![NERC - North American Electric Reliability Corporation logo]

System Personnel Training Standard Drafting Team Meeting

July 11, 2007 — 10 a.m. to 1 p.m. Eastern Daylight Time

Web Conference Agenda

Consortium conference server: 1(732)694-2061
Conference code: 1208071107

Web Ex Meeting Number: 714 440 880
Meeting password: training

1. **Administrative**

   a. Introduction of Participants

   b. Review Antitrust Guidelines (**Attachment 1**)

   c. Review Meeting Objectives:
      i) Review Performance Requirements Reference
      ii) Final Review of Draft 2 of Standard
      iii) Final Review of Response to Comments
      iv) Final Review of Comment Form
      v) Final Review of Implementation Plan

2. **Review Performance Requirements Reference** (**Attachment 2a and 2b**)

3. **Standard Version 2** (**Attachment 3**)
   Note that the yellow highlighted changes were suggested by Earl Cass from a Compliance perspective.

4. **Review Response to Comments** (**Attachment 4**)
   Note that the yellow highlighted changes were suggested by Earl Cass from a Compliance perspective.

5. **Review Comment Form** (**Attachment 5**)

6. **Review Implementation Plan** (**Attachment 6**)

7. **Discuss Next Steps**

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, Bylaws, and Rules of Procedure are followed in conducting NERC business.

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.

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.

2. Standards Drafting Team posted draft standard for comment on September 27, 2006.

3. Standards Drafting Team responded to comments and posted the revised standard on July 15, 2007.

Proposed Action Plan and Description of Current Draft:

This is the ~~first~~ second posting of the proposed standard and its associated implementation plan for a ~~30~~45-day comment period, from ~~September 26~~July 15 — ~~October 25~~ September 1, –20~~07~~6.

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.	July 15 – September 1, 2007~~March 15 – May 1, 2007~~
2. Respond to comments on the second draft of the proposed standard.	October 1, 2007~~May 15, 2007~~
3. Obtain the Standards Committee's approval to move the standards forward to balloting.	October 15, 2007~~June 1, 2007~~
4. Post the standard and implementation plan for a 30-day pre-ballot Att review.	November 1 – December 1, 2007~~June 15 – July 15, 2007~~
5. Conduct an initial ballot for ten days.	December 1 – December 11, 2007~~July 15 – 26, 2007~~
6. Respond to comments submitted with the initial ballot.	January 15, 2008~~August 15, 2007~~
7. Conduct a recirculation ballot for ten days.	January 15 – January 25, 2008~~August 15 – August 25, 2007~~
8. Post for a 30-day preview for BOT.	February 1 – March 3, 2008~~September 1 – September 30, 2007~~

Proposed Effective Date for Regulatory Approvals: ~~July 1, 2007~~**March 15, 2008**

Anticipated Actions	Anticipated Date
9. BOT adoption.	March 15, 2008~~October 15, 2007~~

DRAFT

A. Introduction

1.   **Title:**   **System Operator Training**

2.   **Number:**   PER-005-1

3.   **Purpose:**   To ensure that System Operators performing real-time, reliability-related ~~task~~ ~~tasks~~s on the North American ~~Bulk Electric System~~Bulk Electric System are competent to perform those ~~task~~reliability-related tasks~~s~~. The competency of System Operators is critical to the reliability of the North American interconnected electrical systems.

4.   **Applicability:**

   4.1. **Functional Entities:**

      4.1.1   Reliability Coordinator.

      4.1.2   Balancing Authority.

      4.1.3   Transmission Operator.

   4.2. This standard applies to all ~~S~~system ~~o~~Operator positions of the entities listed in 4.1 that have the authority and responsibility either directly or through communications with others, ~~-~~to perform independent actions that impact reliability by producing a response from the ~~interconnected electrical system~~Bulk Electric System that is real-time and concurrent with the causative action. <mark>This includes contract System Operators or System Operators performing such ~~task~~reliability-related tasks~~s~~ under delegation agreements.</mark>

5.   **Proposed Effective Date for Regulatory Approvals:** <mark>~~July 1, 2007~~March 15, 2008</mark>——

B. Requirements

R1.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall complete the five phases of a systematic approach to training (SAT); which includes analysis, design, development, implementation, and evaluation; to establish or modify a training program(s) that addresses all Bulk Electric System company-specific reliability-related tasks. [Risk Factor: Medium]

R1.   ~~The scope of the training program shall include all tasks performed by the positions identified in 4.2. above. Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall provide a training program for each position identified in Section 4 above developed by using a systematic approach to training. The systematic approach to training shall include, at a minimum, the elements in R2 through R12. [Risk Factor: Medium]~~

R2.   ~~Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct a System Operator job task analysis (JTA). [Risk Factor: Medium]~~

R3. ~~The JTA results shall include a list of tasks assigned to each System Operator position and at a minimum the following information for each of those tasks:~~

R4. ~~The conditions under which the task is performed.~~

R5. ~~The actions to be taken in performing the task, including identification of steps, references and tools used in performing the task.~~

R6. ~~The knowledge, and skill needed to perform the task.~~

R7. ~~The measurable or observable criteria for successful performance of the task.~~

R8. ~~The JTA for each position shall be updated to ensure accuracy. At a minimum the JTA shall be updated when changes occur to tasks, tools, or procedures.~~

~~**R9.**~~ ~~When new positions are created a JTA will be required for that position.~~

~~**R10.**~~ ~~Each Reliability Coordinator, Balancing Authority and Transmission Operator shall assess the training needs of personnel new to a position or reassigned to a position, as part of the process of developing the training plan in R6 (Design and Development of training). This must include verification of both knowledge and performance capability required for the job [Risk Factor: Medium]~~

~~R4.~~R2. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall at least annually assess the training needs of each position for the upcoming year ~~of each position~~ to determine the mis-match between the acceptable and actual performance. ~~covered by this standard as part of the process of developing the training plan in R6. This must include verification of both knowledge and performance capability required for the positions.~~ [Risk Factor: Medium]

~~•Each Reliability Coordinator, Balancing Authority and Transmission Operator shall design and develop a training program with content derived from the results of R2 (Job Task Analysis), R3 and R4 (Needs Assessments). [Risk Factor: Medium]~~

~~•Each responsible entity shall have an annual training plan for each position that identifies the topics, target audience, anticipated duration of the topic, and target schedule for the following types of training: [Risk Factor: Low]~~

~~R6.1.Training for system operators new to a position or reassigned to a position, as identified in R3.~~

~~M1.1.Training for each position covered by this standard, as identified in R4.~~

~~**C.**~~ ~~Each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify that training is developed and delivered by persons within these organizations that have successfully completed a minimum of 40 hours of instruction in using a systematic approach to training from a NERC Continuing Education Program Approved Provider or through a recognized training body who both shall follow the criteria listed in Appendix B. [Risk Factor: Medium]~~

