FOSSIL CONSULTING SERVICES, INC
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NERC-APPROVED! RELAY PROTECTION (FCS_123_RPC_101)

Fossil Consulting Services, Inc. is proud to offer the NERCApproved Relay Protection Training Course. Course participants will receive top-notch training by credentialed instructors with 20+ years of experience in power plant operations and training.

It's a fact: Operators with inadequate training can hurt your bottom line. Your plant has electrical system protective relays and devices designed to protect equipment and minimize damage due to faults or other abnormalities, but operators must respond quickly and correctly to protective relay actions. A mistake in responding to a protective relay alarm or trip could result in expensive equipment damage or a costly plant outage.

This 2-day course is designed to improve the knowledge of Operators about the protection system schemes for which they are responsible, and to make them better able to respond to protective relay actions. This course fulfills the R1 requirement of the NERC Standard PRC-001-1, System Protection Coordination. A quiz will be administered at the conclusion of the course to verify that trainees learned the material in the course.

This course ensures that trained operators are able to respond appropriately to protective relay alarms and trips, and are able to react correctly to abnormal conditions. After completion of this course, trainees will understand the purpose, configuration, limitations, and operational characteristics of the protection system schemes for which they are responsible. More training, more knowledge, less chance of costly mistakes -- now that's something worth investing in!

THE FCS DIFFERENCE

What makes our programs superior to other training programs on the market? FCS experts will visit YOUR facility and examine YOUR plant documentation to customize a SITESPECIFIC course that fits YOUR needs. We go one step further than generic training courses; course participants will not only learn conceptual knowledge; they will learn the specifics of how to put those concepts into practice at YOUR facility.

Already have a training program in place? Great! We can improve your existing program to ensure that trainees learn the materials faster and better. FCS-produced, plant-specific courses are more effective than generic courses and provide a greater Return on Investment (ROI) than generic materials alone.

WHAT OUR CLIENTS SAY ABOUT US:

"The staff provided by FCS were professional trainers and engineers, whose technical experience and training capabilities resulted in a maximum amount of technology transfer to (our) plant operators."

-Plant-specific custom training for an overseas Power Plant

"Thanks to FCS' effective training, our employee knew exactly what to do during our emergency situation, and his quick actions prevented forced outage!"

-Plant-specific simulator training for a major Mid-West U.S. plant

NERC APPROVAL

Relay Protection (FCS_123_RPC_101) is recognized by the North American Electric Reliability Corporation as an approved learning activity for which NERC CE Hours can be awarded, and that the provider adheres to NERC CE Program Criteria.

This course fulfills the R1 requirement of the NERC Standard PRC-001-1, System Protection Coordination and fulfills a total of 16.0 CE hours, 4.0 hours of Standards, and 3.0 hours of Simulation.

Contact Scott Hommel, at (410) 312-6240 or shommel@fossilconsulting.com for information regarding technical content and pricing

COURSE OBJECTIVES

- List and describe protective relay requirements as specified by:
  - NERC Reliability Standard PRC-001, Requirement R1
  - Relevant Company Electric System Operating Orders or Procedures
- Describe basic protective relaying theory and fundamentals, including:
  - Power System Equipment and Layout
  - Power System Faults
  - Function of Relay Protection Systems
  - Zones of Protection
- Describe the function and operation of protective relay equipment, including:
  - Instrument Transformers
  - Electromechanical and Solid State Relays
  - Relay Types (Overcurrent, Differential, Distance, etc.)
  - Device Function Numbers
- Describe the basic concept and operation of distance and carrier relaying schemes.
- Describe the operation and indications associated with their facilities protective relay schemes, including:
  - Facility(ies) Switchyard, Lines and Generator Protection
  - Protection Coordination with Transmission System
- Review and discuss lessons learned from actual relay tripping incident reports (where available)

COURSE OUTLINE:

- Introduction to Protective Relaying
  - Power System Equipment and Layout
  - Power System Faults
  - Function of Relay Protection Systems
  - Zones of Protection
- Protective Relay Requirements
  - NERC Reliability Standard PRC-001, Requirement R1
  - Review of Relay and Protection Schemes Generally Used by Facility and Transmission System
- Protective Relay Equipment
  - Instrument Transformers
  - Electromechanical and Solid State Relays
  - Tripping Circuits and Circuit Breaker Controls
  - Overview of Relay Types (Overcurrent, Distance, Differential, etc.)
  - Device Function Numbers
- Protective Relay Schemes
- (Schemes, Operation and Indications using Station-Specific one-lines and other documentation)
  - Unit Generator(s)
    - Internal Fault Generator Differential
    - Internal/External Unit Differential Relay (87U)
    - Stator Ground
    - Loss of Excitation Relay (40)
    - Negative Phase Sequence Relay (46)
    - Reverse Power Relay (32)

        - Overvoltage Relay (59)
        - Underfrequency Relay (81)
        - Voltage Balance Relay (60)
        - External Fault Back-up Relay 321
        - Generator Grounding
    - High Voltage Transmission Lines
        - Directional Comparison Blocking Distance Scheme
        - Differential Scheme
    - High Voltage Busses
        - Bus Differential Schemes
    - Breaker Failure Protection
    - Additional High Voltage Lines (as applicable)
        - Directional Comparison Blocking Distance Scheme
        - Differential Scheme
    - Main Station Transformer
        - Transformer Ground Differential (64) Scheme
        - Transformer Differential (87) Scheme
        - Transformer High Oil Temperature
        - Neutral Instantaneous and Time Overcurrent Relay (50/51)
        - Sudden Pressure Relay (63MT)
    - Remedial Action Scheme (RAS) Protection
    - "Real World" Protection and Outage Scenarios based on incident reports (when available or generic if not available)