

DE 10-121

Exhibit No. #3
Witness
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Docket No. DE 10-XXX
Exhibit No. 3

STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
RECONCILIATION OF ENERGY SERVICE AND STRANDED COSTS FOR
CALENDAR YEAR 2009

DIRECT TESTIMONY OF
WILLIAM H. SMAGULA

1 **I. Introduction**

2 Q. Please state your name, position, employer and address.

3 A. My name is William H. Smagula. I am Director of Generation for Public Service
4 Company of New Hampshire, (PSNH), a subsidiary of Northeast Utilities (NU).
5 My business address is 780 North Commercial Street, P.O. Box 330, Manchester,
6 New Hampshire 03105.

7 Q. Please provide a brief summary of your background.

8 A. I received a Bachelor of Science in Mechanical Engineering from the University
9 of New Hampshire and a Master of Science in Mechanical Engineering from
10 Northeastern University. I have worked for Public Service Company of New
11 Hampshire and then Northeast Utilities since 1978. I am a Registered Professional
12 Engineer in the states of New Hampshire, Connecticut and Massachusetts. My
13 duties have included Manager of Generation Training for the PSNH system,
14 Station Manager - Merrimack Station, Steam Production Manager - PSNH,
15 Director Fossil Generation - The Connecticut Light and Power Company, and
16 Director, Manage and Operate Services - Northeast Generation Services Company.
17 In June 2001, I assumed the responsibilities of Director - PSNH Generation in
18 New Hampshire.

1 Q. Have you ever testified before this Commission?

2 A. I have provided similar testimony in many previous Commission proceedings
3 regarding the operation of PSNH's fossil-fired and hydroelectric generating plants.

4 Q. Please describe your responsibilities as Director - PSNH Generation.

5 A. In my present position, as Director - PSNH Generation, I am responsible for the
6 operation and maintenance of PSNH's generating stations. I have responsibility
7 for three fossil-fired, steam electric generating stations, nine hydroelectric
8 generating stations, two remote combustion turbine/diesel generator sites and most
9 recently a new biomass fueled boiler. PSNH Generation maintains a diversified
10 fuel portfolio including gas, oil and coal-fired units as well as hydro and
11 renewable biomass with a total generation capacity of approximately 1150 MW.

12 Q. What is the purpose of your testimony in this proceeding?

13 A. The purpose of my testimony is to provide information on all outages that took
14 place at PSNH's fossil-fired, hydroelectric and biomass units and at NextEra
15 Energy Resources, LLC's (formerly FPL Energy) Wyman Station, Unit No. 4 in
16 which PSNH is a small minority owner. This information will be for the period
17 January 1, 2009 through December 31, 2009. I shall also provide information on
18 unit equivalent availability achieved by PSNH's fossil units, consistent with
19 reporting provided in previous years. Unit availability including planned outages
20 will be calculated consistent with past submittals, as well as similar calculations
21 without the influence of planned outages.

22 **II. Generating Unit Operation**

23 Q. Please provide an overview of the performance of PSNH's generating units in
24 2009.

25 A. PSNH's generating units provided total generation in 2009 equal to 3,788,627
26 MWh. The fleet's availability during the 30 highest priced days when customers'
27 exposure to high market prices was the greatest was 97.4%. With the installation

1 of a new, more efficient HP/IP turbine, Merrimack Station's Unit 2 had an
2 increase of 12.0 MW on normal net output from 320 MW to 332 MW and claim
3 capacity increase from 321.75 MW to 337.2 MW. Merrimack Station's Unit 1 had
4 its third longest run ever, operating for 125.65 days. Schiller Unit 6 achieved a
5 new record run of 124 consecutive days.

6 Merrimack Station's Unit 2 and Schiller Station's Unit 6 each completed planned
7 turbine overhauls. These outages were completed safely, accident free and ahead
8 of schedule and with quality results. Schiller Station's Unit 5 planned outage was
9 also completed safely and accident free while being completed on time and within
10 budget. Schiller Station generated 807,298 MWh. Schiller Unit 5, the biomass
11 unit, contributed 318,944 MWh to the fleet's renewable energy production.
12 PSNH's hydroelectric facilities generated 413,300 MWh, with a weighted average
13 equivalent availability of 94.8%. Over the last 50 years of annual hydro
14 generation, this is the third largest year with only 2008 and 1990 being greater.
15 Newington Station completed the year with a 94.2% equivalent availability.
16 Overall, PSNH's generating stations' aggregate equivalent availability was 84.4%
17 in 2009.

18 In 2009, PSNH Generation continued to focus on plant operations and long-term
19 planning to provide benefit to customers through reliable, compliant, and
20 cost-effective operations and management.

21 Q. Please provide a summary of why PSNH's generating units have continued to
22 operate well, with high reliability and high availability.

23 A. PSNH Generation continues to focus on four key items important to long-term
24 operational success: the day-in and day-out operation and maintenance of the
25 units; the preventative maintenance and maintenance conducted during forced
26 outages; pre-planning and execution of planned maintenance outages; and the use
27 of a long-term (5-and 10-year) maintenance outage and capital expenditure
28 planning process. The long-term maintenance plans prioritize reliable plant
29 operations and

1 are founded on equipment history and on-going condition assessment. The
2 generating stations maintain a long-standing preventative maintenance program
3 which allows for proactive management of plant equipment problems to best
4 execute quality maintenance and the operations of the units.

5 PSNH Generation relies on an experienced management team and a skilled work
6 force utilizing best practices derived from experience within our facilities as well
7 as working with suppliers, contractors, experts and other generating plant peers in
8 the industry. PSNH Generation's budget requests continue to emphasize a proper
9 balance between spending what is necessary in the most critical areas, while being
10 sensitive to the overall cost of production to our customers taking Energy Service,
11 both long term and short term. PSNH Generation works hard to determine how
12 maintenance projects can be most effectively executed and how capital
13 investments can be best applied to achieve a high level of plant performance.
14 PSNH Generation also continues to integrate into the above management focus
15 consideration of recommendations by the Commission's consultants.

16 **III. Unit Outages and Availabilities**

17 Q. Please provide a list of all unplanned outages that took place during the period
18 January 1, 2009 through December 31, 2009 for PSNH's fossil and hydro units
19 and for NextEra's Wyman Station Unit No. 4.

20 A. Attachment WHS-1 lists these outages. This listing is similar to the information
21 submitted in the past, as a reporting requirement for the fossil hydro "outage
22 information" resulting from discussion with the Staff in Docket No. DR 91-011.

23 Q. Is there any additional reporting with respect to outages?

24 A. Yes. PSNH provides outage reports for all unscheduled outages in excess of two
25 days at either Newington Station or at the two units at Merrimack Station; and in
26 excess of four days at the three units at Schiller Station and Wyman. These
27 Outage Reports are included as Attachment WHS-2.

1 Q. Please provide a chronological listing of the outages for which Outage Reports are
 2 provided in the testimony.

3 A. The table below provides the chronological listing along with the times and dates
 4 the units were removed and returned to service, as well as the durations of the
 5 outage and the cause of the outage.

<u>Report No.</u>		<u>Outage Start</u>		<u>Outage End</u>		<u>Duration</u>	<u>Reason</u>
		<u>Date Time</u>		<u>Date Time</u>		<u>Days</u>	
OR-1	SR4	1/5	2025	1/10	2359	5.1	Generation Tube Leak
OR-2	SR5	1/26	0958	1/31	0030	4.6	Furnace Fluidized Bed Material
OR-3	MK2	2/12	1550	2/17	0600	4.6	Planned Maintenance Outage
OR-4	MK2	2/25	1535	2/27	1653	2.1	Boiler Leak
OR-5	MK2	4/2	2220	4/5	2219	3.0	Forced Draft Fans
OR-6	MK1	4/20	1635	4/24	1554	4.0	Planned Preventative Maintenance
OR-7	SR6	5/4	1015	5/8	1720	4.3	Tube Leak Water Wall/Burner
OR-8	MK2	5/11	1612	5/16	1454	4.9	Boiler Leak
OR-9	MK2	6/26	1531	6/28	1721	2.1	Boiler Leak
OR-10	MK1	7/21	1605	7/24	1149	2.8	Planned Preventative Maintenance
OR-11	SR5	10/1	1406	10/6	1025	4.8	Furnace Fluidized Bed Material
OR-12	NT	10/6	0500	10/11	1911	5.6	Protection Devices
OR-13	MK1	10/26	1603	10/30	2037	4.2	Planned Preventative Maintenance
OR-14	SR5	11/20	2137	11/25	0135	4.2	Bed Temp/Drum Level Control
OR-15	MK1	12/1	1727	12/5	0325	3.4	Reheater Tube Leak
OR-16	SR4	12/8	0515	12/13	0010	4.8	Generation Tube Leak
OR-17	SR5	12/13	1250	12/17	1755	4.2	Maintenance Outage

6 Q. Please provide a brief summary of each of the Outage Reports discussed above.

7 A. A summary of the Outage Reports follows:

1 OR-2009-01

2 This Schiller Unit 4 maintenance outage was 5.1 days long and began on
3 January 5. The unit tripped off line due to a tube failure in the generation tube
4 bank section of the boiler.

5 During the outage, vacuuming was done in the areas of kicker baffle, superheater
6 hoppers, airheater hoppers, windbox, economizer, airheater, and bottom ash
7 hoppers. The economizer and airheater were water washed.

8 To locate the boiler tube leak, boilermakers had to remove a significant amount of
9 refractory and casing. The tube leak was located in the third row in from the south
10 wall, third tube in from the east at elevation 85'. The leak also damaged
11 approximately thirty feet of refractory on the southeast corner wall. The
12 boilermakers removed several sections of casing so the refractory contractor could
13 repair the insulation and refractory. Because the failed tube had fish-mouthed
14 down its length, the repair was completed with the installation of an eight foot
15 dutchmen. Completing the inspection of the boiler identified some additional tube
16 wear in the area which was pad-weld repaired.

17 OR-2009-02

18 Schiller Unit 5 was taken off line on January 26 for 4.6 days due to low bed
19 material temperatures causing the bed to agglomerate. Low bed temperatures
20 caused by reduced air flow to the bed fluidization system due to air heater leakage
21 had been managed by operations throughout the weekend. However, when
22 operational parameters indicated the bed had crusted over, the unit was taken
23 offline.

24 During the outage, the cyclones were cleaned and the wood chutes and pant legs
25 were repaired. An air heater inspection was conducted and worn tubes were
26 plugged. In addition to furnace bed removal and tuyere cleaning, other areas of
27 Unit 5 boiler and its components were opened, inspected, and cleaned. Cleaning

1 of material from the forced draft fan silencer, air heater air side, and furnace
2 tuyeres went on in parallel with furnace and cyclone cleaning. A boiler inspection
3 was conducted with no additional findings. All boiler doors were re-bricked, ducts
4 closed, cyclone covers installed and unit turned over to operations for start up.

5 OR-2009-03

6 This Merrimack Unit 2 planned maintenance outage was 4.6 days long and started
7 on February 12 after running for 91 days, the 8th longest run in Unit 2's history.
8 The outage was taken to replace brushes on the portable exciter collector ring.
9 Prior to the outage, operators and electricians had been monitoring the brushes for
10 wear and potential arcing. In consultation with the vendor, Siemens, and to avoid
11 damage to the equipment, it was recommended that the portable rental unit be
12 removed from service to replace the necessary brushes. During the outage, a
13 Siemens Engineer was also scheduled in to inspect the collector ring and portable
14 exciter.

15 An inspection of the upper furnace, backpass and penthouse was done. Any
16 identified boiler and casing leaks were repaired.

17 OR-2009-04

18 This Merrimack Unit 2 maintenance outage began on February 25 and was 2.1
19 days long. The unit was removed from service for excessive water usage. Tube
20 leak repairs were made in "E" cyclone, as well as barrel tube leaks in "C" and "G"
21 cyclones. An inspection of the firebox, upper furnace, backpass and penthouse
22 indicated no other water or steam side leaks. The more significant leaks in "E"
23 cyclone included four neck tubes at the 1 o'clock position looking out of the
24 cyclone. All tubes were pad welded back to original wall thickness, new studs
25 were welded on the tubes, and refractory was reinstalled once tube leaks were
26 repaired. A final boiler pressure test was performed, and there were no other
27 waterside leaks found. The Unit was turned over to operations and returned to
28 service.

1 OR-2009-05

2 This Merrimack Unit 2 maintenance outage was 3.0 days and began on April 2 due
3 to a forced draft fan inlet cone failure. At approximately 18:30 hours, 2A FDF
4 vibration alarmed in and amperage levels on 2A and 2B FDF's also increased.
5 Operations found that a portion of the 2A FDF outboard inlet cone had broken off
6 and the unit was removed from service.

7 New metal sections were fabricated to replace the top half of the inlet cone. The
8 task to reconstruct the inlet cone requires precise standards as the clearance
9 between the rotating fan and inlet cone is only ¼". Cracks found on the bottom of
10 the inlet cone, and also the inboard inlet cone, were weld repaired. The fan wheel
11 was inspected and found to be in good shape. The inlet cones on 2B FDF were
12 inspected and no cracks were found. The work was completed and the fan was test
13 run and required balancing. Balancing of the fan was successfully completed and
14 the unit was turned over to operations for start-up.

15 The forced draft fan inlet vanes were replaced in 2002. Since then, this area had
16 been inspected and repaired periodically. Specifically during the 2004 annual
17 outage, cracks were identified and weld repaired on 2A fan draft fan inlet cones at
18 the radial bend just beyond the outer flange. Similar inspections and weld repairs
19 were made during the next three years' annual outages (2005, 2006 and 2007). In
20 2008 no cracks were found. New inlet cones were ordered for both fans and were
21 installed during the August 2009 scheduled outage.

22 OR-2009-06

23 This Merrimack Unit 1 maintenance outage began on April 20 and was 4 days
24 long. The unit was removed from service to clean the air heater after a record
25 setting third longest run in the 48 year history with 127 straight days. The new
26 two tier air heater basket design along with a different type of circumferential seal
27 installed during the fall overhaul performed extremely well contributing to the
28 ability of the unit to run for this period. An air heater inspection indicated that the

1 circumferential and radial seals did not need replacing after five months. A boiler
2 inspection indicated no water or steam tube leaks, and the cyclones, lower, upper
3 furnace and back-pass were in very good condition. Critical path was the high
4 pressure air heater water wash, with a backlog of maintenance jobs being
5 performed by the maintenance department and contractors.

6 OR-2009-07

7 This Schiller Unit 6 maintenance outage was 4.3 days long and began on May 4.
8 The unit was taken offline for a waterwall tube leak. One tube leak was located on
9 the west waterwall section of the furnace, fifth tube north from the south soot
10 blower at elevation 58'. Eight additional worn areas were located on the tubes
11 starting at the soot blower opening tube, heading north. All tubes were pad
12 welded. Tubes in the adjacent area were inspected and no additional problems
13 were identified.

14 The unit was cleaned including the bottom ash hopper, the kicker baffle,
15 superheater hoppers and the wind box. The airheater was cleaned and a water
16 wash was completed.

17 The boiler hydro was successfully completed. Boiler door openings were bricked
18 up and all doors closed. The unit was turned over to operations to be put back into
19 service.

20 OR-2009-08

21 Merrimack Unit 2 was removed from service on May 11 for excessive water usage
22 due to tube leaks in the cyclones and in the furnace wall tubes. This maintenance
23 outage was 4.9 days long. Repairs were made in the SW corner of the firebox wall
24 tubes and in "A", "C", "F", and "G" cyclones. An inspection of the upper furnace,
25 backpass and penthouse indicated no other water or steam side leaks. The wall
26 tube leaks in the SW corner involved setting up a two-man spider (swing staging).

