1.0 PURPOSE:

1.1 This standard establishes general practices for routine preventative maintenance of Protection Systems and Sudden Pressure Relaying utilized at the Company's electric generating plants.

2.0 APPLICABILITY:

2.1 Included in the scope of this standard are Protection Systems and Sudden Pressure Relaying that protect generators, transformers, switchgear, and the individual loads fed from the circuit breakers on a medium voltage or low voltage bus. The standard addresses all aspects of routine maintenance as well as recommended testing and maintenance intervals. Note that Protection Systems and Sudden Pressure Relaying for generators, generator step-up transformers, generator interconnection facilities, main or unit connected auxiliary transformers, reserve or startup auxiliary transformers, and generator bus connected excitation transformers at Bulk Electrical System (BES) plants or Protection Systems for facilities used in aggregating dispersed BES generation from the point where those resources aggregate to greater than 75 MVA to a common point of connection at 100 kV or above, must be maintained per this standard to meet NERC Standard PRC-005, "Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance," requirements.

2.2 Energy Supply does not utilize Automatic Reclosing and as such, maintenance of Automatic Reclosing components is not addressed in this standard. Furthermore, Energy Supply has no RAS, UVLS or UFLS systems and therefore maintenance of those systems is not addressed.

2.3 The maintenance activities and associated maximum maintenance intervals established within this policy are based on those contained in the current version of NERC Standard PRC-005 and associated documents as they exist at the time of the approval of this standard.

2.4 For NERC Standard PRC-005 related schemes all Relays, Voltage and Current Sensing Devices, Associated Control Circuitry Protection System Component Types, as well as Sudden Pressure Relaying, are maintained per a time-based maintenance program with intervals not to exceed the PRC-005 specified maintenance intervals for unmonitored components.

2.5 For NERC Standard PRC-005 related schemes, Communication Protection System Components maintained per this Energy Supply program are maintained per a time-based maintenance program for continuously monitored Communication Protection Systems with intervals not to exceed the PRC-005 specified maintenance intervals for monitored communication components. All present Communication Protection System Components alarm to an operator for communication system failure.

2.6 For NERC Standard PRC-005 related schemes, Battery and Battery Charger Protection System Components are maintained per EPR 5.704S.

3.0 RESPONSIBILITIES:

3.1 Performance Optimization is responsible for assigning a Fleet Engineering staff member in each region to serve as the Protection System Maintenance subject matter expert, (PSM-SME) .

3.2 The facility director and Performance Optimization management should collaborate and designate an individual to serve as a Site Electrical Maintenance Coordinator, (Site EMC), for each site. The Site EMC responsibilities will, in part, include administration of the requirements identified in Section 4.0 below.

Most frequently the Site EMC will be the electrical Performance Optimization Reliability Engineer assigned to the site. Alternatively, if there is not an electrical Performance Optimization Reliability Engineer assigned to the site, a Maintenance Planner, Operations Support Manager, Station Electrician, or a Performance Optimization Fleet Engineer may be assigned to fulfill this role.

4.0 REQUIREMENTS:

The following maintenance and testing activities are identified for implementation of the Protection System maintenance program and shall be used to assure reliable operation and performance of the protection systems:

4.1 Development and Management of the Site Protection System Maintenance Program.

4.1.1 The Site EMC and PSM-SME should work together to identify all protective relays, voltage and current sensing devices (PTs and CTs/DC shunts), communications systems, and associated control circuitry used in Protection Systems and Sudden Pressure Relaying on a site and to group these devices into protective schemes for the purposes of scheduling and performing maintenance.

4.1.2 For NERC PRC-005 Related Protection Systems and Sudden Pressure Relaying, the PSM-SME SHALL develop scheme specific Protection System maintenance procedures. These procedures SHALL

4.1.2.1 Clearly identify all relays, voltage and current sensing devices, communications systems, associated control circuitry trip paths and Sudden Pressure relaying to be tested in conjunction with the maintenance of that particular NERC PRC-005 Related Protection System.

