MERRIMACK STATION

LOCATION: Bow, New Hampshire
RECEIVING WATER: Merrimack River
CAPACITY: 487 MW - Base-Load Plant

Public Meeting, Concord NH    Nov. 3, 2011
Merrimack Station & Outfall Locations
National Pollutant Discharge Elimination System (NPDES)

- NPDES is the national permitting system under the Clean Water Act (CWA)
- Generally, all point sources that discharge to a water of the US require a NPDES permit
- Permits issued for 5-years by statute
- EPA issues NPDES permits for NH
- Cooling water intake regulated under CWA 316(b)
Merrimack Station NPDES Draft Permit: 3 Key Environmental Issues

- Thermal discharge effects on aquatic community – CWA §316(a)
- Cooling Water Intake Structure (CWIS) impacts – CWA §316(b)
- Pollutants (mostly metals) removed from stack flue gas by the new FGD system can enter the Flue Gas Desulfurization Wastewater Treatment System (FGD WWTS)
Measured Average Daily Maximum, Minimum and Mean Water Temperature at Station S-4 for 1 April - 31 October of 1984-2004.

WITH OVERLAY OF EXISTING PERMIT TEMPERATURE “TRIGGER”

S-4 Max = 97.9 ° F

Temperature ° F

60

50

40

30

01Apr 01May 01Jun 01Jul 01Aug 01Sep 01Oct 01Nov

Time of Year

68°F
Merrimack Station’s thermal discharge has caused, or contributed to, appreciable harm to Hooksett Pool’s balanced indigenous population of fish.

- The Hooksett Pool fish community has shifted from a mix of warm and cool water species to a community now dominated by thermally-tolerant species;
- The abundance for all species combined in the 1970’s had declined by 90% in the 2000’s; and
- The abundance of some thermally-sensitive resident species, such as yellow perch, has significantly declined.
Two Decade Comparison of All Fish Species in the Hooksett Pool

Number of Fish Caught per 48 Hrs of Sampling

- 1970's: 60.2
- 2000's: 6.4
Proposed Thermal Limit Determination

• EPA must select the more stringent of technology-based and water quality-based effluent limits
• A CWA §316(a) variance is available for thermal discharges
• PSNH requested a CWA §316(a) thermal variance, claiming the existing effluent discharge did not harm the balanced indigenous population of fish
• EPA, after reviewing 40 years of data, determined balanced indigenous population was not protected, and did not grant PSNH’s variance request.
• EPA based monthly thermal limits at Merrimack Station on the Best Available Technology (BAT) - Closed Cycle Cooling or a comparable technology
CWA § 316(b)

Entrainment & Impingement

Entrainment

Eggs, larvae, young juveniles, and smaller aquatic organisms are drawn into cooling systems and killed or injured by:
- thermal,
- chemical, or
- physical stresses

Impingement

Larger aquatic organisms are pinned against screens or other structures and killed or injured.
Proposed Intake Requirement: Conversion from Open Cycle Cooling to Closed Cycle Cooling

**STANDARD: Best Technology Available (BTA)** to minimize adverse environmental impacts of Cooling Water Intake Structure

**ENVIROMENTAL GAIN:**

- Flow Reduction (Ave Monthly): 265 MGD to 6.5 MGD (97.5 %)
- Eggs & Larvae Saved/Year: 3,620,000
- Impinged Fish Saved/Year: 4,770

**COST:**

- Net Present Value Closed Cycle Cooling: $112M
- Annualized Present Value: $9M/year
EPA Region 1
Mercury Model
(MERGANSER)

- Modeled Mercury Levels in fish and loon tissues
- Based on measured values, mercury air deposition, and landscape features
Proposed Permit Limits for Flue Gas Desulfurization (FGD) Waste Water

- PSNH’s FGD system required by state law (2006).

- In accordance with the CWA, EPA applied best Professional Judgment (BPJ) to determine Best Available Technology (BAT).

- EPA, for Merrimack Station’s FGD WWTS, reviewed a series of treatment processes as BAT based on EPA guidance and the technologies used in similar plants.

- EPA then set effluent limits based on these FGD waste water treatment processes.
Diagram of Proposed Wet Flue Gas Desulfurization Technology

From March 31, 2010 PSNH presentation to NH Public Utilities Commission

- EPA determined the best technology available (BAT) is: Physical/Chemical, Polishing, Biological
- Effluent limits determine based on these technologies capabilities
# Merrimack Station Existing Permit Significant Effluent Limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Existing Permit Limits</th>
<th>Draft Permit Limits</th>
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<tbody>
<tr>
<td><strong>Thermal Discharge</strong></td>
<td><strong>Attempt</strong> to maintain 1ºF ΔT</td>
<td>Monthly/Yearly Thermal Limits (Btu)</td>
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<tr>
<td>Impingement/Entrainment</td>
<td>None</td>
<td>Intake flow reduction consistent with CCC. Install up-to-date fish return system.</td>
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<tr>
<td>Flow</td>
<td>265 MGD</td>
<td>6.5 MGD</td>
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<tr>
<td>Iron</td>
<td>1.0 mg/l</td>
<td>1.0 mg/l</td>
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<tr>
<td>Copper</td>
<td>0.077/0.2 mg/l</td>
<td>0.027/0.083 mg/l</td>
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<tr>
<td>Mercury</td>
<td>No</td>
<td>0.0000071 mg/l</td>
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<tr>
<td>Arsenic</td>
<td>No</td>
<td>0.00227 mg/l</td>
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<tr>
<td>Selenium</td>
<td>No</td>
<td>0.0571 mg/l</td>
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<tr>
<td>Aluminum</td>
<td>No</td>
<td>1.08 mg/l</td>
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<tr>
<td>TSS, O&amp;G, Chlorides, pH, etc.</td>
<td>Yes</td>
<td>Yes</td>
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Merrimack Station Draft/ Final Permit Schedule

- Sept. 30, 2011 – Draft Permit Issued
- Nov. 3, 2011 – Public Hearing; Concord, NH
- Feb. 28, 2012 – Public Comment Period Closes
- EPA reviews, researches and responds to Public Comments and issues Final NPDES Permit.