



November 2, 2009

**VIA ELECTRONIC FILING**

Dan McInnis  
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Energy Development Initiative  
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R3C 3H8

Re: *North American Electric Reliability Corporation*

Dear Mr. McInnis:

The North American Electric Reliability Corporation (“NERC”) hereby submits this Notice of Filing of two proposed Reliability Standards:

- PER-005-1 — System Personnel Training
- PER-004-2 — Reliability Coordination – Staffing

The full text of these proposed standards is contained in **Exhibit A** to this petition. These standards will replace existing NERC Reliability Standards PER-002-0 — Operating Personnel Training and PER-004-1 — Reliability Coordination – Staffing, in accordance with the implementation plan set forth in the respective standards.

Proposed Violation Risk Factors (“VRFs”) or Violation Severity Levels (“VSLs”) are provided for each main requirement in PER-005-1. Because the changes to PER-004-1 removed existing requirements in total without alteration to requirements that remain in PER-004-2, VRFs and VSLs for PER-004-1 are brought forward intact for the requirements that remain in PER-004-2. The VSLs applicable to PER-005-1 and PER-

004-2 are being reviewed pursuant to the four Federal Energy Regulatory Commission (“FERC”) Guidelines detailed in FERC’s June 19, 2008 Order<sup>1</sup> and November 20, 2008 Order,<sup>2</sup> and the review of those assignments will be filed upon approval by the NERC Board of Trustees.

These proposed Reliability Standards were adopted by the NERC Board of Trustees on February 10, 2009.

NERC’s notice consists of the following:

- This transmittal letter;
- A table of contents for the entire notice;
- A description justifying the proposed Reliability Standards;
- Reliability Standards PER-004-2 and PER-005-1 submitted (**Exhibit A**);
- The complete development record of the proposed Reliability Standards (**Exhibit B**); and
- Standard Drafting Team Roster (**Exhibit C**).

Please contact the undersigned if you have any questions.

Respectfully submitted,

/s/ Holly A. Hawkins  
Holly A. Hawkins

*Attorney for North American Electric  
Reliability Corporation*

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<sup>1</sup> *North American Electric Reliability Corp.*, 123 FERC ¶ 61,284 (2008) (“June VSL Order”).

<sup>2</sup> *North American Electric Reliability Corp.*, 125 FERC ¶ 61,212 (2008) (“November VSL Order”).



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## **II. NOTICES AND COMMUNICATIONS**

Notices and communications with respect to this filing may be addressed to the following:

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## **III. BACKGROUND**

### **a. Reliability Standards Development Procedure**

NERC develops Reliability Standards in accordance with Section 300 (Reliability Standards Development) of its Rules of Procedure and the NERC *Reliability Standards Development Procedure*, which is incorporated into the Rules of Procedure as Appendix 3A. NERC's proposed rules provide for reasonable notice and opportunity for public comment, due process, openness, and a balance of interests in developing Reliability Standards. The development process is open to any person or entity with a legitimate interest in the reliability of the bulk power system. NERC considers the comments of all stakeholders, and a vote of stakeholders and the NERC Board of Trustees is required to approve a Reliability Standard for submission to FERC.

The proposed Reliability Standards set out in **Exhibit A** have been developed and approved by industry stakeholders using NERC's *Reliability Standards Development Procedure*, and were approved by the NERC Board of Trustees on February 10, 2009.

The Reliability Standards proposed for approval serve a key reliability goal identified during the 2003 blackout to strengthen the quality of operator training programs.<sup>3</sup> Reliability standard PER-005-1 — System Personnel Training is a new standard that wholly supersedes approved Reliability Standard PER-002-0 and certain requirements in PER-004-1, resulting in a revised PER-004-2 standard that is also proposed. Upon the effective date of the proposed standards, the existing Reliability Standards PER-002-0 and PER-004-1 will be concurrently retired.

These proposed standards are a significant improvement from the currently existing Reliability Standards. For that reason, the standards proposed in this filing are a significant step in strengthening the quality of operator training programs as necessary for the reliability of the bulk power system.

#### **IV. JUSTIFICATION FOR APPROVAL OF PROPOSED RELIABILITY STANDARDS**

This section summarizes the development of the proposed Reliability Standards and provides evidence that the proposed Reliability Standards are just, reasonable, not unduly discriminatory or preferential and in the public interest. This section also

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<sup>3</sup> *August 14, 2003 Blackout: NERC Actions to Prevent and Mitigate the Impacts of Future Cascading Blackouts February 10, 2004*, Recommendation 6. Improve Operator and Reliability Coordinator Training, p. 11:

NERC found during its investigation that some reliability coordinators and control area operators had not received adequate training in recognizing and responding to system emergencies. Most notable was the lack of realistic simulations and drills for training and verifying the capabilities of operating personnel. This training deficiency contributed to the lack of situational awareness and failure to declare an emergency when operator intervention was still possible prior to the high speed portion of the sequence of events.

describes the reliability objectives to be achieved by approving the Reliability Standards. The final discussion in this section provides the stakeholder ballot results and explains how other key issues were considered and addressed by the Standard Drafting Team.

The complete development record for these proposed Reliability Standards is available in **Exhibit B**. This record includes the successive drafts of the Reliability Standards, the implementation plan, the ballot pool and the final ballot results by registered ballot body members, stakeholder comments received during the development of the Reliability Standards, and how those comments were considered in developing the Reliability Standards. The Standard Drafting Team roster is provided in **Exhibit C**.

**a. Basis and Purpose of PER-005-1 — System Personnel Training**

Proposed Reliability Standard PER-005-1 requires the use of a systematic approach to training in developing System Operator training programs, requires verification that System Operators can perform their assigned tasks, and requires responsible entities to provide at least 32 hours of emergency operations training to each of their System Operators every 12 months. For Reliability Coordinators, Balancing Authorities, and Transmission Operators that have operational authority or control over facilities with established Interconnection Reliability Operating Limits (“IROLs”) or that have established operating guides or protection systems to mitigate IROL violations, Requirement 3.1 of PER-005-1 requires that simulation technology, such as simulator, virtual technology, or other technology that replicates the operational behavior of the bulk electric system<sup>4</sup> be used during normal and emergency conditions as a part of their

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<sup>4</sup> Section 215 of the U.S. Federal Power Act and Section 39.1 of FERC’s regulations codified the term “bulk power system” to refer to those facilities and control systems necessary for operating an interconnected electric energy transmission network and electric energy from generating facilities needed to maintain transmission system reliability. Prior to enactment of Section 215 of the FPA, NERC used the



emergency operations training requirements. The proposed Reliability Standards serve to implement a key recommendation from the 2003 Northeast blackout by addressing an identified gap where operations personnel were not adequately trained to maintain reliable operation under emergency conditions.<sup>5</sup> Operators must be trained to recognize and take effective action in response to these emergencies.

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term “bulk electric system” to refer to the facilities subject to its planning and operating rules. In Order No. 693, FERC provided for an initial period in which FERC will rely on the NERC definition of bulk electric system and NERC’s registration process to provide as much certainty as possible regarding the applicability to and the responsibility of specific entities to comply with the Reliability Standards in the start-up phase of a mandatory Reliability Standard regime. *See* Mandatory Reliability Standards for the Bulk-Power System, FERC Stats. & Regs. ¶ 31,242 (2007) (Order No. 693) at P 75, *reh’g denied*, 120 FERC ¶ 61,053 (2007) (Order No. 693-A). Because the drafting team for the Reliability Standards proposed in this filing began work on the development of these standards before the term “bulk power system” was codified, the proposed Reliability Standard continues to use the NERC-defined term “bulk electric system.” In this filing, NERC uses the term “bulk power system” unless citing directly to the proposed Reliability Standard, in which case the term “bulk electric system” is used.

<sup>5</sup> *See* Blackout Report at pp. at 110, 194 and 202, respectively. The US-Canada Blackout Report contained further detail on the deficiencies regarding operator training that contributed to the event:

“Operating procedures were necessary but not sufficient to deal with severe power system disturbances in several of the events. Enhanced procedures and training for operating personnel were recommended. Dispatcher training facility scenarios with disturbance simulation were suggested as well. Operators tended to reduce schedules for transactions but were reluctant to call for increased generation—or especially to shed load—in the face of a disturbance that threatened to bring the whole system down. Previous recommendations concerning training include:

- Thorough programs and schedules for operator training and retraining should be vigorously administered.
- A full-scale simulator should be made available to provide operating personnel with “hands-on” experience in dealing with possible emergency or other system conditions.
- Procedures and training programs for System Operators should include anticipation, recognition, and definition of emergency situations.
- Written procedures and training materials should include criteria that System Operators can use to recognize signs of system stress and mitigating measures to be taken before conditions degrade into emergencies.
- Line loading relief procedures should not be relied upon when the system is in an insecure state, as these procedures cannot be implemented effectively within the required time frames in many cases. Other readjustments must be used, and the System Operator must take responsibility to restore the system immediately.
- Operators’ authority and responsibility to take immediate action if they sense the system is starting to degrade should be emphasized and protected.
- The current processes for assessing the potential for voltage instability and the need to enhance the existing operator training programs, operational tools, and annual technical assessments should be reviewed to improve the ability to predict future voltage stability problems prior to their occurrence, and to mitigate the potential for adverse effects on a regional scale.”

These proposed standards result from a collaborative effort by the NERC Standard Drafting Team and the electric industry over several years to address these challenging training issues. The resulting standards proposed in this filing add a significant amount of structure to the training programs for the principal operators of the bulk power system, namely Reliability Coordinators, Balancing Authorities and Transmission Operators. NERC recognizes that additional training obligations remain to be established for generator operators and various operations support personnel; these will be addressed in a subsequent development effort as described in the *Reliability Standards Development Plan: 2009-2011*.

