

## Standard Development Timeline

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

### Development Steps Completed

1. SAR posted for comment (Dates of posting TBD).

### Description of Current Draft

Anticipated Actions	Anticipated Date
45-day Formal Comment Period with Parallel Initial Ballot	July 2013
15-day Formal Comment Period with Parallel Ballot	September 2013
Recirculation ballot	October 2013
BOT adoption	November 2013

## Definitions of Terms Used in Standard

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

**System Operator:** An individual at a ~~e~~Control ~~e~~Center (~~Balancing Authority, Transmission Operator, Generator Operator, Reliability Coordinator~~) whose responsibility it is to monitor and ~~control~~ that operates or directs the operation of the Bulk electric system in ~~r~~Real-time.

*The following terms are defined for use only within PER-005-2, and should remain with the standard upon approval rather than being moved to the NERC Glossary of Terms:*

**System Personnel:** System Operators of a Reliability Coordinator, Transmission Operator or Balancing Authority, and the Transmission Owner personnel described in the Applicability Section of this standard.

**Support Personnel:** Individuals who carry out outage coordination and assessments, or determine SOLs, IROLs or operating nomograms<sup>1</sup> for Real-time operations.

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<sup>1</sup> Nomograms are used in the WECC region to describe element operating limits.

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

## A. Introduction

1. **Title:**           **Operations Personnel Training**
2. **Number:**    PER-005-2
3. **Purpose:**     To ensure that personnel performing or supporting Real-time, reliability-related tasks on the Bulk Electric System are competent to perform those tasks.
4. **Applicability:**
  - 4.1. **Functional Entities:**
    - 4.1.1 Reliability Coordinator
    - 4.1.2 Balancing Authority
    - 4.1.3 Transmission Operator

Rationale for Transmission Owner: Extending the applicability to Transmission Owners is necessary to address the FERC directive that the ERO develop formal training requirements for local transmission control center operator personnel. In Order No. 742 at P 62, the Commission clarified its understanding that local control center personnel *exercise control over a significant portion of the Bulk-Power System under the supervision of the personnel of the registered transmission operator. The supervision may take the form of directive specific step-by-step instructions and at other times may take the form of the implementation of predefined operating procedures. In all cases, the Commission continued, the local transmission control center personnel must understand what they are required to do in the performance of their duties to perform them effectively on a timely basis. Thus, omitting such local transmission control center personnel from the PER-005-1 training requirements creates a reliability gap.*

### 4.1.4 Transmission Owner that has:

- 4.1.4.1 Personnel in a transmission control center who operate a portion of the Bulk Electric System at the direction of its Transmission Operator.

Rationale for Generator Operator: Extending the applicability to Generator Operators at a centrally located dispatch center is necessary to address the FERC directive that the ERO develop specific requirements addressing the scope, content and duration appropriate for generator operator personnel. The Commission explains in Order No. 693 at P 1359 that *although a generator operator typically receives instructions from a balancing authority, it is essential that generator operator personnel have appropriate training to understand those instructions, particularly in an emergency situation in which instructions may be succinct and require immediate action.* Order No. 742 further clarified that the directive *applies to generator operator personnel at a centrally-located dispatch center who receive direction and then develop specific dispatch instructions for plant operators under their control. Plant operators located at the generator plant site are not required to be trained in PER-005-2.*

### 4.1.5 Generator Operator that has:

- 4.1.5.1 Personnel at a centrally located dispatch center who receive direction from their Reliability Coordinator, Balancing Authority, Transmission Operator, or Transmission Owner and may develop specific dispatch instructions for plant operators under their control.

- 4.1.5.1.1 Personnel at a centrally located dispatch center who relay dispatch instructions, without making any modifications, are excluded.

**5. Effective Date:**

- 5.1.** Requirement R1, Requirement R2, Requirement R3 part 3.1, Requirement R4 and Requirement R5 shall become effective the first day of the first calendar quarter that is 24 months beyond the date that this standard is approved by applicable regulatory authorities, or in those jurisdictions where regulatory approval is not required, Requirement R1, Requirement R2, Requirement R3 part 3.1, Requirement R4 and Requirement R5 become effective the first day of the first calendar quarter that is 24 months beyond the date this standard is approved by the NERC Board of Trustees', or as otherwise made pursuant to the laws applicable to such ERO governmental authorities.
- 5.2.** Requirement R3, with the exclusion of part 3.1, shall become effective the first day of the first calendar quarter beyond the date that this standard is approved by applicable regulatory authorities, or in those jurisdictions where regulatory approval is not required, Requirement R3 becomes effective the first day of the first calendar quarter beyond the date this standard is approved by the NERC Board of Trustees', or as otherwise made pursuant to the laws applicable to such ERO governmental authorities.