1 This area will be inspected again during the planned outage and, as necessary,
2 worn tubes will be replaced and an overlay for erosion protection added. During
3 this outage, all tubes were pad welded back to original wall thickness. New studs
4 were welded on the cyclone tubes and refractory was reinstalled, once all the
5 cyclone tube leaks were repaired. A final boiler pressure test was performed, and
6 there were no other waterside leaks found.

7 OR-2009-09

8 This Merrimack Unit 2 maintenance outage was 2.1 days long and began on
9 June 26. After a 40 day run, Merrimack Unit 2 was removed from service for
10 excessive water usage caused by tube leaks in “G” cyclone. An inspection of the
11 upper furnace, backpass and penthouse indicated two small weepers on the
12 superheater floor. These weepers were pad weld repaired.

13 In “G” cyclone, the repair involved pad welding 5 neck tubes at the 1 o’clock
14 position. New studs were welded on the cyclone tubes and refractory was
15 reinstalled. Once the tube leaks were repaired, a final boiler pressure test was
16 performed, and there were no other waterside leaks found

17 OR-2009-10

18 This Merrimack Unit 1 maintenance outage was 2.8 days long and began on
19 July 21. The unit was removed from service to perform planned preventative
20 maintenance in anticipation of a long run while Unit 2 is off line for the overhaul.
21 The air heater was water washed. An air heater inspection indicated that the
22 circumferential and radial seals did not need replacing.

23 A boiler inspection was performed and identified tube leaks in 1A and 1C
24 cyclones. The upper furnace, secondary superheater, vertical reheater, primary
25 superheater and back-pass, were in very good condition with no other steam or
26 water leaks found. Critical path was the high pressure air heater water wash with a
27 backlog of maintenance jobs being performed by the maintenance department and
28 contractors.

1 OR-2009-11

2 This Schiller Unit 5 maintenance outage was 4.8 days long and began on October
3 1. The unit was taken off line to remove agglomerated bed material that had
4 slowly accumulated during the 166 days since returning to service from the spring
5 overhaul. The unit had returned to service on April 21 and tripped only 4 times in
6 that period totaling less than 24 hours. The unit was taken offline, cooled down
7 and tagged out to allow bed material removal.

8 In addition to furnace bed removal, tuyeres, cyclones, other areas of Unit 5 boiler
9 and its components were opened, inspected, and cleaned. Cleaning of material
10 from forced draft fan silencer in the forced draft fan duct, air heater air side, and
11 furnace tuyeres were completed in parallel with furnace and cyclone cleaning. A
12 boiler inspection was conducted with no additional findings. All boiler doors were
13 re-bricked, ducts closed, cyclone covers installed and unit turned over to
14 operations for start up.

15 OR-2009-12

16 This Newington planned maintenance outage was 5.6 days long and began on
17 October 6. The reason for this maintenance outage was to install an employee
18 electrical exposure protection scheme that would mitigate the hazards identified in
19 a recent arc flash study. The analysis identified five electrical buses with incident
20 energy ranges that resulted in a “Dangerous” hazard class. This hazard class
21 cannot be mitigated through the use of personal protective equipment (PPE), so
22 administrative controls were implemented as a means of protection until a solution
23 could be engineered, procured and constructed. Eaton Corporation was contracted
24 to provide the EPC services necessary to mitigate these hazards. The reduced
25 Plant capacity factor provided an opportunity to install the new protection scheme
26 as soon as the new equipment and man power became available.

27 OR-2009-13

1 This Merrimack Unit 1 maintenance outage was 4.2 days long and began on
2 October 26. The unit was removed from service to complete a planned
3 maintenance outage, including an air heater wash and boiler tube leak repair. The
4 Unit had been on for 94 days. A water wash of the air heater was done. During
5 shutdown of the unit, a hot spot was noticed on the boiler front wall on the 4th
6 floor elevation where the gas recirculation fan wall boxes are located. During the
7 outage, the insulation and lagging were removed to inspect this area. The casing
8 on the wall boxes and beneath the wall boxes was bowed and overheated.
9 Replacing the casing was the critical path work for the outage.

10 A local contractor was contacted to make the new casing pieces. While the casing
11 pieces were being made, the refractory and wire mesh that was beneath the casing
12 was removed. Also the channel iron that the casing attaches to was replaced. New
13 refractory and wire meshing were installed prior to the installation of the new
14 casing. Once the casing arrived it was installed along with new insulation and
15 lagging. Other work done in parallel to the casing repair, the critical path, was the
16 high pressure air heater water wash. Also, a backlog of maintenance jobs were
17 completed including the installation of 1LA & 1LB 480 volt load centers.

18 OR-2009-14

19 Schiller Unit 5 was taken offline on November 20 due to low furnace fluidized bed
20 temperatures which resulted in bed material agglomeration. This maintenance
21 outage was 4.2 days long. The previous day the load on the unit was dropped to
22 clean the condenser. With the lower load, bed temperatures drop, air flow drops,
23 and slumping of the material can occur. While temperatures within the bed
24 initially stabilized, the unit eventually needed to be brought off line to remove
25 agglomerated bed material.

26 The crusted bed material was removed and the tuyeres were cleaned, blown out
27 and inspected. All boiler doors were re-bricked, ducts closed, and the unit was
28 turned over to operations for start up.

1 OR-2009-15

2 This Merrimack Unit 1 maintenance outage was 3.4 days and began on
3 December 1. The unit was removed from service to make repairs to steam side
4 reheater tube leaks in the upper furnace. Two dutchmen were installed and pad
5 welding completed to make the necessary repairs.

6 To maintain availability, this reheater portion of the boiler is scheduled to be
7 replaced in the spring 2010 overhaul. A thorough boiler inspection of the rest of
8 the water and steam side indicated no other problems or issues.

9 An inspection of the air heater did not reveal significant fouling of the baskets, but
10 due to the increased differential pressure since the previous start-up, a water wash
11 was completed while the boiler repairs were being performed. After the wash, an
12 inspection of the upper and lower air heater seals (circumferential and radial) was
13 performed and all were in excellent condition. Critical path was the boiler repairs,
14 with the backlog being performed by the maintenance department and contractors.

15 OR-2009-16

16 Schiller Unit 4 tripped off line on December 8 and was out of service for 4.8 days
17 due to a tube rupture in the generation section of the boiler.

18 The failed generation tube was repaired with a dutchmen, approximately 18 feet
19 long. The failure caused misalignment of tubes in the area and knocked out
20 several wall tiles. Other distorted tubes in the area were straightened. New
21 shields were installed on these tubes and all shielding and tubes in the area were
22 inspected for wear. A general boiler inspection conducted with no other issues
23 identified.

24 Vacuuming was done in the areas of kicker baffle, superheater hoppers, airheater
25 hoppers, windbox, economizer, airheater, drag-ash system, and bottom ash
26 hoppers. The economizer and airheater were water washed.

1 Refractory material was removed and replaced as necessary to complete the boiler
2 tube repairs. The affected wall was repaired with tile as needed and boiler casing
3 was reinstalled. All boiler doors closed and unit turned over to operations to be
4 placed back into service.

5 OR-2009-17

6 This Schiller maintenance outage was scheduled for Unit 5 to address a backlog of
7 maintenance items. The outage began on December 13 and was 4.2 days long. A
8 number of items were addressed including the following.

9 The attemperator valve which had been experiencing inconsistent control response
10 earlier was rebuilt during this outage and the controller reinstalled. The main
11 steam outlet valve was inspected. A crack was found in the support bar for the
12 interior guide portion of the housing. This crack was repaired by grinding it out
13 and re-welding the area. The condenser was opened up and cleaned during this
14 outage. A considerable amount of debris was removed. During changes in the
15 seasons, it is common to pick up extra debris in the cooling water that is supplied
16 from the Piscataqua River. While the unit was offline an inspection of the
17 cyclones was performed. Pluggage in the cyclones and dip legs was removed. All
18 areas were cleaned and material removed. No indication of pluggage was noted in
19 the tuyeres that could be inspected on the bed bottom.

20 Q. Were Planned Maintenance Outages performed at any of PSNH's fossil and hydro
21 units during the period January 1, 2009 through December 31, 2009?

22 A. Yes. Attachment WHS-1 contains of a list of outages including planned
23 maintenance outages for each of PSNH's fossil, biomass, hydro, and combustion
24 turbine units, as well as the Wyman 4 unit. WHS-3 also summarizes in a table the
25 planned maintenance periods for the fossil units.

26 Q. Please provide a list of planned maintenance outages at the PSNH fossil units
27 during January 1, 2009 through December 31, 2009.

1 A. The planned maintenance outages are listed below.

Unit	Planned Maintenance
Merrimack Unit 2	8/1 – 12/6
Newington Unit 1	3/6 – 3/18
Schiller Unit 5	3/29 – 4/21
Schiller Unit 6	8/28 – 10/4

2 Q. Are these planned outages reviewed as part of the Reconciliation of Energy
3 Service and Stranded Costs docket?

4 A. Yes. A review of the planned outages is completed by the PUC Staff utilizing an
5 outside consultant. The outside consultant completes an on-site interview and
6 review process of the planned outages.

7 Q. Does this conclude your testimony?

8 A. Yes, it does.

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>
4/20	1635	4/24	1554	4.0	Planned Preventative Maintenance
4/27	0601	4/27	1351	0.3	Turbine Differential Expansion
4/27	1440	4/27	1854	0.2	Turbine Differential Expansion
5/27	0357	5/28	0026	0.9	Air Heater Motor Coupling Failure
7/21	1605	7/24	1149	2.8	Planned Preventative Maintenance
10/26	1603	10/30	2037	4.2	Planned Preventative Maintenance
11/2	0735	11/2	1717	0.4	Oil Operated Air Pilot Valve Leak
11/11	1019	11/11	1411	0.2	Loss of Fires
12/1	1727	12/5	0325	3.4	Reheater Tube Leaks
TOTAL FORCED OUTAGE DOWN TIME				16.3	

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>
2/12	1550	2/17	0600	4.6	Planned Maintenance Outage
2/17	1159	2/17	1745	0.2	Loss of Turbine Governor Control Oil Pressure
2/25	1535	2/27	1653	2.1	Boiler Leak
4/2	2220	4/5	2219	3.0	Forced Draft Fans
4/6	1047	4/6	2350	0.5	Recirculation Valve
4/22	1631	4/23	0512	0.5	Inlet Cone Cracked
5/11	1612	5/16	1454	4.9	Boiler Leak
6/26	1531	6/28	1721	2.1	Boiler Leak
7/20	1517	7/22	0629	1.6	Cyclone Leak
8/1	0209	12/6	0707	127.2	Planned Annual Outage
12/6	0708	12/6	0728	0.0	No Load Steam Flow
TOTAL FORCED OUTAGE DOWN TIME				19.6	

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>
4/27	0700	4/30	1944	3.5	Planned Annual Outage
10/1	0830	10/1	0849	0.0	Generator Voltage Control
TOTAL FORCED OUTAGE DOWN TIME				0.0	

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>
4/27	0700	4/30	1944	3.5	Planned Annual Outage
7/27	1200	7/28	1424	1.1	Other Jet Engine Problems
10/5	1944	10/6	0755	0.5	Other Jet Engine Problems
10/19	0700	10/19	0813	0.1	Other Jet Engine Problems
10/26	0930	10/26	1042	0.0	Atomizing Air System
TOTAL FORCED OUTAGE DOWN TIME				1.7	

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>
3/6	0000	3/18	1220	12.5	Planned Annual Outage
10/6	0500	10/11	1911	5.6	Protection Devices
TOTAL FORCED OUTAGE DOWN TIME				5.6	

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>
1/5	2025	1/10	2359	5.1	Generation Tube Leak
3/3	1730	3/7	1554	3.9	Generation Tube Leak
6/10	0200	6/12	1309	2.5	Maintenance Outage - Boiler
7/21	1430	7/22	1520	1.0	Maint. Out. - Safety Valve / Extension - Drum
12/8	0515	12/13	0010	4.8	Generation Tube Leak
12/15	0732	12/15	1730	0.4	Ash System Problem
TOTAL FORCED OUTAGE DOWN TIME				17.8	

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>
1/26	0958	1/31	0030	4.6	Furnace Fluidized Bed Material
3/29	1417	4/21	1325	23.0	Planned Annual Outage
5/19	1028	5/19	1210	0.1	Main Fuel Trip (MFT) due to MCC 101 trip
7/18	0639	7/18	1340	0.3	Exciter Problems - Relay Failure
7/18	1439	7/19	0227	0.5	Fuel Problems - Drum Level High
10/1	0745	10/1	0900	0.1	Fuel Problems - Drum Level High
10/1	1406	10/6	1025	4.8	Furnace Fluidized Bed Material
11/4	1125	11/4	1620	0.2	FD Fan Vibration Probe Faulty
11/19	1655	11/20	0809	0.6	Boiler Upset due to Condensor Cleaning
11/20	2137	11/25	0135	4.2	Bed Temp/Drum Level Control Problems
12/13	1250	12/17	1755	4.2	Maintenance Outage
12/31	1507	12/31	1841	0.1	Boiler Trip - Baghouse Control Fuse Failed
TOTAL FORCED OUTAGE DOWN TIME				42.7	

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>
4/2	1240	4/2	2306	0.4	Burners - Fire
4/11	1900	4/11	1945	0.0	Burners - Flame Scanner Issue
5/4	1015	5/8	1720	4.3	Tube Leak Water Wall/Burners
6/30	0001	6/30	2359	1.0	Hydrogen Cooler Leak - Generator
7/6	1254	7/7	1731	1.2	Condensor Tube Leak
7/18	1030	7/21	1430	3.2	Exc Relay/Hydrogen Cooler Leak/Exc Relay
8/12	1950	8/14	2328	2.2	SH Tube Leak
8/18	1040	8/20	1135	2.0	Generation Tube Leak
8/28	2144	10/4	2355	37.1	Planned Annual Outage
10/6	1538	10/6	1700	0.1	BMS Issue with Panel View
11/27	0900	11/29	1135	2.1	Tube Leaks/Drums/Tube Rolls
12/1	0001	12/1	0030	0.0	Exciter AC Regulator Switch
TOTAL FORCED OUTAGE DOWN TIME				16.5	

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>
3/9	0000	3/12	1415	3.6	Planned Annual Outage
9/12	0730	9/12	1630	0.4	Planned Breaker Replacement
9/21	1452	9/21	1830	0.2	Planned Breaker Replacement
10/14	1310	10/29	1725	15.2	Generator Oil Leak
TOTAL FORCED OUTAGE DOWN TIME				15.7	

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>
1/22	0000	1/22	0654	0.3	Repair expansion joint on ID fan
1/24	1937	1/24	2255	0.1	Operator error - attempted to place the boiler master into automatic without placing the fuel oil controller into automatic first
1/30	0507	1/30	0543	0.0	Boiler tripped on low air flow
2/6	2306	2/7	0145	0.1	Operator error - outlet valve inadvertently closed
2/24	0951	2/24	1100	0.0	Boiler tripped on unsuccessful burner shutdown
6/5	0000	6/5	0712	0.3	Repair bus duct heaters
6/30	0000	6/30	1018	0.4	Repair bus duct heaters
8/10	0715	8/10	0922	0.1	Condensate pump discharge valve failed in partially open position
8/11	1345	8/11	1503	0.1	Operator error - attempted repeat starts on burner pair which induced furnace pressure swing
11/6	0000	12/6	0141	30.1	Planned Annual Outage
12/21	1513	12/21	1557	0.0	Boiler tripped on low combustion air flow
TOTAL FORCED OUTAGE DOWN TIME				31.6	

