✓ NERC Standards and Standards Compliance – Still a Work in Progress?

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NERC Standards and Standards Compliance

It’s a challenging time for companies in the electric industry. One reason: the ongoing changes in the regulatory environment, particularly the new North American Electric Reliability Corporation (NERC) reliability standards. Currently, 102 approved reliability standards exist,¹ and the number seems to increase every month. These new standards dictate more than 1,000 requirements and sub-requirements for transmission owners and operators and generation owners and operators who risk paying financial penalties of up to $1 million per day if they fail to comply.²

Since the June 2007 approval of the NERC reliability standards³ utilities around the country have been busy evaluating their compliance in terms of current operating procedures as well as documentation/evidence necessary to show compliance. Many companies have found that the level of effort required to conduct this compliance self-assessment, address any mitigation issues, and assemble the relevant documentation is much greater than they anticipated.

SOME HISTORY

The largest blackout in North American history occurred on August 14, 2003, impacting 50 million people and more than 61,000 MW of load in the United States and Canada.⁴ This event posed a significant set of challenges to regulatory bodies as well as utilities in North America. NERC was challenged to demonstrate that its reliability standards for electric utilities were unambiguous, measurable, and enforceable.

The U.S./Canada Power System Outage Task Force’s final report of April 5, 2004 recommended that NERC reevaluate its existing reliability standards development process and accelerate the adoption of enforceable standards.⁵ An April 19, 2004 order of the Federal Energy Regulatory Commission (FERC) stated a policy objective addressing the need to expeditiously modify NERC reliability standards to make these standards clear and enforceable.⁶

Maintaining reliability on the transmission grid is a complex process that requires skilled operators, sophisticated systems, integrated communication protocols, and careful planning and design. NERC and its regional councils have developed system operating and planning standards for ensuring reliability of the interconnected transmission grid that are based on seven key concepts:⁷

1. Balance power generation and demand continuously
2. Balance reactive power supply and demand to maintain scheduled voltages
3. Monitor transmission line flows and other facilities to ensure thermal limits are not exceeded
4. Keep the system in a stable condition
5. Operate the system so that it remains in a reliable condition even if a contingency condition occurs, such as a loss of a key generator or a transmission facility
6. Plan, design, and maintain the system to operate reliably
7. Prepare for emergencies

NERC standards and guidelines have been in place for many years, but as the 2003 blackout illustrated, the level of compliance with these standards and guidelines by individual transmission entities varied considerably. As of June 18, 2007, compliance with reliability standards became mandatory and enforceable (FERC Order No. 693).⁸ FERC certified NERC as the Electric Reliability Organization (ERO) and stated that NERC will administer and enforce standards and delegate compliance responsibilities to regional reliability councils (RRCs). NERC reliability programs include
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standards, compliance, reliability performance, reliability readiness and improvement, training and education, and situation awareness and infrastructure security. Standards administration and enforcement processes include readiness audits, compliance audits, investigations, and assessment and assignment of penalties and sanctions. Penalties can range from $1,000 to $1 million per day, per violation, and there are also non-financial sanctions. The process can include regional hearings and appeals by the entity that was disciplined.9

APPROVED RELIABILITY STANDARDS

Figure 1 illustrates the categories of approved NERC reliability standards.10 They include emergency operations, reliability and service-related activities, and planning and operating activities that embody the seven transmission reliability key concepts described previously.

Figure 1.

Specific compliance with each standard is driven in large part by the functional responsibility of the transmission entity. Transmission owners, balancing authorities, transmission operators, and reliability coordinators all have differing standard-adherence requirements, depending on their functional roles and responsibilities and the specific activities they perform relative to the transmission grid.11

Compliance, as now defined by the NERC standards, means that entities must be able to prove they meet all of the operational and administrative requirements of each standard. The required method of proof is detailed, up to date, and integrated documentation of policies, processes and procedures that demonstrate operational compliance. It is no longer acceptable to show that an entity’s operations are consistent with the intent or purpose of a policy. Rather, having explicit evidence is now the “standard” and adjustment to these new requirements is critical. One utility employee stated this paradigm shift
succinctly: "proving versus showing" compliance. Utility organizations throughout North America are struggling due to the lack of precedence for the depth and breadth of documentation required.

