

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Webinar

Project 2007-17 Protection System Maintenance and Testing

September 15, 2011

RELIABILITY | ACCOUNTABILITY



- Combines four existing approved standards into one standard
 - PRC-005-1 – Transmission and Generation Protection System Maintenance and Testing
 - PRC-008-0 – Underfrequency Load Shedding (UFLS) Equipment Maintenance Program
 - PRC-011-0 – Undervoltage Load Shedding System (UVLS) Maintenance and Testing
 - PRC-017-0 – Special Protection System (SPS) Maintenance and Testing

- Establishes **maximum** maintenance intervals and **minimum** maintenance activities for all components
 - Establishes opportunity to use condition monitoring to minimize hands-on maintenance
 - Establishes opportunity to use performance history to establish alternative maximum maintenance intervals

- FERC Order 693 (2007)
 - Directed changes to all four legacy standards
- Compliance Violation History for PRC-005-1
 - Single most-violated standard since 2007 – mostly with \$ penalties
 - R1 – failure to address all five component types within Protection System
 - R1 – failure to have basis (or acceptable basis) for intervals and activities
 - R1 – failure to have summary of maintenance and testing procedures
 - R2 – failure to fully implement program according to established intervals (missed activities)

- NERC System Protection Control Task Force/System Protection Control Subcommittee work
 - Assessment of legacy standards (2007)
 - “Protection System Maintenance – A Technical Reference” (2007)
- Industry Uncertainty
 - As evidenced by several Interpretation Requests
 - Also, “What generation Protection Systems are included?”

- Fall 2007 – Standard Authorization Request (SAR) Approved
- September 8, 2009 – Draft 1 Formal Comment Posting
- July 17, 2010 – Draft 2 Formal Comment Posting and Concurrent Initial Ballot – 23% Approval (Failed)
- December 20, 2010 – Draft 3 Formal Comment Posting and Concurrent Successive Ballot – 45% Approval (Failed)

- May 13, 2011 – Draft 4 Formal Comment Posting and Concurrent Successive Ballot – 67% Approval (Approved)
- June 30, 2011 – Draft 5 Recirculation Ballot – 64.76% Approval (Failed)
 - Several common issues in negative comments
 - Have made several minor changes to address areas of concern

- Standards Committee (SC) has directed
 - Post SAR for a 45-day informal comment period
 - Post standard for a 45-day formal comment period
 - Form new ballot body
 - Conduct an initial ballot in last 10 days of formal comment period
 - Post invitations for additional Standard Drafting Team (SDT) members

- Concerns about “3 Calendar Month Intervals”
- Concerns about impact on Distribution Owners with distributed UFLS/UVLS/SPS
- Concerns about alignment with Board of Trustees (BOT)-Approved 2009-17 Interpretation – Definition of “transmission Protection System” regarding the use of the term in PRC-004-1 and PRC-005-1

- This interval applied to two activities related to unmonitored components:
 - Verify station dc supply voltage , and inspect electrolyte level and presence of any unintentional grounds
 - Verify that the communications system is functional
- The intent of the SDT was to accomplish this on a quarterly/three month interval
 - Based on prevailing industry practice

- Industry feedback:
 - Due to the no grace period stipulation, such a requirement would drive most owners to schedule this activity every two months in order to ensure a three month maximum interval
 - Performing inspections at this frequency would result in six inspections each year instead of the four that were intended
- The maximum interval was changed to four calendar months
 - Accomplished the original intent of the SDT and is supported by the industry

- A **DISTRIBUTED** UFLS or UVLS scheme contains individual relays which make independent load shed decisions based on applied settings and localized voltage and/or current inputs. A distributed scheme may involve an enable/disable contact in the scheme and still be considered a distributed scheme.¹

Distributed UFLS and UVLS systems, which use local sensing on the distribution system and trip co-located non-BES interrupting devices, are addressed in **TABLE 3** with reduced maintenance activities.²

- A **NON-DISTRIBUTED** UFLS or UVLS scheme involves a system where there is some type of centralized measurement and load shed decision being made. A non-distributed UFLS/UVLS scheme is considered similar to an SPS scheme and falls under **TABLE 1** for maintenance activities and intervals.¹

