STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION

DOCKET NO. DE 09-091

IN THE MATTER OF:
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, INC.
2008 ENERGY SERVICE AND STRANDED COST RECOVERY CHARGE RECONCILIATION

DIRECT TESTIMONY

OF

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SENIOR CONSULTANT
FOR
THE LIBERTY CONSULTING GROUP

OCTOBER 19, 2009

Q. Mr. Cannata, please state your full name.

A. My name is Michael D. Cannata, Jr.

Q. Please state your employer and your business address?

A. I am employed by Innovative Alternatives, Incorporated (IAI) and am engaged by The Liberty Consulting Group (Liberty) to address the issues raised in this proceeding. My business address is 65A Ridge Road, Deerfield, New Hampshire 03037.

Q. In what capacity are you employed?

A. I am a principal with IAI and in that role I am generally responsible for the review of energy utility engineering and operations management, practices, and procedures.

Q. Please describe your educational background, work experience, and major accomplishments of your professional career?

A. My educational background, work experience, and major career accomplishments are contained in Exhibit MDC-1.

Q. To what professional organizations or industry groups do you belong or have you belonged?

A. I am a member of the Institute of Electrical and Electronic Engineers and its Power Engineering Society, and am a Registered Professional Engineer in the State of New Hampshire (#5618). I served as a member of virtually all of the former New England

Power Pool (NEPOOL) Task Forces and Committees except for their Executive Committee where my role was supportive to an Executive Committee member. I also served as a member of the New England/Hydro Quebec DC Interconnection Task Force and the Hydro Quebec Phase Two Advisory Committee. These two groups designed the Hydro Quebec Phase One and Phase Two 450kV DC interconnections with New England. The various committees and groups that I have served on existed to address the functions now being performed by the Independent System Operator – New England (ISO-NE).

On national issues, I represented Public Service Company of New Hampshire (PSNH) at the Northeast Power Coordinating Council as its Joint Coordinating Committee member, at the Edison Electric Institute as its System Planning Committee member, and at the Electric Power Research Institute as a member of the Power Systems Planning and Operations Task Force.

While in the employ of the State of New Hampshire, I sat as a full member of the New Hampshire Site Evaluation Committee responsible for siting major energy facilities (generating stations, gas transmission lines, electric transmission lines, and gas storage facilities). At the request of the New Hampshire Public Utilities Commission's (NHPUC or Commission) Chairman, I sat on the State Emergency Response Commission. I was also a member of the former Staff Subcommittee on Engineering of the National Association of Regulatory Utility Commissioners.

Q. Have you testified before regulatory bodies before?

A. I have testified before the NHPUC in rate-case, condemnation, least-cost-planning, fuel-adjustment, electric industry restructuring, unit outage reviews, and other proceedings, the Kentucky Public Service Commission and the Maine Public Utilities Commission in transmission siting proceedings, and have submitted testimony at proceedings at the Federal Energy Regulatory Commission (FERC). I have also testified at the request of the Commission before Committees of the New Hampshire Legislature on a variety of matters concerning regulated utilities.

Q. Please describe the areas that your testimony addresses today.

A. My testimony addresses four areas. Liberty was requested to review (1) the market-based capacity/energy planning performed by PSNH during 2008 that augmented its own generation to supply Energy Service to PSNH customers, (2) the outages that occurred at all PSNH generating units during 2008, (3) additional recommendations that have surfaced as a result of my investigation of unit outages and (4) the review of PSNH's efforts to address the eight additional recommendations contained in Section IV.c of the Stipulation and Settlement Agreement in Docket 08-066. I also express my views regarding the availability and capacity factors of PSNH generating units for 2008, the value of Newington Station to customers, and the adequacy of future capital and O&M expenditures for sound plant operations.

This testimony addresses the review areas either through the questions and answers presented below or through a series of individual reports, which are attached to my testimony and are organized as follows.

Capacity/Energy Planning:

Exhibit MDC-2, 2008 Capacity/Energy Planning.

