



## **System Personnel Training Standard Drafting Team Meeting (SPTSDT)**

November 6, 2006 — 1–5 p.m.  
November 7, 2006 - 8 a.m.– 5 p.m.  
November 8, 2006 — 8 a.m.–noon

Hilton O'Hare  
Chicago International Airport  
Chicago, IL  
Phone: 773-686-8000 ☎

### **Agenda**

- 1. Administration**
  - a. Arrangements — Secretary
  - b. Announcement of Quorum — Secretary
  - c. Procedures
    - i) Antitrust Compliance Guidelines
- 2. NERC Standard Drafting Process Review — Secretary**
- 3. Respond to Industry Comments from 1<sup>st</sup> Posting of Draft Standard — Chairman**
- 4. Working Team Members and Tasks — Chairman**
- 5. Status Reports on References**
- 6. Changes to the Standard in Light of Industry Comments and FERC Directives**
- 7. Future Meetings (Information Only)**



## **NERC ANTITRUST COMPLIANCE GUIDELINES**

### **I. GENERAL**

It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition.

It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

Antitrust laws are complex and subject to court interpretation that can vary over time and from one court to another. The purpose of these guidelines is to alert NERC participants and employees to potential antitrust problems and to set forth policies to be followed with respect to activities that may involve antitrust considerations. In some instances, the NERC policy contained in these guidelines is stricter than the applicable antitrust laws. Any NERC participant or employee who is uncertain about the legal ramifications of a particular course of conduct or who has doubts or concerns about whether NERC's antitrust compliance policy is implicated in any situation should consult NERC's General Counsel immediately.

### **II. PROHIBITED ACTIVITIES**

Participants in NERC activities (including those of its committees and subgroups) should refrain from the following when acting in their capacity as participants in NERC activities (e.g., at NERC meetings, conference calls and in informal discussions):

- Discussions involving pricing information, especially margin (profit) and internal cost information and participants' expectations as to their future prices or internal costs.
- Discussions of a participant's marketing strategies.
- Discussions regarding how customers and geographical areas are to be divided among competitors.
- Discussions concerning the exclusion of competitors from markets.
- Discussions concerning boycotting or group refusals to deal with competitors, vendors or suppliers.

### III. ACTIVITIES THAT ARE PERMITTED

From time to time decisions or actions of NERC (including those of its committees and subgroups) may have a negative impact on particular entities and thus in that sense adversely impact competition. Decisions and actions by NERC (including its committees and subgroups) should only be undertaken for the purpose of promoting and maintaining the reliability and adequacy of the bulk power system. If you do not have a legitimate purpose consistent with this objective for discussing a matter, please refrain from discussing the matter during NERC meetings and in other NERC-related communications.

You should also ensure that NERC procedures, including those set forth in NERC's Certificate of Incorporation and Bylaws are followed in conducting NERC business. Other NERC procedures that may be applicable to a particular NERC activity include the following:

- Reliability Standards Process Manual
- Organization and Procedures Manual for the NERC Standing Committees
- System Operator Certification Program

In addition, all discussions in NERC meetings and other NERC-related communications should be within the scope of the mandate for or assignment to the particular NERC committee or subgroup, as well as within the scope of the published agenda for the meeting.

No decisions should be made nor any actions taken in NERC activities for the purpose of giving an industry participant or group of participants a competitive advantage over other participants. In particular, decisions with respect to setting, revising, or assessing compliance with NERC reliability standards should not be influenced by anti-competitive motivations.

Subject to the foregoing restrictions, participants in NERC activities may discuss:

- Reliability matters relating to the bulk power system, including operation and planning matters such as establishing or revising reliability standards, special operating procedures, operating transfer capabilities, and plans for new facilities.
- Matters relating to the impact of reliability standards for the bulk power system on electricity markets, and the impact of electricity market operations on the reliability of the bulk power system.
- Proposed filings or other communications with state or federal regulatory authorities or other governmental entities.
- Matters relating to the internal governance, management and operation of NERC, such as nominations for vacant committee positions, budgeting and assessments, and employment matters; and procedural matters such as planning and scheduling meetings.

Any other matters that do not clearly fall within these guidelines should be reviewed with NERC's General Counsel before being discussed.

