NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Independent Experts Review Project

An Independent Review by Industry Experts

RELIABILITY | ACCOUNTABILITY




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Executive Summary

The North American Electric Reliability Corporation (NERC) retained five industry experts (Team) to independently review the NERC Reliability Standards, setting the foundation for a plan that will result in a set of clear, concise and sustainable body of Reliability Standards. The primary scope was an assessment of the content and quality of the Reliability Standards, including identification of potential Bulk-Power System (BPS) risks that were not adequately mitigated (gaps[1]). As standards are evolving, the project addressed two sets: requirements Enforceable in 2013[2] and those that are Future Enforceable[3]. A secondary task was to suggest an improved organizational structure for the standards, if beneficial. However, the Critical Infrastructure Protection (CIP) standards were not addressed as they require specialized expertise.

The Team established an assessment process to develop recommendations for each requirement. The initial assessment determined whether a requirement should be retired. The remaining requirements were given a content and quality grade. A reliability risk level was assigned and the Team recommended prioritization of future work based on their risk and grades.

Key findings were as follows:

1. Through the application of a consistent set of criteria that included the NERC Reliability Principles, Paragraph 81 criteria, and a qualitative risk assessment, the Team recommended retirement of 147 requirements (36 percent) and retaining 257 in the Future Enforceable set. Namely, based on the Team's assessment, non-reliability requirements exist in the standards which do not contribute to managing reliability risks. The Team further recommended consolidation within the retained requirements resulting in 232 requirements, with an overall requirement reduction of 43 percent. The recommended retirement and consolidation of requirements would enable industry to focus on impactful activities without increased risk to reliability.
2. Of the 257 retained Future Enforceable requirements, the Team found
    a. Eighty one (81) requirements are in "Steady-State"[4] (i.e., no work needed), and
    b. One hundred seventy six (176) requirements need further enhancement to address content and quality issues.
3. Gaps were identified where risks to reliability are not adequately mitigated in the current set of standards: outage coordination, governor frequency response, situational awareness models, and clear three-part communications.
4. While significant improvements were found in recently developed standards, the majority are not yet at Steady-State. The updated standards have 21 percent fewer requirements than those they replaced, resulting in standards that are more focused on the most important activities for reliability. However, improvement in quality and content are required to reach Steady-State.

The Team made the following key near- and long-term recommendations:

1. Remove the recommended 147 requirements from the Actively Monitored List,[5] and retire them. Focus initial improvement efforts on 16 high-risk standards with lower content scores.
2. Continue development of risk-based approaches to identify high priority reliability issues that need to be addressed by a standard, e.g., Reliability Issues Steering Committee (RISC) and Events Analysis.
3. Realign the standards from the current 14 families into 10 families grouped by functions needed for reliability.
4. Address identified gaps.
5. At an appropriate time in the CIP standards development, conduct an evaluation of the CIP requirements using a team of physical security, cyber security and power system operations experts.

[1] The areas where risks to the BPS are not adequately mitigated in the standards may be referred to as "gaps" throughout this report.

[2] The Team defined Reliability Standards that are currently enforceable or will become enforceable in 2013 as the "Enforceable in 2013" set of Reliability Standards.

[3] The "Future Enforceable" group of standards and requirements include Enforceable in 2013 standards and those that have been approved by the Board or by the FERC and are currently pending enforceability. Requirements that will be replaced by the approved standards were not included in this group.

[4] Steady-State was defined as standards that meet the quality and content criteria defined in this report. They are clear, concise, sustainable (stable), necessary for accountability, and sufficient to maintain the reliability of the BPS. These standards do not require further work absent a change in risks, technology, practice, or other impetus.

[5] The Electric Reliability Organization's (ERO) Compliance Monitoring and Enforcement Program (CMEP) Annual Implementation Plan is the annual operating plan for compliance monitoring and enforcement activities. The 2013 Implementation Plan includes a set of Reliability Standards (Actively Monitored List) that were selected based upon ERO-identified high-risk priorities and a three-tiered approach to compliance auditing.

Chapter 1 – Overview

This review is focused on developing a foundation for a plan that transforms NERC's[6] current set of standards to a body of clear, concise, sustainable (stable) standards necessary for accountability and sufficient to maintain the reliability of the BPS (Steady-State). Steady-State standards are both necessary and sufficient to ensure that Registered Entities carry out their responsibilities under the Functional Model in a manner that maintains an Adequate Level of Reliability.[7]

Both industry and the Federal Energy Regulatory Commission (FERC) have raised the concern[8] that there are too many requirements and a significant number of which do not contribute materially to the reliability of the BPS. This creates several challenges: (1) registered entities may lose focus on the most critical matters that can adversely impact reliability, (2) large amounts of industry resources, such as technical expertise, money and time, are diverted from high priority activities in order to demonstrate compliance, and (3) significant resources are dedicated to participate on standards drafting teams, reviewing and commenting on proposed new standards.