The level of detail required for this supporting documentation is significant. As reported in the October 2, 2007 edition of SNLi, David Hilt, Vice President and Director of Compliance at NERC, said recently “(we’ve been at this for two years, and we’re (now) beginning to understand what kind of resources this is going to take. The bulk of what we’re seeing is documentation violations – people who are probably doing the right things, but not documenting it correctly.”¹² NERC and FERC continued to encourage self-reporting of violations and, through the second half of 2007, had been light-handed with the assessment of financial penalties. However, based on information in NERC’s most recent Implementation Plan and Sanction Guidelines, this stance will likely change in 2008.¹³

EMERGENCY OPERATING PROCEDURES

Emergency Operating Procedures (EOPs) can be used to illustrate the tremendous breadth and depth of the NERC standards, as well as the level of documentation required to provide “evidence” of compliance for the auditor. EOPs, which are but one of the twelve areas of compliance illustrated in Figure 1, have nine distinct standards:¹⁴

- EOP-001: Emergency Operations Planning
- EOP-002: Capacity and Energy Emergencies
- EOP-003: Load Shedding Plans
- EOP-004: Disturbance Reporting
- EOP-005: System Restoration Plans
- EOP-006: Reliability Coordination – System Restoration
- EOP-007: Establish, Maintain, and Document a Regional Blackstart Capability Plan
- EOP-008: Plans for Loss of Control Center Functionality
- EOP-009: Documentation of Blackstart Generating Unit Test Result

Each of these EOP standards has a series of requirements that detail specific responsibilities of the transmission entity. To continue the illustration of the breadth and depth of the NERC standards, we will further break down EOP-001 (Emergency Operations Planning), which is one of the more important and certainly the most comprehensive of the compliance standards. The sidebar describes the various requirements of EOP-001 (displayed as R1, R2, R3, etc.).¹⁵

Not only are there myriad requirements within EOP-001, but some also can be found in other standards and frequently require interrelationships with other interconnected balancing authorities and/or transmission operators. Also, specific compliance responsibilities are often shared with other entities, such as reserve sharing groups. As an example, to address the requirements for EOP-001, documentation from COM-002 (Communication and Coordination), TPL-002, 003 and 004 (System Performance), and IRO-004 and IRO-005 (Reliability Coordination) must be incorporated.¹⁶ The relationships with neighboring and remote balancing authorities (BAs) must be described, and the nature and scope of a utility’s system planning initiatives must be documented, along with how those initiatives are coordinated broadly with other utilities in the reliability coordination area.¹⁷
EOP-001 Emergency Operations Planning

R1: Balancing Authorities (BAs) shall have operating agreements with adjacent BAs that shall, at a minimum contain provisions for emergency assistance, including provisions to obtain emergency assistance from remote BAs.

R2: The Transmission Operator (TO) shall have an emergency load reduction plan for all identified Interconnection Reliability Operating Limits (IROLs). The plan shall include the details on how the TO will implement load reduction in sufficient amount and time to mitigate the IROL violation before system separation or collapse would occur. The load reduction plan must be capable of being implemented within 30 minutes.

