BEFORE THE STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION

In the matter of:	)
Public Service Company of New Hampshire	) **DE 09-091**
Reconciliation of 2008 Energy Service	)
and Stranded Cost Rates	)

Direct Prefiled Testimony

of

Kenneth E. Traum
Assistant Consumer Advocate

Dated: October 19, 2009

Q. Please state your name, business address and title.

A. My name is Kenneth E. Traum. I am the Assistant Consumer Advocate for the Office of Consumer Advocate (OCA), which is located at 21 S. Fruit Street, Suite 18, Concord, New Hampshire 03301. I have been employed by the OCA for approximately 20 years. I include my resumé as Attachment 1.

Q. Mr. Traum, have you previously testified before the New Hampshire Utilities Commission (Commission)?

A. Yes, I have testified before the Commission on behalf of the OCA on many occasions, including cases involving electricity, natural gas, water and telecommunications.

Q. What is PSNH requesting in this Docket?

A. In this docket PSNH is seeking to reconcile its revenues and costs associated with its energy service charge and its stranded cost recovery charge for calendar year 2008.

Q. What are the specific items that you will cover in your testimony?

A: I will address two items. First, I will provide the OCA's position on PSNH's inclusion of costs related to the turbine damage at Merrimack Station in Default Energy Service rates in 2008. Second, I will provide the OCA's recommendation with respect to PSNH's management of its coal inventory at Merrimack and Schiller Stations.

Q. Please briefly summarize the OCA's position.

A. With respect to the first issue, the OCA is opposing PSNH's request to recover the amount of $13.2 million not covered by insurance for Replacement Power Costs from its Default Energy Service customers due to a Merrimack Station outage related to foreign matter. On the second issue, the OCA's position is that Default Energy Service customers should not be responsible for paying carrying costs, including PSNH's rate of return, on excessively high levels of coal inventories at Merrimack and Schiller Stations.

Q. With respect to the first issue, the damage to the new turbine at Merrimack Station, please briefly describe the incident as you understand it.

A. From April 1, 2008 until May 22, 2008 PSNH conducted a planned outage for Merrimack Unit 2 in order to do work including the replacement of the Unit's HP/IP turbine. *See* Smagula Testimony, Attachment WHS-1 page 3 of 23 (Bates page 000080). As discussed in the Company's response to Staff 01-029 (*see* Attachment 2), sometime during this period foreign material entered the new turbine (identified as "metal shot blast") and caused damage when the Unit was restarted. As a result, although the turbine was able to return to producing its prior level of output, it was not able to generate the additional output that was a significant part of the financial justification for the project. *See* Attachment 3, Merrimack Station Capital Project Justification, from PSNH Response to Staff 01-029.

As a result of the underperformance of the Unit, on June 20, 2008 PSNH removed the Unit from service again in order to investigate the problem. This outage lasted from June 20 until July 14, 2008. The result of the investigation by PSNH and its consultants was

inconclusive, in that they were not able to determine how the foreign material entered the turbine. However, they were able to determine that foreign material had caused damage to the new turbine blades. *See* PSNH Witness Smagula Attachment WHS-2 Outage Report No.: OR-2008-11(MK2-05) (Bates pages 144-145). PSNH was not able to fully repair the turbine during the June-July 2008 outage, and planned an 18-week outage for the Fall of 2009 to repair the turbine.

Q. What is your understanding of the total costs related to the turbine damage?

A. According to PSNH, the Replacement Power Costs (RPCs) in 2008 were $17.7 million, and Property Damage expense was an additional $3 million, for a total cost of $20.7 million in 2008. *See* Attachment 4, PSNH Response to Data Request TS-01-005.

Q. How much of the total costs incurred related to the turbine damage has been covered by insurance?

A. According to Attachment 4, for RPCs PSNH has received $3 million in insurance proceeds that was booked in December, 2008. Another $1.5 million in RPCs was submitted for insurance reimbursement in the first quarter of 2009. For Property Damage the full $3 million was recovered in 2008, but according to Footnote 6 on Attachment 4 there is a $1 million deductible, which will have to be addressed in 2010.

Q. What are the remaining costs related to the turbine damage that are included in 2008 energy service rates?

A. Information provided by the Company indicates that Replacement Power costs of $13.2 million were not covered by insurance and were included in rates in 2008. *See* Attachment 4, Footnote 1.

Q. Do you know whether PSNH has a policy in place to ensure that foreign matter does not enter or contaminate their generation plants or equipment?

A. In a data response PSNH provided a document titled "Foreign Material Exclusion Practice." *See* Attachment 2. However, this document is dated as "Rev. 6 – Last Updated 7/3/09." It is also important to note that the "Foreign Material Exclusion Practice" document appears to apply to Merrimack Station only. When asked at a technical session whether the policy would be implemented at other generation stations, PSNH stated that each generation plant manager has the discretion as to whether and how to implement the policy. It is our position that PSNH should make the written formal Foreign Material Exclusion ("FME") Practice a requirement for all of its generating plants.

Q: Do you know if PSNH had an FME policy in place prior to July 3, 2009?

A. In the data request included in Attachment 2, PSNH was asked to "Please describe the foreign material exclusion process at Merrimack Station and how it was applied to the installation of the new HP/IP turbine." However, PSNH did not describe what, if any, FME policy was in place when the May 2008 incident

occurred. The company instead provided a policy dated July 3, 2009, which we presume was in place as of that date. The Company suggested that it had an informal policy prior to July 3, 2009 when in another data response it stated that ""the major change that was made from past and present FME practices is that the new practice is clearly formalized and documented, while additional or secondary oversight is utilized as deemed appropriate by the maintenance manager." *See* Attachment 5, PSNH Response to OCA 02-013. As discussed below, this issue of PSNH needing a FME policy was also discussed in last year's reconciliation docket.

