Unofficial Comment Form

Project 2010-05.3 Phase 3 of Protection Systems: Remedial Action Schemes (RAS)
PRC-012-2

DO NOT use this form for submitting comments. Use the electronic form to submit comments on draft 1 of PRC-012-2 – Remedial Action Schemes. The electronic comment form must be submitted by 8 p.m. Eastern, Monday, October 5, 2015.

Documents and information about this project are available on the project page. If you have questions, contact Standards Developer, Al McMeekin (via email), or at (404) 446-9675.

Background Information
This project is addressing all aspects of Remedial Action Schemes (RAS) and Special Protection Systems (SPS) contained in the RAS/SPS-related Reliability Standards: PRC-012-1, PRC-013-1, PRC-014-1, PRC-015-1, and PRC-016-1. The maintenance of the Protection System components associated with RAS (PRC-017-1 Remedial Action Scheme Maintenance and Testing) are already addressed in PRC-005. PRC-012-2 addresses the testing of the non-Protection System components associated with RAS/SPS.

In FERC Order No. 693 (dated March 16, 2007), the Commission identified PRC-012-0, PRC-013-0, and PRC-014-0 as “fill-in-the-blank” standards and did not approve or remand them. These standards are applicable to the Regional Reliability Organizations (RROs), assigning the RROs the responsibility to establish regional procedures and databases, and to assess and document the operation, coordination, and compliance of RAS/SPS. The deference to regional practices precludes the consistent application of RAS/SPS-related Reliability Standard requirements.

The proposed draft of PRC-012-2 corrects the applicability of the fill-in-the-blank standards by assigning the requirement responsibilities to the specific users, owners, and operators of the Bulk-Power System; and incorporates the reliability objectives of all the RAS/SPS-related standards.

45-day Formal Comment Period
The drafting team is soliciting stakeholder comments and feedback on the first draft of PRC-012-2. The team appreciates the feedback you provided during the informal comment period earlier this year and considered all of your suggestions. While many of your thoughts were incorporated into this product, a few were not and the drafting team offers the following explanations.

Choice of applicable entity in specific requirements: The drafting team selected the functional entity they assert is the most capable of performing the required actions. The drafting team recognizes that in some instances the specified entity will need to collaborate or obtain information from other entities. For example, in Requirement R5, the RAS-owner is tasked with analyzing RAS operations. The RAS-owner was
designated because they own the RAS and are responsible for maintaining the performance of the RAS. The drafting team recognizes that the RAS-owner may need to obtain information from entities such as the Transmission Operator, Transmission Planner, Balancing Authority, or others to complete the analysis but contends that ultimate responsibility should remain with the RAS-owner.

**Periodic Planning Evaluation Considerations:** Requirement R4 mandates that the Transmission Planner perform a technical evaluation (planning analyses) of each RAS at least once every 60 full calendar months to verify the continued effectiveness and coordination of the RAS, including BES performance following an inadvertent operation and single component failure of the RAS.

In structuring Requirement R4, the SDT considered the issue of the Transmission Planner (TP) reviewing the RAS design made by the RAS-owner. Although the TP is not involved in the detailed design of the RAS, the SDT asserts that the TP is aware, to some extent, of the redundancy level of the RAS design from the initial planning studies. The language used in the current Requirement R4, Part 4.4 is aligned with the language of Requirement R1.3 in PRC-012-0 (RAS single component failure). PRC-014-0 does not explicitly require to re-verify “single component failure” (when intended to operate), nor does it require to re-verify “inadvertent operation”. Requirement R4 is a planning evaluation to assess the impact of System changes over time on the RAS effectiveness and is not intended to be a RAS design review. The evaluation of a RAS under Requirement R4, Part 4.4 will consider the following three scenarios:

1. The RAS was originally designed such that a “single component failure” does not prevent RAS operation in-whole or in-part.

2. The RAS was originally designed such that a “single component failure” could cause the RAS to not operate when intended. Therefore, System performance when the RAS fails to operate must be evaluated. For deficient System performance, a CAP must be developed per Requirement R6 to meet “single component failure” performance requirements.

3. The RAS was designed such that a “single component failure” could cause part but not all of the RAS to not operate, yet still meet the System performance requirement(s) (e.g. over-arming used to mitigate “single component failure” for load shedding or generation rejection). Due to System changes that may affect achieving the System performance requirement(s), the TP must re-evaluate whether partial operation of the RAS still meets them. If it does not, then a CAP must be developed per Requirement R6 to meet “single component failure” performance requirements.

