



# **WHS – Testimony Appendix A**

**Recommendation No. III.D.1:**

Merrimack 2 start-up boiler feed pump and Siemens workmanship issues - PSNH should include with its May 1, 2011 ES/SCRC reconciliation filing a report describing the efforts taken, and results achieved in addressing Siemens' workmanship issues, so similar issues can be avoided going forward. (Accion testimony, page 13, lines 1-8 and page 63)

**Reference Outage: MK2 Turbine Overhaul**

**Response:**

As part of PSNH's contract management process, supplier evaluations are required be filled out for each contract greater than \$100,000. A review the previous 5 years of Siemens' evaluations was completed, scores ranged from 97 to 100. These scores indicate that Siemens performs and delivers high quality work. The incident associated with the start-up boiler feed pump was determined to be an isolated incident and not typical for the following reasons:

- 1) During PSNH follow-up it was learned that Siemens addressed this issue without PSNH intervention and took reasonable action to prevent this from occurring in the future. These actions included removing the field engineer from field work, and performing the necessary rework at a reduced rate.
- 2) Because of the quick action taken by Siemens PSNH feels this demonstrates that Siemens is dedicated to quality and is a quality contractor.
- 3) PSNH has used Siemens field engineers since this event. Their technical competence has been very satisfactory and the results achieved on the related work were of high quality.

**Recommendation III.E.1:**

Mitigation of Customer Costs regarding certain 2008 generation unit outages  
Leave open the issue of PSNH's efforts to mitigate customer costs related to the HP/IP turbine outage (Outage MK-2E) and require PSNH to file a report that captures the final monetary resolution as part of its May 1, 2011 ES/SCRC reconciliation filing.

**Response:**

The table below summarizes the monetary status of insurance reimbursements associated with Outage MK-2E. As has been reported, there are two components to the insurance coverage – Boiler and Machinery (property damage) and Replacement Power (RPC).

**Boiler and Machinery (\$M)**

	Total	Received	Outstanding
Property Damage	\$20.0*	\$20.0	All Received (*less \$1M deductible)

**Replacement Power (\$M)**

	Total	Received	Outstanding
RPC	\$13.9	\$8.1	\$5.8

<b>Total Claim</b>	\$33.9	\$28.1	\$5.8
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All property damage expenses incurred have been reimbursed to customers, less the insurance deductible of \$1 million. A final payment on incremental replacement power reimbursement totaling approximately \$5.8 million is currently being sought by our insurance representatives.

**Recommendation III.E.2:**

Leave open the Forced Draft and Induced Draft Fan Capabilities under Soft Start Conditions issue as the negotiations are still in progress.  
Leave open the Air Heater Design issue as the negotiations are still in progress.  
Require PSNH to file a report on the open items as part of its May 1, 2011 ES/SCRC reconciliation filing.

**Response:**

Schiller-5 Outage and Warranty/Performance Issues  
PSNH Efforts and/or Resolutions

<p><u>Issue:</u> Forced Draft and Induced Draft Fan motors – design of soft start conditions and capabilities</p> <p><u>Discussion:</u> During a unit start-up in February 2008, the forced draft fan motor experienced an electrical fault. This fault required that the motor be sent off-site and rewound. The repair used higher class H insulation to satisfy operation during soft start conditions. This issue is of concern regarding the induced draft fan motor.</p> <p>The forced draft fan motor returned to Schiller was rewound with Class H insulation, higher class insulation than supplied at purchase (Class F).</p> <p>PSNH discovered that the induced draft fan motor has the same soft start issue, but that the soft start feature, which creates risk, has been eliminated from the operation of the fan and will remain so for future start ups.</p>	<p><u>Resolution:</u> PSNH has purchased a spare FD Fan Motor specifically designed for soft start circuitry. A similar ID Fan Motor was pursued; however, one cannot be designed without requiring a pedestal mount modification. An alternative solution has been implemented which requires the soft start is "turned off" during start ups. PSNH has determined, with the assistance of an electrical consultant that this is a technically acceptable solution as there has been no adverse effects on other operating equipment during start ups in this mode.</p> <p>PSNH has discussed warranty claim information with Alstom, and a monetary settlement agreement was established in January 2011.</p> <p>Issue closed.</p>
<p><u>Issue :</u> Air Heater Design</p> <p><u>Discussion:</u> The air heater has experienced excessive leakage due to air heater tube corrosion and tube failures. PSNH considers this a design issue associated with the air heater. This design issue cause’s reduced generating capacity due to air heater leaks which leads to problems controlling the fluidized boiler bed material temperature. The</p>	<p><u>Resolution:</u> PSNH determined that the most viable long term solution is to replace the affected air heater tubing with tubes made of a stainless steel alloy whose properties will withstand the corrosive environment</p> <p>PSNH has discussed warranty claim</p>

**2009 - SCRC DE 10-121  
Settlement Agreement Recommendation Update**



**Public Service  
of New Hampshire**

The Northeast Utilities System

<p>air leaks caused increased forced draft fan loading causing high current readings, increased NOX emissions, and high cyclone temperatures.</p>	<p>information with Alstom, and a monetary settlement agreement was established in January 2011</p> <p>Issue Closed.</p>
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**Recommendation III.E.5:**

Interconnection of PSNH Generating Units to the PSNH Distribution System

Leave this item open as the analysis and implementation is incomplete.

Require PSNH to file an additional report including progress on its analysis of the Schiller CT and unit over speed relays as part of its May 1, 2011 ES/SCRC reconciliation filing.

**Status Update:**

This recommendation relates to all PSNH units and the combustion turbines located at Schiller, White Lake and Lost Nation. PSNH Generation has actively been working to better the coordination between the generating units identified above and the system which those units are connected to. Shown below is the Progress Assessment Matrix updated to reflect the progress made since the 2009 ES/SCRC filing. As shown on the matrix coordination studies have been completed for the Schiller combustion turbine, Canaan, Gorham, and Hooksett Hydro. Also review of the overspeed protection scheme for the hydro units is scheduled for completion in 2011.

**Schiller CT:**

A review of the settings and coordination of the Schiller CT interconnection relays specifically at the 34.5 kV tie in was completed. The Final report is available to be reviewed at PSNH locations. The study included a review of distribution and generation relay settings, documentation, and a system model. The study did not indicate any adverse coordination between the Schiller CT relaying and the relaying in the surrounding 34.5 kV system.

**Canaan:**

A review of the overcurrent protection scheme was completed by PSNH Distribution-Protection & Control Engineering (D-P&CE). This review was initiated during the System Operating and Review Committee (SORC) process and was identified as a possible area where improved coordination between the hydro unit and the system could be obtained. A review of the event and fault simulation determined that adjustments between the hydro unit overcurrent (51/357) and re-closer (355X10) would resolve the problem.

As a result new settings were issued from D- P&CE in an effort to slow down the 51/357 overcurrent device operation to coordinate better with the re-closer. It should be noted that the D – P&CE study was completed only from the perspective of the distribution system and this analysis did not consider generator protection. Because of this, PSNH Generation has not implemented these settings as of the date of this filing, but has secured additional resources to review the D-P&CE settings and the impact these setting may have on generator protection.

**Gorham:**

A study was performed by D - P&CE in early 2009 that reviewed the operating characteristics of the under voltage relays at all PSNH's hydro facilities. The intent of the study was to identify the root cause of unwanted operations at hydro facilities for

system events. It was determined that all 27/47 relays had similar settings; they were faster than the factory specification 1.20 seconds dropout time.

A fault study was conducted, and it was verified that all hydro relay operating characteristics should be calibrated and set to the factory specifications (1.20 seconds) to insure operational margin. This study included a comprehensive review of all of PSNH's hydro facilities reviewing any circumstances where a generator may trip offline for system events. PSNH hydro group completed the recommended setting verifications and changes in 2010.

After the settings were changed a trip occurred at Gorham prompting a SORC review. A closer look at system events both actual and simulated indicates there is no operational margin between expected line clearing times and Gorham Hydro voltage protection which may result in the undesirable operation of Hydro Units G1-G4.

Based on this study it was determined that the existing under-voltage relay can not accommodate the necessary setting change at this location, replacement under-voltage relays are being considered.

**Hooksett:**

A review of the overcurrent protection scheme was completed by D - P&CE. This review was initiated during the SORC process and was identified as a possible area where improved coordination between the hydro unit and the distribution system could be obtained.

The overcurrent relay protection scheme at Hooksett includes a multifunction device (51V). This device has the capability of monitoring both instantaneous overcurrent and overcurrent based on voltage. The targets reported for this event included the 51V instantaneous overcurrent; the study concluded that the instantaneous function should not have operated during this event. As follow-up a field investigation was initiated and it was learned that the instantaneous function associated with the relay was not in service.