R3: Each TO and BA shall:
- Develop, maintain, and implement a set of plans to mitigate operating emergencies for insufficient generating capacity
- Develop, maintain, and implement a set of plans to mitigate operating emergencies on the transmission system
- Develop, maintain, and implement a set of plans for load shedding
- Develop, maintain, and implement a set of plans for system restoration

R4: Each TO and BA shall have emergency plans that will enable it to mitigate operating emergencies. At a minimum, TO and BA emergency plans shall include:
- Communications protocols to be used during emergencies
- A list of controlling actions to resolve the emergency. Load reduction, in sufficient quantity to resolve the emergency within NERC-established timelines, shall be one of the controlling actions
- The tasks to be coordinated with and among TOs and BAs
- Staffing levels for the emergency

R5: Each TO and BA shall include the following elements when developing an emergency plan:
- Fuel supply and inventory – An adequate fuel supply and inventory plan that recognizes reasonable delays or problems in the delivery or production of fuel
- Fuel switching – Fuel switching plans for units for which fuel supply shortages may occur, e.g., gas and light oil
- Environmental constraints – Plans to seek removal of environmental constraints for generating units and plants
- System energy use – The reduction of the system’s own energy use to a minimum
- Public appeals – Appeals to the public through all media for voluntary load reductions and energy conservation including educational messages on how to accomplish such load reduction and conservation
- Load management – Implementation of load management and voltage reductions, if appropriate
- Optimize fuel supply – The operation of all generating sources to optimize the availability (of fuel)
- Appeals to customers to use alternate fuels – In a fuel emergency, appeals to large industrial and commercial customers to reduce non-essential energy use and maximize the use of customer-owned generation that rely on fuels other than the one in short supply
- Interruptible and curtable loads – Use of interruptible and curtable customer loads to reduce capacity requirements or to conserve the fuel in short supply
- Maximizing generator output and availability – The operation of all generating sources to maximize output and availability. This should include plans to winterize units and plants during extreme cold weather
- Notifying IPPs – Notification of cogeneration and independent power producers to maximize output and availability
- Requests to appropriate government agencies to implement programs to achieve necessary energy reductions
- Load curtailment – A mandatory load curtailment plan to use as a last resort. This plan should address the needs of critical loads essential to the health, safety, and welfare of the community. Address firm load curtailment
- Notifications of appropriate government agencies as the various steps of the emergency plan are implemented
- Notifications to other operating entities as steps in emergency plan are implemented

R6: The TO and BA shall annually review and update each emergency plan. The TO and BA shall provide a copy of its updated emergency plans to its Reliability Coordinator and to neighboring TOs and BAs.

R7: The TO and BA shall coordinate its emergency plans with other TOs and BAs as appropriate. This coordination includes the following steps, as applicable:
- The TO and BA shall establish and maintain reliable communications between interconnected systems
- The TO and BA shall arrange new interchange agreements to provide for emergency capacity or energy transfers if existing agreements cannot be used
- The TO and BA shall coordinate transmission and generator maintenance schedules to maximize capacity or conserve the fuel in short supply. (This includes water for hydro generators)
- The TO and BA shall arrange deliveries of electrical energy or fuel from remote systems through normal operating channels
Reliability standards consist of sets of requirements that define responsibilities of the various entities (reliability coordinators, balancing authorities, transmission operators, generation operators) and for whom each of the requirements are applicable. Sorting through the necessary demonstrations of evidence, documentation procedures, and other activities associated with each standard can be intimidating. With the myriad compliance requirements, preparing for a successful NERC audit should be approached in the same manner a company plans a major construction project. The drive to compliance readiness requires strong leadership to push and change the cultural norms of the organization. The compliance effort should be carefully scoped and a project plan assembled to guide the organization in developing the following:

- A compliance plan to ensure all areas are NERC compliant
- An audit readiness process to prepare for self-certification, self-reporting, compliance audits, spot checks and readiness evaluations
- A process to review and update the compliance documentation on an annual basis
- A method to ensure clear alignment between documentation compliance and training, operational proficiency, and results

COMPLIANCE PLANNING

Compliance planning involves more than just thinking through the likely questions that will be asked in a NERC compliance audit. Instead, it should be considered a comprehensive “risk management program” that requires the participation of several key corporate entities such as operations, finance, risk management, regulatory, training, external affairs, and communications. Having a compliance plan with clear accountabilities, a clear picture of what compliance looks like, and a timetable to achieve it, is at the center of any carefully designed NERC compliance plan. While the immediate impacts of non-compliance are usually felt at the transmission organization level, the specific non-compliance risks for each business activity across the enterprise should be identified and evaluated where possible, and mitigation plans for all impacted organizations should be developed. For example, fuel supply, generation dispatch, and transmission operations personnel are all involved in the operation of the bulk electric system and should be included in the scope of the risk assessment and compliance plan.