The proposed Reliability Standard requires training for the purpose of ensuring that System Operators performing real-time, reliability-related tasks on the North American bulk power system are competent to perform those reliability-related tasks. The proposed standard PER-005-1 addresses the functional entities required to complete the training, the design of training programs, and the implementation of those training programs. PER-005-1<sup>6</sup> represents the first NERC Reliability Standard that expressly addresses the design of System Operator training programs. The implementation of this Reliability Standard will ensure that the expectations for operating the bulk power system

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“Problems identified in studies of prior large-scale blackouts were repeated, including deficiencies in vegetation management, operator training, and tools to help operators better visualize system conditions.”

“NERC found during its investigation that some reliability coordinators and control area operators had not received adequate training in recognizing and responding to system emergencies. Most notable was the lack of realistic simulations and drills for training and verifying the capabilities of operating personnel. This training deficiency contributed to the lack of situational awareness and failure to declare an emergency when operator intervention was still possible prior to the high speed portion of the sequence of events.”

<sup>6</sup> The basic elements of three requirements (R2- 4) of PER-004-1 were incorporated into proposed PER-005-1. The remaining requirements (R1 and R5) from PER-004-1 were not modified and are carried forward intact in PER-004-2.

are understood through the training contemplated by the standard, are formally documented, and are adhered to in practice.

PER-005-1 contains three requirements summarized as follows:

- Requirement R1 mandates the use of a systematic approach to training for both new and existing training programs. The requirement further requires applicable entities to create a company-specific, reliability-related task list relevant to bulk power system operation and to design and develop learning objectives and training materials based on the task list performed by its System Operators each calendar year. Finally, the requirement mandates the training be delivered and the training program be evaluated on at least an annual basis to assess its effectiveness.
- Requirement R2 requires the verification of a System Operator's ability to perform the tasks identified in Requirement R1. The requirement also mandates re-verification of a System Operator's ability to perform the tasks within a specified time period when program content is modified.
- Requirement R3 identifies the number of hours of emergency operations training (at least 32 hours) that a System Operator is required to obtain every twelve months. The requirement further identifies those entities required to use simulation technology such as a simulator, virtual technology, or other technology in their emergency operations training programs.

**The proposed Reliability Standard is just, reasonable, not unduly discriminatory or preferential and in the public interest.**

**1. Proposed Reliability Standard is designed to achieve a specified reliability goal**

Proposed Reliability Standard PER-005-1 — System Personnel Training is designed to ensure that System Operators performing real-time reliability-related tasks on the bulk power system are competent to perform those reliability-related tasks.

**2. Proposed Reliability Standard contains a technically sound method to achieve the goal**

The proposed Reliability Standard contains a technically sound method that strengthens the quality of operator training programs that are necessary for the reliability of the bulk power system. For example, proposed PER-005-1 utilizes a systematic approach to training, a training structure used to ensure that operators receive the training

necessary to perform their assigned tasks. Responsible entities identify the tasks necessary for competent job performance through a systematic analysis of job requirements. A comprehensive training program is then developed based on the results of that analysis.

A systematic approach to training provides: focus on what the trainee needs to know and will be able to do after training is conducted; program development that is experience-based and is a process that is “reusable” as new tasks are identified; and a methodology used in every systematic approach to training that carefully links each component of a training program. A systematic approach to training also provides reasonable assurance that the program effectively addresses the required tasks through application of analysis, design, development, implementation, and evaluation. Finally, the systematic approach to training requires a systematic evaluation of training effectiveness and its relation to on-the-job performance to ensure that the training program conveys all required skills and knowledge. On this basis, the systematic approach to training provides a technically sound foundation for development of operator training programs.

Additionally, the proposed Reliability Standard PER-005-1 requires that System Operators be trained with simulators/simulation technology, which facilitates training on how to respond to events that occur infrequently. This type of training is widely accepted in many industries as an effective and efficient tool for providing training and practice. Simulators/simulation technology has been used by personnel in industries where the consequences of an error can have extensive ramifications for safety. These industries include airline pilots, shipping pilots and operators of control systems in the chemical, oil

and gas industries. Therefore, requiring the use of simulators/simulation technology in training programs is a key component to achieving the objective of the Reliability Standard.

In its development of the proposed Reliability Standard, the team identified Reliability Coordinators, Transmission Operators and Balancing Authorities that have operational authority or control over facilities with established Interconnection Reliability Operating Limits (“IROLs”) or that have established operating guides or protection systems to mitigate IROL violations as having operational control over a significant portion of load and generation. The Standard Drafting Team based this decision on the fact that IROLs, if exceeded, could expose a widespread area of the bulk power system to instability, uncontrolled separation(s) or cascading outages. On this basis, the Standard Drafting Team concluded it is technically sound to use IROLs as a delineating factor to determine which entities need to employ simulator/simulation technology in their training programs.

**3. Proposed Reliability Standard is applicable to users, owners and operators of the bulk power system, and not others**

This standard is applicable only to Reliability Coordinators, Balancing Authorities and Transmission Operators. These entities are users, owners and operators of the bulk power system.

**4. Proposed Reliability Standard is clear and unambiguous as to what is required and who is required to comply**

The proposed Reliability Standard applies to specific functional entities: Reliability Coordinators, Balancing Authorities and Transmission Operators. NERC uses its Section 500 compliance registry process to identify the specific entities that are

required to comply with the proposed standards. The proposed Reliability Standard is specific with regard to what is required to comply with the requirements. PER-005-1 Requirement R1 requires subject entities to use a systematic approach to establish a training program for the bulk power system company-specific, reliability-related tasks performed by its System Operators. Requirement R1 further details four components to: (1) create a list of bulk power system company-specific reliability-related tasks; (2) design and develop learning objectives and training materials based on the task list; (3) deliver the training; and (4) conduct an annual evaluation of the training program to identify and implement any needed changes.

Requirement R2 requires each subject entity to verify each of its System Operator's capabilities to perform each assigned identified task at least one time. Requirement R3 requires each subject entity to provide at least thirty-two hours of applicable emergency operations training to its System Operators within each twelve-month period. The proposed standard also includes measures that are used to determine an entity's compliance with the requirements, and a compliance process to verify conformance with the standard.

##### **5. Proposed Reliability Standard includes clear and understandable consequences and a range of penalties (monetary and/or non-monetary) for a violation**

The proposed PER-005-1 Reliability Standard includes a VRF for each main requirement in the Reliability Standard. In addition, the Reliability Standard contains a table containing VSLs ranging from Moderate to Severe that support the Reliability Standard's requirements.

Reliability Standard PER-005-1, Requirement R1 has a Medium VRF. This requirement is primarily administrative in nature because it prescribes a certain process to

be used when developing a training program. It is unlikely that, under emergency, abnormal or restoration conditions, a violation of this requirement would lead to bulk power system instability, separation or cascading failures or hinder restoration to a normal condition.

An entity that fails to provide evidence that it updated its company-specific reliability-related task list to identify new or modified tasks each calendar year, or the entity that fails to provide evidence of having evaluated its training program to identify needed changes to its training programs, has failed to comply with Requirement R1 at a Moderate Level VSL. An entity that fails to design and develop learning objectives and training materials based on the bulk power system company-specific reliability-related tasks has failed to comply with Requirement R1 at a High Level VSL. An entity that fails to prepare a company-specific reliability-related task list or to deliver training based on the bulk power system company-specific reliability-related tasks has failed to comply with Requirement R1 at a Severe Level VSL.

Reliability Standard PER-005-1, Requirement R2 has a High VRF. This requirement provides for verification of an operator's ability to perform tasks associated with certain functions. If this requirement were violated, it could either directly cause or contribute to bulk power system instability, separation or a cascading sequence of failures, or it could place the bulk power system at an unacceptable risk of instability, separation or cascading failures.

An entity that verifies at least 90% but less than 100% of its System Operators' capabilities to perform each assigned task from its list of bulk power system company-specific reliability-related tasks has failed to comply with Requirement R2 at a Moderate

Level VSL. An entity that verifies at least 70% but less than 90% of its System Operators' capabilities to perform each assigned task from its list of bulk power system company-specific reliability-related tasks or that fails to verify its System Operators' capabilities to perform each new or modified task within six months of making a modification to its bulk power system company-specific reliability-related task list has failed to comply with Requirement R2 at a High Level VSL. An entity that verifies less than 70% of its System Operators' capabilities to perform each assigned task from its list of bulk power system company-specific reliability-related tasks has failed to comply with Requirement R2 at a Severe Level VSL.

Reliability Standard PER-005-1, Requirement R3 has a Medium VRF. Although this requirement provides for certain types of training to be performed at least every 12 months, it is unlikely that under emergency, abnormal or restoration conditions, a failure to complete this training would lead to bulk power system instability, separation or cascading failures or hinder restoration to a normal condition.

An entity that provides at least 32 hours of emergency operations training to at least 90% but less than 100% of their System Operators has failed to comply with Requirement R3 at a Moderate Level VSL. An entity that provides at least 32 hours of emergency operations training to at least 70% but less than 90% of its System Operators has failed to comply with Requirement 3 at a High Level VSL. An entity that provides 32 hours of emergency operations training to less than 70% of its System Operators or did not include simulation technology replicating the operational behavior of the bulk power system in its emergency operations training has failed to comply with Requirement R3 at a Severe Level VSL.



The ranges of penalties for violations will be based on the applicable VRFs and VSLs and will be administered based on the sanctions table and supporting penalty determination process described in NERC Sanction Guidelines, included in Appendix 4B to the NERC's Rules of Procedure.

**6. Proposed Reliability Standard identifies clear and objective criterion or measures for compliance, so that it can be enforced in a consistent and non-preferential manner**

Each requirement in the proposed Reliability Standard is supported by a measure that clearly identifies what is required and how the requirement will be enforced. These measures, which include all sub-requirements, will ensure the requirements are clearly administered for enforcement in a consistent manner and without prejudice to any party. The measures are included in Section C of the proposed Reliability Standard. Furthermore, to aid in the compliance monitoring processes, NERC will develop a Reliability Standard audit worksheet ("RSAW") for this proposed Reliability Standard, once approved, in the list of actively monitored Reliability Standards for a particular program year. These RSAWs are auditor guides that also assist the applicable entity in understanding what they are expected to provide in support of the particular measures to demonstrate compliance.

