**TAC Emergency Conditions List**

Action Item 45

*45 Frequency: Analyze system frequency leading up to EEA conditions and determine impact of low frequency on generation and load tripping.*

LP turbine blades and end windings have a natural frequency that makes them vulnerable to operating at frequencies below 59.4 Hz – particularly true for larger generators. PDCWG is pursuing more specific and technical details from turbine OEMs.

There were also issues dealing with interactions between generator control system tuning and the Interconnection frequency on 2/15, prior to the major frequency event. Steam drum type generators are particularly vulnerable to this issue. 2,000 MW of thermal generation was negatively impacted by frequency instability between 01:30 and 03:00 on 2/15. One particular, and important factor here is generator tuning that is specifically designed to maximize BAL-001-TRE frequency response scoring – that tuning design had very harmful impacts to performance of some generators on 2/15.

PDCWG is requesting more detailed information about how ERCOT calculates PRC in order to investigate more options to improve system reliability with regard to frequency stability and generator telemetry.

Open question – could sub 59.4 Hz frequency have been avoided on 2/15 if Load Shed, or other actions to recover undeployed Ancillary Services had been taken earlier? PDCWG is investigating whether it makes sense to recommend that ERCOT use more conditions than just PRC to make EEA, Load Shed, and other reliability decisions. Another question to be investigated at August PDCWG – what was the behavior of all Ancillary Service deployment/undeployment and delivery performance for 2 hours prior to major frequency excursion?