NERC Reliability Standards – Mandatory Compliance

As you seek to do more with less in the way of financial and people resources, you no doubt are awakened during the night with nagging issues of system reliability. You do the maximum to “serve and protect,” however it’s not painful enough that you may experience system repercussions if problems are encountered; NERC has been given the teeth to levy financial sanctions in the event that you haven’t been appropriately diligent. You can increase your intake of sleeping pills or, more positively, seek technical help from folks who are acquainted with your pain and who can provide calming technical relief to put your mind at ease.

Review

As you are aware, Congress approved legislation requiring the creation of the Electric Reliability Organization (ERO) to be approved by the Federal Energy Regulatory Commission (FERC). Congress determined that FERC would mandate specific standards, and would have the ability to levy financial sanctions for non-compliance, stating that “FERC shall have jurisdiction on all users, owners, and operators of the bulk power system.” In July 2006, FERC approved NERC (North American Electric Reliability Corporation) as the ERO.

Each regulated entity must annually review standards and all documentation for reaffirmation and revision where necessary, as well as complete a self-assessment for compliance. A document retention process must be maintained for a minimum of three process revisions, with documents archived for audit. The entity will be subject to audits including internal business unit audits, independent audits and NERC/FERC review. According to FERC, non-compliance to the standards may result in monetary penalties, non-monetary penalties (operation limitations, watch lists, etc.), requirements for remedial actions, or settlement damages.

The penalty metric is based upon the severity level of the offense, ranging from lower or moderate penalties to high or severe. Each violation within these categories can result in monetary penalties from $1,000 to $1,000,000.

Relief

“I’m not liking the ‘pain.’” “What is my relief?” Siemens PTI is well acquainted and conversant with the NERC standards. All three of our departments will actively support you, through our direct consulting services, our well-known software tools (PSS®E, PSS®MUST, MOD®, PSS®ODMS), or our education courses/programs. The figure below further defines our integrated solution:
Figure 1 – Siemens PTI’s Integrated Solution

EOP  Emergency Preparedness and Operations
INT  Interchange Scheduling and Coordination
MOD  Modeling Data, and Analysis
PER  Personnel Performance, Training, and Qualifications
TOP  Transmission Operations
TPL  Transmission Planning
IRO  Interconnection Reliability Operations and Coordination
Here is how the Siemens PTI team can support your needs:

<table>
<thead>
<tr>
<th>NERC Standard</th>
<th>Consulting</th>
<th>Software</th>
<th>Education</th>
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</table>
| EOP | Emergency Preparedness and Operations  
   - Load shedding  
   - System restoration  
   - Black start | X | X |   |
| INT | Interchange Scheduling and Coordination  
   - Verify reliability with interchange | X | X |   |
| IRO | Interconnection Reliability Operations and Coordination  
   - Verify reliability with interchange | X | X |   |
| MOD | Modeling, Data, and Analysis  
   - Transfer Capability Analyses  
   - Capacity Benefit Margin  
   - Transmission Reliability Margin  
   - Steady-state and dynamic modeling, data, verification, and simulation | X | X | X |
| PER | Personnel Performance, Training, and Qualifications  
   - Training for operating personnel  
   - Training for operations engineers and planning engineers |   |   | X |
| TOP | Transmission Operations  
   - Operations planning  
   - Evaluation of unplanned events  
   - Assessment of outage  
   - Operating data | X | X |   |
| TPL | Transmission Planning  
   - Planning criteria (N-1, N-1-1, etc.)  
   - Documentation of planning process  
   - Steady-state analysis  
   - Dynamic analysis  
   - Generation interconnection | X | X |   |

Our consulting teams are ready to assist you with any complex issues that may surface regarding the above standards. While Siemens PTI can diagnose your problem after the fact, involving Siemens PTI right from the start will save you time and money. Additionally, our education courses are available to provide refresher training or new employee education.

By using the PSS®E suite of tools, it is possible to complete analyses required by the following standards:

**TPL-001** System Performance Under Normal (No Contingency) Conditions (Category A)

**TPL-002** System Performance Following Loss of a Single Bulk Electric System Element (Category B)

**TPL-003** System Performance Following Loss of Two or More Bulk Electric System Elements (Category C)

**TPL-004** System Performance Following Extreme Events Resulting in the Loss of Two or More
Bulk Electric System Elements (Category D)

TPL-005 Regional and Interregional Self-Assessment Reliability Reports

TPL-006 Assessment Data from Regional Reliability Organizations

MOD-010 Steady-State Data for Transmission System Modeling and Simulation

MOD-012 Dynamics Data for Transmission System Modeling and Simulation

Siemens PTI is also able to assist you with issues regarding numerous additional NERC reliability standards, including, among others:

MOD-014 Development of Interconnection-Specific Steady State System Models

MOD-015 Development of Interconnection-Specific Dynamics System Models

MOD-024 Verification of Generator Gross and Net Real Power Capability

MOD-025 Verification of Generator Gross and Net Reactive Power Capability

PRC-002 Define Regional Disturbance Monitoring and Reporting Requirements

PRC-018 Disturbance Monitoring Equipment Installation and Data Reporting

The complete set of NERC reliability standards may be found at [http://www.nerc.com/files/Reliability_Standards_Complete_Set_1Dec08.pdf](http://www.nerc.com/files/Reliability_Standards_Complete_Set_1Dec08.pdf).

You may reasonably be asking yourself why there are so many standards related to modeling. The reasons are numerous:

1. The reliability in system planning and system operation is heavily dependent on computer simulation in order to save the stress on your equipment.
2. Often, records of severe system events offer evidence that simulation results are not fully representative of actual system performance.
3. Several transmission paths have transfer limits imposed by stability (dynamic) issues.
4. The design of special protection schemes is extremely dependent upon simulation results.
5. Black start and restoration studies are heavily dependent upon simulation results.
6. The analysis of system protection adequacy and coordination is heavily dependent upon simulation results.

Summary

NERC standards are designed and implemented to ensure the safe and reliable operation of power systems nationwide. No one appreciates punitive penalties, whether financial or restrictive; however, the penalties do represent that incentive to get our processes in order. Our systems will potentially benefit from the resulting improved efficiencies and cost savings, and we will benefit from the knowledge that the appropriate protections and safeguards are in place.

The worldwide economic situation may indeed cause you headaches, for this we have no cure. However, you can alleviate headaches associated with your plant operations. Develop, review and practice appropriate procedures. Make certain that your people are well trained and conversant in these procedures. Apply the available software tools and link with Siemens PTI to shore up those indefinite areas.