

W. F. Wyman-4 Outages For 2008

W. F. Wyman-4 Station

The W. F. Wyman Station was sold to a competitive power supplier and competes in the New England competitive market to sell its power. Florida Power & Light (FP&L) owns the majority of the unit and is responsible for day-to-day operations. PSNH is a 3 percent minority owner of Unit #4 at the station, and as such, is aware of how the plant conducts business. However, PSNH has little influence over day-to-day operations of the plant provided those operations are within wide operating bounds. This unit is an extremely high cost oil unit that has tight environmental operating restrictions placed on it. The unit operates at an annual capacity factor of approximately 5 percent. Liberty makes this distinction because it believes that the measurement of prudence is different than the measurement used for PSNH's wholly-owned and controlled units providing energy at cost to PSNH customers because of the extent of outside ownership.

The major projects performed at Wyman-4 this year were the replacement of the deteriorating generator step up transformer and the rewind of the generator stator described in Outage I below.

W. F. Wyman-4

A

1/22 – 0.1 days

In 6/07, a new control system was installed. When putting the unit on line, the operator must match certain pressures in the boiler. The boiler was in variable pressure mode during this startup when the boiler tripped due to SUSD (Start up – shut down) procedure irregularities. Investigation found that the proper steps for start up in the variable pressure mode were not in the operator's procedures nor had they ever been. The step missed by the operator was to push the run button which is required of all equipment start functions. It is not known how or why the operator skipped this step. FP&L added this specific step to the procedures and refreshed all personnel on this matter.

B

2/4 – 0.1 days

The unit tripped due to a master fuel trip on high/low furnace pressure. The forced draft fans and the induced draft fans have variable pitch blades that must be coordinated when firing a set of burners. The induced and forced draft fan coordination needed calibration due to the installation of the new control system in 6/07 and was performed at this time. When the new control system was installed, the fan manufacturer set the induced draft fan blade angle at zero degrees with zero demand. After problematic starts, including this outage, and limited number of starts for troubleshooting, the manufacturer tuned the blade setting to -2 degrees and added a time delay. Such work is part of the tune-up process for the new control system.

C (Outage Report OR-2008-04)

2/11 – 6.0 days

The unit was not dispatched at the time of this outage. A fault occurred in the 6.9 kV bus between the station service starting transformer (T-12) and the switchgear. Investigation found that the heaters in the bus were not functional allowing moisture to build up in the bus sections. Subsequent freezing and thawing cycles led to tracking and ultimate failure. Inspection revealed excessive moisture in the remaining bus sections and a measurement of the heater current draw indicated that only possibly one of twenty heaters was operational.

The bus work was repaired and an emergency generator was used to load the bus to dry the bus insulation until insulation readings were acceptable. Once insulation was acceptable, welders were used to maintain a 200 amp load on the bus until new heaters could be installed. The unit was returned to available status. The replacement heaters were ordered and replacement of the heaters was projected to be done in the spring (See Outage E below).

FP&L checked all similar busses in the plant and found that the current draw of the heaters was satisfactory. FP&L has also installed meters that show heater current draw that operators check when making rounds.

D

5/7 – 0.1 days

A faulty low pressure switch tripped a fuel oil pump causing a master fuel trip of the unit. The switch was repaired and the unit returned to service.

E

5/11 – 6.2 days

This outage was a planned outage to install the bus duct heaters that were ordered as a result of the outage described in Outage C above.

F

6/9 – 0.1 days

The operator missed the high temperature alarm on the inlet gas temperature to the induced draft fan. The cause of the high temperature alarm was that there was too much fuel input to the boiler. Because of the high gas temperature, the induced draft fan tripped and shut the unit down. Investigation found that the high temperature alarm was masked due to a large number of alarms coming in during startup including those generated by required tuning for the new control system. In the later part of 2008, FP&L installed an alarm management system to help manage alarms through prioritization, levels, etc.

G

6/20 – 1.5 days

This was a planned maintenance outage. Water had been observed coming from the boiler. A tube leak was found and repaired and the unit was returned to service.

H

7/18 – 0.0 days

This outage is similar to the outage described in Outage B above where a unit trip occurred due to a master fuel trip because of high/low furnace pressure. It was thought that the replacement of the faulty low pressure switch in Outage D above rectified the problem. Investigation found nothing out of order.

I

9/13 – 58.7 days

This major planned overhaul was taken to rewind the generator stator and to perform other scheduled maintenance activities. The station experienced water leaks in 2004 and 2005. Insulation testing of the generator stator in 2006 indicated that the insulation was starting to fail. A rewind of the generator stator was recommended by the original equipment manufacturer and was scheduled to take place during the annual 2008 overhaul.

Dissolved gas analysis of the generator step up transformer indicated that gassing (Indicating deteriorated insulation) was taking place for 4 years. In 2008, it was estimated that the insulation had an 18 month remaining life, so the transformer was scheduled to be replaced during the 2009 annual outage. Because of the need to rewind the generator stator, the step up transformer was replaced during this outage.

J

11/10 – 2.2 days

After the unit returned to service from the major overhaul described in Outage I above, performance testing was required related to the generator and the generator step up transformer. This outage was taken to perform that performance testing.

K

11/12 – 0.4 days

After the unit returned to service from the major overhaul described in Outage I above, performance testing was required related to the generator rotor and the generator step up transformer. This outage was taken to perform that performance testing.

L

11/13 – 2.2 days

After the unit returned to service from the major overhaul described in Outage I above, performance testing was required related to the generator rotor and the generator step up transformer. This outage was taken to perform that performance testing.

M

11/15 – 0.3 days

After the unit returned to service from the major overhaul described in Outage I above, performance testing was required related to the generator rotor and the generator step up transformer. This outage was taken to perform that performance testing.

Evaluation

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

Recommendation Regarding Outage C

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 will be inspecting them prior to the winter freeze and thaw cycles. Liberty recommends that due to shifting market conditions that can change the operation of both Merrimack and Schiller, that PSNH evaluate the need for heaters in their isophase bus ducts.