~~a.The initial or pilot presentation of training delivered by a subject matter expert shall be conducted under the supervision of persons who have successfully completed the requirements of R7.~~

~~R7.2Subject matter experts developing training shall do so under the supervision of persons who have successfully completed the requirements of R7.~~

~~R8.Each Reliability Coordinator, Balancing Authority and Transmission Operator shall implement its system operator training program by providing training identified in R4(needs assessments) and R6(annual training plan). [Risk Factor: Medium]~~

~~R9.~~R3. Each Reliability Coordinator, Balancing Authority and Transmission Operator~~responsible~~ entity shall annually provide each ~~system~~ applicable System ~~o~~Operator ~~covered by this standard~~ with at least 32 hours of emergency operations or system restoration training, which may include training in principals and procedures needed for effectively recognizing and responding to emergencies and ~~on an annual basis, using realistic~~ drills~~,~~, exercises, ~~and~~/or simulations ~~simulating~~ of ~~the~~ system conditions, operating procedures, and communication processes in one or more of the subject areas listed in Appendix A, Emergency Operations Topics. [Risk Factor: Medium]

R4. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall assess the capabilities of each real-time System Operator to perform each assigned task that is on its list of company-specific reliability-related tasks. [Risk Factor: Medium]

R10.Each Reliability Coordinator shall [Risk Factor: Medium]

R10.1.Conduct a restoration plan training exercise annually in coordination with other entities that would be impacted by a wide area blackout within the Reliability Coordinator area.

R10.2.Include training focused on operator familiarization of the Reliability Coordinator area in the training program.

R10.3.Include training focused on operator interactions with neighboring Reliability Coordinator Areas in the training program.

R10.4.Include training focused on achieving 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 in the training program.

R10.5.Include training focused on the definition and location of SOLs and IROLs and inter-tie facility limits of the Reliability Coordinator area in the training program.

R11.Each Reliability Coordinator, Balancing Authority and Transmission Operator shall retain or have retained, documentation of compliance with each requirement of this standard including: [Risk Factor: Lower]

R11.1.Job task analysis for each position as required in R2.

R11.2.Training needs assessment as required in R4 and R5.

R11.3.Training plan for each position, and system operators new to a position or reassigned to a position as required in R6.

R11.4.Course title, description or outline, objectives, learning assessment results, attendee name, completion date, and course evaluation results.

R12.Each Reliability Coordinator, Balancing Authority and Transmission Operator shall conduct an evaluation at least annually of its System Operator training program to determine if the training prepares System Operators to meet the criteria for successful performance as identified in R2.1.4. This program evaluation shall be used to update the program to meet identified deficiencies, giving consideration to the following information sources: [Risk Factor: Lower]

R7. Feedback from trainees to identify areas where the training should be clarified or modified.

R8. Feedback from instructors.

R9. Results of learning assessments.

R10. Audit results.

R11. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall maintain its System Operator training program so that the training materials provided to trainees accurately reflects the current operating environment. [Risk Factor: Lower]

C. Measures

M1. **M1.** Each Reliability Authority, Balancing Authority and Transmission Operator shall have available for inspection, evidence of a SAT--developed training program for each of the

positions identified as meeting the applicability of this standard with evidence of the following SAT-related outcomes:.

M1.1.   ~~M2.   Analysis Each Reliability Authority, Balancing Authority and Transmission Operator shall have~~that results in a list of company-specific reliability-related tasks and measurable or observable criteria for desired performance for each task ~~available for inspection, the results of the current Job Task Analysis~~

M1.2.   Design and develop training that results in learning objectives and content that is derived from results of training analysis and training needs assessment

M1.3.   Implementation of the training program, as identified in a training needs assessment

M1.4.   Evaluations and assessments of training delivered to determine if learning objectives are met

~~as specified in R2.~~

~~M3.   M3.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, the results of its latest training needs assessment for personnel new to a position or reassigned to a position as specified in R3.~~

M2.   ~~M4.~~ Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection~~,~~ the results of its latest ~~latest training needs~~ assessment for each position ~~covered by this standard,~~ as specified in R2~~4~~.

~~M5.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, documentation showing its training program was developed as specified in R5.~~

~~M6.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, its training plan as specified in R6.~~

~~M7.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection documentation of the qualifications of personnel who develop or deliver System Operator training in accordance with R7.~~

~~M8.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, its training records to show that it implemented the training programs as planned in accordance with R6.~~

M3.   ~~M9.   E~~Each Reliability Coordinator, Balancing Authority and Transmission Operator shall ~~have available for inspection~~provide evidence ~~its training records to show~~ that each ~~S~~system ~~o~~Operator ~~covered by this standard~~ has obtained 32 hours of ~~annual~~ emergency operations ~~training~~or system restoration training, as specified in ~~in accordance with~~ R9~~3~~.

M4.   Each Reliability Authority, Balancing Authority and Transmission Operator shall have available for inspection assessments for each real-time System Operator, as specified in R4.

~~E.   M10.   **Each Reliability Coordinator shall have available for inspection, training records indicating a training exercise was conducted as per R10.1 and that each Reliability Coordinator training program includes training as per R10.2 through R10.5.**~~

F. ~~M11.~~ ~~Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection, the training records and documentation to meet the requirements per R11.~~

G. ~~M12.~~ ~~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 in accordance with R12.~~

H. ~~M13.~~ ~~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 R13.~~

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**

   ~~TT~~The Reliability Coordinator, Balancing Authority and Transmission Operator shall each ~~have i~~retain ~~ts current, in-force documents~~ available as evidence of compliance~~.~~ as specified in each of the Measures, for three years.~~.~~

   ~~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 or 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

2.1. Level 1:———

    2.1.1   SAT -dDeveloped Ttraining pPrograms for identified positions.

        2.1.1.1 The entity has an SAT-developed training program that includes 75% through 99% of the company-specific reliability-related tasks.

    2.1.2   Training Needs Assessment

        2.1.2.1 The entity conducted a training needs assessment for 75% through 99% of the applicable positions.

    2.1.3   Emergency Operations Training

        2.1.3.1 Up to10% of System Operators in identified positions did not receive sufficient training hours.

    2.1.4   System Operator Capability Assessment

        2.1.4.1 The entity has assessed the capability of at least 75% of the entities real-time System Operators and each assessment included at least 75% of each System Operator's assigned reliability-related tasks.Less than 100 % of positions have been identified or program in place for > 75% of the positions but < 100%

    2.1.2 Job Task Analysis

        2.1.2.1JTA for fewer than 100 % of positions or more than 25% of the JTAs do not address elements identified in R2.1 and 2.2

    2.1.3 Training Needs Assessment for new or reassigned personnel to identified positions

        2.1.3.1 Needs assessments for ≥ 75% but < 100% of tasks, or does not address knowledge and performance capabilities for ≥75% but < 100% of personnel new to a position or reassigned to a position

    2.1.4 Training Needs assessment for each position.

        2.1.4.1 Needs assessments for ≥ 75% but < 100% of tasks, or does not address knowledge and performance capabilities for ≥75% but < 100% of each position.

