Recommendation for Increasing SPP Training Staff to Address Regional Emergency Operations Training Needs

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Executive Summary

Currently, the regional-specific emergency operations training consists of instructor-led classroom sessions, net conferences, in-person System Operations Conferences, and Regional and Subregional Black Start drills. By working with the Operations Training Working Group (OTWG) in 2010, the SPP training staff will create emergency response scenarios with varying levels of complexity and integrate scenario-specific Dispatcher Training Simulator (DTS) experiences into the instructor-led classroom training and the Black Start drills. The training curriculum will continue to include critical decision making and problem-centered scenarios that will be resolved using the DTS along with other resources. Computer-based self-study will be designed for designated net conferences and for operator-in-training topics.

NERC continuing education requirements have increased the demand for training. Meeting the continuing education needs of SPP members and registered entities will require two additional training staff in 2010. Exhibit C on page 11 provides additional detail regarding FTE calculations.

1. 1.0 FTE responsible for design and development of DTS scenario-based learning events for six 2-day Emergency Response Drills, DTS scenario-based development associated with Regional and Subregional Black Start drills, DTS scenario-based development associated with instructor-led classroom training. These design and development functions will take place in 2010 with a rollout of the DTS scenario-based learning events in 2011. This trainer will also coordinate development efforts with the OTWG, BAs, the Regional Emergency Operations trainers, the DTS engineer, and provide support for the System Operations Conferences.

2. 1.0 FTE responsible for working with the training staff to build and test specific scenarios in the DTS, administering the DTS, providing DTS support during Black Start drills and classroom training sessions, working with the vendor to facilitate DTS enhancements associated with the regional emergency operations training. Such enhancements are needed to provide more realistic simulation activities for the Black Start and Emergency Response drills.

To address the other concerns of the OTWG regarding curriculum expansion and additional courses, the following is proposed:

1. Increase the enrollment limit in the regional emergency operations Net Conferences scheduled for Fall 2009. By altering the logistics (i.e., starting 15 minutes early for roll call, implementing a Learning Contract instead of having a proctor for each individual, and utilizing additional administrative support), the enrollment limit for the net conferences can be raised from 35 to 50. It has been determined this should meet the current demand. The new Learning Management System (LMS) will provide tracking, scheduling, notification reminders, etc. in 2010 that will reduce the current administrative and recordkeeping load.

2. Add a fourth suite of Net Conferences to the 2010 training schedule for a total of 28 deliveries. The additional net conferences will provide the same content as the net conferences being delivered now, but provide more deliveries and opportunities to attend in 2010. This will also address the demand for additional seats in these classes. The trainer will focus his/her efforts in 2010 on delivery, but due to the increased deliveries will be restricted on his/her time to design and develop new net conference materials.

3. Maintain the current six REOPs instructor-led classroom deliveries in 2010.

4. Add a fourth System Operations Conference (SOC) in 2010. The Regional Emergency Operations trainer proposed for 2010 will assist with all four SOCs.

5. Maintain eight Subregional and two Regional Black Start drills in 2010.
2010 Goals and Key Deliverables

The primary goal of the regional training is to provide quality emergency operations training for members and registered entities in the SPP footprint to meet reliability objectives and maintain operator certification requirements. In order to meet this objective, the OTWG proposes the following training events for 2010:

1. Four System Operations Conferences (24 hours each)
2. Two Regional Black Start Drills (24 hours each)
3. Eight Subregional Black Start Drills (16 hours each)
4. 28 Regional Emergency Operations Net Conferences (2 hours each)
5. Three Train-the-Trainer sessions (24 hours each)
6. Six Regional Emergency Operations Classroom Sessions (20 hours each)
7. Resource development for use by SPP members and registered entities in meeting the requirements of PER-005-1

Key Assumptions

1. Enrollment in the training events offered to SPP members and registered entities within the SPP footprint will increase in 2010 and the following years due to NERC continuing education requirements, increased participation, and standards compliance
2. Increased enrollment will raise the administrative demands related to documentation requirements for continuing education and compliance; some of this will be offset by the implementation of the LMS
3. Increased enrollment will require an increase in the frequency of net conferences and instructor-led Regional Emergency Operations classroom sessions
4. Due to current enrollment levels, additional System Operations Conferences will be required in 2010 to accommodate the demand. Even with the addition of a third conference in 2009, all the SOCs for 2009 are filled to capacity with waiting lists equivalent to an additional conference. These numbers do not include entities new to the SPP footprint or other potential new members.
5. Net conference emergency operations and continuing education topics and delivery methods (e.g. Computer-based Training) will expand in 2011
6. SPP training staff will increase their consultative role due to the requirements of PER-005-1
7. An Operator-in-Training framework for registered entities and computer-based training to support the basic curriculum of an Operator-in-Training program is necessary and the design and development of such a program will begin in 2011
8. Design, development, and implementation of scenario-based Emergency Response Drills utilizing the dispatcher training simulator (DTS) will require coordination and facilitation between SPP members, the Operations Training Working Group, the Operations Reliability Working Group, and SPP operations engineering
9. DTS scenario development and maintenance will require staffing to administer the DTS
10. The majority of the regional emergency operations training and education will take place onsite at the SPP offices in Little Rock and via net conferencing with the exception of four SOCs and potential PER-005-1 workshops
11. There are currently 3.0 FTEs providing training and support for SPP members and registered entities. A total of 5.0 FTEs will be required in 2010 to meet the increased demand.
Risks

