

RCIG Assessment
on
Monitoring and Implementation
of
Reliability Standard PRC-005-1
Transmission and Generation Protection System
Maintenance and Testing

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1. Introduction

During the monitoring and implementation of the Compliance Monitoring and Enforcement Program (CMEP) to date, the PRC-005-1 Reliability Standard has been identified as one of the most frequently violated Reliability Standards. Since this Reliability Standard is a high Violation Risk Factor (VRF) and thus could have significant impact on the reliability of the bulk electric system, NERC, the Members Representative Committee, and many other organizations have indicated a strong interest in examining the implementation of this standard, determining the reasons for the frequent violation of this standard, and identifying suggested process enhancements to improve compliance with this standard. Many of the entities affected are on a six year audit cycle and may not be subject to an audit in the near term, which could result in continuing high violation levels at a time when the program is expected to be maturing.

In response, the Regional Compliance Implementation Group (RCIG) took on the responsibility of reviewing this issue. The RCIG developed a Regional Report Template that was distributed to each Region. This template requested the following information:

- Identification of the frequency of standard implementation, including the number of times the standard was monitored by the Regions
- The number of times the entity monitored was compliant/non-compliant
- An identification of the method of discovery
- Identification of both primary and secondary issues related to the reason for the non-compliance
- Identification of suggested process enhancements

After review of the information received from the data returned via the template, the RCIG agreed to issue this whitepaper identifying key reasons for non-compliance and suggested process enhancements.

2. Key Reasons for Non-Compliance and Suggested Process Enhancements

After reviewing the results of the information gathered, the following key reasons were identified, by the RCIG, as the primary reasons that Registered Entities were found to be non-compliant:

1. Not all components of the protection systems were identified or tested.

Data presented demonstrated that in many cases of non-compliance the entity did not test nor maintain all of the defined components of the protection system as defined by the NERC Glossary. These components include protective relays (i.e. electro-mechanical and microprocessor); associated communication systems; DC control circuitry; voltage and current sensing devices (PTs and CTs), and station batteries.

Suggested Process Enhancements

Clarify the definition of a protection system by defining all of the components of the protection system. In addition, reinforce this concept by including the definition in the RSAW for PRC-005, at the Regional Entities' (RE) compliance workshops, other methods of communication that NERC and the RE's have with the applicable Registered Entities, and provide a review of the definition and review the findings of this whitepaper. Present drafting team activities for this standard are expected to address the specific maintenance activities for components in the Protection System definition. Expectations on the use of the glossary may need to be promulgated to the industry, and the process of establishing and changing definitions.

2. Documentation of testing and maintenance results is missing or inadequate.

In many cases the Registered Entity had missing or incomplete documentation. Testing and maintenance may have been done as a long standing practice by the entity, but recordkeeping was insufficient leading to a non-compliance finding. Lack of experience with a true culture of compliance and interaction with a comprehensive compliance monitoring and enforcement program was also identified as a reason for the insufficient documentation. The industry continues to struggle with the level of documentation that is necessary to adequately institute the requirements of the standard. A "zero tolerance" approach of violations to this standard, for which there could be thousands of pieces of applicable equipment, has also contributed to the visibility of this issue.

Suggested Process Enhancements

Registered Entities have to be given further guidance and explicit direction that: a) there needs to be thorough and rigorous documentation of applicable testing and maintenance practices; b) that the documentation is kept current; c) data should be retained for 3 years or the last date maintenance and testing was performed if it is greater than 3 years; and d) the entity has the ability to produce data associated with the Standard requirements. Doing the above is critical to meeting the standard as it is currently written.

On a longer term basis, future consideration should be given to having the requirements of the standard focus not only on documentation, but also on the quality of the maintenance and testing program and the operability of the equipment. Emphasis in the standard should be on the performance of the maintenance and testing and the quality of that performance rather than on the maintenance of documentation. It will be a self-correcting process as the entity will only be able to adequately demonstrate effective testing and maintenance if they can produce evidence and documentation that they have met the parameters of the maintenance and testing program.

3. Failure to complete maintenance and testing activities on time.

Many Regions reported that while the Registered Entities may have conducted their maintenance and testing programs they did not complete them in the time intervals specified in their plan due to many reasons. Entities have had to divert resources to support events such as natural disasters, system emergencies or equipment failures, or may have difficulty in obtaining transmission line or generating plant outages. Their program must identify the management of these issues.

Suggested Process Enhancement

Emphasis on the urgency to meet the specified time intervals must be made explicitly clear. The Registered Entity needs to recognize that the program it establishes is not viewed as a target, but is a minimum that must be achieved, regardless of what situations the company may encounter that interfere with planned maintenance. The entities need to clearly define how they manage the intervals and their schedule. The intervals and the schedule need to be managed to allow an appropriate grace period that each entity can support and justify technically. If tested outside of a scheduled interval, and the operability is deemed to have not been effected, a lower violation should be effectuated. As mentioned above, this point needs to be reinforced with the Registered Entity via all communications methods available to the RE (compliance workshops, Reliability Standard Audit Worksheet (RSAW), Compliance Guidance Document (CGD), etc.). Entities must be made aware of the need to adequately budget and plan their maintenance and testing programs to assure that they are in the best position to meet the requirements of the program, all in the interest to enhance overall system reliability.

4. Lack of complete and thorough monitoring of testing and maintenance programs.

Regions reported that some Registered Entities did not have complete programs. Typically, this involved failure to include items in the definition other than protective relays themselves. This non-compliance issue could be due to unfamiliarity with a formal compliance program, inexperience, or less than diligent implementation.

In particular some smaller companies do not use an oversight approach to their programs. These companies go through all their devices on a cycle but they do not necessarily have them scheduled. Some have maps showing which stations have been completed and when, but there are no summary type worksheets tracking the work. The idea of summary type of worksheets is new to these companies. The reason the smaller companies have been doing it this way is because they contract a lot of this work out. They write contracts to cover their stations within their time cycle and they believe they are done, when in fact that is just part of the tracking that needs to take place.

Suggested Process Enhancements

Where possible, examples of acceptable maintenance and testing programs should be given to the Registered Entities that are deficient. This could occur at a Region's compliance workshop, or through a compliance guidance statement that is posted on the RCIG website, or other means.

5. Inventory lists of applicable devices are incomplete and therefore devices are not scheduled appropriately.

In some instances, Registered Entities did not ensure that all devices were properly transferred from legacy paper or spreadsheet systems to advanced database software management packages in common usage today. In addition, Registered Entities were not ensuring that recently installed devices were added to their active inventory list of devices and therefore not added to maintenance schedules. Inadequate configuration controls can contribute to this issue.

Suggested Process Enhancement

Registered Entities should perform periodic physical inventories, including walkthroughs where needed, to ensure that the active device inventory list is complete and accurate, and that all pertinent devices appear on maintenance and testing schedules.

3. Conclusion

Compliance to the PRC-005-1 Reliability Standard is critical to maintaining bulk electric system reliability. It is imperative that clear information is provided to assure that the Registered Entities have the best opportunity to understand how they can effectively meet the standard. The standard drafting team is presently addressing some of these issues. The RCIG should review and comment on the posted drafts of PRC-005 and provide observations from a compliance perspective. Registered Entities should be given this guidance and information via all methods available as discussed in this whitepaper.

Finally, as the CMEP matures and Registered Entities, particularly those who have had little experience with formal compliance programs, become more familiar with the program it is expected that compliance to the PRC-005-1 Reliability Standard will improve as long as the Registered Entities, NERC, and the Regional Entities are rigorous in their pursuit of an effective compliance program and culture.