    2.1.5 Training Program

        2.1.5.1 Training program does not include up to 10% of identified content from JTA and needs assessment for each position

    2.1.6 Training Plan

        2.1.6.1 Training plan includes only three of the required items in R6 for each position

    2.1.7 Trainer Qualifications

        2.1.7.1 Trainer has < 40 hours of instruction in SAT

    2.1.8 Annual Training Program Implementation

        2.1.8.1 This severity level is not applicable for this requirement

    2.1.932 Hours of EOP training

         2.1.9.1 Up to10% of system operators in identified positions did not receive sufficient hours

       2.1.10 Reliability Coordinator

         2.1.10.1 1 element in R10.2 – R10.5 was not completed or R10.1 was not conducted

       2.1.11 Documentation

         2.1.11.1 Documentation does not include one of the required elements in R11

       2.1.12 Evaluation of Training

         2.1.12.1 Program evaluation is current but incomplete

       2.1.13 Maintain Programs

         2.1.13.1 > 0 < 10% of training content last provided was not reviewed or updated before being used

2.2.   **Level 2:**—

       2.2.1   SAT-Developed Training Programs SAT developed training programs for identified positions.

         2.2.1.1 The entity has a SAT-developed training program that includes 50% through 74% of the company-specific reliability-related tasks.

       2.2.2   Training Needs Assessment

         2.2.2.1 The entity conducted a training needs assessment for 50% to 74% of the applicable positions.

       2.2.3   Emergency Operations Training

         2.2.3.1 At least 20% of System Operators in identified positions did not receive sufficient training hours

       2.2.4   System Operator Capability Assessment

         2.2.4.1 The entity has assessed the capability of at least 50% (but less than 75%) of the entities real-time System Operators and assessment included at least 50% each System Operator's assigned reliability-related tasks.

         2.2.1.1 < 75 % of positions have been identified or program in place ≥ 50% of the positions but < 75%

       2.2.2 Job Task Analysis

         2.2.2.1JTA for < 75 % of positions or more than 50% of the JTAs do not address elements identified in R2.1 and 2.2

       2.2.3 Training Needs Assessment for new or reassigned personnel to identified positions

         2.2.3.1 Needs assessments for ≥50 % but < 75% of tasks, or does not address knowledge and performance capabilities for ≥50 %but < 75% of personnel new to a position or reassigned to a position

       2.2.4 Training Needs assessment for each position.

2.2.4.1 Needs assessments for ≥ 50% but < 75% of tasks, or does not address knowledge and performance capabilities for ≥50 %but < 75% of each position.

2.2.5 Training Program

2.2.5.1 Training program does not include up to 30% of identified content from JTA and needs assessment for each position

2.2.6 Training Plan

2.2.6.1 Training plan includes only two of the required items in R6 for each position

2.2.7 Trainer Qualifications

2.2.7.1 Trainer has less than 30 hours of instruction in SAT Annual

2.2.8 Training Program Implementation

2.2.8.1 Training program was implemented but not based on both needs assessments and the annual training plan

2.2.9 32 Hours of EOP training

2.2.9.1 At least 20% of system operators in identified positions did not receive sufficient hours

2.2.10 Reliability Coordinator

2.2.10.1 Two elements in R10.2 — R10.5 were not completed or R10.1 was not conducted

2.2.11 Documentation

2.2.11.1 Documentation does not include two of the required elements in R11

2.2.12 Evaluation of Training

2.2.12.1 Program evaluation exists but is older than a year but less than two years old

2.2.13 Maintain Programs

2.2.13.1 More than 10% but <15% of training content last provided was not reviewed or updated before being used

2.3.   **Level 3:**

2.3.1   SAT-Developed Training Programs

2.3.1.1 The entity has a SAT-developed training program that includes 25% through 49% of the company-specific reliability-related tasks

2.3.2   Training Needs Assessment

2.3.2.1 The entity conducted a training needs assessment for 25% to 49% of the applicable positions.

2.3.3   Emergency Operations Training

2.3.3.1 At least 30% of System Operators in identified positions did not receive sufficient training hours.

2.3.4   System Operator Capability Assessment

       2.3.4.1   The entity has assessed the capability of at least 25% (but less than 50%) of the entities real-time System Operators and each assessment included at least 25% each System Operator's assigned reliability-related tasks

2.3.1 SAT developed training programs for identified positions.

2.3.2   Less than 50 % of positions have been identified or program in place for ≥ 25% of positions but < 50%

2.3.3 Job Task Analysis

       2.3.3.1 JTA for fewer than 50 % of positions or more than 75% of the JTAs do not address elements identified in R2.1 and 2.2

2.3.4 Training Needs Assessment for new or reassigned personnel to identified positions

       2.3.4.1 Needs assessments for ≥ 25% but < 50% of tasks, or does not address knowledge and performance capabilities for > 75% of personnel new to a position or reassigned to a position

2.3.5 Training Needs assessment for each position.

       2.3.5.1 Needs assessments for ≥ 25% but < 50% of tasks, or does not address knowledge and performance capabilities for ≥ 75% of each position.

2.3.6 Training Program

       2.3.6.1 Training program does not include up to 50% of identified content from JTA and needs assessment for each position

2.3.7 Training Plan

       2.3.7.1 Training plan includes only one of the required items in R6 for each position

2.3.8 Trainer Qualifications

       2.3.8.1 Trainer has less than 20 hours of instruction in SAT

2.3.9 Training Program Implementation

       2.3.9.1 Training program was implemented but was not based on either needs assessments or the annual training plan

2.3.10 32 Hours of EOP training

       2.3.10.1 At least 30% of system operators in identified positions did not receive sufficient hours

2.3.11 Reliability Coordinator

       2.3.11.1 3 of the elements in R10.2 – R10.5 were not included in the training program or R10.1 was not conducted

2.3.12 Documentation

       2.3.12.1 Documentation does not include three of the required elements in R11

2.3.13 Evaluation of Training

       2.3.13.1 Program evaluation exists but is older than two years but less than three years old

2.3.14 Maintain Programs

    2.3.14.1 More than 15% but ≤ 20% of training content last provided was not reviewed or updated before being used

2.4. Level 4:

2.4.1   SAT-Developed Training Programs

    2.4.1.1 The entity has a SAT-developed training program that includes the reliability-related tasks for less than 25% of the company-specific reliability-related tasks.

2.4.2   Training Needs Assessment

    2.4.2.1 The entity conducted a training needs assessment for less than 25% of the applicable positions.

2.4.3   Emergency Operations Training

    2.4.3.1 40% or more of system operators in identified positions did not receive sufficient training hours.