1. Inability to hire a trainer who can meet the job requirements for the Regional Emergency Operations training role
2. Inability to hire a Dispatcher Training Simulator (DTS) Engineer who can coordinate the scenario development between the OTWG, SPP engineering, and SPP training
3. Lack of budget approval for upgrades to DTS functionality
4. DTS functionality upgrades are not provided by the vendor in a timely fashion and prevent the DTS scenarios from being completed
5. Without additional staffing, time for design and development of new courses is very limited and therefore hinders efforts to enhance and continue to expand the SPP regional training program
**Full-time Equivalent (FTE) Overview**
[see EXHIBIT C on page 11 for detailed FTE calculations]

**Assumption: 1 FTE = 1800 hours**

Following is an overview of the number of FTEs needed to fulfill the increased Regional Emergency Operations training demands. This estimate assumes the addition of seven net conference deliveries to accommodate increased enrollment, the addition of one System Operations Conference, and the design and development of six 2-day scenario-based Emergency Response Drills. FTE calculations are based on curriculum development guidelines from Weber State University, the American Society for Training and Development, the U.S. Civil Service, and the Department of Energy.

**Additional Requirements for 2010**

1. **System Operations Conferences** [Subtotal = 480 hours or 0.27 FTE]
2. **Design and Development for Scenario-based Learning Events** [Subtotal = 1,632 hours or 0.91 FTE]
3. **Dispatcher Training Simulator Scenario Development and Testing** [Subtotal = 1,672 hours or 0.93 FTE]

**Total Proposed FTE Additions = 3,784 hours or approximately 2.10 FTEs**

The two additional FTEs for 2010 include:

1. 1.0 FTE responsible for design and development of DTS scenario-based learning events for six 2-day Emergency Response Drills, DTS scenario-based development associated with Regional and Subregional Black Start drills, DTS scenario-based development associated with instructor-led classroom training. These design and development functions will take place in 2010 with a rollout of the DTS scenario-based learning events in 2011. This trainer will also coordinate development efforts with the OTWG, BAs, the Regional Emergency Operations trainers, the DTS engineer, and provide support for the System Operations Conferences.
2. 1.0 FTE responsible for working with the training staff to build and test specific scenarios in the DTS, administering the DTS, providing DTS support during Black Start drills and classroom training sessions, working with the vendor to facilitate DTS enhancements associated with the regional emergency operations training. Such enhancements are needed to provide more realistic simulation activities for the Black Start and Emergency Response drills.
EXHIBIT A

Guide for Determining Hours of Design and Development

Overview

A general rule of thumb can be used to determine the amount of time it takes to design, develop, implement, and evaluate training courses. The following is an example of the calculation of time needed for the design and development of seven different types of courses. Note: This does not include delivery times. Delivery time will be established based on the requirements of and amount of participation. Calculations are based on curriculum development guidelines from Weber State University, the American Society for Training and Development (ASTD), the U.S. Civil Service, and the Department of Energy.

According to “Calculating Cost Savings From Sharing of Training Materials” developed for the U.S. Department of Energy, Office of Nuclear Safety Policy and Standards (http://www.eh.doe.gov/nsps/training/costsav.pdf), the development time per hour of instruction (classroom) is 35-45 hrs of development/hour of classroom time. For technical fundamentals, an average of 50 hrs of development time/hour of classroom instruction is used to account for the increased complexity of the materials and the expertise of the reviewers (e.g., engineering support staff personnel).

The following information was excerpted from "Calculating Cost Savings from Sharing of Training Materials”.

   o Course is five days or less, then 3 hours of preparation for each hour of training.
   o Course is between five and ten days, then 2.5 hours of preparation for each hour of training.
   o Course is over 10 days, then 2 hours of preparation for each hour of training.