Q. Is the 2008 outage the first one related to foreign material at Merrimack Unit 2?

A: No, I am aware of at least one related incident in the recent past. In the 2007 reconciliation docket, DE 08-066, Staff Witness Cannata discussed an outage on May 23, 2007 at Merrimack Unit 2. Mr. Cannata wrote "[i]nvestigation found the remains of a rag in the MBFP (main boiler feed pump) recirculation valve which would account for the flow problem observed. With respect to whether PSNH had a policy in place, Mr. Cannata went on to say that "PSNH has a foreign matter exclusion procedure when openings are made to the internals of the unit. That procedure requires that all openings are to be covered when not working on it." *See* DE 08-066 Testimony of Michael D. Cannata, October 24, 2008, Attachment MDC-3, Outage D (unpaginated). Despite the fact that PSNH had a problem with foreign material in Unit 2 just one year earlier, the company failed to ensure that such an incident would not occur during the May 2008

turbine replacement by taking appropriate steps to prevent foreign material from damaging the turbine.

Q. Do you have any opinion on whether the Foreign Material Exclusion Practice document provided by PSNH is sufficient?

A: I do not, and I would defer to Staff's expert witness who has provided previous testimony on that issue.

Q. What is the OCA's position with respect to whether energy service customers should pay these costs?

A. Our position is that energy service customers should not have to pay the $13.2 million in costs related to the turbine damage which remain after insurance proceeds. This amount should be disallowed because the May 2008 outage resulted from management imprudence.

Q. Why do you believe that the Commission should disallow these costs?

A. PSNH has an obligation to operate its generation plants on behalf of ratepayers in a manner that is prudent, and that uses appropriate management practices to minimize costs and maximize the value of the output of its generation plants. I do not believe that PSNH prudently managed the turbine replacement project. PSNH should have had a stronger and more formal written Foreign Material Exclusion policy in place in light of the fact that the Company had an outage on the same

Unit, also related to foreign material, just one year earlier.[1] PSNH management also should have had appropriate training and oversight in place to ensure that both its own employees, as well as third party contractors under its control working on the turbine replacement and boiler repairs, followed proper procedures to prevent foreign material from damaging the turbine.

PSNH has also indicated as stated in Attachment 2 on page 4 of 4: "Very simply, the FME program requires unattended openings to be covered to prevent material from entering the water/steam side of the process." PSNH management failed to ensure that this policy was followed during a major and very expensive construction project, and that failure resulted in the damage to the turbine. Ratepayers depend on PSNH to take all necessary precautions to prevent these types of incidents, and PSNH failed to do so in this case. Therefore, PSNH shareholders, not ratepayers, should pay the $13.2 million in costs remaining for 2008 after insurance coverage.

Q. Please describe the second issue you identified earlier, regarding the OCA's recommendation with respect to PSNH's management of its coal inventory.

A. The OCA is concerned about the coal inventory levels PSNH maintains at its Merrimack and Schiller Stations. We understand that the inventory levels need to be high enough for reliability purposes, but we believe that they should be maintained only at reasonable levels related to PSNH's need for coal. This is important because Default Energy Service customers pay carrying costs on the

[1] In addition, if PSNH had an informal unwritten policy in place, as the Company seems to suggest in several data response, it should have enforced that policy.

dollar value of the coal inventory, including the Company's Rate of Return on the value of the coal. In order to illustrate the costs of this to ratepayers, I estimate the 2008 carrying costs on the coal piles to be approximately $2.7 million. This is a significant cost to ratepayers and PSNH should strive to minimize these costs to only those which are necessary.

Q: How much coal did PSNH have in inventory in 2008?

A: I have reviewed PSNH's monthly Coal Inventory Summary Reports for 2008 and the monthly report for January 2009. *See* Attachment 6 for the January 15, 2009 report. The Company files these monthly reports with the Commission and provides them to the OCA in accordance with Order No. 24,498 resulting from Docket No. DE 04-177. While the obligation remains with PSNH to manage its coal inventory in a prudent manner, the monthly report shows the "Target Inventory on the ground" for Merrimack and Schiller stations to be 184,500 tons. As of January 1, 2009 the actual inventory on the ground was 416,190 tons, and the average level reported for 2008 was approximately 275,000 tons.

Q: What is your recommendation on this issue?

A: I believe that both of these levels (the actual and average levels) are too high, and that this resulted in unnecessary costs for Default Energy Service customers. I understand that these levels are in part due to the delayed booking of the 2007 coal inventory adjustments, which did not occur until the end of 2008. However, my recommendation is that in the future, PSNH's coal inventory should be held to

a reasonable range around the 184,500 ton target inventory level unless it can demonstrate a need to significantly exceed that target level, e.g. if the Company anticipates a disruption in fuel deliveries. This will ensure that Default Energy Service customers will not be responsible for carrying costs related to excessive inventories of coal. If the Company does see a need to change the target level, it should at a minimum communicate its decision to increase its inventories to the Commission and to the OCA.

Q. Do you have any additional issues to raise at this time?

A. No, although I do wish to reserve our rights to address additional issues pending our review of Staff's testimony which is due on the same day as this testimony.

