

NERC Violation ID	Reliability Standard	Req.	Violation Risk Factor	Violation Severity Level	Violation Start Date	Violation End Date	Method of Discovery	Mitigation Completion Date	Date Regional Entity Verified Completion of Mitigation
RFC2016015998	PRC-005-1b	R2	High	Lower	3/14/2012 (when the Standard became mandatory and enforceable on the entity)	12/29/2017 (Mitigation Plan completion)	Self-Report	12/29/2017	1/26/2018
Description of the Violation (For purposes of this document, each violation at issue is described as a “violation,” regardless of its procedural posture and whether it was a possible, or confirmed violation.)			<p>On August 8, 2016, the entity submitted a Self-Report to ReliabilityFirst stating that, as a Transmission Owner, it was in violation of PRC-005-1b R2.</p> <p>The entity discovered 154 out of 38,168 in-scope PRC-005 relays (0.4%) were outside of the entity’s defined maintenance interval. The entity identified two separate contributing causes for the 154 instances. First, for 46 of the 154 relays, the entity discovered that, in its maintenance and testing Cascade Database, the relays were incorrectly part of the non-Bulk Electric System (BES) Maintenance Program, which has slightly longer intervals than required by its BES program under PRC-005 (six years). The entity discovered this as a result of preparation for PRC-005-2 and PRC-005-6 implementation. Of the 46 relays that were part of the non-BES Maintenance Program, 37 were maintained within seven years, 6 were maintained within eight years, and 3 were maintained within nine years or more.</p> <p>Second, for the remaining 108 relays out of the 154 relays, the entity discovered that those relays were not in its maintenance and testing Cascade Database at all and were thus missing records to show that these 108 relays were maintained and tested. The entity found all 108 of the missing relays during the completion of mitigating activities that included reviewing station diagrams at BES locations to identify PRC-005 relays that were missing from the Cascade Database. These relays were older relays that never made it into the Cascade Database.</p> <p>Additionally, there was one battery/charger at a new substation that was not entered into the Cascade Database in a timely manner and, therefore, orders for maintenance on that battery/charger were delayed.</p> <p>This violation involves the management practices of asset and configuration management, verification, and validation. The root cause of the overdue maintenance was twofold. First, the entity failed to enter all of the required relay schemes into the Cascade Database for tracking purposes, which reveals ineffective asset and configuration management and ineffective verification and validation controls to ensure that all relays were properly entered into the Cascade Database. Second, the process for data entry into the Cascade Database was de-centralized across several entity operating companies rather than being centrally managed which made verification and validation difficult.</p>						
Risk Assessment			<p>This violation posed a moderate risk and did not pose a serious or substantial risk to the reliability of the bulk power system (BPS) based on the following factors. The risk posed by this violation is the loss of equipment or facilities due to misoperation of the protection system equipment where the relay schemes were not maintained and tested in a timely manner. The risk is not minimal because of the number of devices at issue (154 relays) and the relatively long duration for the 108 relays for which the entity lacked testing and maintenance records. (The entity identified two applicable relays at issue that were part of an Interconnection Reliability Operating Limit (IROL). One relay is microprocessor-based and contains self-monitoring which will send relay failure alarms back to the Control Center. Therefore, if an issue were identified, a corrective action would have been taken. Additionally, this line has backup relaying that was maintained. The second relay was found to be within tolerance when tested and there are multiple overlapping relays that were maintained as well and those overlapping relays would act in case of a breaker failure to trip on that second relay thereby reducing the risk. For these reasons, while two relays were part of an IROL, additional and overlapping measures were in place to maintain reliability.)</p> <p>The risk is not serious because this violation involved less than half of one percent of the entity’s in-scope PRC-005 relays. Additionally, of the 154 relays at issue, 46 were part of the entity’s non-BES Maintenance Program and thus were tested between only one and three years later than the required six-year interval. Specifically, 37 were tested only one year late, 6 were tested two years late, and 3 were tested three years late. Of the 108 relays that were not in the Cascade Database, 64 are microprocessor-based and contain self-monitoring (which will send relay failure alarms back to the Control Center if a failure occurs) and 10 had backup relays that would function in case the primary relay failed. For the one new battery/charger at a new substation that was not entered into the entity’s database in a timely manner, the battery/charger was being monitored via low-voltage alarm and the entity performed periodic checks on the battery/charger during routine station inspections. Accordingly, the violation posed a moderate risk to the reliability of the bulk power system.</p> <p>No harm is known to have occurred.</p>						
Mitigation			<p>The entity had already maintained and tested all but one relay scheme by the time the entity discovered all of the issues. The entity issued a maintenance and testing order for the remaining relay scheme and confirmed that work was completed as of April 7, 2016. For every issue, the entity made the appropriate modifications to the Cascade Database by August 8, 2016, to ensure that the equipment is correctly scheduled for future maintenance per the entity’s PRC-005 PSMP.</p> <p>The entity’s mitigating actions directly address the root causes of this violation. First, the entity conducted an extensive review to ensure all relay schemes are appropriately “flagged” in the Cascade Database as being part of the BES Protection System Maintenance Program. (To identify existing equipment potentially in scope of PRC-005 that is missing in Cascade, the entity established a project with dedicated resources to review about 790 substations. The entity re-reviewed the 79 CIP Medium substations that are part of the Bar Coding initiative. In addition, the entity will review approximately 710 additional substations located in its entity-East and entity-West operating areas. For those substations with equipment in scope of PRC-005, the entity will compare substation protective equipment</p>						