Rationale for changes to requirements in the PER Standard related to Transmission Owners and Calendar Year:

- Transmission Owners personnel at local transmission control centers have been added to the PER standard and are subject to all the Requirements of PER-005-2. The reason for adding Transmission Owners is to address Order No. 693 and Order No. 742 FERC directives to include local transmission control center operator personnel.
- To address industry input, the term *annual* has been changed to *each calendar year*.
- PER-005-2 provides a requirement for training, but does not create a requirement for certification.

**B. Requirements and Measures**

- R1.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall use a systematic approach to training (SAT) to develop and implement a training program for its System Personnel as follows: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
  - 1.1.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall create a list of BES company-specific Real-time reliability-related tasks.
    - 1.1.1.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall review and update its list of tasks identified in part 1.1 each calendar year.
  - 1.2.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall design and develop training materials based on the task list created in part 1.1 and part 1.1.1.

- 1.3.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall deliver the training established in part 1.2 to System Personnel.
- 1.4.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall conduct an evaluation each calendar year of the training program established in Requirement R1 to identify any needed changes to the training program and shall implement the changes identified.
- M1.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall review and update its list of tasks identified in part 1.1 each calendar year.
  - M1.1** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection its company-specific Real-time reliability-related task list, with the date of the last update, as specified in Requirement R1 parts 1.1 and 1.1.1.
  - M1.2** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection training materials, as specified in Requirement R1 part 1.2.
  - M1.3** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection System Personnel 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 Requirement R1 part 1.3.
  - M1.4** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner 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 Requirement R1 part 1.4.
- R2.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall verify, at least once, the capabilities of its System Personnel identified to perform each assigned task in Requirement R1 parts 1.1 and 1.1.1. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning ]*
  - 2.1.** Within six months of a modification or addition of Bulk Electric System company-specific Real-time reliability-related tasks, each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall verify the capabilities of each of its System Personnel to perform the new or modified tasks identified in Requirement R1 part 1.1.1.

Rationale for changes to R2: A change from System Operator to System Personnel is used to capture Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner in one term versus spelling each term out a second time in the requirement.

- M2.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection evidence to show that it verified the capabilities of each of the System Personnel identified to perform each assigned task in Requirement R1 parts 1.1 and 1.1.1, as specified in Requirement 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.

Rationale for changes to R3: The 32 hours of Emergency Operations training has been removed since this training should be covered as part of the systematic approach to training process in Requirement R1. The 32 hours is inherent to the systematic approach to training process and a legacy to the 2003 blackout. The removal of 32 hours is also considered to be a paragraph 81 concept due to it being redundant to the systematic approach to training process. Requirement R3.1 also covers the FERC directive for the creation of an implementation plan for simulation technology.

- R3.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner 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 its System Personnel with emergency operations training using simulation technology such as a simulator, virtual technology, or other technology that replicates the operational behavior of the Bulk Electric System.  
*[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
- 3.1.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner that gains operational authority or control over a Facility with an established IROL or establishes operating guides or protection systems to mitigate IROL violations shall comply with Requirement R3 within 6 months of gaining that authority, control or establishing such operating guides or protection systems.
- M3.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection training records that provide evidence that System Personnel completed training that includes the use of simulation technology, as specified in Requirement R3.
- M3.1** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection training records that provide evidence that System Personnel completed training that included the use of simulation technology, as specified in Requirement R3, within 6 months of gaining that authority, control or establishing such operating guides or protection systems.

Rationale for R4: This is a new requirement applicable to Support Personnel as defined above in the definition section. In FERC Order No. 742, the Commission noted that NERC, in developing Reliability Standard PER-005-1, did not comply with the directive in FERC Order No. 693 to expand the applicability of training requirements to include operations planning and operation support staff who carry out outage planning and assessments and those who develop System Operating Limits (SOL), Interconnection Reliability Operating Limits (IROL), or operating nomograms for Real-time operations. This requirement does not require that entities create a new, comprehensive systematic approach to training (SAT) process for training support personnel. Rather, the requirements contemplate that entities will look to the SAT process already developed for System Operators. The entity can use the list created from requirement R1 and select the reliability-related tasks that support personnel conduct and therefore should be trained on.