After discovering the instantaneous function was not in service the determination of this review was the overcurrent scheme operated appropriately. The P&C documentation on file was updated to reflect this change. Also, enhancements to the under frequency scheme similar to those recommended in the Gorham determination are currently being reviewed.

**Hydro Unit Overspeed Review:**

A review of the hydro unit overspeed settings and the coordination of the protective relays for all hydro units will be completed in 2011. The scope of this review is as follows:

- 1) Analysis of vertical units and the determination if the overspeed protection on the vertical units at 120% of rated speed is appropriate.
- 2) Analysis of horizontal units at 110% rated speed is appropriate.
- 3) Performing a review of the overspeed protection which can be applied to both vertical units and horizontal units. Provide recommendation on existing philosophy and recommendations to enhance the overspeed protection scheme.

**Low Voltage Interconnection Study  
Progress Assessment Matrix - May 1, 2011**

		Combustion Turbines			Hydro Units								
		Schiller CT (34.5kV)	White Lake CT	Lost Nation CT	Amoskeag	Ayers Island	Canaan	Eastman Falls	Garvins Falls	Gorham	Hooksett	Jackman	Smith
1	NPCC Test Program In-place	X	N/A	N/A	N/A	X	N/A	X	X	N/A	N/A	N/A	X
2	Under Voltage Study Complete		X	X	X	X	X	X	X	X	X	X	X
3	Setting Letters Issued		X	X	X	X	X	X	X	X	X	X	X
4	Field Verification Settings, necessary changes made per D-P&CE Setting Letters		X	X	X	X	X	X	X	X	X	X	X
5	NPCC Testing Complete	X	X	X	X	X	X	X	X	X	X	X	X
6	Critical Relay Testing Complete	X	X	X	X	X	X	X	X	X	X	X	X
7	Comprehensive Test Program In-place	X	X	X	X	X	X	X	X	X	X	X	X
8	Coordination Study Complete	X				X	X <sup>1</sup>			X <sup>1</sup>	X <sup>1</sup>	X	
9	Overspeed Protection Review <sup>2</sup>				X <sup>2</sup>								

NOTES:

- 1 - Coordination Study completed by D-P&CE, these studies focused on actual events and the study was initiated from the SORC review process.
- 2 - Overspeed protection review for the Hydro units is ongoing, PSNH has secured a qualified contractor to review the overspeed protection scheme.

**ATTACHMENT WHS-1**

**LIST OF UNIT OUTAGES  
AND  
SCHEDULED OUTAGE PERIODS**

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
MERRIMACK 1 - UNIT OUTAGE LIST  
JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
2/19	1729	2/22	0336	2.4	Planned Preventative Maintenance
4/13	1455	5/20	0446	36.6	Scheduled Annual Outage
5/28	2246	5/29	2359	1.1	Economizer Inlet Valve
6/28	2011	7/1	0718	2.5	Boiler Tube Leaks
9/28	1643	10/2	0110	3.4	Planned Preventative Maintenance
10/2	0842	10/6	2037	4.5	Superheater Leaks
11/8	0929	11/8	1325	0.2	Main Steam System Issues
TOTAL FORCED OUTAGE DOWN TIME				13.9	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
MERRIMACK 2 - UNIT OUTAGE LIST  
JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
1/1	1450	1/5	0143	3.5	Boiler Tube Leaks
1/29	1756	2/3	0203	4.3	Boiler Tube Leaks
2/3	0525	2/3	2146	0.7	Drain Line Leak
3/14	2001	3/14	2151	0.1	Protection Devices
5/20	1620	5/24	1800	4.1	Boiler Tube Leaks
7/10	2103	7/11	0557	0.4	Turbine Common Oil
8/10	1401	8/13	0603	2.7	Planned Preventative Maintenance
9/21	1452	10/21	1430	30.0	Scheduled Annual Outage
10/25	0525	10/25	0918	0.2	Feedwater System
TOTAL FORCED OUTAGE DOWN TIME				15.8	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
MERRIMACK CT1 - UNIT OUTAGE LIST  
JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
2/9	1146	2/9	1341	0.1	Generator Voltage Control
5/3	0330	5/7	1724	4.6	Scheduled Annual Outage
5/24	0932	5/24	1107	0.1	Jet Engine Issues
11/4	0838	11/4	1118	0.1	Jet Engine Issues
11/19	0738	11/19	1501	0.3	Jet Engine Inspection
TOTAL FORCED OUTAGE DOWN TIME				0.6	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
MERRIMACK CT2 - UNIT OUTAGE LIST  
JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
5/3	0330	5/25	1512	22.5	Scheduled Annual Outage
6/24	1417	6/24	1535	0.1	Generator Voltage Control
12/7	1048	12/7	1110	0.0	Other Jet Engine Issues
12/10	0932	12/10	1105	0.1	Generator Voltage Control
TOTAL FORCED OUTAGE DOWN TIME				0.1	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 NEWINGTON - UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
6/2	1001	6/2	1047	0.0	Furnace Pressure Trip
6/29	2052	7/1	0459	1.3	Condenser Tube Leak
8/5	0943	8/5	1040	0.0	Ignitor Trip
8/22	1207	8/22	1252	0.0	Furnace Pressure Trip
9/19	0913	9/19	0954	0.0	Low Drum Level Trip
9/30	0801	9/30	0845	0.0	Furnace Pressure Trip
10/30	0000	11/6	1050	7.5	Scheduled Annual Outage
11/10	0924	11/11	0937	1.0	Waterwall Tube Leak
12/12	1911	12/14	0439	1.4	Waterwall Tube Leak
12/15	1244	12/16	1045	0.9	Waterwall Tube Leak
12/27	0643	12/28	0445	0.9	Waterwall Tube Leak
TOTAL FORCED OUTAGE DOWN TIME				5.7	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 SCHILLER 4 - UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
2/26	2135	4/2	0247	34.2	Scheduled Annual Outage
6/5	0638	6/5	1602	0.4	Burner Management System
8/29	0600	8/29	1000	0.2	Start up Failure
11/13	1056	11/18	1939	5.4	Traveling Screens - Sprocket Failure
TOTAL FORCED OUTAGE DOWN TIME				5.9	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 SCHILLER 5 - UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
4/9	2114	4/29	1240	19.6	Scheduled Annual Outage
5/1	1351	5/2	1130	0.9	Forced Draft Fan Motors
7/3	2331	7/16	1140	12.5	Boiler Tube Leak, Bed Material Extension
9/25	1955	10/2	0040	6.2	Cyclone TP High, Bed TP Low, Spreader Drive
11/28	1443	11/29	0358	0.6	Forced Draft Fan Bearing Temp
11/30	1354	11/30	1545	0.1	Bag House Systems - Blown Fuse
12/11	2354	12/16	1258	4.5	Cyclone Furnace
12/22	0310	12/22	0921	0.3	Drum Level Trip
TOTAL FORCED OUTAGE DOWN TIME				25.0	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 SCHILLER 6 - UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
1/26	0307	1/26	0348	0.0	Pulverizer Trip
2/23	2352	2/24	2056	0.9	BFP Discharge Valved Repair
3/1	1434	3/1	1542	0.0	Pulverizer Motor Failure
3/13	2323	3/14	0003	0.0	Scanner Blower Filter Change Out
3/30	1727	3/30	1758	0.0	Scanner Blower Disrupted
4/27	1355	4/29	1400	2.0	Burners - Repair Holes
5/20	0044	5/20	0117	0.0	Burners - Flame Scanners
6/1	1120	6/4	0029	2.5	Generating Tube Leak
10/20	0700	10/20	1430	0.3	Boiler Inspection / Attemperator Valves
11/2	0705	11/3	2100	1.6	Igniter Tubes and Igniters
TOTAL FORCED OUTAGE DOWN TIME				7.5	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 SCHILLER CT1 - UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
3/2	0915	4/25	1151	54.1	Electrical Failures
5/26	1700	5/27	0639	0.6	Electrical Failures
8/10	1105	8/10	1205	0.0	Controls and Instrumentation
8/14	0700	8/14	1515	0.3	Electrical Failures
12/29	0800	12/29	1500	0.3	Air Supply Ducts
12/30	0750	12/30	1305	0.2	Air Supply Ducts
TOTAL FORCED OUTAGE DOWN TIME				55.6	

