Docket No. DE - 08 - XXX
Exhibit No. X

STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION
DIRECT TESTIMONY OF
WILLIAM H. SMAGULA

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
RECONCILIATION OF ENERGY SERVICE AND STRANDED COSTS FOR 2007

I. Introduction

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

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

Q. Please provide a brief summary of your background.

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

Q. Have you ever testified before this Commission?

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

Q. Please describe your responsibilities as Director PSNH Generation.

A. In my present position, as Director - PSNH Generation, I am responsible for the operation and maintenance of PSNH's generating stations. I have responsibility for three fossil-fired, steam electric generating stations, nine hydroelectric generating stations, two remote combustion turbine/diesel generator sites, and a new biomass unit. Generation maintains a diversified fuel portfolio including fossil, hydro and renewable biomass with a total generation capacity of approximately 1150 MW.

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

A. The purpose of my testimony is to provide information on all outages that took place at PSNH's fossil-fired, biomass-fired, and hydroelectric units and at FPL Energy's Wyman Station, Unit No. 4 in which PSNH is a minority owner. This information will be for the period January 1, 2007 through December 31, 2007. I shall also provide information on unit equivalent availability achieved by PSNH's fossil units, consistent with reporting provided in previous years. Again as requested in SCRC Docket 06-068, availability including planned outages will be calculated consistent with past submittals, as well as similar calculations without the influence of planned outages.

II. <u>Generating Unit Operation</u>

Q. Please provide an overview of the performance of PSNH's generating units in 2007.

A. PSNH's generating units provided total generation in 2007 equal to 4,890,326 MWh. The fleet's availability was 99.25% during the 30 highest-priced days, when customers' exposure to high market prices was the greatest.
The base load units, Merrimack Unit Nos. 1 and 2 and Schiller Unit Nos. 4, 5, and 6, had a base load capacity factor of 84.5%, which was 6% higher than PSNH had modeled in the Default Energy Service calculations. Merrimack Station had its highest annual generation in its 47-year history with a total generation of 3,283,470 MWh. Merrimack Unit No. 1 contributed to the station's success with a 97% availability factor resulting in its highest annual generation, producing 953,179 MWh. Merrimack Unit No.1 had no unplanned outages in 2007. Merrimack Unit No. 2 had its third-highest annual generation in its 38-year history, producing 2,330,291 MWh, which included two top-ten longest runs. Schiller Station generated 969,969 MWh, the second highest annual generation in its 50-year history, and operated its new biomass-fueled boiler for its first full year. Contributing to the fleet's renewable energy production, Schiller Unit No. 5 generated 302,359 MWh and the PSNH hydro facilities generated 335,881 MWh. Newington Station completed the year with a 95.7% equivalent availability factor and modified its operation throughout the year to maximize value to customers.

PSNH's generation fleet operated well in 2007 with its Generation team focusing on plant maintenance, operations, and long-term planning to provide benefit to customers through reliable, compliant, and cost-effective operations and management.

Q. Please provide a summary of why the PSNH generating units have continued to operate exceptionally well, with high reliability and high availability?

A. The Generation management team continues to focus on four key items important to long-term operational success: day-in and day-out operation and maintenance of the units; corrective and preventative maintenance and maintenance conducted during forced outages; pre-planning and execution of planned maintenance

outages; and the use of a long-term (5- and 10-year) maintenance and capital expenditure planning process. The long-term maintenance plans prioritize equipment maintenance and replacements to sustain reliable plant operations and are founded on equipment history and ongoing condition assessment. The generating stations maintain a long-standing preventative maintenance program which allows for continuous improvement and proactive management of plant equipment problems to best execute quality maintenance and operation of the units.

The PSNH Generation group relies on an experienced management team and a skilled work force utilizing best practices derived from experience within our facilities as well as working with suppliers, contractors, experts and other generating plant peers in the industry. The PSNH Generation budgets continue to emphasize a proper balance between necessary spending in the most critical areas and being sensitive to the overall cost of production to our customers through the Energy Service rate, both long-term and short-term. The PSNH Generation group works hard to ensure that larger maintenance projects are most effectively executed and that capital investments are best applied to achieve high levels of plant performance. The PSNH Generation group also gives extensive consideration to current and emerging environmental rules and regulations, which continue to challenge the electric utility industry, and looks for opportunities to cost-effectively manage environmental impacts at each of the facilities.

Finally, PSNH Generation continues to integrate into the above management focus consideration of recent recommendations by Liberty Consulting including the areas of contractor control, on-line maintenance, replacement parts inventory, and redundant equipment to shorten forced outage time. Consistent with the above, PSNH Generation continues to develop initiatives in the areas of

- sharing information between stations regarding operational errors and station improvements,

- creating a process that will be used to address distribution and transmission groups' equipment and actions which impact generation, and
- root cause analysis to evaluate unplanned outages at major generating stations.