## A. Introduction

1. **Title:** System Personnel Training
2. **Number:** To be determined
3. **Purpose:** To require the training of power system operating personnel to help ensure the reliability of the North American Interconnections and the bulk electric systems[DLF1]. Training is a necessary element to operating competence. This standard is designed to require that competent performance is defined and deficiencies in competency are corrected through adequate training.
4. **Applicability:** This standard applies to the initial training of new staff and the continuing education of existing staff performing operating tasks in real-time that directly impact the reliability of the Bulk Electric System (BES) Bulk Power System BPS[DLF2]. ~~The tasks in Attachment A[DLF3] have been determined to be such tasks, but this list is not exhaustive, and therefore each organization in the electric utility industry shall determine if they perform any other tasks that directly impact the real-time reliability of the BES[DLF4].~~ The operating tasks covered by this standard may be performed by any of the following industry functions.
  - 4.1. Operating Reliability Function
  - 4.2. Balancing Function
  - 4.3. Transmission Operations Function

## B. Requirements

- R 1. The organization responsible for the performance of the functions covered by this standard shall have a training program that provides its personnel performing the functions covered by this standard with training that addresses the procedures, processes, and tools associated with the performance of their respective job duties. This includes personnel contracted to perform these functions, and personnel of an organization to which these functions have been delegated.
  - R 1.1. The Training program shall address the knowledge, performance, and behavioral competencies required for reliable system operations.
- R 2. A systematic approach shall be used for developing training ~~which and~~ [DLF5] shall contain the following elements:
  - R 2.1. Training needs shall be determined ~~by the using~~ [DLF6] following analysis processes:
    - R 2.1.1. Each company is required to provide a Company-specific List of Reliability related tasks.

Note: Attachment A contains ~~those some~~ [DLF7] tasks performed by operating personnel that have been identified by the NERC Personnel Subcommittee as directly impacting reliability and may be used as a guide in constructing the company specific list. The list in

Attachment A is not exhaustive, and therefore each organization in the electric utility industry shall determine if they perform any other tasks that directly impact the real-time reliability of the BES[DLF8].

R 2.1.2. Task performance requirements shall be formally [DLF9] identified by a task analysis that relates to the Company specific list of reliability related tasks.

R 2.1.3. ~~To determine training needs~~ performance requirements in R 2.1.2 shall include an assessment of the knowledge, performance, and behavioral requirements for task performance

R 2.1.4. The results of the ~~gap~~ assessments in R 2.1.2 and R 2.1.3 shall be used in the design phase to determine learning objectives

R 2.2. Training shall be designed ~~with such that there is a~~ [DLF10] direct correlation between performance requirements, learning objectives, and learning evaluation.

R 2.2.1. Training shall be designed based on objectives identified using the processes in R 2.1.

R 2.2.2. Training design shall include, at a minimum, the learning objectives, target audience, timeline for development and delivery, and an evaluation mechanism to determine whether training outcomes were achieved for each trainee.

R 2.2.3. Each learning activity shall have clear and concise written statements of intended learning objectives based upon the task analysis and training needs assessment [DLF11].

R 2.2.4. The level of complexity of the training shall match the level of complexity of the performance required. [DLF12]

R 2.2.5. Learning evaluations shall ~~be designed to~~ validate [DLF13] competency to perform tasks as stated in the learning objectives.

R 2.3. Training shall ~~be developed to~~ contain [DLF14] learning experiences and delivery methods that enable trainees to meet the learning objectives.

R 2.3.1. Training content shall ~~be developed to~~ match [DLF15] objectives rather than topics.

R 2.3.2. ~~There shall be an outline developed of the content or a brief description of the method for meeting how~~ the learning objectives [DLF16] ~~shall be met~~.

R 2.3.3. A subject matter expert shall verify training content for completeness and accuracy.

R 2.3.4. Delivery methods shall ~~be developed that are appropriate for~~ match [DLF17] the learning objectives and the target audience.

R 2.4. ~~The process of implementation~~ [DLF18] shall include a critical review of the training and adjustments made to ensure content accuracy and delivery method functionality.

R 2.4.1. Inaccuracies or inconsistencies identified during the review or delivery shall be corrected before further delivery of the training.

R 2.5. Learning evaluation shall ~~validate the intended learning for each objective occurred~~ [DLF19] ~~be done for each objective to validate that the intended learning did occur~~.

