



WECC System Operator Training Emergency Operations

Emphasis on this class is on Voltage Stability/Instability, Angle Stability/Instability and Power Oscillations that can be experienced in Power Systems. **Emergency Operations** is a week-long class (**Monday 1:00 – Friday 12:00 pm**) that offers each student a total of **32 NERC Continuing Education (CE) Hours**, including nine (9) NERC CE hours of NERC Standards and 16 NERC CE hours of simulation. Each student will also receive 32 Emergency Operation (EOP) hours.

Primary Topics include:

- Voltage Stability
 - Types of Voltage Collapse
 - Long Term Voltage Collapse
 - Transient Voltage Collapse
 - Classical Voltage Collapse
 - Preventing Voltage Collapse
 - Role of the System Operator

- Angle Stability
 - Definitions
 - Active Power Transfer and the Power Angle Curve
 - Types of Angle Stability
 - Steady State Stability/Instability
 - Transient Stability/Instability
 - Dynamic Stability/Instability
 - Out-of-Step Protection
 - Role of the System Operator

- Power Oscillations
 - Definitions
 - Natural Frequency of Oscillations
 - Oscillations and Excitation Systems
 - Additional Causes of Oscillations
 - Role of the System Operator

The following simulation modules, using the PALCO* System, are included in the class. Additional Modules may be added as they are developed to enhance understanding of the covered topics.

- Introduction to the PALCO System (how to use the simulator)
- Voltage Collapse in a Radial System
- Voltage Stability/Instability
- Angle Stability/Instability
- Surge Impedance Line Loading
- Voltage & Var Characteristics of Generators
- Voltage & Var Characteristics of Transmission Lines

*PALCO is a fictional 28-station power system