

Schiller Unit Outages For 2008**Schiller-4**

The following outages occurred at Schiller-4 during 2008.

A

3/25 – 15.6 days

This planned annual maintenance outage had an ISO outage window of 17 days. The major work performed during this outage was boiler and furnace refractory, non-destructive examinations of boiler tubes etc., and the rewind of the induced draft fan. The boiler inspection indicated that the boiler condition was good and no changes in inspection frequencies were recommended. Examination of the pulverizers revealed that wet coal caused some contamination of the bushings and bearings. Liberty raised questions about the availability of soot blower parts. PSNH stated that they too had concerns and met with the vendor prior to the Schiller 6 annual outage (Scheduled later in the year) to be assured of spare parts for that outage and to develop a spare parts list for the soot blowers. PSNH also stated that the valve repair vendor quality control record keeping was being reinforced with the vendor due to inaccuracies noted during this outage. Work was completed within the outage window and the unit returned to service.

The vendor for the precipitators had 22 electrical/control and mechanical recommendations for both Unit-4 and Unit-6 precipitators. This is a considerable number of recommendations, some of which PSNH was planning to address in future outages. After discussion with the vendor, PSNH and the vendor developed a list of projects which should be done, projects which can be deferred or canceled, and a schedule for completion. PSNH has completed many of the recommendations and scheduled some for action during the 2010 maintenance outages which will be a longer outage than normal. Also see Outage 6-D below.

B (Outage Report OR-2008-09)

5/18 – 4.7 days

The unit was taken off line due to a small refractory failure that allowed the gas path to erode a generating tube causing a leak. While the unit was out of service, a total of 6 to 8 small leaks were identified and repaired and the unit returned to service.

C

10/5 – 1.7 days

The unit was taken off line due to a generating tube leak. The leak was repaired and the unit returned to service.

Schiller-5

The following outages occurred at Schiller-5 during 2008.

A (Outage Report OR-2008-01)

1/3– 6.8 days

The unit was taken off line due to loss of control of the temperature of the bed material during an event involving an air heater with broken tubes. PSNH tried to start the auxiliary gas burner but it failed to start and the unit eventually had to be taken off line. Investigation found that the linkage rod to the air damper shaft was not attached. PSNH believes that the attachment mechanism provided by Alstom had workmanship issues and pursued this matter with Alstom. It was decided to replace the entire damper and linkage assembly to eliminate the issue.

PSNH has also changed the Alstom operating procedures regarding the use of the auxiliary gas burner after this event. After dropping load on the unit as the first defense in temperature control, PSNH will now start the gas burner in preparation of further adjustment requirements rather than waiting for them to occur. PSNH believes that this action will provide more timely control of bed material temperature resulting in greater operator ability to keep the unit on line and prevent damage to the bed material.

B

1/11 – 2.4 days

When returning to service from Outage A above, the unit had to be taken off line due to an economizer tube leak at the inlet header. Investigation revealed that it was stress related crack and that it did not show up during the previous spring's non destructive examination. Repairs were made and the unit returned to service.

C (Outage Report OR-2008-05)

2/22 - 14.9 days

PSNH had been planning both an April (Mud season) and October planned maintenance outage for the unit. Low bed material temperature required that the unit be removed from service to prevent bed crusting. The bed was groomed and while returning to service, the forced draft fan experienced a fault which required that it be sent out for repair. With the length of the outage known, PSNH then decided to bring the April planned outage forward to take advantage of the unit down time for this event.

During this outage, PSNH also made permanent repairs to the linkage to the air damper described in Outage A above.

The forced draft fan motor returned to Schiller was rewound with Class H insulation, a higher class insulation than supplied at purchase (Class F). The higher insulation level is required during soft start conditions (Limits voltage drop and current inrush) as required by specification. PSNH uses a soft start for this motor, but a soft start generates more total heat to the motor due to a longer starting duration. Alstom supplied a motor that had 10 percent less copper than required for soft start conditions. PSNH has ordered a new

motor that will have the proper capabilities for soft start conditions, will use the rewound motor as a spare, and is pursuing this matter with Alstom. PSNH discovered that the induced draft fan motor has the same soft start issue, but that the soft start capability had been out of service during 2007 and will remain so for future start ups. PSNH is formalizing warranty related claims for both the forced draft and induced draft fan motors.

D

6/2 – 0.1 days

The unit was taken out of service due to a hot inboard bearing on the forced draft fan. Investigation found that the bearing oil filter was plugged. Also, the bearing reached 95 degrees C when the bearing temperature should have alarmed at 90 degrees C. PSNH found that Alstom had set the alarm at 100 degrees C. The alarm point was reset to its proper value and PSNH checked most of the alarm set points at other locations and found no major problems.

E

6/13 – 0.1 days

The unit tripped due to vibration of the forced draft fan. Investigation did not reveal the cause of the trip, but vibration of the inlet ductwork was suspected. The inlet ductwork was insufficiently designed and was to be replaced in its entirety in the October planned outage. The ductwork was replaced by Alstom at their expense and the vibration problem has not reoccurred.

