

Combustion Turbine Outages For 2008

The following outages took place at PSNH's combustion turbine units during 2008:

Lost Nation CT-1

Major work that was completed at Lost Nation during 2008 included the installation of high capacity emergency vents on the two fuel storage tanks to comply with the latest fire standards and the installation of oil leak detectors to comply with environmental regulations.

Lost Nation – 1

A

4/14 – 4.33 days

This scheduled outage was taken to perform the annual inspection. Included in the work performed were a visual inspection, general cleaning, and annual equipment tests and servicing the diesel starter engine. Testing and inspections revealed no abnormalities.

White Lake CT-1

Major work that was completed at White Lake during 2008 included the installation of high capacity emergency vents on the four fuel storage tanks to comply with the latest fire standards and the installation of oil leak detectors to comply with environmental regulations.

White Lake – 1

A

3/11 – 0.31 days

The E-SCC dispatcher received an alarm that the unit failed to start while the unit was not in operation or under request to do so. The unit had a new controller installed in October 2007 along with other control changes. The Ethernet module in the new Programmable Logic Controller (PLC) was found to be defective and bypassed so the unit could be returned to service on a remote basis. The module was replaced on 3/14.

B

4/28 – 4.00 days

This scheduled outage was taken to perform the annual inspection. Included in the work performed were a visual inspection, general cleaning, and annual equipment tests. Testing and inspections revealed no abnormalities.

C

6/2 – 0.32 days

The E-SCC dispatcher received an alarm that the unit failed to start while the unit was not in operation or under request to do so. The module position switch (detects loose logic cards) in the new PLC was found to be defective and replaced. The unit was returned to service.

D

6/13 – 0.09 days

The E-SCC dispatcher received an alarm that the unit failed to start while the unit was not in operation or under request to do so. The system computer was found in the off position and would not restart. The operator unplugged and plugged the computer back in resulting in a successful reboot. The unit was returned to service. Subsequent investigation warranted the installation of an Uninterrupted Power Supply which was installed on 7/29. The UPS installation seems to have corrected the problem.

E

7/18 – 0.13 days

The E-SCC dispatcher received an alarm that the unit failed to start while the unit was not in operation or under request to do so. Thunderstorms in the area caused a vibration alarm that initiated the alarm. Alarms were cleared and the unit was returned to service. The vibration monitor was scheduled to be calibrated on 7/30.

F

7/24 – 0.07 days

The E-SCC dispatcher received an alarm that the unit failed to start while the unit was not in operation or under request to do so. Thunderstorms in the area caused a vibration alarm that initiated the alarm. Alarms were cleared and the unit was returned to service. On 7/30, the vibration monitor was calibrated and reconfigured so that it would be in the off position when the unit was not in operation and turned on when the start command is given.

G

9/26 – 0.15 days

The E-SCC dispatcher received an alarm that the unit failed to start while the unit was not in operation or under request to do so. The operator found the generator breaker tripped and a generator high temperature alarm. The operator removed and reinstalled the generator trip circuit card in the annunciator panel (not part of the new controller) which successfully reset the alarm. The unit was returned to service. Subsequent testing of the generator trip relay, remote temperature devices, and wiring found no abnormalities.

Schiller CT-1

A

1/17 – 0.3 days

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# from 500# 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 alarming. PSNH has set up an evaluation team to evaluate this unit including maintenance practices and problems occurring at this unit. PSNH notes that the recommendations were implemented in 2009.

B

3/3 – 1.4 days

The unit was scheduled for its annual inspection with ISO-NE starting 3/8 (effectively 3/10 for normal work days). The unit was mistakenly taken out of service a week early while 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 accesses 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.

C

3/10 – 4.5 days

This scheduled outage was taken to perform the annual inspection. Included in the work performed were a visual inspection, general cleaning, and annual equipment tests. Testing and inspections revealed no abnormalities.

D

6/5 – 0.1 days

While in standby mode, an alarm for high generator stator temperature was received. Investigation found the trip relay in the trip position. The relay was cleaned and tested and the unit was returned to service. A new relay was ordered to replace the exiting relay at an appropriate time in the future.