drawings against Cascade records to identify data integrity issues. Substations in the entity’s other operating area, entity-South (former Allegheny Power), are not included in this mitigating activity because these locations are considered low risk based on a documented substation inventory walk-down completed in 2010 as part of a formal Mitigation Plan (Docket # RFC201000237). The entity has prioritized this work based on risk to its BES transmission system. Top priority is 230 kV and higher substations and secondary priority is remaining BES substations. These activities have a target completion date of March 31, 2019.) Second, the entity has taken steps to ensure that all new equipment is entered into the Cascade Database upon installation. (First, the “Pre-Energization Checklist,” effective May 1, 2016, requires that Project Managers verify that all appropriate equipment has been entered into Cascade. Second, the “New Equipment Entry Process,” effective October 10, 2016, ensures that a substation equipment list is generated by the Substation Design group for all projects and that the list is integrated with the BES Flag review conducted by the entity Protection group. The Asset Management and Records Control department then enters the equipment into Cascade. As an additional post-energization control to ensure all newly installed substation assets have been properly recorded in Cascade, the entity implemented a new monthly detective control. The detective control will confirm that all assets reflected as in-serviced in the entity’s financial database (“Power Plant”) are correctly recorded in the Cascade Database.) The entity has historically employed a de-centralized method for data entry of substation equipment into the Cascade Database. To improve data consistency and integrity, the entity centralized Cascade Database equipment entry within a recently formed corporate department - Asset Management & Records Control (AMRC). In addition, the entity has implemented two new control processes related to new construction and equipment additions at substations and will be implementing an additional control to better ensure new equipment is timely entered into the Cascade Database prior to energization.

To mitigate this violation, the entity:

- 1) reviewed the missing equipment for its CIP Medium and Tier 1 substations;
- 2) did an extent of condition on 100% of its Tier II substations;
- 3) implemented a detective control to ensure that the database includes all BES equipment; and
- 4) reviewed Cascade Database “flags” for a need to shift from the entity’s non-BES maintenance program to its PRC-005 Protection System Maintenance Program (PSMP).

The entity’s mitigating actions will achieve greater assurance regarding the accuracy of the PRC-005 records residing in the Cascade Database. The mitigation actions identified missing protective equipment devices relied upon for BPS reliability and ensured they are properly scheduled as required by the entity PRC-005 PSMP. The mitigation actions also established both detective and preventive internal controls to better position the entity for ongoing accuracy of the records in the Cascade Database.

Other Factors

The Settlement Agreement through which this violation was resolved included two violations, and the factors affecting the penalty determination were considered in relation to both violations together as opposed to each individual violation.

ReliabilityFirst reviewed the entity's internal compliance program (ICP) and considered it to be a mitigating factor in the penalty determination. Although both violations contain multiple instances, the entity's compliance program still deserved mitigating credit because of the controls that allowed it to identify the first issue and the entity’s aggressive and thorough mitigation that the entity undertook and completed for both violations. The parent company of the entity has a robust internal compliance program that is managed by its FERC Compliance Department (FCD), which has corporate oversight responsibilities and is independent from the business units that are responsible for complying with the NERC Reliability Standards. Corporate Business Unit “Compliance Champions” assist FCD with monitoring activities that encourage opportunities to increase reliability. FCD is responsible for tracking and communicating new and updated Reliability Standards to Corporate Business Unit Compliance Champions and their management. All Reliability Standard action items are recorded and tracked via the entity’s compliance software. FCD monitors action items and conducts follow-up meetings as needed. FCD created a Director Dashboard which tracks new Reliability Standards or changes to existing Standards and associated action items. The Director Dashboard is communicated bi-monthly to the entity’s Executive Leadership Team, directors, managers, and Compliance Champions. Action items are given priorities with Regulatory deadlines and milestones given the highest level of Critical Compliance that includes VP notification 30 days prior to due date.