Q. Does this conclude your testimony?

A. Yes.

Kenneth E. Traum Qualifications

My name is Kenneth E. Traum. I am the Assistant Consumer Advocate for the Office of Consumer Advocate (OCA). My business address is 21 S. Fruit Street, Suite 18, Concord, New Hampshire 03301. I have been affiliated with the OCA for approximately twenty (20) years.

I received a B.S. in Mathematics from the University of New Hampshire in June, 1971, and an MBA from UNH in June, 1973. Upon graduation, I first worked as an accountant/auditor for a private contractor and then for the New Hampshire State Council on Aging, before going to the New Hampshire Public Utilities Commission (NHPUC) in February, 1976. At the NHPUC I started as an Accountant III, advanced to a PUC Examiner and later become Assistant Finance Director.

In my positions with the NHPUC, I was involved in all aspects of rate cases, assisted others in the preparation of testimony and presented direct testimony, conducted cross examination of witnesses, directed and participated in audits of utilities, and performed other duties as required. While employed at the NHPUC, I was a member of the NARUC Regulatory Studies Program at Michigan State.

In 1984, I left the NHPUC for Bay State Gas Company. With Bay State, I was involved in various aspects of financial analysis for Northern Utilities, Inc., Granite State Gas Transmission, Inc., and Bay State Gas Company, as well as regulatory activities with regard to Maine, New Hampshire, Massachusetts and the FERC.

In early 1986, I returned to New Hampshire to join the EnergyNorth companies, where my areas of responsibility included cash management, regulatory affairs, forecasting and other financial matters. While with EnergyNorth, I was a member of the New England Utility Rate Forum and the New England Gas Association. I also represented the utility, which is the largest natural gas utility in New Hampshire, over a two year period in the generic Commission docket (DE 86-208) which developed a methodology for conducting gas marginal cost studies.

In 1989 I joined the Office of Consumer Advocate with overall responsibility for advising the Consumer Advocate and its Advisory Board on all Financial, Accounting, Economic and Rate Design issues which arise in the course of utility ratemaking or cases concerning determinations of revenue responsibility, competition, mergers, acquisitions and supply/demand issues. I assist the Consumer Advocate and the OCA Advisory Board in formulating policy, and in implementation of that policy. In that role, I have testified before the NHPUC on many occasions. In early 2005, I was promoted to Assistant Consumer Advocate.

I am a member of the NASUCA (National Association of State Utility Consumer Advocates), Committees on Electricity and Gas. I am currently on the Board of Directors for Granite State Independent Living (GSIL) and formerly served as Chair as well as a member on the GSIL's Finance and Audit Committees.

Public Service Company of New Hampshire
Docket No. DE 09-091

Data Request STAFF-01
Dated: 06/15/2009
Q-STAFF-029
Page 1 of 4

Witness: William H. Smagula
Request from: New Hampshire Public Utilities Commission Staff

Question:
Reference Smagula testimony, page 17. With regard to the planned maintenance outage for Merrimack 2 that commenced on 4/1: Please provide the economic analysis that justified the replacement of the HP/IP turbine. Include all assumptions as part of your response. Please provide your calculations of the net economic impact to energy costs of the results of the HP/IP turbine replacement from the beginning of the initial outage on 4/1 through the 2009 planned maintenance outage. In your response, please identify and explain each economic impact. If PSNH has any insurance related to the HP/IP replacement, please describe the coverage and how it applies. Please describe the guarantees PSNH had from Siemens regarding the performance of the new HP/IP turbine compared to the old turbine. Please provide the details and root causes of any investigation performed by PSNH or its suppliers regarding the intrusion of foreign material into the HP/IP turbine. Please include any reports or relevant communications from each. Please describe the foreign material exclusion process at Merrimack station and how it was applied to the installation of the new HP/IP turbine.

Response:
Attached, please find the economic analysis that culminated from a 2+ year inquiry into the replacement of the HP/IP turbine. It was prepared recognizing an approximately 18-month lead time required for design and manufacturing of the turbine. This discussion and analysis summarized early estimates of a variety of items that would provide value to customers.

- HP/IP Turbine Replacement Cost -early estimate of $9M
- Increased energy efficiency - early estimate of 6 - 10 megawatts
- Avoided maintenance costs during the 2008 outage - $1.8M
- Avoided maintenance costs in 2013 totaling $2-4 million, estimate due to a 10- year inspection cycle rather than a 5-year inspection cycle
- No additional outage time when completed during the 2008 major 8-week outage since the replacement would take no longer than the alternative repair approach

This analysis estimated a pay back period of about 18 months assuming:

- an 8 megawatt increase associated with the improved efficiency
- $81.75/mwhr market price of generation
- 75% capacity factor of the unit
- a capacity value of $6.37/kw-mo

Economic Impact. PSNH interprets this question to request aditional information regarding not only the initial replacement of the HP/IP turbine, but also the subsequent inspection and eventual repair due to the damage to the new HP/IP turbine during the 2008 annual outage start-up. With that, there are 3 outages associated with either the planned HP/IP turbine replacement or subsequent inspection and repair of the HP/IP turbine due to the foreign material that passed through the turbine upon start-up from the April-May annual outage.

First, the Merrimack 2 Annual Outage in April-May 2008 was completed 51 hours ahead of its scheduled ISO window. There were a number of long projects completed during the outage, including the HP/IP turbine replacement, and none of them exceeded the ISO window and thus there was no incremental outage cost (energy costs) to customers associated with the HP/IP replacement.

