Use of Time-Synchronized Measurements in the Operations Horizon – Train-the-Trainer Session

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Agenda

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Training Course Description

TRS and PNNL collaborated to develop a *Use of Time-Synchronized Measurements in the Real-time Ops Horizon* training course (8 CEH).

Course Summary: Provides an introduction to synchrophasor technology, describes the value it can provide in the Real-time Ops Horizon, and demonstrates how synchrophasor-based apps can be used to improve wide-area situational awareness and grid reliability.

Intended Audience: RC, BA and TOP System Operators and Ops Support staff tasked with monitoring and controlling the BES.

Training Course Description (Cont.)

Training Location: Train-the-Trainer sessions and operator training classes held at offsite locations in Summer/Fall 2019.

Training Cost: No registration fee (entities responsible for travel costs only).

Overreaching Training Goals

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- Increase knowledge and advance use of synchrophasor technology by creating training materials that grid operators and electric utilities can integrate into their respective training programs.
- Provide train-the-trainer workshops to help electric industry trainers meet the underlying knowledge requirements before delivering company-specific training on the topic.

Approach to Course Development

The general approach that PNNL and TRS applied to create electric industry training is as follows:

1. Analyze industry training needs.
2. Design the training course.
3. Develop the training materials.
4. Implement the training.
5. Evaluate the training.

Analyzing Training Needs

Current State of Synchrophasor-Based Applications:

- Widely deployed for use in the Operations Planning and Operations Assessment Horizons.
- Limited integration into the control room environment for use in the Same-day and Real-time Operations Horizon.

Solution: Develop training for System Operators and Operations Support staff to demonstrate how synchrophasor measurements can be used to support the performance of reliability-related tasks.

Designing the Training Course

- Lesson 1: Intro to Synchrophasor Technology
- Lesson 2: NERC Functional Roles & Responsibilities
- Lesson 3: Recognizing Power System Oscillations
- Lesson 4: Monitoring Frequency, Voltage & Real/Reactive Power
- Lesson 5: Monitoring Phase Angle Differences

Developing Training Materials – Lessons Learned

- **Demonstrate Value in the Control Room** – Developed content that will help entities build business cases.
- **Strong Operational Use Cases** – Defined specific uses of time-synchronized measurements to perform operational tasks.
- **Flexible Assessment Methods** – Designed a training course that allows for different assessment methods.
- **Advanced Training Options** – Will Consider additional training classes to address more advanced uses of the technology (enhanced state estimation, system islanding/blackstart restoration)

Implementing Training

- Limited number of operator training courses and “train-the-trainer” sessions were provided as part of this project.
- Grid Operators and Electric Utilities that request access to the training materials may customize and deliver the course at their respective facilities.

Evaluating Training

- "Train-the-Trainer" sessions held to receive feedback from industry training experts prior to course delivery.
- Course evaluation forms distributed at operator training classes to gather feedback and identify potential improvements to course materials and delivery methods.
- Industry partners may be surveyed to gather additional feedback after-the-fact.

Training Material Review

Review the following *Use of Time-Synched Measurements in Real-Time Ops Horizon* training documents:

- Training Plan
- NERC ILA
- Training Presentation
- Instructor's Guide
- Training Assessment
- Training Evaluation
- Supplemental Information Sheet
- Time-Synched Measures Reference Document

