

## NERC Lessons Learned:

“Automatic Capacitor Operations along Radial Feed Result in Load Shed”

“Enhanced Alarming Can Help Detect State Estimator and Real-Time Contingency Analysis Issues”

“Telecom Provider Failure Induced Loss of ICCP from Regional Neighbors”

Donnie Bielak  
Reliability Engineering

- **Title**
  - Automatic Capacitor Operations along Radial Feed Result in Load Shed
- **Source of Lesson Learned**
  - ReliabilityFirst
- **Date Published**
  - May 15, 2019

- In an area with ongoing 138 kV outages, an unplanned 138 kV bus outage created a radial load pocket
  - Bus tripped when a mini-excavator made contact with a control cable due to the absence of a section of protective barrier board
  - No initial voltage or thermal violations after the trip
- One area capacitor already in service
- After approximately 90 minutes, another area capacitor switched in service automatically spiking voltage and tripping and locking out both capacitors
- Approximately 30 MW load shed to restore voltages to acceptable levels

- Consider varying load conditions and operating scenarios
- Determine if larger capacitor banks need to be replaced by smaller banks
- Increase system operator situational awareness of crews working near facilities
- Confirm contingency results with load flow analysis
- Limit in-service construction work when load pockets can be formed
- Disable the AVC on the capacitor banks
- Care should be taken when responding to unplanned events to identify additional risks such as newly formed topologies that may become radial

- **Title**
  - Enhanced Alarming Can Help Detect State Estimator and Real-Time Contingency Analysis Issues
- **Source of Lesson Learned**
  - ReliabilityFirst
- **Date Published**
  - May 15, 2019

- Several entities in RF have experienced state estimator or real-time contingency analysis outages that could have been mitigated more quickly with better alarming
- Five EMS outages reviewed
- Entities had real-time monitoring alarms and additional alarms to detect the health of the EMS and alarming functions
- There were circumstances that created the need for an additional alarm to notify the operator of the loss of SE or RTCA functionality

- Perform a risk assessment to help determine any gaps in alarming
  - Risk assessment is critical due to the different registrations, responsibilities, and duties of the entity that owns and operates an EMS
  - Alarming quantity, visualization, and sound effects widely vary
  - It is important for the entity not only to ensure what alarms are needed, but to assess what can cause these alarms to fail or otherwise go unnoticed
- Where applicable, an independent timer may be used as an effective control for ensuring that real-time assessments are being performed on a timely basis

- **Title**
  - Telecom Provider Failure Induced Loss of ICCP from Regional Neighbors
- **Source of Lesson Learned**
  - Northeast Power Coordinating Council
- **Date Published**
  - May 15, 2019



- A RC intermittently lost ICCP at both data centers from a single telco from a hardware failure at a common regional hub
  - Could not fail between the two locations
- Border Gateway Protocol (BGP) WAN configuration at both data centers favored using the primary telco
  - Since primary connection was not completely down, data center did not fail over to secondary telco
  - BGP configuration had to be adjusted to ignore primary communication pathways until the hardware problem was corrected

- Never assume geographic diversity alone provides redundancy for telecom
  - Ensure redundant circuit physical separation and independence of supporting equipment
  - Include language to maintain that separation will be preserved if the provider merges with or is sold to another telco
- Validate the independence by testing with the vendor to attempt to simulate this type of failure
- Ensure that the data center does not continually automatically “fail back” to a preferred provider under intermittent conditions

- [https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/20190501\\_Automatic Capacitor Operations along Radial Feed Result in Load Shed.pdf](https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/20190501_Automatic_Capacitor_Operations_along_Radial_Feed_Result_in_Load_Shed.pdf)
- [https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/20190502\\_Enhanced Alarming helps detect SE RTCA issues.pdf](https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/20190502_Enhanced_Alarming_helps_detect_SE_RTCA_issues.pdf)
- [https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/20190503\\_Loss of ICCP from Regional Neighbors.pdf](https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/20190503_Loss_of_ICCP_from_Regional_Neighbors.pdf)