Second, the inspection outage of Merrimack 2, including the damage to the new HP/IP turbine, and other boiler and balance of plant equipment, required an unplanned outage from June 20 through July 14, 2008. This forced outage has an estimated cost of $13.2 million. The necessity of this outage was to identify equipment problems and insure safe operations of the turbine.

Third, the damage to the new HP/IP turbine is planned to be repaired during a 2009 outage beginning August 1. It is expected that this repair outage will last 18 weeks to bring the turbine to an as new condition. A 2009 annual outage planned for 4 weeks was originally scheduled to occur in the spring of 2009. This outage work will be shifted to occur during the HP/IP repair outage. The net impact of this repair work is an additional 14 weeks of outage. The estimated cost of this additional 14 weeks of outage is $5.2.million.

Insurance. Merrimack Station does have insurance coverage which includes boiler and machinery repairs. There is a $1 million deductible associated with this coverage. Merrimack Station also has replacement power insurance coverage. In this instance, the replacement power coverage has two components: the additional forced outage time associated with the equipment damage, as well as the lost incremental generation associated with the new, more efficient HP/IP turbine. There is a 60-day exclusion period prior to the beginning of the replacement power coverage. There are also daily maximums equal to $417,000/day for the months of December, January, February, June, July, and August $316,000/day for the months of March, April, May, September, October and November. Finally, there is a $31 million dollar total cap. Once the "deductible" period is met, the insurance claim will include both the outage time, described above, and the lost incremental generation. The actual value of the incremental generation will be determined by performance tests that will be completed once the new HP/IP turbine is fully repaired and brought back to an "as-new" condition at the end of the 2009 outage.

Contractual Guarantees. The turbine had a minimum output guarantee equivalent to the original unit output. Secondly, the replaced turbine had a ten-year warranty effective from the time of completion of certain performance tests which would be critical in the determination of additional output. Because the output determinative performance testing has been delayed until December of 2009 (which was done in fairness to a vendor who has a pay-per-performance clause in the contract), the parties agreed that at that time, following the testing on fully repaired turbine, a nine-year warranty will go into effect (the turbine will have been functioning approximately a year and a half by that time).

Investigation. The initial effort was the external review while the unit remained on line. Once the unit was off line and based upon the initial findings, PSNH and Siemens expanded the internal turbine inspection and brought in expert organizations to analyze and identify the foreign material and the root cause of its presence.

Beginning on June 24, 2008, PSNH personnel, Siemens and key vendors inspected steam and meter system equipment and valves for evidence of foreign material contamination, and others provided assistance in chemistry and metallurgy analysis. PSNH was supported by the following firms:

- Siemens Power Corporation
- Thielsch Engineering
- Team Industrial Services
- GE Inspection Technologies
- Baker Testing
- Sheppard T. Powell Associates
- Babcock & Wilcox
- NH Material Laboratory
- Alstom Power

The scope of necessary inspections broadened beyond the originally planned HP-IP turbine inspection. PSNH determined that it was essential to know what equipment and systems contained the foreign material found in the turbine. The material found was commercially available "shot blast" which is small beads of steel used for cleaning metallic surfaces. These inspections would indicate any other damage that occurred, determine requirements for removal of all shot blast material found, and assist in the effort to remove all material and help determine the entry point of this material and the root source. These actions would also assist with ensuring there would be no subsequent damage of a similar nature. The scope expanded into the LP-1 and LP-2 turbines, condensate and feed water systems, boiler headers and tubes, and turbine piping, and other related systems.

Metallurgical analysis of the foreign material was conducted by the three independent laboratories. Those analyses identified an abrasive material that was a chrome-bearing steel alloy, spherical in shape, ranging in diameter from 0.01 - 0.03 inches. The type of material was like that used for a sandblasting process. An investigation as to the source of the material and mode of introduction into the steam system was undertaken.

Preliminary conclusions included the following:

(1) Significant quantities of foreign material entered and passed through the turbine during the initial hours of operation of the unit startup.
(2) The hard dense nature of the foreign material led to the observed solid particle erosion damage to the blade path, seals, casing and rotor.
(3) The observed conditions would be consistent with the operating conditions reported following the return to service on May 22 (high turbine pressure, reduced flow passing capability, decreased turbine efficiency levels, and reduced power output).

On July 11, 2008, PSNH and representatives from Siemens, Babcock & Wilcox and Sheppard T. Powell Associates conducted an "Apollo" root cause review to determine a root cause of the contamination. The Apollo technique focused on the cause and effect of the relationships based upon existing or obtainable evidence and data with each cause identified as being the result of both a cause and an action. A number of possible causes were ruled out during the session while other causes were identified as requiring additional information or further evaluation. Although the analysis to date showed the contamination to be shot blast material, no definitive conclusions were reached by the Apollo analysis as to the source of the material.

Summary Observations
PSNH personnel conducted a root cause analysis to determine the source of the shot blast material found inside the turbine. PSNH personnel reviewed the following information:

-- Merrimack Station inspection results
-- possible sources for the origination of the shot blast material
-- quality assurance measures that were taken at manufacturing facilities during fabrication of the turbine piping and boiler tubes
-- quality assurance measures that were taken at Merrimack Station during installation
-- report of samples that were sent out for analysis

As summarized in the PSNH Fossil Station Outage Report issued after the completion of the outage and included in the May 1 filing, inspections showed material was contained to the following systems and equipment:

-- HP/IP Turbine
-- HP/IP Turbine extractions and associated feedwater heating components
-- Main Boiler Feed Pump
-- LP Turbine
-- LP Turbine extractions and associated condensate heating components, Condenser Hotwell, Condensate Pumps, DA Pumps, and Condensate Polisher.

