

**Non-Operation of Non-Redundant  
Primary Protection Systems  
Order 754**

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# FERC Order 754

2

## □ **Issue Concerning Protection Systems**

- The Commission is investigating an issue concerning the study of the non-operation of non-redundant primary protection systems; e.g., *the study of a single point of failure on protection systems. (P19)*

# FERC Order 754

3

## □ **FERC Commission directs:**

- FERC staff to meet with NERC and its appropriate subject matter experts to explore this reliability concern
- Identify any additional actions necessary to address the matter.
- NERC to make an informational filing within six months of the date of the issuance of this Final Rule
  - Explain whether there is a further system protection issue that needs to be addressed and, if so, what forum and process should be used to address that issue
  - What priority it should be accorded relative to other reliability initiatives planned by NERC

# Existing TPL Reliability Standards

4

- **TPL-003-0a:**

*(selected requirements)*

- R1.3.10: Include the effects of existing and planned protection systems, including any backup or redundant systems.
- R1.5: Consider all contingencies applicable to Category C.
  - SLG Fault, with Delayed Clearing (stuck breaker or protection system failure)
    - Delayed clearing of a Fault is due to failure of any protection system component such as a relay, circuit breaker, or current transformer, and not because of an intentional design delay.

# Revised TPL Reliability Standard

5

- **TPL-001-2** (Filed with FERC 10/11/2011)
- **P5 Multiple Contingency** (Fault plus relay failure to operate)
  - Delayed Fault Clearing due to the failure of a non-redundant relay<sup>13</sup> protecting the Faulted element to operate as designed
    - Footnote 13: Applies to the following relay functions or types: pilot (#85), distance (#21), differential (#87), current (#50, 51, and 67), voltage (#27 & 59), directional (#32, & 67), and tripping (#86, & 94).

# NERC Planning Committee Actions

6

- **Charged the System Protection and Controls Task Force (SPCTF) in 2005 to prepare a Standard Authorization Request to address redundancy**
  - SPC Subcommittee report was published to provide technical justification in November 2008
- **Performance Metrics (beyond standards)**
  - Identify trends in protection system misoperation
- **Reliability Assessment (beyond standards)**
  - Assess long-term industry preparations

# Protection System Reliability

## NERC SPCS Report: November 2008

7

- **Purpose** - To provide clarity on Protection System redundancy requirements, based on the relationship between performance of the Protection System and the performance of the BES
- Protection and planning engineers determine the proper solution for each element (lines, buses, transformers)
- Proposed Protection System Reliability (Redundancy) Requirements
- Status of recommendations

# Protection System Reliability

## NERC SPCS Report: November 2008

8

- Transmission Planners coordinate with respective Protection System engineers to determine worst case protection failure scenarios to model
- Transmission Planners model scenarios and measure system performance
  - If system performance falls below the appropriate TPL requirements, then Transmission Planners and Protection System engineers must work together to find and implement the most effective solution