based on the maximum temperature rise of 25°F permitted by the Station's NPDES Permit [Ref. 4.3], the maximum heat load was also calculated using Equation 2.1. Table 3.2 shows the maximum postulated monthly and annual heat loads for once-through condenser cooling at Schiller Station. The maximum daily heat load was determined to be approximately 8149.6 MBtu/day at Unit 4, 8380.8 MBtu/day at Unit 5, and 8380.8 MBtu/day at Unit 6[3].

[3] The maximum daily heat loads were determined by dividing the maximum annual heat loads provided in Table 3.2 by 365.25 (to account for leap years).

Table 3.2 Maximum Heat Loads for Once-Through Condenser Cooling Water

	Month	Unit 4 (MBtu)	Unit 5 (MBtu)	Unit 6 (MBtu)
31	January	252,638	259,805	259,805
28.25	February	230,227	236,758	236,758
31	March	252,638	259,805	259,805
30	April	244,489	251,424	251,424
31	May	252,638	259,805	259,805
30	June	244,489	251,424	251,424
31	July	252,638	259,805	259,805
31	August	252,638	259,805	259,805
30	September	244,489	251,424	251,424
31	October	252,638	259,805	259,805
30	November	244,489	251,424	251,424
31	December	252,638	259,805	259,805
	Annual	2,976,649	3,061,092	3,061,092

Monthly = daily × # days/month
February days/month = 28.25

4 References

4.1 Stephen S. Perkins, Office of Ecosystem Protection, Environmental Protection Agency. Letter to William H. Smagula, Public Service of Hew Hampshire, Information Request for NPDES Permit Re-issuance NPDES Permit No: NH0001473. May 2010.

4.2 Public Service of New Hampshire, Enercon Services, Inc, and Normandeau Associates. Response to the United States Environmental Protection Agency CWA §308 Letter, PSNH Schiller Station, Portsmouth, New Hampshire. October 2008.

4.3 United States Environmental Protection Agency. NPDES Permit No. NH000173. 1991.

Attachment 1

Cooling Water Data for Schiller Station Salt Water
(Provided by PSNH)

Cooling water data for Schiller Salt water

unit	Parameter	Condenser/coolers	Cooling water heat exchanges	Cooling water salt pump	Comments
3	Range [F]				
	Discharge flow rate [gpm]			? oil water sep,cooling heat exchanger for air compressor	
4	Range [F]	18.30	11.00		
	Discharge flow rate [gpm]	28,200	950	Molycooler	
5	Range [F]	19.10			
	Discharge flow rate [gpm]	29,000		Cooling water for support on 5 start-up Molycooler	
6	Range [F]	18.80			
	Discharge flow rate [gpm]	29,000		Molycooler	

h = heat load (Btu/h)

$c_p = 1\ (Btu/lb_m\ {}^oF)$ *for water* .94

$\rho = 8.33\ (lb_m/gal)$ *for water* $1.025 \times 8.33 = 8.54$

q = water volume flow rate (gal/min)

dt = temperature difference (° F)

$h = c_p\ \rho\ q\ dt$

	cp	p	q	dt
Unit #4	0.94	8.54	28,200	18.30
Unit #5	0.94	8.54	29,000	19.10
Unit #6	0.94	8.54	29,000	18.80
Aux 4	0.94	8.54	950	11

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