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NERC Lessons Learned and Alerts

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Link: Lessons Learned (nerc.com)

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NERC Lessons Learned

Preventing unwanted operations during relay diagnostic restarts

Initial Distribution: November 16, 2022

Interest Groups:	TO, TOP, GO, GOP, DP
Problem Statement:	An entity experienced an unexpected operation of a breaker failure relay that was protecting a breaker on a BES main bus, upon further investigation, it was found that that the relay's memory was corrupted by cosmic high energy charged particles. The self-diagnostic system of the relay identified the corrupted memory and initiated a diagnostic restart, which lead to an undesired breaker failure trip.
Lessons Learned :	One practice that can be applied is to specify what the relay should do on the first pass through the free form logic, one helpful option is to block operations when a diagnostic restart is asserted, preventing any unwanted operations until the restart is completed.
	Another identified best practice is to test the relay by applying normal input voltage and load current to the relay and then cycle the power to the relay. This test can be performed during commissioning or during type testing. Testing may identify a relay that is susceptible to closing its output contacts during a diagnostic restart.
	A third identified best practice is to isolate the relay from the system by opening its test switches prior to making any changes to the relay. If an undesired output is issued upon restart, there will be no system impact since the relay is isolated. Personnel should ensure there are no standing output(s) coming from the relay prior to returning it to service.
	Update firmware versions released by manufacturer

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Air Blast Circuit Breaker Cold Weather Operation

Initial Distribution: December 15, 2022

Interest Groups:	TO, TOP, GO, GOP, RC
Problem Statement:	An Air blast circuit breaker automatically locked in the “closed” position because of low pressure protection due to a leak from the gasket during extreme low temperature (-42.8 C). Typically air compressor can keep up with slow leaks, but in this extreme cold the leak rate exceeded the compressor’s ability to adapt. 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.
Lessons Learned :	Scheduled condition monitoring should be used to keep track of seal or gasket degradation as a potential cause of air leakage. Extreme cold temperatures reduce the effectiveness of the seals due to loss of elasticity during operations. Long term compression of gaskets also makes them less effective.
	Maintenance and inspection practices for air blast circuit breakers need to include condition checks and grout and coating replacements as needed.
	Advancing maintenance programs to replace seals and gaskets earlier than specified in the manufacturer’s manual should be considered.
	The complexity and number of required components in an air blast breaker introduces additional failure modes and mechanisms not seen in similar capability SF6 breakers. They have additional maintenance needs as well. Sourcing spare parts for this equipment may be difficult, so entities may find that a cost benefit analysis favours replacing these breakers with something else than maintaining them.

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