NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Lesson Learned

Combustion Turbine Anti-Icing Control Strategy

Primary Interest Groups
Generator Owner (GO)
Generator Operators (GOP)

Problem Statement
Unexpected icing due to intermittent interference from outside sources may present operating challenges.

Details
After an entity's investigation of an icing-over of a combustion turbine air inlet, it was determined that there were several situations where the original equipment manufacturer's (OEM) anti-icing logic did not detect all potential icing conditions as currently designed. This investigation was performed in consultation with the OEM's engineering department and included independent research from the entity's power plant users group. In a few instances, unexpected icing occurred where combustion turbine air inlets were subject to intermittent interference from outside sources of warm and moist air streams, such as when located near surface water bodies (rivers, lakes, oceans) or near artificial sources that emit warm, saturated air streams (such as cooling tower plumes, exhaust stack plumes, blowdown tank vents, flash tank vents, etc.). Although these outside sources are somewhat intermittent and unpredictable, they can occasionally impact the combustion turbine inlet air, depending on wind speed and direction, wind gust intensity, and plant equipment orientation. Due to the intermittent nature of these occurrences, the anti-icing instrumentation did not consistently detect these instances and icing in the inlet ductwork occurred.

Corrective Actions
As a result of these occurrences, the entity instituted a more aggressive combustion turbine anti-icing strategy to prevent a reoccurrence. In addition to using the existing OEM anti-icing software package, the entity's solution proactively opens the inlet bleed heat valve to a minimum value of 10% whenever ambient temperatures drop below 45°F, ensuring a baseline level of heating is added to the combustion turbine inlet air at all times during cold weather operation. This minimum value was recommended through consultation with the OEM's engineering department along with in-service testing on the combustion turbines. To date, this approach has proven effective and has prevented a reoccurrence of the issue.

Lesson Learned
Ensure that manual corrective actions are proactively taken when unexpected icing may occur due to intermittent interference from outside sources of warm, moist air streams from rivers, lakes, or oceans or near artificial sources that emit warm, saturated air streams, such as cooling tower plumes, exhaust stack plumes, blowdown tank vents, or flash tank vents. Also see NERC Lesson Learned LL20120903 "Winter Storm Inlet Air Duct Icing."[1]

[1] https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/LL20120903_Winter_Storm_Inlet_Air_Duct_Icing.pdf

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