WYMAN IV - UNIT OUTAGE LIST  
JANUARY TO DECEMBER

<u>OUTAGE DATE</u>	<u>START TIME</u>	<u>OUTAGE DATE</u>	<u>STOP TIME</u>	<u>DAYS</u>	<u>REASON</u>
1/10	1252	1/10	1413	0.1	Switchyard equipment 345 KV transmission line
2/1	0514	2/1	0620	0.0	Stator cooling system monitor failure
2/4	0948	2/4	1402	0.2	Transmission line OOS
3/7	0920	3/7	1110	0.1	Transmission line OOS
3/8	1233	3/8	1445	0.1	Transmission line OOS
4/3	0001	5/4	1521	31.6	Scheduled Annual Outage
5/4	1636	5/5	0813	0.7	Planned Annual Outage post testing
5/5	1007	5/5	1047	0.0	Planned Annual Outage post testing
5/5	1051	5/6	1440	1.2	Planned Annual Outage post testing
5/6	1620	5/7	1530	1.0	Planned Annual Outage post testing
5/7	1956	5/8	1030	0.6	Planned Annual Outage post testing
6/24	1402	6/24	1612	0.1	High bearing vibration
7/24	0001	7/25	1955	1.8	Air flow calibration issue
8/10	0613	8/10	0749	0.1	Operator failure
9/2	1743	9/2	1826	0.0	Drum level excursion
12/10	2345	12/11	2303	1.0	Maintenance Outage
TOTAL FORCED OUTAGE DOWN TIME				3.4	

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 AMOSKEAG UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Days	Water Spilled / Lost (Y or N)	Outage Type	Cause of Outage
S	4/2/10 21:40	4/2/10 22:35	0.0	Y	T or D	Line Fault
S	12/1/10 7:31	12/1/10 8:34	0.0	Y	EMO	Black Start Test
1	6/17/10 4:47	6/17/10 5:35	0.0	N	Trip	Trip - Lubrication
1	11/30/10 9:00	11/30/10 15:13	0.3	Y	EMO	Diver Safety
2	1/1/10 0:01	5/13/10 15:00	132.6	Y	UO	Gen. Rewind
2	9/11/10 17:02	9/11/10 20:01	0.1	N	Trip	Trip - Failed to Phase
3	2/11/10 7:30	2/11/10 14:00	0.3	Y	EMO	Gen. Winding Test
3	3/12/10 14:41	3/12/10 14:43	0.0	N	Trip	Trip - Failed to Start
3	6/28/10 8:00	9/23/10 12:13	87.2	N	UO	Generator Rewind

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 AYERS UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<b>Unit Number</b>	<b>Date &amp; Time OFF line</b>	<b>Date &amp; Time ON line</b>	<b>Outage Duration - Days</b>	<b>Water Spilled / Lost (Y or N)</b>	<b>Outage Type</b>	<b>Cause of Outage</b>
1	2/1/10 7:00	2/5/10 14:30	4.3	N	AI	Annual Inspection
1	2/5/10 14:00	2/9/10 13:30	4.0	N	Trip	Trip - Failed to Phase
1	6/5/10 6:27	6/5/10 8:45	0.1	Y	T or D	Line Fault
1	11/3/10 13:45	11/3/10 14:07	0.0	Y	T or D	Line Fault
2	2/4/10 13:15	2/4/10 13:30	0.0	Y	Trip	Trip - Overspeed
2	8/9/10 8:00	8/19/10 15:00	10.3	N	AI	Annual Inspection
2	11/3/10 13:45	11/3/10 17:40	0.2	Y	T or D	Line Fault
3	11/15/10 7:47	11/19/10 18:21	4.4	Y	AI	Annual Inspection

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 CANAAN UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<b>Unit Number</b>	<b>Date &amp; Time OFF line</b>	<b>Date &amp; Time ON line</b>	<b>Outage Duration - Days</b>	<b>Water Spilled / Lost (Y or N)</b>	<b>Outage Type</b>	<b>Cause of Outage</b>
1	2/8/10 21:58	2/9/10 8:37	0.4	Y	Trip	Trip - Field
1	2/10/10 5:17	2/10/10 10:12	0.2	Y	Trip	Trip - Overspeed
1	2/26/10 0:55	2/26/10 3:35	0.1	Y	T or D	Line Fault
1	2/26/10 4:00	2/26/10 6:35	0.1	Y	T or D	Line Fault
1	5/6/10 13:15	5/6/10 15:23	0.1	Y	T or D	Line Fault
1	5/6/10 15:42	5/6/10 15:52	0.0	Y	T or D	Line Fault
1	5/7/10 14:25	5/7/10 16:30	0.1	Y	Trip	Trip - Unknown
1	6/24/10 9:22	6/24/10 13:14	0.2	Y	EMO	Testing - Auto Phase
1	7/19/10 8:12	7/26/10 2:45	6.8	Y	AI	Annual Inspection
1	8/2/10 14:53	8/2/10 17:15	0.1	Y	T or D	Line Fault
1	8/23/10 11:20	8/23/10 11:31	0.0	Y	T or D	Line Fault
1	11/10/10 14:55	11/10/10 20:17	0.2	Y	EMO	Testing - Auto Phase
1	12/1/10 18:17	12/1/10 20:23	0.1	Y	T or D	Line Fault
1	12/28/10 10:13	12/28/10 11:03	0.0	Y	T or D	Line Fault

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 EASTMAN UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<b>Unit Number</b>	<b>Date &amp; Time OFF line</b>	<b>Date &amp; Time ON line</b>	<b>Outage Duration - Days</b>	<b>Water Spilled / Lost (Y or N)</b>	<b>Outage Type</b>	<b>Cause of Outage</b>
1	1/30/10 1:16	1/30/10 2:29	0.1	N	Trip	Trip - ESCC
1	7/12/10 8:00	7/16/10 16:00	4.3	N	AI	Annual Inpsection
2	1/15/10 16:58	1/15/10 19:23	0.1	Y	Trip	Trip - Lubrication
2	1/30/10 6:12	1/30/10 7:16	0.0	Y	Trip	Trip - Lubrication
2	4/11/10 7:42	4/11/10 10:04	0.1	Y	Trip	Trip - Lubrication
2	4/14/10 9:00	4/14/10 11:00	0.1	Y	EMO	Fish Louver
2	7/13/10 22:35	7/14/10 0:30	0.1	Y	Trip	Trip - Lubrication
2	9/27/10 9:31	10/4/10 18:41	7.4	Y	AI	Annual Inspection
2	10/4/10 17:02	10/4/10 18:41	0.1	Y	Trip	Trip - Temperature
2	12/13/10 9:35	12/14/10 14:47	1.2	Y	EMO	Headgate Repair

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
GARVINS UNIT OUTAGE LIST  
JANUARY TO DECEMBER

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Days	Water Spilled / Lost (Y or N)	Outage Type	Cause of Outage
S	2/26/10 8:44	3/1/10 12:20	3.2	Y	EMO	Worker Safety in SS
S	3/11/10 9:00	3/11/10 11:00	0.1	Y	EMO	Diver Safety
S	5/5/10 8:45	5/5/10 15:30	0.3	Y	EMO	Diver Safety
S	5/17/10 6:31	5/19/10 17:00	2.4	Y	EMO	Worker Safety in SS
S	5/19/10 5:25	5/19/10 17:00	0.5	Y	EMO	Worker Safety in SS
S	12/1/10 13:45	12/1/10 15:00	0.1	Y	EMO	Fish Passage
S	12/8/10 8:25	12/8/10 9:00	0.0	Y	EMO	Black Start Testing
1	2/25/10 23:57	2/26/10 1:15	0.1	Y	Tor D	Line Fault
1	7/26/10 15:00	7/26/10 16:43	0.1	Y	T or D	Line Fault
1	10/11/10 6:35	10/11/10 8:04	0.1	N	Trip	Trip - Pond Control
1	11/29/10 8:00	12/21/10 17:19	22.4	N	AI	Annual Inspection
1	12/31/10 2:16	12/31/10 4:54	0.1	Y	Trip	Failed to Phase
2	6/14/10 8:00	9/10/10 16:00	88.3	N	EMO	Turbine Seal Replacement
2	11/29/10 8:45	11/29/10 14:00	0.2	Y	EMO	Diver Safety
3	6/7/10 9:00	6/11/10 14:43	4.2	N	AI	Annual Inspection
3	9/2/10 9:20	9/2/10 11:45	0.1	N	EMO	Fish Passage
4	1/15/10 8:14	1/15/10 10:16	0.1	N	EMO	Fish Passage
4	6/7/10 11:10	6/7/10 11:23	0.0	N	AI	Annual Inspection
4	10/15/10 8:09	2/2/11 14:00	110.2	Y	EMO	Unit Fire