In all cases, detailed design review is not required. The SDT recognizes that involvement of the RAS-owner may be necessary for the TP to be aware of the consequences of single component failure for its RAS.

**CAP Development Considerations:** The drafting team selected the RAS-owner as the applicable entity to develop, submit, and implement CAPs associated with RAS performance because they own the RAS, are responsible for maintaining the performance of the RAS, and make all of the financial decisions regarding the RAS. The six-month timeframe to develop a CAP was selected to provide enough time for engineering
studies to analyze possible modifications to the RAS. The six months is the maximum timeframe. The SDT anticipates that most CAPs can be developed in less time. The glossary definition of a CAP includes the work schedules associated with implementing and completing actions within the CAP. The implementation timeframe should not impact System reliability because the RC will determine whether the RAS can remain in service, or if other System operating limits must be imposed. The RAS-owner must submit the CAP to the RC. The RC is not required to approve a CAP that does not require functional modifications to the RAS; however, the drafting team expects the RC would provide feedback on any concerns with CAP adequacy. A CAP that does require functional modifications will be reviewed and approved by the RC in accordance with Requirements R1, R2, and R3.

**Functional Testing:** The drafting team asserts that the functional testing of RAS should remain in PRC-012-2 and not be included in PRC-005. While the drafting team agrees that many RAS have Protection System components that will be maintained in accordance with PRC-005, the purpose of the functional testing is to verify the control equipment operation and confirm the overall RAS performance rather than the performance of individual Protection System components. PRC-005 does not include the maintenance of RAS controllers such as PLCs, computers, or the control functions of microprocessor relays. There is no double jeopardy because PRC-012-2 specifically requires the verification of only non-Protection System components. The drafting team contends that functional testing is complementary to the Protection System component maintenance required in PRC-005. An entity could maintain its Protection System components in association with a functional testing of a RAS and document it for compliance with its Protection System Maintenance Plan for PRC-005.

**RAS Database and Attachment 3:** The drafting team selected the Reliability Coordinator to maintain the RAS database because the RC is the reviewing entity for new and functionally modified RAS and as such receives the pertinent data from the RAS-entity in Attachment 1. The RAS database serves as a repository of information about all RAS in an RC Area that enables entities with a reliability-related need access to the information through the RC. The data in Attachment 3 is the minimum an RC is required to maintain; however, the RC has the discretion to require additional information deemed necessary for a high-level understanding of a RAS. The drafting team contends it is not necessary to require detailed information for every RAS in the database as that would make database maintenance a burden for both the RC and the entities, while bringing little improvement to reliability. While the SDT agrees that detailed information may be important to an entity with a reliability-related need, it was agreed that such cases are specific enough to be treated individually and not systematically through a standard requirement. The drafting team also asserts that a requirement for an entity to provide detailed modeling information to other registered entities is not necessary. Entities that have a reliability-related need for this information have multiple avenues to get the data; e.g., regional model building processes, Planning Coordinator, and/or direct request to the RAS-owner.

The drafting team is charged with assigning the requirements of the new standard to the specific users, owners, and operators of the Bulk-Power System while incorporating the reliability objectives of all the RAS/SPS-related standards. In drafting this standard, the team has worked diligently to minimize the changes that will be required from your existing processes. The drafting team requests that you read the
standard including the rationales and technical justifications thoroughly and provide your thoughtful comments. The electronic comment form must be completed by 8 p.m. Eastern Monday, October 5, 2015.

Questions
Requirements R1, R2, and R3 pertain to the submittal of Attachment 1 information to the Reliability Coordinator (RC) for the review of a RAS, the RC using Attachment 2 as a guide for performing the RAS review, and the RC approving the RAS prior to the RAS being placed in service. Question 1 is relevant to these activities.

1. **RAS review and approval:** Do you agree with the RAS review process outlined by Requirements R1, R2, and R3? If no, please provide the basis for your disagreement and an alternate proposal.

☐ Yes  ☒ No

Comments: Regarding Requirement R1, the RAS-entity is not typically qualified to provide some of the information required in Attachment 1, such as Sections II.3, II.4, II.5, and II.6. This information is typically developed by the Planning Coordinator (PC) or Transmission Planner (TP). RAS-owners typically only implement the RAS as functionally required by the PC or TP. The Planning Coordinator should be listed as an applicable entity.