2.4.4   System Operator Capability Assessment

    2.4.4.1 The entity has assessed the capability less than 25% of the entities real-time System Operators and each assessment included less than 25% of each System Operator's assigned reliability-related tasks.

2.4.1   SAT developed training programs for identified positions.

    2.4.1.1 No positions identified and No program(s) in place

2.4.2 Job Task Analysis

    2.4.2.1 No JTA for any current positions

2.4.3 Training Needs Assessment for new or reassigned personnel to identified positions

    2.4.3.1 No needs assessment for any positions

2.4.4 Training Needs assessment for each position.

    2.4.4.1 No needs assessment for any positions

2.4.5 Training Program

    2.4.5.1 Training program does not include up to 70% of identified content from JTA and needs assessment for each position

2.4.6 Training Plan

    2.4.6.1 No Training plan for any of the identified groups

2.4.7 Trainer Qualifications

    2.4.7.1 Training was developed or delivered by a trainer that has no instruction in SAT, or training was developed or delivered by a subject matter expert without the supervision of a trainer qualified as specified in R7

2.4.8 Training Program Implementation

    2.4.8.1 No training program was implemented

    2.4.9~~32 Hours of EOP training~~

        2.4.9.1~~40% or more of system operators in identified positions did not receive sufficient hours~~

    2.4.10~~Reliability Coordinator~~

        2.4.10.1~~No elements of R10.2 — 10.5 were completed or R10.1 was not conducted~~

    2.4.11~~Documentation~~

        2.4.11.1~~Documentation does not include any of the required elements in R11~~

    2.4.12~~Evaluation of Training~~

        2.4.12.1~~No program evaluation, or program evaluation is older than three years~~

    2.4.13~~Maintain Programs~~

        2.4.13.1~~No evidence of training being maintained, or more than 20% of training content last provided was not reviewed or updated before being used~~

E. Regional Differences

None.

Version History

Version	Date	Action	Change Tracking

Appendix A: Emergency Operations Topics

These topics are identified as meeting the topic criteria for Emergency Operations training per Rrequirement 9 3 of this standard..

A. Recognition and Response to System Emergencies

1. Emergency drills and responses
2. Communication tools, protocols, coordination
3. Operating from backup control centers
4. System operations during unstudied situations
5. System Protection
6. Geomagnetic disturbances weather impacts on system operations
7. System Monitoring – voltage, equipment loading
8. Real-time contingency analysis
9. Offline system analysis tools
10. Monitoring backup plans
11. Sabotage, physical, and cyber threats and responses

B. Operating Policies Related to Emergency Operations

1. NERC standards that identify emergency operations practices (e.g. EOP Standards)
2. Regional reliability operating policies
3. Sub-regional policies and procedures
4. ISO/RTO policies and procedures

C. Power System Restoration Philosophy and Practices

1. Black start
2. Interconnection of islands – building islands
3. Load shedding – automatic (under-frequency and under-voltage) and manual
4. Load restoration philosophies

D. Interconnected Power System Operations

1. Operations coordination
2. Special protections systems
3. Special operating guides
4. Voltage and reactive control, including responding to eminent voltage collapse
5. Understanding the concepts of Interconnection Reliability Operating Limits versus System Operating Limits
6. DC tie operations and procedures during system emergencies
7. Thermal and dynamic limits
8. Unscheduled flow mitigation − congestion management
9. Local and regional line loading procedures
10. Radial load and generation operations and procedures
11. Tie line operations
12. E-tagging and Interchange Scheduling
13. Generating unit operating characteristics and limits, especially regarding reactive capabilities and the relationship between real and reactive output

E. Technologies and Tools

1. Forecasting tools
2. Power system study tools
3. Interchange Distribution Calculator (IDC)

F. Market Operations as They Relate to Emergency Operations
       1. Market rules
       2. Locational Marginal Pricing (LMP)
       3. Transmission rights
       4. OASIS
       5. Tariffs
       6. Fuel management
       7. Real-time, hour-ahead and day-ahead tools

Appendix B: Systematic Approach to Training Instructor Training Program Criteria

This document is based on *Guidelines for Instructor Training and Qualifications* published by the National Academy for Nuclear Training. This appendix serves as a guide to identify what the instructors of organizations should be competent in for training development and delivery. Programs that can be counted towards requirement 7 of this standard should contain content as identified in this appendix.

Discussion

Each training organization should analyze its training-related work activities to ensure that tasks and associated knowledge and skill requirements are identified and included in instructor training programs. Qualification requirements should be established for all company and contract personnel who perform training activities. All contract instructors, short and long-term, must meet the qualification requirements for the subjects they teach.

Subject-matter experts (SMEs) should receive sufficient coaching and monitoring from qualified instructors to enable them to effectively conduct the training activity. This coaching can be provided separate from the instructor training program. Entities should consider training SMEs on applicable portions of the instructor training program if they are expected to instruct classes on a routine basis.

Technical Competence

Training personnel who perform as SMEs in the development, presentation, or evaluation of technical instruction must possess technical qualifications consistent with their assignments. Technical qualifications of SMEs include theoretical and practical knowledge and practical work experience at or above the level that is required of the trainees.

Interpersonal Skills Qualification

The ability to develop and provide effective technical training is effected by the interpersonal skills of training personnel. Communication skills and a positive demeanor are among the interpersonal skills that impact instructional effectiveness. Competent instructors possess strong communication skills and can present varying perspectives of instruction to address different learning styles. The abilities to organize and present information both orally and symbolically are crucial to ensure that the information is received as intended. Other skills include the ability to listen and respond to questions, to phrase questions that stimulate student involvement and learning, and to deal effectively with conflict.

Instructor Training - Discussion

Initial instructor training is designed to ensure that instructors possess the technical competence and instructional skills necessary to conduct quality training. Instructor initial training prepares individuals to perform training system development activities and training-related tasks. Course content prepares instructors for important and difficult tasks in various training settings. To ensure that instructor trainees have mastered learning objectives, performance in the appropriate training setting(s) is evaluated.

Instructor Training - Orientation

Orientation training provides the instructor trainee with a background of the training environment in the electric power industry. Recommended content for an orientation module includes the following:

- fundamentals of performance-based training and the systematic approach to training

- corporate and industry training policies and procedures related to training

- facilities, equipment, and services that support training

- the ethical and integrity issues of training

Instructor Training - Instructional Skills

Instructional skills initial training provides the instructor with the necessary knowledge and skills to implement training efficiently and effectively in various training settings. To accomplish this objective, it is essential that training be provided to personnel who perform important and difficult training tasks, regardless of their job titles. Instructor trainees who will perform training development activities, such as analysis, design, development, and evaluation, are trained on the respective areas. Temporary instructors receive training to support the instructional roles they fulfill. Recommended content for instructional skills training includes the following:

- job and needs analysis

- instructional design

- developing and sequencing learning objectives

- planning and developing an instructional unit

- instructor guides / lesson plans

- instructional methods

- selecting, developing, and modifying instructional materials and media

- using operating experience

- the role of the instructor

- instructional principles

- presenting classroom instruction

- evaluating trainees

- questioning techniques

- on-the-job training

- individualized instruction (self-study)

- developing test items, written tests, and oral tests for learning assessments

- maintaining and using trainee and program records

- trainee stress

- training evaluations

- adult learning principles

Instructor Training - Program Content

Job and Needs Analysis

Competence in this area enables the instructor trainee to perform analyses to identify training requirements.