III. Unit Outages and Availabilities

Q. Please provide a list of all unplanned outages that took place during the period January 1, 2007 through December 31, 2007 for PSNH's fossil and hydro units as well as for FPL Energy's Wyman Station Unit No. 4.

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

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

A. Yes. PSNH provides outage reports for all unscheduled outages in excess of two days at Newington Station, two days for either of the two units at Merrimack Station, four days for any of the three units at Schiller Station, and four days at Wyman Station Unit No. 4. These Outage Reports are included as Attachment WHS-2. In 2007, Merrimack Unit No.1 completed three planned air heater wash outages in excess of two days and had no forced outages. Newington Station did not incur any outages at or above the four-day threshold. Finally, as recommended and agreed to in Docket DE 07-057, brief summaries of a subset of hydro outages caused by transmission, distribution or protective relay events are also included in Attachment WHS-2.

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

A. The table below provides , in chronological order, the Outage Report number, unit affected, date and time removed from service, date and time returned to service, total outage duration, and cause of outage.

Report No.	Unit	Off-line		On-line		Duration	Cause
		Time	Date	Time	Date		
OR-2007-1	Schiller 5	0442	01/02	0830	01/13	11.15 days	Boiler – vortex finder failure
OR-2007-2	Merrimack 2	0740	02/09	0004	02/13	3.68 days	Superheater tube leak
OR-2007-3	Schiller 5	1640	02/09	1250	02/16	6.84 days	Boiler – bed agglomeration
OR-2007-4	Merrimack 1	1621	03/22	0518	03/26	3.54 days	Planned maintenance
OR-2007-5	Schiller 4	1014	03/26	1904	03/30	4.36 days	Superheater tube leak
OR-2007-6	Schiller 6	1410	04/29	0130	05/07	7.47 days	Generation tube leak
OR-2007-7	Merrimack 2	1707	05/29	1922	06/01	3.09 days	Economizer tube leak
OR-2007-8	Merrimack 1	1723	06/22	0334	06/25	2.42 days	Planned maintenance
OR-2007-9	Schiller 5	2117	06/22	1335	06/29	6.67 days	Planned maintenance
OR-2007-10	Schiller 5	1251	09/03	1015	09/08	4.89 days	Boiler – bed agglomeration
OR-2007-11	Merrimack 1	1619	09/20	0144	09/24	3.39 days	Planned maintenance
OR-2007-12	Merrimack 2	1620	09/24	2153	10/04	10.23 days	Planned maintenance/ feedwater flow nozzle failure

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

A. A summary of the Outage Reports follows:

OR-2007-01

This Schiller Unit No. 5 outage was 11.15 days in duration and began on January 2. The unit came off-line when the average temperature of the furnace bed material was sufficiently low to trip the master fuel switch. A boiler inspection found that the vortex finders in Cyclones 1 and 5 had broken at the welded support flanges and fallen to the conical section of the cyclones. This internal element dislodgement, combined with ash accumulation and pluggage, caused an initial increase in furnace temperature that led to a loss of furnace bed fluidization. This, in turn, caused the furnace to cool and the bed sand to form into lumps (agglomeration), causing additional lack of combustion uniformity and resulting in

furnace cooling until the low temperature trip set point for the furnace was reached. The welds attaching the vortex finders to Cyclones 2, 3, 4, and 6 were also degraded. All vortex finders were removed and the ring flanges on all six cyclones were removed. The ring flange material was either repaired or replaced. All weld areas were inspected and either repaired or totally ground out and rewelded. The vortex finders were reinstalled in the cyclones. Other corrective and preventive work activities were completed and the unit was returned to service on January 13.

OR-2007-02

This Merrimack Unit No. 2 outage was 3.68 days in duration and started on February 9. The unit was removed from service due to a secondary superheater tube leak. The leak was found on an exterior tube in the secondary superheater inlet pendant. The failed tube was bent and severed. Adjacent tubes were damaged by the failed tube and also had to be repaired. The repairs required the erection of staging and scaffolding for safe access. A total of 64 feet of tube, including two new lower bends and six welds, were removed and replaced. The unit was returned to service on February 13.

The cause of the initial tube failure was coal ash corrosion. Because there had been other secondary superheater tube failures in recent years caused by coal ash corrosion, Merrimack Station management had completed targeted inspections and testing during the 2006 and 2007 overhauls and scheduled replacement of this area of the boiler for the spring 2008 planned overhaul.