1. Text from Page 33 of the PRC-005-2 Protection System Maintenance Supplementary Reference & FAQ, Dated July 29, 2011.

2. Text from Page 26 of the PRC-005-2 Protection System Maintenance Supplementary Reference & FAQ, Dated July 29, 2011.

- **RELAYS** have the **SAME** maintenance activities and intervals as Table 1-1.
- **VOLTAGE AND CURRENT SENSING DEVICES** have the **SAME** maintenance activity and interval as Table 1-2.
- **DC SYSTEMS** need **ONLY** have their **VOLTAGE READ** at the relay every **12 YEARS**.
- **CONTROL CIRCUITS** have the following maintenance activities every **12 YEARS**:
 - Verify the trip path between the relay and lock-out and/or auxiliary tripping device(s).
 - Verify operation of any lock-out and/or auxiliary tripping device(s) used in the trip circuit.
 - No verification of trip path required between the lock-out and/or auxiliary tripping device(s) and the non-Bulk Electric System (BES) interrupting device.
 - No verification of trip path required between the relay and trip coil of the non-BES interrupting device for circuits that have no lock-out and/or auxiliary tripping device(s).
 - No verification of trip coil required.
- **NO MAINTENANCE ACTIVITY** is required for **ASSOCIATED COMMUNICATION SYSTEMS**.

3. Text from Page 86 of the PRC-005-2 Protection System Maintenance Supplementary Reference & FAQ, Dated July 29, 2011.

- **NON-BES INTERRUPTING DEVICES** that participate in a distributed UFLS or UVLS scheme are **EXCLUDED FROM THE TRIPPING REQUIREMENT, AND PART OF THE CONTROL CIRCUIT TEST REQUIREMENT**; however the part of the trip path control circuitry between the load shed relay and lock-out or auxiliary tripping relay must be tested at least once every 12 years.
- In the case where there is **NO LOCK-OUT OR AUXILIARY TRIPPING RELAY** used in a distributed UFLS or UVLS scheme which is not part of the BES, there is **NO CONTROL CIRCUIT TEST REQUIREMENT**.
- There are many circuit interrupting devices in the distribution system that will be operating for any given under-frequency event that requires tripping for that event. A failure in the tripping-action of a single distributed system circuit breaker (or non-BES equipment interruption device) will be far less significant than, for example, any single BES Protection System failure such as a failure of a bus differential lock-out relay. While many failures of these distributed system circuit breakers (or non-BES equipment interruption device) could add up to be significant, it is also believed that many circuit breakers operate often for fault clearing duty and are consequently operated at least as frequently as any requirements that appear in this standard.

3. Text from Page 86 of the PRC-005-2 Protection System Maintenance Supplementary Reference & FAQ, Dated July 29, 2011.

- *Today's PRC-004-1 & -005-1 cite "transmission Protection System"*
- NERC Glossary defines "Protection System" but not "transmission"
- Interpretation 2009-17 says:
 - *"A Protection System for a radially-connected transformer energized from the BES would be considered a transmission Protection System ... only if the protection trips an interrupting device that interrupts current supplied directly from the BES and the transformer is a BES element."*
- An *interpretation* cannot expand the apparent meaning of PRC-005-1 – it had to accommodate existing regional interpretations.

- PRC-005-2 *Applicability* Section 4.2.1 says “*Protection Systems that are installed for the purpose of detecting faults on BES Elements (lines, buses, transformers, etc.)*” – terms are fully defined.
- In developing PRC-005-2, the SDT’s goal is to ensure the applicability, requirements, and measures achieve the purpose of the standard and do not introduce interpretation(s), or the need for interpretation(s) into the standard. The SDT believes the stated *Applicability* supports the purpose and does not utilize or depend upon an interpretation or definition of the term “transmission Protection System”.

- SC directed
 - Post SAR for a 45-day informal comment period
 - Post standard for a 45-day formal comment period
 - Form new ballot body
 - Conduct an initial ballot in last 10 days of formal comment period
 - Post invitations for additional SDT members

- SAR and standard recently posted per SC directives
- Future schedule dependent on ballot results and comment volume
 - SDT meeting scheduled for November, 2011

- 16 industry members
 - Diverse in region, transmission/generation/distribution, company size and structure
 - All with many years of experience in establishing, managing, and/or implementing Protection System maintenance programs
- Approximately 8-10 very active observers
 - Approximately 25 other observers have attended at least one SDT meeting

- Currently seeking additional members – particularly from small entities
- Encourage interested Subject Matter Experts to become involved as observers – either within meetings or via “plus” list
 - Contact NERC Project Coordinator to be added to “plus” list

- Project website
 - [http://www.nerc.com/filez/standards/Protection System Maintenance Project 2007-17.html](http://www.nerc.com/filez/standards/Protection_System_Maintenance_Project_2007-17.html)
- Charles Rogers, Chair
 - cwrogers@cmsenergy.com
- Al McMeekin – NERC Project Coordinator
 - al.mcmeekin@nerc.net

- Please submit your questions via the chat window on ReadyTalk.
- The presenters will respond to as many questions as possible during remainder of the scheduled Webinar.
- Unanswered questions will be addressed and posted on NERC website.