Assessment of Impact of Proposed Modification to the Definition of "Protection System"

Existing Definition:
Protection System — Protective relays, associated communication systems, voltage and current sensing devices, station batteries, and DC control circuitry.

Proposed Definition (Clean):
Protection System - Protective relays, associated communication systems necessary for correct operation of protective devices, voltage and current sensing inputs to protective relays, station DC supply, and DC control circuitry from the station DC supply through the trip coil(s) of the circuit breakers or other interrupting devices.

General Description of Definition Change
The proposed definition of Protection System modifies the existing definition to

1) More precisely define the applicable communication systems
2) More precisely define the involved voltage and current sensing inputs
3) Expand the existing definition to include the entire station DC supply
4) More expansively and precisely define the applicable DC control circuitry.

General Assessment of Impact of Change
After adoption of the proposed change, the definition remains consistent with the existing uses. The modifications make it more useful and lead to an increased ability to monitor compliance of some of the standards using the definition. The following table illustrates each use of the term, "Protective System" in the existing FERC-approved standards, whether the term is capitalized (indicating that the intent is to use the defined term) or not. The modifications, though, address ambiguities that have been identified within the existing approved definition, and are important for the detailed use of the definition within the draft PRC-005-2 Standard.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
NUC-001-1 — Nuclear Plant Interface Coordination	R7. Per the Agreements developed in accordance with this standard, the Nuclear Plant Generator Operator shall inform the applicable Transmission Entities of actual or proposed changes to nuclear plant design, configuration, operations, limits, **protection systems**, or capabilities that may impact the ability of the electric system to meet the NPIRs.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
NUC-001-1 — Nuclear Plant Interface Coordination	R8. Per the Agreements developed in accordance with this standard, the applicable Transmission Entities shall inform the Nuclear Plant Generator Operator of actual or proposed changes to electric system design, configuration, operations, limits, **protection systems**, or capabilities that may impact the ability of the electric system to meet the NPIRs.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PER-005-1 — System Personnel Training	R3.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator that has operational authority or control over Facilities with established IROLs or has established operating guides or **protection systems** to mitigate IROL violations shall provide each System Operator with emergency operations training using simulation technology such as a simulator, virtual technology, or other technology that replicates the operational behavior of the BES during normal and emergency conditions.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-001-1 — System Protection Coordination	R1. Each Transmission Operator, Balancing Authority, and Generator Operator shall be familiar with the purpose and limitations of **protection system** schemes applied in its area.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-001-1 —– System Protection Coordination	R4. Each Transmission Operator shall coordinate **protection systems** on major transmission lines and interconnections with neighboring Generator Operators, Transmission Operators, and Balancing Authorities.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
PRC-001-1 — System Protection Coordination	R5. A Generator Operator or Transmission Operator shall coordinate changes in generation, transmission, load or operating conditions that could require changes in the **protection systems** of others: R5.1. Each Generator Operator shall notify its Transmission Operator in advance of changes in generation or operating conditions that could require changes in the Transmission Operator's **protection systems**. R5.2. Each Transmission Operator shall notify neighboring Transmission Operators in advance of changes in generation, transmission, load, or operating conditions that could require changes in the other Transmission Operators' **protection systems**.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-003-1 — Regional Procedure for Analysis of Misoperations of Transmission and Generation Protection Systems	Purpose - To ensure all transmission and generation **Protection System** Misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-003-1 — Regional Procedure for Analysis of Misoperations of Transmission and Generation Protection Systems	R1. Each Regional Reliability Organization shall establish, document and maintain its procedures for, review, analysis, reporting and mitigation of transmission and generation **Protection System** Misoperations. These procedures shall include the following elements: R1.1. The **Protection Systems** to be reviewed and analyzed for Misoperations (due to their potential impact on BES reliability).	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
PRC-003-1 — Regional Procedure for Analysis of Misoperations of Transmission and Generation Protection Systems	R2. Each Regional Reliability Organization shall maintain and periodically update documentation of its procedures for review, analysis, reporting, and mitigation of transmission and generation **Protection System** Misoperations.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-003-1 — Regional Procedure for Analysis of Misoperations of Transmission and Generation Protection Systems	R3. Each Regional Reliability Organization shall distribute procedures in Requirement 1 and any changes to those procedures, to the affected Transmission Owners, Distribution Providers that own transmission **Protection Systems**, and Generator Owners within 30 calendar days of approval of those procedures.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations	Purpose - Ensure all transmission and generation **Protection System** Misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations	R1. The Transmission Owner and any Distribution Provider that owns a transmission **Protection System** shall each analyze its transmission **Protection System** Misoperations and shall develop and implement a Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Reliability Organization's procedures developed for Reliability Standard PRC-003 Requirement 1.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations	R2. The Generator Owner shall analyze its generator **Protection System** Misoperations, and shall develop and implement a Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Reliability Organization's procedures developed for PRC-003 R1.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations	R3. The Transmission Owner, any Distribution Provider that owns a transmission **Protection System**, and the Generator Owner shall each provide to its Regional Reliability Organization, documentation of its Misoperations analyses and Corrective Action Plans according to the Regional Reliability Organization's procedures developed for PRC-003 R1.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