NERC retained five industry experts (Team) to independently review the NERC Reliability Standards, setting the foundation for a plan that will result in a set of clear, concise, and sustainable body of Reliability Standards. The primary scope was an assessment of the content and quality of the Reliability Standards, including identification of potential BPS risks that were not adequately mitigated (gaps). Thirteen of the 14 families of standards were evaluated, consisting of 91 standards with 446 requirements that are enforceable, or will become enforceable, in North America. The CIP family, containing nine standards and 43 requirements, and regional standards, were not included in this review.

Team Composition

The Team consisted of five independent industry experts (Ed Ernst, Bill Thompson, Brian Silverstein, Jim McIntosh, and John Meyer) and a sixth participant from FERC (Darrell Piatt). The Team members have over 230 years of combined experience in the electric utility industry. Their areas of experience and competence included power systems engineering, relaying, transmission system planning, transmission and power system operations (including control center operations and dispatching, generation operations, transmission operations, and maintenance). The independent consultants brought executive leadership, experience from all three U.S. Interconnections, backgrounds working in investor-owned utilities (IOUs) and public power, and experience in both vertically integrated and regional transmission organizations/independent system operator (RTO/ISO) market environments and small entities. The Team also had experience working with the Canadian Provinces and Mexico. The FERC participant offered an additional perspective to the Team's discussions that included a thorough knowledge of previous FERC orders and an understanding of various requirements' contributions to BPS reliability. Biographies are provided in Appendix A.

NERC executive management team and staff provided overall NERC Management vision and oversight to the Team, including direction that the project should be an independent review and the results should include the Team's findings. In addition, NERC Standards Committee (SC) members participated at various times with the Team to observe and offer comments (generally no more than two SC members per meeting). The Team also requested that standard drafting team member representatives and informal development group members discuss the importance and history of certain requirements.

Scope of Work

The Team's scope of work was focused on conducting an independent review and evaluation of each requirement and sub-requirement of the non-CIP NERC Reliability Standards. The review assessed the current status of the NERC Reliability Standards and developed an understanding for the level of work necessary to transform the standards to Steady-State,

[6] NERC's mission is to ensure the reliability of the BPS. To accomplish this, NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the BPS through system awareness; and educates trains and ce rtifies industry personnel.

[7] The Adequate Level of Reliability Task Force and supporting documents can be located on the NERC website at: http://www.nerc.com/comm/Other/Pages/Adequate%20Level%20of%20Reliability%20Task%20Force%20ALRTF.aspx

[8] Concerns were raised at the FERC Technical Conference "Priorities for Addressing Risks to the Bulk Power System", which is located on the FERC website at: http://ferc.gov/EventCalendar/EventDetails.aspx?ID=5561&CalType=%20&CalendarID=116&Date=&View=Listview

along with the determination of any existing reliability gaps. As its secondary task, the Team identified a revised organizational structure for the standards to align them with reliability functions.

The Team conducted its detailed review and evaluation for (1) the standards Enforceable in 2013 and (2) the Future Enforceable version of the standards.

Enforceable in 2013	Future Enforceable
• Requirements that are currently enforceable	• Requirements that are currently enforceable and not proposed to be replaced by the Board or FERC
• Requirements that will become enforceable in 2013	• Requirements that will become enforceable in 2013 and are not proposed to be replaced by the Board or FERC
	• Requirements that are approved by the Board
	• Requirements that are approved by FERC

Table 1: Sets of Reliability Standards Examined

The findings and recommendations from this independent review, including the need for improvements, areas where risks to the BPS are not adequately mitigated in the standards (referred to herein as "gaps"), retirements, consolidations and the addition of a New Construct[9] serve as a foundation and guide for NERC's 2014–2016 Reliability Standards Development Plan (RSDP). Further, the results and recommendations offer guidance to existing and future drafting teams.

Relationship to Other Activities

The Team noted the importance of continued concurrent development of the NERC initiatives outlined below, and incorporated a number of existing and ongoing activities into its assessment.

- **Paragraph 81**

  Paragraph 81[10] is an initiative focused on retiring requirements that either: (a) provide little protection to the BPS, (b) are unnecessary, or (c) are redundant. This initiative is being conducted in two phases — Phase 1 identified 34 requirements for retirement and was filed with FERC on February 28, 2013. Phase 2 will review more complex candidates identified by industry. The Team used the Paragraph 81 criteria as one of the tests to determine if a requirement would be recommended for retirement. The Team also cross-checked its findings with the Phase 2 candidates, and used this comparison to stimulate verification discussions.