4.1.2.2 Provide adequate guidance to assure that the maintenance activities specified in paragraph 4.2.2 below are performed for each component type utilized within that particular protection system scheme and so that completion is documented for compliance evidence.

4.1.2.3 Identify any subsequent work and asset management system Work Orders issued to address and track any Unresolved Maintenance Issues - issues identified but not corrected during the performance of the procedure

4.1.2.4 Be reviewed and updated as necessary by the PSM-SME following any protection system modifications.

4.1.3 The PSM-SME is responsible for maintaining documentation of the desired setpoints of all protective relays and to have this information available for technician reference during maintenance. The PSM-SME should strive to develop consistent setpoint documentation at all plants. Consistency in the methods of setpoint documentation will make maintenance much easier for the technicians who travel from site to site to perform relay calibration.

4.1.4 The Site EMC shall ensure that plant protective system component maintenance and testing as described in this standard is performed within the intervals established in Table 1, “Maximum Allowed Protection System Maintenance Intervals.”

4.1.4.1 Under no circumstance shall the period between tests of any particular device exceed the timeframe prescribed in Table 1, except that maintenance and testing of a device may be completed any time within a calendar year (i.e., the interval is based on calendar years and not anniversary dates).

4.1.4.2 The plant overhaul schedule should be taken into consideration when scheduling protection system maintenance and testing.

4.1.4.3 Equipment outages may be required to maintain and test certain devices; therefore, equipment outage schedules should be considered when scheduling protection system maintenance and testing.

4.1.4.4 In scheduling the maintenance and testing activities, priority should be driven by the criticality of the equipment, the cleanliness of the environment, the type of relay involved (electromechanical, solid state, or microprocessor based), and past maintenance history. While prioritization of scheduling may be appropriate, in no event shall the period between maintenance and testing of a specific device exceed the applicable interval set out in Table 1.

4.1.5 Once all of the protective relay schemes have been identified and appropriate maintenance intervals have been identified for each of the individual schemes, the Site EMC should assure this information is entered into the work and asset management system PM program so that protective relay maintenance of all protective relay schemes will be automatically scheduled to be performed on a recurring basis.

4.1.5.1 For NERC PRC-005 Related Protection Systems and Sudden Pressure Relaying, the work and asset management system PM shall call for the performance of the scheme specific procedures developed per Section 4.1.2 above.

4.1.6 The Site EMC is responsible for onsite coordination of protection system maintenance activities.

4.1.7 Periodically, the PSM-SME and the Site EMC should review as found vs. as left test data recorded during performance of maintenance. Based on the findings of this review, they may elect to lengthen or shorten the maintenance interval assigned to a particular scheme. However, for NERC PRC-005 related protection and sudden pressure relaying systems, the interval cannot be extended beyond that specified on Table 1.

4.2 Performance of Protection System Maintenance

4.2.1 **Effective Program Start Dates.** For compliance purposes, the relay maintenance program effective start date for all component types other than sudden pressure relaying is 4/1/2015 which is the original effective date of

PRC-005-2. For sudden pressure relaying the effective program start date is 1/1/2016 which is the original effective date of PRC-005-6. See NERC Implementation Plans for detailed phased in requirements.

4.2.1.1 For those protection systems for which maintenance activities meeting the requirements of paragraph 4.2.2 were performed prior to 4/1/2015, initial maintenance may be scheduled based on the last completion date and the appropriate Table 1 maximum allowed interval.

4.2.1.2 For newly installed or modified Protection Systems, initial maintenance should be scheduled based on the final commission/acceptance test date and the appropriate Table 1 maximum allowed interval.

4.2.2 **Maintenance Activities.** The following maintenance activities should be performed for the various component types making up a Protection System. For PRC-005 related schemes, these maintenance activities must be performed to meet the maintenance activity requirements of PRC-005.

