



BALANCING TECHNOLOGY AND PROTECTION AND CONTROL RELIABILITY

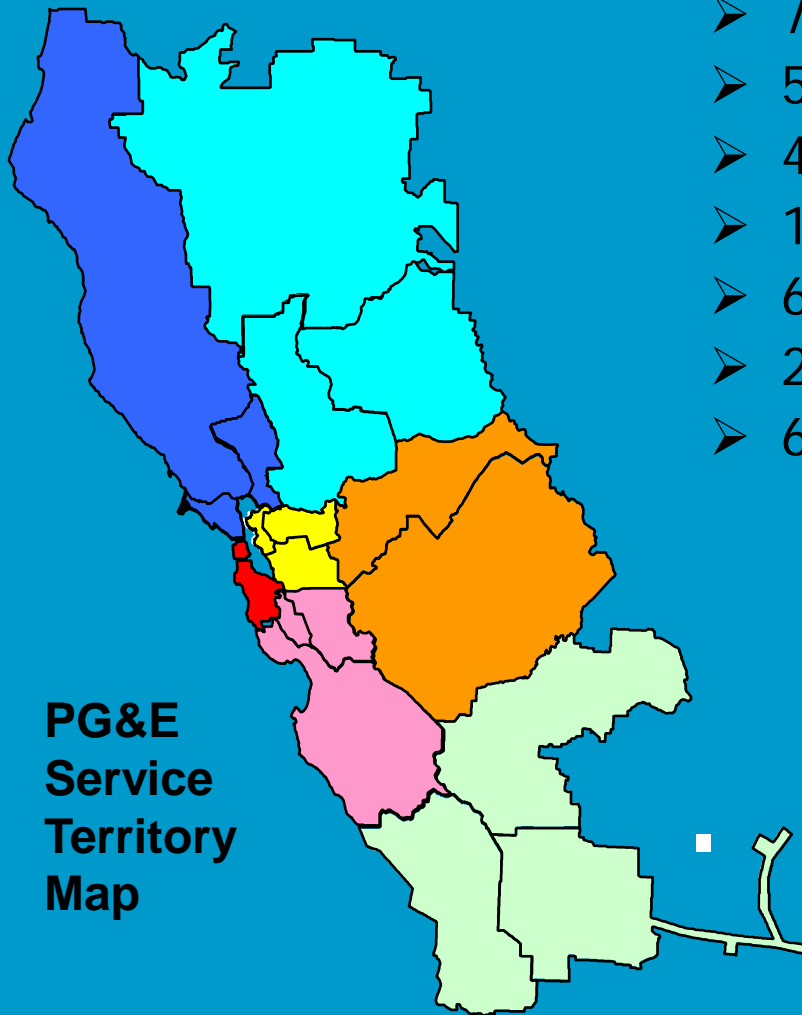
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Battle Scars

2013 i-PCGRID Workshop
TECHNICAL PRESENTATIONS

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- 70,000 Square Miles Service Territory
- 5 Million Electric Customers
- 4 Million Gas Customers
- 18,610 miles of Electric Transmission Lines
- 6,800 miles of 230 kV and 500 kV
- 22,544 MW Peak Demand in 2006
- 6,861 MW-Owned Generation





PG&E Transmission Assets

Transmission (Circuit Miles)

500 kV	1,330
230 kV	5,420
115 kV	6,230
60/70 kV	<u>5,630</u>
	18,610

Protection Equipment

Transmission	22,000
Distribution	<u>16,000</u>
Total	38,000

Substations

Transmission	142
Distribution	<u>712</u>
Total	854







NERC Compliance Program - Background

- In 2005, in response to the 2003 Northeast blackout, Congress created Section 215 of the Energy Policy Act of 2005 which created the Electric Reliability Organization (ERO) under FERC.
- The North American Electric Reliability Corporation (NERC) is certified as the ERO and develops and enforces mandatory reliability standards for all users, owners, & operators of the bulk electric system.
- NERC Reliability Standards became mandatory and enforceable effective June 18, 2007.
- Entities failing to comply are subject to sanctions and penalties of up to \$1 million per day per violation. In addition, Entities must bear the costs of mitigating the violations that may include very expensive Compliance Directives from FERC and/or NERC.



