Proposal Regarding SPP
Regional Training
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Recommendation for Providing SPP Regional Training for Members

Introduction:
The most viable regional training solution for providing SPP regional training will be one that utilizes a partnership between designated SPP training Fulltime Equivalents (FTEs) and an agreed-upon vendor. The FTEs will have a responsibility to work with the vendor in providing basic education and the FTEs will design and conduct regional-specific emergency operations training, systems training, and restoration drills.

Vendor-Partner Relationship:
SPP training staff will work with the OTWG to identify and prioritize a training curriculum from fundamentals to more advanced scenario-based courses. SPP will develop regional-specific training and restoration drills to conduct throughout the year. SPP will recommend the basic curriculum (suite of training), but will not design or deliver the basic curriculum that can be provided by various vendors.

The coursework that falls into the vendor-provided category would be:
   A) Core Fundamentals
   B) NERC Standards
   C) System Protection
   D) NERC Certification

Exhibit A provides curriculum detail

SPP FTE Responsibilities:
The regional-specific emergency operations, systems training, and restoration drills will consist of simulated operations events, using EMS displays. Several scenarios will be created with variances in complexity. Systems training will cover topics based upon scenarios that will be seen by operators on a more regular basis. If there are vendor-provided materials that could be infused into this part of the curriculum, SPP will utilize a vendor “partner” and offer standard curricula that have been tailored to the needs of the SPP region. Where it makes sense, SPP will utilize training staff to identify course requirements and design and deliver the courses. But where it is more resource effective, SPP will utilize the vendor to design and deliver the courses.

The coursework that SPP training staff will provide:
   A) Regionally-Oriented Emergency Ops and Systems Training
   B) Subregional and Regional Restoration Drills

Exhibit A provides curriculum detail
Recommendation for Increasing SPP Training Staff

Assumption: 1 FTE = 1800 hours

Exhibit B provides details on how the hours of design and development are calculated.

Following is an overview of the number of FTEs needed to fulfill the SPP regional training proposal:

SPP Training Staff Responsibilities for Vendor-Partner Training
SPP training staff will negotiate with the selected vendor to obtain the most cost effective training solution for the: A) Core Fundamentals, B) NERC Standards, C) System Protection, and D) NERC Certification

- SPP training staff will coordinate the pricing, availability and course delivery with the OTWG
- SPP training staff will act as a clearinghouse for operator access to the available vendor-provided coursework
- SPP training staff will submit NERC applications for all courses to be approved for CEH credit
- SPP training staff will track continuing education credits
- SPP training staff will partner with a vendor, where appropriate, to provide the essential core knowledge in the emergency operations and systems training

FTE Calculation
A one-hour vendor-partner course will require approximately 1.5 hours of SPP coordination.

40 1-hour courses x 1.5 hours = 1.5 weeks or 60 hours

Administrative Duties = 10 weeks or 400 hours

Due to the nature of a vendor partnership, SPP’s administrative role will be greater than the standard administrative responsibilities of 15%

Subtotal FTEs = 460 hours or .26 FTE
SPP Training Staff Responsibilities for Regionally-Oriented Emergency Ops and Systems Training

- These courses will be scenario-based, utilizing simulations
- SPP training staff will design and develop content and assessments for these courses
- This training series will require five (5) days of classroom training including instruction and lab-based/simulation training
- This training series will be delivered two times per year
- SPP training staff will design and develop online workbook exercises - the workbook exercises will be designed to reinforce the classroom experience and prepare the participant for the exam(s)
- SPP will design and develop exams that will be for participants online
- SPP training staff will act as a clearinghouse for operator access to the coursework.
- SPP training staff will submit NERC applications for all courses to be approved for CEH credit
- SPP training staff will track continuing education credits
- SPP training staff will partner with a vendor, where appropriate, to provide the essential core knowledge in the emergency operations and systems training
- SPP training staff will offer this series two times per year

FTE Calculation

One 8-hour day of scenario-based training utilizing simulations will require approximately 6.5 weeks of design and development time.

- 10 days training x 6.5 weeks = 65 weeks or 2600 hours of design and development time
- 2 hours of online workbook exercises = 4 weeks or 168 hours
- Administrative Duties = 6 weeks or 240 hours

Subtotal FTEs = 3008 hours or 1.67 FTE
SPP Training Staff Responsibilities for Subregional and Regional Restoration Drills

- These courses will be scenario-based, utilizing simulations
- SPP training staff, working in partnership with our members, will design and develop content and assessments for these restoration drills
- SPP training staff will partner with designated individuals from each region to conduct the drills
- SPP training staff will conduct one restoration drill per year in each of the four sub-regions; the drill will be conducted over a one-day period
- SPP training staff will conduct two regional restoration drills per year; the drills will be conducted over a one-day period
- SPP training staff will submit NERC applications for these events
- SPP training staff will track continuing education credits earned through participation in the drills
- SPP training staff will partner with SPP engineers to ensure seamless integration of the simulator into each drill
- SPP training staff will partner with SPP engineers to run meaningful, appropriate scenarios

FTE Calculation
One 8-hour day of scenario-based training utilizing simulations will require approximately 6.5 weeks of design and development time.