4.2.2.1 Maintenance Activities for Electromechanical Protective Relays

Perform the following as appropriate:

- Perform and record a single point, as found calibration check of the device prior to cleaning or adjusting the relay.
- Clean, inspect, and adjust the relay as necessary.
- Perform an as left calibration check of the device. For time overcurrent relays, this as left check should be at a minimum of three points on the time characteristic curve.
- Verify that the relay output contacts will act to trip the associated circuit breaker or actuate any associated lockout device.
- Verify the relay as left settings are as specified

4.2.2.2 Maintenance Activities for Analog Electronic Protective Relays

Perform the following as appropriate:

- Perform and record a single point as found calibration check of the device. The results of this initial test should be recorded.

- If the results of the as found test or relay self test were acceptable, the technician need not perform any as left testing. If the results of the initial test were unacceptable, the technician should adjust the relay and perform as left testing. If performed, the results of the as left testing should be recorded.

- Verify that the relay output contacts will act to trip the associated circuit breaker or actuate any associated lockout device.

- Verify the as left relay settings are as specified

4.2.2.3 Maintenance Activities for Microprocessor Based Protective Relays

Perform the following as appropriate:

- Verify that the relay output contacts will act to trip the associated circuit breaker or actuate any associated lockout device.

- Verify proper functioning of the input analog/digital converters.

- Verify proper response to relay inputs critical to Protection System performance.

- Verify the as left relay settings are as specified.

4.2.2.4 Maintenance Activities for Current Transformers (CTs) and DC shunts

A CT/Shunt Verification Test should be performed at the interval listed in Table 1. Acceptable methods of CT Verification include:

- CT Feedback (Saturation) Test

- CT/Shunt Load Check Test

- CT/Shunt Comparison Test

4.2.2.5 Maintenance Activities for Potential Transformers (PTs)

A PT Verification Test should be performed at the interval listed in Table 1. Acceptable methods of PT Verification include:

- Turns Ratio Test

- Phase Comparison Test

- PT Comparison Test

4.2.2.6 Maintenance Activities for Associated Control Circuitry

4.2.2.6.1 For NERC PRC-005 related schemes, control circuitry between the protective relay output contacts and the trip coil(s) of the interrupting device(s) actuated by the protection system must be tested. This includes actuation of lockout devices and auxiliary tripping relays and verifying that each trip coil can trip the associated circuit breaker.

4.2.2.6.2 When testing control circuits, it is not necessary to test each individual path completely from the relay all the way to the trip coils of the interrupting device. However, each segment must be functionally tested and overlap of testing will assure functionality of the entire circuit. For example, if several different protective relays can cause a lockout device to actuate and that lockout in turn actuates a circuit breaker trip coil, it is only necessary to prove that each individual relay can actuate the lockout and only once prove that the lockout can actuate the breaker trip coil.

4.2.2.6.3 For NERC PRC-005 related schemes, testing of associated control circuitry SHALL be performed and documented using the scheme specific testing procedures discussed in Sections 4.1.2 and 4.1.5.1 above.

4.2.2.7 Maintenance Activities for Batteries and Battery Chargers Associated with Protection Systems

4.2.2.7.1 Batteries have many critical functions at power plants beyond those served in protection systems. Furthermore, maintenance of batteries is vastly different in scope and process than that for other protection system devices. As such, requirements for the maintenance and testing of battery and charger systems is provided for in a separate stand alone document, EPR 5.704S, “Battery Maintenance Standard”

4.2.2.7.2 The Site EMC SHALL assure that batteries and chargers associated with NERC PRC-005 Related Protection Systems are maintained per EPR 5.704S.

4.2.2.8 Maintenance Activities for Protection System Communication Systems

4.2.2.8.1 Verify that the communications system meets performance criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate)

For Fiber Optic Systems perform the following:

- Perform equipment alarm function test back to station DCS
- Single end testing utilizes the local relay and looped back communication equipment to verify local scheme functionally.

4.2.2.8.2 The trips via the communications shall be maintained per the DC Control Circuitry maintenance requirements at an interval of 6 years. This includes verification of communication system inputs and outputs that are essential to proper functioning of the protection system.