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 - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S)	Cause of Outage
1	1/26/09 8:00	1/30/09 11:49	99.82	4.16	N	S	Annual Inspection
1	7/27/09 17:14	7/27/09 19:14	2.00	0.08	Y	F	T or D Event
1	8/20/09 9:49	8/20/09 11:46	1.95	0.08	Y	F	T or D Event
1	12/9/09 6:22	12/9/09 6:44	0.37	0.02	Y	S	Black Start Test
2	2/2/09 8:00	2/6/09 13:00	101.00	4.21	N	S	Annual Inspection
2	9/13/09 18:02	9/13/09 18:55	0.88	0.04	Y	F	Trip Lubrication
2	11/23/09 7:20	12/31/09 23:59	928.65	38.69	Y	S	Generator Rewind
3	2/9/09 8:00	2/13/09 9:53	97.88	4.08	N	S	Annual Inspection
3	7/21/09 1:15	7/21/09 11:45	10.50	0.44	Y	F	Trip-Coil Failure
3	8/20/09 9:48	8/20/09 12:51	3.05	0.13	Y	F	T or D Event
3	11/22/09 15:01	11/23/09 7:47	16.77	0.70	Y	F	Trip-Coil Failure
3	12/9/09 6:22	12/9/09 6:44	0.37	0.02	Y	S	Black Start Test

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

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S)	Cause of Outage
1	3/11/09 10:48	3/11/09 11:16	0.47	0.02	Y	F	Preemptive shutdown-commutator
1	4/3/09 9:19	4/3/09 9:37	0.30	0.01	Y	F	Preemptive shutdown-commutator
1	6/19/09 9:25	6/19/09 9:59	0.57	0.02	Y	F	T or D Event
2	6/19/09 9:25	6/19/09 10:03	0.63	0.03	Y	F	T or D Event
2	8/21/09 15:43	8/21/09 16:39	0.93	0.04	Y	F	T or D Event
3	1/5/09 20:21	1/23/09 9:00	420.65	17.53	Y	F	Preemptive shutdown-commutator
3	6/19/09 9:25	6/19/09 10:06	0.68	0.03	Y	F	T or D Event

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

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S)	Cause of Outage
1	4/11/09 8:50	4/11/09 10:46	1.93	0.08	Y	F	T or D Event
1	4/19/09 15:20	4/19/09 17:30	2.17	0.09	Y	F	Trip Unknown
1	4/23/09 10:16	4/23/09 14:32	4.27	0.18	Y	F	T or D Event
1	4/28/09 13:31	4/28/09 15:15	1.73	0.07	Y	F	T or D Event
1	5/14/09 12:24	5/14/09 13:45	1.35	0.06	Y	F	T or D Event
1	7/3/09 16:51	7/3/09 21:22	4.52	0.19	Y	F	T or D Event
1	7/16/09 21:42	7/16/09 23:20	1.63	0.07	Y	F	T or D Event
1	7/17/09 12:57	7/17/09 14:48	1.85	0.08	Y	F	Trip Unknown
1	7/20/09 8:09	11/23/09 13:09	3029.00	126.21	Y	S	Penstock Replacement
1	11/23/09 15:04	11/23/09 15:44	0.67	0.03	Y	F	Trip -lubrication
1	11/28/09 7:28	11/28/09 9:35	2.12	0.09	Y	F	T or D Event
1	12/9/09 17:24	12/10/09 13:28	20.07	0.84	Y	F	T or D Event

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

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S)	Cause of Outage
1	1/1/09 0:01	1/26/09 8:46	608.75	25.36	Y	S	Generator Rewind (cont from 2008)
1	3/8/09 18:57	3/8/09 20:08	1.18	0.05	Y	F	Trip -lubrication
1	3/9/09 2:55	3/9/09 4:22	1.45	0.06	Y	F	Trip -lubrication
1	4/3/09 3:50	4/3/09 6:11	2.35	0.10	Y	F	T or D Event
1	5/21/09 17:23	5/21/09 19:02	1.65	0.07	Y	F	Trip -lubrication
2	4/3/09 3:50	4/3/09 6:31	2.68	0.11	Y	F	T or D Event
2	4/20/09 9:38	4/20/09 10:37	0.98	0.04	Y	S	Fish passage
2	7/20/09 8:30	8/4/09 10:15	361.75	15.07	Y	S	Annual Inspection
2	8/26/09 9:26	8/26/09 13:32	4.10	0.17	Y	F	Trip - Temperature
2	9/14/09 3:34	9/14/09 8:24	4.83	0.20	N	F	Trip - Lubrication

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 - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	3/15/09 8:59	3/16/09 14:58	29.98	1.25	N	S	Preemptive Shutdown- seals
1	3/19/09 9:42	3/19/09 10:03	0.35	0.01	Y	F	Preemptive Shutdown- temperature
1	5/22/09 8:26	5/22/09 9:30	1.07	0.04	N	F	Trip- Lubrication
1	6/29/09 7:37	7/31/09 13:00	773.38	32.22	Y	S	Preemptive Shutdown- headgate
1	10/5/09 7:00	10/13/09 15:00	200.00	8.33	N	S	Preemptive Shutdown- lubrication
1	10/22/09 11:38	10/22/09 12:07	0.48	0.02	Y	S	Black Start Test
1	12/15/09 10:13	12/15/09 11:15	1.03	0.04	Y	S	Fish passage
2	3/9/09 14:00	3/9/09 15:00	1.00	0.04	Y	F	Unit failed to start
2	3/17/09 22:05	3/17/09 22:55	0.83	0.03	Y	F	Trip -VARS
2	3/19/09 9:42	3/19/09 10:03	0.35	0.01	Y	F	Preemptive Shutdown- temperature
2	3/24/09 9:55	3/24/09 10:57	1.03	0.04	Y	F	Trip -VARS
2	4/30/09 5:53	4/30/09 7:42	1.82	0.08	Y	F	Trip -VARS
2	6/29/09 8:33	6/29/09 14:43	6.17	0.26	Y	S	Diver Safety
2	6/30/09 7:37	6/30/09 8:12	0.58	0.02	Y	S	Diver Safety
2	7/1/09 8:30	7/1/09 8:44	0.23	0.01	Y	S	Diver Safety
2	7/25/09 15:16	7/25/09 16:41	1.42	0.06	Y	F	Trip -VARS
2	8/24/09 19:30	8/24/09 21:33	2.05	0.09	Y	F	Trip -VARS
2	10/13/09 7:35	10/20/09 14:35	175.00	7.29	Y	S	Annual Inspection
2	10/22/09 11:38	10/22/09 12:07	0.48	0.02	Y	S	Black Start Test
2	12/15/09 10:12	12/15/09 11:11	0.98	0.04	Y	S	Fish passage
3	10/22/09 11:38	10/22/09 12:07	0.48	0.02	Y	S	Black Start Test
3	12/15/09 10:11	12/15/09 11:00	0.82	0.03	Y	S	Fish passage
4	4/25/09 12:26	4/25/09 14:33	2.12	0.09	Y	F	Trip-temperature
4	4/25/09 16:37	4/25/09 18:11	1.57	0.07	Y	F	Trip-temperature
4	7/18/09 3:00	7/18/09 8:44	5.73	0.24	Y	F	Trip - coil
4	9/8/09 8:10	9/11/09 13:56	77.77	3.24	N	S	Annual Inspection
4	10/22/09 11:38	10/22/09 12:07	0.48	0.02	Y	S	Black Start Test
4	12/15/09 10:10	12/15/09 11:13	1.05	0.04	Y	S	Fish passage

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 - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	5/26/09 0:10	5/26/09 14:55	14.75	0.61	Y	F	Pond control Fault
1	10/13/09 8:52	11/16/09 12:49	819.95	34.16	Y	S	Annual Inspection
2	2/8/09 18:30	2/8/09 19:07	0.62	0.03	Y	F	T or D Event
2	5/8/09 8:40	5/12/09 14:15	101.58	4.23	Y	S	Premptive shutdown-commutator
2	5/26/09 0:10	5/26/09 11:05	10.92	0.45	Y	F	Pond control Fault
2	6/2/09 0:17	6/4/09 8:08	55.85	2.33	Y	F	Trip - PT failed
2	6/23/09 10:43	6/24/09 10:45	24.03	1.00	N	S	Premptive shutdown-temperature
2	10/13/09 8:52	11/16/09 12:49	819.95	34.16	Y	S	Annual Inspection
3	2/8/09 18:31	2/8/09 19:15	0.73	0.03	Y	F	T or D Event
3	4/9/09 8:25	4/9/09 9:19	0.90	0.04	Y	F	Trip - loss of field
3	6/2/09 0:17	6/2/09 0:28	0.18	0.01	Y	F	Trip - loss of field
3	6/8/09 7:59	6/16/09 13:16	197.28	8.22	Y	S	Annual Inspection
3	9/15/09 12:45	9/15/09 14:20	1.58	0.07	Y	F	Trip - actuator
3	10/14/09 11:42	10/14/09 14:07	2.42	0.10	Y	F	start failure - coil
3	10/20/09 8:27	10/20/09 14:52	6.42	0.27	Y	S	Diver safety
3	10/21/09 10:40	10/21/09 15:53	5.22	0.22	Y	S	Premptive shutdown-temperature
3	10/24/09 9:53	10/24/09 10:33	0.67	0.03	Y	F	Premptive shutdown-pond control
3	10/31/09 15:50	10/31/09 16:22	0.53	0.02	Y	F	T or D Event
4	2/8/09 18:31	2/8/09 19:22	0.85	0.04	Y	F	T or D Event
4	5/14/09 8:53	5/14/09 9:00	0.12	0.00	Y	F	Trip - loss of field
4	6/29/09 23:57	6/30/09 0:41	0.73	0.03	Y	F	Trip - lubrication
4	8/31/09 8:34	9/3/09 14:22	77.80	3.24	N	S	Annual Inspection
4	10/5/09 16:01	10/5/09 16:42	0.68	0.03	Y	F	Premptive shutdown-pond control
4	10/20/09 8:27	10/20/09 14:27	6.00	0.25	Y	S	Diver safety
4	10/21/09 10:41	10/21/09 16:00	5.32	0.22	Y	S	Premptive shutdown-temperature
4	10/24/09 3:22	10/24/09 4:49	1.45	0.06	Y	F	Premptive shutdown-pond control
4	10/31/09 15:50	10/31/09 16:32	0.70	0.03	Y	F	T or D Event

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

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	8/17/09 8:00	8/21/09 14:24	102.40	4.27	Y	S	Annual Inspection
1	8/31/09 11:50	8/31/09 12:23	0.55	0.02	Y	F	Preemptive shutdown-lubrication
1	10/19/09 8:09	10/30/09 15:35	271.43	11.31	Y	S	Replace brown glass

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

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	3/27/09 12:30	3/27/09 12:50	0.33	0.01	N	S	T or D Event
1	4/6/09 11:06	4/6/09 11:52	0.77	0.03	N	F	T or D Event
1	12/1/09 7:14	12/10/09 14:14	223.00	9.29	N	S	Switchyard Transformers

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 - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	4/13/09 9:00	4/17/09 11:26	98.43	4.10	N/A	S	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 - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	9/12/09 6:58	9/17/09 12:50	125.87	5.24	Y	S	Annual Inspection
1	10/17/09 7:36	10/17/09 14:32	6.93	0.29	Y	S	T or D Event

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

Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration, Days	Water Available for unit? (Y or N)	Forced (F), Scheduled (S) or Reserved (R)?	Cause of Outage
1	1/26/09 6:35	1/26/09 8:14	1.65	0.07	N/A	F	Start failure - program
1	2/1/09 4:26	2/1/09 6:55	2.48	0.10	N/A	F	Unit temporarily unavailable
1	6/30/09 17:30	7/1/09 13:08	19.63	0.82	N/A	S	Unit temporarily unavailable
1	8/11/09 9:57	8/11/09 10:18	0.35	0.01	N/A	F	Start failure - PT fuse

ATTACHMENT WHS-2

PUC OUTAGE REPORTS

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-01 (SR4-01)

Station/Unit: Schiller Unit No. 4

Dates: January 5 – January 10, 2009

Duration: 5.1 days

Immediate Cause:

The unit was removed from service due to a generation bank tube leak.

Discussion / Remedy:

The unit tripped off line due to a tube rupture in the generation section of the boiler.

With the unit offline, the unit was vented and the forced draft (FD)& induced draft (id) fans were left on for cooling. The vacuum contractor and boilermakers were notified. Once the vacuum contractor mobilized, the crew began vacuuming the unit. Two boilermaker crews were established, one to work the day shift and one for the night shift.

Vacuuming was done in the areas of kicker baffle, superheater hoppers, airheater hoppers, windbox, economizer, airheater, and bottomash hoppers. The economizer and airheater were water washed. A moderate amount of ash was removed.

The boilermaker crew needed to remove a significant amount of refractory and casing to locate the leak. The leak was located in the third row in from the south wall, third tube in from the east at elevation 85. The leak damaged about thirty feet of refractory on the southeast corner of the wall. The boilermakers also removed several sections of casing so the refractory contractor could get to the insulation and refractory. Removal of damaged refractory began immediately once access was established. The duration of this outage was longer than some boiler tube leak outages, due to the difficult location of the leak, as well as the effort to find and obtain access to the leak.

This tube leak occurred in an area where external tube wear is not typical. The leak, due to external erosion, created a fish mouth down the length of the tube. The tube repair was completed with the installation of an eight foot dutchman. Further inspection of the boiler located other tube wear and these areas were pad weld repaired and/or shielded. The tubes looking north to south include:

In the Super heater Section:

1. Pad welds Elements #1, 21, 23 - 2nd tubes in (looking east)
2. Shields #1, 21, 23, 25, 29
3. Pad welds Element # 78 elevation 86' - first 5 tubes (looking east)

In the Generation Bank:

1. Pad welds: Row 40 tube 1, Row 39 tubes 1 & 2, Row 38 tubes 1 & 2
2. Shields, Row 1 tube 3, Row 2 tube 2, Row 39 tube 3

Upon completion of tube and shielding work, the boiler was filled for a hydro. A successful hydro was achieved and the refractory contractor began to replace missing tile and make repairs to the damaged wall that was caused by the tube rupture. Boilermakers reinstalled the boiler casing when the refractory and insulation work was completed.

All the boiler doors were closed and boiler was turned over to operations to be put into service.

Additional work completed during the outage.

Mechanical Department

- 1) Pulverizes A&B; changed oil in gearboxes and exhausters.
- 2) Oil leak inboard bearing; disassembled bearing, found oil seal cracked. Replaced both end seals. Reassembled bearing with new gaskets and clean oil. Changed oil outboard bearing
- 3) Rotated inlet cover on oil cooler to allow pyrite dumpster to move further in.
- 4) LP receiver leak; replaced suction valve and check valve.
- 5) Aux. steam freeblow valve leaking by; replaced valve.
- 6) Steam leak top of DA Heater; top flange leaking, re-torqued all bolts.
- 7) Installed tee, nipple and valve in Surface Blowdown line for future sampling use.
- 8) Changed oil in FD Fan bearings.
- 9) Steam drum valve packing leak, replace upper root valve to sightglass.
- 10) Replaced drag chain and drive sprocket on SH drag ash system
- 11) Oil leaks, 4A BFP, cleaned and repaired all leaks in oil return line piping.
- 12) #2 burner damper binding, removed shroud to inspect and test. No issues found.
- 13) #5 burner damper binding, removed shroud to inspect and test. Found to be dragging on igniter tube. Relieved contact area.
- 14) Changed oil in 4A-BFP.
- 15) Component cooling system leak, replaced 15 feet of supply line to the BA system.
- 16) Greased both 4A and 4B coal feeders.
- 17) Greased turbine linkage and HP slides.
- 18) Air ejector, re-piped drain lines to go to the LP Receiver tank.
- 19) 4A-BFP, replaced the remote discharge reading root valve.
- 20) Component cooling system, replaced supply line stab, fittings and valve to the DA Pumps.