- R 2.5.1. ~~There shall be documented~~ methods for participants to demonstrate the achievement of the objectives ~~shall be documented~~. [DLF20]
- R 2.5.2. Individual competency shall be evaluated for tasks requiring individual competency.
- R 2.5.3. Where team performance is the objective or critical to the objective, there shall be evaluation methods to check each individual's performance within the group, in addition to evaluation of team performance.
- R 3.** Each responsible organization as specified in R 1 of this standard shall provide the following types of training programs:
- R 3.1. A training program for the initial training of personnel performing the ~~functions-tasks identified in R 2.1.1~~ listed in section 4 of the Introduction to this standard. The initial training program shall include training on the following levels and shall be applied as appropriate for the individual's existing knowledge, skills, and abilities.
- R 3.1.1. Baseline Entry-level Training Program ~~Ref~~
- R 3.1.2. Basic Curriculum for System Operations
- R 3.1.3. Core Training Elements for System Operations
- R 3.1.4. Area-Specific Performance Requirements
- R 3.2. A ~~continuing education-training~~ [DLF21] program shall be provided for personnel covered by this standard that ensures that personnel are kept up to date on functions they perform. The continuing training program shall meet all the requirements of this standard.
- R 3.3. The operating organization shall provide refresher training in those operations and procedures ~~including situational awareness~~, which may be required on a seasonal or otherwise infrequent basis.
- R 3.4. Emergency operations preparedness training programs shall be provided for all personnel covered by this standard.
- R 3.4.1. At a minimum, all personnel covered under this standard shall participate annually in drills or exercises in emergency operations.
- R 3.4.2. Drills or exercises shall be comprehensive enough to involve all personnel likely to be involved in an emergency operation.
- R 3.4.3. Emergency operations, power system restoration training, and drills or exercises shall be conducted on a sub-regional, regional and interconnection basis with all real-time operating personnel that may impact reliability in a region and interconnect participating in the drills. Drills shall include simulations of system conditions, operating ~~procedures-procedures~~ and the communication process required during emergency operations and power system restoration.
- R 3.4.4. ~~While all conceivable events do not have to be included each year, a reasonable cross-section of events should be covered~~. [DLF22]
- R 3.4.5. ~~The drills and exercises shall be realistic and use of a simulator is preferred. If a simulator not available, tabletop exercises shall be used~~. [DLF23]
- R 3.4.6. Personnel shall be trained for emergency operations preparedness in the role they would be assigned for a particular emergency event.

R 3.4.7. The outcome of the drills or exercises shall be analyzed to identify competency gaps associated with emergency operations and response.

~~R 3.4.8. Each Reliability Coordinator, Transmission Operator, and Balancing Authority shall provide at least 32 hours of training per year of training for each required system operator performing the tasks identified in R 2.1.1, using and drills or exercises of using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel [DLF24]. emergency operations preparedness training for the following personnel:~~

~~R 3.4.8.1. Positions that have the primary responsibility, either directly or through communications with others, for the real-time operation of the interconnected Bulk Electric System.~~

~~R 3.4.8.2: R 3.4.7.1. Positions directly responsible for complying with NERC standards.~~

R 4. The requirements for valid training apply to any mode of training delivery, including on-the-job-training (OJT). Specifically, OJT shall meet all the requirements in R 2, and the following additional requirements:

R 4.1. ~~In the case of OJT, a A person [DLF25] in charge of responsible for~~ an operating desk may train another person when time permits while on duty.

R 4.2. OJT is delivered by a qualified OJT instructor

R 4.3. ~~OJT is shall be~~ done using the actual tools and setting ~~involved in that real-task performance [DLF26] shall involve~~. The tools and settings, ~~at a minimum, shall be a close resemblance need not be of~~ production or live systems ~~[DLF27], but shall be a close resemblance of such~~.

R 4.4. Successful OJT task performance shall be documented using performance criteria for successful completion of live task performance except for performance criteria that cannot be duplicated outside live performance conditions. In such a case, the closest training conditions that can be reasonably produced shall be used.

R 4.5. On the job training (OJT) evaluation shall be considered successfully completed when the trainee's performance of the task is documented to meet the learning objectives based on performance criteria for the task.

R 4.6. Performance criteria for a task shall include, at a minimum, what triggers action or the condition requiring performance of the task; the action or performance required, and the criteria for successful completion.

R 5. Each training program shall meet the following requirements:

R 5.1. There shall be a documented annual training plan derived from needs assessments for each type of training program required in R 3 and R 4.

R 5.2. Training programs shall be evaluated for effectiveness in delivering training to achieve the desired results. Program evaluation shall include:

R 5.2.1. Learning assessment results,

R 5.2.2. Trainer and ~~providersponsor~~ evaluation of learning activities,

- R 5.2.3. Feedback from participants, and
- R 5.2.4. Post-training workplace performance feedback.
- R 5.3. Each training program in use shall be maintained, which shall include the following measures:
  - R 5.3.1. Changes to program material are controlled and documented. Anyone can request changes, but a review and approval process shall be followed.
  - R 5.3.2. All training materials shall be reviewed prior to use to ensure they are current.
  - R 5.3.3. The training program shall consider the results of the training program evaluation process when updating the training activities.
- R 6.** Sufficient documentation shall be maintained to validate compliance with this standard.
- R 7.** All personnel developing or delivering training to personnel to whom this standard applies shall be qualified by experience and training. Add explanation of categories of training personnel
  - R 7.1. Trainer: Trainers shall be competent in both the development and delivery of training.
    - R 7.1.1. All training delivered to personnel covered by this standard shall be developed by, or under the guidance of, a competent trainer.
    - R 7.1.2. Trainers shall be trained in the fundamentals of training, which shall include developing the elements of a valid training program as described in requirements R 3 - R 4.
    - R 7.1.3. Trainer competencies: Trainers shall meet the following competencies.
      - R 7.1.3.1. Design training using the process in R 2.1 and 2.2.
      - R 7.1.3.2. Determine barriers to skill transfer in the workplace and take corrective actions.
      - R 7.1.3.3. Trainers that deliver training shall be trained in the fundamentals of instruction and demonstrate basic competency in instruction
  - R 7.2.** Instructor: An Instructor assigned to teach any part of a training program shall have basic instruction competencies or be directly supervised by a trainer.
  - R 7.3. On-the-Job-Training Instructor: An OJT Instructor shall be validated as competent in the job or task which they are instructing.
    - R 7.3.1. Management shall determine acceptable performance of a task.
    - R 7.3.2. Performance shall be sufficiently documented that successful OJT instructors can clearly identify when competent performance is achieved.
    - R 7.3.3. Once an OJT instructor checks a trainee off as trained, management or supervision shall validate that the person is ready to perform the task without supervision or further training.
- R 8.** Personnel performing an operating function during a regularly scheduled shift shall not normally be required to train in parallel. Each responsible organization employing personnel listed in section 4 of the Introduction to this standard shall be adequately staffed with fully