4.2.2.8.3 In lieu of the above, Protection System Communication Systems, if present, at the interface between power plants and the substation may be maintained per the Substation/Transmission Protection System Maintenance Program for communication systems.

4.2.2.8.4 Synchronized and Non-synchronized end to end protective system testing shall be done in coordination of the authority on the other end of the communication line.

4.2.2.9 Maintenance Activities for Sudden Pressure Relaying

4.2.2.9.1 Sudden Pressure Relaying should be performed at the interval listed in Table 1 and verify:

- The pressure or flow sensing mechanism is operable.
- Electrical operation of associated electromechanical lockout devices.

- Functionality of all associated paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

4.2.2.9.2 For NERC PRC-005 related schemes, testing of Sudden Pressure Relaying SHALL be performed and documented using the scheme specific testing procedures discussed in Sections 4.1.2 and 4.1.5.1 above.

4.3 Implementation Schedule for Newly Acquired Plants

For Protection Systems acquired through acquisition or merger process there will be a transition period from the previous entity's program to Xcel Energy Supply's program. PRC-005 related protection systems reviews SHALL be completed before commercial operation begins under Xcel Energy's control. The initial performance of all the maintenance activities required by Section 4.2 must be completed no later than the sooner of the end of first scheduled maintenance outage or within two years of assuming ownership of the facility. However, if test records are available from the previous owner's testing program and the requirements of Section 4.2 are met; the first scheduled maintenance may be based on the completion date of those records.

For batteries, see Section 4.5 of EPR 5.704S 'Battery Maintenance Standard (NERC)'

5.0 REQUIRED RECORDS

5.1 The PSM-SME and Site EMC SHALL have a method to identify all protective relay schemes and to document the individual relays, CTs, and PTs making up a particular scheme. Note that scheme specific procedures can be used to fulfill this requirement.

5.2 The PSM-SME SHALL maintain documentation of the desired setpoints of all protective relays and baseline CT, DC shunt and PT verification test data.

5.3 For every protective relay, voltage and current sensing device, calibration or testing history should be maintained in the program maintenance files for the last three test intervals. For NERC PRC-005 Related Protection Systems, calibration and/or test history SHALL be maintained at least for the last 2 completed test intervals

5.4 For NERC PRC-005 Related Protection Systems and Sudden Pressure Relaying, the Site EMC SHALL maintain the last 2 completed scheme specific maintenance procedures in the program maintenance files

6.0 DEFINITIONS & REFERENCES

6.1 Definitions

6.1.1 **As Found Relay Setting** – a check of a relay setpoint that is taken prior to performing any cleaning, adjustment, or maintenance on a relay.

6.1.2 **As Left Relay Setting** – a check of a relay setpoint that is taken after all cleaning, adjustment, and maintenance has been completed on a relay.

6.1.3 **Automatic Reclosing –** Includes the following Components:

- Reclosing relay
- Supervisory relay(s) or function(s) – relay(s) or function(s) that perform voltage and/or sync check functions that enable or disable operation of the reclosing relay
- Voltage sensing devices associated with the supervisory relay(s) or function(s)
- Control circuitry associated with the reclosing relay or supervisory relay(s) or function(s)

Automatic Reclosing is not installed or used in Energy Supply owned facilities.

6.1.4 **Bulk Electric System (BES) Plants –** plants which connect to the transmission system at voltages $\geq$ 100 KV at the point of interconnection and are either individual units sized at >20 MVA or aggregate site size of > 75 MVA. Additionally any units used for black start restoration, regardless of the size or the voltage at which they connect to the system are included in the BES. See NERC BES definition for BES classification of dispersed generating assets such as wind or solar farms.

6.1.5 **Communication Systems** – Communication Systems in Protection Systems are typically defined as relays at remote ends of transmission lines communicating via various mediums in order to transmit data such as current values and trip signals. Communication Systems types such as Carrier and Tone, are not used with Protection Systems maintained by Energy Supply Power Plants. Digital Equipment type Communication Systems are occasionally used. Digital Equipment is typically defined as follows:

6.1.5.1 Digital Equipment types self monitor channel integrity and will alarm back to the control center through DCS equipment notifying of channel issues or problems.