2. One hour of classroom (instructor led) training (30 hours):
   o Analysis – 4 hrs.
   o Design - 3 hrs.
   o Development - 16 hrs.
   o Evaluation and Revision - 7 hrs.

3. One hour of highly technical or poorly defined training (45 hours):
   o Analysis - 10 hrs.
   o Design - 9 hrs.
   o Development - 18 hrs.
   o Evaluation and Revision - 8 hrs.

4. One hour of Self-Contained Training for hand-off to other instructors (50 to 100 hours):
   o Analysis - 12 to 24 hrs.
   o Design - 10 to 20 hrs.
   o Development - 19 to 38 hrs.
   o Evaluation and Revision - 9 to 18 hrs.

5. Interactive Multimedia Instruction (IMI): 200 - 500 man-hours for each instructional hour of IMI. If your organization is inexperienced, expect your average developmental man-hours to be closer to 450-500 man-hours per instructional hour. The 1995 August/September issue of CBT Solutions Magazine reported that 221 hours was the average development time.
Based on information from several resources, SPP developed a list of various types of learning experiences with varying levels of complexity and the time required to develop an 8-hour session for each type. The following assumes that the trainer is an expert in the subject matter being delivered. If this is not the case, the design and development times could increase.

1. **Information-Only Courses** (e.g., presentations)
   For every hour of informational training, it is necessary to spend approximately eight hours of development for each hour of the class. Because it is informational, it does not require a complicated development process. A complexity factor of "1" should be used if the course is informational and the evaluation is a simple objective assessment (e.g., Multiple Choice).

   In this instance, an 8-hour information-only course with an objective assessment will require:
   \[
   8 \text{ hours (course length)} \times 8 \text{ hours (development time)} \times 1 \text{ (complexity factor)} = 64 \text{ hrs}
   \]
   So for a one-day, information-only class with objective assessments, it will take approximately 1.5 uninterrupted weeks to design and develop content and assessments. *This does not include delivery time.*

2. **Activity-Based Courses** (e.g., workbooks/worksheets, tabletop exercises)
   For every hour of activity-based training, it is necessary to spend approximately eight hours of development for each hour of the class. Because it is activity-based, it requires a more complicated development process. A complexity factor of "2" should be used if the course is activity-based and the evaluation is a simple objective assessment (e.g., Multiple Choice) or a written problem-based assessment.

   In this instance, an 8-hour activity-based course with an objective assessment will require:
   \[
   8 \text{ hours (course length)} \times 8 \text{ hours (development time)} \times 2 \text{ (complexity factor)} = 128 \text{ hrs}
   \]
   So for a one-day, activity-based class with objective assessments, it will take approximately 3 uninterrupted weeks to design and develop content and assessments. *This does not include delivery time.*

3. **Scenario-Based Courses** (this might include the use of a simulator)
   For every hour of hands-on, performance-based training, it is necessary to spend approximately eight hours of development for each hour of the class. Because it is performance-based, it also requires additional time for developing performance-based assessments. A complexity factor of "3" should be used if the course and evaluation are hands-on. If a simulator is used, this will require additional time and coordination.

   In this instance, an 8-hour performance-base course with performance-based assessments will require:
   \[
   8 \text{ hours (course length)} \times 8 \text{ hours (development time)} \times 3 \text{ (complexity factor)} = 192 \text{ hrs}
   \]
   So for a one-day, hands-on class with performance-based assessments, it will take approximately 5 uninterrupted weeks to design and develop content and assessments. *This does not include delivery time.*
4. **Simulator-based**- an 8 hour performance-based, scenario-based course with performance-based assessments will require: For every hour of simulator-based training, it is necessary to spend approximately eight hours of development for each hour of the class. Because it is performance-based and involves the integration of simulator use, it requires additional time for developing performance-based assessments. A complexity factor of “4” should be used since the course and evaluation are hands-on and performance-based.

\[
8 \text{ hours (course length)} \times 8 \text{ hours (development time)} \times 4 \text{ (complexity factor)} = 256 \text{ hrs}
\]

So for a one-day, hands-on, simulator-based class with performance-based assessments, it will take approximately 6.5 uninterrupted weeks to design and develop content and assessments. *This does not include delivery time.*

5. **Vendor-Provided Courses**

If any of these courses are offered by a vendor, it reduces the amount of time required of the training staff. A good rule of thumb for vendor-provided training is to use the following:

\[
8 \text{ hours (course length)} \times 0.5 \text{ (complexity factor)} = 4 \text{ hrs}
\]

So for a one-day, vendor-provided class, it will take approximately ½ day of a training staff member. *This does not include delivery time.*

6. **Vendor-Partner Courses**

If any of these courses are offered by a vendor and training staff are asked to partner with the vendor in the design and development process, it reduces the amount of time required of the training staff, but still requires more than a course that is solely vendor-provided. A good rule of thumb for training developed in partnership with a vendor is:

\[
8 \text{ hours (course length)} \times 1.5 \text{ (complexity factor)} = 12 \text{ hrs}
\]

So for a one-day, vendor-partner class, it will take approximately 1.5 days of a training staff member. *This does not include delivery time.*

7. **Online Courses** (courses created using FLASH, CAPTIVATE, or other MACROMEDIA products that are animated and interactive)

Due to the nature of these courses, the design and development calculations are different than those above.