The Planning Coordinator is the correct function to determine where a RAS Scheme is required. The need for a RAS is determined from TPL studies and planned system performance. The standard correctly provides the RC with an opportunity to participate in providing opinion. The NERC Functional Model defines the RC as being “The functional entity that maintains the Real-time operating reliability of the Bulk Electric System within a Reliability Coordinator Area.” It is not responsible for the planning or installation of a Protection System. The NERC Functional Model does not support the RC as being the reviewer. The RC currently does not review nor have the authority to approve any other facility or protection system installation. Clarification of R3 regarding approval of the RAS after all issues have been addressed should be made. The approval mentioned in R3 could be interpreted as an approval that each identified outstanding issue was addressed not complete formal approval of the RAS. If the RC is to perform the review, we suggest the following:

R3- Following the review performed pursuant to Requirement R2, the RAS-entity shall address each issue identified by the Reliability Coordinators participating in the review and obtain final approval(s) for the RAS from each Reliability Coordinator participating in the review, prior to placing a new or functionally modified RAS in service or retiring an existing RAS.

Regarding Requirement R3 some of the identified issues would be most appropriately addressed by the PC or TP, especially the items in Section II of Attachment 1 as mentioned earlier. It is inappropriate for the RAS-entity to assume compliance responsibility for addressing each identified issue. The RAS-owner for the RAS issues should be the responsible entity.
Requirement R4 mandates that the Transmission Planner perform a technical evaluation (planning analyses) of each RAS at least once every 60 full calendar months to verify the continued effectiveness and coordination of the RAS, including BES performance following an inadvertent operation and single component failure of the RAS. Questions 2, 3, and 4 pertain to these topics.

2. **RAS Periodic Evaluations:** Do you agree with the RAS planning evaluation process outlined by Requirement R4? If no, please provide the basis for your disagreement and an alternate proposal.

- [ ] Yes
- [x] No

Comments: It would be more appropriate to specify the RAS-entity in R4 instead of the RAS-owner.

The RAS-entity and the RAS-owner should be provided with the results of the review. The PC may be more appropriately qualified to review certain RAS than the TP. Consider revising R4 to read “Each Transmission Planner shall evaluate...”

Add wording to the Rationale for Requirement R4 to clarify that the intent is not to evaluate all RAS at the same time, but that each RAS is to be evaluated on a 60 full calendar month cycle.

Would the Planning Coordinator ever perform this evaluation instead of the Transmission Planner?

3. **RAS Inadvertent Operation:** Do you agree with Requirement 4 Part 4.3 and Attachment 1 which stipulates that RAS inadvertent operation due to a single component malfunction still satisfies the System performance requirements common to TPL-001-4 P1-P7 events listed in Parts 4.3.1-4.3.5? (Note that this requirement remains the same as PRC-012-0 R1.4 except for the allowance for designed-in security that would prevent RAS inadvertent operation for any single component malfunction). If no, please provide the basis for your disagreement and an alternate proposal.

- [ ] Yes
- [x] No

Comments: Part 4.3 addresses inadvertent operation and addresses security of the RAS. This is important. However, we suggest that only sub-Parts 4.3.1 and 4.3.2 as well as controlling system separation are the only aspects that are needed. We do not understand the intent of sub-Part 4.3.3 “applicable facility ratings”. Is this normal, emergency, DAL (drastic action limit), etc.? In Attachment 2 we agree that inadvertent operation needs to be understood. However, if that inadvertent operation does not cause one of the three significant adverse impacts to the reliability of the BES then the RAS should not be subject to additional requirements which likely will only have a localized effect. The addition of this language in sub-Parts 4.3.3, 4.3.4, and 4.3.5 unnecessarily may result in local RAS to have increased design complexity, additional components which may increase the likelihood of misoperation (decreasing the reliability of the RAS) and excessive costs. We suggest the SDT consider...
that all RAS that have a wider impact, those whose inadvertent operation could result in Cascading, System Separation or instability be subject to this standard and its design requirements. To place these requirements as written on all RAS would be of little or no benefit to achieving an adequate level of reliability on the BES, and based on this we would characterize this as placing a Paragraph 81 requirement in the standard. Furthermore, this could actually be a detriment to the reliable operation of a local RAS subjecting it to unnecessary additional design requirements.

4. **RAS Single Component Failure:** Do you agree with Requirement 4 Part 4.4 and Attachment 1 which stipulates that any RAS intended to satisfy System performance requirements in a TPL standard must still satisfy those requirements when experiencing a single component failure? (Note that this requirement remains unchanged from PRC-012-0 R1.3.) If no, please provide the basis for your disagreement and an alternate proposal.