Conclusion - Indeterminate Cause / Single Event (May 22-23, 2008)
PSNH has been unable to reach definitive conclusions for the entry point of the contamination or the source of the material. PSNH concluded it appeared to be from a single event that occurred on May 22-23 during the initial start-up. These conclusions were based upon the following information:

- The unit did not experience a degradation of output over time but rather never reached its design load. There was no further degradation of output over the subsequent 28-day operation.
- Some valves downstream from the turbine experienced malfunction during the start-up indicating that the material traveled through the turbine extraction lines and caused problems with the condensate and feedwater heater level control valves.
- After ramp-up at approximately 130 MW output, scaling data was available and observed. It was noted at this point that the actual performance data did not match the supplied Siemens design curves for the new turbine.
- Unit 2 maintained a constant output and no further degradation after returning to service from this outage although it was less than the designed output.
- PSNH has never purchased the contaminant material for use at Merrimack Station and no other on-site contractors used it on-site.

Foreign Material Exclusion (FME) Policy. The Merrimack Station FME Practice is for all station work and has as a primary focus the systems and equipment associated with the steam-water cycle used to generate electricity. The level of detail as well as the expansiveness of the program is based on the work and the direction set by the Maintenance Manager. Very simply, the FME program requires unattended openings to be covered to prevent material from entering the water/steam side of the process, and new material is inspected, blown out or boroscoped to prevent material from entering the cycle. Individuals are designated as inspectors who have FME as a primary focus, supplementing operators, maintenance personnel, station management and others who all contribute to constant monitoring. Also, contractors who do work are well versed on this program and incorporate necessary practices and inspections as part of their work. Every contractor has a PSNH liaison or sponsor who also has FME oversight responsibility. Specific to the turbine work, Siemens has a long standing FME program that addresses the equipment and turbine and peripherals work scope that is honored by all who are in the turbine vicinity during outages.

The current Merrimack Station FME Practice is attached.

Public Service of New Hampshire

Merrimack Generation Station

97 River Rd.

Bow, NH 03304

FOREIGN MATERIAL

EXCLUSION

PRACTICE

Rev. 6 – Last Updated: 7/3/09

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FME Practice Review & Approval			
Action	Name / Signature	Title	Date
Last Revised by	Fred Uboldi	Engineer	7/3/09
Approved	Gerald Duval	Maintenance Manager	7/3/09
Approved	Harold Keyes	Station Manager	
Approved	William Smagula	Director Generation	

1. Purpose

1.1. The purpose of this plan is to control work practices to preclude the introduction of foreign material (FM) into critical plant systems and components in order to eliminate the potential for damage to equipment, increase equipment reliability, and reduce equipment downtime.

1.2. The purpose of this document is to provide a guideline for the Foreign Material Exclusion (FME) Practice utilized at Merrimack Station. Different outages or different work scopes may deem different FME needs. The extent of FME requirements for any outage or different work scopes will be determined by the Station and/or Maintenance Manager.

2. Scope

2.1. This Practice will apply to any or all of the following Merrimack Station (MK) systems or equipment: MK-1, MK-2, MK-Common (AA), GCT-1 and/or GCT-2.

2.2. This Practice may apply to the opening or breaching of any piece of equipment, component, piping or tubing in any of the following systems / components:

2.2.1 Turbine Generator
2.2.2 Boiler
2.2.3 Main, Reheat, Extraction, Auxiliary, and Start-Up Steam Systems
2.2.4 Condensate System
2.2.5 Feedwater System
2.2.6 Make-up Water System

2.4. When deemed applicable, Contractor work will adhere to the standards and of this Practice. If a Contractor has their own FME program, it must be approved by the Merrimack Station Maintenance Manager.

2.4.1 MK personnel, or any representative(s) designated by MK management, shall have access to the work to spot check the Contractor's adherence to required FME procedures.

2.4.2 The Contractor shall immediately notify MK Management of any Loss of FM control.

2.4.3 If requested, the Contractor will provide MK copies of all FME records at the completion of work.

3. Responsibilities

3.1. The FME Practice shall have support from the highest levels of Merrimack Station and PSNH Generation.

3.1.1 The critical nature of the equipment operated and maintained by Merrimack Station necessitates that effort should be taken to prevent damage to MK systems and components.

3.1.2 Workers have the primary responsibility of precluding the introduction of foreign material to systems or equipment. This includes both PSNH and contracted personnel.

3.1.3 The Merrimack Station Maintenance Manager is responsible for ensuring that workers are aware of the FME Practice. He would also be responsible for determining any actions required for employees or contractors that neglect to follow the Practice.

3.2. FME Inspector

The FME Inspector(s) shall be designated by the Maintenance Manager or by a person appointed by the Maintenance Manager. Depending upon the type of outage, scope of work, and/or specific conditions, the FME Inspector may be any or all of the following: Contractor, designated PSNH employee, the employee performing the work. Unless specified otherwise by the Maintenance Manager, the employee performing the work is the default FME Inspector. The FME Inspector may be designated to perform any or all of the following:

3.2.1 Identify system / component openings which are susceptible to FM during a given outage. This may require daily communication with the Planning, Maintenance, Operations and/or Engineering Departments.