qualified operations and operations support personnel such that there is time designated only for training. The amount of time required for training shall be determined by the process in R2.

- R 9. An analysis shall be conducted to determine the training facilities necessary to accomplish the required training.

Revision Number	Date	Revision Made
1	6/14/06	Globally accepted all tracked changes and renumbered requirements.
2	6/14/06	Removed field codes and comments
3	6/14/06	Replaced entity with organization and entities with organizations. Replaced the verbs "will" and "must" with "shall." Renumbered references to requirements in the text of the requirements.
<u>4</u>	<u>6/15/06</u>	<u>Revised by Dave Folk. Explanations of changes are included in the comments throughout the document.</u>

### C. Measures

- M1. The training program shall have agreement and consistency between training objectives, learning content, and learning evaluation as listed in R6.
- M2. Each entity operating bulk electric system facilities shall provide evidence of operating personnel and system support personnel training in accordance with Requirement R11.  
On the shelf vs. delivered?

- M3.** Each entity operating bulk electric system facilities shall have documentation available for inspection to meet Requirement R1 through R6. This documentation shall include an analysis of needs which establishes competency levels and identifies the competency gap.
- M4.** Each entity operating bulk electric system facilities shall have available for inspection, the processes, procedures, and tools to meet the systematic approach to training in Requirement R6.
- M5.** Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R7 and R10 including a training plan, **sample courses?** and program evaluation.
- M6.** **Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R12 through a NCTO certificate or equivalent.**
- M7.** Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R13 including, instructor or trainer qualification requirements, job description and trainer or instructor training completion.
- M8.** Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R14 including a training plan for both initial and continuing training.
- M9.** Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R15 including instructor qualification, trainee performance criteria, and trainee evaluation or assessment.
- M10.** Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R16 including training records and shift schedules and an analysis of staffing needs.
- M11.** Each entity operating bulk electric system facilities shall have available for inspection evidence of meeting R17 including an analysis of training facility needs.

## **D. Compliance Monitoring Process**

### **1.1 Compliance Monitoring Responsibility**

Regional Reliability Organization

[e28]

### **1.2 Compliance Monitoring Period**

Self-certification: The Responsible Entity shall annually provide to their RRO, a self-certification based on Requirements R1 through R16.

Self-certification: The Reliability Coordinators shall annually provide to NERC a self-certification based on Requirements R1 through R16

**1.3 Reset Timeframe**

One calendar year.

**1.3 Data Retention**

Minimum of three years.

**1.4 Additional Compliance Information**

The operating personnel and other system support personnel training records shall be reviewed and assessed compared to the program curriculum.

**2. Levels of Non-Compliance**

**2.1 Level 1:** The Responsible Entity system support personnel training program has not been properly documented.

An operating personnel training program is not properly documented.

**2.2 Level 2:** The Responsible Entity System Support personnel training program does not address all elements of Requirements R1 through R16.

The Responsible Entity operating personnel training program does not address all elements of Requirements R1 through R16.

**2.3 Level 3:** The Responsible Entity operating personnel training program does not address Requirements R1 through R5.

The Responsible Entity system support personnel training program does not address Requirements R1 through R5.  
*(this may be modified to address the 5 day issue/32 hours)*

**2.4 Level 4:** A Responsibility Entity has not developed and documented a training program for its operating personnel.

A Responsibility Entity has not developed and documented a training program for its system support personnel.

**E. Regional Differences**

1. None

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Periodic Review:

The Regional Reliability Organization (RRO) shall conduct an on-site review of the Responsible Organizations operating personnel and other system support personnel training programs every three years. The organizations identified by NERC as a Responsible Entity are those which are subject to NERC certification.

NERC shall conduct an on-site review of the Reliability Authority operating personnel and other system support personnel training programs every three years.