Generating Unit Outages:

Exhibit MDC-3, Merrimack Outages For 2008

Exhibit MDC-3A – Liberty Assessment of Economics of the Merrimack Unit 2 HP/IP Turbine Replacement in 2008

Exhibit MDC-4, Newington Outages For 2008

Exhibit MDC-5, Schiller Unit Outages For 2008

Exhibit MDC-6, Hydroelectric Unit Outages For 2008

Exhibit MDC-7, Combustion Turbine Outages For 2008

Exhibit MDC-8, W. F. Wyman Outages for 2008

Q. Please summarize your capacity and energy planning testimony.

A. With regard to capacity and energy planning, Liberty concluded that the PSNH filing is an accurate representation of the capacity and energy purchasing process that took place in 2008, and that PSNH made sound management decisions with regard to its capacity and energy purchases in a market environment. Liberty reviewed the capacity and energy testimony filed by PSNH, conducted an on-site interview with knowledgeable personnel responsible for the capacity and energy planning function at PSNH, requested follow-up information, and reviewed detailed, backup information

of the summary results supplied by PSNH. Liberty also concluded that the capacity factor projections for PSNH units used for 2008 market purchases were reasonable and included ongoing discussions with generating plant personnel. Liberty also confirmed that PSNH did model changes in unit maintenance scheduling reflecting short, planned reliability outages in 2008 as agreed to in a previous proceeding. Liberty also concluded that customer migration introduced volatility into planning future PSNH customer energy service needs because of the difficulty in planning purchases for unknown customer decisions.

Q. Do you have recommendations regarding capacity and energy planning issues?

A. No. PSNH used the same supplemental energy purchase philosophy in 2008 as it did in 2007. PSNH chose to keep this approach to market supplemental purchases in order to minimize risks due to customer migration and market price.

Q. Please state the results of your review of the PSNH unit outages that occurred during 2008.

A. With regard to planned and forced unit outages, Liberty found that the base load units on the PSNH system ran well in 2008. In fact, PSNH units generally performed as well or better than forecasted. Such output is of note because, over time, unit operation has become more complicated, or unit output has been reduced by increased safety requirements dealing with confined spaces, with the addition of spray modules in the outlet canal at Merrimack, with the reduction of the operating level of Unit 2 at Merrimack to reduce the likelihood of full load trips to maintain the unit's

reliability, with the installation of supplemental electrostatic precipitators and SCRs on both units at Merrimack, and the use of low sulfur coal to comply with state and federal environmental regulations.

Liberty reviewed outage information, conducted on-site interviews, and submitted follow-up requests for information as necessary. In each instance except those noted below, Liberty found the outages to be reasonable and not unexpected for the particular unit, its vintage, or the outage was necessary for proper operation of the unit. Liberty also concluded that PSNH conducted proper planning and management oversight regarding these planned and forced unit outages. Liberty also has recommendations from its review of unit outages that it believes will improve the operation of PSNH's generating units.

Q. Which outages did you find unreasonable?

A. The first outage that Liberty believes to be unreasonable is associated with Newington Outage 1-C on 3/14/08 as identified in Exhibit MDC–4. This outage occurred when the upgraded turbine control system required adjustments to be made exactly at 3600 rpm. Tuning of the speed control was performed and the unit ramped to full load but was cycled off line in the evening due to economics. This outage was taken the next day to make those turbine control system adjustments, the time was expected, and had been included in the outage schedule to do so.

The unit was operating at 3600 rpm and de-energized when the closed cooling water plunger seat cracked in the solenoid valve that prevented cooling water from flowing to the two exciter coolers. As a result, the air temperature of the exciter began to rise. An alarm came into the unit operator when the exciter temperature reached 110 degrees F. This alarm, a high cool air alarm, is a warning alarm, and when reached, procedures require that the operator investigate its cause. A duplicate alarm came in approximately 2 ½ minutes later. No investigation to the cause of the alarms was made. Subsequent to the first alarms and 24 minutes later, a second alarm came into the control room. This alarm occurs when the exciter temperature reaches 170 degrees F, is called a high hot air temperature alarm, and when reached, procedures state that the operator is required to investigate/validate and/or shut the unit down. A duplicate alarm came in approximately nine minutes later. The operator acknowledged all four alarms as a group to clear the alarm screen. The operator failed to investigate the alarms and convinced himself that these alarms were not consistent with a de-energized unit. The operator therefore did not initiate a unit shut down. Due to these operator actions/inactions, the exciter was damaged.

