NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Unofficial Comment Form for Protection System Maintenance and Testing (Project 2007-17)

Please **DO NOT** use this form. Please use the electronic comment form located at the link below to submit comments on the draft Protection System Maintenance and Testing. **Comments must be submitted by September 8, 2009**. If you have questions please contact Al Calafiore at Al.Calafiore@nerc.net or by telephone at 678-524-1188.

http://www.nerc.com/filez/standards/Protection_System_Maintenance_Project_2007-17.html

Background Information:
The draft standard combines the previous standards, PRC-005-1 — Transmission and Generation Protection System Maintenance and Testing, PRC-008-0 — Underfrequency Load Shedding Equipment Maintenance Program, PRC-011-0 — UVLS System Maintenance and Testing, and PRC-017-0 — Special Protection System Maintenance and Testing. It also addresses FERC directives from FERC Order 693, including that NERC establish maximum allowable maintenance intervals.

In accordance with the FERC directive, this draft standard establishes requirements for a time-based maintenance program, where all relevant devices are maintained according to prescribed maximum intervals. It further establishes requirements for a condition-based maintenance program, where the hands-on maintenance intervals are adjusted to reflect the known and reported condition of the relevant devices, and for a performance-based maintenance program, where the hands-on maintenance intervals are adjusted to reflect the historical performance of the relevant devices.

1. The Standard Drafting Team proposes to change the name of the draft standard from "Protection System Maintenance and Testing" to "Protection System Maintenance", and to include testing as one component of "Protection System Maintenance Program", which will be a defined term. Do you agree? If not, please explain in the comment area.

   ☒ Yes
   ☐ No
   Comments:

2. Within Table 1a, Table 1b, and Table 1c, the draft standard establishes specific minimum maintenance activities for the various types of devices defined within the definition of "Protection System". Do you agree with these minimum maintenance activities? If not, please explain in the comment area.

   ☐ Yes
   ☒ No
   Comments:
   A. In the tables, the term "verification" should be switched with "check".
   B. The verification activities include testing for "specific gravity" in batteries. Since "impedance testing" will give you the same results or similar results; revise the tables to reflect this, as well.
   C. Another question deals with the table title verbiage. Table 1a and 1c are labeled as Protection Systems, while Table 1b is Protection System Components. One could

interpret table 1c as saying that if any one component of the protection system in question is not in compliance with level 3 monitoring stipulations, then every component must be degraded to level 2 monitoring as so forth. This needs to be clarified.

D. Some activities, such as complete functional testing, could lead to reduced levels of reliability, because [1] it requires removing elements of the transmission system from service and [2] it requires performing tests that are inherently prone to human errors. The MRO NSRS does not believe the perceived benefits justify the anticipated costs.

E. In the tables, under Table 1a and Protection system communications equipment and channels, a technical justification should be provided to show that performance and quality channel testing would result in the reduction of regional disturbances and blackouts. Quality and performance testing is subjective. Subjective tests are inherently poor compliance measures. The requirements to measure, document, store, and prove channel quality data is a poor use of limited compliance resources.

F. In the tables, under Table 1a and Station DC supply (and anywhere else), equalize (battery) voltages should be eliminated. Equalizing battery voltages reduces battery life and do not provide a significant gain in overall system reliability to offset the loss of battery life.

G. In the tables, under Table 1a and Station DC supply (and anywhere else), delete the reference to measuring the fluid temperature of "each cell". A technical basis should be demonstrated that shows why individual cell fluid temperature measurement would reduce the occurrence of regional disturbances. If fluid temperature measurement remains in the standard, a single fluid temperature measurement per battery bank should be sufficient to demonstrate that the battery bank was performing within normal parameters. The compliance burden to add fluid temperature measurements for each cell is unwarranted and reduces compliance personnel resources that could be utilized on more important reliability activities.

3. Within Table 1a, the draft standard establishes maximum allowable maintenance intervals for the various types of devices defined within the definition of "Protection System", where nothing is known about the in-service condition of the devices. Do you agree with these intervals? If not, please explain in the comment area.