Electrical Department

- 1) changed oil and inspected the leads on the following motors: ID Fan, FD Fan, A/B Pulverizer, A / B Circulator
- 2) replaced the Air Heater Motor; change the bearings
- 3) Completed control changes for the 4B BF Pump electric oil pump.
- 4) Uploaded PLC programs from the BMS PLC's for future use in case of a failure.
- 5) Replaced turbine throttle valve open indication lamp holder.

Instrumentation Department

1. 4A pulveriser did not trip off when Unit 4 came off. Worked with electrical department. They found an open connection in the wiring and we repaired it.
2. O2 probe. O2 probe removed and inspected -tested ok, replaced the filter on the end of the unit. O2 probe re-installed and tested.
3. Air Flow probes. The 4 air flow probes were removed and associated electronics to send out for calibration.
4. Drafts. All draft lines were opened and inspected. Pluggage noted and cleaned (all rodded, then blown back with air).
5. Flame detectors. All flame detectors were removed for inspection and cleaned.
6. Igniters. All igniters were removed for inspection. All were cleaned and adjusted as required.
7. LP Drip tank level switch. A new level control switch was installed to allow separate control of the 2 pumps.
8. No load steam flow switch was replaced and calibrated.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-02 (SR5-01)

Station/Unit: Schiller Unit No. 5

Dates: January 26 – January 31, 2009

Duration: 4.6 days

Immediate Cause:

The unit was taken off line due to low boiler bed temperatures which allowed the bed material to agglomerate.

Discussion/Remedy:

Unit 5 was taken off line due to bed agglomeration caused by low air flow to the fluidization system due to air heater leakage and also plugged cyclones. Outage support contractors were notified and mobilization of manpower and equipment started. The unit went into cool down phase. The vacuum contractor was mobilized and after set up bed material removal began.

Boilermakers were mobilized, manpower and equipment to pull cyclone covers was initiated to facilitate cyclone cleaning. While the unit was off line, the wood chute pant legs were patched and the wood chutes in the furnace were weld overlayed. An inspection of the air heater was completed to identify any worn tubes to be plugged. A scaffold was erected in the bottom of the air heater and the necessary tubes were plugged. Upon completion of repair work the cyclone covers were installed, doors were closed and the unit was turned over to operations.

In addition to furnace bed material removal, tuyere cleaning, and cyclone cleaning, other areas of unit 5's boiler and its components were opened, inspected, and cleaned. Cleaning of material from the forced draft fan silencer in the forced draft fan duct, air heater air side, and furnace tuyeres went on in parallel with furnace and cyclone cleaning. A boiler inspection was conducted with no additional findings. All boiler doors were re-bricked, ducts closed, cyclone covers installed and unit turned over to operations for start up.

Additional work completed during the outage.

1. O2 Probe-checked the calibration of the O2 probe and found it good.
2. Tuyere and Bed Transmitters checked
3. Tuyere and bed differential pressure transmitters were checked for calibration.
4. Bed pressure transmitters were checked for calibration. –no issues
5. Blew back the draft connections - no pluggage found.
6. Drum indication - blew down the drum transmitters and drum gauges.
7. Sootblowing valve - the valve was checked for stroke and operation
8. Installed new wood slide gate oilers on the slide gate air supplies.
9. MOV-012 Checked wiring, DCS, and feedback board.
10. Cyclone TC's removed on cyclones 1,2,4, and 5 – inspected and replaced as necessary.
11. Low steam flow switch was checked for calibration adjusted and re-installed.
12. #1 Flyash hopper slide gate - removed instruments from the gate for it's replacement.
13. Cyclone differential ports were checked at each port and rodded out
14. Cyclone manometers - cleaned two and replaced one.
15. Wood silo level - silos are being vacuumed out and the level measurement was checked and found good.
16. Bed Lift Tube – checked differential transmitter line for pluggage and cleaned.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-03 (MK2-01)

Station/Unit: Merrimack Station Unit No. 2

Dates: February 12 – February 17, 2009

Duration: 4.6 days

Immediate Cause:

The unit was removed from service due to replace portable exciter collector ring brushes.

Discussion/Remedy:

A maintenance outage was scheduled for Unit 2 to be removed from service at 15:50 hours on February 12, 2009 after running for 91 days, the 8th longest run in unit 2's history. The outage was taken to replace brushes on the portable exciter collector ring. Prior to the outage, operators and electricians had been monitoring a few brushes for potential arcing. In consultation with the vendor and to avoid equipment damage, Merrimack Station received a recommendation from Siemens to remove the portable rental unit from service to replace the necessary brushes. During the outage, a Siemens Engineer was also scheduled in to inspect the collector ring and portable exciter.

A boiler inspection of the upper furnace, backpass and penthouse was completed. Cracks in the boiler floor membrane were identified and repaired. B&W Engineering was called in to help determine the best method of repair.

Additional work completed during the outage.

The following is a list of other work performed during the outage. It includes jobs that were in the priority backlog and jobs that were found during the inspection of the boiler at the beginning of the outage.

Maintenance Department

- Opened and closed boiler and cyclone doors.
- Replaced Main Steam Drain Valve BW-210.
- Replaced PCV-300A & 300B steam Sootblowing station.
- Repaired Steam Sootblowing Root Valve.
- Repaired 2-B GRF casing leak on outboard end under shaft.
- Replaced Steam Sootblowing system manual isolation valve on 7-1/2.
- Replaced IR's #1 and #2.

- Repacked IR #3.
- Replaced the north and south economizer airlock inlet butterfly valves.
- Replaced 2A Secondary fan coil outlet valve TCV-59.
- Replaced 2B GRF Cooling water flow indicator.
- Replaced Main boiler feed pump recirc drain piping to atmosphere.
- Repaired Cold reheat manual drain valve station.
- Inspected So. GRF Recirc. Seal air Damper.
- Inspected No. GRF Recirc. Seal air Damper.
- Inspected SCR System.
- Inspected 2-F coal feeder.
- Repaired 2-F Coal Feeder Head pulley.
- Inspected and cleaned 2-A incline Redler.
- Inspected 2B coal Feeder Discharge Blast Gate.
- Inspected and greased 2A & 2B Forced Draft Fan inlet dampers.
- Replaced Aux Steam lines steam trap 4th floor NE corner.
- Replaced 2-G Coal feeder Belt drive gear box bearing.
- Repacked IK -2.
- Repaired 2B SH Attenuation valve.
- Replaced Slag tank gate rollers.
- Balance Checked 2-B forced draft fan.
- Straightened secondary air damper on 2-G Cyclone
- Repaired H.P. /I.P. turbine inner Cylinder Drain valve.
- Repaired crack in shot hopper #3.
- Rebuilt Precip Flyash hopper air locks #2 & #3
- Repaired 1st point heater vent piping on 4th floor.
- Replaced 2-A north Slag Swipper.

Electrical Department

- Inspected original precipitator and repaired as needed.
- Inspected Generator rotor ground Detector Brush.
- Repaired Main steam 210 valve operator switches.
- Inspected Hot Spots that were identified by Thermal Imaging on G-2 Breaker wiring compartment. (Cleaned and tightened terminals)
- Cleaned and tested all Cyclone flame detectors.
- Found and repaired ground in 2LC load center.
- Replaced firing Circuit card on Mobile Exciter and added alarms for Pulse Card. w/ Siemens rep.
- Inspected and replaced worn brushes on the temporary Exciter.

Instrument Department

- Replaced #1 East O2 Cal. line.
- Rebuilt all west O2 Probes.
- Calibrated DES-3 Local thermometer on 4th floor.
- Replaced MK2 Boiler draft connection purge valve DPT-4.

- Repaired Positioner FCV – 12A.
- Cleaned Windbox / Penthouse Draft Connection Elev. 7-½ south.
- Repaired Steam Sootblowing sensing line.
- Calibrated 2F & 2G coal Feeders.
- Installed new PCV-300A & 300-B Steam Sootblowing valve Controls.
- Repaired LCV-42 Slag Tank Level Control Valve.
- Stroked 2 –G Sec. Air damper.

Chemical Department

- Brush cleaned Cooling water heat exchangers.
- Brush cleaned water boxes on both sides of the main condenser.

North American Industrial Services

- Vacuumed gas recirculation duct.
- Vacuumed tempering duct.
- Vacuumed D-O1 duct and economizer & SCR hoppers.

Boiler Work

- Performed a complete boiler inspection.
- Repaired boiler floor cracks.
- Repaired cracks in Penthouse roof.
- Replaced both boiler port draft connections on 7 1/2 south.
- Weld repaired seal air piping underneath 2B gas recirc duct.
- Repaired casing on #4 (south) economizer hopper.
- Repaired air leaks on top of the windbox in the crawl space on the 4th floor.
- Replaced several studs on 2-A cyclone door frame.
- Repaired 2-B GRF North Expansion joint.
- Replaced 2-A Flyash injection tube.
- Repaired gas leak in the Gas Recirc. Fan duct on 5th floor.
- Repaired pagoda seal on east Penthouse roof.
- Repaired casing leak inside Economizer duct.
- Repaired minor leaks in 2F, 2G Cyclone and the 2nd GRF window.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-04 (MK2-03)

Station/Unit: Merrimack Station Unit No. 2

Dates: February 25 - February 27, 2009

Duration: 2.1 days

Immediate Cause:

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

Discussion/Remedy:

Unit 2 was removed from service at 15:35 hours on February 25, 2009 for high water usage. The majority of the repairs that were made were in "E" cyclone. There were also barrel tube leaks repaired in "C" and "G" cyclones. An inspection of the firebox, upper furnace, backpass and penthouse indicated no other water or steam side leaks. The leaks in "E" cyclone included 4 neck tubes at the 1 o'clock position looking out of the cyclone.

The cluster of tube failures occurred when a primary leak caused a second leak with a ricocheting action which caused additional tube wastage on the adjacent tubes leading to the secondary tube failures. This area in cyclone E was sufficient to require the unit be removed from service. A small leak in "C" cyclone was in the south tube of the slag tap was repaired and two small tube leaks in "G" were easily repaired. G cyclone leaks were located on the re-entrant throat at the 7 o'clock position looking into the cyclone and on a barrel tube 2' from the neck at the 11 o'clock position looking into the cyclone. The tubes were pad welded back to original wall thickness, studs were welded on the tubes and refractory was reinstalled, once the tube leaks were repaired. A final boiler pressure test was performed, and no other waterside leaks found.

Additional work completed during the outage.

The following is a list of other work that was performed during the outage. It includes jobs that were in the priority backlog and jobs that were found during the inspection of the boiler at the beginning of the outage.

Maintenance Department

- Opened and closed boiler and cyclone doors.
- Adjusted packing on 2-B condenser vacuum pump.
- Repaired leaking door on the northeast corner of the hotwell.

- Repaired fitting on the temporary 1st stage pressure sensing line.
- Repaired 2-A condensate pump motor oil sight glass.
- Replaced 2-A boiler cyclone port glass.
- Replaced mechanical seal on slag tank fill pump.
- Replaced oil in 2-B forced draft fan inboard bearing.
- Inspected all flyash hoppers and flyash injection system.
- Checked and cleaned chemical hydrazine pump.
- Repaired valve chain on the inlet valve of the #2 SCR hopper.
- Replaced knife gate valve on the center hopper by-pass line.
- Replaced actuator on #3 airlock pressurizing/vent valve on the supplemental precipitator.
- Added and adjusted packing on slag tank fill pump recirc valve.
- Cleaned the cooling bar and piping on 2-b slag swiper.
- Adjusted packing on H.P. /I.P. Turbine inner casing drain valve.
- Cleaned and checked blowers, feeders and piping on firemate system.
- Adjusted, cleaned and inspected horizontal and incline redlers.
- Inspected all of the sootblowing systems IK'S and IR'S.
- Adjusted packing on IK'S 3,4,5 and 6.
- Patched several areas on 2-A south incline redler.
- Adjusted and cleaned conveyor chain on 1-A north incline redler.
- Cleaned 2-A polisher strainer.

Electrical Department

- Reset and tested electrical limits on the natural recirculation valve.
- Inspected G-2 wiring with thermal imaging camera and tighten connections on G2 TB6.
- Rebuilt and tested limitorque for the 210 main steam drain valve.

Instrument Department

- Calibrated all three feedwater flow transmitters.
- Replaced gasket on the filter for the control air supply to the cyclone primary and secondary dampers.
- Replaced both gauges on the (Hi/Lo side) for the balance drum of the start-up boiler feed pump.
- Tested LCV-108 4th point heater normal level drain valve.
- Inspected the turbine Auxiliary oil pump gauge.

North American Industrial Services

- Vacuumed gas recirculation duct.
- Vacuumed tempering duct, and under the incline redlers.
- Vacuumed D-O1 duct
- Vacuumed the chemical delivery drain.

Boiler Work

- Performed a complete boiler inspection.
- Repaired boiler tube leaks as described above.
- Replaced steel and ceramic wear blocks in “A” cyclone.
- Repaired oval manway door on the cold side of the air heater.
- Repaired small crack on the boiler floor.
- Repaired casing leak in the southeast corner of the windbox.
- Repaired casing leak in the south bay of the D-01 duct.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-05 (MK2-04)

Station/Unit: Merrimack Station Unit No. 2

Dates: April 2 - April 5, 2009

Duration: 3.0 days

Immediate Cause:

The unit was removed from service due to a forced draft fan inlet cone failure.

Discussion/Remedy:

On April 2, 2009 at approximately 18:30 hours 2A fan draft fan vibration alarmed in and amperage levels on 2A and 2B fan draft fans also increased. Operations found that a portion of 2A fan draft fan outboard inlet cone had broken off. The unit was removed from service and a crew was called in to begin the repairs.

The inlet cone is approximately 6' diameter at the outer flange and tapers down to a 4' diameter where it enters into the eye of the fan wheel, and it is 26" wide. The top 1/3 of the inlet cone had cracked along the bolted flange, broke off and was flung by the fan blade into the outlet duct. One large piece and some smaller pieces of the broken section were removed from the outlet duct. Empire Sheet Metal was employed to fabricate pieces so that the top half of the inlet cone could be replaced. The task to reconstruct the inlet cone had to be performed to precise standards as the clearance between the rotating fan and inlet cone is 1/4".

There is adequate access to the inside of the fan through doors in the duct work. But to weld the outside of the cone, access is through the inlet vanes which control the fan's output. The pieces were fitted and welded together in place around the 9'7" diameter fan wheel. Cracks found on the bottom of the inlet cone, and also the inboard inlet cone, were weld repaired. The fan wheel was inspected and found to be in good shape. The inlet cones on 2B fan draft fan were inspected and no cracks were found. The work was completed and the fan was test run and required balancing. Balancing was successful which led to the restart of the unit.

The forced draft fan inlet vanes were replaced in 2002. Since then, this area had been inspected and repaired periodically. Specifically during the 2004 annual outage, cracks were identified and weld repaired on 2A fan draft fan inlet cones at the radial bend just beyond the outer flange. Similar inspections and weld repairs were made during the next three years' annual outages (2005, 2006 and 2007). In 2008 no cracks were found. New

inlet cones were ordered for both fans and were installed during the August 2009 scheduled outage.

Additional work completed during the outage.

