NERC Lessons Learned:

“Inadvertent CVT Fuse Removal on a Live Circuit”

“RAS Unexpected Operation”

“Loss of Monitoring or Control Capability due to Power Supply Failure”

“Breaker Failure due to Multiple Reclose Attempts”

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• **Title**
  – Inadvertent CVT Fuse Removal on a Live Circuit

• **Source of Lesson Learned**
  – Northeast Power Coordinating Council (NPCC)

• **Date Published**
  – August 1, 2019
• During a planned outage, switching was required to transfer load from one circuit to another parallel circuit
• After the load transfer, the switching crew skipped a pre-isolation switching procedure to familiarize with station equipment
• The crew inadvertently pulled the CVT fuses from the circuit carrying load
• Resulted in line protection relay operation and loss of 382MW
• Circuit was later energized and load restored
Lessons Learned

- Enhance labeling differences between similar nearby or parallel equipment
- Ensure all staff positively identify the equipment associated with their job
- Have training and documentation which clearly details the roles and responsibilities of every staff member
- Be cognizant on the effect of long wait times
- Do not skip procedures due to familiarity
- Periodically conduct refresher training courses for all staff
• **Title**
  – RAS Unexpected Operation

• **Source of Lesson Learned**
  – Northeast Power Coordinating Council (NPCC)

• **Date Published**
  – August 1, 2019
Problem Statement

• In accordance with work plan, a technician physically removed the control unit that commands the RAS in order to conduct test plans
• After the test, control unit was returned and system restored to normal operation
• Technician noticed an incorrect label on one of the control unit cards
• Technician attempted to change card label with the control unit in place
• Cards were not secured with screws as required, therefore slight motion triggered RAS
• RAS rejected generation and triggered load shedding
Lessons Learned

- Ensure installation of equipment follows supplier’s design recommendations
- Ensure RAS cards are firmly screwed to avoid RAS activation due to card movement
- No matter how small the job, work plan procedures and their review should be detailed and precise to ensure all steps are completed appropriately
- Equipment assembly procedures should include reminders to avoid omission of equipment pieces
• **Title**
  – Loss of Monitoring or Control Capability due to Power Supply Failure

• **Source of Lesson Learned**
  – North American Electric Reliability Corporation (NERC)

• **Date Published**
  – August 1, 2019
Several entities have experienced energy management system (EMS) outages from power supply failure.

Outages due to the instability and insecurity of normal power supplies and the failure of standby power supplies.

7 cases were reported and investigated during scheduled and unplanned power outages.

In 1 case, system operator failed to notice an EMS alarm indicating lack of communication between CC & substation.
Lessons Learned

• Routines should be created for monthly testing and maintenance running of backup generators
• UPS battery life, charge cycle and size should be assessed as part of risk analysis
• Periodic maintenance and monitoring of any UPS system beneficial
• Devices should be balanced between PDUs to prevent overloading
• Ensure input ratings of the PDU are in harmony with the outlet ratings and that they have the required functions
• The power supplies of the switches should be connected into the different UPS circuits
Lessons Learned

• A redundant sealed valve regulated lead acid battery string on each parallel UPS is recommended
• Communication between work groups or departments is vital to maintaining situational awareness of the bulk power system
• Mandatory operator response to alarms should be reinforced
• **Title**
  – Breaker Failure due to Multiple Reclose Attempts

• **Source of Lesson Learned**
  – Western Electricity Coordinating Council (WECC)

• **Date Published**
  – August 13, 2019
Problem Statement

- A tree fell into a 115 kV line, breaking the C-phase conductor
- C-phase conductor fell and made permanent contact with the grounded transmission tower
- Breakers cleared fault and then initiated a re-close
- One of the breakers malfunctioned and improperly self-initiated re-closures into the faulted line seven more times
- During the final reclose attempt, the breaker failed to interrupt the fault and eventually faulted internally on the C-phase
- The main bus differential lockout relay opened all breakers on the 115 kV bus.
Lessons Learned

- It was found that there was an insufficient gap between the top of the close-coil plunger and the close lever in the breaker’s closing mechanism.
- Breakers do not come from the manufacture this way and was a result of improper maintenance.
- After performing work on breakers, ensure the reassembly of equipment follows manufacturer’s recommendations.
- Include a step to verify the gap parameters in breaker diagnostic checklists that are used during maintenance activities.
- Lesson learned includes steps for visual inspection to determine if condition exists on other breakers.
Links