Liberty recommends a disallowance for the replacement power costs associated with this outage as the PSNH operator should have followed established procedures rather than rationalize alternative actions. Temperature, flow, and pressure alarms are some of the most important alarms to occur in a generating station. In addition and simplistically, temperature alarms originate from temperature probes that report temperatures independent of the operational status of the unit. Liberty does not

recommend disallowance of net capital costs or net O&M costs associated with this outage due to the complexities of valuing plant in service beyond its book service life and other material facts such as insurance etc. Upon investigation of the incident and to address contributing factors, PSNH has re-emphasized the requirement to follow established procedures and monitor alarms, is continuing training start up exercises every two weeks at Newington (a program initiated just prior to this incident), initiated a comprehensive review of alarm management practices, and disciplined the operator on duty at the time. The specific incident at Newington and these lessons learned programs such as alarm management are also being emphasized at Merrimack and Schiller stations.

Although Liberty recommends disallowance for replacement power costs for this outage, Liberty commends the operator involved and PSNH for developing a culture at the generating stations in which the operators and other personnel feel comfortable in stepping forward and taking responsibility for their actions. Such a culture can do nothing but improve plant performance.

The second outage is Outage Newington 1-D that occurred on 4/10/08, is related to the damaged exciter noted above, and is identified in Exhibit MDC-4. When returning to service from the installation of the Siemens' spare exciter rotor, balancing was required when the unit was phased. This outage was taken to accomplish that balancing. The rotor was balanced in the shop, but shop balancing does not exactly match field conditions. The rotor was balanced and the unit returned to service.

Liberty recommends a disallowance for the replacement power costs of this outage as the outage would not have been required but for the improper operator actions described in Outage C above.

The next outage is Outage Garvins 4-D which occurred on 12/28/08 as identified in Exhibit MDC-6. A low oil alarm for the lower guide bearing was received by the dispatcher. When a station operator arrived he found that the oil pump was not returning oil from the bearing sump to the bearing reservoir fast enough. The unit was immediately taken off line. Investigation found that the oil return line was being restricted by a kink in the line. The line was replaced and the unit returned to service.

A kink in the oil return line has to occur from human handling during normal cleaning operations or other work related to the return lube oil system. When dismantling and reassembling the oil return line, it must be moved to allow line up of the connections. Liberty believes that an operator did not exercise due care during one of these operations. Further, the operator should have known the oil line was kinked, should have known that oil flow could be restricted to the reservoir, and should have either replaced the line immediately or as soon as possible. Liberty recommends disallowance of replacement power costs for this outage. Liberty also recommends that PSNH review its procedures when a low oil alarm is received by the dispatcher because the dispatcher is unable to determine if low oil is no oil. Allowing the unit to run until an operator arrives may cause unnecessary damage.

The next outage is Outage Jackman 1-E which occurred on 5/5/08 as identified in Exhibit MDC-6. During the upgrade of the transmission side of the substation, a transmission contractor's excavator boom contacted the generator output cables that connect to the generator step up transformer. The contact resulted in the failure of the generator step up transformer. No injuries were reported. Inspection revealed that no other equipment was damaged during the incident. The outage was required to allow time to bring in a mobile transformer replacement. The mobile transformer only allowed operation of the unit up to 2.2 MWs which is lower than the unit's capability.

The contractor had swapped out the smaller machine being used in the grading of the substation. PSNH specifically instructed the contractor not to use the larger machine inside the substation, but when the PSNH inspector left, the larger machine was brought into the substation to perform the remaining work tasks. The incident occurred even though the contractor had a ground spotter who was determined to be "inattentive" at the time of the incident.

The contractor has accepted total responsibility for the incident and PSNH is pursuing financial compensation including replacement power costs.

For the contractor to directly ignore PSNH instructions indicates a significant weakness in the understanding between PSNH and contractors working in PSNH substations and the authority of the contractor to change PSNH instructions. Liberty

also notes that PSNH supervision was heavily concentrated at the Mammoth Road TB-73 transformer upgrade project at the time of this incident. Liberty recommends disallowance of replacement power costs for this outage and that PSNH require that contractors comply with PSNH inspector specifically stated instructions.

The next outage is Outage Jackman 1-H which occurred on 11/6/08 as identified in Exhibit MDC-6. The unit tripped off line while a transmission contractor was performing relay and control work in the substation. Investigation found that circulating current of approximately 1 amp was flowing in the CT residual circuit (CT circuit shorted and bus de-energized condition) and was sufficient enough to initiate the trip. A potential of 0.19 volts existed between the point of grounding of the relay ground and the relay cabinet. The unit was returned to service. Further work included the installation of new 4/0 ground conductors between the old control house and the new 115 kV control house to reduce the potential difference between them.