☐ Yes  
☒ No

Comments: Requirement R4 Part 4.4 is problematic for a number of reasons. First, placing this requirement on the Transmission Planner does not conform to the responsibilities or abilities of the Transmission Planner. The TP may have some familiarity with the design of the RAS or with the Operating Procedures which may be in place, but does not know or need to know the specifics of a single component failure, just the ramification of an overall RAS operation failure or inadvertent operation. Currently, Part R1.3 of standards PRC-012-0 and -1 contains a single component failure design requirement. When these standards were approved by the NERC BOT there was no NERC BES definition nor was there an approved definition of what a RAS is. We believe that had the full implication of the costs to be borne by the industry been recognized and subsequent minimal or no reliability benefit associated with meeting that requirement for local impact only schemes, the standard would not have been approved by the NERC BOT. Furthermore, the System Protection Coordination Subcommittee of NERC had specifically noted and suggested that 4 types of RAS are on the BES. Two of these were local and these categories were developed to afford the SDT to tailor specific and appropriate reliability and security requirements on these local type schemes. To broadly apply these more stringent requirements to all RAS on the new BES with the new RAS definition has little cost benefit. In addition, the existing PRC-012-0 and -1 only require a single component failure review and design requirement at the time of review. PRC-014-0 and -1, which are the SPS/RAS assessment standards currently do not require the Transmission Planner to include a requirement such as Requirement R4 Part 4.4 in their periodic assessment. The SDT has gone unnecessarily beyond the intent of the current standards in this regard.

In addition it should be noted that all existing RAS have gone through regional reviews and been approved for implementation. These existing RAS may not have met the existing single component failure requirement due to the revision of the BES. The regions each have a process for ensuring the reliability of the BES, and that the necessary level of reliability and security had been met at the time of approval. Furthermore, misoperation studies have not indicated that there is a reliability need to
incorporate single component failure design into local systems. These local RAS which do not meet the requirement would need to be redesigned, outages taken, and then revisions made to come into compliance. This, in and of itself would represent a risk to the operation and reliability of the BES.

Requirement R4 Part 4.4 currently states;

“4.4 A single component failure in the RAS, when the RAS is intended to operate, does not prevent the BES from meeting the same performance requirements (defined in Reliability Standard TPL-001-4 or its successor) as those required for the events and conditions for which the RAS is designed.”

We suggest Part 4.4 be removed. However, if not removed, we propose the following:

4.4 A single component failure in the RAS, when the RAS is intended to operate, does not result in any of the following conditions on the BES:

- Cascading
- Uncontrolled System Separation
- Instability

The above modification would provide the necessary level of security and reliability to the BES. Ensuring that RAS installed on the BES or installed to meet TPL requirements would only be required when the RAS operation is critical, and any inadvertent operation results in a significant impact to the BES.

Requirements R6 and R7 pertain to the development and implementation of Corrective Action Plans (CAPs). Question 5 addresses these requirements.

5. **Corrective Action Plans**: Do you agree that the application of Requirements R6 and R7 would address the reliability objectives associated with CAPs? If no, please provide the basis for your disagreement and an alternate proposal.

☐ Yes  ☒ No

Comments: Requirement R6 reads as follows:

“Within six-full-calendar months of being notified of a deficiency in its RAS pursuant to Requirement R4 or Requirement R5, each RAS-owner shall participate in developing a Corrective Action Plan (CAP) and submit the CAP to its reviewing Reliability Coordinator(s).”

As written, R6 doesn’t clearly assign the responsibility to the RAS-owner and only states they shall participate. Standard requirements need to be specific on who is responsible for what, and when. We also suggest that any CAP being submitted to the RC be a “mutually agreed upon” CAP. To address this issue we suggest the following:
Within six-full-calendar months of being notified of a deficiency in its RAS pursuant to Requirement R4 or Requirement R5, each RAS-owner and affected Reliability Coordinator(s) shall develop a mutually agreed upon Corrective Action Plan (CAP) and submit the CAP to its reviewing Reliability Coordinator(s).

Also, there may be a need for an additional requirement to notify the RC and TOP when the CAP has been completed, and the RAS is performing correctly. This should be considered by the SDT. This brings specific closure to any RAS deficiency.

Requirement R5 stipulates that the RAS-owner identifies deficiencies to its reviewing RC. Suggest R6 be revised to read:

“Within six-full-calendar months of identifying or of being notified of a...”