**7. Proposed Reliability Standard achieves a reliability goal effectively and efficiently - but does not necessarily reflect "best practices" without regard to implementation cost**

The proposed Reliability Standard helps the industry achieve the stated reliability goal effectively and efficiently by requiring the implementation of a systematic approach to training for reliability related tasks performed by System Operators (Requirement R1). This includes the development of a list of company specific bulk power system reliability related tasks, learning objectives and training material based on the list and an annual

review of the training program. (Requirements R1.1 – R1.4). The proposed standard requires that the operator’s ability to perform each of the tasks on the task list to be verified (Requirement R2). The proposed standard also requires that a portion of the training be devoted to emergency operations and restoration topics that includes the expectation for certain entities to provide simulation (Requirement R3). NERC recognizes that the implementation cost of a full-fledged system-specific simulator can be significant. Therefore, the use of a simulator is only required for entities managing facilities having a significant impact on the bulk power system (Requirement R3.1), that is, those who are responsible for identifying, managing, or mitigating IROLs. Additionally, these entities have thirty-six (36) months to implement the simulator requirement (Applicability Section 5.3). This approach takes into consideration the implementation cost of simulators, as well as the time to integrate simulation technologies into the training program.

**8. Proposed Reliability Standard is not “lowest common denominator,” i.e., does not reflect a compromise that does not adequately protect bulk power system reliability**

The proposed Reliability Standard does not reflect a “lowest common denominator” approach because the proposed standard adds significant structure and specificity beyond that required in the current operator training standards. The proposed standard is a significant improvement from the currently existing Reliability Standard. For that reason, the standard proposed in this filing is a significant step in strengthening the quality of operator training programs as necessary for the reliability of the bulk power system.

The proposed standard requires users, owners or operators of the bulk power system to utilize a systematic approach to training in order to establish, coordinate and

implement training programs which do not exist in the PER-002-0 or PER-004-1 Reliability Standards. Further, the expectation to include a minimum of thirty-two hours of emergency operations training for every twelve-month period exists in the current standards but the requirement to add simulation training for certain entities is new. Therefore, the proposed standards add greater expectations with respect to operator training than exists currently. As a result, these standards are not the lowest common denominator with regard to its development, and are a significant step in improving operating training standards for bulk power system reliability.

**9. Proposed Reliability Standard considers the costs to implement a proposed Reliability Standard on smaller entities but not at consequence of less than excellence in operating system reliability**

With the exception of the requirement for simulation training discussed previously, all entities, small and large, are expected to comply with the proposed standards in the same manner. The standards allow an entity to tailor a training program to its company-specific related tasks and thus recognizes that a training program is not a “one size fits all.” Smaller entities may have a lesser number of reliability-related tasks than larger entities, thus the size of their training program will be smaller as a result.

The requirement in this standard for the use of simulation technology has been limited to only those entities with established IROLs or that have established operating guides or protection systems to mitigate IROL violations. In addition, simulation technology has been identified in the proposed PER-005-1, Requirement R3.1 standard as a “simulator, virtual technology, or other technology that replicates the operational behavior of the BES during normal and emergency operations.” Therefore, the standard adequately takes into account the costs of achieving compliance with the requirements of the standard because

several options for implementing simulation technology are available in order to achieve compliance. Because all of options presented in Requirement R3.1 of the proposed Reliability Standard will achieve the desired result for operating training, the proposed standard's purpose in ensuring bulk power system reliability is not compromised for the sake of achieving greater cost savings.

**10. Proposed Reliability Standard is designed to apply throughout North America to the maximum extent achievable with a single Reliability Standard while not favoring one area or approach**

The proposed Reliability Standard is a single standard that will be universally applicable in the U.S. and in applicable governmental areas in Canada where NERC standards or their equivalents are made effective. This proposed Reliability Standard recognizes business and operational variations in the responsibilities of large and small entities. For example, only entities with established IROLs or that have protection schemes in place to mitigate an IROL are obligated to integrate simulation capability, respectful of the impact these entities have on the reliability of the bulk power system.

**11. Proposed Reliability Standard causes no undue negative effect on competition or restriction of the grid**

The proposed training standard enhances the operation and reliability of the grid and does not constrain competition or restrict transmission capability. Because the proposed standard does not have a business practice impact, this factor is not applicable.

**12. The implementation time for the proposed Reliability Standards is reasonable.**

Operator training is a high priority activity. Recommendation 6 of the 2003 Blackout report titled "Improve Operator and Reliability Coordinator Training" served notice to the industry that operator training needed improvement.

The implementation schedule for the proposed standards is reasonable and recognizes that training is not a “one-size-fits-all” program. The 24-month implementation timeframe for Requirement R1 and R2 allows flexibility in creating and implementing the training programs that use a systematic approach to training, and is structured and tailored to the functions that each entity performs in operating the bulk power system. Additionally, Requirement R3, which addresses emergency operations training, is presently in effect through PER-002-0 Requirement R4 and PER-004-1 Requirement R2. Therefore, immediate implementation of this Requirement will not impose any further burden on entities.

The proposed Requirement R3.1, which requires entities that have operational authority or control over Facilities with established IROLs or that have established operating guides or protection systems to mitigate IROL violations to use simulation technology within the emergency operations training construct, allows for a 36-month implementation period. Many of the entities already provide for the use of simulation technology within their training programs to some extent. However, the proposed standard will require these entities to ensure that simulation technology is integrated as a core component of those programs going forward. For entities currently without such capabilities, the implementation timeframe allows the needed flexibility to secure and integrate simulation technology into one compliance program. Finally, the proposed Reliability Standard generally exempts smaller entities that do not have a significant effect on the bulk power system from this requirement, except for those with IROL responsibility. Accordingly, NERC believes this proposed implementation plan presents a reasonable time frame to comply with the proposed Reliability Standard.

### **13. The Reliability Standard development process was open and fair**

NERC develops Reliability Standards in accordance with Section 300 (Reliability Standards Development Process) of its Rules of Procedure and the NERC *Reliability Standards Development Procedure*, which is incorporated into the Rules of Procedure as Appendix 3A. NERC's proposed rules provide for reasonable notice and opportunity for public comment, due process, openness, and a balance of interests in developing Reliability Standards. The development process is open to any person or entity with a legitimate interest in the reliability of the bulk power system. The process considers the comments of all stakeholders, and a vote of both the stakeholders and the NERC Board of Trustees is required to approve a Reliability Standard for submission to the applicable governmental authorities.

The proposed Reliability Standards set out in **Exhibit A** have been developed and approved by industry stakeholders using NERC's *Reliability Standards Development Procedure*, and were adopted by the NERC Board of Trustees on February 10, 2009 for filing with the applicable governmental authorities. Therefore, NERC has utilized its standard development process in good faith and in a manner that is open and fair.

### **14. Proposed Reliability Standard balances with other vital public interests**

The Reliability Standard PER-005-1, System Personnel Training, does not require balancing against any vital public interests nor does it do any harm to any vital public interest. The System Personnel Training Standard supports vital public interests by ensuring that operating personnel of the bulk power system are adequately trained to operate the bulk power system at the highest levels of bulk power system reliability.

## **15. Proposed Reliability Standard considers any other relevant factors**

NERC does not propose any additional factors for consideration at this time.

### **b. Basis and Purpose of PER-004-2 Reliability Coordination – Staffing**

Reliability Standard PER-004-1 — Reliability Coordination – Staffing addresses subject matter critical to bulk power system reliability, namely that Reliability Coordinators have sufficient competent staff to effectively perform the Reliability Coordinator functions. Proposed Reliability Standard PER-004-2 — Reliability Coordination – Staffing includes modifications to the PER-004-1 standard, that were made to avoid redundancy and potential conflict, and to conform to the requirements now associated with proposed new Reliability Standard PER-005-1.

More specifically, PER-004-2 modifies Reliability Standard PER-004-1, by deleting Requirements R2, R3, and R4 because more detailed, complete, and less ambiguous requirements addressing the same issues are now included as Requirements R3, R2, and R1, respectively, of new proposed Reliability Standard PER-005-1. A more detailed description of these changes appears below. Note that the remaining requirements in PER-004-1 are carried forward to PER-004-2 intact, including all associated VRF and VSL assignments, and are included herein.

#### **Replacement of PER-004-1 Requirement R2 with PER-005-1 Requirement R3**

PER-004-1 Requirement R2 provides:

***R2.**All Reliability Coordinator operating personnel shall each complete a minimum of five days per year of training and drills using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel.*

In contrast, proposed Requirement R3 of PER-005-1 provides:

***R3.** At least every 12 months each Reliability Coordinator, Balancing Authority and Transmission Operator shall provide each of its System Operators with at least 32 hours of emergency operations training applicable to its organization that reflects emergency operations topics, which includes system restoration using drills, exercises or other training required to maintain qualified personnel. [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

***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.*

Because the proposed PER-005-1 Requirement R3 addresses the training requirement pertaining to duration and drills, simulations, and exercises formerly described in PER-004-1 Requirement R2, and because the provisions of PER-004-1 Requirement R2 would now be redundant and potentially conflict with the more precise requirements of PER-005-1 Requirement R3, proposed PER-004-2 has been modified to remove Requirement R2, with the associated renumbering of the remaining requirements. These changes are consistent with NERC Reliability Standard objectives to eliminate redundancy and ambiguity in existing Reliability Standards.