OR-2007-03

This Schiller Unit No. 5 outage was 6.84 days in duration and began on February 9. The unit came off-line due to low furnace temperature resulting in a master fuel trip. The unit had experienced erratic furnace bed temperatures over the prior few days. It is suspected that a loss of wood feed condition on February 4 on one side

of the furnace resulted in low furnace temperatures, causing a crust to develop on the bed. This period of low furnace temperature led to a master fuel trip. Because residual heat of the boiler was sufficient to supply steam to the generator for a period of time, the unit was initially kept on-line. After attempts to break up the crust were unsuccessful, however, station management decided to take the unit off-line to avoid potential damage to the unit.

Low furnace temperatures had allowed the bed material to agglomerate, requiring a number of days to remove bed material from the boiler. The boiler inspection found that two of the six cyclones were plugged with ash and required vacuuming. Once the bed sand was replaced and the cyclone vacuuming and repairs were completed, the unit began its start-up activities. During the process, a cyclone plugged which required the bed material to be removed again. The plugged cyclone was cleared and the other five cyclones were inspected and found to be clear. Bed material was replaced and the unit returned to service on February 16.

OR-2007-04

Merrimack Unit No. 1 was taken off-line on March 22 for preventative maintenance after 107 days of continuous operation that spanned the entire winter period. This outage lasted 3.54 days. There were multiple factors for removing the unit from service at this time. First, it was a relatively low-demand period. In addition, a large number of maintenance items that required a shutdown for completion had been identified during the long run. Completion of this work would increase confidence in the ability of Unit 1 to operate through Unit 2's annual overhaul in April. During the outage, numerous preventative and corrective maintenance items were completed including water washing of the 1A and 1B air heaters, which is required every 3 to 4 months of operation. The unit was returned to service on March 26.

OR-2007-05

This Schiller Unit No. 4 outage was 4.36 days in duration and began on March 26. The unit was taken off-line due to excessive water usage resulting from a superheater tube leak. The boiler was filled to detect the leak, which was located in the first pendant of the superheater. The cause of the leak was coal ash corrosion. The repair was made with a pad weld. To identify any additional leaks, a hydro test of the boiler was completed following the repair. Another small leak was found in the superheater section on an existing pad weld. A pad weld repair was completed and the boiler was refilled to check for any additional leaks. A small leak was identified at a lower level in the furnace area. After this leak was pad welded, a final hydro test was completed and the plant was brought on-line on March 30.

OR-2007-06

This Schiller Unit No. 6 outage was 7.47 days in duration and began on April 29. The unit was taken off-line due to excessive water usage resulting from tube leaks in the steam drum area. An inspection was completed. Wet refractory at the bottom of the steam drum indicated that some of the joints between the generation tubes and the steam drum penetrations were leaking. Boilermakers re-rolled 24 tubes. A hydro test was initiated to locate any additional leaks. A small leak was discovered in a generation tube weld. Operators stopped the hydro test and drained the boiler below the level of the leak. The tube was repaired and the hydro test was continued. This hydro test indicated new generation tube roll leaks.

The manufacturer of the tube rolling equipment was brought on-site to confirm that the tube rolling equipment was sized and being used correctly. Once this was confirmed, all 240 generation tube joints at the steam drum penetrations were rolled twice and extra measurements taken to ensure that the rolls were correct. A boiler hydro was completed to determine if other tube joint rolls were leaking. Additional leaks were found at the screen tube and roof tube rolled joints on the

steam drum. These tubes were re-rolled and the hydro test was successfully completed. The unit was returned to service on May 7.

OR-2007-07

This Merrimack Unit No. 2 outage was 3.09 days in duration and started on May 29. The unit was taken off-line due to excessive water usage resulting from an economizer tube leak. The boiler inspection found three leaks in the economizer. An original weld on a top tube had eroded as a result of coal ash corrosion and caused subsequent damage to five other tubes below it. Three repairs were made with Dutchmen and three with pad welds. The boiler pressure check was successful and the unit was brought back on-line on June 1.

The economizer sections are original plant equipment and are 39 years old. Recognizing the potential for leakage due to age and susceptibility to coal ash corrosion, the station has been conducting enhanced inspection and testing of the economizer during each overhaul since 2006.

OR-2007-08

Merrimack Unit No. 1 was removed from service on June 22 to conduct preventative maintenance after an 89-day run. The need for an air heater wash was apparent, based on pressure drop increase and time on-line. To avoid outages during the high-demand summer period, ISO-NE was contacted and a weekend outage planned with the unit being removed Friday evening. This maintenance outage lasted 2.42 days. A considerable number of maintenance items on the outage back log list were completed. Water washing of the 1A and 1B air heaters, as typically required every three to four months of operation, governed the outage's critical path. This maintenance outage was intended to enable the unit to run successfully through the upcoming summer peak period. The unit was returned to service on June 25.