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
GORHAM UNIT OUTAGE LIST  
JANUARY TO DECEMBER

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Days	Water Spilled / Lost (Y or N)	Outage Type	Cause of Outage
S	6/14/10 8:12	6/23/10 11:31	9.1	Y	AI	G1, G2 Annual Inspection and SS Maintenance
S	6/19/10 18:26	6/19/10 19:09	0.0	Y	T or D	Line Fault
S	7/16/10 21:11	7/17/10 7:30	0.4	Y	T or D	Line Fault
1	2/24/10 0:40	2/24/10 1:57	0.1	Y	Trip	Trip - Lubrication
3	8/24/10 12:06	8/24/10 12:41	0.0	Y	EMO	Bypass Flow Testing
3	8/30/10 7:58	9/2/10 10:51	3.1	N	AI	Annual Inspection
4	3/12/10 13:15	3/12/10 13:22	0.0	Y	EMO	Trip - Lubrication
4	6/19/10 18:26	6/19/10 19:09	0.0	Y	T or D	Line Fault
4	7/16/10 21:11	7/17/10 7:30	0.4	Y	T or D	Line Fault
4	8/18/10 0:31	8/18/10 8:04	0.3	N	Trip	Trip - Governor Control

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 HOOKSETT UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<b>Unit Number</b>	<b>Date &amp; Time OFF line</b>	<b>Date &amp; Time ON line</b>	<b>Outage Duration - Days</b>	<b>Water Spilled / Lost (Y or N)</b>	<b>Outage Type</b>	<b>Cause of Outage</b>
1	2/25/10 23:48	2/26/10 8:56	0.4	Y	T or D	Line Fault
1	4/29/10 12:00	4/29/10 14:30	0.1	Y	T or D	Line Fault
1	7/26/10 15:00	7/26/10 18:02	0.1	Y	T or D	Line Fault
1	8/2/10 8:01	8/6/10 16:00	4.3	Y	AI	Annual Inspection
1	11/10/10 19:01	11/10/10 20:38	0.1	Y	T or D	Line Fault

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 JACKMAN UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<b>Unit Number</b>	<b>Date &amp; Time OFF line</b>	<b>Date &amp; Time ON line</b>	<b>Outage Duration - Days</b>	<b>Water Spilled / Lost (Y or N)</b>	<b>Outage Type</b>	<b>Cause of Outage</b>
1	3/11/10 15:25	3/11/10 18:12	0.1	N	T or D	Line Fault
1	4/3/10 11:26	4/3/10 12:19	0.0	N	T or D	Line Fault
1	8/16/10 8:00	11/12/10 10:00	88.1	Y	AI	Annual Inspection
1	11/20/10 11:31	11/23/10 14:31	3.1	N	EMO	Electrical Maintenance

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 LOST NATION UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Days	Water Spilled / Lost (Y or N)	Outage Type	Cause of Outage
1	5/10/10 9:18	5/20/10 14:20	10.2	N/A	AI	Annual Inspection

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
SMITH UNIT OUTAGE LIST  
JANUARY TO DECEMBER

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Days	Water Spilled / Lost (Y or N)	Outage Type	Cause of Outage
1	9/12/10 7:00	9/22/10 14:10	10.3	Y	AI	Annual Inspection
1	10/26/10 8:35	10/26/10 21:46	0.5	Y	EMO	Worker Safety

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE  
 WHITE LAKE UNIT OUTAGE LIST  
 JANUARY TO DECEMBER

<b>Unit Number</b>	<b>Date &amp; Time OFF line</b>	<b>Date &amp; Time ON line</b>	<b>Outage Duration - Days</b>	<b>Water Spilled / Lost (Y or N)</b>	<b>Outage Type</b>	<b>Cause of Outage</b>
1	2/12/10 7:48	2/12/10 8:01	0.0	N/A	Trip	Failed to Phase
1	4/12/10 8:00	4/23/10 16:00	11.3	N/A	AI	Annual Inspection
1	5/26/10 16:56	5/26/10 18:48	0.1	N/A	Trip	Failed to Phase

## **ATTACHMENT WHS-2**

### **PUC OUTAGE REPORTS**

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-01 (MK2-01)

**Station/Unit:** Merrimack Station Unit No. 2

**Dates:** January 1 – January 5, 2010

**Duration:** 3.5 days

**Immediate Cause:**

The unit was removed from service due to excessive water usage.

**Discussion / Remedy:**

The unit tripped off line due to excessive water usage. A boiler inspection identified both cyclone tube leaks and tube leaks in the furnace walls.

“F” cyclone had a tube leak at the 10:00 o’clock position looking into the cyclone. It was determined that since the failure was towards the backside of the barrel tubes, that staging would have to be erected in the windbox for access to perform the repair. A section of boiler wall tubing had to be removed with a cutting disc for several feet along four tubes. The tubes were then spread with wedges. Once the tube failure was accessible, the repair could be performed. Once the repair was complete the tubes had to be realigned and the wall section previously removed needed to be reinstalled. In the fireside of the cyclone, studs had to be welded back onto the barrel tubes and then refractory installed after the pressure check. The leak in “E” cyclone was under the flat studs at the 1 o’clock position looking out of the cyclone. Studs were removed in an 8” by 8” area, followed by inspection and prepping of the barrel tubes for weld repair. After the weld repair and the pressure check, new flat studs were welded back in place. The tube leak in “G” cyclone was located at the 4 o’clock position looking into the cyclone. After the weld repair and pressure check, new pin studs were welded back on and refractory was reinstalled.

The tube leak on the front wall, (elev. 287’) and a right sidewall tube leak both required sky climbers. Cooling and vacuuming of the penthouse was performed in order to access the area needed for cable drops. Cutting through the section of boiler wall tubing adjacent to the roof tubes provided the space needed to hang the two sky climbers.

The west (front) wall tube was at elevation 287’, 8’ from the south wall. Three small pad welds were performed, one on the failure, and the two tubes adjacent to the failure. The

sidewall tube failed and caused damage to the five nose tubes. Both wall tube leaks appeared to be from stress cracks due to tube thinning caused by erosion. The leaks in the gas recirculation duct were on the front wall tubes, first window (counting south to north), at the floor level. All five tubes were pad welded. The second tube from the window failed causing tube wastage on the other tubes. The other leak was at the third window, counting south to north, first wall tube at the floor level. These leaks were caused by erosion. Once all the tube leaks were repaired, a final boiler pressure test was performed. There were no other waterside leaks found. The staging, sky climbers and all other equipment was then removed from the boiler, remaining doors were closed, and the unit turned over to operations.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-02 (MK2-02)

**Station/Unit:** Merrimack Station Unit No. 2

**Dates:** January 29 – February 3, 2010

**Duration:** 4.3 days

**Immediate Cause:**

The unit was taken off line due to excessive water usage.

**Discussion/Remedy:**

Unit 2 was removed from service at 17:56 hours on January 29, 2010 for excessive water usage. A boiler inspection identified a tube leak in the lower bank of the primary superheater and a number of cyclone tube leaks.

The major repair involved the lower bank of the primary superheater, located near the rear wall. These tube leaks were caused by flyash erosion. These horizontal tube elements are very close together and loop back and forth creating a stack of up to 18 tubes deep. From the northeast corner and counting north to south, the leaks involved the 1<sup>st</sup> and 2<sup>nd</sup> elements, and were on the bottom two tubes on both elements. Due to the severe weather conditions, elevations 6 1/3 and 6 2/3 needed to have wind shelters constructed, and propane heaters installed. Lagging and insulation was removed on both levels and a large section of the boiler wall was cut out on the north side to gain access to the primary tubes. The section of wall removed to obtain access added 12 extra wall tube welds and seal welding of the membrane. On the rear (east) wall, a section of boiler wall was also removed for welding access. The ladder bracket and tube shields were removed to allow freedom to move tubes individually.

Due to the location of the failure, a decision was made to cut the bend sections out, pad weld the minor damaged area and fabricate and install new bend sections. The tube shields and ladder brackets were reinstalled. The wall panel was then welded back in place, with a pressure check to follow. Once the pressure check was complete, the section of boiler removed to access necessary for repair was installed followed by the insulation and lagging. To prepare for future outages, sections of the loops were ordered and placed in stock.

Other tube leaks identified and repaired during this outage were in the 'D', 'F' and 'G' cyclones, and were easily pad weld repaired. "G" cyclone had one tube leak at 10

o'clock, looking out of the cyclone and 8' in from the neck tubes. "D" cyclone had four tubes in need of repair (adjacent to each other) at 10 o'clock and 3" to 7" from the neck. "F" cyclone had one tube leak at the bends by the secondary air damper, 3' 6" from the neck tubes. The cyclone leaks were caused by erosion.

Once all the tube leaks were repaired, a final boiler pressure test was performed. There were no other waterside leaks found, and the remaining doors were closed, and the unit turned over to operations.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## **FOSSIL STATION OUTAGE REPORT**

**Outage Report No.:** OR-2010-03 (MK1-01)

**Station/Unit:** Merrimack Station Unit No. 1

**Dates:** February 19 – February 22, 2010

**Duration:** 2.4 days

**Immediate Cause:**

The unit was removed from service due to air heater pluggage.