When doing incremental projects in old substations, grounding configuration, adequacy, and location may not be fully known. A ground potential check should be done to ensure proper grounding between the existing and new work. A ground potential check was not part of this project and Liberty recommends disallowance of replacement power costs for this outage.

The next outage is Outage Jackman 1-I which occurred on 12/2/08 as identified in Exhibit MDC-6. The unit tripped when transmission contractors working in the

substation caused the auxiliary breaker on the mobile 34.5 kV substation to operate and in turn caused the trip of the unit. During the removal of the front access panel in the distribution control room, a breaker for the mobile substation popped out of place. This panel is similar to the breaker panel a residential homeowner has in the basement. A white caution tag had been installed on the panel indicating that operation of this breaker would trip the unit. When the face panel was removed, the breaker was activated and the unit tripped. The breaker was reset and the unit returned to service.

In recent years, there has been numerous transmission contractor related outages at hydro stations and many of them appear due to speed of work and therefore lack of due care. In this case, the breaker could not have tripped unless it was bumped during a hasty removal of the panel cover or the white tag became entangled in the panel cover upon removal. In either case, due care was not exercised. There appears to be a weakness in the PSNH/contractor relationship on the expectation of due care to be exercised when in PSNH substations. Liberty recommends disallowance of replacement power costs for this outage and that PSNH revise its contractor relationships so that it is clear that PSNH instructions must be followed otherwise contractual penalties will be imposed.

The next outage is Outage Schiller CT-1-A which occurred on 1/17/08 as identified in Exhibit MDC-7. The unit failed to start when called on by the ISO. Low air pressure "maxed out" the pressure speed timer. The air compressor was undergoing repairs in

Germany and air pressure was taken from Schiller Station to start the unit. To increase efficiencies and reduce losses, the air pressure at Schiller was reduced to 250 pounds from 500 pounds which is insufficient to start the unit. The time/speed setting was increased to allow more time to bring the unit up to required speed before it caused alarms to go off. Schiller Station set up a team to evaluate this unit including maintenance practices and problems occurring at this unit. PSNH notes that the recommendations of this team were implemented in 2009.

This outage occurred for reasons identical to the outage described in the review of the 2007 SCRC (Outage Schiller CT-1-H on 12/13). Liberty recommends that the replacement power relative to this outage be disallowed. The decision to reduce air pressure at Schiller either had no review or a review at such a level that the combustion turbine was not considered. Even a cursory review should have raised the question of adequate air pressure for starting the combustion turbine. In any case, the occurrence of the identical outage one month later should have received a PSNH response including the lessons learned from the previous outage.

The last outage that Liberty finds unreasonable is Outage Schiller CT-1-B which occurred on 3/3/08 as identified in Exhibit MDC-7. The unit was scheduled for its annual inspection starting 3/8 with the ISO (effectively 3/10 for normal work days). The unit was mistakenly taken out of service a week early while the Schiller Station was in an outage for Unit #5. While reassembling the unit, the replacement of a damaged igniter extended the outage. The igniter was damaged during reassembly of

the unit when a shroud for the hot side of the burner cans was slid back over the igniter section of the combustion turbine to allow access to the burners cans. The exciters are somewhat delicate and located in close proximity to the shrouds. This type of damage has not been common over the almost 40-year life of the unit. Liberty views this incident as accidental. Once reassembled, the unit was returned to service. To prevent reoccurrence of taking the unit out on the wrong date, PSNH reviewed week beginning and week ending calendars as used by the ISO with maintenance personnel.

The time for the outage and outage extension above were 0.65 days and 0.78 days respectively. Liberty recommends that the replacement power relative to the early removal of the unit (0.65 days) be disallowed. Removal of the unit was not adequately communicated especially when the well established intent of outage scheduling at Schiller is to sequence unit outages for work force purposes. Operators should have known outage schedules and unit scheduling requirements. The outage time associated with the damaged igniters is considered accidental by Liberty.

Q. In addition to your recommendations regarding the recovery of outage costs, do you have other recommendations regarding your review of unit outages?