The operating personnel and other system support personnel training records shall be reviewed and assessed compared to the program curriculum.

#### References

Needs assessment is not required for those tasks performed infrequently if periodic training is done that encompasses the full scope of tasks. This does not pertain to training of an emergency operations nature. Refer to R 10 for emergency operations training requirements. If a needs assessment is done for such infrequent tasks, the results shall be used for focusing training and not for exempting individuals from any periodic training requirement.

#### Need a reference document that describes how to transition the plan into actual training

**R 7.6 Transfer of Skills:** The transfer of skills to the workplace shall be verified. Although training cannot guarantee performance in the workplace, successful performance after training is the broader objective of this standard. Skill transfer shall be considered successful when:

**R 7.7.1** Competency is transferred back to workplace as evidenced by competent performance

**R 7.7.2** The competent performance of tasks results in the effectiveness of the organization to maintain the reliability of the bulk electrical system.

**R 7.7.3** If competency has not been successfully transferred to the work place, an analysis shall be undertaken to determine the reason why it has not. Remedial action shall be taken as necessary to ensure the transfer and deployment of skills occurs

#### Definitions

Analysis - Apply logic to define a requirement or problem, identify possible causes and possible solutions and select the solutions that best fit the needs.

Competency

Competency Gap

Level of complexity – training

Level of complexity - performance

Training sponsor

The subject matter expert shall be a person that meets the organization's performance requirements for the tasks being taught.

workplace performance FINITION AS ONE TYPE OF POST-TRAINING FEEDBACK

Post-training feedback on the training Ref

## Definitions and References

1 – Geoff Elmer

2 – Rick King

3 – Laurel

4 – Jim Bowles

5 – Ray Gross

6 – John Taylor

**3 acceptable performance of a task - see effective performance**

**1 Analysis - Apply logic to define a requirement or problem, identify possible causes and possible solutions and select the solutions that best fit the needs.,**

**2 annual training plan,**

**3 Area-Specific Performance Requirements**

~~3~~

~~3 Attachment A contains those tasks, 2~~ 6

**barriers to skill transfer, 6**

**2 Baseline Entry-level Training Program, ~~3~~**

**3 basic competency in instruction, ~~6~~**

**2 Basic Curriculum for System Operations, ~~3~~**

~~3 basic instruction competencies, 6~~

**4 bulk electric system, ~~7~~**

~~5~~ **4 categories of training personnel, ~~5~~**

~~5~~ **4 close resemblance, ~~5~~**

~~3~~ **competencies, ~~2~~**

~~3~~ **3-Competency, ~~10~~**

~~6~~ **3-competency gaps, ~~4~~**

**3 competent performance, ~~6~~**

**5 competent trainer**

~~3~~ **4 continuing education, ~~3~~**

- 2 continuing education program
- 2 Core Training Elements for System Operations
  - 1 Delivery
    - 1 Delivery methods,~~3~~
    - 1 design,~~2~~
    - 1 development~~2~~
  - 6 Drills,~~4~~
    - 3 Effective performance
  - 4 emergency operations preparedness training
  - 4 emergency operations,~~4~~
    - 1 evaluation
    - 6 exercises,~~4~~
    - 6 exercises in emergency operations,~~4~~
    - 6 fundamentals of instruction,~~6~~
    - 6 fundamentals of training,~~6~~
    - 1 implementation,~~3~~
    - 3 Individual competency,~~3~~
    - 5 Instructor,~~6~~
    - ~~23~~ knowledge, performance, and behavioral,~~2~~
    - ~~31~~ Learning evaluation,~~3~~
    - ~~26~~ learning experiences,~~2~~
    - ~~26~~ learning objectives,~~2~~
    - 6 Level of complexity - performance,~~10~~
    - 6 Level of complexity – training,~~10~~
    - 6 On the shelf,~~7~~
    - 2 on-the-job-training (OJT),~~4~~
    - 5 On-the-Job-Training Instructor
      - ~~41~~ operating personnel,~~1~~
    - 2 outline developed of the content or a brief description of how the learning objectives will be met,~~2~~
      - ~~5~~ ~~3~~ performance criteria,~~5~~
      - ~~53~~ Post-training workplace performance feedback
    - 6 power system restoration training,~~4~~
    - 5 qualified OJT instructor
      - ~~15~~ qualified operating personnel
        - 6 realistic,~~4~~
        - ~~1~~ ~~6~~ real-time operating personnel,~~4~~
        - ~~36~~ refresher training,~~3~~
        - 6 regional,~~4~~
      - 4 Responsible Entity,~~9~~
      - ~~26~~ sample courses,~~7~~
      - 4 simulator,~~4~~
      - 4 sponsor,~~5~~
      - 4 subject matter expert
      - ~~64~~ sub-regional,~~4~~
      - 1 systematic approach,~~2~~
      - 5 tabletop exercises,~~4~~