Instructional Design

Competence in this area enables the instructor trainee to identify & use the following:

- training needs
- job and task analysis results
- correctly sequence learning objectives

Learning Objectives

Competence in this area enables the instructor trainee to develop and sequence learning objectives for effective training. Topics include:

- types of learning objectives
- basic components of learning objectives
- organization and sequencing learning objectives
- hierarchy of learning

Instructional Units

Competence in this area enables the instructor trainee to perform the following in the developing instruction:

- planning a unit of instruction
- selecting proper subject matter content
- selecting learning objectives for a unit of instruction

Instructor Guides / Lesson Plans

Competence in this area enables the instructor trainee to develop and use instructor guides / lesson plans correctly. Topics include:

- purposes
- types
- basic components
- planning
- preparation
- use

Instructional Methods

Competence in this area enables the instructor trainee to select and use an appropriate method of instruction for a given situation. Topics include:

- lectures

- discussions

- practical discussions

- facilitation

- tutoring

- creative instructional techniques to promote trainee involvement

- field activities

Instructional Materials and Media

Competence in this area enables the instructor trainee to identify, develop, and modify instructional materials appropriate for use in specific instructional situations. Topics include:

- need for and purpose of instructional materials

- types of instructional materials and media

- selection of appropriate instructional materials and media

- correct use of instructional materials and media

- characteristics of effective instructional materials and media

Operating Experience

Competence in this area enables the instructor trainee to identify sources of operating experience and integrate the experience into the training. Topics include:

- purpose and benefits of using operating experience

- sources of operating experience

- screening operating experience for training significance

- incorporating operating experience into training

- ways to effectively present operating experience information

Role of the Instructor

Competence in this area enables the instructor trainee to identify attributes of a good instructor and define the expected role in training. Topics include:

- the competent instructor

- desire to teach / instruct

- instructor / trainee relationships

instructor's role in the total training effort

Instructional Principals

Competence in this area enables the instructor trainee to identify the following:

 how trainees learn

 factors that affect learning

 different approaches to learning

 instructional techniques to support learning styles

Classroom Instruction

Competence in this area enables the instructor trainee to demonstrate correct practice in the following areas:

 communication techniques

 pacing of instruction

 response to trainees

 control of the class

 physical setting and arrangement of the classroom

 techniques to optimize learning

Trainee Evaluation

Competence in this area enables the instructor trainee to evaluate trainees and training effectiveness. Topics include:

 purpose of trainee evaluation

 methods of trainee evaluation

 methods to measure trainee and training effectiveness

Questioning Techniques

Competence in this area enables the instructor trainee to identify apply good questioning techniques. Topics include:

 purposes of questioning

 benefits of questioning

 types and levels of questions

 how and when to ask questions

 interpretation of trainee responses

 summarization of responses to reinforce correct answer

 regaining control of the class to continue training

On-the-job Training (OJT)

Competence in this area enables the instructor trainee to plan, conduct, and evaluate on-the-job training activities. Topics include:

 description of OJT

 working with management

 advantages and disadvantages of OJT

 planning, conduct and monitoring OJT

 planning and conducting task performance evaluation (TPE)

(evaluation of OJT)

 differentiation of OJT and TPE

 creation and maintenance of records

Individualized Instruction (Self-Study)

Competence in this area enables the instructor trainee to demonstrate an understanding of developing and managing individualized instruction (self-study). Topics include:

 principles of individualized instruction

 types of individualized instruction method

 role of the instructor

 evaluation of individualized instruction

(prepare and conduct learning assessments for individualized instruction)

Tests and Test Items (Learning Assessments)

Competence in this area enables the instructor trainee to develop, administer, and grade performance based learning assessments. Topics include:

 purpose of testing / learning assessments

 types of measuring instruments

 bases of the test / learning assessment

 relationship of test items to learning objectives

 types and use of test items

 planning of the test / learning assessment

 construction of test items and the test / learning assessment

 administration of the test / learning assessment

Trainee and Program Records

Competence in this area enables the instructor trainee to identify necessary trainee and program records and maintain those records as required by company and industry policies and procedures. Topics include:

  creation of records

  types of records to be maintained

  maintenance of records

  use of records

  analysis of records as part of training program evaluation

Trainee Stress

Competence in this area enables the instructor trainee to identify the common signs of trainee stress and implement the appropriate action. Topics include:

  social/behavior problems

  symptoms of stress

  dealing with stress problems

  legal implications caused by instructors involvement or noninvolvement

Training Evaluations

Competence in this area enables the instructor trainee to perform the following evaluation activities to identify area for improvement of training:

  monitoring of personnel performance

  review of post-training evaluations

  analysis of learning assessment results to determine revisions necessary in training materials, instruction, or learning assessments

  evaluation of trainee feedback

  evaluation of management feedback

  evaluation of personnel performance for additional training needs

Adult Learning Principles

Competence in this area enables the instructor trainee to understand and apply adult learning principles to the training environment. Topics include:

  characteristics of adult learners

  relationship between instructor and adult trainees

  adult methods of learning

  methods of instructing adults

  establishing adult learning climates

Reference:

National Academy for Nuclear Training, (1998), *Guidelines for Instructor Training and Qualification*, (ACAD 97-014).

