

## Lesson Learned

### Turbine Combustor Lean Blowout on Large-Frame Combustion Turbines

#### Primary Interest Groups

Generator Operators (GOPs)  
Generator Owners (GOs)

#### Problem Statement

Under certain frequency excursions, some large-frame combustion turbines (CTs) may be prone to tripping by turbine combustor lean blowouts.

#### Details

Lean combustion flameout or blowout is a known characteristic of some combustion turbines due to their lean fuel and air mixture design. During a fault in the area of a CTs site, voltage dropped dramatically. This effectively reduced the area load, causing area generators to accelerate. Some CTs in that area that were operating in a lean-burn mode (used for reducing emissions) tripped offline as result of a phenomenon known as turbine combustor lean blowout. As CTs accelerated in response to the frequency excursion, the direct-coupled turbine compressors forced more air into their associated combustion chambers at the same time as the governor speed control function reduced fuel input in response to the increase in speed. This resulted in what is known as a CT blowout, or loss of flame, causing the units to trip offline.

#### Corrective Actions

- The combustion control systems were retuned to improve combustion system stability.
- A bore-scope inspection was performed.
- An additional inspection of combustion systems will be performed during scheduled outages to determine if the cracking issue is present in the unit.<sup>1</sup>

#### Lesson Learned

Entities should check combustion control systems to improve unit stability for these conditions. Additional inspections of combustions systems may be warranted depending on the unit.

**Note:** General Electric (GE) issued a Technical Information Letter (TIL), dated December 31, 2010, which stated that an issue with certain type of transition pieces applicable to Frame 7FA DLN 2.6 CTs might contribute to flameout conditions. As noted in TIL 1774, recent fleet-wide unit, single-chamber lean blowouts can be attributed to cracking at the forward (round) end of the Transition Piece (TP) Impingement sleeve. GE's root cause analysis determined that one possible cause of this type of cracking is excessive gaps between the wear pads and the TP forward sleeve. Cracks in these locations can result in an increase in

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<sup>1</sup> Per GE's proprietary Technical Information Letter (TIL) 1774

airflow for the affected chamber and a lean blowout event. Because of this TIL, additional items will need to be checked during planned outages.

NERC also issued [“Industry Advisory” A-2008-06-26-02](#) on Turbine Combustor Lean Blowout.

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