- **Current Standards Development Work**

  The current development work identified in the 2013-2015 RSDP will bring the ERO's standards program current with its obligations to address regulatory directives and conduct five-year reviews of all standards, all within (or earlier than) the plan's 2013-2015 time horizon. This work must be completed to lay a foundation for implementation of the strategic recommendations identified in this report. There is urgency to complete work in 2013, while maintaining the quality of the projects, so work can begin as soon as the 2014-2016 RSDP is endorsed by the Board.

  Efforts that have been ongoing in the standards area include:

  - Complete five-year reviews and on-going standards development projects;

[9] "New Construct" refers to a new organizational structure for the Reliability Standards. The sections of the new structure are explained in Chapter 4 of this report and outlined in Appendix C.

[10] Paragraph 81 refers to this paragraph in the March 15, 2012 FERC Order Accepting with Conditions the Electric Reliability Organization's Petition Requesting Approval of New Enforcement Mechanisms and Requiring Compliance Filing; *North American Electric Reliability Corporation,* 138 FERC ¶ 61,193 at P 81 (2012).

- Resolve outstanding FERC directives;
- Increased efficiencies and effectiveness of the Standards Development Process, including the addition of informal development activities to assess direction prior to formal standards development; and
- Support the Team's review of the Reliability Standards.

Because the Team's activities occurred simultaneous with the aforementioned projects, through NERC staff, the Team informed existing standard drafting teams and informal development groups of the recommendations for specific requirements. Through this, the Team's recommendations were then integrated into the ongoing activities.

- **Reliability Assurance Initiative**

The Reliability Assurance Initiative (RAI) seeks to implement a risk-based compliance monitoring approach, including consideration of an entity's internal controls to obtain a reasonable assurance of compliance with Reliability Standards. The initiative is also designed to support efforts related to Find, Fix and Track (FFT) enforcement concepts and a reasonableness approach to zero tolerance.[11]

This transformation initiative compliments the Team's recommendations. Standards and compliance fit together – the requirements set forth actions for which there must be accountability, and compliance verifies that accountability. However, industry must be able to focus on reliability during standards development, with confidence of how compliance will be assessed. The RAI will strive to make compliance expectations clear and conduct compliance assessment to foster learning wherever possible.

- **Events Analysis**

The Events Analysis department provides data to support decisions regarding where the ERO should focus its efforts. This group conducts Root Cause Analyses (RCAs) to determine what actions, or lack of actions, have the greatest impact on BPS reliability. While the database of the results is still in its infancy, the group has collected several years of data. Using this data, they have begun to draw initial inferences and develop more targeted research, follow-on questions, or verification of other data sources. In addition to the RCA database, the group is working to support the development of an industry near-miss database to enable the early identification of reliability issues and formulate interventions and remediation strategies to reduce the potential of disturbances.

The Team consulted with the Events Analysis group to determine if any of the requirements recommended for removal led or contributed to an event. The Events Analysis group provided support for the Team's recommendations with the understanding that this support was based on the available data. While the Team believes this will be very valuable in the future for prioritizing standards efforts, the current database of RCAs includes approximately 320 categorized events to date and will continue to grow. The Team encourages industry to support these efforts with timely and complete event analysis reports and participation in the cause code assignment process.[12]

- **Reliability Issues Steering Committee (RISC)**

The RISC is an advisory committee that reports directly to the Board. It triages and provides front-end, high-level leadership and accountability for nominated issues of strategic importance to BPS reliability. As a part of its work, the RISC reviewed 41 topics identified by NERC staff in terms of their potential threat to reliability. The RISC grouped these topics into broad risk areas, and then ranked each area as a High, Medium, or Low Priority. The Team used the RISC rankings as one way to validate its work.

[11] For further information regarding the RAI and whitepapers see the NERC website at: Reliability Assurance Initiative

[12] The Events Analysis Process Document can be located on the NERC website at: http://www.nerc.com/pa/rrm/ea/EA%20Program%20Document%20Library/ERO_Event_Analysis_Process_Document_Version_1_Feb_2012.pdf, and the NERC Cause Code Assignment Process can be located on the NERC website at: http://www.nerc.com/pa/rrm/ea/EA%20Program%20Document%20Library/NERC_Cause_Code_Assignment_Process_February_2013.pdf

Chapter 2 – Project Process

Evaluation Process and Criteria

Scoring System and Evaluation Flow Diagram

The Team created a flow diagram to ensure its evaluations were repeatable for every requirement. The flow diagram below took the Team through a series of specific questions for each requirement.