- Inspected and greased 2A GRF coupling
- Checked 2A secondary fan coils for leaks – none found
- Replaced Slag Sluice and Fill pump mechanical seals.
- Repaired casing leak at bottom of #3 shot hopper
- Replaced 3' section of flyash piping west of 2C Cyclone
- Weld repaired 2A fan coil return piping
- Replaced hot well sight glass.
- Repaired 2B Fan coil drip return pump check valve.
- Replaced suction flange gasket on 2C Fan coil drip return pump.
- Replaced IK 10, 14, 9 wall box seals.
- Balanced 2A and 2B FDF's.
- Replaced fan coil drip return piping sample valve.
- Repaired slag tank south view port pipe.
- Replaced 2A fan coil drip return pump oil seal.
- Replaced 2B FDF inboard motor bearing oil.
- Replaced governor speed changer cover gasket.
- Repositioned 2F coal feeder roller.
- Repositioned 2B coal feeder drive pulley.
- Brush cleaned condenser tubes.
- Brush cleaned heat exchanger tubes.
- Repaired Supplemental precipitator south purge blower heater wires.
- Replaced 13 exciter brushes
- Repaired Control Board Fuel trip light fixture.
- Tightened MT-2 transformer flange bolts.
- Repaired #8 Governor Valve conduit.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-06 (MK1-01)

Station/Unit: Merrimack Station Unit No. 1

Dates: April 20 – April 24, 2008

Duration: 4.0 days

Immediate Cause:

The unit was removed from service to complete planned preventative maintenance of the air heater.

Discussion/Remedy:

Unit 1 was removed from service on April 20th to clean the air heater after a record setting 3rd place longest run of 127 straight days in the unit's 48 year history. The two tier air heater basket design along with a different type of circumferential seal installed during the fall overhaul performed well contributing to the ability of the unit to run for this period. An air heater inspection indicated that the circumferential and radial seals did not need replacing after five months. A boiler inspection indicated no water or steam tube leaks, and the cyclones, lower, upper furnace and back-pass were in very good condition. 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 work completed during the outage.

Mechanical Department

- Opened "A", "B" and "C" cyclone doors.
- Rebuilt IR- 7 sootblower.
- Lubed and inspected IK sootblower chains.
- Repacked IK-4 sootblower.
- Inspected IK-1 sootblower lance tube nozzle.
- Replaced 1-A condensate pump discharge check valve.
- Replaced the deaerator tank vacuum breaker.
- Replaced the south lance tube on G9b-0 ledge sootblower.
- Plugged tubes in the 5th/6th point low pressure feedwater heater.
- Replaced a section of the boiler blowdown tank piping.
- Replaced door and sliding valve gaskets on the Elliott water strainer.
- Replaced gasket on the seal oil pump cunio filter cover.

- Opened and closed door to the cooling water heat exchanger.
- Cleaned the primary fan coils.
- Inspected and cleaned 1-B forced draft fan outboard motor bearing.
- Changed oil in 1-B forced draft fan inboard and outboard motor bearings.
- Cleaned inlet vanes, wheel and balanced 1-B forced draft fan.
- Changed oil in 1-B forced draft fan inboard and outboard bearings.
- Changed oil in 1-A forced draft fan inboard and outboard motor bearings.
- Changed oil in 1-A forced draft fan inboard and outboard bearings.
- Replaced elbow on cooling water outlet line for 1-B BFP motor oil cooler.
- Replaced motor and sole plate on 1-A air heater drive.
- Installed new sole plate under 1-B air heater motor.
- Changed oil and filters in 1-A and 1-B air heater top support bearings.
- Inspected drive motor couplings on 1-A and 1-B air heaters.
- Replaced PCV-17 valve.
- Replaced sight glass on 1-C coal feeder gear box.
- Replaced 1-A coal feeder gear box.
- Inspected 1-A, 1-B and 1-C coal feeders.
- Replaced PCV 1 and 1-A aux. steam trap.
- Rebuilt screen wash pump.
- Inspected slag tank and replaced gate rollers, repacked gate shaft and rebuilt piston.
- Replaced slag tank jetpulsion venturi and nozzle.
- Fabricated and installed new pipe elbow adjacent to venturi.
- Replaced the service water pump gland water line and valves.
- Replaced the slag service water pump.
- Replaced the slag sluice pump gland water line and valves.
- Replaced slag tank water pump gland water line and valves.
- Checked slag tank trough, no buildup.
- Replaced the slag swiper (breaker).

Electrical Department

- Replaced all collector ring brushes and #16 brush spring on the exciter.
- Cleaned exciter filters.
- Repaired connector on 1A boiler feed pump discharge valve motor operator.
- Installed new shaft stop alarm relay for annunciator and air heater running status on 1-A air heater air drive.
- Installed new shaft stop alarm relay for annunciator and air heater running status on 1-B air heater air drive.
- Disconnected and reconnected 1-A air preheater motor for maintenance.
- Replaced motor on the main cooling fan for the voltage regulator/exciter.
- Repaired 1-C coal feeder “no coal” alarm.
- Connected new station batteries, installed new digital volt ground meter.
- Tested the DA level control stop valve
- Replaced broken seal-tight for slag crusher speed switch.

- Disconnected and reconnected 1-A cooling water pump motor for maintenance.
- Replaced coupling on gland seal condenser exhaust motor.

Instrument Department

- Cleaned sensing line and tested 1st stage steam pressure transmitter.
- Installed Microsoft software updates and current metso cyber security patches on the MK 1 metso boiler control system.
- Replaced 1-B boiler feed pump outboard bearing oil pressure gauge.
- Verified reading on bearing #1, turbine supervisory 3300/16 dual vibration monitor.
- Calibrated 1-A, 1-B and 1-C coal feeders.
- Verified stem travel response for the SSH attemperation control valves (1-A and 1-B).
- Adjusted FCV -8 1-A SSH attemperation drain valve solenoid.
- Tested and stroked cyclone secondary air dampers.
- Replaced main air pressure sensing line blow back valve.
- Checked calibration on the main steam turbine pressure gauge on the turbine deck.
- Installed a pressure gauge in the gland water supply line to 1-B vacuum priming pump.
- Tested and verified calibration on 1-A BFP suction flow transmitter.
- Replaced union and pipe nipple on 1-B BFP suction pressure gauge.
- Inspected and stroked low pressure feedwater heater valves LCV-4 and LCV-5.
- Calibrated sootblowing transmitters which included the air heater, SCR, boiler north and boiler south.
- Installed pressure gauge to monitor turbine aux governor oil impeller pressure.

Chemical Department

- Brush cleaned south side condenser tubes.
- Brush cleaned north side condenser tubes.
- Brush cleaned the cooling water heat exchanger.

North American Industrial Services

- Vacuumed SCR reactor slope.
- Vacuumed breech area under the air heater turning vanes.
- Vacuumed the precipitator inlet and SCR inlet.
- Vacuumed the tops of “A” and “C” cyclones.
- High pressure water washed 1-A and 1-B air heaters.

Boiler and Valve Work

- Performed complete boiler inspection.
- Inspected 1-A and 1-B air preheater steam cleaning devices.
- Weld repaired lower frame on 1-A reactor outlet/air heater inlet expansion joint.
- Repaired casing on the SE corner of the economizer.
- Welded patch on the bottom of 1-C fly-ash transition piece.

- Cleaned SCR injection probes.
- Inspected circumferential seals on 1-A and 1-B air preheaters.
- Installed membrane on rear wall tubes on the firebox side.
- Repaired boiler casing on the rear wall, elevation 264'.
- Repacked PCV-41-1-1 steam sootblowing control valve.
- Rebuilt FCV-3 condensate recirculation control valve.
- Installed new rotorque valve operator on LCV-17 2nd point extraction check valve.
- Repaired LCV-4 low pressure heater normal level control valve.
- Repaired LCV-5 5th point heater normal level control valve.
- Replaced valve stem on FCV-9 1-b SSH attemperation drain manual valve.
- Inspected, disassembled and cleaned FCV-5 1-A BFP recirculation control valve.
- Rebuilt 3rd point extraction valve.
- Rebuilt southwest vent valves on the 1st point high pressure heater.
- Rebuilt northwest vent valves on the 1st point high pressure heater.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-07 (SR6-03)

Station/Unit: Schiller Unit No. 6

Dates: May 4 – May 8, 2009

Duration: 4.3 days

Immediate Cause:

The unit was removed from service due a tube leak in the west waterwall section of the furnace.

Discussion / Remedy:

The unit was taken offline for a tube leak. The steam drum was vented and furnace doors opened, bricks removed, boiler drained and unit tagged out. The forced draft (FD) & induced draft (ID) fans were left on for cooling. Two PSNH crews were set up to work the day shift and the night shift. The vacuum contractor was notified and requested to mobilize and vacuum the unit. The unit was cleaned, starting in the bottom ash hopper. Ash was removed from the kicker baffle, superheater hoppers and the wind box. The airheater was cleaned and a water wash was completed.

One tube leak was located on the west waterwall section of the furnace, fifth tube north from the south soot blower at elevation 58'. Eight additional worn areas were located on the tubes starting at the soot blower opening tube, heading north. The wear on these tubes appeared to be caused by soot blower steam. The tubes were pad weld repaired. The sootblower drain valves and timing were checked. The surrounding area was fully inspected and no other tube damage was found.

The boiler was filled for a hydro and a successful one was achieved. Boiler door openings were bricked up and all doors closed. The unit was turned over to operations to be put back into service.

The Boiler Inspector completed an annual inspection of the unit. The Operating permit from the State of NH requires the inspection and it was due at this time. The inspection of the boiler took place and no issues or concerns were noted by the inspector.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-08 (MK2-07)

Station/Unit: Merrimack Station Unit No. 2

Dates: May 11 – May 16, 2009

Duration: 4.9 days

Immediate Cause:

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

Discussion/Remedy:

Unit 2 was removed from service at 16:12 hours on May 11, 2009 due to high water usage. Repairs were made in the southwest corner of the firebox at elevation 274', and in "A", "C", "F", and "G" cyclones. An inspection of the upper furnace, backpass and penthouse indicated no other water or steam side leaks.

In "A" cyclone, the repair involved pad welding 3 neck tubes at the 12 o'clock position. "C" cyclone had 2 leaks, one on a barrel tube 1' under the bends of the secondary air damper. The other leak was on the windbox side of the cyclone (north-center) and was located inside the area that is sealed with casing. This casing is designed to protect the tubes where they go into the rear wall connection tubes. There were minor leaks in "F" cyclone on the elbows just below the secondary air damper, and one leak in the bottom, near the middle of the cyclone. The leak in "G" was on the neck, 12 o'clock position on the neck. The wall tube leaks in the southwest corner of the furnace required setting up a two-man spider (swing staging), pad welding 4 tubes on the west wall and 4 tubes on the south wall, approximately 12" pads. This area will be inspected during the overhaul and as necessary, tube areas will be replaced and overlay added for erosion protection.

The tube leaks were pad welded back to original wall thickness. When the tube leaks were repaired, studs were welded on the cyclone tubes and refractory was reinstalled, once the tube leaks were repaired. A final boiler pressure test was performed, and there were no other waterside leaks found.

Additional work completed during the outage.

The following is a list of other work that was performed during the outage. It includes jobs that were in the priority backlog and jobs that were found during the inspection of the boiler at the beginning of the outage.

Maintenance Department

- Opened and closed boiler and cyclone doors.
- Replaced gland water piping to 2B circulator.
- Replaced inlet and outlet gaskets on LCV-106 1st point heater level control valve.
- Cleaned 2A and 2B condensate pump suction strainers.
- Performed inspection on the flash tank.
- Performed inspection on the deaerator tank.
- Welded a patch on 2-B and 2-E gravimetric coal feeder downcomers.
- Weld repaired crack on the north inlet cone of 2-A forced draft fan.
- Replaced the mechanical seal on the slag tank fill pump.
- Replaced the primary fan coil drip return tank drain valve.
- Replaced unions and pipe on the steam trap located on the west side of the secondary fan coil steam isolation valve, in the northwest corner of the fan room.
- Inspected 2-A gas recirculation fan and repaired casing leaks.
- Replaced the north and south economizer airlock inlet butterfly valves.
- Replaced 2-B DA pump inboard gland seal.
- Installed new trim and spacers under the actuator springs for FCV-5 main boiler feed pump recirc control valve.
- Replaced north slag tank neck fill valve.
- Replaced stem bushing on DA storage tank drain valve.
- Repaired the SCR SV-570 valve.
- Rebuilt the start-up boiler feed pump suction valve.
- Repacked LCV-107 valve for the 2nd point high pressure feedwater heater.
- Repacked TCV-3A and TCB-3B secondary superheat attemperator spray valves.
- Rebuilt BW-301-2 2B attemperator manual drain valve.
- Repacked aux steam PCV-37 valve.
- Rebuilt PCV-130 turbine gland steam start-up supply valve.
- Rebuilt gland steam manual valve for PCV-130.
- Replaced water side vent valves (the two second from the east).
- Replaced seal air hoses on sootblower IK #10, #15, #16, #17, and #25.
- Replaced IK-34 sootblower lance tube.
- Inspected and cleaned 2-A incline redler.

Electrical Department

- Inspected and repaired as necessary precipitator.
- Repaired the top oil temperature gauge/switch for MT-2.
- Power washed cooling radiators on MT-2 main transformer.
- Replaced northwest and southwest cooling fan motors on MT-2 main transformer.
- Located and corrected faulty ground in 2LC load center.
- Disconnected and reconnected slag tank fill pump motor.
- Inspected and replaced worn brushes on the temporary exciter.

Instrument Department

- Calibrated 2-D secondary air transmitter.
- Adjusted sensor for shaft stop alarm on 2-B gas recirculation fan.
- Stroked condensate polisher by-pass valve to check.
- Repaired manometer on top of the turbine oil tank.

Chemical Department

- Brush cleaned north and south heat exchangers.
- Cleaned water boxes on both sides of the main condenser.

North American Industrial Services

- Vacuumed gas recirculation duct.
- Vacuumed tempering duct.
- Vacuumed D-O1 duct and economizer hoppers.

Boiler Work

- Performed a complete boiler inspection.
- Repaired boiler tube leaks as described above.
- Weld repaired seal air piping underneath 2B gas recirculation duct.
- Repaired casing on #4 (south) economizer hopper.
- Repaired air leaks on top of the windbox in the crawl space on the 4th floor.
- Replaced studs on 2-A cyclone door frame.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-09 (MK2-08)

Station/Unit: Merrimack Station Unit No. 2

Dates: June 26 – June 28, 2009

Duration: 2.1 days

Immediate Cause:

The unit was removed from service after a 40 day run due to high water usage.

Discussion/Remedy:

After a 40 day run, Unit 2 was removed from service at 15:31 hours on June 26, 2009 for high water usage. The majority of the repairs were in “G” cyclone. An inspection of the upper furnace, backpass and penthouse indicated two small weeping leaks on the superheater floor. These small leaks were padwelded.

In “G” cyclone, the repair involved pad welding 5 neck tubes at the 1 o’clock position. Tubes were weld repaired to original wall thickness. Studs were welded on the cyclone tubes and refractory was reinstalled. Once the tube leaks were repaired, a final boiler pressure test was performed, and there were no other waterside leaks found.

Additional work completed during the outage.

The following is a list of other work that was performed during the outage. It includes jobs that were in the priority backlog and jobs that were found during the inspection of the boiler at the beginning of the outage.

Maintenance Department

- Opened and closed boiler and cyclone doors.
- Replaced LCV-42 slag tank level control valve.
- Replaced 1st point high pressure heater line vent isolation valve.
- Rebuilt one of the economizer vent valves (furthest west).
- Rebuilt economizer vent valve (fourth in line from east to west).
- Inspected 2-A forced draft fan inlet cone.
- Replaced slag tank gate rollers.
- Weld repaired 3rd point extraction drip line.
- Adjusted springs in valve actuator (FCV-5) MBFP recirc control valve.