- 4 target audience,
- 4 timeline,-2
- ~~23~~ task analysis,-2
- 3 task performance
- 3 Task Performance Requirments
- 3 tasks performed infrequently, 9
- 6 Tasks performed in real-time that directly impact system reliability (from study)**
- 3 team performance,-3
- 45** The subject matter expert shall be a person that meets the organization's performance requirements for the tasks being taught,-10
- 6 train in parallel,-6
- 1 trainee evaluation,-7
- 5 Trainer,-5
- 5 Trainer competencies,-6
- 4 Training
  - 1 Training Design
- 5 training facilities,-6
- 5 training materials,-5
- 1 training needs assessment,-,2
- 62** training program,-3,5
- 5 Training sponsor,-10
- 6 transfer of skills to the workplace,-10
- 4 \_validate,-6

**bulk electric system (Bulk Power System)** As defined by the Regional Reliability Organization, the electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100 kV or higher. Radial transmission facilities serving only load with one transmission source are generally not included in this definition. Source: *Glossary of Terms Used in Reliability Standards*

**close resemblance:** similar enough in appearance or function that task performance can be evaluated as if in a real on-the-job situation.

**Categories of training personnel:**

Trainer: competent in both the development of training and its delivery in multiple environments.

Instructor: competent in basic training delivery skills in a classroom environment

On-the-Job-Training Instructor: competent in delivering training in a real or simulated on-the-job environment.

**continuing education:** An instructional program that brings participants up to date in a particular area of knowledge or skills

**emergency operations preparedness training:** training intended to provide either basic competencies or increased proficiency in the procedures or use of systems used for response or recovery from system emergencies

**emergency operations:** procedures used for response or recovery from system emergencies (emergency defined in NERC glossary)

**Operating personnel:** individuals at a control center (Balancing Authority, Transmission Operator, Generator Operator, or Reliability Coordinator) whose responsibility it is to monitor and control that electric system in real time. (Same as System Operator in NERC Glossary)

**Responsible Entity:** The Reliability Coordinator, Balancing Authority or Transmission operator to whom the standard applies

**Simulator:** A device, computer program or system used during software verification, which behaves or operates like a given system when provided with a set of controlled inputs.

**Sponsor:** the entity who provides or otherwise assumes responsibility for training meeting the requirements of this standard.

**subject matter expert:** One who has: demonstrated competency and mastery in a particular subject or topic; can perform a job or a selected group of tasks to standards; shall know what is critical to the performance of the task and what is nice-to-know; shall



have recent job experience, otherwise, knowledge of the task may be outdated by new procedures or equipment.

**sub-regional:**

**target audience:** the specific class or group of individuals for whom a course of instruction is planned and designed.

**Timeline:** A visualization of a sequence of events showing their temporal relationship.

**Training:** planned and organized process or activity intended to impart skills, techniques and methodologies or make proficient through instruction and hands-on practice

**Validate:** To give evidence that a solution or process is correct

### 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. Standard Drafting Team appointed by the Standards Committee on June 21, 2006.

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

This is the first posting of the proposed standard and its associated implementation plan for a 30-day comment period, from September 26–October 25, 2006.

#### Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments and post a revised standard and implementation plan for a second comment period for 45-days.	November 15–December 29, 2006
2. Respond to comments on the second draft of the proposed standard.	January 15, 2007
3. Obtain the Standards Committee's approval to move the standards forward to balloting.	January 15, 2007
4. Post the standard and implementation plan for a 30-day pre-ballot review.	February 1–March 2, 2007
5. Conduct an initial ballot for ten days.	March 5–16, 2007
6. Respond to comments submitted with the initial ballot.	March 23, 2007
7. Conduct a recirculation ballot for ten days.	March–April 4, 2007
8. Post for a 30-day preview for BOT.	April 1–30, 2007
9. BOT adoption.	May 2, 2007

## A. Introduction

1. **Title:** System Operator 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 are competent to perform those 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:** July 1, 2007

## B. Requirements

- R1. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct a System Operator job task analysis (JTA). The analysis must be updated when there is a new or revised task or tool. The JTA results shall include a list of company-specific reliability-related tasks assigned to each System Operator position and the following information for each of those tasks: [Risk Factor: High ]
  - R1.1. The conditions under which the task is performed.
  - R1.2. The actions to be taken in performing the task, including identification of references and tools used in performing the task.
  - R1.3. Identification of whether the task is performed alone or as part of a team.
  - R1.4. The criticality of the task with respect to reliability.
  - R1.5. The frequency of performing the task.
  - R1.6. The knowledge, skill, and experience needed to perform the task.
  - R1.7. The criteria for successful performance of the task.
- R2. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall assess the training needs (for the tasks identified in Requirement 1 and the criteria for successful performance of the task identified in Requirement 1.7) of entry-level or newly hired experienced System Operators.[Risk Factor: Medium]
- R3. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct a training needs assessment of incumbent System Operator to identify mismatches (for the tasks identified in Requirement 1 and the criteria for successful performance of the task identified in Requirement 1.7) between actual performance and the criteria for successful performance for each position performing reliability-related tasks identified in R1 (including any contract System Operator or System Operator performing tasks identified in R1 under delegation agreements) at least once every year. [Risk Factor: High]
- R4. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have an annual training plan developed from the training needs assessments in R2 and R3 that identifies the topics, anticipated duration of the topic, and target schedule for the following types of training: [Risk Factor: Medium]