A. Yes, I do. The first additional recommendation relates to outages where PSNH is pursuing insurance, warranty claims or performance issues against the manufacturer. PSNH efforts are not complete and may not be complete until 2010 in some cases. The outages at issue are Outage MK-2-E (Inspection of the damaged HP/IP turbine),

Outages Newington-1-C and Newington-1-D (Damaged exciter), and all outages with performance issues, claims, etc. associated with Schiller-5. Liberty's recommendations are specifically enumerated below.

Liberty recommends that replacement power costs for Outage MK-2-E be recovered in this proceeding, but notes that the total review is not complete. Liberty also recommends that the Commission provide an after-the-fact opportunity for review of PSNH's efforts to mitigate costs to customers in this outage to complete the review.

Liberty recommends that replacement power costs for Outages Newington-1-C and Newington-1-D not be recovered by PSNH in this proceeding. Liberty also recommends that the Commission provide an after the fact opportunity for review of PSNH's efforts to mitigate costs to customers in this outage.

Liberty recommends that PSNH recover replacement power costs for the outages related to warranty and performance issues of Schiller Unit 5 in this proceeding. Liberty also recommends that PSNH prepare a report of all such Alstom warranty and performance issues that describe the issue involved PSNH's efforts for resolution with Alstom, and the final resolution. Liberty further recommends that the report be filed by February 1, 2010 and updated in future SCRC reconciliation filings until all issues are resolved. Liberty further recommends that the Commission provide an after the fact opportunity for review of PSNH's efforts to mitigate costs to customers in these outages.

The second recommendation relates to the isophase bus duct failure at Wyman-4 due to malfunctioning heaters. Merrimack and Schiller stations do not have heaters in their isophase bus ducts due to their initial base load design and operation. Newington does have heaters and PSNH inspected them prior to the winter freeze and thaw cycles. Liberty recommends that due to volatile market conditions that can change the operation of both Merrimack and Schiller, that PSNH evaluate the need for heaters in their isophase bus ducts.

The third recommendation relates to National Electrical Safety Code required patrols of the 34.5 kV lines in rights of ways. In its explanation regarding Outage Canaan 1-F, PSNH stated that that patrols were limited to aerially thermographic inspection of 34.5 kV lines in rights of way due to constraints of declining Reliability Enhancement Program funding. Liberty understands that PSNH had agreed to perform inspections of all distribution facilities on a four year schedule as part of its 2006 REP plan. Liberty recommends that this issue be specifically addressed in the 2009 Reliability Enhancement Program contained in PSNH's current rate case.

The fourth recommendation relates to outages caused by trees that are outside of rights of way. Outages Canaan 1-E and Canaan 1-L were caused by trees which PSNH stated were outside of the right of way. PSNH further states that many of its older 34.5 kV lines in rights of way (1,600 miles plus) do not have language in the easements that allow PSNH to address "danger trees" outside of the right of way.

PSNH therefore does not address the outside of right of way danger tree issue. Liberty recommends that PSNH address danger trees that are outside of the 34.5 kV rights of ways, include identification of such trees in NESC required patrols, and identify where PSNH does and does not have the rights to remove danger trees. Liberty further recommends that this issue be specifically addressed in the 2009 Reliability Enhancement Program contained in PSNH's current rate case.

The fifth and last recommendation concerning outages relates to the number of outages at the hydro and combustion turbine units that appear to be due to protection mis-coordination. Many outages involve apparent mis-coordination between PSNH lower voltage generating units and the distribution system. PSNH has begun an analysis regarding settings etc. and suspects that some trip settings may be set too tight. PSNH also states that many of its small generating stations do not have regimented relay testing requirements by Northeast Power Coordinating Council or North American Electric Reliability Corporation as they are not considered bulk power facilities, however; PSNH does perform relay testing on all units. PSNH further states that relay settings have not changed at its small generating stations since the early 1980s. While new generation coming onto the PSNH system undergoes an interconnection analysis that reviews coordination, no such analysis has been done for PSNH's own units. Liberty recommends that PSNH perform interconnection analyses for all combustion turbines and hydro units connected to the lower voltage PSNH system. The Merrimack combustion turbines and Smith hydro are connected to the 115 kV system and such mis-coordination does not exist. Liberty further recommends

that PSNH establish an appropriate relay testing program for all combustion turbines and hydro units. Liberty suggests that PSNH complete this work expeditiously and file a report of its actions to date and completion schedule concurrent with the next SCRC filing.