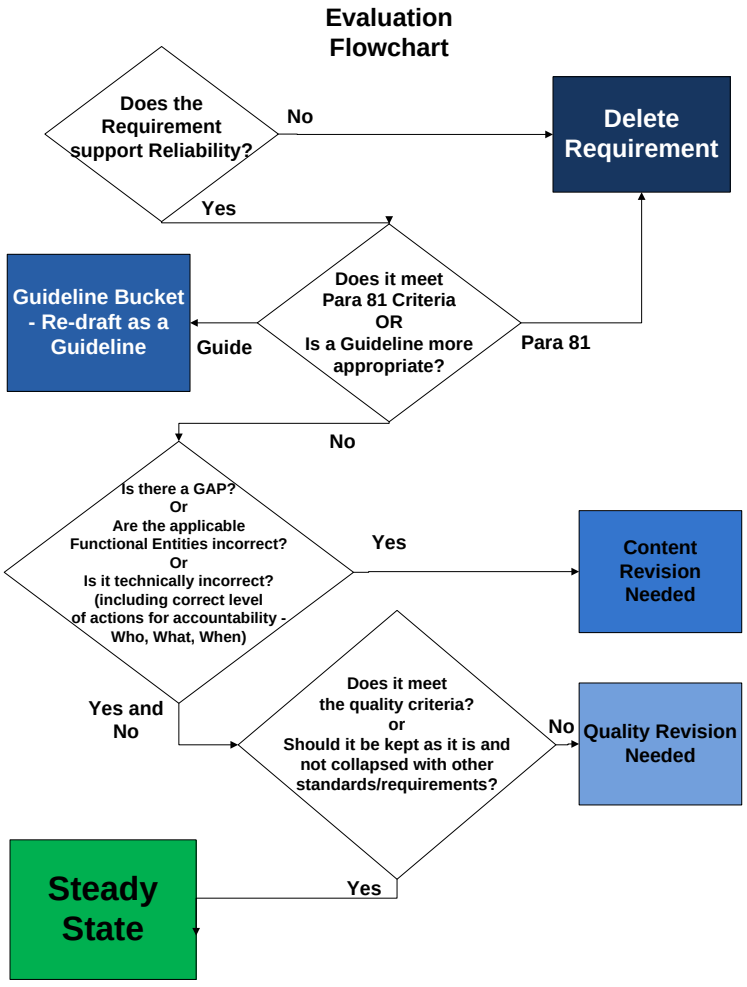

Figure 1: Evaluation Flow Chart

The evaluations began with the Team review of each requirement to determine if it:

- does not support a Reliability Principle,[13]
- meets the Paragraph 81 criteria,[14] or
- is better suited as a guideline.[15]

If the requirement met at least one of the above criteria, it was recommended for retirement. All remaining requirements should be retained, though some can be consolidated as noted below.

The Team then evaluated each requirement that was retained for content and quality (i.e., the scoring system). Specific criteria were identified that defined a Steady-State requirement—three criteria for content and twelve for quality—using the following documents:

- The NERC Functional Model
- NERC Rules of Procedure
- Ten Benchmarks for an Excellent Reliability Standard
- Acceptance Criteria of a Reliability Standard
- Results Based Standards materials development guidance
- FERC Order 672 (Order containing the 16 factors for a standard)
- FERC Order 693 (Order approving the initial body of Reliability Standards)
- Additional FERC Orders (including Order 748, Order 890, and Order 729)

Evaluation Criteria

After reviewing the above documents, the Team determined that the below criteria identified whether a requirement had reached Steady-State:

Content

1. Is the content of the requirement technically correct, including identifying who does what and when?
2. Are the correct functional entities identified?
3. Are the appropriate actions, for which there should be accountability, included or is there a gap?

Quality

1. Should the requirement stand alone as is or should it be consolidated with other standards?
2. Is it drafted as a results-based standard (RBS) requirement (performance, risk (prevention) or capability) and does it follow the RBS format (e.g., sub-requirement structure)?
3. Is it technologically neutral?
4. Are the expectations for each function clear?

[13] The Team evaluated the Reliability Principles and determined that the Reliability Principles required two additions. See Appendix B.

