Newington Outages For 2008

Newington-1

The major projects for Newington in 2008 were the removal and inspection of the station's 6 largest motors and two of its medium sized motors and the installation of an upgrade to the turbine control system during the annual outage. For 2008, Newington's availability was above 95 percent. For 2008, Newington's capacity factor was approximately 3 percent. For the years of 2003 through 2005, the unit's capacity factor had hovered from just below 40 percent to above 50 percent. In 2006 and 2007, the unit's capacity factor hovered in the 8 percent range.

The following outages took place at Newington during 2008:

A
1/21 – 0.3 days
While starting the unit, a steam leak developed in the superheater drain line, a 4 inch line. The leak was large enough to warrant repairs so the unit was taken off line. Temporary repairs were made and the unit was returned to service. Permanent repairs were made during the major overhaul described in Outrage B below.

The leak was attributed to flow accelerated corrosion. Flow accelerated corrosion only occurs in carbon/steel pipe at 250 psi to 400 psi with multi phase flow conditions (steam and wet steam) present. Newington was in the process of evaluating its small diameter piping (4 inch) for this condition, but had not yet evaluated this section of pipe. Large diameter piping was evaluated years ago. PSNH also indicated that this issue has already been addressed at Merrimack and Schiller.

B
3/1 – 12.1 days
This was a planned outage to perform a major over haul of the unit and was scheduled for 14 days with the ISO and was completed in just over 12 days. During this outage, both forced draft fans, both induced draft fans, and both circulating pump motors were sent out for a complete inspection. 36 welds of dissimilar material were made in the secondary superheater outlet header. ABB informed PSNH in 2007 that it would no longer support the turbine control system at Newington which was installed in 1992. ABB was offering an upgrade to its existing control systems that would extend their lives by at least 10 years. The outage proceeded without incident.

C
3/14 – 26.2 days
When returning from the annual outage in Outage B above, the unit was operating at a higher MW level than it should have been at. The problem centered on the new speed control that had been installed during the annual outage and the initial settings applied.

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, was expected, and time 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 is a warning alarm, is called a high cool air 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, the operator by procedure is required to shut the unit down. A duplicate alarm came in approximately 9 minutes later. The operator acknowledged all 4 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 to a de-energized unit. The operator therefore did not initiate a unit shut down.

The operator stated that his experience during de-energized exciter and full speed conditions (Which the unit was under during this outage) during start up lasted for approximately 5 minutes and that he believed that the unit could operate indefinitely in this mode without harm. Due to these operator actions, the exciter was damaged.

Rather than wait 18 to 22 weeks for a new exciter, PSNH decided to participate in the Siemens spare rotor program The Siemens spare rotor was not 100 percent refurbished and the rotor coupling required modification. This rework extended the outage time.

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 (program was 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.

D
4/10 – 0.7 days
When returning to service from the installation of the Siemens spare 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 match field conditions. The rotor was balanced and the unit returned to service.

E
7/21 – 0.1 days
The unit was getting ready to start when the low pressure oil trip valve operated and would not open. This problem also occurred in 2007 and no cause was found at that time. In 2007, PSNH installed indicator lights to help troubleshoot the problem if it occurred in the future. Upon investigation, PSNH found that the low pressure oil relay had picked up; however the contacts did not make contact because the plunger had hung up. The relay was replaced and the unit returned to service. Note: The hung up plunger finding is consistent with the investigation conducted in 2007.

F
7/22 – 0.1 days
This outage consisted of a late phasing of the unit. During start up, the B induced draft fan tripped due to a faulty speed switch. PSNH found that the switch setting had moved. PSNH attempted to use the A induced draft fan for start up but the unit also tripped due to a furnace pressure excursion. Motor starting requirements require that a 90 minute waiting period take place between the first and second starts so that motor thermal capabilities are not exceeded. The unit started successfully on the second attempt. PSNH performed troubleshooting of the fan system, exercised the fan system components, but no problems were found.

G
7/24 – 0.7 days
The unit was off line but in reserve status. Water was observed by plant personnel under the boiler. A small leak was found in the economizer outlet in a rear wall tube. Repairs were made and the unit returned to service. The unit was not called for by the ISO during repairs.

H
12/9 – 0.1 days
The problems with the induced draft fan B occurred again on start up after not occurring for months. Induced draft A was used to start the boiler, but the boiler tripped off due to high furnace pressure. PSNH waited 90 minutes to restart the A induced draft fan (cooling requirement), however the unit again tripped on high furnace pressure when an attempt to start was made. PSNH performed extensive mechanical troubleshooting including logic anomalies between the A and the B induced draft fan systems as the feed forward system uses signals and not pressures for activation and the damper/vane drive systems. No binding or rubbing problems were found. PSNH did find some air leaks in several duct expansion joints and scheduled their repair or replacement during the 2009 spring overhaul (Four on the A side and 3 on the B side).

With regard top the B induced draft fan system, investigation found that the relay associated with the motor bearing lube oil pressure (Trips the motor on loss of oil pressure) was faulty. The relay was replaced and similar relays in other systems were tested in the 2009 spring overhaul.

PSNH notes that in 3/09; most of the expansion joints of the induced draft fan system and the feed forward system were replaced. The problem has not reoccurred since that time.

Evaluation for Newington Except Outages C and D

Liberty reviewed these outages and found them either to be reasonable and not unexpected for this unit and it's vintage or necessary for proper operation of the unit. Liberty concluded that PSNH conducted proper management oversight.

Evaluation for Outages C and D

Evaluation of Outage C

Liberty recommends a disallowance for the replacement power costs associated with this outage as the PSNH operator should have followed established procedures rather than to 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 which 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 material facts of the instant case. PSNH corrective actions are appropriate and should also be implemented 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. Liberty recommends that the Commission provide an after the fact opportunity for review of PSNH's efforts to mitigate costs to customers in this outage.

Evaluation of Outage D

Liberty recommends a disallowance for the replacement power costs of this outage as the outage would not have been required but for the improper actions described in Outage C above. Liberty recommends that the Commission provide an after the fact opportunity for review of PSNH's efforts to mitigate costs to customers in this outage.