3.2.2 Ensure appropriate control measures are in place so that FM cannot be introduced into any system / component that has been breached.

3.2.3 Perform visual, borescope or other inspections at time of breaching and closure to ensure that no FM exists.

3.2.4 Perform visual, borescope or other inspections of new piping, tubing, and/or components prior to installation at Merrimack Station.

3.2.5 Retrieve, or assist in retrieval, of any FM found in a system / component.

3.2.6 Track system / component openings, inspections, closures, retrievals, and FME related activities during the work.

3.2.7 Assist the work crews, who have the primary responsibility of FME, as necessary to accomplish the purpose of this Practice.

3.3 Station Personnel

3.3.1 Station management, engineers, supervisors, foremen, and DIC's shall have read and understand the FME Practice at Merrimack Station. These individuals would ensure that those people working under them understand the concepts and importance of the FME Practice.

3.3.2 Planners shall have read and understood the FME Practice at Merrimack Station. Planning shall, whenever possible, identify in advance the need for FME during the planning and work order conversion process. Under the direction of the Maintenance Manager, the degree of FME requirements will be established.

3.3.3 Members of the Operations, Maintenance, and Chemistry Departments are directly associated with the success of the FME Practice. Their supervisors / foremen shall ensure that these workers understand the concepts and importance of the FME Practice. These workers will follow the Practice and provide feedback to their supervisors / foremen as to the effectiveness of the plan and suggest possible improvements, as well as report any abnormal or unacceptable findings to their supervisor.

3.3.4 Warehouse personnel shall be responsible for material stored in the warehouse and shall protect affected material accordingly.

3.4 Contractors

3.4.1 Merrimack Station Contractor Liaisons will be responsible to ensure that contract superintendents, supervisors, and foremen fully understand the Merrimack Station FME Practice. Contractor management is responsible to ensure that their workers comply with the Merrimack Station FME Practice or an approved substitute.

3.4.2 Craft Labor is directly associated with the success of the FME Practice. Contract supervisors and foremen shall ensure that their workers understand the concepts and importance of the FME Practice. Workers shall provide feedback to their supervisors / foremen as to the effectiveness of the FME Practice, suggest

possible improvements and report any abnormal or unacceptable findings to their supervisor.

4. FME Practice

This Practice is the standard procedure for FME control at Merrimack Station. If a contractor can demonstrate that their FME Practice is equal or greater, they will be allowed to follow that Practice instead of that listed below.

Based upon the nature or work scope of a particular job or outage, the Maintenance Manager may increase the requirements for the FME Practice, including control measures and documentation.

4.1. Pre-work Planning and Communication.

4.1.1 Through the planning process, any work identified as having a potential to introduce FM to a system / component shall be communicated to the person(s) performing the work.

4.1.2 For normal standard maintenance performed, the FME Inspector will be the person performing the work or person in charge of the work, if applicable.

4.1.3 The Maintenance Manager may appoint individual(s) to be designated FME Inspector(s) for a particular job, a particular outage, or for a particular Contractor's work. If this is the case, all persons performing that work will be advised of the FME Inspector(s) and any additional FME requirements.

4.1.3 Person(s) in charge of work being performed will, through the use of pre-work tailboard meetings, ensure that all workers are aware of the FME status of the job. They will brief the workers on the importance of following the Practice and address any questions or concerns.

4.2. Initial Breaching of Systems and / or Components

4.2.1 Upon initial breach of a system or component listed in Section 2.2, the FME Inspector will visually inspect the equipment to insure there is no Foreign Material present. If uncertain, he may also utilize a borescope for the inspection. The FME Inspector will then record the information on Appendix A ~ Merrimack Station Standard FME Inspection Form.

4.3 FME Control

4.3.1 After evaluating the specific job, the FME Inspector shall determine the best means of FME Control for the opening. This may include any or all of the following: temporary cover, inflatable plug, periodic inspection, barriers, guarding or other means. If uncertain, he will consult his supervisor or the Maintenance Manager.

4.3.2 The FME Control will be left in place any time the breaching is left unattended or as otherwise directed by the Maintenance Manager.

4.3.3 The person in charge of the job or FME Inspector will notify the Maintenance Manager any time there is a loss of FME Control. This includes such things as dropped tools or hardware, defective control measures, or any circumstance that may introduce FM to the system.

4.4 New / Replacement Materials

4.4.1 Any new materials or those taken from inventory, which could possibly introduce FM to a Merrimack Station system / component, will be inspected by the best means possible prior to its installation. The FME Inspector will perform this as close to the installation time as is practical and will record the results on Appendix B ~ Merrimack Station Material FME Inspection Form.

4.5 Breaching Closure

4.5.1 The FME Inspector will perform a final inspection of the opening prior to its closure, ensuring that no FM is in the system / component. The FME Inspector will record the results on Appendix A ~ Merrimack Station Standard FME Inspection Form.

4.5.2 The system / component should not be left unattended or unsecured between the periods of final inspection and final closure. The person in charge of the job is responsible for this.

4.5.3 The FME Inspector will add any comments to Appendix A ~ Merrimack Station Standard FME Inspection Form and then print his name and sign the form, stating that the FME Practice procedures were properly followed.

4.6 Re-opening of the system / component

4.6.1 Should a system / component require re-opening, the job shall, from an FME standpoint, being considered a new job and the procedure will be re-implemented from step 4.2.