[14] The March 15, 2012 FERC Order Accepting with Conditions the Electric Reliability Organization's (ERO) Petition Requesting Approval of New Enforcement Mechanisms and Requiring Compliance Filing, *North American Electric Reliability Corporation,* 138 FERC ¶ 61,193 at P 81 provided the opportunity for the ERO to evaluate requirements, which resulted in the Paragraph 81 project. The Paragraph 81 criteria can located in the Phase 1 Technical Paper, which can be located on the NERC website at: http://www.nerc.com/pa/Stand/Pages/Project2013-02_Paragraph_81.aspx

[15] The NERC technical committees develop guidelines. The processes for each are contained in each committee's charter. The Planning Committee's Report/Reliability Guideline Approval Process for approving guidelines is contained in Appendix 4 of its charter; the Operating Committee's Reliability Guidelines Approval Process is contained in Appendix 3 of its charter.

5. Does the requirement align with the purpose?
6. Is it a higher solution than the lowest common denominator?
7. Is it measureable?
8. Does it have a technical basis in engineering and operations?
9. Is it complete and self-contained?
10. Is the language clear and does not contain ambiguous or outdated terms?
11. Can it be practically implemented?
12. Does it use consistent terminology?

Each requirement was given a score of 0 to 3 for content and 0 to 12 for quality, with 0 being the lowest score. Finally, each requirement was evaluated for risk to reliability based on the Team's experience, taking into consideration the ranking developed by the RISC and the violation risk factor (VRF) for each requirement.

Validation of Work

Following the evaluation for each requirement, the Team validated its work against other industry work to (1) ensure the body of requirements recommended for retention was sufficient to cover reliability needs, (2) determine if any requirements recommended for retirement should be retained based on industry data, and (3) validate the risk impact rating on each requirement. The Team's validation process did not focus on ensuring total agreement with past work, rather to confirm there was a valid basis for variances. In addition, work products were reviewed for consistency and data recording errors.

Specifically, the Team's validation process included the following:

1. A review was conducted of all of the requirements recommended for retention to make sure they were sufficient in scope to adequately address reliability. The Team used a new organization structure (New Construct – see Appendix C) for organizing standards that was based on the 2002 Standards Authorization Committee's "*White Paper on NERC's Set of Organization Standards*." This New Construct, which is described in Chapter 4, helped verify that the retained requirements were sufficient as well as how the requirements fit together.
2. Sufficiency of the requirements recommended for retention was verified by conducting a comparison to the NERC Functional Model.
3. Requirements recommended for retention were compared to the Paragraph 81 recommendations (both the Phase 1 and Phase 2 candidates) to determine whether any of the retained requirements should be reconsidered for retirement.
4. Consultation with the Events Analysis team determining if any of the requirements recommended for retirement led or contributed to an event.
5. Requirements considered for retirement were reviewed against their reported violation history.
6. Requirements considered for retirement were further reviewed against the current VRF and the RISC ranking. If these requirements had either a high VRF or a high RISC ranking, further validation was pursued to ensure that the retirement of the requirement would have minimal impact on the reliability of the BPS.

Chapter 3 – Results of Analysis

The Team documented its detailed analysis and recommended changes. The results can be used as a foundation and guidance towards NERC's 2014-2017 Reliability Standards Development Plan (RSDP).

Recommended for Retirement

A three-part test was used for initial screening of all requirements to determine if a requirement was needed to maintain the reliability of the BPS, as described in Chapter 2.