**Replacement of PER-004-1 Requirements R3 and R4 with PER-005-1 Requirements R1 and R2**

Currently, PER-004-1 Requirements R3 and R4 provide:

***R3.** Reliability Coordinator operating personnel shall have a comprehensive understanding of the Reliability Coordinator Area and interactions with neighboring Reliability Coordinator Areas.*

***R4.** Reliability Coordinator operating personnel shall have an extensive understanding of the Balancing Authorities, Transmission Operators, and Generation Operators within the Reliability Coordinator Area, including the operating staff, operating practices and procedures, restoration priorities and objectives, outage plans, equipment capabilities, and operational restrictions.*



Proposed Reliability Standard PER-004-2 modifies the previously approved standard to remove these requirements, because they are more fully addressed by Requirements R1 and R2 of PER-005-1. Requirements R1 and R2 of proposed Reliability Standard PER-005-1 are as follows:

***R1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall use a systematic approach to training to establish a training program for the BES company-specific reliability-related tasks performed by its System Operators and shall implement the program. [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]***

***R1.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall create a list of BES company-specific reliability-related tasks performed by its System Operators.***

***R1.1.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall update its list of BES company-specific reliability-related tasks performed by its System Operators each calendar year to identify new or modified tasks for inclusion in training.***

***R1.2. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall design and develop learning objectives and training materials based on the task list created in R1.1.***

***R1.3. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall deliver the training established in R1.2.***

***R1.4. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct an annual evaluation of the training program established in R1, to identify any needed changes to the training program and shall implement the changes identified.***

***R2. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify each of its System Operator's capabilities to perform each assigned task identified in R1.1 at least one time. [Violation Risk Factor: High] [Time Horizon: Long-term Planning]***

***R2.1. Within six months of a modification of the BES company-specific reliability-related tasks, each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify each of its System Operator's capabilities to perform the new or modified tasks.***

**c. Basis for Retirement of PER-002-0 — Operating Personnel Training – Staffing**

The Requirements of Reliability Standard PER-002-0 have been completely replaced and supplanted by the specific provisions of proposed new Reliability Standard PER-005-1. Retirement of PER-002-0, upon the effective date of PER-005-1 is necessary to avoid redundancy, conflict, and confusion regarding the mandatory training standards.

**V. PROPOSED RELIABILITY STANDARDS' COMPLIANCE WITH THE DIRECTIVES IN FERC ORDER NO. 693**

When FERC approved Reliability Standard PER-002-2 in Order No. 693, it directed that modifications be made through the Reliability Standards development process. Those modifications were addressed in the development of the Reliability Standards proposed in this filing. FERC's directives, summarized in Paragraphs 1393 and 1394 of Order No. 693, are addressed below. In cases where the approach in the Reliability Standards proposed in this filing deviate from the FERC directives, justification is offered to support an approach that is an equal and effective alternative to achieve the same reliability objective.

**1. Identify the Expectations of Training for Each Job Function and Develop Training Programs Tailored to Each Job Function.**

In Order No. 693, FERC directed NERC to identify the expectations of the training for each job function, and develop training programs tailored to each job function with consideration of the individual training needs of the personnel.<sup>7</sup> FERC noted that, in its inclusion of a formal training program for local control center personnel, this program

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<sup>7</sup> Order No. 693 at P 1393.

should be tailored to the functions local control center operators, generator operations, and operations planning staff performing functions that impact the reliable operation of the bulk power system for both normal and emergency operations.<sup>8</sup>

Requirement R1 of the proposed PER-005-1 Reliability Standard requires each responsible entity to create a list of bulk power system company-specific reliability-related tasks performed by its System Operators. The responsible entity then uses the task list to design and develop learning objectives and training materials, thereby identifying the expectations of the training for each job function (or collection of tasks). By doing so, the proposed standard provides the opportunity for entities to develop training programs that are tailored to each job function with specific consideration to individual training needs. Similarly, Requirement R1.2 further adds that entities are required to design and develop learning objectives and training materials based on the task list, thereby identifying the expectations of the training for each job function (or collection of tasks).

As stated in the purpose of this proposed standard, the intent of these requirements is to ensure that properly trained individuals are operating the bulk power system. The proposed standard helps to achieve that purpose by providing the structure necessary to accomplish this intent while also ensuring that a means of evaluating the capability of the individual to perform each assigned task can be adequately determined. Accordingly, because the proposed standard requires that the training requirements be identified by task, the proposed Reliability Standard appropriately identifies the expectations of the training for each job function that is tailored to the functions of local

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<sup>8</sup> *Id.* at P 1348.

control center personnel performing tasks related to the reliable operation of the bulk power system for both normal and emergency operations.

**2. Expand the Applicability Section of the Proposed Reliability Standard to include Reliability Coordinators, Local Transmission Control Center Operating Personnel, Generator Operators Centrally-located at a Generator Control Center with Direct Impact on the Reliable Operation of the Bulk Power System, and Operations Planning and Operations Support Staff that carry out Outage Planning and Assessments and those who Develop SOLs, IROLs, or Operating Nomograms.**

In Order No. 693, FERC required that the Applicability section of the PER-002-0 Reliability Standard be expanded to include Reliability Coordinators, local transmission control center operating personnel, Generator Owners centrally located at a generator control center with direct impact on the reliable operation of the bulk power system, and operations planning and operations support staff who carry out outage planning and assessments, and those who develop System Operating Limits (“SOLs”), IROLs, or operating nomograms for real-time operations.<sup>9</sup> The proposed PER-005-1 Reliability Standard has been expanded to include Reliability Coordinators as an applicable entity, and also includes Balancing Authorities and Transmission Operators.

Generator Owners, operations planning, and operations support staff were not included in the scope of the development of the Reliability Standards proposed in this filing, and instead are included in the scope of Project 2010-1 – Support Personnel Training, which is part of NERC’s *Reliability Standards Development Plan: 2009-2011*. The inclusion of these entities in the standards proposed here would have necessitated expansion of the Standard Drafting Team roster to ensure these disciplines were fairly represented. NERC elected to complete the core activities as identified in the project scope and obtain FERC approval on the proposed standards now rather than further delay

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<sup>9</sup> *Id.* at P 1393.

the completion of this important set of standards. However, NERC plans to address the expansion of the training standard to other entities through a separate project team.

In determining how to apply FERC's guidance in expanding the Applicability section to local transmission control center operating personnel, the team referred to guidance provided in the NERC Drafting Team Guidelines to address this issue. As provided in this guideline document, the Applicability section must identify the functional entities (from the NERC Reliability Functional Model<sup>10</sup>) that are required to comply with the requirements in a proposed Reliability Standard. In its analysis, the team agreed that the NERC Reliability Functional Model accurately captures the list of functions that a Transmission Operator performs, and therefore includes those performed by local control center personnel. Accordingly, the team determined that if all entities register based on the guidance provided in NERC's *Statement of Compliance Registry Criteria*, FERC's directive in Order No. 693 will be appropriately addressed because the Transmission Operator has the ultimate responsibility to ensure that its functional responsibilities are met, even if through other entities.

### **3. Use the Systematic Approach to Training Methodology in the Development of New Training Programs.**

In Order No. 693, FERC states that a Systematic Approach to Training is a proven approach to: identify the tasks and associated skills and knowledge necessary to accomplish those tasks; determine the competency levels of each operator to carry out those tasks; determine the competency gaps; and design, implement, and evaluate a training plan to address each operator's competency.<sup>11</sup> Accordingly, FERC directed that

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<sup>10</sup> The NERC Reliability Functional Model is available at <http://www.nerc.com/page.php?cid=2|247|108>.

<sup>11</sup> *Id.* at P 1380.

NERC develop a modification to the PER-002-2 Reliability Standard, or a new Reliability Standard, that uses the Systematic Approach to Training methodology.<sup>12</sup>

Proposed Reliability Standard PER-005-1, Requirement R1 requires that each Reliability Coordinator, Balancing Authority, and Transmission Operator to use a systematic approach to training to establish a training program for the bulk power system company-specific reliability-related tasks performed by its System Operators.

Accordingly, FERC's directive that a Systematic Approach to Training be used is met in the proposed Reliability Standard.

**4. Include the Use of Simulators by Reliability Coordinators, Transmission Operators, and Balancing Authorities that have Operational Control over a Significant Portion of Load and Generation.**

In Order No. 693, FERC stated that hands-on training using simulators can add significant value to training for emergencies and can add significant reliability benefits if Reliability Coordinators, Transmission Operators, and Balancing Authorities that have operational control of a significant portion of load and generation are required to obtain simulator training.<sup>13</sup> FERC noted that, because the cost is likely to outweigh the reliability benefits for small entities, small entities can continue to use training aids such as generic operator training simulators and realistic table-top exercises.<sup>14</sup> However, FERC directed that NERC develop a requirement for the use of simulators dependant on the entity's role and size.<sup>15</sup>

Proposed Reliability Standard PER-005-1 Requirement R3.1 states "Each Reliability Coordinator, Balancing Authority and Transmission Operator that has

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<sup>12</sup> *Id.* at P. 1382.

<sup>13</sup> *Id.* at P 1390.

<sup>14</sup> *Id.* at P 1391.

<sup>15</sup> *Id.*

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.” This allows entities the flexibility to utilize the most current technology available that replicates the operational behavior of the bulk power system.

The team determined that the proposed language in Requirement R3.1 is an equal and effective approach in meeting FERC’s directives in Order No. 693 because the proposed standard requires simulator training for entities that have operational control of a significant portion of load and generation, while balancing the costs of simulator training on small entities. In developing the proposed standard, the team identified Reliability Coordinators, Transmission Operators and Balancing Authorities that have operational authority or control over facilities with established IROLs or that have established operating guides or protection systems to mitigate IROL violations as entities with operational control over a significant portion of load and generation. IROLs, if exceeded, could expose a widespread area of the bulk power system to instability, uncontrolled separation(s) or cascading outages. For this reason, the standard drafting team believed that focusing on IROLs was an equal and effective method for determining those entities that are required to use simulator/simulation technology in their training programs to that directed by FERC in Order No. 693.

**5. Determine the Feasibility of Developing Meaningful Performance Metrics Associated with the Effectiveness of the Training Programs.**

In Order No. 693, FERC directed NERC to determine whether it is feasible to develop meaningful performance metrics associated with the effectiveness of a training program, and if so, to develop such performance metrics.<sup>16</sup> In its analysis of FERC's directive, the team considered the effectiveness of the systematic approach to training and whether this provides meaningful performance metrics associated with the effectiveness of a training program.