F

10/6 – 0.2 days

The unit tripped due to a trip of the induced draft fan. Indication pointed towards a trip due to high amperage, but investigation revealed that it was a circuit board issue that triggered the alarm. The circuit board was replaced and the unit returned to service.

G

10/17 – 9.7 days

This planned maintenance outage was scheduled with an ISO window of 10 days and was taken to replace what PSNH considered a deficient Alstom design (Alstom disagrees) of the vortex finder, one of which had fallen into the cyclone cone. PSNH had redesigned the equipment by beefing up the Alstom design. Subsequently in 2009, the other 5 vortex finders were replaced with redesigned units. During this outage, the inlet ductwork to the forced draft fan was also upgraded as described in Outage E above. PSNH also repaired 800 air heater tubes with sleeves because of corrosion problems. These sleeves were repaired during the October 2007 outage with 12 inch sleeves which were thought to have resolved the problem, but did not. 48 inch sleeves were used for reinforcement in this outage.

One half of the air heater will be retubed in 2009. PSNH is claiming that the air heater issue is a design defect and is pursuing the matter with Alstom via a warranty claim.

H (Outage Report OR 2008-17)
12/7 – 4.7 days

The unit was operating at reduced loads due to air heater leak problems leading to problems controlling the bed material temperature. The air leaks caused increased forced draft fan loading causing high current readings, increased NOX emissions, and high cyclone temperatures requiring the unit to be taken off line. Seven air heater tubes were plugged and the unit was turned over to operations. While returning to service, the forced draft fan motor drive end bearing overheated due to insufficient oil. The bearing slinger ring was repaired and the unit returned to service.

Schiller-6

The following outages took place at Schiller-6 during 2008:

A
2/14 – 0.1 days

The unit was experiencing wet coal conditions. One pulverizer was lost and while putting in oil guns to support boiler temperature because the pulverizer temperature was below 135 degrees F, the other pulverizer tripped. The oil gun procedure takes approximately one half hour to implement. To shorten the time for intervention, oil would have to be heated and circulated continuously, a process that is expensive and normally not required. A pulverizer mill should be operated at a temperature of 150 degrees F; however temperatures of 135 degrees F and lower can be tolerated while mitigation takes place to prevent loss of boiler fires. Operators are not required to insert oil guns at a temperature of 135 degrees F. As a result of this incident, PSNH reviewed its procedures during low coal pulverizer temperatures and reaffirmed that a dynamic operator response, rather than a prescribed operator response is correct.

B
2/15 – 2.6 days

The unit was taken off line with a controlled shutdown due to a generating tube leak. A total of 4 leaks were found consisting of 2 generating tubes, a waterwall tube, and a tube roll were found. Repairs were made and the unit returned to service.

C
3/24 – 0.8 days

The unit was taken off line due to a chemical injection line leak that was caused by steam blowout from the deaerator due to steam wear. A section of the pipe was replaced and the unit returned to service. Other pipes have been inspected since this incident.

D
4/11 – 14.5 days

This annual planned maintenance overhaul was scheduled with the ISO for 2 weeks (17 days). During this outage major boiler tube reinforcement was performed. The outage

was moved up to the old Unit-5 maintenance window in April to take advantage of personnel on site performing the Unit-4 outage. The outage went as planned.

PSNH instituted a partial soot blower exchange program during this outage as a result of the parts problems that occurred in Outage – SCH-4-A above. Also see Outage 4-A above for status of precipitator repair recommendations.

E

6/18 – 1.6 days

The unit was taken off line due to a generating tube leak. Three leaks were found and repaired and the unit returned to service.

F

7/1 – 2.3 days

The unit was taken off line due to a primary superheater tube leak. The leak was repaired and during the hydro test for the boiler, 24 small leaks were found at the rolls of the tubes at the bottom of the mud drum. Those leaks were welded and the unit returned to service.

G

10/4 – 2.7 days

The unit was taken off line in a controlled fashion due to a primary superheater tube leak. The failed tube and tubes in the area were repaired and the unit returned to service.

H

11/24 – 1.1 days

The unit was taken off line due to a leak at the deaerator flange at the point of connection of the pipe from the tank due to steam wear. The pipe was repaired and the unit returned to service.

Evaluation

Liberty reviewed the outages at Schiller and found them either to be reasonable and not unexpected for these units and their vintage or found them necessary for proper operation of the units. Liberty concluded that PSNH conducted proper management oversight.

Recommendation Regarding Unit 5

Many outages have centered on issues regarding Alstom designs or Alstom workmanship issues. Liberty has reported on the action that PSNH is taking such as making a formal claim etc., however, little is known about the final resolution and the net impact (Replacement power costs versus settlement) it is having on customers. Liberty recommends that PSNH recover replacement power costs for the outages related to warranty and performance issues 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 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.