- Repacked sootblower IR-13.
- Replaced boiler aspirating port viewing glass on 'E', 'F' and 'G' cyclones.
- Replaced 2-C condensate drip return pump motor.
- Repaired pugmill chute and added an expansion joint.
- Rebuilt the secondary superheater outlet header drain valve.
- Repaired the secondary superheater header drain line on elevation 287'.
- Replaced spool piece of flyash piping to 2-A cyclone.
- Fabricated and installed pipe support for the 3rd point extraction safety valve.
- Inspected and greased 2-B gravimetric coal feeder.
- Greased the hillard clutch seals on 2-A and 2-B gas recirc fan.
- Inspected the slag tank water pump gland water tubing.
- Rebuilt LCV-108 4th point heater drain valve.

Electrical Department

- Replaced #4 and #5 automatic voltage controllers on the supplemental precipitator.
- Inspected the original precipitator.
- Inspected and replaced three worn brushes on the temporary exciter.
- Inspected 2-B circulating water pump breaker.
- Checked 2-C condensate drip return pump motor for vibration.

Instrument Department

- Installed valves and test ports for test gauges to perform MBFP performance testing.
- Inspected and stroked LCV-108 heater normal drain valve.
- Inspected control air line on 2-B GRF tempering damper.
- Purged all secondary air transmitter sensing lines, also filled manometers.

Chemical Department

- Brush cleaned north and south heat exchangers.
- Cleaned water boxes on both sides of the main condenser.

North American Industrial Services

- Vacuumed D-O1 duct and economizer hoppers.
- Vacuumed yard service sump.

Boiler Work

- Performed a complete boiler inspection.
- Repaired boiler tube leaks as described above.
- Repaired air leak on the windbox by "G" cyclone (3' crack in the casing).
- Replaced several studs on 2-A cyclone door frame.
- Repaired top section of SCR DO-5 south expansion joint.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-10 (MK1-04)

Station/Unit: Merrimack Station Unit No. 1

Dates: July 21- July 24, 2009

Duration: 2.8 days

Immediate Cause:

The unit was removed from service after a 55 day run due to perform planned preventative maintenance and complete an air heater water wash.

Discussion/Remedy:

Unit 1 was removed from service on July 22nd after a 55 day run to perform planned preventative maintenance in anticipation of a long run while Unit 2 is off line for the overhaul which is scheduled to begin August 1.

A boiler inspection indicated tube leaks in 1A and 1C cyclones. 1A tube leak was on the 19th barrel tube from the neck on the knee bend up by the secondary air damper. 1C cyclone tube leak was on the knee bends also, 8th tube from the neck. The upper furnace secondary superheater, vertical reheater, and primary superheater and back-pass were in good condition with no other steam or water leaks found. An air heater inspection indicated that the circumferential and radial seals did not need replacing. Critical path was the high pressure air heater water wash with a backlog of maintenance jobs being performed by the maintenance department and contractors.

Additional work completed during the outage.

Mechanical Department

- Opened "A", "B" and "C" cyclone doors.
- Replaced IR-8 and IR-10 sootblower with a rebuilt unit.
- Repacked IR-1, IR-3, IR-4, IR-10 and IR-15 sootblowers.
- Repacked IK-1 sootblower.
- Repaired SCR reactor inlet door frame.
- Replaced the slag tank jet propulsion venturi.
- Replaced cuno filter on 1-A boiler feed pump hydraulic coupling.
- Repaired elbow on slag tank sluice line.
- Replaced elbow for slag tank overflow.
- Replaced slag tank rodder port piping and packing for the port door.

- Replaced mechanical seal on 1-A cooling water pump.
- Replaced the scavenger valve on SB-4.
- Repacked the root valve for the 3rd point extraction steam trap.
- Installed remaining silencers on 1-A forced draft fan.
- Repaired the 1-B forced draft fan inboard oil leak.
- Replaced drain valve on 1A condensate pump discharge line.
- Replaced 1-A boiler feed pump gland seal flexible braided hose.
- Inspected and cleaned 1A, 1B and 1C cyclone blast gates.
- Inspected and cleaned 1A and 1B primary fan coils.

Boiler and Valve Work

- Performed complete boiler inspection.
- Repaired boiler waterside tube leaks as described above.
- Cleaned the SCR reagent probes.
- Repacked FCV-5 1A boiler feed pump recirc control valve.
- Inspected 1A and 1B air heater cleaning devices.
- Repaired boiler casing above IR-14.
- Repacked retaining stud for wear block on 1C cyclone.

North American Industrial Services

- Vacuumed SCR inlet and reactor slope.
- Vacuumed breech area under the air heater turning vanes.
- Vacuumed the slag trough.
- High pressure water washed 1-A and 1-B air heaters.

Instrument Department

- Replaced turbine dump valve diaphragm and tubing.
- Calibrated turbine air switch that controls dump valve air supply.

Chemical Department

- Brush cleaned south side condenser tubes.
- Brush cleaned north side condenser tubes.
- Brush cleaned the cooling water heat exchanger.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-11 (SR5-07)

Station/Unit: Schiller Unit No. 5

Dates: October 1 – October 6, 2009

Duration: 4.8 days

Immediate Cause:

The unit was removed from service due to remove agglomerated bed material that had accumulated over time.

Discussion / Remedy:

The unit was taken off line to remove agglomerated bed material that had slowly accumulated during the 166 days since returning to service from the spring overhaul. The unit had returned to service on April 21 and tripped only 4 times in that period totaling less than 24 hours.

The unit was taken offline, cooled down and tagged out to allow bed material removal. Vendors were notified so that mobilization of manpower and equipment could start. Vacuum vendor was mobilized and set up, crew began removing bed material. Boilermakers were mobilized to obtain manpower and equipment to pull cyclone covers and allow vacuum contractor access to clean out cyclones.

In addition to furnace bed removal, tuyere cleaning, cyclone cleaning, other areas of unit 5 boiler and its components were opened, inspected, and cleaned. Cleaning of material from FD fan silencer, air heater air side, and furnace tuyeres went on in parallel with furnace and cyclone cleaning. A boiler inspection was conducted with no additional findings. All boiler doors were re-bricked, ducts closed, cyclone covers installed and unit turned over to operations for start up.

Additional work completed during the outage.

- 1) Weld repaired north pantleg on "A" wood feeder.
- 2) Weld repaired south pantleg on "A" wood feeder.
- 3) Weld repaired pantleg on "B" wood feeder.
- 4) Removed restriction from "D" backflow damper.
- 5) 10th stage heater; replaced trap station and root valve to trap.
- 6) HP drip control valve; replaced both flanges to valve.
- 7) Replaced drain valve from 10th stage feedwater heater.

- 8) 10th stage feedwater heater; replaced trap bypass valve.
- 9) 10th stage ext. "A"; replace freeblow valve.
- 10) Emergency Wood Hopper; modified cleanout doors to improve operation.
- 11) Reclaimer cable reel; replaced coupling insert.
- 12) C5 conveyor; replaced drive sheaves and belt.
- 13) Continuous blowdown tank; replaced inlet valve from turbine blowdown tank.
- 14) Feedwater system; Installed new drain valve.
- 15) Feedwater system; replaced drain valve.
- 16) "B" BFP; replaced warm-up valve.
- 17) "A" BFP; replaced warm-up valve.
- 18) "A" BFP; Re-worked leaking oil return lines.
- 19) Condenser; repaired leaking drag line on north side.
- 20) Bed ash Drain Screw- Repacked east end.
- 21) Bed ash Drain Screw- Repacked west end. Stuffing box worn.
- 22) FD Fan- modified coupling guard to ease tightness.
- 23) 6A- DA Pump- cleared cooling water return line pluggage. Verified supply line clear.
- 24) Insulated around floor openings of the wood ash pug mill

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-12 (NT-01)

Station/Unit: Newington Station

Dates: October 5 – October 11, 2009

Duration: 5.6 days

Immediate Cause:

Newington Station was taken out of service for 5.6 days for a scheduled maintenance outage on October 5th, 2009 and returned to service on October 11, 2009.

Discussion/Remedy:

The reason for this maintenance outage was to install an employee electrical exposure protection scheme that would mitigate the hazards identified in a recent arc flash study. The study was performed according to the IEEE equations that are presented in NFPA70E-2004. The analysis identified five electrical buses with incident energy ranges that resulted in a “Dangerous” hazard class. This hazard class cannot be mitigated through the use of personal protective equipment (PPE), so administrative controls were implemented as a means of protection until a solution could be engineered, procured and constructed. Eaton Corporation was contracted to provide the EPC services necessary to mitigate these hazards. The reduced Plant capacity factor provided an opportunity to install the new protection scheme as soon as the new equipment and man power became available. Following is a summary of work completed during that outage.

Additional Work Completed During the Outage:

Electrical Department

Critical Path:

Critical path activities for the outage involved the installation of a 4160V Bus Differential Protection for Bus 1 & 2, and 480V Bus Overcurrent Protection for Power Centers 1LA, 1LB & 1LC. Each protection scheme required the installation of new Schweitzer digital relays, associated test switches, shorting blocks, wiring and current transformers (CT's). The project required the relocation of some of the existing CT's and the installation of 48 new CT's which required sections of the bus to be de-energized and dismantled. CT's were installed on all three phases, at each feeder, main and tie breaker for the bus differential scheme. The bus overcurrent protection schemes required new CT's to be installed on all three phases, of the low voltage side, of the load center transformers. One of the new bus differential relays is shown in photo 1.



Photo 1

The installation of the new current transformers required various electrical outages. Critical loads were powered through the use of existing alternate feeds, temporary feeds, a temporary generator, and the plant's emergency generator. All of the new equipment was tested before installation and retested during the commissioning scope of the project. After the commissioning, each of the large motors was started through independent electrical feeds (PN1B/PN2A) with the bus tie-breaker (P100) closed.

Mechanical Department

Balance of Plant Work Scope:

ID Fan Lube Oil Piping: Recent inspections revealed various sections of supply/return lube oil piping were in need of replacement. During this outage maintenance technicians replaced sections of corroded piping on both lube oil systems. Sections of piping were cut out, new piping was welded in and new pipe supports were replaced as needed. The plant electricians installed new heat trace cable and controllers for each lube oil system. New insulated lube oil piping is shown below in photo #2.



Photo 2

Prior to placing the systems back in service, temporary strainers were installed at the bearing housings and the systems were flushed.

Instrument Department

Primary Air Heater Tube Sleeving

Due to recent tube failures, the primary air heater coils were inspected during the 2009 spring outage. Obtaining actual wall thickness measurements was difficult due the exterior scale. To prevent future tube failures and extend the useful life of the air heaters, CTI Industries, Inc. was contracted to supply & install CTI Shield/Seals (tube sleeves) in the "B" primary air heater tubes (2 rows of tubes/section, 4 sections/heater)

During this outage CTI completed their contracted work scope; Plant Maintenance & Operations conducted a hydrostatic test of the sleeved tubes and provided additional support as needed.

Maintenance Department

Condenser

The Station's maintenance staff conducted an internal inspection of the condenser. The peripheral tube stakes were repositioned as necessary by the maintenance staff and will be checked the next time the condenser is open for inspection.

Boiler and Valve Work

Valves

Colonial Valve was contracted to inspect/repair the following valves:

LV-43	Valve was inspected and rebuilt
TV-26-2	A new valve was installed
TV-28-1	Valve was inspected and repaired as necessary
TV-28-2	Valve was inspected ; no problems found

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-13 (MK1-05)

Station/Unit: Merrimack Station Unit No. 1

Dates: October 26 – October 30, 2009

Duration: 4.2 days

Immediate Cause:

The unit was removed from service to perform planned preventative maintenance.

Discussion/Remedy:

The unit was removed from service on October 26 for planned preventive maintenance, including an airheater wash and boiler tube leak repair. The Unit had been on for 94 straight days. A water wash of the Air heater was completed. Critical path was a hot spot that was noticed during shut down on the boiler front wall on the 4th floor elevation where the GRF wall boxes are located. During the forced outage the insulation and lagging was removed to inspect the area. The casing on the wall boxes and casing beneath the wall boxes had over heated and was replaced.

A local vendor was contacted to fabricate the replacement casing pieces. While the casing pieces were being made the refractory and wire mesh that was beneath the casing was removed. Also the channel iron that the casing attaches to was replaced. New refractory and wire meshing was installed prior to the installation of the casing. Once the casing arrived it was installed along with new insulation and lagging. Other work that ran in parallel to critical path was the high pressure air heater water wash with a backlog of maintenance jobs being performed by the maintenance department and vendors including the replacement of 1LA & 1LB 480 volt Load centers.

Additional work completed during the outage.

Mechanical Department

- Opened “A”, “B” and “C” cyclone door.
- Rebuilt SCR SB-4 Sootblower Poppet valve.
- Rebuilt SCR SB-7 Sootblower Poppet valve.
- Replaced Aspirating Air Line piping on the 4th floor just above IR-4 Sootblower.
- Repaired Economizer Inlet Valve.
- Repaired 1A and 1B forced draft fan inboard bearing seal and cleaned.
- Repaired leak on 2nd Pt. Extraction drain.

- Replaced 1-C Coal Feeder Bearing #3.
- Repaired 1-B Fan Coil Steam Supply Manual Valve.
- Repaired pin hole on HP Heater piping to DA tank.
- Rebuilt 1st Pt. High Pressure heater north and south steam vent valves.
- Replaced the slag tank South Slope Nozzle valve.
- Rebuilt Sootblowing Air supply valve SB-1.
- Inspected and repaired piping for Condensate chemical injection to the DA.
- Repaired leak at 1A condensate pump discharge head.
- Repaired flange leak at 1A Boiler Feed pump vent pipe.
- Repaired Exciter Brush Rigging Cover.
- Replaced 1A Cyclone ports and rod tubes.
- Replaced 1B Air heater South Steam trap.
- Repaired cracked weld on bottom of slag tank fill box.
- Repaired slag tank upper deck fill pump pin hole.
- Repaired slag tank leak, upper NW corner.
- Cleaned slag tank viewing ports.
- Replaced slag tank Aspirating NW port.
- Repaired Slag tank Aspirating port piping and 3 way valve.
- Repaired Fan coil steam supply trap bypass manual vale.
- Replaced shaft on 1 B coal feeder cleanout gearbox.
- Replaced Slag Tank swiper.
- Performed preventative maintenance on the Slag tank Crusher.
- Repaired slag tank flange leak above control panel.

Boiler and Valve Work

- Performed complete boiler inspection.
- Inspected 1-A and 1-B air preheater steam cleaning devices.
- Repaired hole in Bull Nose just above IR 4.
- Repaired front wall casing on the 4th.
- Repaired casing on the NE corner 3 1/3 level and 4th floor east by dead air space.
- Repaired 5 barrel tubes in “C” cyclone.
- Cleaned SCR injection probes.
- Inspected circ seals on 1-A and 1-B air preheaters.
- Replaced 8 top seals in 1A Air Heater.
- Repaired hole in Boiler casing just north of IR 4 at floor level.
- Repaired casing leak just north of G9B-3.

North American Industrial Services

- Vacuumed SCR reactor slope.
- Vacuumed breech area under the air heater turning vanes.
- Vacuumed the precipitator inlet and SCR inlet.
- Vacuumed the tops of “A” and “C” cyclones.
- High pressure water washed 1-A and 1-B air heaters.

Electrical Department

- Replaced collector ring brushes as needed.
- Cleaned exciter filters.
- Wired remote start for 1-B Air heater Cleaning device.
- Installed new 1LA & 1LB 480 volt Loadcenters
- Installed new shaft stop alarm relay for annunciator and air heater running status on 1-B air heater air drive.
- Repaired IK 10 motor junction box.
- Inspected ESP's.