The team determined that the systematic approach to training requires evaluation against stated objectives, as required in proposed Reliability Standard PER-005-1, Requirement R1.4. That is, Requirement R1.4 requires each Reliability Coordinator, Balancing Authority, and Transmission Operator to conduct an annual evaluation of the training program established in Requirement R1 to identify any needed changes to the training program and implement the changes identified. Therefore, the systematic approach to training and the requirement for entities to assess whether their System Operators are receiving effective training provides a meaningful assessment of the training program. An evaluation of how System Operators perform during infrequent, actual events on the system would not provide useful metrics on an ongoing basis.

Additionally, the team clarified that proposed Reliability Standard PER-005-1 is a training standard that identifies what a trainee should do and evaluates the training program against that standard, as described in PER-005-1, Measure M1.4. This standard is not intended to address individual System Operator performance apart from the

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<sup>16</sup> *Id.* at P 1394.



requirements associated with the company-specific reliability-related tasks identified in Requirement R1.

**6. Consider whether Personnel that Support EMS Applications should be included in the Mandatory Training Requirements.**

FERC directed NERC to consider through the Reliability Standards Development Process the question of whether personnel that support EMS applications should be included in mandatory training.<sup>17</sup> This issue is being addressed in Project 2010-01 Support Personnel Training.

**7. Consider FirstEnergy's Comments regarding the Nuclear Plant Operators' Training Program as part of the Standards Development Process.**

In Order No. 693, FERC directed NERC to consider FirstEnergy's comment that nuclear power plant operators already subject to NRC training requirements should therefore satisfy the requirements of a NERC Reliability Standard regarding training programs. This is being addressed in Project 2010-01 Support Personnel Training.

**8. Include Requirements Pertaining to Personnel Credentials for Reliability Coordinators similar to PER-003.**

In Order No. 693, FERC directed NERC to include in the proposed standard requirements pertaining to personnel credentials for Reliability Coordinators similar to those in PER-003-0.<sup>18</sup> This issue is being addressed in Project 2007-04 Certifying System Operators.

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<sup>17</sup> *Id.*

<sup>18</sup> *Id.* at P 1415.

## **9. Consider the Suggestions of FirstEnergy and Xcel as part of the Standards Development Process.**

In Order No. 693, FERC directed NERC to consider the suggestions of FirstEnergy and Xcel in the Reliability Standards development process.<sup>19</sup> FirstEnergy sought revisions to the terms “shall have a comprehensive understanding of” and “shall have extensive knowledge” because it will be difficult for entities to demonstrate compliance with these terms.<sup>20</sup> After its review of these terms, the team determined that this language should not be included in the proposed PER-005-1 Reliability Standard. Rather, the Standard Drafting Team believed that the credentials inherent in the terms “shall have comprehensive understanding of” and “shall have extensive knowledge” would be evident once an entity developed its Reliability Coordinators’ company-specific reliability-related tasks, as required in Requirement R1 of proposed PER-005-1.

Xcel suggested that the emergency training requirements be expressed in hour increments rather than days to allow for flexibility in scheduling training and coordinating with rotating shift schedules.<sup>21</sup> As a result, the language in proposed PER-005-1 Requirement R3 now requires that System Operators obtain at least 32 hours of emergency operations training applicable to its organization that reflects emergency operations topics, rather than the five days that is included in the current version of the Reliability Standard.

For the reasons stated above, NERC believes the proposed Reliability Standards PER-004-2 and PER-005-0 provide significant improvement to bulk power system

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<sup>19</sup> *Id.* at P 1417.

<sup>20</sup> *Id.* at P 1413.

<sup>21</sup> *Id.* at P 1414.

System Operator training programs and address a key recommendation from the 2003 U.S./Canada Blackout Report and other prior large-scale blackouts.

## **VI. SUMMARY OF THE RELIABILITY STANDARD DEVELOPMENT PROCEEDINGS**

### **a. Development History**

The Standards Authorization Request (“SAR”) for a new training standard, sponsored by the NERC Personnel Subcommittee, was posted for two 30-day comment periods, from December 7, 2004 through January 7, 2005, and from February 17, 2006 through March 20, 2006. The refinements to the SAR narrowed the list of applicable entities to the Reliability Coordinator, Transmission Operator and Balancing Authority and narrowed the focus to using the systematic approach to training System Operators to ensure that System Operators are competent to perform real-time reliability-related tasks.

The Standard Drafting Team posted the draft standard for four public comment periods. The initial draft of the standard was posted for a 30-day comment period, from September 27, 2006 through October 26, 2006. A generic task list, organized by task, was posted with the standard. There were 58 sets of comments, including comments from 174 people representing 91 different entities from all NERC Regions and six of the nine Industry Segments. The initial draft of the standard was very detailed and included a requirement for each of the specified steps to employing a “structured approach to training.” Many stakeholders indicated that these individual requirements should be consolidated into a single requirement, and the team agreed. The team removed separate requirements targeted for entry-level training, a requirement that exceeded the scope of the SAR. The team also addressed qualifications of persons developing or delivering

training, and removed requirements for extensive documentation of each training activity and maintenance of training materials.

The second draft of the standard was posted for a 45-day public comment period, from August 15, 2007 through September 28, 2007. There were 43 sets of comments, including comments from 130 different people from more than 70 companies representing 9 of the now 10 Industry Segments. Based on stakeholder comments, the drafting team modified the standard extending the effective date for emergency operations training from “effective immediately” to effective 36 months after regulatory approval.” The drafting team further modified the requirements to specify that the company-specific reliability-related task lists must be updated at least annually and that an additional assessment must be performed as the task list is modified. In addition, the drafting team modified the standard to include the use of simulators for emergency operations training.

The third draft of the standard was posted for a 45-day public comment period from February 25, 2007 through April 9, 2007. There were 51 sets of comments, including comments from more than 100 different people from approximately 100 companies representing 9 of the 10 Industry Segments. Based on stakeholder comments, the drafting team modified the standard reducing the effective dates for two of the requirements from 36 months after regulatory approval to 24 months after regulatory approval. The drafting team also modified the standard mandating system restoration training and clarified the methods of training that could be used as part of its emergency operations training. The team further modified the emergency operations training using simulators to emergency operations training using simulation technology such as a

simulator, virtual technology, or other technology that replicates the behavior of the bulk power system during normal and emergency operations.

The fourth draft of the standard was posted for a 30-day comment period from June 18, 2008 through July 17, 2008. There were 41 sets of comments, including comments from more than 140 different people from approximately 70 companies representing 8 of the 10 Industry Segments. The drafting team made only minor changes to improve clarity following the fourth posting.

The team finalized the proposed Reliability Standards, and presented them for Standards Committee approval for balloting. In accordance with the *Reliability Standard Development Procedure*, NERC posted the proposed Reliability Standard for a 30-day pre-ballot review from September 26, 2008 through October 25, 2008. The first ballot took place October 27, 2008 through November 5, 2008. During the first ballot, 90.13% of those registered for the ballot pool voted, which exceeded the minimum 75% quorum required to be considered a valid vote. The proposed Reliability Standard received a weighted segment approval of 82.47%. However, there were negative ballots submitted with a comment, triggering the need for a recirculation ballot. The majority of the negative voters expressed concerns surrounding the two (2) year implementation time frame, the treatment of existing training programs and mandating of the use of simulators.

The drafting team explained that the need for improvements to System Operator training was identified in the 2003 Blackout Report and that an entity would conceivably have more than two (2) years to implement the program based on the process utilized to gain regulatory approval of a standard. Concerning the treatment of existing training

programs, the team explained that existing training programs would have to be verified against the Standard to ensure compliance with the use of a systematic approach to training. The drafting team also explained that the use of a simulator was a directive from FERC Order No. 693 and that the team had expanded the concept of using a simulator to include simulation technology, virtual technology or other technology that replicates the operational behavior of the bulk power system to increase flexibility for an organization to meet the requirement of the standard using the most cost effective solution. The drafting team further explained that it proposed the following language as delineating factors for determining those entities that must use simulation technology in their training programs; "...that has operational authority or control over facilities with established IROLs or has established operating guides or protection systems to mitigate IROL violations..." This language was proposed as an alternative that is an equally efficient and effective method of achieving the intent of the FERC Order No. 693 directive to include "the use of simulators by Reliability Coordinators, Transmission Operators and Balancing Authorities that have operational control over a significant portion of load or generation."

After the standard drafting team responded to the comments, the proposed Reliability Standard proceeded to a recirculation ballot that was conducted from December 12, 2008 through December 22, 2008. The proposed Reliability Standard passed with a final quorum of 91.48% and a weighted segment approval of 80.63%. A two-thirds weighted segment approval is required for passage. On February 10, 2009, the NERC Board of Trustees adopted the proposed Reliability Standard.

## **b. Key Issues**

During the development of the proposed Reliability Standard, the standard drafting team considered three major issues raised by stakeholders that are discussed in this section: (i) the need for a new training standard, (ii) the use of a systematic approach to training methodology, and (iii) the use of simulators in training programs.

### **Need for a New Training Standard**

There are several stakeholders who do not believe that the proposed standards are needed. They list cost and lack of resources as primary reasons for not supporting the standard. Some indicate that existing training programs are sufficient. The drafting team reminded these stakeholders that a lack of training was one of the contributing causes of the 2003 blackout and that FERC Order No. 693 Appendix D established that Operating Personnel Training is a “High Priority Standard.”

### **Use of a Systematic Approach to Training**

Several stakeholders indicated that the standard should not specify the use of the systematic approach to training process. Many of the stakeholders that objected to the use of the systematic approach to training process either did not understand the process or did not want to revise their existing programs to fit the systematic approach to training process. The drafting team explained that this was a training process that has been widely recognized in many different occupational fields as an effective and efficient method of linking training to specific performance on designated tasks. The SAR for this project specified that the requirements in the standard must mandate use of the systematic approach to training process and that one of the directives in FERC Order No. 693 was to

modify the existing training standard to require the use of the systematic approach to training methodology in the development training programs.