OR-2007-09

This Schiller Unit No. 5 outage was 6.67 days in duration and began on June 22. This maintenance outage was coordinated with ISO-NE to complete a number of boiler maintenance items which had been identified over a six-to-eight-week period. The new boiler had experienced periodic high cyclone temperatures as well as air and fuel swings which were limiting the firing capability and often causing reductions in boiler steam output. PSNH, along with the boiler manufacturer, Alstom, had completed a number of on-line efforts to resolve the operational constraints by modifying boiler control system logic. These adjustments resulted in boiler performance improvements. However, during the outage a number of additional activities were conducted to further improve performance of the unit, including inspecting the primary air system, cleaning the tuyeres, replacing the bed material, and cleaning and inspecting the cyclones. Other corrective and maintenance activities were completed and the unit was returned to service on June 29.

OR-2007-10

This Schiller Unit No. 5 outage was 4.89 days in duration and began on September 3. The unit was removed from service due to an agglomeration of the bed material which significantly impacted boiler performance. The station had been monitoring high circulating water discharge temperatures for a couple of weeks. To improve the water discharge temperature, a water box cleaning was planned for September 2. During a water box cleaning, one half of the condenser is isolated which requires steam flow and load to be reduced, which further requires operators to reduce fuel input and remove bed material from the boiler. While bringing the plant through this transition, operators also monitor air flow differential pressure (DP) across the furnace bed in order to ensure that the appropriate bed temperature for the plant condition is maintained. Cleaning one half of the water boxes at a time is not uncommon at Schiller Station, but brand new when being done in

conjunction with operation of the new wood boiler and its significantly different operational characteristics.

During the transition, the boiler began to experience temperature and pressure swings. Though the boiler was stabilized, indications were that bed material problems had developed. A number of on-line solutions to correct bed material consistency were attempted. However, it was determined that the unit should be brought off-line to correct the problem.

The boiler was inspected. The bed material had enough agglomeration to necessitate removal by manually vacuuming the tuyere area. It took approximately four days to replace the estimated 100 tons of bed material in the furnace. A number of other inspections and repairs were performed while the unit was off-line to maximize unit performance and operations. Once complete, the unit was returned to service on September 8.

OR-2007-11

Merrimack Unit No. 1 was taken off-line on September 20 for 3.39 days to perform preventative maintenance following an 81-day run through the summer peak period. Water washing of the 1A and 1B air heaters was required and dictated the critical path. A boiler inspection was completed. Work activities that had accumulated on the maintenance outage back log list were completed. After completion of this maintenance outage and its return to service on September 24, the unit ran continuously for the remainder of the year.

OR-2007-12

This Merrimack Unit No. 2 outage was 10.2 days in duration. The unit initially came off-line on September 24 for planned maintenance after operating for 113 consecutive days through the summer peak load period. A number of maintenance activities had accumulated on the outage backlog list after an extensive run of

nearly 4 months. A boiler inspection was completed, a number of routine inspections and cleanings were completed, and a number of other repair activities were performed.

During startup from the maintenance outage on September 28, operators observed that feedwater flow was not consistent with other plant parameters. This feedwater flow information and signal is a critical operational parameter that must be available for unit operation. The start-up was stopped to investigate the problem. A boroscope examination revealed that the feedwater flow nozzle, located inside the feedwater line, had become detached. The flow nozzle is the sensing device from which the flow measurement is calculated. The repair consisted of removing about 14 feet of the heavy-walled feedwater line and then repairing and re-welding the nozzle to the inside of the feedwater line section. The repaired nozzle, attached to the feedwater line section, then was shipped to Alden Laboratories in Massachusetts for calibration. When the flow nozzle/pipe assembly returned, the heavy-walled feedwater pipe section was welded back in place, radiographically inspected, and stress relieved. In parallel with this repair, a spare flow nozzle was ordered, and a new one was manufactured by the station's machine shop as part of a contingency plan. As a result of this incident, a program to inspect and replace other flow nozzles throughout the system was implemented. The unit returned to service on October 4.

Q. Do you have any additional reporting requirements associated with this submittal?

A. Yes. PSNH Generation completed and submits herein an assessment of the Merrimack Unit No. 1 scheduled overhaul frequency as discussed in the Liberty Auditing consultant's testimony and summarized in the settlement agreement. The report is included in attachment WHS-4 of this testimony.

Q. Does this conclude your testimony?

A. Yes, it does.