Instrument Department

- Repaired MK 1 Air Heater transmitter sensing line leak at orifice.
- Changed out Analog Process SP card to accept remote powered input.
- Replaced 1-A & B boiler feed pump coupling temperature gauges.
- Rebuilt 2 north O2 probes, replaced 2 south O2 Probes.

Chemical Department

- Brush cleaned south side condenser tubes.
- Brush cleaned north side condenser tubes.
- Brush cleaned the cooling water heat exchanger.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-14 (SR5-11)

Station/Unit: Schiller Unit No. 5

Dates: November 20 – November 25, 2009

Duration: 4.2 days

Immediate Cause:

The unit was taken offline due to low bed temperatures and bed material agglomeration.

Discussion / Remedy:

The unit was taken offline due to low bed temperatures as they did not fully recover from the previous boiler upset. The upset occurred the day prior when the load on the unit was dropped to clean the condenser. There were indications that the bed had slumped, and did eventually become unrecoverable. Temperatures within the bed initially began to stabilize and were enough to support continued operation for a short period of time.

Vacuum vendor was notified and requested to mobilize manpower and equipment to support cleaning out of the bed material. The unit went into cool down phase with boiler doors being opened and ID fan left on. The bed had crusted over and was removed by vacuum vendor. The tuyere's were cleaned, blown out and inspected. All boiler doors were re-bricked, ducts closed, and the unit was turned over to operations for start up.

The I&C Department reviewed the attemperator controls. It had been reported that there had been a level control problem during ramp up on load. The system logic was changed to allow the bailey valve to stay full open instead of closing when signaled that the main feedwater valve lifted off its seat. No problems with the controls were found.

Clean sand was put into the boiler for start up. The unit was turned over to operations for start up and phase.

Additional jobs in the maintenance backlog were completed as well as other corrective and preventive maintenance work activities.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-15 (MK1-04)

Station/Unit: Merrimack Station Unit No. 1

Dates: December 1 - December 5, 2009

Duration: 3.4 days

Immediate Cause:

The unit was removed from service due to a reheat tube leak.

Discussion/Remedy:

Unit 1 was removed from service to make repairs to steam side reheater tube leaks in the upper furnace. An inspection revealed that two pendants were involved, numbers 10 and 11 counting from north to south. The tube leaks in the 11th pendant caused the damage in the tubes on the tenth pendant. On both pendants, six feet up from the bottom of the pendant, tubes 6 and 7 (both pendants counting west to east on the pendant) were steam cut and sections of the pendants (dutchman) would have to be replaced. Tubes 4 and 5 were also pad welded on pendant 10. With this material being SA-213-T91, 12 hours was needed for stress relieving the welds.

To maintain reliability, this area of the boiler has been previously scheduled to be replaced in the spring 2010 overhaul. A thorough boiler inspection of the rest of the water and steam side indicated no other problems or issues.

An inspection of the air heater did not reveal significant fouling of the baskets, but due to the increased differential pressure since the previous start-up, it was decided to perform a water wash while the boiler repairs were being performed. After the wash, an inspection of the upper and lower air heater seals (circumferential and radial) was performed and all were in excellent condition. Critical path was the boiler repairs, with the backlog being performed by the maintenance department and vendors.

Additional work completed during the outage.

Mechanical Department

- Opened "C" cyclone door.
- Repaired the attachment for the clapper valve on the slag tank.
- Changed oil in the inboard and outboard bearings on 1A and 1B forced draft fans.
- Cleaned view port glass on slag tank and checked cooling water supply.

Boiler and Valve Work

- Performed complete boiler inspection.
- Weld repaired 1C cyclone door.
- Externally inspected 1C water jacket.
- Installed four Dutchmen in the Reheater (details above).
- Inspected 1-A and 1-B air preheater steam cleaning devices.
- Inspected circ seals and radial seals on 1-A and 1-B air preheaters.
- Rebuilt both isolation valves on the SSH attemperation vent line.
- Rebuilt the main steam inlet valve to the HP trap.
- Installed new stem and hand wheel assembly in the DES-1 steam desuperheater manual valve.
- Rebuilt #9 secondary superheater outlet drain valve.
- Rebuilt #5 primary superheater outlet drain valve.
- Rebuilt #6 primary superheater inlet drain valve.
- Rebuilt #11 and #12 primary superheater outlet drain valves.
- Rebuilt #10 secondary superheater inlet drain valve.
- Rebuilt the drain valve on the 5th point LP heater.

Electrical Department

- Connected and disconnected stress relieving equipment.

Chemical Department

- Brush cleaned south side condenser tubes.
- Brush cleaned north side condenser tubes.
- Cleaned the tube sheet of the cooling water heat exchanger.

North American

- Vacuumed the SCR inlet, SCR outlet, breech room and economizer by-pass dampers.
- Water washed 1A and 1B air preheaters.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-16 (SR4-05)

Station/Unit: Schiller Unit No. 4

Dates: December 8 – December 13, 2009

Duration: 4.8 days

Immediate Cause:

The unit was removed from service due to a generation tube leak.

Discussion / Remedy:

The unit tripped off line due to a tube rupture in the generation section of the boiler. The unit was vented and the forced draft (FD) & induced draft (ID) fans were left on for cooling. The vacuum contractor and boilermakers were notified. Once the vacuum contractor had mobilized the crew began vacuuming out the unit. Two boilermaker crews were established, one to work the day shift and one for the night shift.

Vacuuming was done in the areas of kicker baffle, superheater hoppers, airheater hoppers, windbox, economizer, airheater, drag-ash system, and bottomash hoppers. The economizer and airheater were water washed. A moderate amount of ash was removed. All coal was removed from pulverizers as well.

Boilermakers repaired the tube failure working around the clock. The failed tube, a generation tube, was found to be in the third row in from the south and twelfth tube over. The failure distorted some other tubes in that area and they needed to be realigned as well. Also several wall tiles were knocked out and needed to be replaced. The ruptured tube was repaired with a "dutchmen", roughly 18 feet long. All other effected tubes were straightened by pulling them back into place. Shields were installed on the effected tubes. Inspected all shielding and tubes in the area for wear, 6 tubes in that area were pad welded just above the shield hangers. A general boiler inspection was conducted with no other issues identified.

Refractory was removed to complete the boiler tube repairs. The effected wall was repaired with tile as needed. Crews returned after tube repair was complete to re-establish the boiler wall and repair the south wall. Boilermakers reinstalled boiler casing and sealed up the boiler. All boiler doors closed and unit turned over to operations to be placed back into service.

Additional work completed during the outage.

- 1) Replace casing gasket on the HP drip pump.
- 2) Added a new valve in the BFP warm-up lines. Warm-up valves needed to be changed, none in stock. These new valves will allow for isolation.
- 3) Replaced main blowdown tank inlet valve from the turbine blowdown tank.
- 4) Inspected 4A-BFP cooling water sight flow indicator. No issues with flapper, changed glass.
- 5) Adjusted packing on 4A-BFP main discharge valve.
- 6) Tightened leaking unions on 4A-BFP oil line.
- 7) Repaired oil leaks on 4B-BFP oil line.
- 8) Sootblower #3, adjusted chain, removed (3) links.
- 9) Sootblower #4, Replaced gasket, inlet flange.
- 10) Sootblower #12, Tightened packing bolts.
- 11) Sootblower #18, Replace bolt in limit switch and set.
- 12) LP receiver tank, Replaced gate valve, check valve and section of pipe.
- 13) Steam Drum Safety Valve Flange Repaired, new gasket installed.
- 14) Replace steam drum column valves.

PSNH

FOSSIL STATION OUTAGE REPORT

Outage Report No.: OR-2009-17 (SR5-12)

Station/Unit: Schiller Unit No. 5

Dates: December 13 – December 17, 2009

Duration: 4.2 days

Immediate Cause:

A maintenance outage was schedule to perform maintenance on the condenser and the cyclones, as well as inspect and repair as necessary the attemperator and main steam outlet valves.

Discussion / Remedy:

A maintenance outage was scheduled for Unit 5 to complete maintenance on valves, the cyclones and clean the condenser. The unit was taken offline, cooled down and tagged out. Bed material was removed back to the storage silo. Remaining material was inspected and removed as necessary from the boiler.

Condenser leg temperatures had been increasing recently, an indicator that the condenser tube sheets were becoming plugged. The condenser was opened up and cleaned during this outage. A considerable amount of debris was removed. During changes in the seasons, it is common to pick up extra debris in the cooling water that is supplied from the Piscataqua River.

The attemperator valve was rebuilt during this outage and controller reinstalled. During an inspection of the main steam outlet valve, a crack was noted in the support bar for the interior guide portion of the housing. This area had been repaired once in the past as a minor crack had been noted a couple years ago. This crack was repaired by grinding it out and re-welding the area.

While the unit was offline an inspection of the cyclones was performed. Some pluggage in the cyclone and dip legs was noted. Vacuum contractor was notified and removed the pluggage and performed a boiler cleaning. All areas were cleaned and material removed.

The tuyeres were inspected for pluggage in the areas that were cleaned off on the bed bottom. No indication of pluggage was noted.

Additional work completed during the outage.

Mechanical Department

- Steam drum sightglass, east side, replaced all glass segments.
- Air ejector, Replaced gasket on 2nd stage inlet line.
- Lube oil sump, replaced filter on south side of tank.
- 5A-BFP, Replaced the casing drain valve.
- Desuperheater spray water control valve, inspected
- Rotary feeder "F", Replaced packing both sides.
- Rotary feeder "G", Replaced packing both sides.
- Rotary feeder "D", Replaced rotary valve.
- Rotary feeder "A", Replaced packing both sides.
- Replace both flyash penetrations into the ash silo.
- Removed staging as requested.
- Replaced 6" valve on condenser vent line to air ejector.

Instrumentation Department

- Blew down the drum level transmitters.
- Removed and inspected all cyclone T/C's.
- T/C's in cyclones 2 and 5 were replaced.
- Tightened up on several valve packings.
- Investigated a report of unusual drum level control nothing found out of the ordinary
- Re-secured the drum level transmitters sensing lines that had melted plastic saddles.
- Replaced the pump for the Wet O2 CEM analyser.
- Calibrated both drum pressure transmitters.
- Blew back the differential pressure line for the bed sand lift pipe.
- Blew back the bed and tuyere dp transmitters.
- Repaired the wood feeder slide gate oilers.
- Attemperator spray control valve seated and stroked. Tested ok.
- Replaced a leaking solenoid on the attemperator block valve.
- Replaced the pump for the Wet O2 CEM analyser.
- Replaced a leaking solenoid on the attemperator block valve.

ATTACHMENT WHS-3

PSNH STEAM UNIT AVAILABILITY

PSNH STEAM UNIT AVAILABILITY

January 2009 through December 2009

	Merrimack Unit 1	Merrimack Unit 2	Newington Unit 1	Schiller Unit 4	Schiller Unit 5	Schiller Unit 6
January	99.7%	99.9%	98.3%	83.4%	74.4%	100.0%
February	99.7%	75.4%	100.0%	100.0%	99.0%	99.8%
March	99.7%	99.7%	59.6%	87.2%	90.9%	100.0%
April	84.0%	84.4%	100.0%	100.0%	31.5%	98.4%
May	96.8%	84.0%	100.0%	99.8%	99.8%	86.1%
June	98.6%	92.6%	98.9%	90.8%	99.5%	94.8%
July	89.5%	94.2%	100.0%	95.7%	96.6%	84.3%
August	98.7%	0.3%	99.5%	99.0%	99.1%	76.3%
September	98.7%	0.0%	100.0%	99.0%	98.9%	0.0%
October	86.2%	0.0%	81.3%	99.8%	83.7%	84.9%
November	98.0%	0.1%	98.9%	99.8%	81.1%	93.0%
December	85.8%	82.7%	94.4%	82.8%	83.7%	99.9%

Planned Maintenance Outages

January 2009 through December 2009

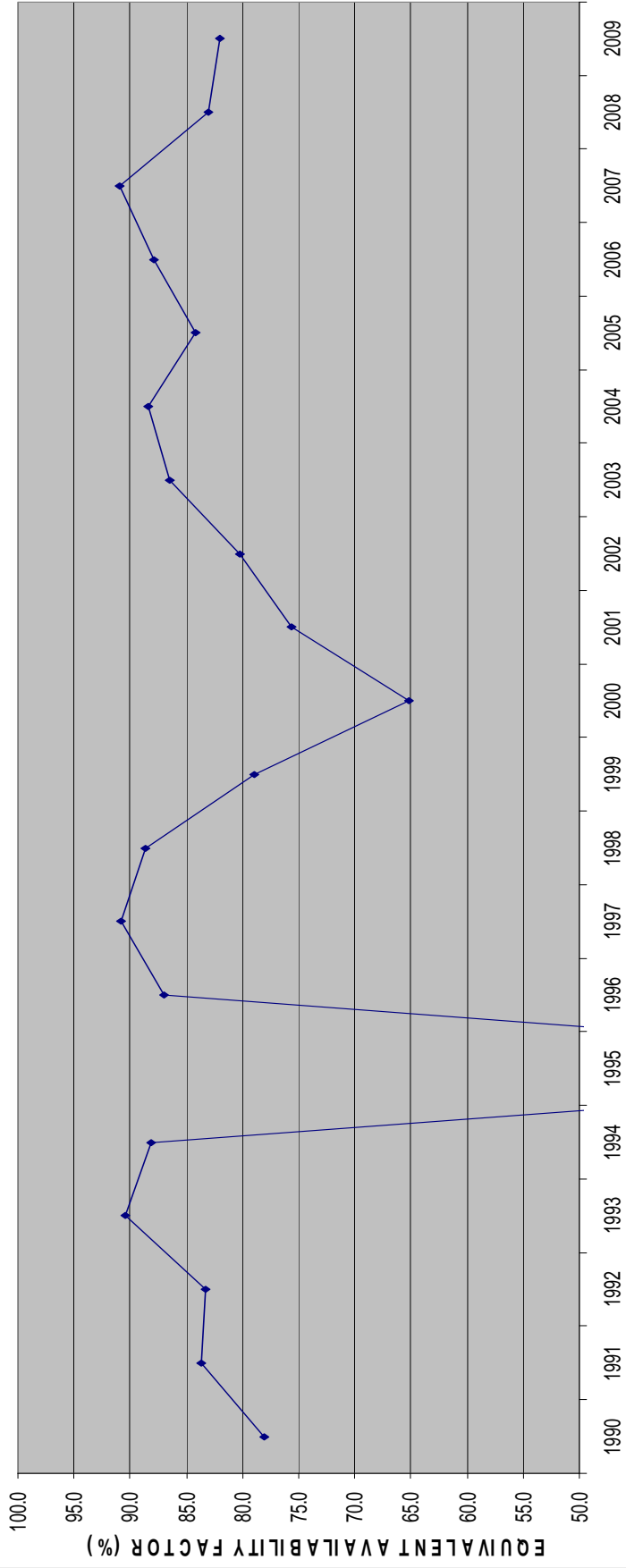
Unit	Month(s)
Merrimack 1	Aug-Dec Mar
Merrimack 2	
Newington	
Schiller 4	Apr
Schiller 5	
Schiller 6	Sep-Oct

DEFINITION:

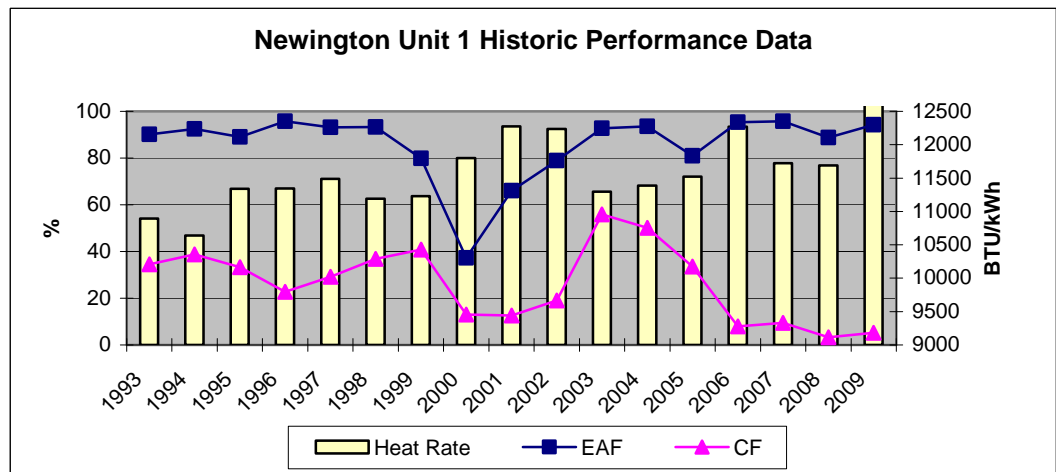
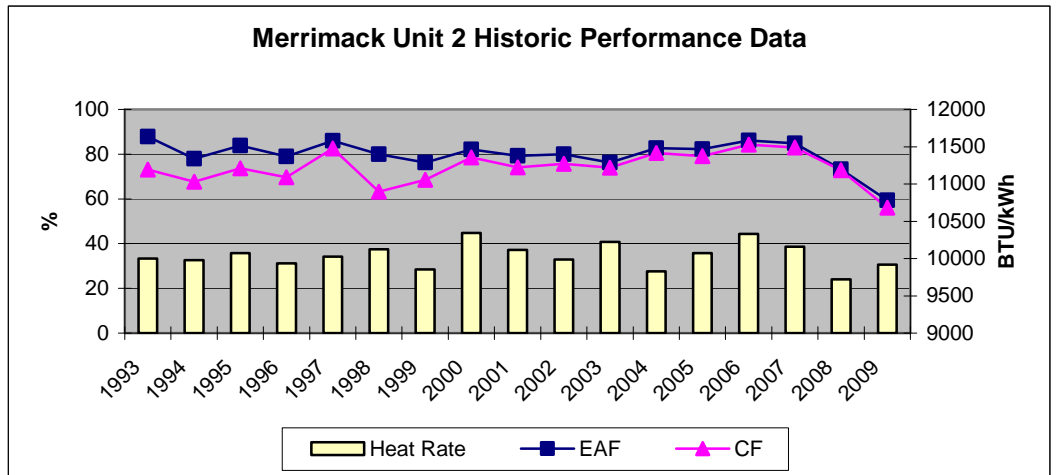
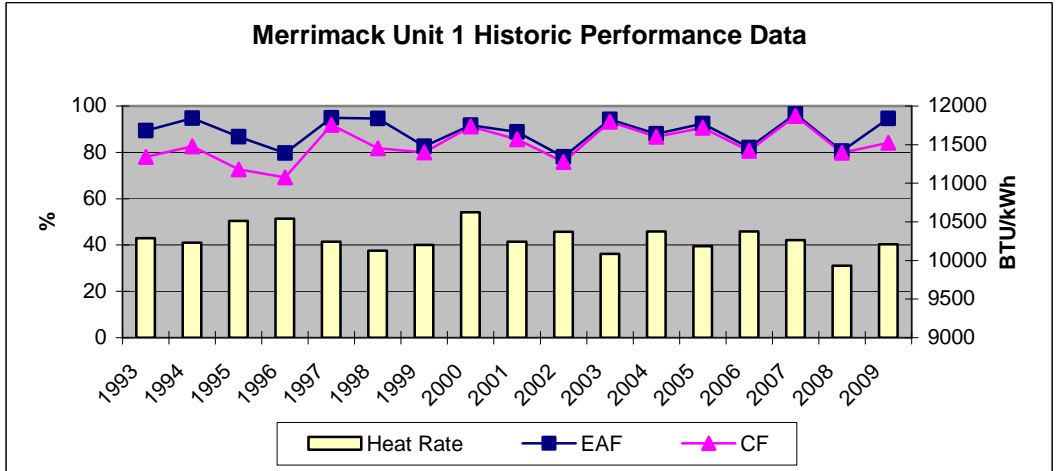
Unplanned Outage Equivalent Availability Factor - EAF(Unplanned):

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

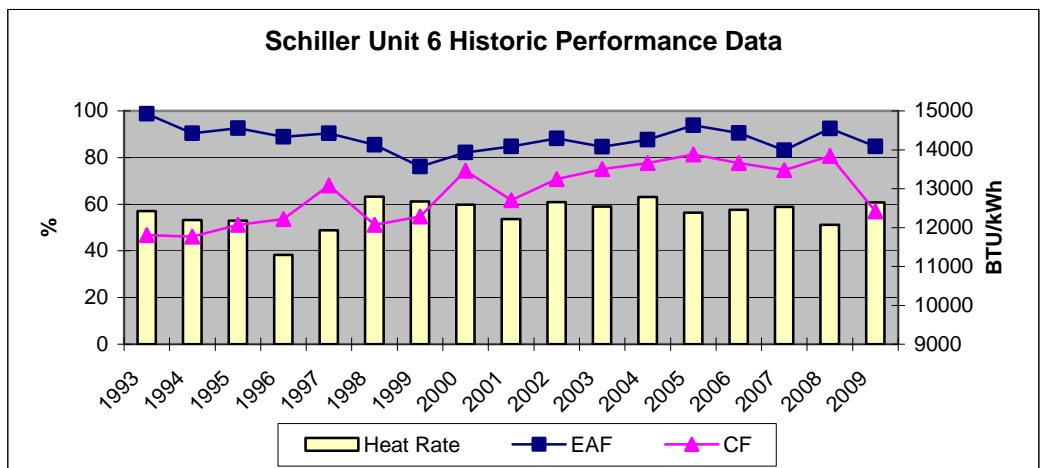
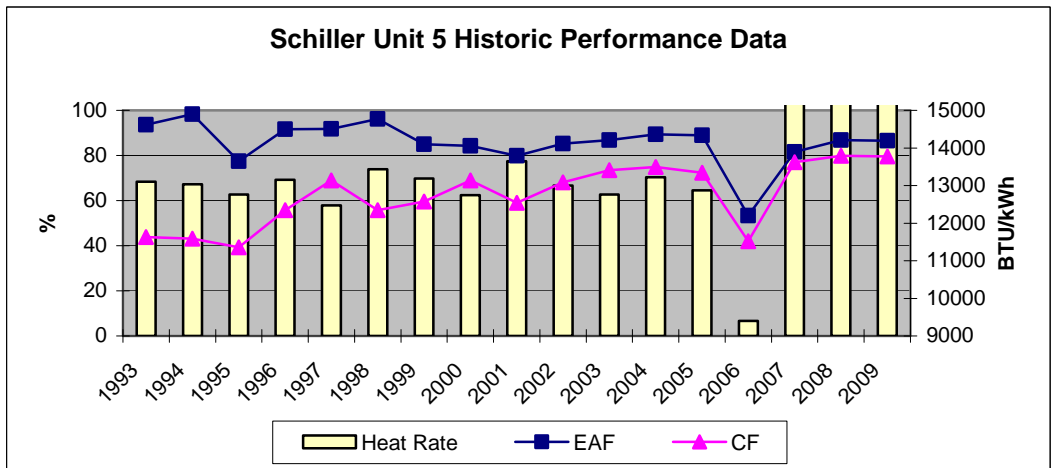
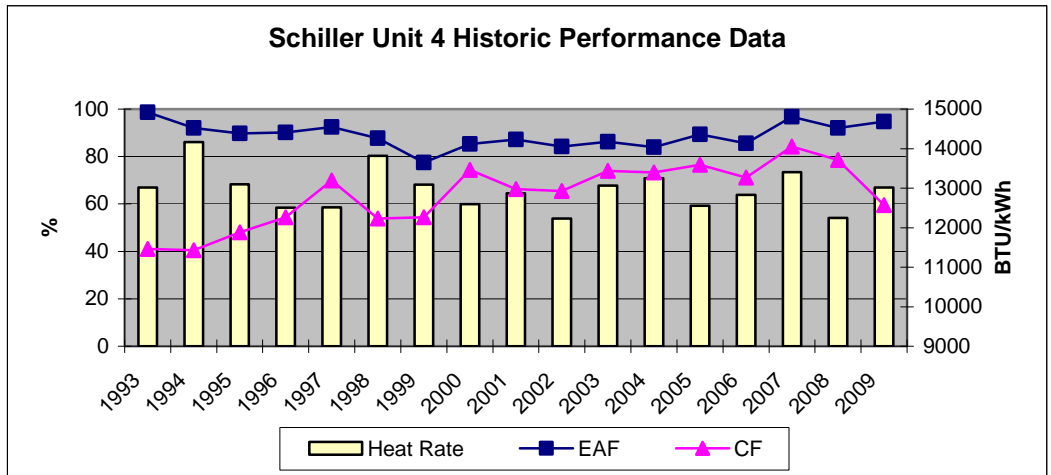
PSNH FOSSIL SYSTEM WEIGHTED EAF
2009



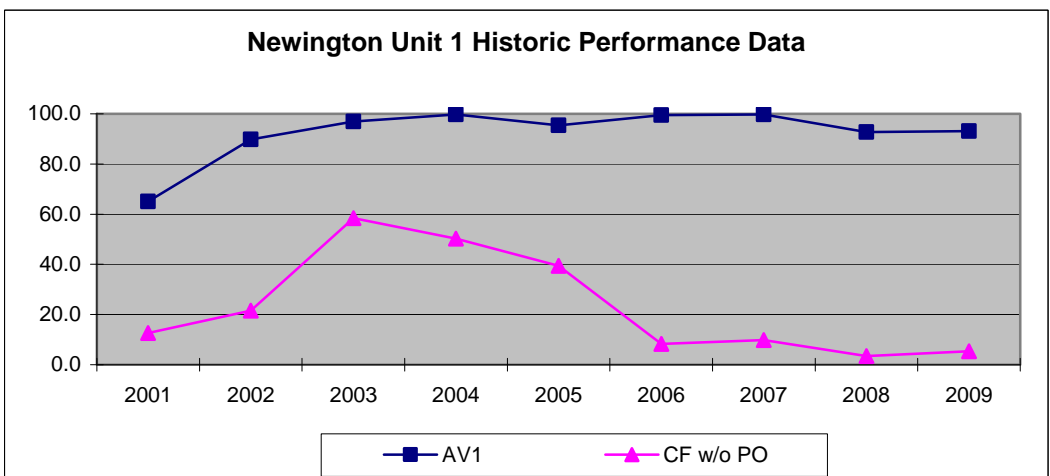
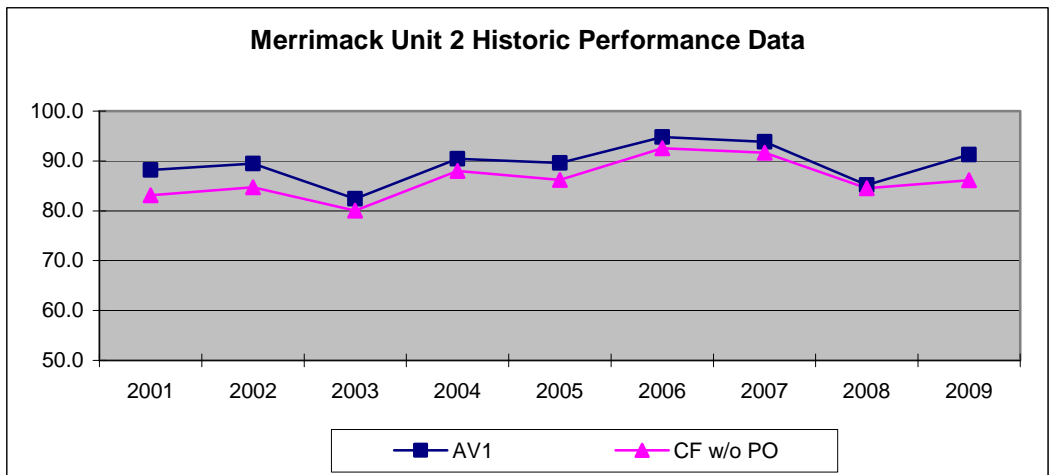
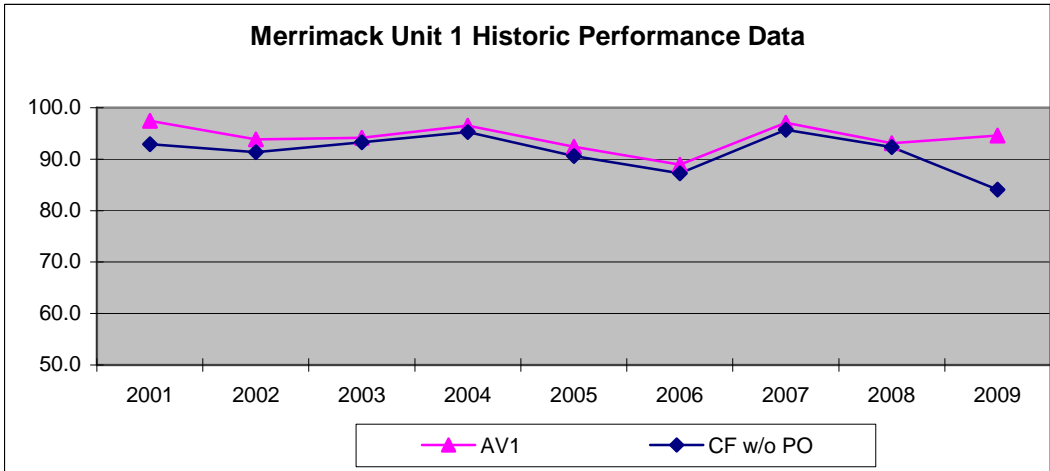
Steam Plant Graphs – Planned outages included



Steam Plant Graphs – Planned outages included



Steam Plant Graphs – Planned outages omitted



DE 10-121

Exhibit No. <u>3</u>
Witness _____
DO _____ FILE

Docket No. DE 10-XXX
Exhibit No. 3

STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
RECONCILIATION OF ENERGY SERVICE AND STRANDED COSTS FOR
CALENDAR YEAR 2009

DIRECT TESTIMONY OF
WILLIAM H. SMAGULA

1 **I. Introduction**

2 Q. Please state your name, position, employer and address.

3 A. My name is William H. Smagula. I am Director of Generation for Public Service
4 Company of New Hampshire, (PSNH), a subsidiary of Northeast Utilities (NU).
5 My business address is 780 North Commercial Street, P.O. Box 330, Manchester,
6 New Hampshire 03105.

7 Q. Please provide a brief summary of your background.

8 A. I received a Bachelor of Science in Mechanical Engineering from the University
9 of New Hampshire and a Master of Science in Mechanical Engineering from
10 Northeastern University. I have worked for Public Service Company of New
11 Hampshire and then Northeast Utilities since 1978. I am a Registered Professional
12 Engineer in the states of New Hampshire, Connecticut and Massachusetts. My
13 duties have included Manager of Generation Training for the PSNH system,
14 Station Manager - Merrimack Station, Steam Production Manager - PSNH,
15 Director Fossil Generation - The Connecticut Light and Power Company, and
16 Director, Manage and Operate Services - Northeast Generation Services Company.
17 In June 2001, I assumed the responsibilities of Director - PSNH Generation in
18 New Hampshire.