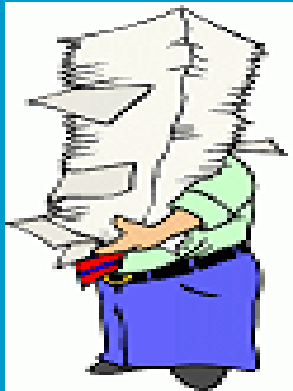
NERC Compliance Program - Background

- The Western Electricity Coordinating Council (WECC) is the Compliance Enforcement Agency under its delegation agreement with NERC, and in accordance with the NERC Compliance and Monitoring Enforcement Program (CMEP).
- CMEP defines Actively Monitored Standards, and annual audit plans.
- Audits for Balancing Authorities and Transmission Operators are conducted every three years.
- CMEP also includes annual self certification, investigations, self reporting, complaints, and spot check audits as part of overall compliance program.
- 110 Standards and over 1000 Requirements are currently in effect.

Primary Evaluations of NERC Compliance Requirements

The first step was to understand what Full Compliance is.

- If it is **NOT** documented, then we are **NOT** in Full Compliance.



- You must prove that you did the work, NOT that your system is reliable.
- Documentation and maintaining evidence of compliance is the utility's responsibility.
- The utilities must be able to produce evidence, at any time, that proves compliance for any type of audit.



- Types of Documentation include Plans, Programs, Procedures (have a plan), Test Records (demonstrate performance under the plan).



According to NERC Standard PRC-005-2 the protection system is comprised of the following five elements:

Protection System Maintenance and Testing Process (PSMP) five elements:

- ✓ Protective relays that respond to electrical quantities.
- ✓ Communications systems necessary for the correct operation of protective functions.
- ✓ Voltage- and current-sensing devices providing inputs to protective relays.
- ✓ Station direct current (dc) supply associated with protective functions (including batteries, battery chargers, and non-battery-based dc supply).
- ✓ Control circuitry associated with protective functions operating through the trip coil(s) of the circuit breakers or other interrupting devices.



According to NERC Standard PRC-005-2 the protection system is comprised of the following five elements:

Protection System Maintenance and Testing Process (PSMP) five elements:

There are five PSMP procedures that accomplish the NERC required testing of the entire protection system.

Those five procedures are:

1. Relay Testing Procedure
2. Associated Communication Equipment Testing Procedure
3. Voltage and Current Sensing Devices Testing Procedure
4. Station DC Supply Testing Procedure
5. DC Control Circuitry Testing Procedure



There are many ways to prove compliance from the absurdly simple to the simply absurd.

An example of the absurdly simple:

Old-School

- Keep everything on paper
- Keep all maintenance records up-to-date
- Keep all maintenance records in a file cabinet

An example of the simply absurd

- Videotape all maintenance tasks and actions

There is no one method that is specified in the requirements!
A simple “check-off” of all the 5 elements tasks is believe to be acceptable.



Be aware that an auditor may well ask for additional data beyond “I did it!”



Use technology to document performance and archive test records

Use technology in the PSMP documentation requirement to meet the new PRC-005-2 regulatory requirement.

- The new PSMP will be able to use computerized automated testing as well as manual testing to document and archive all test results and documents and verify that each of the five elements task were performed to meet the new requirements.
- The new PSMP documentation can also provide specificity and avoid variations on how work task and documentation is performed and therefore be consistent, compliant and measurable.
- The new PSMP can also provide electronic archiving and web access to all test records and documents that will be use for compliance purposes.

Link to Component Functional test slides

- [NEW Component & FUNCTIONAL TEST.ppsx](#)
- [ALPHA RTS.ppsx](#)
- [RTS Communication Test.ppsx](#)
- [RTS TERMINAL FUNCTIONAL TEST.ppsx](#)

Old School

vs.

New School



? QUESTIONS ?