**Discussion/Remedy:**

After a seventy-nine day run, Unit 1 was removed from service clean the air heater. A boiler inspection did not reveal any water or steam side tube leaks. Before the wash, an inspection of the upper and lower air heater seals (circumferential and radial) was performed. The only seals found in need of replacement were several upper circumferential seals on “A” air heater. These seals were replaced. Critical path was the air heater wash with a backlog of jobs being performed by the maintenance department and vendors.

A Merrimack Station boiler inspection team performed a boiler inspection. No tube leaks were found.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-04 (MK2-03)

**Station/Unit:** Merrimack Station Unit No. 2

**Dates:** May 20 – May 24, 2010

**Duration:** 4.1 days

**Immediate Cause:**

The unit was removed from service due to high water usage.

**Discussion/Remedy:**

Unit 2 was removed from service at 16:20 hours on May 20, 2010 for excessive water usage after 108 days of consecutive operation. The boiler inspection identified tube leaks in all the cyclones except for cyclone 'D'.

"A" cyclone had a tube leak behind the button studs above the throat and a cooling water leak under the metal alverite wear block that fits around the coal inlet chute. "B" cyclone had a cooling water leak under the ceramic wear blocks. Facing the firebox from inside the cyclone, the leak was at the nine o'clock position. Both "A" and "B" cooling water jackets needed the wear blocks removed to repair the leaks. "C" cyclone had two leaks located on the leading edge neck tube. The leaks were located at the eight and the ten o'clock position looking out of the cyclone. "E" cyclone had leaks 4 inches down from the secondary air bends 30 inches from the neck. The tubes included tubes 21 thru 28. An old pin stud started leaking and cut the adjacent tube, which cut the next tube and this chain reaction continued resulting in a eight tube needing to be repaired. "F" cyclone had a tube leak under the flat studs, three feet from the neck and sixty-eight inches up from the stud line. Facing the neck, looking out of the cyclone, "G" cyclone had a tube leak on the neck at the one o'clock position. "G" cyclone also had a leak behind the flat studs, two feet from the throat, four feet up from the pin stud line. After the weld repairs and pressure check, new pin studs were welded back on and refractory was installed.

Additionally, there was a tube leak in the backpass on the lower bank of the primary superheater. The tube was located on the top of the 26<sup>th</sup> primary superheater tube counting from north to south. This tube was pad welded as were numbers 25 and 27. The tubes are protected by gunnite blocks, but they are starting to show worn areas on and between the blocks allowing flue gas erosion to take place on the tubes. The worn areas on and between the blocks were repaired with refractory and will be addressed in

more detail during the annual overhaul. There was another small tube leak in a convection pass right sidewall tube on 6-2/3 south, 18" up from the header near a floor beam attachment. The tube was pad welded.

Once all the tube leaks were repaired, a final boiler pressure test was performed. There were no other waterside leaks found.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-05 (MK1-02)

**Station/Unit:** Merrimack Station Unit No. 1

**Dates:** June 28 – July 1, 2010

**Duration:** 2.5 days

**Immediate Cause:**

The unit was removed from service due to excessive water usage.

**Discussion/Remedy:**

Unit 1 was removed from service due to excessive water usage. A boiler inspection revealed two rear water wall tube leaks around IR-12 sootblower (elev. 264') and a smaller wall tube leak on the south wall of the firebox (right hand sidewall elev. 233').

The rear wall failure required a spider (small swing staging) to gain access in order to make the repair. Due to the location of the leak, we were able to attach the cables for the spider to the bullnose. This eliminated the need to wait the 24 to 36 hours that are required for the penthouse to cool enough to enter safely. The affected tubes were tube numbers 9 and 10 from the south wall. These tubes were removed and replaced with two 50" Dutchmen. The tube leak on the south wall was number 8 counting from the front wall, (SW corner) and 22 ½' from the boiler floor. The leak in this wall tube was pad weld repaired. The tube failures were located on the sides of the tubes and were caused by erosion.

Note that the affected tubes associated with both of these leaks are tangent tubes. These tubes have virtually no space between them. This requires extra steps to prepare them for the welding process. 360 degrees of access needs to be provided around the tubes for cutting, grinding and welding. Both repairs required the lagging, insulation, boiler casing, refractory and wire mesh to be removed. The tubes had to be cut free from the horizontal support channels. The tubes were then spread with wedges and pulled in or out of alignment in order to make the repairs. After the tubes were repaired, a successful black light and leak check procedure was performed on all the welds.

The tubes were then pulled back into alignment and tack welded back onto the horizontal channels, new wire mesh was tack welded back on the tubes, refractory and boiler casing were reinstalled followed by the insulation and lagging.

An air heater wash was also completed. Before the wash, an inspection of the upper and lower air heater seals (circumferential and radial) was performed. All were in good condition and none were missing. Critical path would be the air heater wash with a backlog being performed by the maintenance department and vendors.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-06 (SR5-02)

**Station/Unit:** Schiller Unit No. 5

**Dates:** July 3 – July 16, 2010

**Duration:** 12.5 days

**Immediate Cause:**

The unit was removed from service due to a boiler tube leak eventually causing the loss of wood flow, the loss of boiler drum level, and a positive furnace pressure condition. This outage was extended due to bed fluidization and bed material transfer issues.

**Discussion/Remedy:**

Unit #5 was taken off line at 2331 on July 3<sup>rd</sup>. The vacuum vendor and boilermakers were notified and requested to mobilize, for outage support. Additional outage support included nondestructive examination contractor and tube sleeve contractor.

Unit 5 can take up to 24-hrs to cool, late on July 4<sup>th</sup> internal temperatures reached a safe level and bed removal work commenced. Bed removal was slow, because it was saturated with water caused by the tube leak and very heavy which limited flow.

Boiler makers arrived on site Monday morning, July 5<sup>th</sup> and began rigging and pulling cyclone covers. All 6-cyclone covers were removed to facilitate cleaning and inspection. Cleaning the cyclones continued through Thursday, July 8<sup>th</sup>.

Once a sufficient amount of material from the furnace was removed inspection was initiated. The inspection identified five leaks. An in-bed tube between dip legs #5 and #6 had failed which caused leaks on four other tubes in the vicinity. On July 5<sup>th</sup> furnace cleaning was complete and tube repair work commenced. Five dutchman were installed to complete the repairs. Non-destructive examination of the other in-bed tubes was completed by an outside vendor on July 7<sup>th</sup>. No areas of concern were noted. Once furnace work was completed the tuyeres were cleaned with compressed air.

Also the tube sleeve contractor was contacted on July 4<sup>th</sup>, to mobilize their crew to complete sleeve installation on the air heater during the outage. The vacuum vendor cleaned the upper tubesheet during the Tuesday July 5<sup>th</sup> night shift to ensure air heater sleeve work would not be delayed. With the exception of approximately 30 tubes, eight foot sleeve sections were installed on the first 15 cold end rows. Sleeves were not installed on the 30 tubes because of heavy corrosion, so these tubes were plugged.

Once the in-bed tube repair work and air heater sleeve installation was completed the initial hydro was conducted. During the hydro, a leak was found in a steam cooled backpass wall tube. The area was thoroughly inspected and no indication of corrosion, cracking or other cause was identified, the leak was repaired by pad weld. Following this repair a successful pressure test was completed.

I&C personal completed an inspection of the gas burner system and other sensing equipment that could have been exposed to water damage caused by the boiler leak. No issues were identified.

### **Outage Extension:**

Operations began adding bed material to the furnace on Friday July 9<sup>th</sup>, approximately 10 to 15 tons of material was transferred from the silo into the furnace, but the flow from the silo stopped and could not be restarted. Inspection of the bed material nozzle from the furnace found large chunks of solidified bed material causing pluggage and preventing the material transfer. The cause of the pluggage was due to the boiler tube leak which saturated the bed material and was transferred from the furnace to the silo during shutdown.

Disassembly of the transfer piping to remove the restriction and unloading of the silo was necessary to insure quality bed material was loaded in the furnace. Once complete the bed material was transferred to the furnace, and gas firing followed. Because of the volume of water caused by the tube leak gas firing was prolonged to prevent refractory damage. During the start-up tuyere and furnace bed pressure differentials were not trending as expected. The start-up was aborted on July 10<sup>th</sup> and the furnace was inspected, during the inspection the bed material had shifted which indicates proper fluidization. At this time it was thought that the pressure sensing taps were plugged and the cause of the abnormal pressure indication. Sensing lines were cleaned and start-up resumed on July 11<sup>th</sup>.

During start up on July 11<sup>th</sup> tuyere pressure differential remained elevated, bed temperatures were not increasing as expected and FD fan discharge pressure indicated restricted air flow. Start-up was aborted on July 13<sup>th</sup>, and the bed material removed.

On July 14<sup>th</sup> a detailed inspection of the tuyeres indicated that many of the tiny air ports, 0.030" slits, were plugged with fine bed material caused by the in-bed tube leak. Hand cleaning (wire brush) the slits was required to remove the material. Upon completing the tuyere cleaning a normal start-up was completed and the unit phased Friday morning.