6.1.5.2 Communication Processors that act as a RTU (remote terminal unit) to communicate relay status are not applicable to this standard as long as no digital bits are passed between relays for protection functions.

6.1.6 **Current Transformer (CT)** – an instrument transformer that has its primary winding in series with the current to be measured and which produces a small signal current in its secondary winding that is proportional to the current in its primary winding. This secondary current is used to provide inputs to protective relaying and/or metering that requires a current signal to operate.

6.1.7 **CT/DC shunt Verification Test** – any type of test or observation that provides some level of assurance that a CT or DC shunt is functioning properly. The verification test should include the CT secondary wiring or shunt MV signal wiring between the relay panel and the location of the CT or DC shunt. Some possible methods of verifying proper CT/DC Shunt function include:

6.1.7.1 Performance of a CT Feedback test (Saturation Test) – an offline test in which a voltage is impressed on a CT and current is measured and compared to previous test data. This test can detect developing problems with the CT or with the wiring that interconnects the CT to the meter or relay that it feeds. The CT is considered acceptable if the excitation current is within +/- 50% of the baseline value for a given input voltage.

6.1.7.2 Performance of CT/DC shunt load checks – observation of secondary currents on in service CTs or millivolt signals from DC shunts to verify currents are as expected for a given load. A three-phase set of CT's is considered acceptable if the current from each CT is within +/- 5% of the average of the set of CT's. A DC shunt is considered acceptable if within 5% of the anticipated value for the given operating point for the DC circuit being monitored.

6.1.7.3 CT/Shunt Comparison Test – For CTs, a comparison of the outputs of 2 separate CTs monitoring the same current. This may be accomplished by observing current, Volt-ampere, watt, or VAR indications fed from two separate sets of CTs. The CT is considered acceptable if the current from the CT is within +/- 5% of the CT to which it is being compared. For DC shunts, comparison of the output of a DC shunt to current measured by use of a DC clamp on ammeter and is acceptable if within 5%

6.1.8 **Electromechanical Relay** – any relay that relies on interaction of electromagnetic forces and moving parts such as springs, disks, or pneumatic diaphragms to establish the relay setpoint. Electromechanical relays often have tight mechanical clearances and rely on low friction jewel bearings to allow movement of the relay disk. As such, these relays are quite sensitive to the presence of coal dust and other environmental factors. Relays located in dusty or dirty areas will require more frequent maintenance than similar relays located in cleaner environments. Electromechanical relays also make use of magnets whose magnetic properties degrade over time resulting in setpoint drift that necessitates periodic re-calibration of the relay. For the above reasons, electromechanical relays require more frequent maintenance than do electronic or microprocessor based relays.

6.1.9 **(Analog) Electronic Relay** – a relay whose setpoint is controlled by analog electronics such that there are no moving parts involved in establishing the setpoint. These relays are much less affected by dust and dirt and exhibit significantly less setpoint drift than do electromechanical relays. Electronic or solid state relays require less frequent and less extensive maintenance then do electromechanical relays.

6.1.10 **Microprocessor Based Relay** - a relay that uses digital electronics and has a programmable microprocessor to control trip and alarm features. These devices are equipped with alarming self check features that are constantly monitoring relay performance and condition. As such, microprocessor relays are highly reliable and require much less frequent and extensive maintenance than either electromechanical or analog electronic relays.

6.1.11 **NERC PRC-005 Related Protection Systems–** protection system relays, communication systems, associated trip circuits and instrument transformers which protect and act to trip generator, generator step up transformer, generator interconnection facilities, main or unit connected auxiliary transformers, reserve or startup auxiliary transformers at BES plants, or Protection Systems for facilities used in aggregating dispersed BES generation from the point where those resources aggregate to greater than 75 MVA to a common point of connection at 100 kV or above.