Effective oversight of the reliability of the BES depends on robust and timely self-reporting by Registered Entities. The entity promptly identified and reported the violation due to the effective execution of its compliance program and the installation of internal controls that yielded identification of the issues prior to the occurrence of any harm. Therefore, ReliabilityFirst awarded some mitigating credit to the entity.

ReliabilityFirst considered the entity’s cooperation during the Settlement Agreement process and awarded mitigating credit. The entity has been cooperative throughout the entire enforcement process. Following the Self-Reports, the entity met and communicated with ReliabilityFirst on a regular basis, including multiple in-person meetings onsite at ReliabilityFirst to discuss the violations, the mitigation, and the status of mitigation. Throughout the enforcement process, the entity voluntarily provided ReliabilityFirst with an abundance of information regarding the violations in a manner that was detailed and timely.

The entity is also in the process of constructing a new Center for Advanced Energy Technology (CAET) facility. This facility will allow for the introduction of new technology to the entity Transmission substation environment, will aid in the connectivity to the field devices, and improve data acquisition. The entity expects the facility to be operational by March 31, 2019.

	<p>Lastly, the entity is installing an Operational Technology Configuration Management (OTCM) Database to manage all configurable devices and configuration files. Previously, the relay setting system was a standalone tool and not connected to any devices in the field, and configurations of non-relay devices were managed locally. This tool is being integrated with the entity's maintenance and testing Cascade Database for consistency and workflow management. The entity is phasing the rollout of these systems and processes across the entity's operating companies beginning in the 4th quarter of 2018 with a targeted completion date in 2019. (The entity estimated the total cost to implement corrective actions and preventive measures for RFC2016015998, RFC2017017902, and related NERC Standards at \$78.8 million: Substation walkdowns (includes inventory, barcoding, etc.) = \$47.3 Million; Drawing review – compared substation one-line diagrams with Cascade equipment files = \$1.65 Million; OTCM Project = \$29.4 Million; and Internal labor spent on mitigating activities = \$400k.)</p> <p>ReliabilityFirst considered the entity's compliance history in determining the penalty. ReliabilityFirst considered the entity's compliance history to be an aggravating factor in the penalty determination.</p>
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RFC2017017902	PRC-005-6	R3	High	Severe	4/2/2017 (when the Standard became mandatory and enforceable on the entity)	6/1/2018 (Mitigation Plan completion)	Self-Report	6/1/2018	6/18/2018
<p>Description of the Violation (For purposes of this document, each violation at issue is described as a “violation,” regardless of its procedural posture and whether it was a possible, or confirmed violation.)</p>			<p>On June 30, 2017, the entity submitted a Self-Report to ReliabilityFirst stating that, as a Transmission Owner, it was in violation of PRC-005-6 R3.</p> <p>The entity identified this violation through the PRC-005-3(i) Guided Self Certification process in 2017. The entity discovered that it was incorrectly determining battery performance maintenance by utilizing the average of the string of the battery cell’s internal ohmic value to compare to the individual cells rather than using the individual baseline for each battery as specified in the PRC-005-6 R3, Table 1-4(a) - 18 Calendar Months Maintenance Interval. This affected 441 out of 715 in-scope PRC-005 batteries (62%). (When 10% or more of the cells indicated an impedance variation of greater than 20% of the entire string, then further testing would be done to determine if battery replacement was needed. This battery replacement strategy resulted in the installation and replacement of more than 70 Bulk Electric System batteries and chargers (\$1.5 million); an additional \$1.5 million was spent on working and closing over 5,000 corrective maintenance and preventative maintenance orders over an 18 months period, prior to the Self-Report.) After identifying the violation, the entity performed the correct tests per PRC-005-6 R3 and did not identify any additional battery banks that needed to be replaced. Although the entity was not previously applying the tests using the individual battery baselines across its footprint, the entity’s testing method yielded similar results to comparing against battery baselines as required in PRC-005.</p> <p>The entity conducted an investigation to determine how this violation occurred. In 2014 and 2016, the entity added instructions to record the initial average battery baseline impedance as measured 6 to 12 months after a new set of batteries had been installed to two different procedures. Due to an inconsistent implementation of this new maintenance strategy, however, most of the entity’s operating companies incorrectly continued to utilize the average of the string of battery cell’s internal ohmic value to compare to the individual cells.</p> <p>This violation involves the management practices of work management and validation as the entity failed to validate that its new maintenance strategy for determining battery performance maintenance was consistently implemented across the entity operating companies. That inconsistent implementation across the entity is a root cause.</p>						
<p>Risk Assessment</p>			<p>This violation posed a moderate risk and did not pose a serious or substantial risk to the reliability of the bulk power system based on the following factors. Comparing each battery’s measurements every 18 months to the initial baseline helps entities establish deviations as a predictor of age, wear, etc., which would reduce the risk of unexpected battery malfunctions due to those factors. This risk was mitigated in this case by the fact that, although the entity’s testing practices were not in strict compliance with the Standard (because the entity was incorrectly determining battery performance maintenance by utilizing the average of the string of the battery cell’s internal ohmic value to compare to the individual cells rather than using the battery baseline), the entity was timely performing maintenance and testing on its batteries in a way to maximize battery performance. After the entity established the battery baselines per PRC-005 and compared to testing results, the entity did not identify any additional battery banks that needed to be replaced. (The entity identified 21 applicable lines and two applicable transformers that were part of an Interconnection Reliability Operating Limit (IROL) that utilized batteries at issue in this noncompliance. After the battery baseline was established per PRC-005 and compared to testing results, the entity did not identify any additional battery banks that needed to be replaced. As of June 1, 2018, PJM has removed 14 of the applicable lines and the two applicable transformers as IROL Facilities. Based on the current PJM defined IROLs, only seven applicable lines utilized batteries at issue in this noncompliance.) Although the entity was not comparing to battery baselines across its footprint, the entity’s method yielded similar results to comparing against battery baselines as required in PRC-005. (ReliabilityFirst notes that the entity has an established battery replacement strategy that has replaced over 90 battery systems and has worked nearly 1070 Corrective Maintenance orders on batteries over the past 18 months.)</p> <p>No harm is known to have occurred.</p>						
<p>Mitigation</p>			<p>To mitigate this violation, the entity:</p> <ol style="list-style-type: none"> 1) updated the Methods Section 16M testing procedure to incorporate evaluation of the test data to the established baseline impedance. This activity ensures that qualified field technicians will have proper instructions on evaluating battery baseline impedance; 2) has determined baseline impedances for all existing batteries. This activity ensures that all batteries older than 12 months have an established baseline; 3) has created a detective control that will be performed annually to record the average battery impedance of batteries that are between 6 and 15 months old. This activity ensures newer batteries have a recorded baseline; 4) has performed an extent of condition to determine the list of batteries that need to be evaluated against their baseline impedance. This activity ensures that all batteries required per PRC-005-6 R3, Table 1-4(a) are included in the list to be mitigated; 5) developed an instructor-led training module; 6) conducted training on the updated testing procedure for field technicians qualified for battery testing; and 7) collected in-scope battery test data through June 1, 2018 and evaluated results against baseline impedance. 						