In addition, several stakeholders felt the drafting team was trying to prescribe a certain systematic approach to training process while others requested that the drafting team add more specificity to the standard regarding the term systematic approach to training. The drafting team explained that there are several different terms used to describe this approach to developing training programs. The drafting team felt that adding a definition would restrict the use of certain valid approaches and force some entities into modifying their existing practices, without any additional benefit to reliability. There are many variations to the systematic approach to training process, but all include the steps identified in sub-requirements R1.1 through R1.4. The team assembled a list of references covering the systematic approach to training process and posted these for stakeholders.

### **Use of a Simulator**

Some stakeholders did not support the requirement to use a simulator or simulation technology for training and argued that the use of simulators should not be mandatory because of the cost associated with staffing, development and maintenance of simulator/simulation technology. Order No. 693 included a directive to modify the existing training standard to include the use of simulators by Reliability Coordinators, Transmission Operators and Balancing Authorities that have operational control over a significant portion of load and generation. The use of simulators/simulation technology as effective training tools, particularly for learning how to react to events that occur infrequently, is widely accepted in other industries as an effective and efficient method of



providing training and practice. Simulators/simulator technology is used by personnel in many industries where the ramifications of an error have far-reaching consequences to safety – including airline pilots, shipping pilots, and operators of control systems in chemical, oil and gas industries.

Respectfully submitted,

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# **Exhibit A**

## **Reliability Standards Proposed**

## A. Introduction

1. **Title:** System Personnel Training
2. **Number:** PER-005-1
3. **Purpose:** To ensure that System Operators performing real-time, reliability-related tasks on the North American Bulk Electric System (BES) are competent to perform those reliability-related tasks. The competency of System Operators is critical to the reliability of the North American Bulk Electric System.
4. **Applicability:**
  - 4.1. **Functional Entities:**
    - 4.1.1 Reliability Coordinator.
    - 4.1.2 Balancing Authority.
    - 4.1.3 Transmission Operator.
5. **Proposed Effective Date for Regulatory Approvals:**
  - 5.1. In those jurisdictions where regulatory approval is required, Requirement R1 and Requirement R2 shall become effective on the first day of the first calendar quarter, 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirement R1 and Requirement R2 shall become effective on the first day of the first calendar quarter, 24 months after Board of Trustees adoption.
  - 5.2. In those jurisdictions where regulatory approval is required, Requirement R3 shall become effective on the first day of the first calendar quarter after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirement R3 shall become effective on the first day of the first calendar quarter after Board of Trustees adoption.
  - 5.3. In those jurisdictions where regulatory approval is required Sub-requirement R3.1 shall become effective on the first day of the first calendar quarter, 36 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, the Sub-requirement R3.1 shall become effective on the first day of the first calendar quarter, 36 months after Board of Trustees adoption.

## B. Requirements

- R1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall use a systematic approach to training to establish a training program for the BES company-specific reliability-related tasks performed by its System Operators and shall implement the program. *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
  - R1.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall create a list of BES company-specific reliability-related tasks performed by its System Operators.
    - R1.1.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall update its list of BES company-specific reliability-related tasks performed by its System Operators each calendar year to identify new or modified tasks for inclusion in training.
  - R1.2. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall design and develop learning objectives and training materials based on the task list created in R1.1.

- R1.3.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall deliver the training established in R1.2.
- R1.4.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct an annual evaluation of the training program established in R1, to identify any needed changes to the training program and shall implement the changes identified.
- R2.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify each of its System Operator's capabilities to perform each assigned task identified in R1.1 at least one time. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*
  - R2.1.** Within six months of a modification of the BES company-specific reliability-related tasks, each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify each of its System Operator's capabilities to perform the new or modified tasks.
- R3.** At least every 12 months each Reliability Coordinator, Balancing Authority and Transmission Operator shall provide each of its System Operators with at least 32 hours of emergency operations training applicable to its organization that reflects emergency operations topics, which includes system restoration using drills, exercises or other training required to maintain qualified personnel. *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
  - 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.

### **C. Measures**

- M1.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection evidence of using a systematic approach to training to establish and implement a training program, as specified in R1.
  - M1.1** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection its company-specific reliability-related task list, with the date of the last review and/or revision, as specified in R1.1.
  - M1.2** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection its learning objectives and training materials, as specified in R1.2.
  - M1.3** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection System Operator training records showing the names of the people trained, the title of the training delivered and the dates of delivery to show that it delivered the training, as specified in R1.3.
  - M1.4** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection evidence (such as instructor observations, trainee feedback, supervisor feedback, course evaluations, learning assessments, or internal audit results) that it performed an annual training program evaluation, as specified in R1.4
- M2.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection evidence to show that it verified that each of its System Operators is

capable of performing each assigned task identified in R1.1, as specified in R2. This evidence can be documents such as training records showing successful completion of tasks with the employee name and date; supervisor check sheets showing the employee name, date, and task completed; or the results of learning assessments.

**M3.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection training records that provide evidence that each System Operator has obtained 32 hours of emergency operations training, as specified in R3.

**M3.1** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection training records that provide evidence that each System Operator received emergency operations training using simulation technology, as specified in R3.1.

## **D. Compliance**

### **1. Compliance Monitoring Process**

#### **1.1. Compliance Enforcement Authority**

For Reliability Coordinators and other functional entities that work for their Regional Entity, the ERO shall serve as the Compliance Enforcement Authority.

For entities that do not work for the Regional Entity, the Regional Entity shall serve as the Compliance Enforcement Authority.

#### **1.2. Compliance Monitoring Period and Reset**

Not Applicable.

#### **1.3. Compliance Monitoring and Enforcement Processes:**

Compliance Audits

Self-Certifications

Spot Checking

Compliance Violation Investigations

Self-Reporting

Complaints

#### **1.4. Data Retention**

Each Reliability Coordinator, Balancing Authority and Transmission Operator shall keep data or evidence to show compliance for three years or since its last compliance audit, whichever time frame is the greatest, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Reliability Coordinator, Balancing Authority and Transmission Operator is found non-compliant, it shall keep information related to the non-compliance until found compliant.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

#### **1.5. Additional Compliance Information**

None.

**Standard PER-005-1 — System Personnel Training**

**2. Violation Severity Levels**

R#	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	None	<p>The responsible entity failed to provide evidence that it updated its company-specific reliability-related task list to identify new or modified tasks each calendar year (R1.1.1)</p> <p>OR</p> <p>The responsible entity failed to provide evidence of evaluating its training program to identify needed changes to its training program(s). (R1.4)</p>	<p>The responsible entity failed to design and develop learning objectives and training materials based on the BES company specific reliability related tasks. (R1.2)</p>	<p>The responsible entity failed to prepare a company-specific reliability-related task list (R1.1)</p> <p>OR</p> <p>The responsible entity failed to deliver training based on the BES company specific reliability related tasks. (R1.3)</p>
R2	None	<p>The responsible entity verified at least 90% but less than 100% of its System Operators' capabilities to perform each assigned task from its list of BES company-specific reliability-related tasks. (R2)</p>	<p>The responsible entity verified at least 70% but less than 90% of its System Operators' capabilities to perform each assigned task from its list of BES company-specific reliability-related tasks (R2)</p> <p>OR</p> <p>The responsible entity failed to verify its system operator's capabilities to perform each new or modified task within six months of making a modification to its BES company-specific reliability-related task list. (R2.1)</p>	<p>The responsible entity verified less than 70% of its System Operators' capabilities to perform each assigned task from its list of BES company-specific reliability-related tasks. (R2)</p>
R3	None	<p>The responsible entity provided at least 32 hours of emergency operations training to at least 90% but less than 100% of their System Operators. (R3)</p>	<p>The responsible entity provided at least 32 hours of emergency operations training to at least 70% but less than 90% of its System Operators. (R3)</p>	<p>The responsible entity provided 32 hours of emergency operations training to less than 70% of its System Operators (R3)</p> <p>OR</p> <p>The responsible entity did not include simulation technology replicating the operational behavior of the BES in its emergency operations training. (R3.1)</p>

**E. Regional Variances**

None.

**Version History**

Version	Date	Action	Change Tracking

## Standard Development Roadmap

*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. Standards Committee approves SAR for posting on December 1, 2004.
2. SAR Drafting Team posted SAR for comments on December 7, 2004.
3. SAR Drafting Team responds to comments, revises SAR, and posts revised SAR for comments on February 17, 2006.
4. SAR Drafting Team responds to comments and revises SAR on May 15, 2006.
5. Standards Committee approves development of Standard on May 15, 2006.
6. The Standards Authorization Committee appointed the Standard Drafting Team on June 21, 2006.
7. Standards Drafting Team posted draft standard for comment on September 27, 2006.
8. Standards Drafting Team responded to comments and posted the revised standard on August 15, 2007.
9. Standard Drafting Team responded to comments and posted the revised standard for comment on February 15, 2008.
10. Standards Drafting Team responded to comments and posted the revised standard for comment on June 18, 2008.
11. Standards Drafting Team responded to comments from the fourth posting and will request the Standards Committee to move the standard forward to balloting on September 15, 2008.

### Proposed Action Plan and Description of Current Draft:

This is the fifth version of the proposed standard and its associated implementation plan that has been posted for industry comments. The drafting team will be requesting the Standards Committee to move the standard forward to balloting.

### Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments on the fourth draft of the proposed standard.	September 15, 2008
2. Obtain the Standards Committee's approval to move the standard forward to balloting.	September 15, 2008
3. Post the standard and implementation plan for a 30-day pre-ballot review.	September 17, 2008
4. Conduct an initial ballot for ten days.	October 17, 2008
5. Respond to comments submitted with the initial ballot.	November 1, 2008
6. Conduct a recirculation ballot for ten days.	November 11, 2008
7. Post for a 30-day preview for board.	November 21, 2008
8. BOT adoption.	December 22, 2008



## A. Introduction

1. **Title:** System Personnel Training
2. **Number:** PER-005-1
3. **Purpose:** To ensure that System Operators performing real-time, reliability-related tasks on the North American Bulk Electric System (BES) are competent to perform those reliability-related tasks. The competency of System Operators is critical to the reliability of the North American Bulk Electric System.
4. **Applicability:**
  - 4.1. **Functional Entities:**
    - 4.1.1 Reliability Coordinator.
    - 4.1.2 Balancing Authority.
    - 4.1.3 Transmission Operator.
5. **Proposed Effective Date for Regulatory Approvals:**
  - 5.1. ~~In those jurisdictions where regulatory approval is required, Requirement R1 and Requirement R2 shall become effective on the first day of the first calendar quarter, 24 months after the first day of the first calendar quarter following applicable regulatory approval, or in those jurisdictions where no regulatory approval is required, Requirement R1 and Requirement R2 shall the Reliability Standard become effective on the first day of the first calendar quarter, 24 months after the first day of the first calendar quarter after Board of Trustees adoption.~~
  - 5.2. ~~In those jurisdictions where regulatory approval is required, Requirement R3 shall become effective on the first day of the first calendar quarter after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirement R3 shall become effective on the first day of the first calendar quarter after Board of Trustees adoption. Requirement R3 is presently in effect and will remain in effect upon approval of this Standard.~~
  - 5.3. ~~In those jurisdictions where regulatory approval is required §sub-R requirement R3.1 shall become effective on the first day of the first calendar quarter, 36 months after the first day of the first calendar quarter following applicable regulatory approval, or in those jurisdictions where no regulatory approval is required, the §sub-requirement R3.1 shall become effective on the first day of the first calendar quarter, 36 months after the first day of the first calendar quarter after Board of Trustees adoption.~~

## B. Requirements

- R1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall use a systematic approach to training to establish a training program for the BES company-specific reliability-related tasks performed by its System Operators and shall implement the program. *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
  - R1.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall create a list of BES company-specific reliability-related tasks performed by its System Operators.
    - R1.1.1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall update its list of BES company-specific reliability-related

tasks performed by its System Operators ~~each calendar year~~ **at least annually** to identify new or modified tasks for inclusion in training.

- R1.2.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall design and develop learning objectives and training materials based on the task list created in R1.1.
  - R1.3.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall deliver the training established in R1.2.
  - R1.4.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct an annual evaluation of the training program established in R1, to identify any needed changes to the training program and shall implement the changes identified.
- R2.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify each of its System Operator’s capabilities to perform each assigned task identified in R1.1 at least one time. [*Violation Risk Factor: High*] [*Time Horizon: Long-term Planning*]
- R2.1.** Within six months of a modification of the BES company-specific reliability-related tasks, each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify each of its System Operator’s capabilities to perform the new or modified tasks.
- R3.** At least every 12 months each Reliability Coordinator, Balancing Authority and Transmission Operator shall provide each of its System Operators with at least 32 hours of emergency operations training applicable to its organization that reflects emergency operations topics, which includes system restoration using drills, exercises or other training required to maintain qualified personnel. [*Violation Risk Factor: Medium*] [*Time Horizon: Long-term Planning*]
- 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.

**C. Measures**

- M1.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection evidence of using a systematic approach to training to establish and implement a training program, as specified in R1.
  - M1.1** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection its company-specific reliability-related task list, with the date of the last **review and/or** revision, as specified in R1.1.
  - M1.2** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection its learning objectives and training materials, as specified in R1.2.
  - M1.3** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection System Operator training records showing the names of the people trained, the title of the training delivered and the dates of delivery to show that it delivered the training, as specified in R1.3.
  - M1.4** Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall have available for inspection evidence (such as instructor observations, trainee

feedback, supervisor feedback, course evaluations, learning assessments, or internal audit results) that it performed an annual training program evaluation, as specified in R1.4

- M2.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection evidence to show that it verified that each of its System Operators is capable of performing each assigned task identified in R1.1, as specified in R2. This evidence can be documents such as training records showing successful completion of tasks with the employee name and date; supervisor check sheets showing the employee name, date, and task completed; or the results of learning assessments.
- M3.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection training records that provide evidence that each System Operator has obtained 32 hours of emergency operations training, as specified in R3.
  - M3.1** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection training records that provide evidence that each System Operator received emergency operations training using simulation technology, as specified in R3.1.

#### **D. Compliance**

##### **1. Compliance Monitoring Process**

###### **1.1. Compliance Enforcement Authority**

For Reliability Coordinators and other functional entities that work for their Regional Entity, the ERO shall serve as the Compliance Enforcement Authority.

For entities that do not work for the Regional Entity, the Regional Entity shall serve as the Compliance Enforcement Authority.

###### **1.2. Compliance Monitoring Period and Reset**

Not Applicable.

###### **1.3. Compliance Monitoring and Enforcement Processes:**

Compliance Audits

Self-Certifications

Spot Checking

Compliance Violation Investigations

Self-Reporting

Complaints

###### **1.4. Data Retention**

Each Reliability Coordinator, Balancing Authority and Transmission Operator shall keep data or evidence to show compliance for three years or since its last compliance audit, whichever time frame is the greatest, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.—

If a Reliability Coordinator, Balancing Authority and Transmission Operator is found non-compliant, it shall keep information related to the non-compliance until found compliant.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

**1.5. Additional Compliance Information**

None.

2. Violation Severity Levels

2.

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R#	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	None	The responsible entity failed to provide evidence that it updated its company-specific reliability-related tasks <del>list</del> to identify new or modified tasks <del>each calendar year</del> <del>at annual bases</del> (R1.1.1) OR The responsible entity failed to provide evidence of evaluating its training program to identify needed changes to its training program(s). (R1.4)	The responsible entity failed to design and develop learning objectives and training materials based on the BES company specific reliability related tasks <del>(when developing a new or modifying an existing training program)</del> . (R1.2)	<del>When developing a new or modifying an existing training program,</del> The responsible entity failed to prepare a company-specific reliability-related tasks <del>list</del> (R1.1) OR <del>When developing a new or modifying an existing training program,</del> The responsible entity failed to deliver training based on the BES company specific reliability related tasks. (R1.3)
R2	None	The responsible entity verified at least 90% but less than 100% of its System Operators' capabilities to perform each assigned task from its list of BES company-specific reliability-related tasks. (R2)	The responsible entity verified at least 70% but less than 90% of its System Operators' capabilities to perform each assigned task from its list of BES company-specific reliability-related tasks (R2) OR The responsible entity failed to verify its system operator's capabilities to perform each new or modified task within six months of making a modification to its BES company-specific reliability-related tasks <del>list</del> . (R2.1)	The responsible entity verified less than 70% of its System Operators' capabilities to perform each assigned task from its list of BES company-specific reliability-related tasks. (R2)

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R#	Lower VSL	Moderate VSL	High VSL	Severe VSL
R3	None	The responsible entity provided at least 32 hours of emergency operations training to at least 90% but less than 100% of their System Operators. (R3)	The responsible entity provided at least 32 hours of emergency operations training to at least 70% but less than 90% of its System Operators. (R3)	<p>The responsible entity provided 32 hours of emergency operations training to less than 70% of its System Operators (R3)</p> <p>OR</p> <p>The responsible entity did not include simulation technology replicating the operational behavior of the BES in its emergency operations training. (R3.1)</p>

**E. Regional Variances**

None.

**Version History**

Version	Date	Action	Change Tracking

**A. Introduction**

1. **Title:** Reliability Coordination — Staffing
2. **Number:** PER-004-2
3. **Purpose:**  
Reliability Coordinators must have sufficient, competent staff to perform the Reliability Coordinator functions.
4. **Applicability**
  - 4.1. Reliability Coordinators.
5. **Effective Date:**
  - Retire Requirement 2 when PER-005-1 Requirement 3 becomes effective.
  - Retire Requirements 3 and 4 when PER-005-1 Requirements 1 and 2 become effective.

**B. Requirements**

- R1. Each Reliability Coordinator shall be staffed with adequately trained and NERC-certified Reliability Coordinator operators, 24 hours per day, seven days per week.
- R2. Reliability Coordinator operating personnel shall place particular attention on SOLs and IROLs and inter-tie facility limits. The Reliability Coordinator shall ensure protocols are in place to allow Reliability Coordinator operating personnel to have the best available information at all times.

**C. Measures**

None

**D. Compliance**

1. **Compliance Monitoring Process**
  - 1.1. **Compliance Monitoring Responsibility**  
Regional Reliability Organizations shall be responsible for compliance monitoring.
  - 1.2. **Compliance Monitoring and Reset Time Frame**  
One or more of the following methods will be used to assess compliance:
    - Self-certification (Conducted annually with submission according to schedule.)
    - Spot Check Audits (Conducted anytime with up to 30 days notice given to prepare.)
    - Periodic Audit (Conducted once every three years according to schedule.)
    - Triggered Investigations (Notification of an investigation must be made within 60 days of an event or complaint of noncompliance. The entity will have up to 30 days to prepare for the investigation. An entity may request an



extension of the preparation period and the extension will be considered by the Compliance Monitor on a case-by-case basis.)

The Performance-Reset Period shall be 12 months from the last finding of non-compliance.

**1.3. Data Retention**

Each Reliability Coordinator shall keep evidence of compliance for the previous two calendar years plus the current year.

If an entity is found non-compliant the entity shall keep information related to the noncompliance until found compliant or for two years plus the current year, whichever is longer.

Evidence used as part of a triggered investigation shall be retained by the entity being investigated for one year from the date that the investigation is closed, as determined by the Compliance Monitor,

The Compliance Monitor shall keep the last periodic audit report and all requested and submitted subsequent compliance records.

**1.4. Additional Compliance Information**

None.

**2. Levels of Non-Compliance for a Reliability Coordinator (Replaced with VSLs)**

**2.1.**

**E. Regional Differences**

None identified.