Subregional Drills: 4 days x 6.5 weeks of design and development time
= 26 weeks or 1040 hours

Regional Drills: 2 days x 6.5 weeks of design and development time
= 13 weeks or 520 hours

Administrative Duties: 6 weeks or 240 hours

**Subtotal FTEs = 1800 hours or 1.0 FTE**

.26 FTE (Vendor)
1.67 FTE (Regional-specific Training)
**1.0 FTE (Sub-regional and Regional Restorations Drills)**

Total FTEs = 2.93 FTEs
I. VENDOR PARTNER

A. Core Curriculum
   1. Ohms Law, Power & Energy Formulas
   2. Basic Concepts of Series and Parallel Circuits
   3. Formulas for Voltage/Current Division
   4. Inductance, Capacitance, Phase angle, and Power angle, Angle Stability
   5. Vector Diagrams
   6. Electromagnetism, Induction, Transformers and Conductors
   7. Generators
   8. Torque Angle and Synchronizing

B. NERC Standards
   1. SAC Balancing, Resource and Demand
   2. SAC Communications
   3. SAC Critical Infrastructures Protection
   4. SAC Emergency Preparedness and Operations
   5. SAC Interchange Scheduling and Coordination
   6. SAC Interconnection Reliability Operations and Coordination
   7. SAC Personnel Performance, Training, and Qualification
   8. SAC Protection and Control
   9. SAC Transmission Operations
   10. SAC Voltage and Reactive Control

C. System Protection
   1. Intro to SP & Protective Relays Introduction to System Protection and Protective
      Relays
   2. Non-directional Overcurrent Relays & Principles Non-directional Overcurrent Relay
      and the Principles of Overcurrent Operation
   3. Basic Operation and Protection of Differential Relays Explanation of the Basic
      Operation and Protection of Differential Relays
   4. Overcurrent Relay Protection, Bank Overcurrent Protection, et. al Overcurrent Relay
      Protection Settings, Bank Overcurrent Protection, Specialized Transformer Protection
      and the Operation of a Bank Protective Relay
   5. Distribution Underfrequency Relays, Capacitor Banks, et. al. Distribution:
      Underfrequency Relays, Capacitor Bank and Feeder Protection
   6. Relay Functional Diagrams & Bank Relay Cabinet Relay Functional Diagrams and
      the Bank Relay Cabinet Layout
   7. Distance Relays, Directional & Zone Relays, et. al. Distance Relays, Directional and
      Zone Relaying, Carrier Phase Line Relays and Ground Relays
   8. Breaker Reclosing, Breaker Failure Relay, Bus Differential, et. al. Breaker Reclosing,
      Breaker Failure Relay, Bus Differential Relay and One-shot Reclosing
      Tripping, Capacitor Bank Protection and Breaker Configuration
   10. Transmission Relay Functionals, et. al. Transmission Relay Functionals including
        Line, Bus, and Transformer
   11. Panel Layouts Panel Layouts including Line, Tie Breaker, Bus Differential and
       Transformer Bank
   12. Generator Protection Generator Protection
D. NERC Certification
1. An Introduction to NERC 2006 Certification
2. Balancing Resource and Demand
3. Critical Infrastructure Protection
4. Communications
5. Emergency Preparedness and Operations
6. Interchange Scheduling and Coordination
7. Interconnection Reliability Operations and Coordination
8. Personnel Performance, Training, and Qualification
9. Protection and Control
10. Transmission Operations
11. Voltage and Reactive Control

II. SPP TRAINING STAFF

A. Emergency Ops and Systems Training
1. Simulated regional scenarios with all members across SPP
2. Transmission Loading Relief and Congestion Management
3. Energy Emergency Alert and Other Extreme Conditions
4. Reserve Sharing System (RSS)
5. Voltage Control, system stability (regionally oriented)
6. SPP procedures, structure, groups, and operations areas
7. Interconnected power system operations, energy shortages
8. Interconnect Reliability Operating Limit - system operator response, SPP Reliability Coordinator response

B. Restoration Drills
Restoration drills will emphasize system recovery during simulated blackouts ranging from outage pocket(s), to larger interconnect-wide outages. Principles of restoration will be discussed, but the drills will focus on outage recovery and the communications required for inter- and intra-regional coordination. SPP will design, develop, and coordinate four sub-regional restoration drills per year and one Regional drill at SPP. SPP will work with the OTWG and the Restoration training subcommittee to ensure that the drills are meeting their requirements.
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 among SPP members.

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 information only, it does not require a complicated development process. A complexity factor of “1” should be used if the course is information 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:

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

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 SPP training staff. A good rule of thumb for vendor-provided training is to use the following:

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

So for a one-day, vendor-provided class, it will take approximately ½ day of an SPP training staff member.

6. **Vendor-Partner Courses**
   
   If any of these courses are offered by a vendor and SPP training staff is asked to partner with the vendor in the design and development process, it reduces the amount of time required of the SPP 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:

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

So for a one-day, vendor-partner class, it will take approximately 1.5 days of an SPP 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.