

Lesson Learned

Plant Operator Training to Prepare for a Winter Weather Event

Primary Interest Groups

Generator Owners (GO)
Generator Operators (GOP)
Balancing Authorities (BA)

Problem Statement

During a severe winter weather event, human performance errors caused generating units with a combined output of over 700 Mw to trip, which contributed to the Reliability Coordinator (RC) and Balancing Authority (BA) having to implement rolling load sheds.

Details

The Generator Owner/Generator Operators (GO/GOP), using detailed checklists, performed their annual weatherization program on their plants in the Fall/Winter of 2010 to prepare for the cold weather. As the weather forecast began calling for freezing temperatures, the plants implemented pre-defined freeze protection procedures. These procedures are specific to each plant and unit and include tasks such as ensuring that generating equipment is protected and ready for a freeze event, heaters are fueled and ready to operate, the station has spare food and accommodations for staff, and that subsidiary plant equipment is protected. During the cold weather event, the plants experienced temperatures below freezing for 65 hours and wind chills as low as in the single digits. At two plants, four units tripped due to human performance errors. The human performance errors experienced by these two plants were:

- Frozen instrument sensing lines caused false instrumentation signals to be transmitted. Operators did not recognize that data integrity had been affected which led to incorrect operator decisions and actions.
- Plant operators, who were manually operating units, made mistakes by not compensating for the colder temperatures.
- Plant changes were made in violation of the plant's tag lockout procedure
- It's mentioned in Bullet 3 and 4 in lessons learned about possible communication issues, it would be appropriate to list an example here to lead in to the lessons learned.

The frozen critical instrument sensing lines were thawed and other measures were implemented to correct the errors and return the generation to service. The generation was back online later in the day but missed the morning peak.

Corrective Actions

The GO/GOP evaluated their plant training programs and addressed the human performance issues. They incorporated training, which improved the situational awareness of operators, by informing them of the additional unit parameters which should be cross referenced with other critical system measurements to aid them in their ability to identify inaccurate instrument measurements. The training organization also evaluated and implemented changes in each plant control room and unit console to minimize the potential for human performance error.

Lessons Learned

To maximize plant operator human performance during cold weather operations, GO/GOPs should consider the following:

- Have operators trained on the winter freeze protection plan and the emergency winter operation plan to provide them better insight into the plant operation during winter events including awareness of the capabilities and limitations of the freeze protection monitoring system.
- It is likely that operators will accept critical metering as always being accurate, as it usually is reliable most of the time. Hence, there is a need for data integrity training and reminders that critical unit data may be inaccurate and should always be correlated with other data to help determine its accuracy. Also, procedures should be developed and practiced where operators are dependent on manually receiving critical operating data to simulate conditions where parameter sensing transmitters malfunction or freeze. Simulators would be ideal to provide this training.
- Plant operators communicate with many other entities and during a period of high stress operations events, common with severe winter weather, operators will be communicating with other entities such as BAs, which are also experiencing high stress conditions. Due to possible miss-communications, plant operators should ensure, just as with normal communications, the use of 3-way communications protocol is used when receiving or giving instructions.
- During high stress situations such as capacity emergencies, human performance errors could occur due to terminology differences between entities. For example, a BA communicates to its Transmission Operator (TOP) to “shed 500 Mw of load” from the system. To accomplish this, the TOP removes power from enough customers to reduce 500 Mw of load on the system. This terminology has a different meaning to plant operators. In many cases, if a plant operator received the same message, it would be interpreted to mean to shed their customer load by reducing their generation output 500 Mw. BAs must be very careful in using this terminology. If such terminology is used where both TOPs and GOPs see the same message, the BA should consider adding the verbiage “For plants – do NOT reduce generation”.
- If staff cannot be housed near the plant, GO/GOPs should ensure that additional staff such as Operations, Maintenance and Engineering personnel, who are trained to be able to perform certain critical jobs, are at the plant prior to the onset of an extreme cold weather event and throughout the extreme cold weather. Human performance errors increase dramatically if personnel have to perform duties which they have not been trained to do and which are normally done by others.

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