WECC Standard PRC-004-WECC-1 — Protection System and Remedial Action Scheme Misoperation	Purpose - Regional Reliability Standard to ensure all transmission and generation **Protection System** and Remedial Action Scheme (RAS) Misoperations on Transmission Paths and RAS defined in section 4 are analyzed and/or mitigated.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
WECC Standard PRC-004-WECC-1 — Protection System and Remedial Action Scheme Misoperation	R1. System Operators and System Protection personnel of the Transmission Owners and Generator Owners shall analyze all **Protection System** and RAS operations. R1.2. System Protection personnel shall analyze all operations of **Protection Systems** and RAS within 20 business days for correctness to characterize whether a Misoperation has occurred that may not have been identified by System Operators.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
WECC Standard PRC-004-WECC-1 — Protection System and Remedial Action Scheme Misoperation	R2. Transmission Owners and Generator Owners shall perform the following actions for each Misoperation of the **Protection System** or RAS. It is not intended that Requirements R2.1 through R2.4 apply to **Protection System** and/or RAS actions that appear to be entirely reasonable and correct at the time of occurrence and associated system performance is fully compliant with NERC Reliability Standards. If the Transmission Owner or Generator Owner later finds the **Protection System** or RAS operation to be incorrect through System Protection personnel analysis, the requirements of R2.1 through R2.4 become applicable at the time the Transmission Owner or Generator Owner identifies the Misoperation: R2.1 If the **Protection System** or RAS has a Security-Based Misoperation and two or more Functionally Equivalent **Protection Systems** (FEPS) or Functionally Equivalent RAS (FERAS) remain in service to ensure Bulk Electric System (BES) reliability, the Transmission Owners or Generator Owners shall remove from service the **Protection System** or RAS that misoperated within 22 hours following identification of the Misoperation. Repair or replacement of the failed Protection System or RAS is at the Transmission Owners' and Generator Owners' discretion. R2.2. If the **Protection System** or RAS has a Security-Based Misoperation and only one FEPS or FERAS remains in service to ensure BES reliability, the Transmission Owner or Generator Owner shall perform the following. R2.2.1. Following identification of the **Protection System** or RAS Misoperation, Transmission Owners and Generator Owners shall remove from service within 22 hours for repair or modification the **Protection System** or RAS that misoperated. R2.2.2. The Transmission Owner or Generator Owner shall repair or replace any **Protection System** or RAS that misoperated with a FEPS or FERAS within 20 business days of the date of removal. The Transmission Owner or Generator Owner shall remove the Element from service or disable the RAS if repair or replacement is not completed within 20 business days.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
WECC Standard PRC-004-WECC-1 — Protection System and Remedial Action Scheme Misoperation	R2.3. If the **Protection System** or RAS has a Security-Based or Dependability-Based Misoperation and a FEPS and FERAS is not in service to ensure BES reliability, Transmission Owners or Generator Owners shall repair and place back in service within 22 hours the **Protection System** or RAS that misoperated. If this cannot be done, then Transmission Owners and Generator Owners shall perform the following. R2.3.1. When a FEPS is not available, the Transmission Owners shall remove the associated Element from service. R2.4. If the **Protection System** or RAS has a Dependability-Based Misoperation but has one or more FEPS or FERAS that operated correctly, the associated Element or transmission path may remain in service without removing from service the **Protection System** or RAS that failed, provided one of the following is performed. R2.4.1. Transmission Owners or Generator Owners shall repair or replace any **Protection System** or RAS that misoperated with FEPS and FERAS within 20 business days of the date of the Misoperation identification, or R2.4.2. Transmission Owners or Generator Owners shall remove from service the associated Element or RAS.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
WECC Standard PRC-004-WECC-1 — Protection System and Remedial Action Scheme Misoperation	R3. Transmission Owners and Generation Owners shall submit Misoperation incident reports to WECC within 10 business days for the following. R3.1. Identification of a Misoperation of a **Protection System** and/or RAS, R3.2. Completion of repairs or the replacement of **Protection System** and/or RAS that misoperated.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
WECC Standard PRC-STD-003-1 — Protective Relay and Remedial Action Scheme Misoperation	Purpose - Regional Reliability Standard to ensure all transmission and generation **Protection System** Misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated. PRC-STD-003-1 is a Regional Reliability Standard that meets Requirement 1 of the NERC Standard PRC-003-1.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
TPL-001-0.1 — System Performance Under Normal Conditions (also TPL-002-0, TPL-003-0, and TPL-004-0)	Table 1C - SLG Fault, with Delayed Clearing (stuck breaker or **protection system** failure):	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
TPL-001-0.1 — System Performance Under Normal Conditions (also TPL-002-0, TPL-003-0, and TPL-004-0)	Table 1D - 3Ø Fault, with Delayed Clearing (stuck breaker or **protection system** failure):	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
TPL-001-0.1 — System Performance Under Normal Conditions (also TPL-002-0, TPL-003-0, and TPL-004-0)	Table 1 – Footnote e. Normal clearing is when the protection system operates as designed and the Fault is cleared in the time normally expected with proper functioning of the installed **protection systems**. Delayed clearing of a Fault is due to failure of any **protection system** component such as a relay, circuit breaker, or current transformer, and not because of an intentional design delay.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