Like an enterprise risk management program, NERC compliance management is all about choices and accountability. The culture of compliance within an organization is one of the key metrics in determining not only an entity’s commitment to operating satisfactorily under the requirements of the standards, but also in the potential level of sanctions to be levied upon a verified violation. In this case, “walking the talk” can be financially beneficial. Compliance oversight responsibilities could reside within the transmission operations organization or be centralized at the enterprise level (in the regulatory or enterprise risk management area). In any case, significant senior management involvement is essential. Compliance management must become an integral part of the entity’s ongoing management processes and daily operational tasks. Once a culture of compliance is established, entities can look forward to periodic compliance audits, spot checks, and other investigations triggered by scheduled evaluations or system contingencies. Being confidently prepared for such evaluations is a key feature of a robust compliance program.

In addition, the communication of the overall compliance plan, as well as the expectations of all employees for ongoing compliance, is essential. One utility went so far as to establish a program
management office for NERC compliance to formalize responsibilities, ensure appropriate senior management attention, implement detailed monitoring and reporting processes, and disseminate status updates throughout the organization on an ongoing basis.18

AUDIT READINESS PROCESS

Transmission owners, operators, balancing authorities, and other entities are all subject to audits by the RRC. Audits consist of a detailed and thorough review of documentation across several dimensions. Auditors are looking for “evidence” (a NERC audit worksheet term) that the entity is in complete compliance with the standard.19 Audit readiness begins with an internal assessment of the compliance program and supporting documentation within the transmission organization and all other applicable corporate areas. However, NERC has not created a situation where transmission entities must guess how compliance will be measured. They provide detailed audit worksheets that directly indicate what is important to the success of the audited entity.20 NERC is interested in proof that a transmission entity is in compliance with each standard. When the audit is completed, each standard requirement will be assessed, with specific risk factors noted for each requirement of each standard. Figure 2 shows a NERC “Audit Compliance Finding Summary Table,” which can be found in the Reliability Standard Audit Worksheets.21 It illustrates how audit observations will be rolled up for each of the standards (Figure 2 is the audit compliance summary table for EOP-001).

<table>
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<th>Non-Compliant (Severity Level)</th>
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<tr>
<td></td>
<td></td>
<td>Level 1 (Lower)</td>
</tr>
<tr>
<td>R1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
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</tr>
<tr>
<td>R3</td>
<td></td>
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<tr>
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</tr>
<tr>
<td>R6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7</td>
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</tr>
</tbody>
</table>

Figure 2.

As one can see, the preparation for an audit of just EOP-001 can be very time consuming. Typical audits encompass many different standards, which translates into a significant amount of documentation management for the utility. Many utilities are using various documentation management tools to address this issue.

An overall audit readiness process typically includes the following steps:

Step 1 - Develop a compliance process
Step 2 - Identify all applicable standard requirements and measures
Step 3 - Perform an evaluation of all standards compliance documentation
Step 4 - Address any deficient documentation, monitor progress to completion, and ensure future auditability

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Step 1 is the development of the process or procedures used to review all compliance documentation, remediate all deficiencies, and maintain the compliance readiness process over time. Companies can follow a process illustrated in Figure 3 or use detailed checklists.

**Figure 3.**

Step 2 simply entails reading through the NERC standards and determining those applicable to the organization based on its transmission system responsibilities.