Q. Are there recommendations you have for PSNH not related to the specific review of the unit outages?

A. Yes, there are three general recommendations that Liberty has to offer in that regard. The first general recommendation relates to the many outages that relate to inspection and refurbishing of major turbine and generator parts off site. When PSNH sends a major generator/turbine component off site for inspection and repair, it is exposed to major emergent work issues that all but automatically become critical path components of the outage. Such components include the various HP, IP, and LP turbines and generator components. Such emergent work issues are especially significant for base load units in a market environment. Liberty recommends that PSNH perform an evaluation of procuring spare critical generator and turbine components or procuring industry arraignments that facilitate the same goal in order to reduce risks to customers for catastrophic failures of such components.

The second general recommendation relates to the first recommendation regarding the fact that major station components are sent off site. Transporting large pieces of equipment is a very complicated effort considering that each state may have different and conflicting requirements and restrictions. Lack of coordination in travel permits

can often extend outage times because the components in transit are already on the outage critical path. Liberty recommends that contractual arrangements with manufacturers of major system components have travel plans in place and hold the manufacturer responsible for unnecessary transportation impacts on unit outages.

Lastly, with regard to the third general recommendation, Liberty understands that the manufacturers of generators and turbines are recommending longer times between inspection of their components. For example, manufacturer ABC recommends an inspection time of 10 years for its turbine that used to have a five year inspection cycle. Liberty is aware of multiple instances where older station components have failed in the later years of the manufacturer's new recommendations resulting in significant unplanned outages and additional outage costs charged to customers. Liberty recommends that PSNH not simply adopt unit manufacturer's recommendations regarding claims of extension of outage maintenance without first doing its own independent analysis tot support such actions as prudent.

Q. What was the result of your review of the eight Additional Recommendations included in the Stipulation and Settlement Agreement in Docket DE 08-066?

A. The eight Additional Recommendations listed in Section IV.c. of the Stipulation and Settlement Agreement in synopsis form are:

1. Review foreign material exclusion policy and modify as required. Add more accountability to the policy.

2. Evaluate the need of a roving person to ensure practices, procedures, and safety requirements are met.

3. Review existing equipment inspection schedules for adequacy and evaluate original equipment that does not have a set inspection to determine if one should be included.

4. PSNH should not rely exclusively on aerial patrols for lines in rights-of-way.

5. Consider moving check valves and exercise care in the placement of check valves.

6. Identify locations at generating stations where the switching function is performed by two systems with different configurations.

7. Check system lightning protection in the area of Canaan hydro station.

8. Review existing distribution protection setting and make changes to minimize impact to local generation and minimize impact to local generation with make future protection settings.

Liberty reviewed the PSNH action responses to those recommendations. Liberty accepts PSNH's response to Additional Recommendations #1 through #3 and #5 thorough #7 as a good faith effort to objectively review the issue and make appropriate adjustments in its operational practices. Additional Recommendation #4 centered on PSNH performing ground patrols of its 34.5 kV lines in rights of way. No patrols were initiated, but PSNH wishes to address this issue in its current rate case. Liberty specifically addresses this issue above. Additional Recommendation #8 regarding potential mis-coordination with units on the lower voltage PSNH system is

also addressed above. Liberty considers the eight additional recommendations in the DE 08-066 Stipulation and Settlement Agreement addressed to its satisfaction if Liberty's further recommendations here regarding Additional Recommendations #4 and #8 above are adopted.

Q. What was the result of your review of the unit availabilities and capacity factors of the PSNH units?

A. As stated above, the base load units have run well especially considering that many factors have tended to reduce unit output and lower performance metrics. Recently, PSNH has been extending the period in which long maintenance outages are performed on some of its units. Major overhauls are now conducted on different cycles, depending on the unit and its maintenance requirements.

Liberty made the following observations regarding 2008 capacity and availability factors with planned outages removed from the calculations so that the different maintenance schedules do not skew the data.

Schiller 4 and Schiller 6 availabilities generally run about 95 percent with capacity factors of over 80 percent.

Unit 5 at Schiller had its boiler replaced in late 2006 with a wood fired fluidized bed boiler. This unit has different characteristics than the old coal fired boiler so Liberty makes no comparisons with historic operation. Liberty does note that in 2007, the

first full year of commercial operation the unit had numerous startup and warranty issues which impacted the availability and capacity factors for the unit. In spite of new unit difficulties, Schiller 5 had an approximately 85 percent availability and an approximately 80 percent capacity factor for 2007. In 2008, further improvement was noted in that unit availability was approximately 90 percent and unit capacity factor was about 80 percent.