- R4.1.** Entry-level System Operator training to bring entry-level System Operator performance to a minimum acceptable level of competency on all assigned reliability-related tasks.
- R4.2.** Refresher training to reduce performance gaps of incumbent System Operator.
- R4.3.** Refresher training to provide incumbent System Operator with practice in performing tasks with high criticality and low frequency of occurrence.
- R4.4.** Continuing training to provide incumbent System Operator with new knowledge and skill to perform new or revised tasks or to use new tools.
- R5.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify that persons developing or delivering training have the following qualifications: [Risk Factor: High]
  - R5.1.** Training development:
    - R5.1.1.** Operating knowledge in the subject matter covered by the training activity.
    - R5.1.2.** Competency in developing training using a systematic approach.
  - R5.2.** Training delivery:
    - R5.2.1.** Competency in training delivery.
- R6.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall implement its System Operator training program by providing training to all of its System Operator (including any contract System Operator or System Operator performing tasks identified in R1 under delegation agreements) as follows: [Risk Factor: High]
  - R6.1.** Entry-level training to provide System Operator with the knowledge and skill identified in R2 to meet the associated criteria for successful performance identified in R1.7.
  - R6.2.** Continuing training to reinforce knowledge and skills of incumbent System Operators as identified in the JTA (Requirement 1) that were not covered in Requirement 4.2.
  - R6.3.** Refresher training to eliminate performance gaps identified by the training needs assessments in Requirement 2, and Requirement 3.
  - R6.4.** Continuing training to acquire the knowledge and skills necessary for new or modified tasks and tools identified in R2 and R3.
  - R6.5.** Annual refresher training for incumbent System Operator that includes the use of drills and simulations on tasks that have high reliability-related criticality (as identified in R1.4) and low frequency of occurrence (as identified in R1.5) to meet the associated criteria for successful performance identified in R1.7. This refresher training shall include:
    - R6.5.1.** At least 32 hours of emergency operations or system restoration training, simulating the system conditions, operating procedures and communication processes.
    - R6.5.2.** At least one exercise each year shall involve other entities on a sub-regional, regional or interconnection-wide basis, involving all real-time operating positions likely to be involved in the actual event, with each person performing their assigned duties. [Risk Factor: Medium]
- R7.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall document the following for each training activity used to support its reliability-related System Operator training: [Risk Factor: Lower]
  - R7.1.** Title of the activity.
  - R7.2.** Training provider.
  - R7.3.** Description of the content covered by the activity.

- R7.4.** Training method or methods.
- R7.5.** Tools or reference documents needed for the training.
- R7.6.** Identification of the task or tasks (identified in R1), or supporting knowledge or skill (identified in R1.6) covered by the training.
- R7.7.** Identification of the conditions under which the associated task is performed (as identified in R1.1).
- R7.8.** Identification of any prerequisite training.
- R7.9.** Objectives and assessments that duplicate the criteria for successful performance identified in R1.7 and mastery of the knowledge and skills in R1.6.
- R7.10.** Practice in following the steps and using the tools and references identified in R1.2, including practice with others if the task is normally performed as part of a team (as identified in R1.3)
- R8.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall track the progress of each of its System Operator (including any contract System Operator or System Operator performing tasks identified in R1 under delegation agreements) in using training to obtain the knowledge, skill and experience needed to meet the performance criteria specified in R1.7 for the tasks identified in R1 by maintaining the following records: [Risk Factor: Medium]
  - R8.1.** For each reliability-related task identified in R1, the date and method used to assess whether the System Operator's performance meets the criteria specified in R1.7
  - R8.2.** For participation in each training activity identified under R7, the date and duration of participation in training activities designed to develop their ability to meet the performance criteria in R1.7.
- R9.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct an annual evaluation of its System Operator training program to determine if the training does prepare System Operator to meet the criteria for successful performance as identified in R1.7 and use the results to update the program to meet identified deficiencies, giving consideration to the following information sources: [Risk Factor: Medium]
  - R9.1.** Feedback from trainees to identify areas where the training should be clarified or modified.
  - R9.2.** Results of learning assessments.
  - R9.3.** Post-training workplace performance feedback.
  - R9.4.** Audit results.
- R10.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall maintain its System Operator training program so that the information provided to trainees accurately reflects the current operating environment. [Risk Factor: Medium]

### **C. Measures**

- M1.** Each Reliability Authority, Balancing Authority and Transmission Operator shall have available for inspection, the results of its latest JTA with the details specified in R 1.1 through R1.7.
- M2.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, the results of its latest training needs analysis that identifies each entry-level or newly hired experienced System Operator's training needs as specified in R2.
- M3.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, the results of its latest training needs analysis that identifies each incumbent System Operator's mismatches between actual performance and the criteria for successful performance as specified in R3.