6.1.12 **Potential Transformer (PT)** – an instrument transformer that is intended to have its primary winding connected in parallel with a power circuit such that the small voltage signal induced in the secondary is proportional to the voltage on the power circuit and primary winding of the transformer. The secondary winding voltage signal is then used in metering and relays.

6.1.13 **Protection System -** NERC's official definition of a Protection System is:

- Protective relays which respond to electrical quantities,
- Communications systems necessary for correct operation of protective functions
- Voltage and current sensing devices providing inputs to protective relays,
- Station dc supply associated with protective functions (including batteries, battery chargers, and non-battery-based dc supply), and
- Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices

6.1.14 **PT Verification Test -** any type of test or observation that provides some level of assurance that a PT is functioning properly. The verification test should include the PT secondary wiring between the relay panel and the location of the PT. Some possible methods of verifying proper PT function include:

6.1.14.1 Turns Ratio Test. A turns ratio test is performed by injecting a voltage into one of the windings and the resultant output is measured on the other winding. The test is acceptable if resultant voltage is within +/- 2% of expected values.

6.1.14.2 Phase Comparison Test. A test where each of the phase outputs of a set of PT's is compared to the average of the set. A three-phase set of PT's is considered acceptable if the voltage from each PT is within +/- 5% of the average of the set of PT's.

6.1.14.3 Comparison Test – comparison of the outputs of 2 separate PTs monitoring the same current. This may be accomplished by observing current, Volt-ampere, watt, or VAR indications fed from two separate sets of PTs. The PT is considered acceptable if the voltage from the PT is within +/- 5% of the PT to which it is being compared.

6.1.15 **Scheme** – a grouping of protective relays applied together to protect a device such as a generator, transformer, bus, or load. Typically, all relays in a relaying scheme will require many of the same isolation points and equipment outages in order to perform maintenance or calibration of the relay. As such, maintenance of protective relaying is planned and scheduled on the basis of protective schemes rather than by individual relays.

6.1.16 **Sudden Pressure Relaying** – A system that trips an interrupting device(s) to isolate the equipment it is monitoring and includes the following components:

- Fault pressure relay – a mechanical relay or device that detects rapid changes in gas pressure, oil pressure, or oil flow that are indicative of faults within liquid filled, wire-wound equipment
- Control circuitry associated with a fault pressure relay

6.2 References

6.2.1 PRC-005-6, "Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance"

6.2.2 NERC Supplementary Reference and FAQ, “PRC-005-6 Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance and Testing - October 2015.”

6.2.3 NERC Implementation Plan, “Project 2007-17.4 FERC Order Directive 803 PRC-005-6”

6.2.4 EPR 5.704S Battery Maintenance Standard (found on the Energy Supply Performance Optimization Policies web page)

7.0 REVISION HISTORY

Date	Revision	Change
8/1/05	0	Original Issue
3/12/07	0	Revised into a standard
3/20/07	1	Revised Table A Plant identifiers to Coal/RDF and Gas/CT/Hydro
5/21/08	1.1	Corrected policy number in heading on Appendix A and reference to Appendix A in ¶4.4
11/17/08	2.0	Reformatted numbering of section 4.2 and provided for alternative methods of current and potential transformer verification. Added paragraph 4.2.1 to clarify program start date
6/1/09	2.1	Added definition of microprocessor based relay and delineated requirements for microprocessor vs. analog electronic relays in paragraphs 4.2.3 and 4.2.4 and Table A. Added further clarification of the bases of Table A intervals in paragraph 4.1.3
7/21/10	2.2	Added sentence to paragraph 4.2.1 to clarify intent of requirements for scheduling of initial maintenance necessary to fulfill program initiation requirements
11/21/2012	3.0	Major Rewrite to meet requirements of pending NERC standard PRC-005-2. Significant changes include: -change in title to clarify scope of standard is for Protection Systems rather than just protective relays. -moved program bases description up to Section 2.0. Establish draft PRC-005-2 materials as the basis for the program. -changed departmental references from “Maintenance Resources” to “Technical Resources & Compliance” to reflect organizational changes. -added paragraphs 4.1.2, 4.1.5.1, and 5.3 to discuss new requirements for scheme specific testing procedures for NERC PRC-005 Related Protection Systems -added paragraph 4.2.2.6 and modified Table A to Table 1 and provided greater clarity for requirements for testing of associated control circuits. -added paragraph 4.2.2.7 to recognize and emphasize that batteries and battery chargers are part of a protection system but are maintained per requirements delineated in EPR 5.704S, Battery Maintenance Standard. -added paragraph 4.2.2.8 to recognize that Communication Systems are part of protection systems but to document that