PER-005- Reference Documents

~~Disclaimer:~~

~~The following documents are to be considered references as described in the NERC Reliability Standards Development Procedure for the NERC Standard PER_005. A Reference Document as defined by the Reliability Standards Development Procedure is a document developed to support a given NERC Standard.~~ The list of hyperlinks below identifies references for the NERC Standard PER-005. The references ~~se documents are provided to explain~~ are intended to assist with the application of a systematic approach to training. ~~or facilitate implementation of the System Operator Training Standard but do not contain mandatory requirements subject to compliance review. As such the information is to be considered ways to implement the PER_005 standard, but not the only ways.~~

_____

~~Six reference documents are provided to assist with the application of a systematic approach to training. The initial reference covers an explanation of the systematic approach to training. Additional references go into more detail about a phase of the systematic approach, or the use of a tool that facilitates training. For ease of navigating, each reference is listed with a link to the complete document. Each reference also contains links to other references.~~

A Systematic Approach to Training References:

(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

~~(add link to document)~~

~~Job Task Analysis (add link to document)~~

Training Needs Assessment (4) DOE Standard - Table-Top Needs Analysis
DOE-HDBK-1103-96
http://hss.energy.gov/NuclearSafety/techstds/standard/hdbk1103/hdbk1103.pdf

(add link to document)

On-The-Job-Training (add link to document)

Task Identification Workbook (add link to document)

Performance Criteria References:

National Contract Management Association, World Congress 2005, "Prime time: contract Management at the Core of the Enterprise";
http://www.ncmahq.org/presentations/wc05/Service_Contracting/804_Cameron.ppt

U.S. Office of Personnel Management, "Developing Performance Standards";
http://www.opm.gov/perform/articles/118.asp

U.S. Office of Personnel Management, "What to Avoid When Writing Standards";
http://www.opm.gov/perform/articles/122.asp

U.S. Department of Energy, "Writing Performance Elements and Tasks;
http://humancapital.doe.gov/pms/trngelem.pdf

(add link to document)
Idaho Division of Human Resources;
www.dhr.idaho.gov/Training/performanceManagement/Setting.htm

Defining Performance Standards;
http://www.indiana.edu/~uhrs/training/performance_management/define.htm

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 Authorization Committee on June 21, 2006.

2. Standards Drafting Team posted draft standard for comment on September 27, 2006.

3. Standards Drafting Team responded to comments and posted the revised standard on July 15, 2007.

Proposed Action Plan and Description of Current Draft:

This is the ~~first~~ second posting of the proposed standard and its associated implementation plan for a 30-day comment period, from ~~September 27- October 26, 2006~~July 15 to September 1, 2007.

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.	July 15 – September 1, 2007~~November 15- December 29, 2006~~
2. Respond to comments on the second draft of the proposed standard.	October 1, 2007~~January 15, 2007~~
3. Obtain the Standards Committee's approval to move the standard forward to balloting.	October 15, 2007~~January 15, 2007~~
4. Post the standard and implementation plan for a 30-day pre-ballot review.	November 1 – December 1, 2007~~February 1- March 2, 2007~~
5. Conduct an initial ballot for ten days.	December 1 – December 11, 2007~~March 5- 16, 2007~~
6. Respond to comments submitted with the initial ballot.	January 15, 2008~~March 23, 2007~~
7. Conduct a recirculation ballot for ten days.	January 15 – January 25, 2008~~March - April 4, 2007~~
8. Post for a 30-day preview for board.	February 1 – March 3, 2008~~April 1- 30, 2007~~
9. BOT adoption.	March 15, 2008~~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 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.

      4.2.   This standard applies to all System Operator positions of the entities listed in 4.1 that have the authority and responsibility either directly or through communications with others, to perform independent actions that impact reliability by producing a response from the Bulk Electric System that is real-time and concurrent with the causative action. This includes contract System Operators or System Operators performing such reliability-related tasks under delegation agreements.

5.   **Proposed Effective Date for Regulatory Approvals:** ~~July 1, 2007~~March 15, 2008

B. Requirements

R1.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall complete the five phases of a systematic approach to training (SAT); which includes analysis, design, development, implementation, and evaluation; to establish or modify a training program(s) that addresses all Bulk Electric System company-specific reliability-related tasks. [Risk Factor: Medium]

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 at least annually 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 of each System Operator position for the upcoming year to determine the mis-match between acceptable and actual performance. [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.

R3. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall verify that persons developing or delivering training have the following qualifications: [Risk Factor: High]

    R3.1. Training development:

        R3.1.1. Operating knowledge in the subject matter covered by the training activity.

        R3.1.2. Competency in developing training using a systematic approach.

    R3.2. Training delivery:

        R3.2.1. Competency in training delivery.

R4. 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]

    R4.1. 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.

    R4.2. 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.

    R4.3. Refresher training to eliminate performance gaps identified by the training needs assessments in Requirement 2, and Requirement 3.

    R4.4. Continuing training to acquire the knowledge and skills necessary for new or modified tasks and tools identified in R2. and R3.

    R4.5. 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:~~

R3. Each Reliability Coordinator, Balancing Authority and Transmission Operator entity shall annually provide each applicable System Operator with ~~A~~at least 32 hours of emergency operations or system restoration training, which may include training in principals and procedures needed for effectively recognizing and responding to emergencies and drills, exercises, or simulations of system conditions, operating procedures, and communication processes in one or more of the subject areas listed in Appendix A, Emergency Operations Topics. [Risk Factor: Medium]

R4. Each Reliability Coordinator, Balancing Authority and Transmission Operator shall assess the capabilities of each real-time System Operator to perform each assigned task that is on its list of company-specific reliability-related tasks. [Risk Factor: Medium]~~, simulating the system conditions, operating procedures and communication processes.~~

> ~~**R4.5.1.** 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]~~

~~**R5.** 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 evidence of a SAT-developed training program for each of the positions identified as meeting the applicability of this standard with evidence of the following SAT-related outcomes:

M1.1.   Analysis that results in a list of company-specific reliability-related tasks and measurable or observable criteria for desired performance for each task

M1.2.   Design and develop training that results in learning objectives and content that is derived from results of training analysis and training needs assessment

M1.3.   Implementation of the training program, as identified in a training needs assessment

M1.4.   Evaluations and assessments of training delivered to determine if learning objectives are met

M2.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall have available for inspection the results of its latest assessment for each position, as specified in R2.

M3.   Each Reliability Coordinator, Balancing Authority and Transmission Operator shall provide evidence that each System Operator has obtained 32 hours of emergency operations or system restoration training, as specified in R3.

M4.   Each Reliability Authority, Balancing Authority and Transmission Operator shall have available for inspection assessments for each real-time System Operator, as specified in R4.

~~**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 R6.2. 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 OrganizationCompliance Enforcement Authority

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

1.3. Data Retention

For Measure 1, each Reliability Coordinator, Balancing Authority and Transmission Operator shall have its current SAT developed training program available for review at all times.

For Measure 2, each Reliability Coordinator, Balancing Authority and Transmission Operator shall have its latest assessment for each position available for review at all times.

For Measure 3, each Reliability Coordinator, Balancing Authority and Transmission Operator shall retain records of training, as specified in R3, for three years.

For Measure 4, each Reliability Coordinator, Balancing Authority and Transmission Operator shall have its latest assessment for each operator available for review at all times.

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:**

    2.1.1   SAT-Developed Training Program

        2.1.1.1 The entity has an SAT-developed training program that includes 75% through 99% of the company-specific reliability-related tasks.

    2.1.2   Training Needs Assessment

        2.1.2.1 The entity conducted a training needs assessment for 75% through 99% of the applicable positions.

    2.1.3   Emergency Operations Training

        2.1.3.1 Up to10% of System Operators in identified positions did not receive sufficient training hours.

    2.1.4   System Operator Capability Assessment

        2.1.4.1 The entity has assessed the capability of at least 75% of the entities real-time System Operators and each assessment included at least 75% of each System Operator's assigned reliability-related tasks.