- M4.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, its latest annual training plan as specified in R4.
- M5.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection documentation of the qualifications of personnel who developed or delivered System Operator training to show compliance with R5.
- M6.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, its training activities for its entry-level System Operator as specified in R6.1.
- M7.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, its training records to show that it provided each of its incumbent System Operators with annual refresher training and continuing training in accordance with R 6.2 and 6.4.
- M8.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection its training records to show that it provided its incumbent System Operator with training to eliminate performance gaps in accordance with R6.3.
- M9.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, training materials used for entry-level training, refresher training, and continuing training that meet the criteria identified in R7.
- M10.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, a training record showing the current status of each of its System Operators in meeting the performance identified in R1.7 as specified in R8.
- M11.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, the results of its latest annual evaluation of its System Operator training program. (R9)
- M12.** Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, the latest versions of its System Operator training program to demonstrate that the information in the training materials was updated in accordance with R10.

## **D. Compliance**

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

#### **1.1. Compliance Monitoring Responsibility**

Regional Reliability Organization

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

One or more of the following methods shall be used to verify 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 monitoring period for all requirements is one calendar year. The performance reset period for all requirements is one calendar year.

#### **1.3. Data Retention**

The Reliability Coordinator, Balancing Authority and Transmission Operator shall each have its current, in-force documents available as evidence of compliance as specified in each of the Measures.

If an entity is found non-compliant the entity shall keep information related to the non-compliance 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. Violation Severity Levels (To be added with the next draft of the standard)**

**2.1. Level 1:**

**2.2. Level 2:**

**2.3. Level 3:**

**2.4. Level 4:**

**E. Regional Differences**

None.

**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>

# System Personnel Training Standard Drafting Team

## Task List

Updated: 10/17/06

		<i>Item</i>	<i>Assigned To</i>	<i>Due Date</i>
<b>TASK TEAM</b>	1	Develop the list of system operator reliability related tasks into a preliminary JTA tool to be posted with the next draft of the system operator training standard.	Julie Pierce (Lead), Laurel Hennebury	November 7
<b>JTA TEAM</b>	2	Develop a Job Task Analysis Guide as a reference for the System Operator Training Standard	John Smith (Lead), Rick King, Ray Gross	November 15
<b>PERFORMANCE CRITERIA TEAM</b>	3	Develop a guide for writing performance criteria to post with the next draft of the system operators training standard	Ed Seddon (Lead), Mike Sitarchyk, Cesar Seymour	November 30
<b>NEEDS ASSESSMENT TEAM</b>	4	Develop a guide for conducting a training needs assessment to post with the next draft of the system operators training standard	Geoff Elmer (Lead), Dan Ewing, Dave Folk	November 30
<b>ADDIE PROCESS TEAM</b>	5	Develop a guide for conducting a training needs assessment to post with the next draft of the system operators training standard	James Bowles (Lead), Eric, Rod Burnell, Donnie Harrell	November 30
<b>OJT TEAM</b>	6	Develop a guide for conducting valid On-the-Job Training to post with the next draft of the system operators training standard	Mike Gammon (Lead), Julie Pierce, Keith Fortenberry	November 30
<b>RESPOND TO SYSTEM OPERATOR TRAINING STANDARD COMMENTS</b>	7	Review the comments and agree on an approach to a response for each comment	SPTS DT	November 6



## **System Personnel Training Standard Drafting Team**

### **Task List**

*Updated: 10/17/06*

		<i>Item</i>	<i>Assigned To</i>	<i>Due Date</i>
<b>DRAFT RESPONSE TO COMMENTS</b>	8	Based on the approach agreed to by the SPTSDT during the November 6 meeting, draft a response to each comment.	John Taylor, Julie Pierce, James Bradley	November 20
<b>SETUP WEBEX FOR SPTSDT TO REVIEW AND FINALIZE RESPONSE TO COMMENTS</b>	9	Meet via Webex and conference call to agree on response to comments for posting	John Taylor	November 20
<b>REVISE SYSTEM OPERATOR TRAINING STANDARD FOR SECOND POSTING</b>	10	Make revisions to draft standard	SPTSDT	December 12 meeting
<b>POST REVISED SYSTEM OPERATOR TRAINING STANDARD</b>	11	Post response to comments on first draft with the second draft of the standard and all reference documents.	Craig Lawrence	December 20