



# Transmission and Distribution Operator Training

Prepared for:

U.S.-Jordan Electric Transmission  
Partnership Executive Exchange  
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# NERC requirements

- Operator Certifications

- Reliability Coordinator
- Transmission Operator
- Balance and Interchange Operator
- Balance and Interchange/Transmission Operator



# NERC requirements

- All training must have SAT basis
  - Job-Task Analysis (JTA)
  - Objectives matched to analysis
  - Trainee evaluation matched to objectives
- Approved Provider status
  - SOCCED database
  - Local database



# NERC requirements

- Initial Training

- Curriculum

- Industry Operating Experience

- Continuing Training

- aka Continuing Education Hours (CEH)

- Curriculum

- Industry Operating Experience



# Initial Training

- Example Training Flowpath
  - Transmission Operator Program
- Example Training Course
  - AC Power Concepts



# Continuing Training

## ■ Examples

- CEEP/Load Shed
- Transfer Path Control
- Restoration Principles
- Blackstart Plan Reviews
- Blackstart Drill
- Power System Dynamics
- Strategic Decision Making
- Emergency Leadership



# APS Operator Training Programs

- Transmission Operator
  - “Energy Control Center Supervisor – Transmission”
- Balance and Interchange Operator
  - “Energy Control Center Supervisor – Generation”
- Dispatcher
- Distribution Operations Specialist
- Load Management Specialist



# Department Procedures for Abnormal Ops

- Blackstart plan in support of Sub-Regional Restoration strategy
- Load Curtailment Plan
- Business Resumption Plan
- Operating Letters for local issues, equipment specifics, etc
- Summer and Winter Operating Studies



# Training for Abnormal Ops

- Restoration Principles
  - Terminology
  - Roles and Responsibilities
  - Command, Control, and Communications
  - Generation and Cranking Paths
  - Load Pickup and Frequency control
  - Synchronizing Islands
  - Resumption of AGC
  - Relay behavior
  - Lessons Learned
  - Standards
- Regional Black Start Plans
- Black Start Drill
- Capacity and Energy Emergency Plan / Load Shedding
- Path Control
- Initial training on Operating Studies



# Operations Training Simulator

- EMS Operations (new personnel)
- Load Shedding (5/10)
- Path Control (10/10)



# Promoting Realism

- EMS
- Operating Letters
- Drawings
- Substation and Generator Field Visits
- Use of relay actuation synopses
- OTS (eventually)



# Evaluating Trainees

- Objective-based training
- Evaluations based on learning domain
  - Cognitive
  - Psycho-motor
  - Affective
- Passing Grade – 80%



# Evaluating the Training Program

- Kirkpatrick Model

- Reaction (Feedback)

- Learning (Exam)

- Transfer (Post Training Evaluation)

- Results (ROI)

- Periodic audits

# Questions?

- Contact Information:

Michael Scott

APS Power Operations

Section Leader, Training

502 S 2<sup>nd</sup> Avenue, MS 2260

Phoenix, AZ 85003

602-250-1384 Office

602-677-2569 Cell

[michael.scott@aps.com](mailto:michael.scott@aps.com)