

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. SAR posted for comment (Dates of posting).
2. SC authorized moving the SAR forward to standard development (SC meeting date when authorized).

Description of Current Draft

(Describe the type of action associated with this posting such as 30-day informal comment period, 30-day formal comment period, 45 day formal comment period with parallel initial ballot, 30-day formal comment period with parallel successive ballot, recirculation ballot)

Anticipated Actions	Anticipated Date
30-day Formal Comment Period	June 9, 2011
45-day Formal Comment Period with Parallel Initial Ballot	September 16, 2011
Recirculation ballot	December 19, 2011
BOT adoption	February 13, 2012

Effective Dates: Requirement R1 and its associated parts shall become effective on the first day of the first calendar quarter, 3 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, all requirements go into effect on the first day of the first calendar quarter, 3 months after Board of Trustees adoption.

Version History

Version	Date	Action	Change Tracking

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Misoperation:

Any of the following:

1. **Failure to Trip - During Fault** - Any failure of a Protection System to operate for a Fault within the zone it is designed to protect.
2. **Failure to Trip - Other Than Fault** - Any failure of a Protection System to operate for a non-Fault condition such as power swings, under-voltage, over excitation, or loss of excitation for which the Protection System was intended to operate.
3. **Slow Trip** - Any Protection System operation that is slower than planned for a Fault within the zone it is designed to protect.
4. **Unnecessary Trip - During Fault** - Any Protection System operation for a Fault not within the zone it is designed to protect.
5. **Unnecessary Trip - Other Than Fault** - Any Protection System operation for non-Fault conditions such as power swings, under-voltage, over excitation, or loss of excitation for which the Protection System is not intended to operate.

When this standard has received ballot approval, the text boxes will be moved to the Application Guidelines Section of the Standard.

A. Introduction

1. **Title: Protection System Misoperation Identification and Correction**
2. **Number:** PRC-004-3
3. **Purpose:** Identify and correct the causes of Misoperations of Bulk Electric System (BES) Protection Systems.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1 Transmission Owner
 - 4.1.2 Generator Owner
 - 4.1.3 Distribution Provider
 - 4.2. **Facilities**
 - 4.2.1 Protection Systems for Facilities that are part of the BES.
 - 4.2.2 Special Protection Systems (SPS), Remedial Action Schemes (RAS), and Under Voltage Load Shedding programs are excluded from this standard.
5. **Background:**

A key element for BES reliability is the correct performance of Protection Systems. Monitoring BES Protection System events, as well as identifying and correcting the causes of Misoperations, will improve Protection System performance. In FERC Order No. 693 (dated March 16, 2007), the Commission identified PRC-003-1 as a “fill-in-the-blank” standard and did not approve or remand the standard since the regional procedures had not been submitted.

Since PRC-003-1 is not enforceable, there is no mandatory requirement for the Regional Entity procedures to support the requirements of PRC-004-2. This represents a potential reliability gap.

This project includes revising the existing definition of Misoperation, which reads:

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

In general, this definition needs more specificity and clarity. The terms “specified time” and “abnormal condition” are ambiguous. In the third bullet, more clarification is needed as to whether an unintentional Protection System operation for an atypical yet explainable condition is a Misoperation.

Misoperation data, as currently collected and reported, is not usable to establish a consistent metric for measuring Protection System performance. The SAR includes establishing a standard with uniform applicability, revising the definition of Misoperation, and clarifying reporting requirements.

The proposed requirement of the revised Reliability Standard PRC-004-3 meets the following objectives:

- Review all Faults and Protection System operations on the BES to identify those that are BES Protection System Misoperations.
- Analyze BES Protection System Misoperations to determine the cause(s).
- Develop and implement Corrective Action Plans to address the cause(s) of BES Protection System Misoperations.

The reporting of Misoperations associated with Special Protection Schemes, Remedial Action Schemes, and Under-Voltage Load Shedding has not been addressed in this standard due the complexity of the subject matter. NERC intends to address these areas through a separate project in the future.