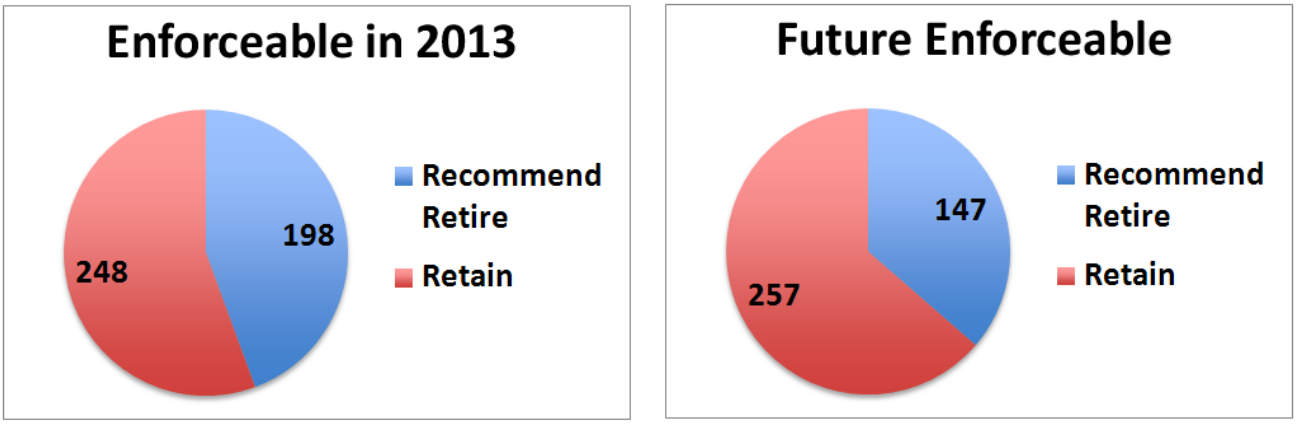

Figure 2: Retained and Retired Requirements

For the group of standards that are Enforceable in 2013, the Team found 44 percent of the requirements were not needed to maintain reliability and were recommended for retirement.[16] Although there were three tests under which a requirement could have received a recommendation for retirement, the majority (81 percent) were based on the Paragraph 81 criteria. Common reasons were:

- Does not support a Reliability Principle (*see,* Appendix B)
- Duplicative
- Addresses market issues, not a reliability matter
- Administrative or documentation

In fact, at the requirement level, 10 of the recommendations for retirement[17] in the Enforceable in 2013 set (eight in the Future Enforceable set) were already approved by the Board for retirement under Paragraph 81 Phase 1. There was progress made in eliminating unneeded requirements in the Future Enforceable set – the total number of requirements is reduced from 446 to 404, with only 36 percent recommended for retirement.

Content Scores

As the Team focused on improving requirements that should be kept, the content and quality evaluations examined only those requirements that remain after recommended retirements.[18] Content Scores represent the technical basis of a requirement and are scored of 0 to 3 based on the attributes given in Chapter 2.

[16] *See,* Appendix E for a table documenting the recommendations.
[17] There was a greater number at the sub-requirement level (34 in total, including CIP, within 19 Reliability Standards).
[18] The Team did not evaluate content and quality for the TPL standards that will be replaced by TPL-001-4, thus in the Enforceable in 2013, this standard family is not represented.

The Team found that in the Future Enforceable set, 124 out of 257 retained requirements (48 percent) were correct and complete from a content standpoint and received a score of 3. Because the Team agreed that a requirement should score a 3 to be considered Steady-State, the remaining requirements need to be part of NERC's transformation activities. The Team recognized incremental improvement from the Enforceable in 2013 set to the Future Enforceable set. The most common deficiencies include the need to identify all of the functional entities that the requirement should apply to and clearly describing required actions.

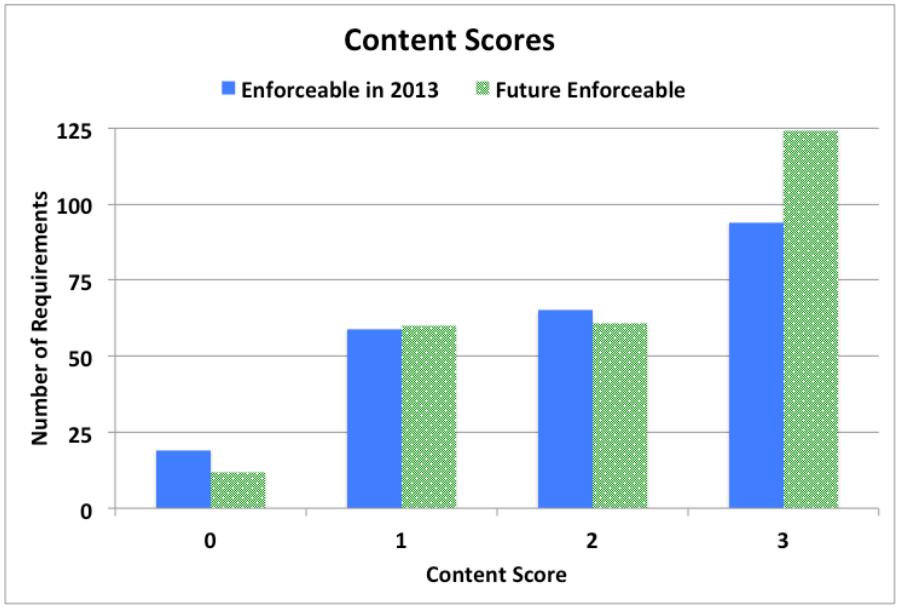

Figure 3: Content Scores

Quality Scores

Quality Scores represent how well a requirement is written, and are scored of 0 to 12 based on the attributes given in Chapter 2.