2.2. **Level 2:**

2.2.1 SAT-Developed Training Programs

2.2.1.1 The entity has a SAT-developed training program that includes 50% through 74% of the company-specific reliability-related tasks.

2.2.2 Training Needs Assessment

2.2.2.1 The entity conducted a training needs assessment for 50% to 74% of the applicable positions.

2.2.3 Emergency Operations Training

2.2.3.1 At least 20% of System Operators in identified positions did not receive sufficient training hours.

2.2.4 System Operator Capability Assessment

2.2.4.1 The entity has assessed the capability of at least 50% (but less than 75%) of the entities real-time System Operators and assessment included at least 50% each System Operator's assigned reliability-related tasks.——

2.3. Level 3:

2.3.1 SAT-Developed Training Programs

2.3.1.1 The entity has a SAT-developed training program that includes 25% through 49% of the company-specific reliability-related tasks.

2.3.2 Training Needs Assessment

2.3.2.1 The entity conducted a training needs assessment for 25% to 49% of the applicable positions.

2.3.3 Emergency Operations Training

2.3.3.1 At least 30% of System Operators in identified positions did not receive sufficient training hours.

2.3.4 System Operator Capability Assessment

2.3.4.1 The entity has assessed the capability of at least 25% (but less than 50%) of the entities real-time System Operators and each assessment included at least 25% each System Operator's assigned reliability-related tasks.———

2.4. Level 4:

2.4.1 SAT-Developed Training Programs

2.4.1.1 The entity has a SAT-developed training program that includes the reliability-related tasks for less than 25% of the company-specific reliability-related tasks.

2.4.2 Training Needs Assessment

2.4.2.1 The entity conducted a training needs assessment for less than 25% of the applicable positions.

2.4.3 Emergency Operations Training

2.4.3.1 40% or more of system operators in identified positions did not receive sufficient training hours.

2.4.4 System Operator Capability Assessment

> > **2.4.4.1** The entity has assessed the capability less than 25% of the entities real-time System Operators and each assessment included less than 25% of each System Operator's assigned reliability-related tasks.

E. Regional Differences

None.

Version History

Version	Date	Action	Change Tracking

Appendix A: Emergency Operations Topics

These topics are identified as meeting the topic criteria for Emergency Operations training per Requirement 3 of this standard.

A. Recognition and Response to System Emergencies
    1. Emergency drills and responses
    2. Communication tools, protocols, coordination
    3. Operating from backup control centers
    4. System operations during unstudied situations
    5. System Protection
    6. Geomagnetic disturbances weather impacts on system operations
    7. System Monitoring – voltage, equipment loading
    8. Real-time contingency analysis
    9. Offline system analysis tools
    10. Monitoring backup plans
    11. Sabotage, physical, and cyber threats and responses

B. Operating Policies Related to Emergency Operations
    1. NERC standards that identify emergency operations practices (e.g. EOP Standards)
    2. Regional reliability operating policies
    3. Sub-regional policies and procedures
    4. ISO/RTO policies and procedures

C. Power System Restoration Philosophy and Practices
    1. Black start
    2. Interconnection of islands – building islands
    3. Load shedding – automatic (under-frequency and under-voltage) and manual
    4. Load restoration philosophies

D. Interconnected Power System Operations
    1. Operations coordination
    2. Special protections systems
    3. Special operating guides
    4. Voltage and reactive control, including responding to eminent voltage collapse
    5. Understanding the concepts of Interconnection Reliability Operating Limits versus System Operating Limits
    6. DC tie operations and procedures during system emergencies
    7. Thermal and dynamic limits
    8. Unscheduled flow mitigation − congestion management
    9. Local and regional line loading procedures
    10. Radial load and generation operations and procedures
    11. Tie line operations
    12. E-tagging and Interchange Scheduling
    13. Generating unit operating characteristics and limits, especially regarding reactive capabilities and the relationship between real and reactive output

E. Technologies and Tools
    1. Forecasting tools
    2. Power system study tools
    3. Interchange Distribution Calculator (IDC)

F. Market Operations as They Relate to Emergency Operations
      1. Market rules
      2. Locational Marginal Pricing (LMP)
      3. Transmission rights
      4. OASIS
      5. Tariffs
      6. Fuel management
      7. Real-time, hour-ahead and day-ahead tools

Please use this form to submit comments on the second draft Standard PER-005 – System Operator Training. Comments must be submitted by **September 1, 2007**. You may submit the completed form by e-mail to sarcomm@nerc.net with the words "System Operator Training Standard" in the subject line. If you have questions please Linda Clarke at linclrke@msn.com or by telephone at 610-310-7210.

Individual Commenter Information
(Complete this page for comments from one organization or individual.)

Name:
Organization:
Telephone:
E-mail:

NERC Region		**Registered Ballot Body Segment**
☐ **ERCOT**	☐	1 — Transmission Owners
☐ **FRCC**	☐	2 — RTOs and ISOs
☐ **MRO**	☐	3 — Load-serving Entities
☐ **NPCC**	☐	4 — Transmission-dependent Utilities
☐ **RFC**	☐	5 — Electric Generators
☐ **SERC**	☐	6 — Electricity Brokers, Aggregators, and Marketers
☐ **SPP**	☐	7 — Large Electricity End Users
☐ **WECC**	☐	8 — Small Electricity End Users
☐ **NA – Not Applicable**	☐	9 — Federal, State, Provincial Regulatory or other Government Entities
	☐	10 — Regional Reliability Organizations and Regional Entities

Group Comments (Complete this page if comments are from a group.)

Group Name:

Lead Contact:

Contact Organization:

Contact Segment:

Contact Telephone:

Contact E-mail:

Additional Member Name	Additional Member Organization	Region*	Segment*

*If more than one Region or Segment applies, indicate the best fit for the purpose of these comments. Regional acronyms and segment numbers are shown on prior page.

Background Information:

The System Operator Training standard is deigned to help ensure that System Operators who work for Reliability Coordinators, Balancing Authorities, and Transmission Operators are provided with training to promote the reliability and adequacy of the North American interconnections and their bulk power systems.

The proposed standard allows each Reliability Coordinator, Balancing Authority, and Transmission Operator to use a valid approach in determining its system operator's training needs and then in developing and delivering training that meets those individual training needs to support reliable bulk power system operations.

The System Operator Training Drafting Team would like to receive industry comments on this group of standards. Accordingly, we request that you include your comments on this form and e-mail to sarcomm@nerc.net with the subject "System Operator Training" by **September 1, 2007**.

You do not have to answer all questions. Enter All Comments in Simple Text Format.

Insert a "check" mark in the appropriate boxes by double-clicking the gray areas.