Note that there are two WECC standards, PRC-003-STD-1 and PRC-004-WECC-1, related to reporting of Misoperations for a limited set of WECC Paths and Remedial Action Schemes. In those cases where those standards will overlap with the Continent-wide standard, entities are expected to comply with the more stringent standard. Doing so will ensure compliance with the less stringent standard as well. There are no apparent conflicts between the standards that would lead to mutually exclusive compliance.

B. Requirements and Measures

R1. Each Transmission Owner, Generator Owner, and Distribution Provider shall have and implement a procedure to identify and address all Protection System Misoperations within its system. At a minimum, the procedure shall include: [*Violation Risk Factor: High*] [*Time Horizon: Operations Assessment, Operations Planning*]

1.1 A detailed description of the processes used to:

- 1.1.1** Document and review all BES Faults and BES Protection System operations.
- 1.1.2** Identify and document all associated Misoperations, if any.
- 1.1.3** Investigate and address each Misoperation.

- 1.2** A requirement that the Registered Entity shall, within 90 calendar days of each identified Misoperation, investigate the Misoperation to determine its cause(s) and do one of the following:
- For each Misoperation where the cause(s) are identified, document the investigation and the cause(s).
 - For those cases where the cause(s) are not identified, document the investigation, any cause(s) that were ruled out, and any additional steps planned to identify the cause(s).
- 1.3** A requirement that for all Misoperations for which the cause(s) was (were) identified, the Registered Entity shall, within 120 calendar days of the Misoperation, develop one of the following:
- A Corrective Action Plan (CAP) that includes:
 1. Interim corrective actions (if any).
 2. Final corrective or mitigating actions to reduce potential impacts to BES reliability.
 3. A work timetable.
 - A declaration explaining why there is no need to develop a CAP.
- 1.4** A requirement that for all Misoperations for which the cause(s) was (were) not identified, the Registered Entity shall, within 120 calendar days of the Misoperation, develop one of the following:
- An action plan that identifies:
 1. Additional investigative actions and/or Protection System modifications.
 2. A work timetable.
 - A declaration that includes an explanation of why no further investigation or actions will be taken.
- 1.5** A requirement that the Registered Entity complete each CAP or action plan as outlined in its timetable, and document its completion as implemented.

Rationale for R1: This requirement mandates entities have a process to identify and correct Protection System Misoperations. A review of the Transmission Availability Data System (TADS) data for the past three years reveals that the fourth ranked initiating cause of BES outages not related to weather is “Failed Protection System Equipment.” By developing more structure regarding the manner in which Misoperations are identified and corrected, risks to the BES caused by Misoperations can be reduced by ensuring that certain mandatory practices are consistently undertaken. Further, such consistency will also enhance reporting and the development of performance metrics that indicate overall system health, as well as facilitate the sharing of “lessons learned.”

- M1.** The Transmission Owner, Generator Owner and Distribution Provider shall have a current copy of its procedure for identifying and addressing Misoperations in accordance with Requirement R1.
- M2.** The Transmission Owner, Generator Owner and Distribution Provider shall have dated written lists of Faults, Protection System operations, and identified Misoperations with their associated date of occurrence to demonstrate implementation of the procedural elements related to Requirement R1, Part 1.1.
- M3.** The Transmission Owner, Generator Owner and Distribution Provider shall have a dated written investigation report for each Misoperation identifying either cause(s), or where the cause(s) of the Misoperation cannot be identified, any additional steps planned for identifying causes to demonstrate implementation of the procedural elements related to Requirement R1, Part 1.2.
- M4.** To demonstrate implementation of the procedural elements related to Requirement R1, Part 1.3, the responsible entity shall have, for each Misoperation with an identified cause or causes, a dated CAP or a dated written declaration explaining why there is no need to develop a CAP.
- M5.** To demonstrate implementation of the procedural elements related to Requirement R1, Part 1.4, the responsible entity shall have, for each Misoperation without an identified cause or causes, a dated written action plan that includes a work timetable for implementation or a dated written declaration explaining why no further investigation or actions will be taken.
- M6.** The responsible entity shall have dated evidence, such as work management program records or work orders or other dated evidence, to demonstrate implementation of any plans completed during the implementation of the procedural elements related to Requirements R1, Part 1.5.
- M7.** The responsible entity shall have dated documentation that describes the manner in which the each CAP or action plan was completed to demonstrate compliance with the procedural elements related to Requirements R1, Parts 1.5

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

Regional Entity

1.2. Evidence Retention

The Transmission Owner, Generator Owner and each Distribution Provider that owns a BES Protection System shall retain data or evidence to show compliance with Requirement R1 and Measures M1, M2, M3, M4, M5, M6, and M7 for six calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The Compliance Monitor shall retain any audit data for six years.