☐ Yes

☒ No

A. It looks like for unmonitored systems, breaker trip coils are to be checked for continuity every 3 months. There is no mention of auxiliary relays. In the partially monitored and fully monitored sections, trip coils and auxiliary relays are lumped in the same category at 6 calendar years each. What happened to the aux relays in the unmonitored section? Also, note that the term "trip coils" is used, not "breaker trip coils" in the type of component category.

B. The maintenance interval for Protection System Control Circuitry (Trip coils and Auxiliary relays) is 6 years, but the interval for relay output contacts is 12 years when these components are partially monitored. It seems that these things all have a similar reliability. If commissioning tests are done diligently, the trip DC availability is continuously monitored and the trip coil itself is continuously monitored, no functional tests should be needed. The only thing that would be done at PM time would be to ensure that the alarming method is still functional.

4. Within Tables 1b and 1c, the draft standard establishes parameters for condition-based maintenance, where the condition of the devices is known by means of monitoring within the substation or plant and the condition is reported. Do you agree with this approach? If not, please explain in the comment area.

   ☒ Yes

   ☐ No

   Comments:

   A. The MRO NSRS agrees with this approach; however, I think most entities will not see the advantage of condition-based maintenance until they can resolve any gaps in data retention.

      If an entity was retaining a set of maintenance records but failed to include all the needed information as specified in this standard so they would need to adjust their maintenance procedure to collect all information and then they would need to wait for the entire retention period until they could start using the extended maintenance interval.

      If an entity had a collateral set of records which verified the information that lacked in the original maintenance record then could the entity start using the extended maintenance interval?

      For example, an entity has records showing that they have maintained a voltage or current transformer within the prescribed maintenance interval listed in level 1 monitoring (which is a maximum 12 year maintenance interval). Could this same entity go to level 3 monitoring (which is a continuous maintenance interval) immediately if it can query their SCADA and produce detailed records indicating the accuracy of the PT or CT for the maintenance records already retained?

   B. For lockout relays, if commissioning tests are done diligently, the trip DC availability is continuously monitored and the trip coil itself is continuously monitored, is it necessary to operate these relays for functional testing? For breaker failure lockout relays, re-verifying the operation of the coil and all the contacts could mean taking multiple breakers and line terminals out of service at the same time. Functional trip tests could cause unintentional tripping of equipment, cause equipment damage and interruption of service to customers. It's hard to see how the reliability of the BES is significantly improved by doing this test. The MRO NSRS feels the risk of adverse impact could be greatly reduced by a longer interval such as 12 years.

   C. In table 1c, the word “continuous or continuously monitored” is used. Please clarify the “within 1 hour” time frame takes into account that there may be a communication outage (failover) that will prevent an entity to “continuously” monitor a device.

5. Within PRC-005 Attachment A, the draft standard establishes parameters for performance-based maintenance, where the historical performance of the devices is known and analyzed to support adjustment of the maximum intervals. Do you agree with this approach? If not, please explain in the comment area.

☐ Yes

☒ No

Comments:

A. The MRO NSRS is concerned that this approach could lead to non-compliance if the company follows this process and a Compliance Auditor disagrees with the method that was used. An applicable entity should be protected if they follow the standard appropriately. There should be some assurance of a grace period for mitigation if this selected approach was not accepted.

B. Please provide the basis for having at least 60, then taking 30 (50%) for testing/maintenance. This may give an unfair advantage to larger companies rather than being fair across the board. This places an undue burden on smaller companies by having to team up with other asset owners.

6. The Standard Drafting Team has provided a "Supplementary Reference Document" to provide supporting discussion for the Requirements within the standard. Do you have any comments on the Supplementary Reference Document? Please explain in the comment area.

   ☐ Yes

   ☒ No

   Comments: N/A

7. The Standard Drafting Team has provided a "Frequently-asked Questions" document to address anticipated questions relative to the standard. Do you have any comments on the FAQ? Please explain in the comment area.