**R4.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall establish and implement training for Support Personnel specific to those Real-time reliability-related tasks identified by the entity pursuant to Requirement R1 part 1.1 and part 1.1.1 that relate to the Support Personnel’s job function. *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

**M4.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection training materials and training records that provide evidence that Support Personnel completed training. This evidence can be documents such as training records showing successful completion of training with the employee name and date.

**R5.** Each Generator Operator shall use a systematic approach to training to establish and implement training for its personnel described in applicability section 4.1.5. The training shall also include topics identified as follows: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning ]*

**5.1.** Each Generator Operator shall coordinate with its Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner to identify training topics that address the impact of the decisions and actions of a Generator Operator’s personnel as it pertains to the reliability of the Bulk Electric System during normal and emergency operations.

**5.1.1.** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall provide input as requested by the Generator Operator.

**M5.** Each Generator Operator shall have available for inspection training materials and training records that provide evidence that its applicable personnel completed

Rationale for R5: This is a new requirement applicable to Generator Operators described in the applicability section. In FERC Order No. 742, the Commission noted that in developing proposed Reliability Standard PER-005-1, NERC did not comply with the directive in FERC Order No. 693 to expand the applicability of training requirements to include generator operators centrally-located at a generation control center with a direct impact on the reliable operation of the Bulk-Power System. The Commission acknowledged that the training for GOPs need not be as extensive as the training for TOPs and BAs. FERC also stated that the systematic approach to training methodology is flexible enough to build on existing training programs by validating and supplementing the existing training content, where necessary, using systematic methods. It is important that the relevant generator operator personnel receive the necessary training. This requirement does not necessitate an SAT process that is as comprehensive as that used for TOPs, RCs and BAs. R5 also acknowledges that in order to provide the necessary training applicable to GOPs, GOPS will need to coordinate with their RC, BA, TOP and TO to understand the training topics that each GOP should be trained on.

training. This evidence can be documents such as training records showing successful completion of training with the employee name and date.

**M5.1** Each Generator Operator shall have available for inspection evidence, such as an email or attestation that it coordinated with the Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner in establishing the training requirements.

**M5.1.1** Each Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner shall have available for inspection evidence, such as an email or attestation, that it provided input to the Generator Operator.

## C. Compliance

### 1. Compliance Monitoring Process

#### 1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, “Compliance Enforcement Authority” means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

#### 1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the compliance enforcement authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

Each Reliability Coordinator, Balancing Authority, Transmission Operator, Transmission Owner, and Generator 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, Transmission Operator, Transmission Owner, or Generator 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.

#### 1.3. Compliance Monitoring and Assessment Processes:

As defined in the NERC Rules of Procedure, “Compliance Monitoring and Assessment Processes” refers to the identification of the processes that will be



used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

**1.4. Additional Compliance Information**

None

**D. Regional Variances**

None.

**E. Interpretations**

None.

**F. Associated Documents**

None.

**Table of Compliance Elements**

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
<b>R1</b>	<b>Long-term Planning</b>	<b>Medium</b>	<b>None</b>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner, failed to provide evidence that it updated its company-specific Real-time reliability-related task list to identify new or modified tasks each calendar year (1.1.2)</p> <p>OR</p> <p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner, failed to provide evidence of evaluating its training program each calendar year to identify needed changes to its training program(s). (1.4)</p>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to design and develop training materials based on the task lists. (1.2)</p>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to prepare a task list (1.1 or 1.1.1.)</p> <p>OR</p> <p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to deliver training based on the task lists. (1.3)</p>
<b>R2</b>	<b>Long-term Planning</b>	<b>High</b>	<b>None</b>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and</p>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner</p>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner verified less</p>