### **Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-07 (MK2-04)

**Station/Unit:** Merrimack Station Unit No. 2

**Dates:** August 10 – August 13, 2010

**Duration:** 2.7 days

**Immediate Cause:**

The unit was removed from service to complete planned maintenance repairs.

**Discussion / Remedy:**

Unit 2 was removed from service to complete planned maintenance repairs after a seventy-eight day run at 14:01 hours on August 10, 2010. A boiler inspection was completed and identified tube leaks in “F” cyclone. An inspection of the upper furnace, backpass and penthouse indicated no other water or steam side leaks.

In “F” cyclone, the repair involved pad welding two different areas on the north side of the barrel tubes. One area that required pad welding was located five feet up from the bottom center of the cyclone and three feet from the neck. A total of six tubes were repaired. The cause was a leak at the base of a pin stud, which caused wall thickness loss on the adjacent barrel tubes. The second area involved a leak under the staggered flat studs caused by erosion. Removal of flat studs was required in order to pad weld the tube failure.

All tubes were pad welded, new studs were welded on the cyclone tubes and refractory was reinstalled once all the tube leaks were repaired. A final boiler pressure test was performed, and there were no other waterside leaks found.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-08 (SR5-02)

**Station/Unit:** Schiller Unit No. 5

**Dates:** September 25 – October 2, 2010

**Duration:** 6.2 days

**Immediate Cause:**

The unit came off line after a feeder trip and subsequent unit trip.

**Discussion/Remedy:**

Cyclone temperatures were high and bed temperature low at the time of the feeder trip and subsequent unit trip. Sand usage and ash disposal had been increasing over the past month indicating that cyclone pluggage was increasing.

Investigating the feeder trip, the pneumatic fuel spreader damper drive gear box was found failed. The failure was due to loss of lubrication due to a seal failure. This gear box was replaced. All of the other three gear boxes were inspected with one more being replaced and the other two had new seals installed. All four gear boxes had new sight glasses installed on the upper or lower gear boxes.

During the outage a complete boiler inspection was performed. One area of wear was found next to soot blower 21 which was pad welded. The boiler was then pressure checked and no leaks were found.

All 6 cyclones and furnace bed were cleaned and vacuumed.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## **FOSSIL STATION OUTAGE REPORT**

**Outage Report No.:** OR-2010-09 (MK1-03)

**Station/Unit:** Merrimack Station Unit No. 1

**Dates:** September 28 – October 2, 2010

**Duration:** 3.4 days

**Immediate Cause:**

The unit was removed from service after an 88 day run to perform planned preventative maintenance.

**Discussion/Remedy:**

Unit 1 was removed from service on September 28<sup>th</sup> after an 88 day run to perform planned preventative maintenance. An air heater inspection was completed prior to the air heater wash and found that the circumferential and radial seals did not need replacing.

A boiler inspection indicated a small waterside barrel tube leak in 1B cyclone, located in the 12 o'clock position where the cyclone decreases down in diameter to form the re-entry throat, 10" in from the step down. This was a small leak next to a stud, and easily repaired. The upper furnace including the secondary superheater (SSH), vertical reheater (VRH), and the primary superheater (PSH) and backpass were in very good condition with no other steam or water leaks found.

Critical path was the high pressure air heater water wash with a backlog of maintenance jobs being performed by the maintenance department and vendors.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-10 (MK1-04)

**Station/Unit:** Merrimack Station Unit No. 1

**Dates:** October 2- October 6, 2010

**Duration:** 4.5 days

**Immediate Cause:**

The unit was removed from service due to a secondary superheat inlet tube failure.

**Discussion/Remedy:**

Unit 1 was removed from service on October 2, due to a secondary superheater inlet tube failure. The initial visual inspection of the tube failure indicated the possibility of overheating. To insure there were no restrictions in the secondary superheater header (SSH), an internal inspection was performed.

The tube failure was in the 5<sup>th</sup> platen counting from the south to north on the 3<sup>rd</sup> tube up from the bottom of the bend. Due to the location of the failure, two swing stagings were set up to access both sides of the platen. The top of the screen tubes in the lower part of the firebox had to be planked over to provide a working platform for the set-up of the swing stagings. The penthouse needed to be vacuumed, refractory removed from the penetrations and insulation bags removed from the SSH inlet header to allow access for the cable drops which supported the picks. Because the failure was on a tight bend radius of the platen, replacement sections were bent at a remote metal shop per B&W prints. The section involved was the 3<sup>rd</sup> and 10<sup>th</sup> tubes that formed one of the bottom loops in the platen. Handcuffs on the platen were also removed to allow lateral movement for tube replacement, and realignment of the platen.

After the welding process was complete, the welds were black lighted for quality assurance. After the black lighting was complete, the tubes were realigned and new handcuffs were installed. The swing staging was then lowered to the firebox and disassembled. The planking that was on the screen tubes was removed, the cables removed from the penthouse, new refractory poured around the SSH penetrations in the penthouse and the insulation bags were reinstalled on the SSH header. All doors were then closed and the unit was released to operations for availability.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## FOSSIL STATION OUTAGE REPORT

**Outage Report No.:** OR-2010-11 (SR4-01)

**Station/Unit:** Schiller Unit No. 4

**Dates:** November 13 – November 18, 2010

**Duration:** 5.4 days

**Immediate Cause:**

The unit was removed from service due to traveling screen drive sprocket failure.

**Discussion / Remedy:**

A large drive gear on the traveling screens snapped in half at shaft hub. The unit was dropped to 1 mill load. The 4A main circulator was secured to prevent collapsing of the screens due to the large amount of leaves present on them. Suction on the salt water pump was lost with salt water coming from #1 screen house.

The damaged sprocket was removed from the screen and sent to Generation's machine shop to assess the time to fabricate a new one. In parallel, suppliers were contacted to check the availability of a replacement part. It was determined that although the machine shop could fabricate a new sprocket it would be quicker to have a new sprocket shipped from the supplier. Delivery was expected November 18, 2010. Installation was expected to be completed the same day as received.

The sprocket arrived as scheduled on the 18<sup>th</sup>. Additional machining was completed to obtain a proper fit up and alignment with the unit's existing configuration. Once the modifications were completed the sprocket was installed and successfully tested. The unit was then turned over to operations.

During the outage a boiler inspection was completed. No boiler leaks were found. Areas of wear were found on the bent tube shields entering into the mud drum. Ten shields were replaced on both the north and south sides. Refractory tile was repaired and one tile replaced in the vertical tile baffle between the superheat and kicker baffle area. All 3 superheater hoppers and the furnace were vacuumed.

On November 18<sup>th</sup>, the authorized inspector conducted a boiler inspection for the annual operating permit. The inspector found no deficiencies or concerns.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

# PSNH

## **FOSSIL STATION OUTAGE REPORT**

**Outage Report No.:** OR-2010-12 (SR5-03)

**Station/Unit:** Schiller Unit No. 5

**Dates:** December 11 – December 16, 2010

**Duration:** 4.5 days

**Immediate Cause:**

Schiller Unit No. 5 was removed from service for 4.5 days to complete maintenance work and remove cyclone pluggage.

**Discussion/Remedy:**

Unit 5 has been on load reduction due to increasing cyclone pluggage. The unit was taken offline for maintenance work to clean them. One cyclone also had a hot spot and needed to be investigated.

Unit 5 requires a longer cool down period due to the configuration of the boiler. Once the temperature was safely reduced, boiler doors were opened and the cooling process continues. Operations removed as much bed material as possible as the unit was being brought down (approximately 80-90 tons removed). The remaining bed material is vacuumed out. The bed-tube was inspected and a thickness check was completed. Several tubes were plugged as a result of the findings.

The cyclones were vacuumed and cleaned. The inspection found that the #2 cyclone was plugged solid, the #3 cyclone had some build up and the hot spot identified was due to missing bricks in that area. All cyclones were checked for pluggage, and cleaned as needed. Refractory folks repaired the cyclone where the hot spot was. Cyclone covers reinstalled, boiler doors closed and unit turned back over to operations to be put into service.

The condenser was cleaned of leaves, shells, and other debris.

**Additional routine work was completed during the outage.**

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the inspection of the boiler at the beginning of the outage, and other corrective and preventative work in an effort to avoid future forced outages and support an extended unit run.