1. **Do you** agree that **it is reasonable** for **assessment**s **of performance mis-matches by system operator positions** be performed **at least annually? [R2]**Question 1? **If not, please explain in the comment area.**

    ☐ Yes
    ☐ No
    Comments:

2. **As stated in the approved SAR for this standard, do you agree that there should be a requirement to perform an assessment of the capabilities of each real-time System Operator to perform each assigned task that is on its list of company-specific reliability-related tasks? [R4] If not, please explain in the comment area.**

    ☐ Yes
    ☐ No
    Comments:

3. **Are you aware of any conflicts between the proposed standard and any regulatory function, rule/order, tariff, rate schedule, legislative requirement, or agreement? If not, please explain in the comment area.**

    ☐ Yes
    ☐ No
    Comments:

4. **Please provide any other comments (that you have not already provided in response to the questions above) that you have on the draft standard PER-005.**

    Comments:

Implementation Plan — System Operator Training Standard

Background

The System Operator Training Standard is designed to provide all system operators who work for a Reliability Coordinator, Balancing Authority and Transmission Operator entity with training to provide the knowledge and skills needed to perform all assigned tasks to a specified level of proficiency. The training provided under this standard includes a training plan for incumbent system operators and those new to a position or reassigned to a position.

The drafting team prepared both a reference document and a list of reference is developing several reference documents to assist the responsible entities in complying with this standard. The reference documents address the following topics: include the following:

A Systematic Approach to Training

-

- Performance Criteria

    - A description of the Systematic Approach to Training (SAT) process including one specific SAT method called ADDIE.

    - A High Level description of what a job task analysis is for a position, including reference document locations to identify how to create a job task analysis.

    - A workbook that includes a list of tasks commonly assigned to system operating positions, for use in starting the job task analysis process

    - A high level description of what Performance Criteria is for a position, including reference document locations to identify how to create Performance Criteria.

    - A high level description of what a training needs assessment is for a position, including reference document locations to identify how to conduct a training needs assessment.

    - An overview of the On-the-Job Training (OJT) delivery method and how to develop this type of training.

Effective Date

The proposed standard will become effective beginning the quarter following the FERC approval of the standard and the following timeline of implementation will apply.

Compliance with PER-005 will be implemented over a three-year period, as follows

Compliance with the requirements is phased in as follows[1]:

| | 0 Yr. | | 1.5 Yr. | 2.5 Yr. | ——— | 3 Yr. |

PHASE	REQUIREMENT IMPLEMENTATION	
Phase I	R3 upon Effective Date	
Phase II	R2 up to 18 Months	
Phase III	R1 and R4 up to 36 Months	

REQUIREMENTS	A 3-Year Phased Implementation Period	
Phase I - ———— 1, 2, 3, 4	R1, R2, R3, R4 up to 18 Months	
Phase II ———— 5, 6, 7, 8, 10	R5, R6, R7, R8, R10 up to 30 Months R9: See Note[2]	
Phase III ———— 11, 12, 13	R11, R12, R13 up to 36 Months	

Note that R3 from PER-005 is a duplicate of R2 from the approved and PER-004-1, therefore compliance is required upon the effective date. (The SPTSDT is requesting that R2 be removed from PER-004-1 to eliminate the duplication.)

Impact on Existing Standards and Other Standards in Development

When this standard, PER-005, is fully implemented, the Drafting Team recommends retiring PER-002-0 –Operating Personnel Training. PER-002-0 requires the Balancing Authority and Transmission Operator to have a training program, but has no specific requirements for the Reliability Coordinator to have a training program for its operating personnel. The requirements in PER-002 are not written as specifically or as objectively as the requirements in the proposed standard PER-005. The drafting team recommends removal of this standard to eliminate duplication of subject matter.

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[1] Note that not all training needs to be implemented by the effective date if they are not applicable. If for example, there are no new System Operators, then there would not be a need to begin using the training designed for entry-level System Operators. However, the annual training plan for the incumbent operators must be provided by the effective date for Requirement 6.2.

[2] Note Requirement R9 in the Reliability Standard PER-005 is effective immediately upon the approval of the Reliability Standard and is exempt from the phased implementation plan

The drafting team also recommends retiring PER-004-1 – Reliability Coordination –Staffing by moving requirement 1 of PER-004 to the existing PER-003 standard and including Requirements 2 though 5 in the PER-005 standard.

PER-004-1 has the following five requirements:

- Requirement 1 requires the Reliability Coordinator staffing to be 24/7 and must be put into PER-003 to quantify the staffing needed. This requirement will be retained in PER-004 until that change is complete.

- Requirement 2 requires the Reliability Coordinator's operating personnel to have five days (32 hours per add NERC reference) a year of emergency operations training and is included with the proposed standard and the drafting team recommends removal of this requirement from PER-004-1 to eliminate duplication of requirements.

- Requirement 3 requires the Reliability Coordinator's operating personnel to have a comprehensive understanding of the Reliability Coordinator Area and interactions with neighboring Reliability Coordinator Areas and is included with the proposed standard and the drafting team recommends removal of this requirement from PER-004-1 to eliminate duplication of requirements.

- Requirement 4 requires the Reliability Coordinator's operating personnel to 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 and is included with the proposed standard and the drafting team recommends removal of this requirement from PER-004-1 to eliminate duplication of requirements .

- Requirement 5 requires the Reliability Coordinator's operating personnel to pay particular attention on SOLs and IROLs and inter-tie facility limits and requires the Reliability Coordinator to ensure that protocols are in place to allow Reliability Coordinator operating personnel to have the best available information at all times.

  The current NERC standards: IRO-003, IRO-004, IRO-005, and IRO-006 require the Reliability Coordinator to operate within the SOLs and IROLs of the power system and to have monitoring capabilities for these areas. The Drafting Team determined that the language in this requirement of PER-004 is duplication with the content of other existing Standards. The drafting team is including this Reliability Coordinator training topic in the new PER-005 standard to ensure that IROL and SOLs are covered in every Reliability Coordinator training plan (See Requirement

10.5). The drafting team recommends removal of this requirement from PER-004-1 to eliminate duplication of requirements in IRO-003, IRO-004, IRO-005, and IRO-006. .

Applicability

This standard applies to all system operator positions of a Reliability Coordinator, Balancing Authority and Transmission Operator entity that have the authority and responsibility either directly or through communications with others, to perform independent actions that impact reliability by producing a response from the interconnected electrical system that is real-time and concurrent with the causative action. This includes contract System Operators or System Operators performing such tasks under delegation agreements.

This standard applies to all System Operator positions a Reliability Coordinator, Balancing Authority and Transmission Operator entity that have the authority and responsibility either directly or through communications with others, to perform independent actions that impact reliability by producing a response from the Bulk Electric System that is real-time and concurrent with the causative action. This includes contract System Operators or System Operators performing such reliability-related tasks under delegation agreements.