Step 3 is the internal assessment portion of the process and consists of locating and compiling all compliance documentation, reading all documentation for content relative to the standards/requirements, and determining any gaps that may exist. **Figure 2**, which is a NERC Audit Compliance Finding Summary Table, is useful for recording any observations for the gap analysis. Several key dimensions should be considered when evaluating the completeness of compliance documentation:

- **Availability**: Do documents exist that can demonstrate that the specific requirements of a standard can be met?
- **Organization**: If the documentation exists, is it organized in a logical way?
- **Access**: If the documentation does exist, is it accessible to the people who need to use the documentation?
- **Navigation**: Is it easy to move from section to section in the documentation or are there circular references and/or references to documentation that does not exist?
- **Terminology**: Is there consistent terminology used throughout the documents of record?
- **Training**: Have the operators been trained on any new procedures or processes reflected in the documentation?
- **Structure**: Is the documentation electronic or in hard copy only? Is the documentation format consistent from standard to standard?
- **Version Control**: Are the documents current? Are there clear owners of the documentation?

In some cases, utilities are using their own internal audit functions to conduct these reviews.

Step 4 is the gap closure effort in which any weaknesses identified in step 3 are addressed. Also included in this step is the development of a sustainability model for maintaining the documentation (NERC requires annual updating) and compliance readiness going forward.
CLEAR ALIGNMENT WITH OPERATIONAL RESULTS

Due to their importance, NERC has designated three key areas of focus for reliability: vegetation management, protection system performance and coordination, and cyber security. However, each of these areas has experienced challenges since the establishment of NERC standards:

- Vegetation management – there have been eight 230kV or higher voltage line outages reported since April 2007
- Protection system performance and coordination – there have been four recent near misses, indicating a continued need for attention
- Cyber security – with obvious national attention, but also with all new standards entities are struggling to address

So is NERC compliance merely a paper exercise or does it actually aid in improving system reliability? Has system performance improved since the implementation of the standards? The short answer is: not yet. Figure 4 summarizes NERC’s own event tracking data base.24

<table>
<thead>
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<th>Impact</th>
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<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>T Loss = 1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T Loss &gt; 1 or G Loss &lt; 2,000 MW</td>
<td>17</td>
<td>16</td>
<td>8</td>
<td>22</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>G Loss &gt; 2,000 MW or L Loss &lt; 1,000 MW</td>
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<td>20</td>
<td>19</td>
<td>12</td>
<td>11</td>
<td>9</td>
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<td>4</td>
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<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Blackout</td>
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<td></td>
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<tr>
<td></td>
<td>L Loss &gt; 10,000 MW</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td>39</td>
<td>27</td>
<td>37</td>
<td>29</td>
<td>18</td>
</tr>
</tbody>
</table>

Figure 4.

The recent outage in south Florida also serves to illustrate that the results so far are mixed, at best. In a recent SNLi article,25 NERC CEO Rick Sergel initially applauded the efforts of Florida utilities to restore power after a south Florida system disturbance on February 26, 2008 led to the loss of multiple power plants and 26 transmission lines that cut power to millions of customers. NERC categorized the event as a "Category 4" system disturbance. (The NERC event classification system is designed to designate the severity of bulk power system disturbances and has five levels, with Category 5 the most severe.) "We commend the restoration efforts conducted by the affected utilities yesterday," Sergel said in a statement. "Their ability to restore power quickly and effectively to the hundreds of thousands of consumers affected by the outage clearly exemplifies excellence in planning and the execution of those plans."