For a one-hour, online, interactive course, the following metrics apply:

- 40 hours research and development of data for course
- 40 hours script writing
- 40 hours Flash animation development
- 40 hours Captivate development and editing
- 8 hours audio recording

**168 Total Hours** or approximately 4 weeks of design and development time

So for a one-hour, online, interactive course, it will take approximately four weeks to design and develop content and assessments. This assumes that the developer will have experience using the available tools.
EXHIBIT B

Regional Training Requirements set Forth by NERC, FERC, and SPP Criteria

Following are excerpts from the NERC Reliability Standards, FERC Order 693, and the SPP Criteria.

**NERC Standard EOP-005-1** requirement R6:
To ensure plans, procedures, and resources are available to restore the electric system to a normal condition in the event of a partial or total shut down of the system.

**R6.** Each Transmission Operator and Balancing Authority shall train its operating personnel in the implementation of the restoration plan. Such training shall include simulated exercises, if practicable.

**NERC Standard EOP-005-1; 1.4 Additional Compliance Information** requires:

**1.4.3** Documentation must be retained in the personnel training records that operating personnel have been trained annually in the implementation of the plan and have participated in restoration exercises.

**NERC Standard EOP-008-0** requirement R1.6:
Each reliability entity must have a plan to continue reliability operations in the event its control center becomes inoperable.

**R1.6.** The plan shall include procedures and responsibilities for providing annual training to ensure that operating personnel are able to implement the contingency plans.

**NERC Standard PER-002-0** requires:
Each Transmission Operator and Balancing Authority must provide their personnel with a coordinated training program that will ensure reliable system operation.

**R1.** Each Transmission Operator and Balancing Authority shall be staffed with adequately trained operating personnel.

**R2.** Each Transmission Operator and Balancing Authority shall have a training program for all operating personnel that are in:

**R2.1.** Positions that have the primary responsibility, either directly or through communications with others, for the real-time operation of the interconnected Bulk Electric System.

**R2.2.** Positions directly responsible for complying with NERC standards.

**R3.** For personnel identified in Requirement R2, the Transmission Operator and Balancing Authority shall provide a training program meeting the following criteria:

**R3.1.** A set of training program objectives must be defined, based on NERC and Regional Reliability Organization standards, entity operating procedures, and applicable regulatory requirements. These objectives shall reference the knowledge and competencies needed to apply those standards, procedures, and requirements to normal, emergency, and restoration conditions for the Transmission Operator and Balancing Authority operating positions.

**R3.2.** The training program must include a plan for the initial and continuing training of Transmission Operator and Balancing Authority operating personnel. That plan shall address knowledge and competencies required for reliable system operations.

**R3.3.** The training program must include training time for all Transmission Operator and Balancing Authority operating personnel to ensure their operating proficiency.
R3.4. Training staff must be identified, and the staff must be competent in both knowledge of system operations and instructional capabilities.

R4. For personnel identified in Requirement R2, each Transmission Operator and Balancing Authority shall provide its operating personnel at least five days per year of training and drills using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel.

NERC Standard PER-004-1 requires:
Reliability Coordinators must have sufficient, competent staff to perform the Reliability Coordinator functions.

R1. Each Reliability Coordinator shall be staffed with adequately trained and NERC-certified Reliability Coordinator operators, 24 hours per day, seven days per week.

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

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

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

R5. Reliability Coordinator operating personnel shall place particular attention on SOLs and IROLs and inter-tie facility limits. The Reliability Coordinator shall ensure protocols are in place to allow Reliability Coordinator operating personnel to have the best available information at all times.

Proposed NERC Standard PER-005-1 requires:
To ensure that System Operators performing real-time, reliability-related tasks on the North American Bulk Electric System (BES) are competent to perform those reliability-related tasks. The competency of System Operators is critical to the reliability of the North American Bulk Electric System.

R1. Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall use a systematic approach to training to establish a new or modify an existing training program(s) for the BES company-specific reliability-related tasks performed by its System Operators.