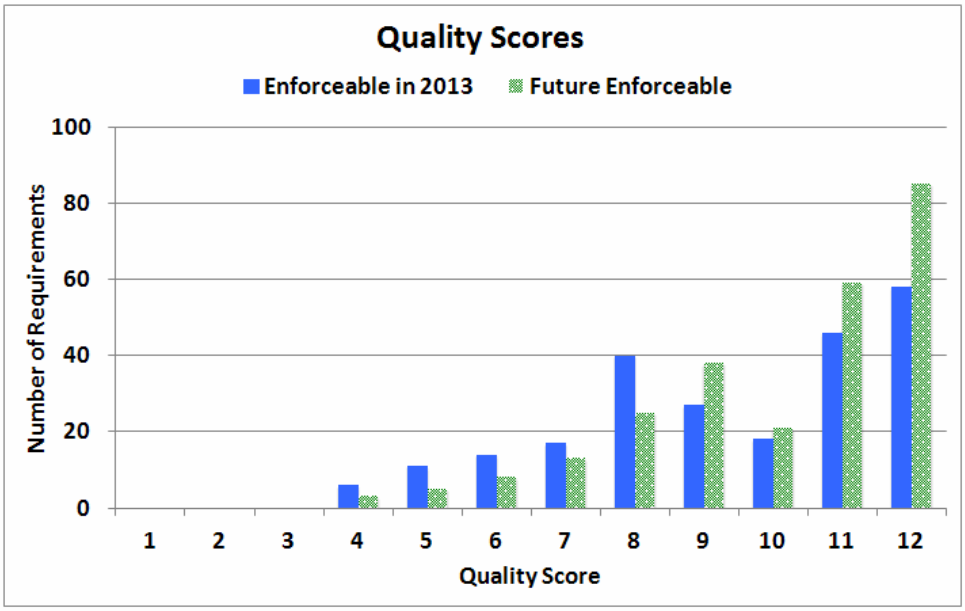

Figure 4: Quality Scores

While the Team identified some improvement from the Enforceable in 2013 set to the Future Enforceable set, significant improvement is still needed. Common deficiencies include requirements that were incomplete or not self-contained, contained unclear language, and were difficult to measure. The Team agreed that a Steady-State requirement should score between 11 and 12. Fifty-six percent of requirements are currently at this level.

Overall Results

The Team used the measures of content and quality to describe the status of the retained requirements, and concluded that a Content Score of 0, 1 or 2, or a Content Score of 3 with a Quality Score less than 11, indicates that a requirement should be enhanced.

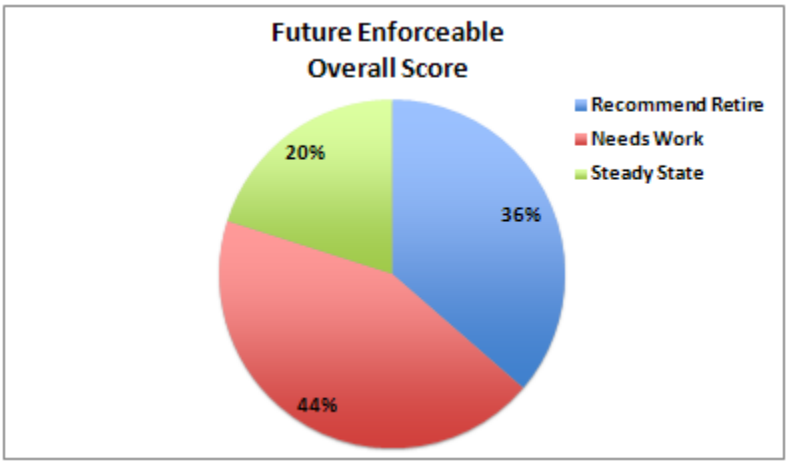

Figure 5: Overall Scores for Future Enforceable Requirements

Twenty percent of the Future Enforceable requirements are in Steady-State requiring no further work. About 44 percent should be enhanced for content, quality, and to address any gaps.

Results by Family

The NERC Reliability Standards are currently organized into 14 families. CIP was excluded from this analysis.

There is significant variation across the different families of standards. For example, the single standard in the Nuclear (NUC) family is in Steady-State. On the other hand, 85 percent of the requirements in the Interchange Scheduling and Coordination (INT) family are recommended for retirement, with none of the remaining requirements in Steady-State. All 14 of the requirements in the Communications (COM) family should be enhanced. The findings in Figure 6 may be reflective of whether a family was updated. This figure provides an indication of where NERC should focus attention.