If a Transmission Owner, Generator Owner and Distribution Provider that owns a BES Protection System is found non-compliant, it shall keep information related to the non-compliance until found compliant, or for the time specified above, whichever is longer.

1.3. Compliance Monitoring and Assessment Processes:

Compliance Audit

Self-Certification

Spot Checking

Compliance Violation Investigation

Self-Reporting

Complaints

1.4. Additional Compliance Information

Periodic Data Submittal: Within 60 calendar days following the end of each calendar quarter, each Transmission Owner, Generator Owner, and each Distribution Provider that owns BES protection Systems will submit a quarterly report to its Regional Entity that lists all Protection System Misoperations identified in accordance with Requirement R1 using the format specified by the ERO. Each responsible entity will include the status of each of its Misoperation CAPs or action plans developed until these CAPs or action plans are reported complete.

The Regional Entity will report the Misoperation information provided by the responsible entities to NERC on a quarterly basis.

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Operations Assessment, Operations Planning	High	<p>The responsible entity documented the investigation and either identified the cause or listed the additional steps planned to identify the cause in more than 90 calendar days but less than or equal to 120 calendar days following the Misoperation.</p>	<p>The responsible entity documented the investigation and either identified the cause or listed the additional steps planned to identify the cause in more than 120 calendar days but less than or equal to 130 calendar days following the Misoperation.</p>	<p>The responsible entity documented the investigation and either identified the cause or listed the additional steps planned to identify the cause in more than 130 calendar days but less than or equal to 140 calendar days following the Misoperation.</p>	<p>The responsible entity did not have a procedure to identify and address all Protection System Misoperations.</p> <p style="text-align: center;">OR</p> <p>The responsible entity failed to implement its procedure to identify and address all Protection System Misoperations.</p> <p style="text-align: center;">OR</p> <p>The responsible entity documented the investigation and either identified the cause or listed the additional steps planned to identify the cause in more than 140 calendar days following the Misoperation.</p> <p style="text-align: center;">OR</p>

			<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented a CAP or a declaration in more than 120 calendar days but less than or equal to 150 calendar days following the Misoperation.</p>	<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented a CAP or a declaration in more than 150 calendar days but less than or equal to 160 calendar days following the Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity developed and documented a CAP but failed to include one of the elements listed in Requirement R1, Part 1.3.</p>	<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented a CAP or a declaration in more than 160 calendar days but less than or equal to 170 calendar days following the Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity developed and documented a CAP but failed to include two of the elements listed in Requirement R1, Part 1.3.</p>	<p>The responsible entity failed to document the investigation and identify the cause or list the additional steps planned to identify the cause.</p> <p style="text-align: center;">OR</p> <p>The responsible entity developed and documented a CAP or a declaration in more than 170 calendar days following the Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity failed to develop and document a CAP or a declaration following a Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity developed and documented an action plan or a declaration in more than 170 calendar</p>
			<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented an action plan or a declaration in more than 120</p>	<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented an action plan or a declaration in more than 150 calendar</p>	<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented an action plan or a declaration in more than 160 calendar</p>	<p style="text-align: center;">OR</p> <p>The responsible entity developed and documented an action plan or a declaration in more than 170 calendar</p>

			calendar days but less than or equal to 150 calendar days following the Misoperation.	days but less than or equal to 160 calendar days following the Misoperation.	<p>days but less than or equal to 170 calendar days following the Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity developed and documented an action plan but failed to include the delivery dates in accordance with the work timetable specified in Requirement R1, Part1.4.</p> <p style="text-align: center;">OR</p> <p>The responsible entity implemented the CAP or other action plan, but did not meet the completion timeline stated in the plan.</p>	<p>days following the Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity failed to develop and document an action plan or a declaration following a Misoperation.</p> <p style="text-align: center;">OR</p> <p>The responsible entity failed to implement a CAP or other action plan.</p>
--	--	--	---------------------------------------------------------------------------------------	------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