E

6/20 – 0.0 days

While in standby mode, an alarm for high generator stator temperature was received. Investigation found the trip relay in the trip position. This is an identical outage cause as discussed in Outage D above. The new relay ordered as a result of Outage D above was

received on 6/17 and there was insufficient time since receiving the relay for it to be installed prior to this outage. The new relay was installed at this time.

F

9/28 – 0.1 days

While in standby mode and connected to the 34.5 kV system (The Schiller CT has the capability to feed into the 34.5 kV system or to Schiller Station), a lightning arrestor just outside the coal pile on the 367 34.5 kV line failed. The failed lightning arrestor was isolated, the unit was switched to its alternate feed, and the unit was returned to service.

G

10/20 – 0.1 days

The unit was called to operate by the ISO and went to full load. After approximately 5 minutes, a vibration alarm for probe #3 shut the unit down. Investigation found that one of the vibration probes was dirty. The probe was cleaned and the unit was returned to service. PSNH notes that all probes were inspected and cleaned in the 2009 annual inspection.

H

10/28 – 0.0 days

This was a short scheduled outage to replace a thermocouple monitoring temperature of the turbine. Two turbine temperature alarms were received the previous day and identified the need for replacement.

Merrimack CT-1

Major work completed at the Merrimack combustion turbine included the removal and replacement of the free (rotating blade) turbine on CT-1.

CT-1 and CT-2 are connected to the 115 kV transmission yard via a common step transformer and have common fuel systems. Some of the concurrent outages listed below are a result of those configurations.

A

4/21 – 4.3 days

This scheduled outage was taken to perform the annual inspection. Included in the work performed were a visual inspection, general cleaning, and annual equipment tests. Testing and inspections revealed no abnormalities. During this inspection, the free turbine (rotating blade) was replaced with a loaner so the PSNH turbine could be refurbished. Once refurbished, the PSNH turbine would be reinstalled (See Outage 1-E below)

Although not required to because of configuration, the CT-2 annual outage was performed at the same time. (Also see Outage 2-A below)

B

5/7 – 0.2 days

This outage was taken to replace a “T” in the CT-1 fuel line. The “T” was replaced and the unit was returned to service.

A fuel filter leak on CT-2 was also repaired during this outage. (Also see Outage 2-B below) The fuel system consists of common fuel tanks with a common feed line and a common filter. The fuel system then splits into two lines with a separate filter for each unit.

C

5/10 – 0.2 days

This outage was taken to repair a lube oil pump leak. The leak was repaired and the unit was returned to service.

D

7/21 – 1.0 days

While in operation, a high vibration initiated a unit trip. The turbine vendor did a boroscope examination of the area surrounding the vibration location for damage.

No damage was found. The vibration probe was replaced and the unit started without incident.

E

10/6 – 4.1 days

This scheduled outage was taken to reinstall the PSNH free turbine so that the loaner turbine could be returned. (Also see Outage 1-A above)

F

10/26 – 0.1 days

During the Merrimack-1 overhaul, the CT-1 circuit breaker was replaced. It was required to de-energize the bus to test this breaker. (Also see Outage 2-D below)

Merrimack CT-2

A

1/5 – 1.4 days

This scheduled outage was taken to perform the annual inspection. Included in the work performed were a visual inspection, general cleaning, and annual equipment tests. Testing and inspections revealed no abnormalities. This outage was done in conjunction with Outage 1-A above.

B

5/7 – 0.2 days

This outage was taken to repair a fuel filter leak on CT-2 and was done in conjunction with a fuel line repair to CT-1. The leak was repaired and the unit was returned to service. (Also see Outage 1-B above)

C

10/20 – 1.0 days

The unit was called upon to run by the ISO. CT-2 failed to phase to the system. Bad diodes were found in the dead bus relay board. The relay board was replaced and the unit was returned to service.

D

10/26 – 0.1 days

This outage was required so that the bus could be de-energized for testing of the new generator breaker on CT-1 because of the step transformer configuration. (Also see Outage 1-F above)

Evaluation Except for Outages Schiller CT-1 A and B

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

Schiller CT-1 Outages A and B

Schiller CT-1, Outage 1-A

This outage is for identical reasons as the outage described in the review of the 2007 SCRC (Outage 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.

Schiller CT-1, Outage 1-B

The time for the outage and outage extension 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.