   ☐ Yes

   ☒ No

   Comments: Overall, the FAQ's are helpful toward understand what the SDT was thinking. Explanations for questions dealing with the maintenance activities (e.g., battery testing) indicate an attempt to line up the requirement with IEEE standards. While it is commendable to attempt alignment reliability standards with other industry standards, it also begs the question of why requirements that are already covered by other standards should be repeated in reliability standards. In addition, if the other standards are changed, then they could become inconsistent with or contradictory to the reliability standard.

8. If you are aware of any conflicts between the proposed standard and any regulatory function, rule, order, tariff, rate schedule, legislative requirement, or agreement please identify the conflict here.

   Conflict: Order 672 says that standards should be clear and unambiguous.

   Comments: N/A

9. If you are aware of the need for a regional variance or business practice that we should consider with this project, please identify it here.

   Regional Variance: None

   Business Practice: N/A

Comments: N/A

10. If you have any other comments on this Standard that you have not already provided in response to the prior questions, please provide them here.

Comments:

A. In the applicability section 4.2.5.5, change the statement to say, “Protection systems for BES connected station-service transformers for generators that are part of the BES.”

B. In the applicability section 4.2.5, change the statement to replace “are part of” with “directly connected to”. The “are part of” will be left to interpretation. Please indicate the added reliability benefit by collecting this in Table 1a Page 9 protection system communication equipment and channels.

C. If a breaker failure relay is also being used for sync-check, is it required to verify the voltage inputs since they are used for a closing function and not a tripping function? It is understood that the current inputs would have to be verified since these are used for breaker failure tripping.

D. Please clarify requirement R1-1.1, does one have to individually list out each Protection System and its associated maintenance activities or can the PSMP be a generalized procedure that covers each of the components in all of a utility's Protection Systems?

E. All references to breakers should be eliminated; thus, eliminate breaker trip coils. Breakers are primarily mechanical in nature and should be excluded similar to mechanical relay systems such as sudden pressure relays.

F. Clarify that trip coils checks or tests can be verified through alternate means other than physically tripping the coil or potentially requiring system outages to physically trip a coil. Alternate tests could consist of checking self monitoring relays, continuity lights, etc. Trip coil tests could require transmission line outages which can be denied by regulatory authorities due to system conditions beyond an entity’s control. Significant delays of months or longer could occur to obtain a transmission line outage. Further, potentially requiring transmission line outages for trip coil test could harm BES reliability by increase the number of force transmission line outages due to testing. System reliability could be significantly negatively impacted anytime testing on trip circuits is performed due to human errors causing outages or regional disturbances.

G. One item R1.3 (inclusion of batteries) was questioned as why this was specifically called out. It should be part of the definition.

H. Define the term “condition-based”.

I. The format of the tables is poor with 17 line items addressed in each. It is difficult to relate one table to another because they are not consistent with regard to the type of components. For example table 1a references of components a “breaker trip coil (only)” and the 1b references “trip coils and auxiliary relays”.

J. R1.1 please add “… as they apply to the applicable entity”. As stated now, all three tables must be accomplished.

K. Please add the words “time based maintenance methods” to table 1a for clarity in the heading.

L. Table 1b under general description, last sentence the word “elements” should be replaced with “maintenance activities” which will provide exactly what is intended.

M. Table 1b, if maintenance activities for level 2 monitoring include level 1 maintenance activities, then redundant activities in table 2 that are contained in table 1 should be removed (the same for table 3 to table 2 to table 1).

N. If an entity maintenances a protective relay such that it is included in level 2 monitoring (a Condition Based Maintenance program) and this relay is considered to have a maximum interval of 12 years, does the entity need to also perform the maintenance activities for level 1 monitoring since the table 1b header indicates, “General Description: Protection System components whose alarms are automatically provided daily (or more frequently) to a location where action can be taken for alarmed failures. Monitoring includes all elements of level 1 monitoring with additional monitoring attributes as listed below for the individual type of component?”