NERC Lessons Learned

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- Air Blast Circuit Breaker Cold Weather Operation
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Problem Statement

- Cold weather temperatures can drastically challenge the reliability of the Bulk Electric System (BES). This lesson learned focuses on a specific issue for sectionalizing elements in substations

Details

- This substation event took place in very cold and windy location. Local temperatures dropped to -33 F (-36 C) with wind-chill effectively making it -45 F (-42.8 C)
- Earlier in the morning, one air blast circuit breaker automatically locked in the “closed” position because of low pressure protection due to air leaks from the gaskets
- The operator tried to isolate the circuit breaker, but one of the phases of adjacent motor-operated disconnect switches did not operate properly because of weather conditions (only two phases opened).
- This resulted in the opening of several circuit breakers in the substation, the tripping of one circuit, and excessive compressor runtime alarms on the breakers.

Corrective Action

Predictive Inspection: This maintenance for air blast breakers is meant to detect issues that concern resistance, the appearance of corrosion or mechanical damage, silicone seals, and the position of drip washers. This should occur every 8 years.

Complete Inspection: One module per breaker is inspected. The main contacts and sub-assemblies (blow-off and control valves as well as the C-20 valve and its spherical reservoir) are tested and drive shaft pins are replaced. This maintenance should occur every 1,000 operations.

Lessons Learned

Scheduled condition monitoring should be used to keep track of seal or gasket degradation as a potential cause of air leakage.

Small air leaks cause unnecessary cycling and wear on compressors, resulting in additional maintenance needs (e.g., oil changes, belt/motor/piston replacement).

References

- https://www.nerc.com/pa/rrm/ea/Pages/Lessons-Learned.aspx

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