NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Lesson Learned
Auxiliary Relay Contact Contamination

Primary Interest Group
Transmission Owners (TO)
Generation Owners (GO)
Distribution Providers (DP)

Problem Statement
A substation circuit breaker may have failed to operate because of possible auxiliary relay contact oxidation.

Details
A fault occurred that required the associated protection system to actuate. One of the substation circuit breakers designed to open by the scheme failed to do so, correctly initiating a breaker failure operation. This caused adjacent protection schemes to correctly operate to isolate the fault.

Following the event, during troubleshooting, the breaker once again failed to trip on the first test attempt. In subsequent tests, the breaker operated properly.

Upon further investigation, the contacts for the auxiliary relays were examined and were noted to be visibly tarnished. This sequence of events indicates that possible sulfidation may have degraded circuit integrity and prevented the breaker from tripping.

Corrective Actions
The entity burnished the contacts for all auxiliary relays in the affected protection scheme, and performed functional tests that verified the integrity of the circuit before returning the protection scheme to service.

The entity evaluated its auxiliary relay contact maintenance practices and modified its inspection procedures to include inspecting (where possible and practical) for signs of contamination (corrosion, oxidation, sulfidation, environmental) and to clean the contacts if necessary as part of the maintenance interval.

Lesson Learned
The entity periodically functionally tests its protection system, which includes functional checks of auxiliary relay contacts. However, this event raised questions about contact integrity due to possible sulfidation, oxidation, and contamination. Entities should review and evaluate their maintenance and inspection practices for the auxiliary relay contacts to ensure these problems do not occur. Entities may also want to consider if any environmental factors warrant more frequent inspection of auxiliary relay contacts.

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For more Information please contact:

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