## **ATTACHMENT WHS – 3**

### **PSNH FOSSIL STEAM UNIT AVAILABILITY**

# PSNH FOSSIL STEAM UNIT AVAILABILITY

## January 2010 through December 2010

	Merrimack Unit 1	Merrimack Unit 2	Newington Unit 1	Schiller Unit 4	Schiller Unit 5	Schiller Unit 6
January	100.0%	81.6%	100.0%	100.0%	100.0%	99.9%
February	91.4%	90.1%	100.0%	92.5%	100.0%	96.9%
March	100.0%	99.8%	100.0%	0.0%	100.0%	99.7%
April	42.1%	100.0%	100.0%	96.3%	34.5%	93.3%
May	34.7%	86.9%	100.0%	100.0%	97.1%	99.9%
June	92.8%	100.0%	96.1%	98.7%	100.0%	91.5%
July	99.0%	98.8%	99.3%	100.0%	59.7%	100.0%
August	100.0%	91.4%	99.8%	99.5%	100.0%	100.0%
September	92.3%	68.7%	99.8%	100.0%	82.8%	100.0%
October	82.1%	33.0%	93.5%	100.0%	96.7%	99.0%
November	99.5%	100.0%	78.5%	82.1%	97.9%	94.7%
December	100.0%	100.0%	89.6%	100.0%	84.5%	100.0%

## Planned Maintenance Outages January 2010 through December 2010

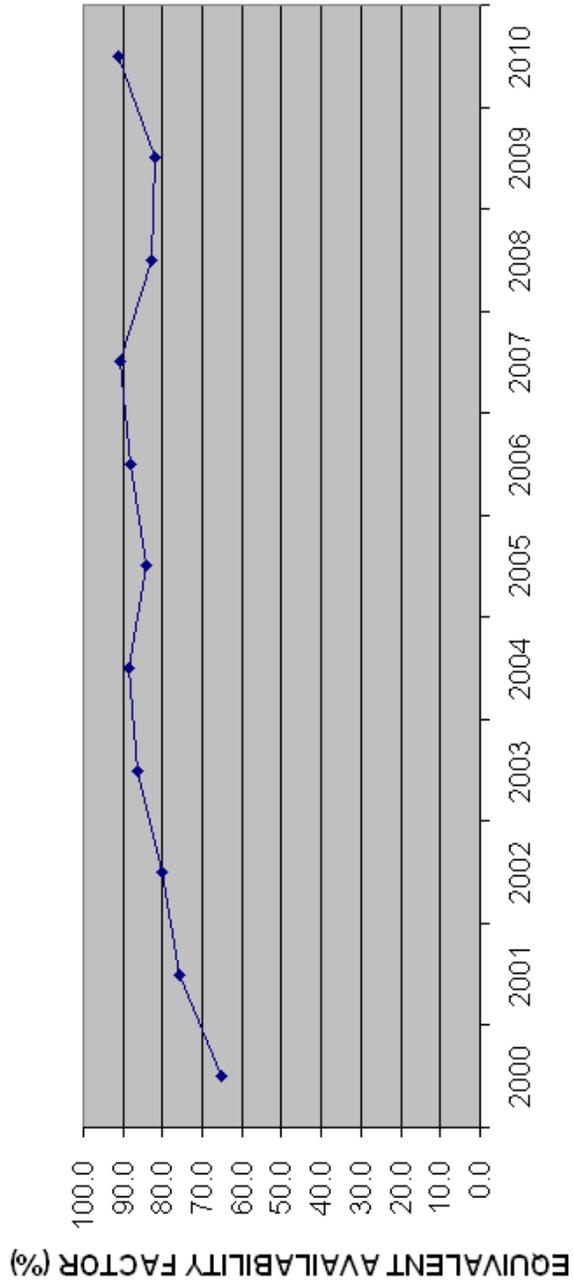
Unit	Month(s)
Merrimack 1	Apr-May
Merrimack 2	Sep-Oct
Newington	Nov
Schiller 4	Mar
Schiller 5	Apr
Schiller 6	

### DEFINITION:

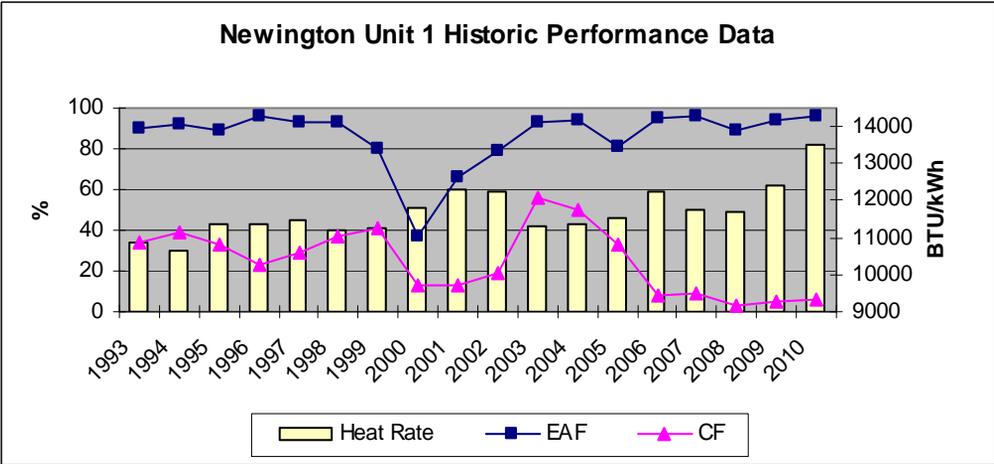
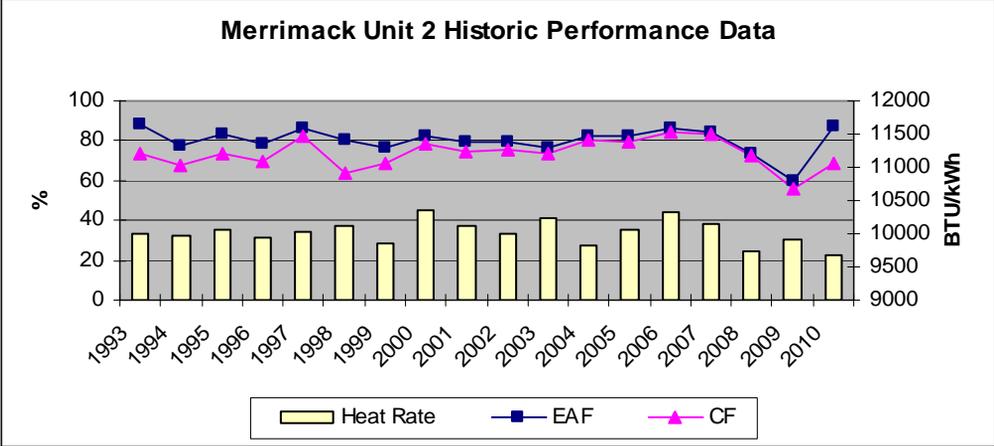
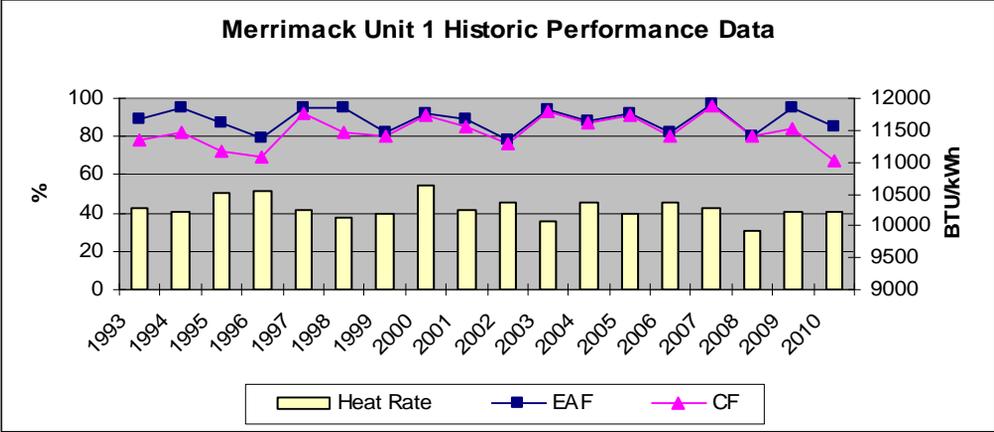
Unplanned Outage Equivalent Availability Factor - EAF(Unplanned):

$$\frac{(\text{Available Hours} + \text{Planned Outage Hours} - \text{Equiv. Unit Derated Hours} - \text{Equiv. Seasonal Derated Hours}) \times 100}{\text{Period Hours}}$$