4.7 Record Keeping

4.7.1 All FME related records will be returned to Planning with corresponding work order papers, where they will be retained for at least one year.

4.8 Practice Review

4.8.1 This FME Practice shall be reviewed periodically for effectiveness and possible improvement.

ORIG → HEKeys
cc → Dept 6K
JoanneB
EGB

Docket No. DE 09-091
Data Request STAFF-01
Dated: 06/15/2009
Q-STAFF-029 Attachment

Merrimack Station Capital Project Justification

Project Title: Unit #2 HP/IP Steam Turbine Modernization
Total Cost: $9,000,000
Project Number: Project Year: 2008
Requested by: David Gruwell, P.E.
Prepared by: David Gruwell, P.E.

Project Summary:

Replace Merrimack Unit #2 Turbine-Generator's high pressure (HP) and intermediate pressure (IP) steam turbine rotating and stationary blade components with a more efficient and reliable design.

Description of Work:

The HP/IP Rotor, Stationary Blade Rings and Inner Cylinder Casing will be replaced. The outer cylinder casing will remain as is. Using today's high powered computers the HP & IP rotating and stationary blades will be designed for maximum efficiency using three-dimensional flow analysis to optimize the steam turbine blade design; designing each stage individually. State of the art blade tip seals will provide additional efficiency improvement.

Hardware Scope of Supply:

Fully Integral, No-Bore rotor
3D Integral Shroud Rotating Blading
New Inner Cylinder and Stationary Blade Rings
3D Integral Shroud Stationary Blading
Improved Blade Path and Dummy Ring Sealing
Bearings
Main Oil Pump

Performance Improvement:

The Turbine-Generator output will increase by six to ten MW's at normal full load steam inlet conditions of flow, pressure and temperature. Therefore an additional six to ten megawatts of power will be generated without having to burn any additional coal. This additional amount of power can be generated without having to upgrade the generator.

Justification:

The new HP/IP Turbine will be more reliable and more efficient than the existing 1960's design. The existing HP/IP Turbine requires inspection and repair every five years to maintain reliable operation. The new design has a recommended inspection interval of ten years. The Unit #2 HP/IP Turbine is scheduled for its next maintenance inspection in the Spring of 2008. It is scheduled to have nozzle blocks, one row of control stage blades and one row of IP rotating blades installed in 2008, for a budgeted total cost of $1,847,000. An additional $1,445,000 of maintenance is budgeted for 2013. The 2013 budget has the potential of increasing with contingencies for IP Blades and Inner Cylinder Repairs. The installation of the new HP/IP Turbine in 2008 can be performed within the eight week window which is normally required for turbine repairs.

The added power gained from this efficiency improvement will provide a very rapid pay back period based on the market value of electricity. The installed cost of the new HP/IP Turbine is budgeted for $9,000,000. If we subtract the avoided scheduled maintenance cost of $1,847,000 budgeted for 2008 from the installed cost of the new turbine, the net cost is $7,153,000. Using an energy value of $81.75 per MWH for electricity in 2008 and a capacity value of $6.37 per KW-Mo, the pay back period is 18 months.

Avoided Market Electricity Purchases =
(8 MW)($81.75/MWH)(24 H/Day)(.75 capacity factor) = $11,772/Day
Capacity Value = (8,000 KW)($6.37/kw-mo)/(30 days/mo) = $1,699/Day
Pay Back Period = $7,153,000 / $13,471/Day = 531 Days

Payment Schedule:

The lead time to design and manufacture this equipment is at least eighteen months. Assuming an order is placed by July 1st 2006, charges will be accrued as follows:

2007: $5,000,000
2008: $4,000,000

Total Project Cost: $9,000,000

Approved by: H. E. Keyes **Date** 4/28/2006
H.E.Keyes

Approved by: W H Smagula **Date** 4/28/06
W.H.Smagula

MK2 Generator Capability Study

The unit is presently operating at 335 MW gross (320 net) so an additional 12 MW's will bring it up to 347 MWs. The generator capability rating is 384 MVA and it is capable of generating 346 MW's with a .9 power factor and 167 MV's. Higher outputs are attainable within the existing capability of the generator at higher power factors:

.935 PF 359 MW and 136 MV
.950 PF 365 MW and 120 MV
.980 PF 376 MW and 76 MV

Prepared by: David Gruwell
11/17/05

Public Service Company of New Hampshire
Docket No. DE 09-091

Technical Session TECH-01

Dated: 09/10/2009
Q-TS-005
Page 1 of 2

Witness: **William H. Smagula**
Request from: **New Hampshire Public Utilities Commission Staff**

Question:
Please complete

a) the attached table - "Merrimack Station Unit 2 2008 Costs Related to Foreign Material Damage to Turbine,
b) indicate the total coverage of each policy, the respective deductibles, and the remaining coverage available after taking account of the amounts reported in each column on the table.

Response:
a) The attached table has been populated with the information requested.

b) The total coverage policy associated with replacement power is $31 million per event with a 60-day exclusion (deductible) period. The requested reimbursement for replacement power during 2008 was $4.5 million of which $3 million was received and booked in December 2008. Additional requests for replacement power cost reimbursement are being made in 2009.

The boiler machinery (property damage) has a deductible of $1 million with no policy cap. During 2008, covered expenses of $3 million were requested, and $3 million were received and booked in December 2008. Additional requests for maintenance expense reimbursement are being made in 2009.

In summary, the following identifies the insurance coverage deductibles and caps.