A revised Misoperation definition is being proposed for industry adoption. It includes the following conditions:

(1) Any failure of a Protection System to operate for a Fault within the zone it is designed to protect. A lack of target information, e.g. when a high-speed pilot system does not trip because a high-speed zone element trips first, is not a Misoperation. If a fault or abnormal condition is cleared within the time normally expected with proper functioning of at least one Protection System element, then failure of another Protection System element associated with the protection scheme is not a Misoperation.

(2) Any failure of a Protection System to trip for a non-Fault condition such as power swings, over excitation, or loss of excitation for which the Protection System was intended to operate. For example, failure to trip the generator by loss of field protection for a loss of field condition on that generator is a Misoperation.

(3) Any Protection System operation that is slower than planned for a Fault within the zone it is designed to protect. Delayed fault clearing associated with an installed high-speed protection scheme is not a Misoperation if the high speed performance is not required by planning studies associated with the TPL standards or by coordination requirements with other Protection Systems.

(4) Any Protection System operation for a Fault not within the zone it is designed to protect. An example of this type of Misoperation is an over-reaching trip due to a lack of coordination between Protection System relays. Note: Operation of properly coordinated backup Protection System relays to clear the fault in an adjacent zone is not a Misoperation if the primary protection fails to clear the fault within the specified time.

(5) Any Protection System operation for non-Fault conditions such as power swings, over excitation, or loss of excitation for which the Protection System is not intended to operate. For example, tripping a generator by the operation of loss of field protection during an off-nominal frequency condition while the field is intact is a Misoperation.

This definition is based on the established IEEE/PSRC I3 Working Group on ‘Transmission Protective Relay System Performance Measuring Methodology’ categories (excluding Failure to Reclose) of Relay System Misoperation. The phrase abnormal condition has been replaced with “non-fault condition” to remove ambiguity.

Failure to automatically reclose after a fault is not included as a Protection System Misoperation because reclosing equipment is not included under the definition of Protection Systems. Operations which are initiated by control systems (not by Protection Systems), such as those associated with generator controls, or turbine/boiler controls, Static VAR Compensators (SVCs), Flexible AC Transmission Systems (FACTS), High-Voltage DC (HVDC) transmission systems, circuit breaker mechanisms, or other facility control systems are also not Misoperations of a Protection System.

Requirement R1 states the overall objective of the standard, which is to ensure that entities have and consistently implement a procedure to identify and correct all Protection System Misoperations. Specific detail regarding what this procedure must include is provided in the **Parts 1.1 through 1.5**.

Application Guidelines

Part 1.1 requires that entities have a process to review all events for potential Misoperations and identify all Misoperations found. Reviewing all events associated with Faults on the BES and reviewing all BES Protection System Operations is necessary for reviewing all events which may be associated with BES Protection System Misoperations. The process of identifying a Misoperation from an analytical standpoint begins with a review of all situations that challenge Protection Systems. Faults are one of the major sources of challenge to the BES Protection System. A fault does not need to occur on the BES to result in a BES Protection System Misoperation. To completely identify Misoperations, it must be determined if the Protection System operated for a Fault within its zone of protection, a Fault outside its zone, or a no-Fault condition. Unless all BES Protection System operations and Faults that challenge them are reviewed, it cannot be determined with certainty that all Misoperations are identified. For example, if you only reviewed Faults resulting in an overtrip, you would not necessarily identify Misoperations caused by slow trips.

Given that a Misoperation has been identified, **Part 1.2** requires the responsible entity accurately identify the underlying or “root” cause in sufficient detail to develop a corrective action plan that remedies the problem to prevent Misoperation recurrence. The cause of most Misoperations can be identified without extraordinary effort. Where a cause cannot be identified, a thorough documentation of the investigation is required to aid future investigation of the Misoperation particularly if it recurs. It is expected that the responsible entity will perform due diligence to identify the Misoperation cause.