TPL-002-0a — System Performance Following Loss of a Single BES Element	R1. The Planning Authority and Transmission Planner shall each demonstrate through a valid assessment that its portion of the interconnected transmission system is planned such that the Network can be operated to supply projected customer demands and projected Firm (nonrecallable reserved) Transmission Services, at all demand levels over the range of forecast system demands, under the contingency conditions as defined in Category B of Table I. To be valid, the Planning Authority and Transmission Planner assessments shall: R1.3. Be supported by a current or past study and/or system simulation testing that addresses each of the following categories,, showing system performance following Category B of Table 1 (single contingencies). The specific elements selected (from each of the following categories) for inclusion in these studies and simulations shall be acceptable to the associated Regional Reliability Organization(s). R1.3.10. Include the effects of existing and planned **protection systems**, including any backup or redundant systems. R1.3.12. Include the planned (including maintenance) outage of any bulk electric equipment (including **protection systems** or their components) at those demand levels for which planned (including maintenance) outages are performed.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
TPL-003-0a — System Performance Following Loss Two or More BES Elements	R1. The Planning Authority and Transmission Planner shall each demonstrate through a valid assessment that its portion of the interconnected transmission systems is planned such that the network can be operated to supply projected customer demands and projected Firm (nonrecallable reserved) Transmission Services, at all demand Levels over the range of forecast system demands, under the contingency conditions as defined in Category C of Table I (attached). The controlled interruption of customer Demand, the planned removal of generators, or the Curtailment of firm (non-recallable reserved) power transfers may be necessary to meet this standard. To be valid, the Planning Authority and Transmission Planner assessments shall: R1.3. Be supported by a current or past study and/or system simulation testing that addresses each of the following categories, showing system performance following Category C of Table 1 (multiple contingencies). The specific elements selected (from each of the following categories) for inclusion in these studies and simulations shall be acceptable to the associated Regional Reliability Organization(s). R1.3.10. Include the effects of existing and planned **protection systems**, including any backup or redundant systems. R1.3.12. Include the planned (including maintenance) outage of any bulk electric equipment (including **protection systems** or their components) at those Demand levels for which planned (including maintenance) outages are performed.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
TPL-004 — System Performance Following Extreme BES Events	R1. The Planning Authority and Transmission Planner shall each demonstrate through a valid assessment that its portion of the interconnected transmission system is evaluated for the risks and consequences of a number of each of the extreme contingencies that are listed under Category D of Table I. To be valid, the Planning Authority's and Transmission Planner's assessment shall: R1.3. Be supported by a current or past study and/or system simulation testing that addresses each of the following categories, showing system performance following Category D contingencies of Table I. The specific elements selected (from within each of the following categories) for inclusion in these studies and simulations shall be acceptable to the associated Regional Reliability Organization(s). R1.3.7. Include the effects of existing and planned **protection systems**, including any backup or redundant systems. R1.3.9. Include the planned (including maintenance) outage of any bulk electric equipment (including **protection systems** or their components) at those demand levels for which planned (including maintenance) outages are performed.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
TPL-006-0 — Assessment Data from Regional Reliability Organizations	R1. Each Regional Reliability Organization shall provide, as requested (seasonally, annually, or as otherwise specified) by NERC, system data, including past, existing, and future facility and Bulk Electric System data, reports, and system performance information, necessary to assess reliability and compliance with the NERC Reliability Standards and the respective Regional planning criteria. The facility and Bulk Electric System data, reports, and system performance information shall include, but not be limited to, one or more of the following types of information as outlined below: R1.5. Transmission system and supporting information (thermal, voltage, and Stability Limits, contingency analyses, system restoration, system modeling and data requirements, and **protection systems**.)	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.

Assessment of Impact on Existing Standards – Based on May 20, 2009 Revision of NERC Standards		
Standard Number and Name	**Clause (excluding Measures and compliance elements)**	**Impact**
Glossary of Terms Definition — Delayed Fault Clearing	Fault clearing consistent with correct operation of a breaker failure protection system and its associated breakers, or of a backup **protection system** with an intentional time delay.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
Glossary of Terms Definition — Misoperation	• Any failure of a **Protection System** element to operate within the specified time when a fault or abnormal condition occurs within a zone of protection. • Any operation for a fault not within a zone of protection (other than operation as backup protection for a fault in an adjacent zone that is not cleared within a specified time for the protection for that zone). • Any unintentional **Protection System** operation when no fault or other abnormal condition has occurred unrelated to on-site maintenance and testing activity.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
Glossary of Terms Definition — Normal Clearing	A **protection system** operates as designed and the fault is cleared in the time normally expected with proper functioning of the installed **protection systems**.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.
Glossary of Terms Definition — Planning Authority	The responsible entity that coordinates and integrates transmission facility and service plans, resource plans, and **protection systems**.	The proposed revisions to the definition are consistent with this use, and do not affect the applicability of the definition.