				<p>Transmission Owner verified at least 90% but less than 100% of its System Personnel capabilities to perform each assigned task from its tasks list. (R2)</p>	<p>verified at least 70% but less than 90% of its System Personnel capabilities to perform each assigned task from its task lists (R2)</p> <p>OR</p> <p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to verify its System Personnel capabilities to perform each new or modified task within six months of making a modification to its task list of the tasks in Real-time. (2.1)</p>	<p>than 70% of its System Personnel capabilities to perform each assigned task from its task lists. (R2)</p>
<b>R3</b>	<b>Long-term Planning</b>	<b>Medium</b>	<b>None</b>	<b>None</b>	<b>None</b>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner did not provide its System Personnel with any form of simulation technology training (R3)</p> <p>OR</p> <p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner did not verify its System Personnel capabilities to perform each new or modified task within six months of making a modification to its task list. (R3.1)</p>

<b>R4</b>	<b>Long-term Planning</b>	<b>Medium</b>	<b>None</b>	<b>None</b>	<b>None</b>	<p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to establish training for its Support Personnel (R4)</p> <p>OR</p> <p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to implement training for its Support Personnel. (R4)</p>
<b>R5</b>	<b>Long-term Planning</b>	<b>Medium</b>	<b>None</b>	<b>None</b>	<p>The Generator Operator failed to use a systematic approach to training to establish training requirements as defined in Requirement R5.</p>	<p>The Generator Operator failed to coordinate with its Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner to identify training topics as defined in Requirement R5 part 5.1</p> <p>OR</p> <p>The Reliability Coordinator, Balancing Authority, Transmission Operator, and Transmission Owner failed to provide the requested input as defined in Requirement R5 part 5.1.1.</p> <p>OR</p> <p>The GOP failed to implement the training as defined in Requirement R5.</p>

### Guidelines and Technical Basis

#### Requirement R1:

Any systematic approach to training will: 1) determine the skills and knowledge needed to perform tasks, 2) determine what training is needed to achieve those skills and knowledge, 3) determine how to assess the acquisition of those skills and knowledge by the learner, 4) should determine if the learner can perform the task(s) acceptably in either a training or on-the-job environment, 5) determine if the training is effective, and make adjustments as necessary.

#### Reference #1: Determining Task Performance Requirements

The purpose of this reference is to provide guidance in writing a performance standard that describes the desired outcome of a task. A standard for acceptable performance should be in either measurable or observable terms. Clear standards of performance are necessary for an individual to know when he or she has completed the task and to ensure agreement between employees and their supervisors on the objective of a task. Performance standards answer the following questions:

How timely must the task be performed?

*Or*

How accurately must the task be performed?

*Or*

With what quality must it be performed?

*Or*

What response from the customer must be accomplished?

When a performance standard is quantifiable, successful performance is more easily demonstrated. For example, in the following task statement, the criteria for successful performance is to return system loading to within normal operating limits, which is a number that can be easily verified.

Given a System Operating Limit violation on the transmission system, implement the correct procedure for the circumstances to mitigate loading to within normal operating limits.

Even when the outcome of a task cannot be measured as a number, it may still be observable. The next example contains performance criteria that is qualitative in nature, that is, it can be verified as either correct or not, but does not involve a numerical result.

Given a tag submitted for scheduling, ensure that all transmission rights are assigned to the tag per the company Tariff and in compliance with NERC and NAESB standards.

#### Reference #2: Systematic Approach to Training References:

The following list of hyperlinks identifies references for the NERC Standard PER-005 to assist with the application of a systematic approach to training:

## Application Guidelines

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- (1) DOE-HDBK-1078-94, A Systematic Approach to Training  
<http://www.hss.energy.gov/NuclearSafety/techstds/standard/hdbk1078/hdbk1078.pdf>
- (2) DOE-HDBK-1074-95, January 1995, Alternative Systematic Approaches to Training,  
U.S. Department of Energy, Washington, D.C. 20585 FSC 6910  
<http://www.hss.energy.gov/NuclearSafety/techstds/standard/hdbk1074/hdb1074.html>
- (3) ADDIE – 1975, Florida State University  
[http://www.nwlink.com/~donclark/history\\_isd/addie.html](http://www.nwlink.com/~donclark/history_isd/addie.html)
- (4) DOE Standard - Table-Top Needs Analysis  
DOE-HDBK-1103-96  
<http://hss.energy.gov/NuclearSafety/techstds/standard/hdbk1103/hdbk1103.pdf>

**Requirement R2:**

**Requirement R3:**

**Requirement R4:**

**Requirement R5:**