An investigation report generally includes the following information: 1) initial evidence, 2) probable or potential causes, 3) tests and studies, and 4) conclusions. A brief description of the event surrounding the Misoperation may be included if not separately documented. The initial evidence, which may also be documented separately, contains the sequence of events, relay targets and a summary of Disturbance Monitoring Equipment (DME) records. The probable (or potential) causes are a list of those causes which are most likely to have contributed to the Misoperation and could be considered for testing. The test and studies documented in the report would describe and provide findings of those tests (e.g. relay calibration and simulation tests, communication noise and attenuation tests, CT/VT ratio tests, DC continuity checks and functional tests) and studies (e.g. short circuit and coordination studies) performed in the attempt to determine the root cause. The conclusions should summarize the root cause(s) substantiated by the evidence and findings of the tests and studies.

If no root cause was found, then the conclusions would attest to the indeterminate results and delineate those causes that have been eliminated.

Part 1.2 gives 90 calendar days from the date of the Misoperation to complete the investigation. The 90 day allowance was selected to provide sufficient time for the responsible entity to get through a seasonal period that can restrict the ability to take the outages necessary to effectively identify the Misoperation root cause(s) or document the investigation for unsolved root causes. This standard applies to all BES Protection Systems some of which are more critical than others. It is assumed that critical systems will be addressed with more urgency which may delay the investigation of less critical systems. Some regional standards (such as PRC-004-WECC-1) may identify those critical elements and provide more stringent time frames.

In most cases where a root cause of a Misoperation is identified, a Corrective Action Plan to address the cause will improve the performance and reliability of the BES. **Part 1.3, Bullet 1**

Application Guidelines

establishes the need for an entity to have a procedure for developing Corrective Action Plans. A Corrective Action Plan should include interim corrective actions, final corrective actions, and a timeline for completion delivery dates. Interim corrective actions may be useful to quickly address some of the aspects of the Misoperation prior to implementation of a final solution. Examples for interim corrective actions are: disabling a blocking scheme prior to conversion to a permissive scheme, and taking equipment offline or removing equipment from service until new equipment is available.

The reliability of the BES could be greatly enhanced by making it immune to faults. Protection Systems are applied to the BES to clear faults and contain their negative impacts, thereby maintaining the reliability and stability of the BES. However, it is impossible (or at least highly impractical) to create failure proof Protection Systems. This is particularly true of Protection Schemes which rely on substation to substation communications for proper operation. The communication equipment can be spread over large distances, and be exposed to failure causes beyond the capability of the Protection System's owner's capability to control. Part of proper application of these Protection Systems involves analysis of their behavior during communication failures.

Where studies have determined that high speed clearing is required over 100% of the protected element to maintain stability, a communication failure must not prevent high speed fault clearing. In general, this will result in some amount of tripping for external faults. That, by definition, is a misoperation. There are usually things that can be done to reduce the tendency to misoperate, and to reduce the impact of a misoperation. However, the possibility typically cannot be eliminated. Altering the Protection System to eliminate tripping for every possible over trip during communication failures would prevent this type of misoperation, but it would negatively impact the stability of the BES.

Where studies have determined that excessive tripping is a greater threat to stability than slow tripping for a remote end line fault, permissive schemes can be used to provide high speed tripping. These schemes provide security against excessive tripping during communication failures, but will result in slower tripping for some faults. Under the proposed Misoperation definition, this may not always be considered a Misoperation, but it is certainly less than optimal Protection System performance. It does promote system stability however. Improving the likelihood of high speed clearing at the expense of security in these cases, will negatively impact the stability of the BES.

In rare cases such as the one described above, where altering a Protection System to avoid the recurrence of a Misoperation may lower the reliability or performance of the BES, a declaration addressing the lack of a CAP is required. Additionally, if analysis of the event shows that the cause of the failure is beyond the Protection System owner's ability to prevent or correct (such as a communication failure caused by an external dig in), corrective action may not be appropriate.

Part 1.3 Bullet 2 allows for this situation by requiring that where corrective action is not taken, the Protection System owner has to provide a declaration that includes a description of the failure mode, the Misoperation, and the potential impacts on the BES of eliminating the mode of Misoperation.