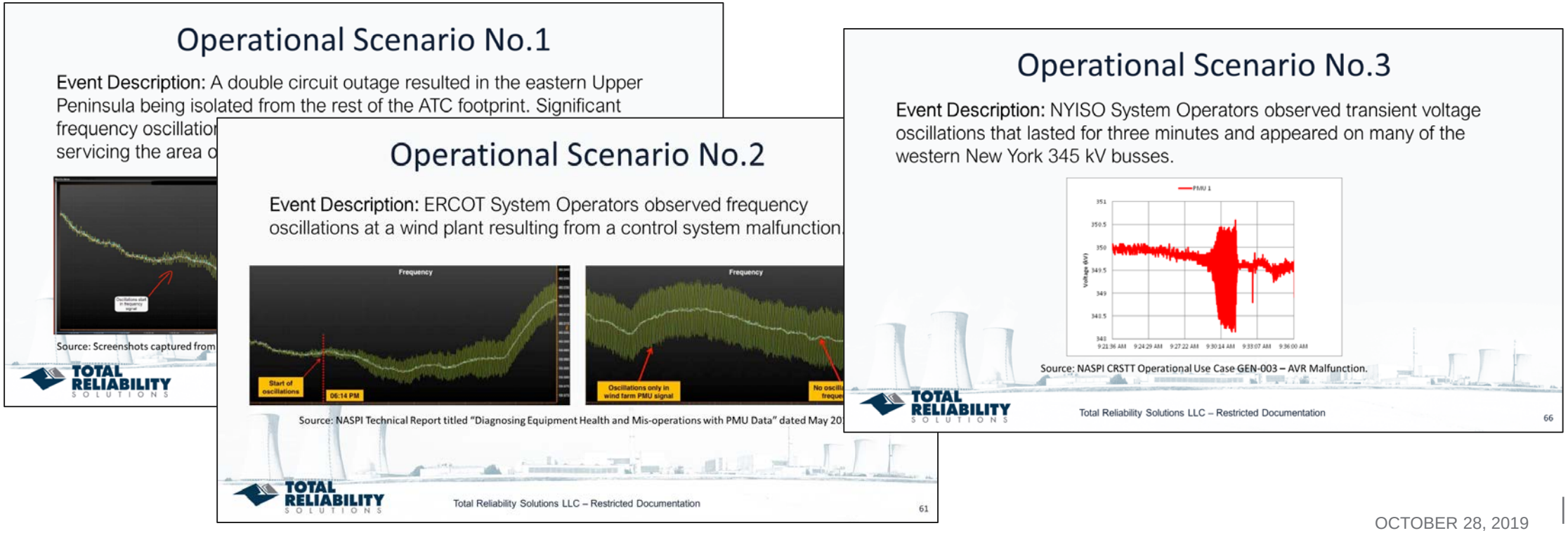
Technical Training Delivery

TRS instructor to deliver the following course lessons to "train-the-trainer" session attendees to ensure underlying knowledge requirements are met:

- Introduction to Synchrophasor Technology
- Power System Oscillations

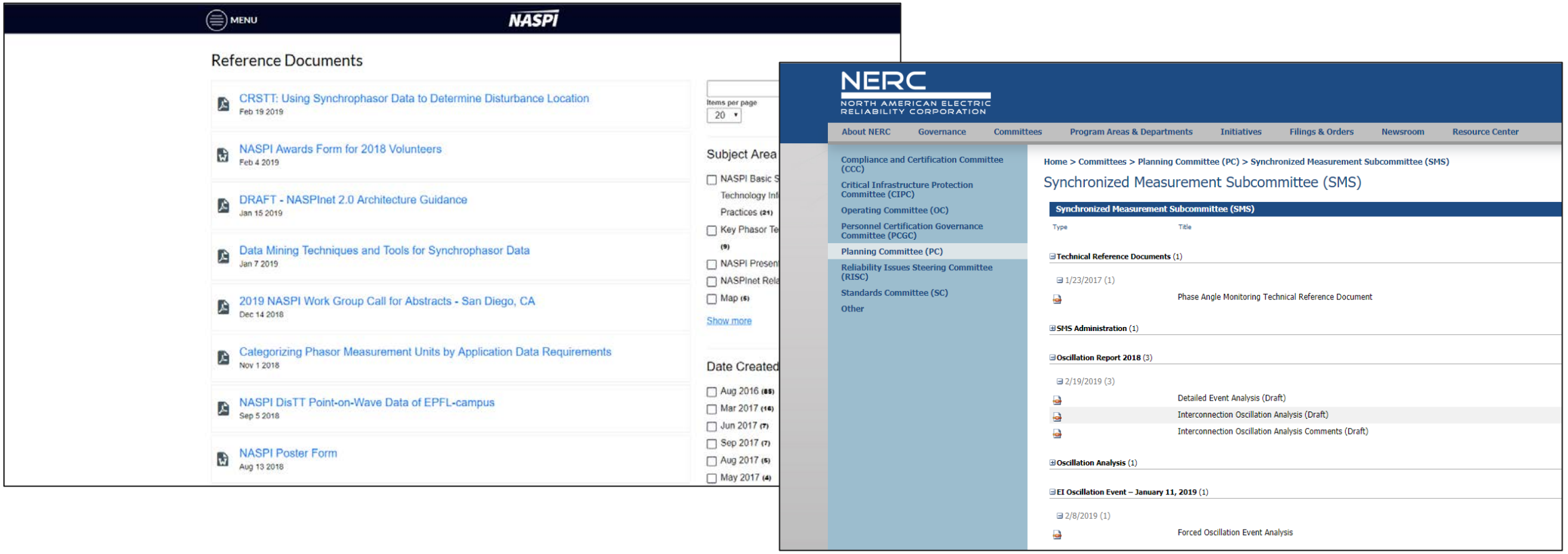
Operational Scenario Review

TRS instructor to review each operational scenario with the "train-the-trainer" session attendees and discuss how each can be modified to meet their respective needs.



Reference Materials

TRS Instructor to review reference materials and additional sources of information that attendees might find useful.



Requests for Feedback

Roundtable discussion about the training to gather feedback:

Do you think this training will be of interest to your operators?

Do you think the training will provide value?

Do you have recommendations for how the training could be improved?

Contact Information

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