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

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

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

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

R1.4. Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall conduct an evaluation of the training program established in R1, to identify any needed changes to the training program and shall implement the changes identified.
R2. Each Reliability Coordinator, Balancing Authority, and Transmission Operator shall verify each or its System Operator’s capabilities to perform each assigned task identified in R1.1 at least one time.

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

R3. At least every 12 months each Reliability Coordinator, Balancing Authority, and Transmission Operator shall provide each of its System Operators with at least 32 hours of emergency operations training applicable to its organization that reflects emergency operations topics (which includes system restoration) using training, drills, exercises, and hands on training using simulators.

FERC Order 693:

1331. PER-002-0 requires that transmission operator and balancing authority personnel are adequately trained. The Reliability Standard: (1) directs each transmission operator and balancing authority to have a training program for all operating personnel who occupy positions that either have primary responsibility, directly or indirectly, for the real-time operation of the Bulk-Power System or who are directly responsible for complying with the NERC Reliability Standards; (2) lists criteria that must be met by the training program and (3) requires that operating personnel receive at least five days of training in emergency operations each year using realistic simulations.

1332. In the NOPR, the Commission proposed to approve Reliability Standard PER-002-0 as mandatory and enforceable. In addition, the Commission proposed to direct that NERC submit a modification to PER-002-0 that: (1) identifies the expectations of the training for each job function; (2) develops training programs tailored to each job function with consideration of the individual training needs of the personnel; (3) expands the applicability to include reliability coordinators, generator operators, and operations planning and operations support staff with a direct impact on the reliable operation of the Bulk-Power System; (4) uses the Systematic Approach to Training (SAT) methodology in its development of new training programs and (5) includes performance metrics associated with the effectiveness of the training program. In addition, the Commission requested comments on the benefits and appropriateness of required “hands-on” training using simulators in dealing with system emergencies.

SPP Criteria 9.1.1 requires:

“Balancing Authorities and Transmission Operators shall train appropriate personnel in the implementation and execution of their Black Start plan.”

SPP Criteria 9.2 suggests that the Black Start plan of each Balancing Authority and Transmission Authority contain:

“g. Provisions for training and documentation of training for personnel”

SPP Criteria 10.1 requires:

“The Reliability Authority shall instigate and monitor this testing and training process” in regard to SPP Emergency Communication
EXHIBIT C

FTE Calculation by Event

Assumption: 1 FTE = 1800 hours

System Operations Conferences (SOC)

Prep, coordination, modification, and support of four SOCs

\[80 \text{ hours/delivery} \times 4 \text{ deliveries} = 320 \text{ hours}\]

Delivery (4 @ 40 hours)

\[4 \text{ deliveries} \times 40 \text{ hours/delivery} = 160 \text{ hours}\]

Subtotal = 480 hours [0.27 FTEs]

Design and Development for Scenario-based Learning Events

Design and development time for Emergency Response Drill scenarios

\[2 \text{ days} \times 8 \text{ hours} \times 6 \text{ deliveries} = 96 \text{ course hours}\]

8 hours design & development time x 96 course hours

\[768 \text{ hours} \ [0.43 \text{ FTEs}]\]

Design and development time for Subregional Black Start drill scenarios

\[2 \text{ days} \times 8 \text{ hours} \times 4 \text{ deliveries} = 64 \text{ course hours}\]

8 hours design & development time x 64 course hours

\[512 \text{ hours} \ [0.28 \text{ FTEs}]\]

Design and development time for Regional Black Start drill scenario

\[3 \text{ days} \times 8 \text{ hours} = 24 \text{ course hours}\]

8 hours design & development time x 24 course hours

\[192 \text{ hours} \ [0.11 \text{ FTEs}]\]

Design and development time for scenarios for instructor-led classroom training

\[2.5 \text{ days} \times 8 \text{ hours} = 20 \text{ course hours}\]

8 hours design & development time x 20 course hours

\[160 \text{ hours} \ [0.09 \text{ FTEs}]\]

Subtotal = 1,632 hours [0.91 FTEs]
Dispatcher Training Simulator Scenario Development and Testing

One hour of highly technical training = (approximately 40 hours prep for one scenario)

- Analysis - 10 hours
- Design - 9 hours
- Development - 18 hours

DTS scenario development and testing = 12 Emergency Response Scenarios x 40 hours
for Emergency Response Drills
[40 hours of analysis, design, and
development per DTS scenario]

DTS prep and support for Black Start drills = 74 days x 8 hours/day
and regional instructor-led classroom training

Total Proposed FTE Additions for 2010 = 3,784 hours or approximately 2.10 FTEs