Boiler and Machinery: -- deductible $1M
(i.e. property damage)
Replacement power (specific to MK2):
(RPC) -- 60 day waiting period
-- Daily Cap $417K/daily max Dec-Feb, Jun-Aug
-- Daily Cap $316K/daily max Mar-May, Sept-Nov
-- Policy Cap $31M

Merrimack Station Unit 2 2008 Costs related to Foreign Material Damage to Turbine						
	Total (Gross) Costs	Avoided Costs due to Plant out of Service	Net Cost and Date Expense Booked to Energy Service	Insurance Amounts Received to Date	Date(s) Insurance Proceeds Booked to Energy Service	Status & Amounts of Additional Insurance Claim Amounts not yet received
Replacement Power Costs (RPCs)						
Jun 1 – Jul 31 2008	$19.1M	$5.9M	$13.2M(1) Date:Jun, Jul	NA(2)	--	NA(2)
Aug 1 – Oct 31 2008	$3M(3)	$0M(5)	$3M(3) Date:Aug,Sep,Oct	$3M	Dec 2008	$0
Nov 1 –Dec 31 2008	$1.5M(5)	$0M(5)	$1.5M Date:Nov,Dec	$0M	--	$1.5M Submitted 2009-Q1
Property Damage Expense						
Jun 1 – Jul 31 2008	$3M	$--	$3M(4) Date:Jun- Sep	$3M(6)	Dec 2008	$0
Aug 1 – Oct 31 2008	$0M	$--	$-- Date:	$--	--	NA
Nov 1 –Dec 31 2008	$0M	$--	$-- Date:	$--	--	NA

(1) $13.2M RPC associated with turbine inspection outage from June 20 – July 14 (all within the 60 day exclusion period)
(2) No insurance due to 60 day exclusion period
(3) Includes last 10 days of July
(4) Costs incurred during June, July; billing/payments over subsequent months
(5) RPC generation losses during August – December are associated with incremental generation and therefore have no avoided costs.
(6) The $1M deductible will be deducted from the final payment expected in 2010.

Public Service Company of New Hampshire
Docket No. DE 09-091

Data Request OCA-02
Dated: 08/14/2009
Q-OCA-013
Page 1 of 1

Witness: William H. Smagula
Request from: Office of Consumer Advocate

Question:
Referring to the responses to Staff 1-027 and Staff 1-029, please provide the prior "Foreign Matter Exclusion Policy" or practices for its fossil stations. Please also provide a comparison of the old policy and the new one, noting the changes. What is the status of the policy provided and dated 7/3/09? When did it go into effect?

Response:
PSNH's generating facilities employ similar foreign material exclusion (FME) practices. Using Merrimack Station as an example, the station utilizes what would be considered industry standard and commonly used practices. For example, when a valve is removed from a piping system, any openings are protected with some form of covering or plug for the period of time the valve is removed. When a section of pipe or tube is removed, the ends are typically wrapped and taped. New components, such as boiler tubing, that are to be installed are inspected for foreign material and blown out with compressed air prior to installation. Visual or borescope inspections are made on critical equipment prior to closure. The PSNH employee in charge of each job is responsible for FME requirements. Also, specific to the steam turbine generators, Siemens (formerly Westinghouse) follows their own FME procedures. To a large degree, these procedures are consistent with those of Merrimack Station regarding the protection of openings and inspection of equipment.

The process of foreign material exclusion from any Merrimack Station system or equipment has essentially remained the same, focusing on the protection of openings so that material cannot enter during on-going maintenance work and then inspecting the openings prior to closure. Changes that have been implemented are summarized as follows:

Additional checks and balances
In order to ensure the reliability of the FME practice, specific personnel are designated to have additional oversight roles and they perform walk-downs of all FME-related jobs during major outages. A list of these jobs is maintained and the controls in place for each item are checked for integrity.
Designated FME Roles
Responsibilities for FME roles are assigned by management. This effort may include just the person performing the work for a routine, non-shutdown job to one or more people performing the duties during an outage. Designation of responsibilities provides greater accountability.
Documentation
Records of inspections and control checks will be maintained. This provides confirmation of efforts to ensure FME and assists the facility to monitor these activities to ensure that no areas have been overlooked.

In summary, the major change that was made from past and present FME practices is that the new practice is clearly formalized and documented, while additional or secondary oversight is utilized as deemed appropriate by the maintenance manager.

The Foreign Material Practice, Revision 6, dated 7/3/09 is the current, approved version for Merrimack Station. This Foreign Material Practice, Revision 6, went into effect prior to 8/1/09 for use at the beginning of the Unit 2 planned Annual Outage.

PSNH
COAL INVENTORY SUMMARY REPORT

1/15/2009

	MK Inventory on the ground	Schiller Inventory on the ground	Actual Inventory MK & SCH on the ground	MK Target Inventory on the ground	SCH Target Inventory on the ground	Total Target Inventory	Delta Actual vs. Target
1/1/2009	319,425	96,765	416,190	148,500	36,000	184,500	231,690
1/15/2009	303,713	80,898	384,611	148,500	36,000	184,500	200,111

MK enroute	SCH enroute
8,500	

Last Year

1/1/2008	**228,127**	**49,080**	**277,207**	**148,500**	**36,000**	**184,500**	**92,707**
1/15/2008	**208,457**	**62,008**	**270,465**	**148,500**	**36,000**	**184,500**	**85,965**

DE 09-091 OCA Prefiled Testimony of Traum
10/19/09
Attachment 6