Newington maintained an availability of approximately 95 percent in 2008. Its capacity factor has fallen from 60 percent in 2003 to 40 percent in 2005, 10 percent in 2006 and 2007, and to approximately 3 percent in 2008. Its cost in relation to the market price is the reason for the decline.

Capacity and availability factors for Merrimack-1 have historically run at approximately 90 percent. Since it went to its two-year maintenance schedule in 2002, these factors dropped closer to 90 percent or below in the non outage years but have recovered to between 90 and 95 percent in both 2007 and 2008. Liberty believes that these results indicate that PSNH is adapting its maintenance operations to the new 2-year schedule.

The availability factor for Merrimack-2 has historically run at approximately 90 percent. The historical capacity factor runs about 85 percent. In the last few years including 2007, its availability factor has been 95 percent and its capacity factor has improved to over 90 percent. In 2008, both the unit availability and capacity factors

were approximately 85 percent due to the problems associated with the new HP/IP turbine.

Q. Are there other observations you made with regard to the availabilities and capacity factors of PSNH generating units?

A. There is one. The capacity factor of Newington has dropped to approximately 3 percent in 2008. Information supplied by PSNH suggests that Newington cost millions more than it earned for customers in 2008. Such value could bring into question the continued operation of the unit from an economic viewpoint.

Q. What is your opinion of the continued operation of the Newington unit from an economic viewpoint?

A. I have none at this point in time because looking at the economics of plant operation in 2008 does not reflect the value of the plant over its 40 to 60 year life. In addition, the information provided by PSNH did not include the value of Newington as a hedge against the market. As Liberty understands the issue, such a market hedge arrangement has not yet been made and Liberty believes that it may be expensive. Also, units such as Newington mesh extremely well with the generation expansion plan envisioned by the region. The New England region is leaning towards increased energy production from renewable resources, namely wind. Wind power can fluctuate widely and within a short period of time. Fast reaction resources such as Newington have value in integrating those renewable resources into the power grid. Newington also has a dual fuel capability which must be factored into the evaluation. Lastly, the

capacity and energy markets change very quickly. Liberty does conclude that this docket would not be the proper place to address the value of Newington to PSNH customers and suggests that if the subject is ripe for review that a separate proceeding be initiated that considers the complexities of valuing Newington going forward.

Q. What did you form as a conclusion when you reviewed the projected spending for capital projects and O&M at PSNH generating stations?

A. Liberty reviewed the 5-year capital and O&M budgets for Merrimack Station, Newington Station, Schiller Station, and the Hydro group, made the following general observations, and draw the following conclusions.

Capital

PSNH capital expenditures have been at an elevated level in the last few years and remain relatively high even after eliminating the Northern Wood Power Project and the Merrimack Clean Air components.

A peak in net capital expenditures (without wood and clean air projects) occurs at Merrimack Station in 2008 due to multiple major projects including the turbine replacement project.

The PSNH 5-year business plan calls for continued equipment replacement as required for reliable and efficient unit operations.

O&M

PSNH O&M expenditures have been at an elevated level for the last few years and remain relatively high in the 5-year business plan.

A peak in the O&M expenses occurred in 2008 at Merrimack Station which Liberty believes again centered around major projects including the turbine replacement project

The PSNH 5-year business plan calls for continued maintenance of equipment as required for efficient unit operations.

Liberty concluded that PSNH is spending and plans to spend sufficient funds for capital replacement projects and sufficient money for adequate maintenance to assure continued operation of its units consistent with good utility practice and with recognition of their age.

Q. Are there any other items you wish to discuss?

A. I only wish to list the data responses relied upon in the preparation of my testimony, in addition to the materials filed by PSNH, so they may be officially admitted into the record. Those data responses are attached following my exhibits and are:

Staff Set 01

Data Responses 9 through 33.

Staff Set 02

Data Response 5.

OCA Set 01

Data Responses 9 through 25.

OCA Set 02

Data Responses 9 through 15.

Tech Set 01

Data Responses 1, 2, 4, and 5.

Tech Set 02

Data Response 5.

Q. Does that conclude your testimony?

A. Yes, it does.