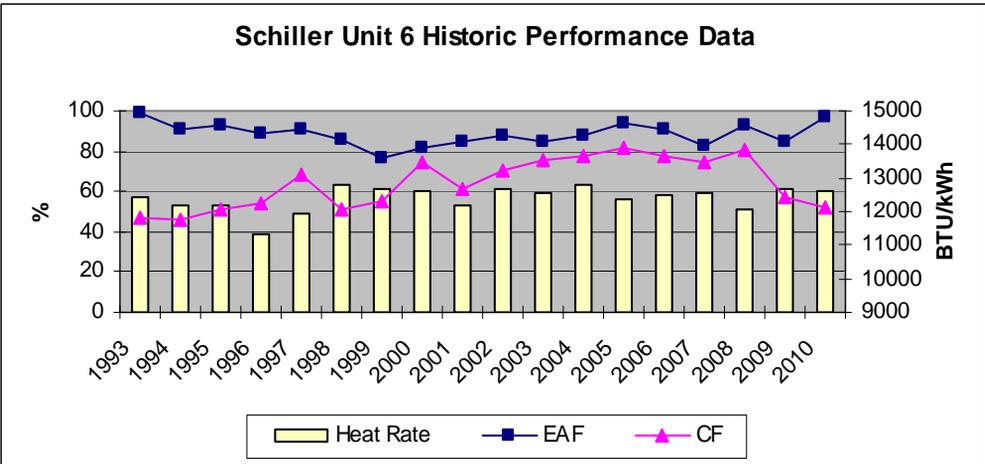
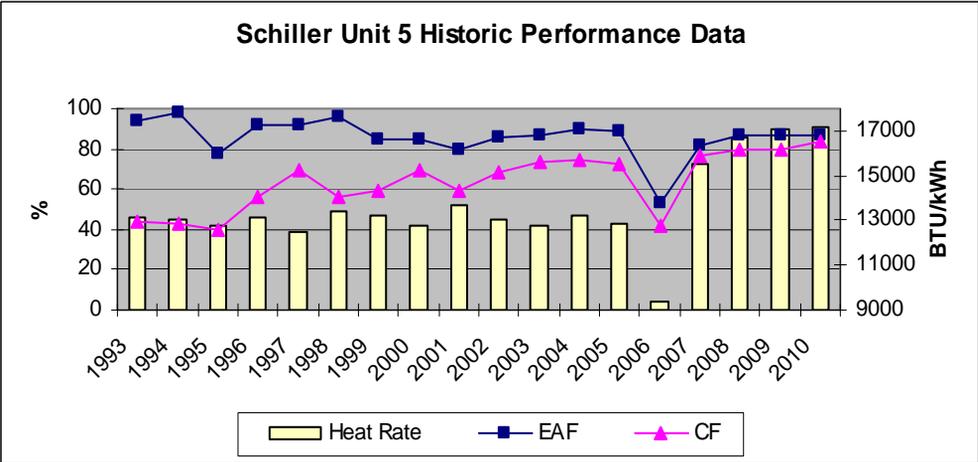
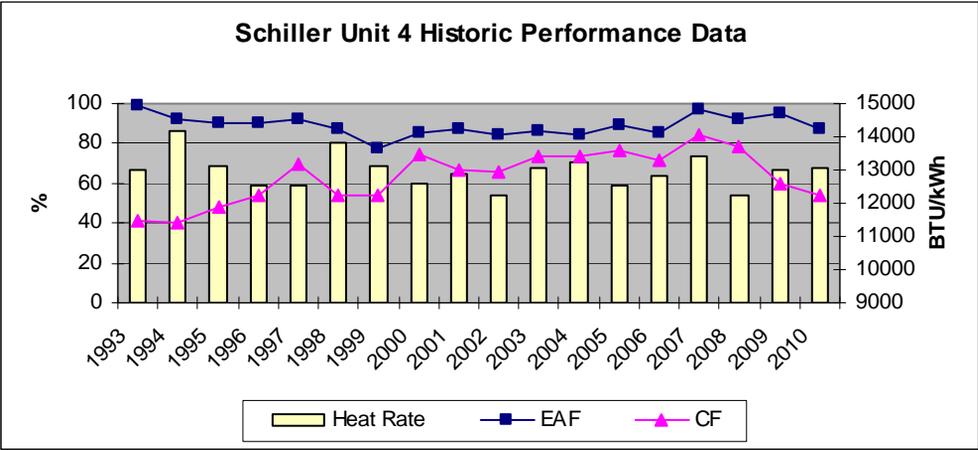
**PSNH FOSSIL SYSTEM WEIGHTED EAF  
2010**



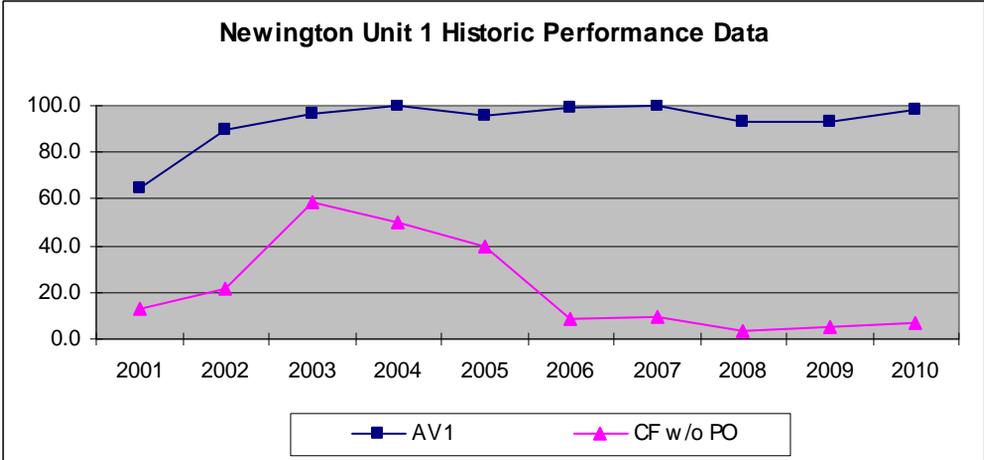
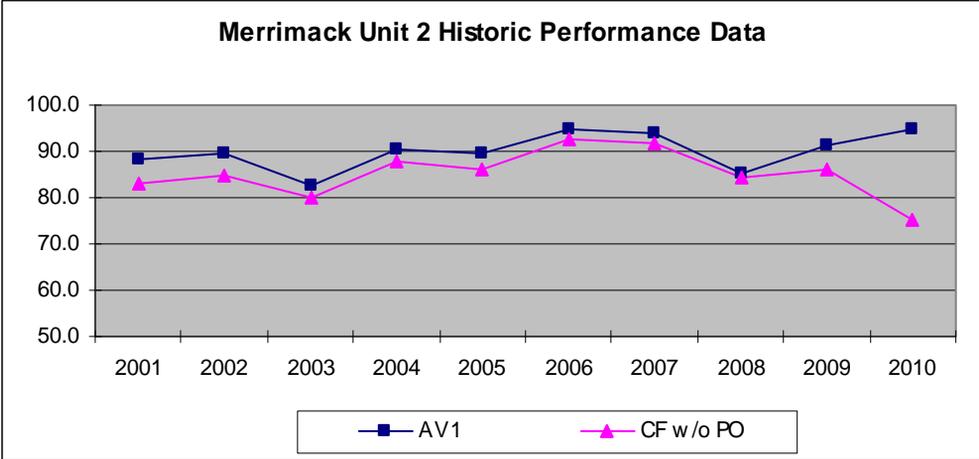
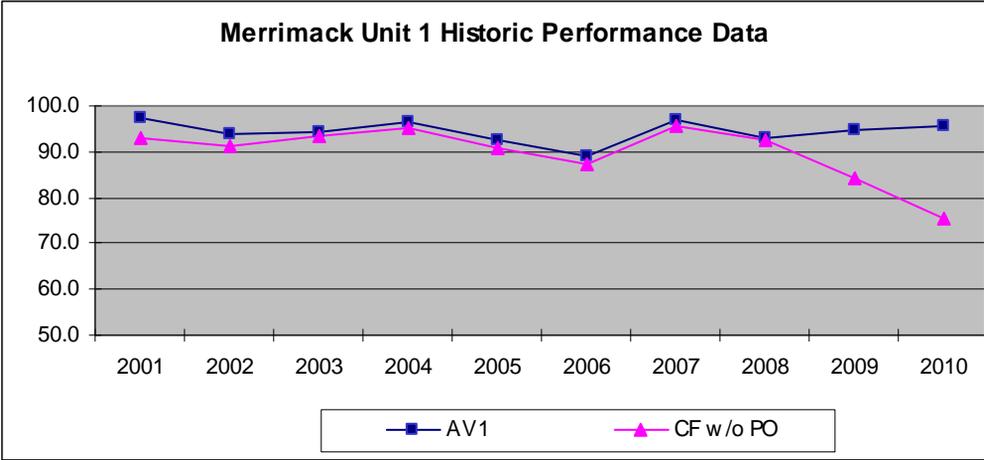
# Fossil Plant Graphs – Planned Outages Included



# Fossil Plant Graphs – Planned Outages Included



# Fossil Plant Graphs – Planned Outages Omitted



# Fossil Plant Graphs – Planned Outages Omitted

