

# Lesson Learned

## Plant Onsite Material and Personnel Needed for a Winter Weather Event

### Primary Interest Groups

Generator Owners

Generator Operators

### Problem Statement

A 700 Mw generating plant, despite having installed new freeze protection to maintain the plant's operability to 40 degrees F during 0 degrees F conditions, contributed to a BA having to implement load sheds because it could not keep generation online during 0 degrees F conditions because of critical components freezing.

### Details

Before a cold weather event, the plant personnel discussed the forecast for the on-coming cold weather during plant staff meetings, advising everyone to remind their teams to prepare for the cold weather of longer duration than the plant had experienced before. Temporary enclosures were constructed in areas subject to wind. Portable heaters and tarps were placed where critical equipment, instrumentation and/or piping was located. The fuel level in the kerosene heaters was checked and fuel was added as needed. Heat tracing panels were checked and heat tracing was verified to be functional. A "tools down" order was communicated to all plant personnel to prevent any problems associated with non-emergency maintenance work. This order included no changes or tuning to be done on the plant control system. The "Work Force Disruption Policy" was initiated and essential maintenance and operations personnel were confirmed and scheduled for day and night shifts staying at the plant site to avoid delays in personnel getting onsite. Operators and the plant water technicians increased rounds. Physical surveys of all piping and tubing insulation were conducted and deficiencies were corrected. This continued throughout the event.

For several days, the Plant experienced night time low temperatures of the middle teens, daytime highs of the middle twenties and wind chills as low as zero degrees. Despite the precautions taken, a level switch and transmitter sensing line froze, resulting in low condensate storage level and a turbine trip just before 6:00 a.m.

Among the weatherization changes made to bring the unit back online were temporary insulation and drop lights which were wrapped around the units' low water level transmitters. Repairs were made to the level switch target guide and operations thawed the low level transmitter, insulated it and installed a 250 watt heat lamp on the transmitter.

After cleanup and resolving other issues which resulted from frozen equipment, the unit returned to service at 3 a.m. the next day.

### **Corrective Actions**

The GO/GOP brought additional supplies in addition to those already on-site for winter operation, including over 1300 gallons of kerosene for heaters, over 40 more tarps, 750 feet of heat trace, ten hand-held propane torches and fuel, extension cords, etc. Additionally, the GO/GOP:

- Developed a Freeze Protection Task Team for continuous monitoring and evaluation of the Freeze Protection Procedure. Some of the responsibilities included prioritization of corrective actions taken and recommend permanent repairs.
- Contacted suppliers of prefabricated insulation covers to schedule an evaluation of current covers to confirm proper durability and functionality as well as have the suppliers make recommendations for improvements.

### **Lessons Learned**

GO/GOPs should maintain a sufficient inventory of winterization supplies for each generating unit. These supplies should be on site and located near each generating unit for easy access. Items to have in stock that may need to be needed to increase freeze protection are:

- Extension cords
- Portable generators
- Insulation material and fleece blankets
- Electrical heat trace
- Heat guns
- Plastic rolls
- Heat lamps and portable heaters
- Copper instrumentation tubing
- Propane heaters and propane bottles
- Handheld welding torches
- Heat lamps

GO/GOPs should:

- Consider placing thermometers in rooms containing equipment sensitive to cold temperatures and monitor in order to be able to take action when temperatures fall below freezing.
- Consider having extra personnel at the plant site or in hotels near the plant so as to have the necessary personnel available to keep the plant operating and to minimize personnel having to travel roads icy roads.

- Evaluate their plant electrical circuits to insure they have enough capacity to handle electrical heaters. Those circuits with Ground Fault Interrupters (GFIs) should be continuously monitored to make sure they have not tripped due to condensation.
- Drain any non-critical service water lines in anticipation of cold weather.
- Know the ambient temperature for which the freeze protection is designed.

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