Date	Revision	Change
		they are not utilized within Protection Systems maintained by Energy Supply
03/26/2013	3.1	– Removed Supersedes EPR 5.714G from title block – Removed references to PRC-005-2 and made all references to PRC-005 throughout document – Added UAT/RAT and SU transformers back in section 2.0 – Updated section 2.0 applicability for a communication device maintenance program, defining types and monitoring statuses. – 4.1.2.4 added for updating procedures for changes in relaying – 4.1.5.1 added 'of' for clarification in the statement 'for the performance of' – 4.2.2 the statement 'requirements required by' was changed to 'requirements of PRC-005' – Completely rewrote 4.2.2.8 and added subsections for fiber optic communication systems in all regions – Updates to section 4.3 for acquired plants – Added 6.1.14 definition of a communication system – Updated Section 6.2 references – Updated Table 1 to include communication systems
05/07/2013	3.2	– Added wording in section 2.0 that was inadvertently deleted in previous revision.
11/04/2013	3.3	– Added wording to address generator interconnection facilities in the following sections: Section 2.0, new definition 6.1.8, modified definition 6.1.10, and Table 1
08/03/2015	3.4	– Revised section 2.0 to more accurately describe in scope protection systems at dispersed BES generation facilities per PRC-005-2(i) applicability – Deleted section 4.4 which referenced a non-existent specification for performance of relay testing by vendor personnel
02/09/2016	4.0	– Major re-write to address requirements of NERC standard PRC-005-6, including adding Automatic Reclosing and Sudden Pressure Relaying.
11/07/2016	4.1	– Minor re-write to include: ▪ use of the generic term "voltage and current sensing device" instead of "instrument transformer" or "CTs/PTs" and to include DC shunt testing for new AVR systems

Date	Revision	Change
		which have Protection System trips derived from DC shunt signals for generator field current. ▪ Re-organization of Table A to clarify applicability for dispersed generation assets. ▪ Deletion of references to Maximo and addition of generic term “work and asset management system”. ▪ Clarified in applicability that ES does not have RAS, UFLS or UVLS systems.
3/20/2020	5.0	– Update department names to reflect current organization. – Updated references – Updated paragraph 4.2.1 to reflect effective program start dates for PRC-005-2 and PRC-005-6 phased in maintenance programs per the associated NERC Implementation Plans. – Clarified responsibilities of the Site Electrical Maintenance Coordinator and the Protection System Maintenance Subject Matter Expert
5/3/2023	5.1	– Updated link to Performance Optimization Policy

Table 1 – Maximum Allowed Protection System Maintenance Intervals

Relay Application	Environment	Device Type	Maximum Allowed Maintenance Interval*
Generator, Generator Interconnection Facility, and Dispersed Gen Aggregating Facility Protective Relays	All	Electromechanical or Electronic (Analog)	6 years
	All	Microprocessor based	6 years
GSU, MSA RSA/Startup Transformer Relays	All	Electromechanical or Electronic (Analog)	6 years
	All	Microprocessor based	6 years
MV & LV Switchgear Protection Relays	All	Electromechanical or Electronic (Analog)	6 years
	All	Microprocessor based	12 years
Voltage and Current Sensing Devices	All	Current	12 years
	All	Potential	12 years
Communication Systems	All	Communications	12 years
Associated Control Circuits	All	Trip Paths	6 years
Sudden Pressure Relaying	All	Pressure and Flow Sensor, Associated Lockout Devices and Control Circuits	6 years

*Maximum allowed interval is based on calendar years.