While many things can be done to improve the performance of Protection Systems, it is not possible to prevent all failures. Protection Systems which are designed to operate during partial

Application Guidelines

failure modes in a manner that promotes the maintenance of BES stability may experience Misoperations for which a Corrective Action Plan may not be appropriate.

In some cases, analysis of all available information will not identify a root cause. **Part 1.4** is intended to allow entities to deal with these scenarios and still meet the overall objectives of the reliability standard.

In some of these cases additional steps may be identified (such as applying more monitoring equipment) to aid in future investigations of subsequent Misoperations. Modifications to the Protection System may be identified which could reduce the likelihood of a recurrence of the Misoperations. These steps and modifications should be identified to aid in future investigations of recurring Misoperations.

When a root cause is not identified and all investigative avenues have been exhausted, a declaration detailing the description of the investigative work conducted as well as the justification for the decision to conclude the investigation is required.

Parts 1.3 and 1.4 both give 120 calendar days from the date of the Misoperation to develop a plan or otherwise address the Misoperation. This give an additional 30 days beyond the deadline established on **Part 1.2**. As discussed above, this allowance provides sufficient time for the responsible entity to get through a seasonal period that can restrict the ability to take the outages necessary to effectively identify the Misoperation root cause(s) or document the investigation for unsolved root causes. Also as discussed above, some regions may choose to implement more stringent deadlines for some of all of its Protection Systems.

Finally, the goal of the standard has not been met unless action plans are actually implemented, as is required in **Part 1.5**. The responsible entity is required to implement and complete a CAP or other action plan to accomplish the purpose of this standard, which is to prevent future Misoperations, thereby minimizing risk to the BES. The CAP or action plan is intended to correct the root causes of Protection System Misoperations and prevent them from recurring. The responsible entity is also required to complete the CAP or action plan, document the manner in which the plan was implemented, and retain the appropriate evidence to demonstrate implementation.

This requirement sets the expectation that the work identified in the CAP or action plan will be completed on schedule as planned. Deferrals or other relevant changes to the CAP or action plan need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of successful CAP or action plan execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports or other evidence.

A review of the Transmission Availability Data System (TADS) data for the past three years reveals that the fourth ranked initiating cause of BES outages not related to weather is “Failed Protection System Equipment.” Given the high ranking of this metric, it is appropriate to collect

Application Guidelines

data on Protection System Misoperations for analysis to drive improvements in Protection System reliability.

Section C-1.4 requires periodic data reporting and references a common reporting format to facilitate consistent reporting of Misoperation data by all Transmission Owners, Generator Owners, and Distribution Providers. Reporting Misoperation data in a common format permits the ERO to analyze the data, develop meaningful metrics for measuring Protection System performance, identify trends in Protection System performance that negatively impact reliability, and identify lessons learned.

Analysis of data from all Misoperations across North America makes possible identification of issues and trends that may not be identifiable through analysis of smaller data sets on an entity or regional basis. Information regarding identified issues and trends and recommended actions will be shared with Transmission Owners, Generator Owners, and Distribution Providers through lessons learned or industry alerts. Sharing this information will permit recipients to take appropriate actions to drive improvements in Protection System performance.

The common reporting template also will improve the usefulness of metrics developed to track Protection System performance. While the most relevant category defined in TADS is titled “Failed Protection System Equipment,” the title is not an accurate description of the information reported in the metric. This metric includes all Protection System Misoperations that are not related to human error, which is only a subset of all Protection System Misoperations. The Protection System Misoperations related to human error (e.g., miscoordinated settings, incorrect setting calculations, and errors in applying settings to the relay, etc.) are tracked separately from Protection System equipment-related Misoperations, and are grouped together with other human errors by a utility employee or contractor. Similarly, Protection System Misoperations related to failed equipment such as a failed CVT on the primary insulation side are reported under “Failed AC Substation Equipment.” Reporting of Misoperations data using the common format specified in **C-1.4** will permit development of metrics specific to Protection System Misoperations, with the potential to break down the metric by category of Misoperation (e.g., failure to trip, slow trip, unnecessary trip, etc.) and cause of Misoperation (ac system, dc system, as-left personnel error, incorrect setting/logic/design, and relay failures/malfunctions).