Sergel, who said NERC is investigating the disturbance, added, "While we can't predict the timetable of analysis, information collected by new monitoring technologies, called 'synchro-phasors,' will enable our teams to analyze (the) outages more quickly than in the past. This new technology is like the MRI of bulk power systems, giving operators and analysts more granulated data and helping them to dissect and piece together the events that occurred step by step, microsecond by microsecond."
A week later, SNLi reported that the widespread blackout that struck south Florida was caused by a Florida Power & Light Co. (FPL) field engineer who improperly disabled two relays at a substation while seeking to diagnose a faulty switch. In performing the diagnosis of the faulty switch, the employee contacted an off-site dispatcher to bring the switch back into service under the belief that it was working properly, but the system then short-circuited and, because the two relays had been disabled, the short-circuit could not be isolated from the rest of the grid. That event caused a system-wide reduction in voltage that resulted in power plants at three different FPL facilities tripping offline.

The maintenance, according to FPL president and CEO Armando Olivera, was done contrary to FPL's standard procedures, and the relays—one that would isolate the piece of equipment from the rest of the substation and one that isolated the substation from the rest of the grid—were disabled without authorization.

"Under normal conditions [an employee] can disable one, but never disable two," Olivera said during a conference call with the media. He noted that had the substation-level relay been in service, a few thousand customers at most would have been affected and potentially none would have experienced an outage. "We don't know still, why that particular employee took it upon himself to disable both sets of relays," he said, adding that the utility has taken interim steps to add oversight to a number of activities and provide additional employee training on performing system maintenance.

One key issue likely to be posed by auditors is whether the compliance documentation is used to augment actual operations. Operators are “where the rubber meets the road.” Utilities able to demonstrate that existing job aids and training programs improve (or better still, have improved) performance will go a long way towards a favorable audit determination. As such, trainers play a vital role in the compliance process. There are explicit training requirements in certain standards and implicit requirements in others (for example, the operators "shall know," and “shall be aware,” etc.) with training records as necessary evidence.

**PROCESSES ARE STILL EVOLVING**

Finally, it is important to note that the NERC and RRC audit processes are still evolving. Many utilities have not yet completed their first compliance audit. While NERC has the responsibility to ensure consistency of audit outcomes and penalties, there is still a wide variability of enforcement across RRCs. Some standards are incomplete, while others are unclear. Most importantly however, there is no history of precedents to rely upon. As a result, there is some inconsistency between regions on various interpretations and expectations.

Nevertheless, utilities should expect a meticulous and methodic audit process. If a standard says “operators shall do A and B,” expect the auditor to say: “Show me how you do A; then show me how you do B.” Utilities that have effective compliance processes in place and complete their audit readiness checks by preparing a rigorous element-by-element checklist for each standard to ensure all documentation is available will fare the best.

Based on some early audits, companies have found that their initial compliance self-assessment was lacking. Expectations were not understood, and the scope of required compliance documentation was underestimated [in terms of level of detail and the “burden of proof (i.e., the need for “audit trail”
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quality]). The implication—an immediate increase in the level of effort and commitment to the compliance process—is required to avoid penalties and/or sanctions.

An effective self-reporting and compliance process requires:

- A fully developed and documented plan for compilation/development of auditable documentation
- A complete and robust self-assessment plan
- Ongoing coordination and communication within the company, with NERC and with the RRCs

CLOSING

The August 2003 blackout served as a wake-up call to all of North America. Several years of detailed assessment and planning by transmission governing bodies has provided a method of systematically improving the integrity of the transmission grid. It should be noted, however, that this is only one aspect of the “transmission solution” in North America. Strengthening the transmission infrastructure by constructing and upgrading the network continues to be a major challenge. Transmission is the superhighway for generation of any size and technology type, and a reliable grid remains vital to the security and economic wellbeing of the nation. NERC compliance is important, but it must be coupled with a viable infrastructure and relentless pursuit of operating excellence.