**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>
0	April 1, 2005	Effective Date	New
0	August 8, 2005	Removed “Proposed” from Effective Date	Errata
1	November 1, 2006	Adopted by Board of Trustees	Revised
2		Retire R2 and M1 when PER-005-1 Requirement 3 becomes effective. Retire R3, R4 and M2 when PER-005 R1 and R2 become effective.	Revised

## A. Introduction

1. **Title:** Reliability Coordination — Staffing
2. **Number:** PER-004-4.2
3. **Purpose:**  
Reliability Coordinators must have sufficient, competent staff to perform the Reliability Coordinator functions.
4. **Applicability**
  - 4.1. Reliability Coordinators.
5. **Effective Date:** January 1, 2007.

- Retire Requirements 2 and 5 retired when PER-005-1 Requirement 3 becomes effective.
- 1. Retire Requirements 3 and 4 retired when PER-005-1 Requirements 1 and 2 become effective.

## B. Requirements

- R1. Each Reliability Coordinator shall be staffed with adequately trained and NERC-certified Reliability Coordinator operators, 24 hours per day, seven days per week.
- ~~R2. All Reliability Coordinator operating personnel shall each complete a minimum of five days per year of training and drills using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel.~~
- ~~R3. Reliability Coordinator operating personnel shall have a comprehensive understanding of the Reliability Coordinator Area and interactions with neighboring Reliability Coordinator Areas.~~
- ~~R4. Reliability Coordinator operating personnel shall have an extensive understanding of the Balancing Authorities, Transmission Operators, and Generation Operators within the Reliability Coordinator Area, including the operating staff, operating practices and procedures, restoration priorities and objectives, outage plans, equipment capabilities, and operational restrictions.~~
- R2. Reliability Coordinator operating personnel shall place particular attention on SOLs and IROLs and inter-tie facility limits. The Reliability Coordinator shall ensure protocols are in place to allow Reliability Coordinator operating personnel to have the best available information at all times.

## C. Measures

- ~~None~~
- ~~M1. The Reliability Coordinator shall have and provide upon request training records that confirm that each of its operating personnel has completed a minimum of five days per year of training and drills using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel, as specified in Requirement 2.~~

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~~M2. Each Reliability Coordinator shall have and provide upon request evidence that could include but is not limited to, a documented training program and individual training records for each of its operating personnel or other equivalent evidence that will be used to confirm that it meets Requirements 3 and 4.~~

## D. Compliance

### 1. Compliance Monitoring Process

#### 1.1. Compliance Monitoring Responsibility

Regional Reliability Organizations shall be responsible for compliance monitoring.

#### 1.2. Compliance Monitoring and Reset Time Frame

One or more of the following methods will be used to assess compliance:

- Self-certification (Conducted annually with submission according to schedule.)
- Spot Check Audits (Conducted anytime with up to 30 days notice given to prepare.)
- Periodic Audit (Conducted once every three years according to schedule.)
- Triggered Investigations (Notification of an investigation must be made within 60 days of an event or complaint of noncompliance. The entity will have up to 30 days to prepare for the investigation. An entity may request an extension of the preparation period and the extension will be considered by the Compliance Monitor on a case-by-case basis.)

The Performance-Reset Period shall be 12 months from the last finding of non-compliance.

#### 1.3. Data Retention

Each Reliability Coordinator shall keep evidence of compliance for the previous two calendar years plus the current year.

If an entity is found non-compliant the entity shall keep information related to the noncompliance until found compliant or for two years plus the current year, whichever is longer.

Evidence used as part of a triggered investigation shall be retained by the entity being investigated for one year from the date that the investigation is closed, as determined by the Compliance Monitor,

The Compliance Monitor shall keep the last periodic audit report and all requested and submitted subsequent compliance records.

#### 1.4. Additional Compliance Information

None.

### 2. Levels of Non-Compliance for a Reliability Coordinator (Replaced with VSLs)

~~2.1. Level 1: Not applicable.~~

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~~2.2. Level 2: Not applicable.~~

~~2.3. Level 3: Not applicable.~~

~~2.4.2.1. Level 4: There shall be a separate Level 4 non-compliance, for every one of the following requirements that is in violation:~~

~~2.4.1 One or more of its shift operating personnel did not complete a minimum of five days per year of training and drills using realistic simulations of system emergencies in the past year. (R2)~~

~~2.4.2 No evidence operating personnel have a comprehensive understanding of the Reliability Coordinator Area and interactions with neighboring Reliability Coordinator Areas. (R3)~~

~~2.4.3 No evidence operating personnel have an extensive understanding of the Balancing Authorities, Transmission Operators, and Generation Operators within the Reliability Coordinator Area. (R4)~~

**E. Regional Differences**

~~1. None identified.~~

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**Version History**

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
0	August 8, 2005	Removed “Proposed” from Effective Date	Errata
1	November 1, 2006	Adopted by Board of Trustees	Revised
<u>2</u>		<u>Retire R2 and M1 when PER-005-1 Requirement 3 becomes effective. Retire R3, R4 and M2 when PER-005 R1 and R2 become effective.</u>	<u>Revised</u>

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## Standard PER-002-0 — Operating Personnel Training

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The SPT SDT recommends that this entire standard be retired when PER-005 becomes effective.

### A. Introduction

1. **Title:** Operating Personnel Training
2. **Number:** PER-002-0
3. **Purpose:** Each Transmission Operator and Balancing Authority must provide their personnel with a coordinated training program that will ensure reliable system operation.
4. **Applicability**
  - 4.1. Balancing Authority.
  - 4.2. Transmission Operator.
5. **Effective Date:** April 1, 2005

### B. Requirements

- R1. Each Transmission Operator and Balancing Authority shall be staffed with adequately trained operating personnel.
- R2. Each Transmission Operator and Balancing Authority shall have a training program for all operating personnel that are in:
  - R2.1. Positions that have the primary responsibility, either directly or through communications with others, for the real-time operation of the interconnected Bulk Electric System.
  - R2.2. Positions directly responsible for complying with NERC standards.
- R3. For personnel identified in Requirement R2, the Transmission Operator and Balancing Authority shall provide a training program meeting the following criteria:
  - R3.1. A set of training program objectives must be defined, based on NERC and Regional Reliability Organization standards, entity operating procedures, and applicable regulatory requirements. These objectives shall reference the knowledge and competencies needed to apply those standards, procedures, and requirements to normal, emergency, and restoration conditions for the Transmission Operator and Balancing Authority operating positions.
  - R3.2. The training program must include a plan for the initial and continuing training of Transmission Operator and Balancing Authority operating personnel. That plan shall address knowledge and competencies required for reliable system operations.
  - R3.3. The training program must include training time for all Transmission Operator and Balancing Authority operating personnel to ensure their operating proficiency.
  - R3.4. Training staff must be identified, and the staff must be competent in both knowledge of system operations and instructional capabilities.
- R4. For personnel identified in Requirement R2, each Transmission Operator and Balancing Authority shall provide its operating personnel at least five days per year of training and drills using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel.

### C. Measures

- M1. The Transmission Operator and Balancing Authority operating personnel training program shall be reviewed to ensure that it is designed to promote reliable system operations.

## Standard PER-002-0 — Operating Personnel Training

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### D. Compliance

#### 1. Compliance Monitoring Process

Periodic Review: The Regional Reliability Organization will conduct an on-site review of the Transmission Operator and Balancing Authority operating personnel training program every three years. The operating personnel training records will be reviewed and assessed compared to the program curriculum.

##### 1.1. Compliance Monitoring Responsibility

Self-certification: The Transmission Operator and Balancing Authority will annually provide a self-certification based on Requirements R1 through R4.

##### 1.2. Compliance Monitoring Period and Reset Timeframe

One calendar year.

##### 1.3. Data Retention

Three years.

##### 1.4. Additional Compliance Information

Not specified.

#### 2. Levels of Non-Compliance

**2.1. Level 1:** N/A.

**2.2. Level 2:** The Transmission Operator or Balancing Authority operating personnel training program does not address all elements of Requirement R3.

**2.3. Level 3:** The Transmission Operator or Balancing Authority operating personnel training program does not address Requirement R4.

**2.4. Level 4:** A Transmission Operator or Balancing Authority has not provided a training program for its operating personnel.

### E. Regional Differences

None identified.

### Version History

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
0	August 8, 2005	Proposed Effective Date	Errata

## **Exhibit B**

# **Record of Development of Proposed Reliability Standards**

**[Available Upon Request]**

# **Exhibit C**

## **Standard Drafting Team Roster**



## System Personnel Training Standard Drafting Team (Project 2006-01)

<b>Chairman</b>	Patricia E. Metro Manager, Transmission and Reliability Standards	National Rural Electric Cooperative Association 4301 Wilson Blvd. — Mail Code EP11-253 Arlington, Virginia 22203	(703) 907-5817 (703) 907-5517 Fx <a href="mailto:patti.metro@nreca.coop">patti.metro@nreca.coop</a>
	James Bowles Training Coordinator	Electric Reliability Council of Texas, Inc. 2705 West Lake Drive Taylor, Texas 76574	(512) 248-3942 (512) 248-3082 Fx <a href="mailto:jbowles@ercot.com">jbowles@ercot.com</a>
	Ed Seddon Coordinator Standards Compliance	Orlando Utilities Commission 6113 Pershing Avenue Orlando, Florida 32822	(407) 716-8166 (407) 384-4148 Fx <a href="mailto:eseddon@ouc.com">eseddon@ouc.com</a>
	Raymond C. Gross Senior Trainer/Coordinator, Customer Relations & Training Dept.	PJM Interconnection, L.L.C. 955 Jefferson Avenue Valley Forge Corporate Center Norristown, Pennsylvania 19403-2497	(610) 666-8890 (610) 666-4379 Fx <a href="mailto:grossrc@pjm.com">grossrc@pjm.com</a>
	James E. Bradley Senior Specialist	Exelon Corporation 1N301 Swift Road Lombard, Illinois 60148	(630) 691-4734 (630) 691-5412 Fx <a href="mailto:james.bradley@comed.com">james.bradley@comed.com</a>
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