	<p>The entity’s mitigating actions implemented process improvements that will ensure qualified field technicians will have proper instructions on evaluating battery baseline impedance; baseline determination to ensure that all batteries older than 12 months have an established baseline; annual baseline updates to ensure newer batteries have a recorded baseline; and training to ensure the reinforcement of the new testing method.</p>
<p>Other Factors</p>	<p>The Settlement Agreement through which this violation was resolved included two violations, and the factors affecting the penalty determination were considered in relation to both violations together as opposed to each individual violation.</p> <p>ReliabilityFirst reviewed the entity's internal compliance program (ICP) and considered it to be a mitigating factor in the penalty determination. Although both violations contain multiple instances, the entity's compliance program still deserved mitigating credit because of the controls that allowed it to identify the first issue and the entity’s aggressive and thorough mitigation that the entity undertook and completed for both violations. The parent company of the entity, has a robust internal compliance program that is managed by its FERC Compliance Department (FCD), which has corporate oversight responsibilities and is independent from the business units that are responsible for complying with the NERC Reliability Standards. Corporate Business Unit “Compliance Champions” assist FCD with monitoring activities that encourage opportunities to increase reliability. FCD is responsible for tracking and communicating new and updated Reliability Standards to Corporate Business Unit Compliance Champions and their management. All Reliability Standard action items are recorded and tracked via the entity’s compliance software. FCD monitors action items and conducts follow-up meetings as needed. FCD created a Director Dashboard which tracks new Reliability Standards or changes to existing Standards and associated action items. The Director Dashboard is communicated bi-monthly to the entity’s Executive Leadership Team, directors, managers, and Compliance Champions. Action items are given priorities with Regulatory deadlines and milestones given the highest level of Critical Compliance that includes VP notification 30 days prior to due date.</p> <p>ReliabilityFirst considered the entity’s cooperation during the Settlement Agreement process and awarded mitigating credit. The entity has been cooperative throughout the entire enforcement process. Following the Self-Reports, the entity met and communicated with ReliabilityFirst on a regular basis, including multiple in-person meetings onsite at ReliabilityFirst, to discuss the violations, the mitigation, and the status of mitigation. Throughout the enforcement process, the entity voluntarily provided ReliabilityFirst with an abundance of information regarding the violations in a manner that was detailed and timely.</p> <p>ReliabilityFirst considered the entity's compliance history in determining the penalty. ReliabilityFirst considered the entity's compliance history to be an aggravating factor in the penalty determination.</p>