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Endnotes


2 From the “Background NERC Reliability Standards” page of the NERC website at ftp://www.nerc.com/pub/sys/all_updl/standards/StandardsBackground.pdf in the Overview section

3 From the “Background NERC Reliability Standards” page of the NERC website at ftp://www.nerc.com/pub/sys/all_updl/standards/StandardsBackground.pdf in the Overview section


8 The complete order can be found on the NERC website at ftp://ftp.nerc.com/pub/sys/all_updl/docs/ferc/order_693.pdf

9 The “NERC Compliance Monitoring and Enforcement Program Overview” process map, as depicted on page 6 and further detailed in “Attachment 2 – Compliance Enforcement Authority Hearing Process” of Appendix C: Uniform Compliance Monitoring and Enforcement Program of the North American Electric Reliability Corporation (issued April 19, 2007), provides details related to the hearings and appeals process which is available at ftp://ftp.nerc.com/pub/sys/all_updl/rop/Appendix4C-Uniform-CMEP-eff-041907.pdf

10 All of the approved NERC Standards are located on the NERC website at http://www.nerc.com/~filez/standards/Reliability_Standards_Regulatory_Approved.html


12 Ryan Self, NERC continues ‘year of transition’ with adoption of mandatory reliability standards, SNLi (on-line) (October 2, 2007)

13 NERC, Compliance Monitoring and Enforcement Program 2008 Implementation Plan Version 1.7 (September 26, 2007) and Sanction Guidelines of the North American Electric Reliability Corporation, Effective January 15, 2008

14 All of the approved NERC Standards are located on the NERC website at http://www.nerc.com/~filez/standards/Reliability_Standards_Regulatory_Approved.html

15 The requirements of each NERC Standard can be viewed on the NERC website at http://www.nerc.com/~filez/standards/Reliability_Standards_Regulatory_Approved.html by clicking on a standard

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For example, COM-002 R1 requires that, “Each Transmission Operator, Balancing Authority, and Generator Operator shall have communications (voice and data links) with appropriate Reliability Coordinators, Balancing Authorities, and Transmission Operators. Such communications shall be staffed and available for addressing a real-time emergency condition. R1.1. Each Balancing Authority and Transmission Operator shall notify its Reliability Coordinator, and all other potentially affected Balancing Authorities and Transmission Operators through predetermined communication paths of any condition that could threaten the reliability of its area or when firm load shedding is anticipated.” EOP-001 also has requirements related to firm load shedding.

For example, EOP-001 R4.4 requires that, “Each Transmission Operator and Balancing Authority shall have emergency plans that will enable it to mitigate operating emergencies. At a minimum, Transmission Operator and Balancing Authority emergency plans shall include: The tasks to be coordinated with and among adjacent Transmission Operators and Balancing Authorities.” And in IRO-004 R3, “Each Reliability Coordinator shall, in conjunction with its Transmission Operators and Balancing Authorities, develop action plans that may be required, including reconfiguration of the transmission system, re-dispatching of generation, reduction or curtailment of Interchange Transactions, or reducing load to return transmission loading to within acceptable SOLs or IROLs.” Both can be found at [http://www.nerc.com/~filez/standards/Reliability_Standards_Regulatory_Approved.html](http://www.nerc.com/~filez/standards/Reliability_Standards_Regulatory_Approved.html) by clicking on a standard.

San Diego Gas & Electric

The call for evidence can be found in Reliability Standard Audit Worksheets (RSAWs) on the NERC website at [http://www.nerc.com/~comply/auditor_resources.html](http://www.nerc.com/~comply/auditor_resources.html).

RSAWs can be found on the NERC website at [http://www.nerc.com/~comply/auditor_resources.html](http://www.nerc.com/~comply/auditor_resources.html).

RSAWs can be found on the NERC website at [http://www.nerc.com/~comply/auditor_resources.html](http://www.nerc.com/~comply/auditor_resources.html).

The NERC Audit Compliance Finding Summary table can be found in the RSAW templates in the Compliance Finding Summary section.

Northeast Utilities and Calpine

From the NERC Event Tracking Database as presented at the EUCI Conference on Meeting NERC Reliability Requirements, February 26-27, 2008 in Atlanta, GA

Andrew Engblom, *FPL: Human error caused south Florida blackout, SNLi (on-line)* (February 29, 2008)