6. **Implementation Plan:** Do you agree with the Implementation Plan? If no, please provide the basis for your disagreement and an alternate proposal.

☐ Yes
☒ No

Comments: The Implementation Plan should be modified to include clarification for implementation of R4. Suggest adding the language used in the Rationale for Requirement R4, which says: “Sixty-full-calendar months, which begins on the effective date of the standard pursuant to the implementation plan...”

The standard or the Implementation Plan should allow the RAS-owner sufficient time to mitigate a design deficiency identified as part of R4, such as the lack of redundancy without removing the RAS from service. Clarification should be provided to allow for continued operation of an existing RAS after a single component failure scenario is identified until a Corrective Action Plan can be completed.

The Implementation Plan should address the possible scenario of a RAS misoperation occurring within 120 days of the Standard’s effective date, and if R5 would apply. Would this misoperation require the development of a CAP after the effective date of the Standard? This would apply for R6 and R7 as well.

For testing records will the RAS-owner need to have documentation of testing prior to the standard’s effective date? This should be clarified in the Implementation Plan.

7. If you have any other comments that you haven’t already provided in response to the above questions, please provide them here.
Comments: Because feeder loading can be changed intentionally, it is frequent to add, substitute, or remove load tripping devices (not distributed relays) in order to maintain the amount of load that is required by a load tripping RAS. Would these changes constitute a RAS functional modification? If so, suggest revising the definition of RAS functional modification. The Attachment 1 procedure that would have to be applied would be overly burdensome.

Regarding the Applicability Section 4.1.4 for the RAS-entity, who designates the RAS-owner to represent all RAS-owner(s)?

In the Rationale for Requirement R1, last sentence of the first paragraph, “A functional modification is any modification to a RAS beyond the replacement of components that preserves the original functionality.” How will “any modification to a RAS beyond the replacement of components” preserve the original functionality? Functional modification requires clarification. Suggest developing a formal definition:

RAS Functional Modification--a change to the resultant action for which a RAS is designed.

Rationale for Requirement R8--We agree with segmented testing. However, the requirement does not state this and implies an overall test should still be performed.

R8 currently states:

At least once every six-calendar years, each RAS-owner shall perform a functional test of each RAS to verify the overall RAS performance and the proper operation of non-Protection System components.

Suggest revising to:

At least once every six-calendar years, each RAS-owner shall perform a functional test of each RAS to verify the overall RAS performance and the proper operation of non-Protection System components. This test can be either:

- An end-to-end test encompassing all components and testing actual functionality
- A segmented test to test all the components by grouping them together into blocks until all parts of the RAS have been tested

Additional information in the Technical Guideline may be required to explain how the six year cycle is measured when allowing segmented testing. Segmented testing can test all components of an RAS every six years, but an individual component could end up being tested once every 10 years. For example, a RAS is designed so that it is comprised of a segment “A”, and a segment “B”. Segment “A” is tested in year 1, segment “B” is tested in year 5. As per Requirement R8 the RAS has been tested within “six-calendar years.” The clock starts for the next functional test period, and segment “B” is
tested in year 1 (one year since its first test), and segment “A” tested in year 5 (nine years since its first test). The RAS was tested within the “six-calendar years”, but segment “A” had a nine year interval. Is this what is intended? It should be required that all segments be tested in the same calendar year.

The RAS-owner should be included in Attachment 3.

Requirement R8 and guidance provided in the supplemental material as written go beyond the direction stipulated by the SAR which states that the standard will address maintenance and testing on non-Protection System components of a RAS. Maintenance of Protection Systems installed as a RAS for BES reliability is clearly covered in PRC-005. We are very concerned that there are different timeframes and duplicative testing for RAS components. In particular, the supplemental material provided is very confusing and appears to suggest duplicative testing compared to testing already required by PRC-005. Suggest that all testing requirements for RAS should be contained in one standard. The testing time periods should be made consistent with Table 1-1 in PRC-005, specifically 6 years for an unmonitored protection system, and 12 years for an unmonitored microprocessor protection system.

NPCC suggests deletion of the phase “including any identified deficiencies” in R5 because Parts 5.1 through 5.4 clearly define the necessary level of analysis required by the RAS-owner. Leaving this phrase in will lead to confusion over whether the proper operation of a “composite” RAS is considered a deficiency if one of the two redundant RAS suffer a component failure.

In C. Compliance, Section 1.2 Evidence Retention: the RC and TP have not been included. The TO, GO and DP are requested to keep data for requirements that they might not be responsible for.