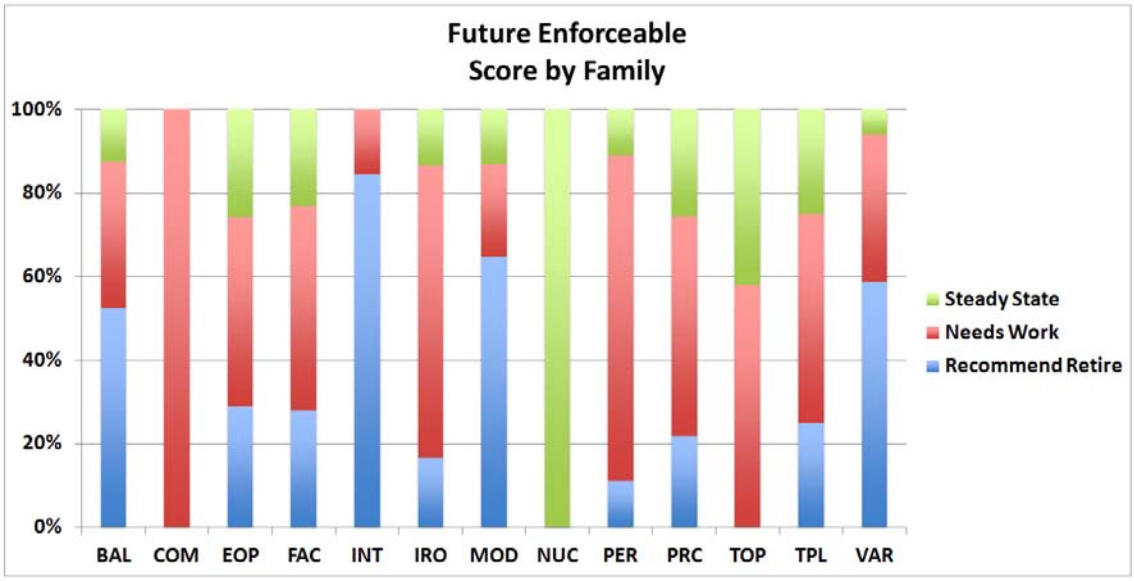

Figure 6: Scores for Future Enforceable Standards Families

How Are Updated Standards Doing?

Of the 63 standards in the Future Enforceable set, 18 have been updated.[19] This represents 93 out of 404 requirements. The Team examined these 18 standards to measure if the standards are improving.

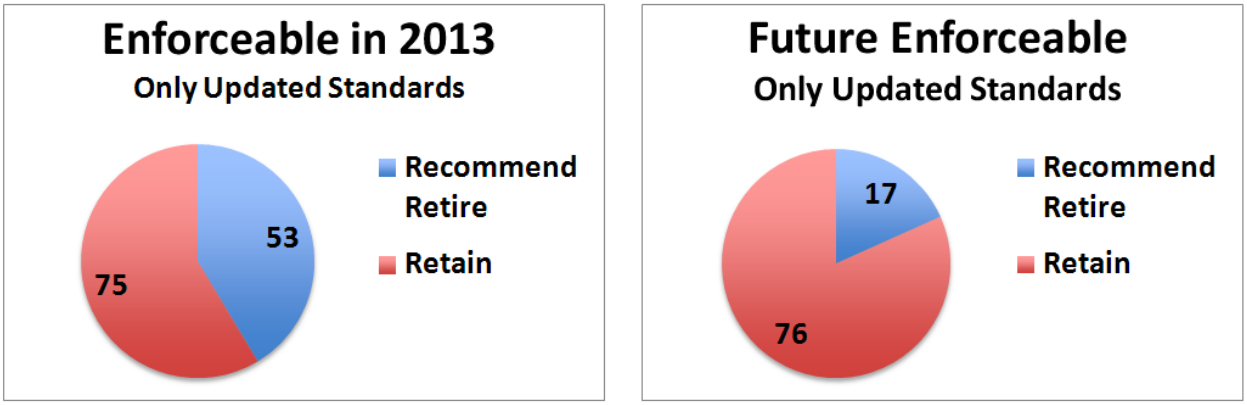

Figure 7: Updated Standards

The first observation is that the total number of requirements in the updated standards decreased from 117 to 93, a 21 percent consolidation. Almost half of the requirements in the Enforceable in 2013 set are recommended for retirement, dropping to 18 percent in the Future Enforceable set. There is a much more dramatic change in the number of requirements that were recommended for retirement between Enforceable in 2013 versus Future Enforceable when focusing on updated standards compared to the entire set of standards. The Team concluded that the work of the drafting teams has resulted in a smaller set of requirements that are focused on the most important activities for reliability.

[19] See Appendix D for list of Future Enforceable standards that have been updated. The TPL standards were not included in this analysis, as the standards being replaced by TPL-001-4, which is pending FERC approval, were not scored. PRC-004 was included as there was improvement. MOD-028 was not included as it is recommended for retirement.

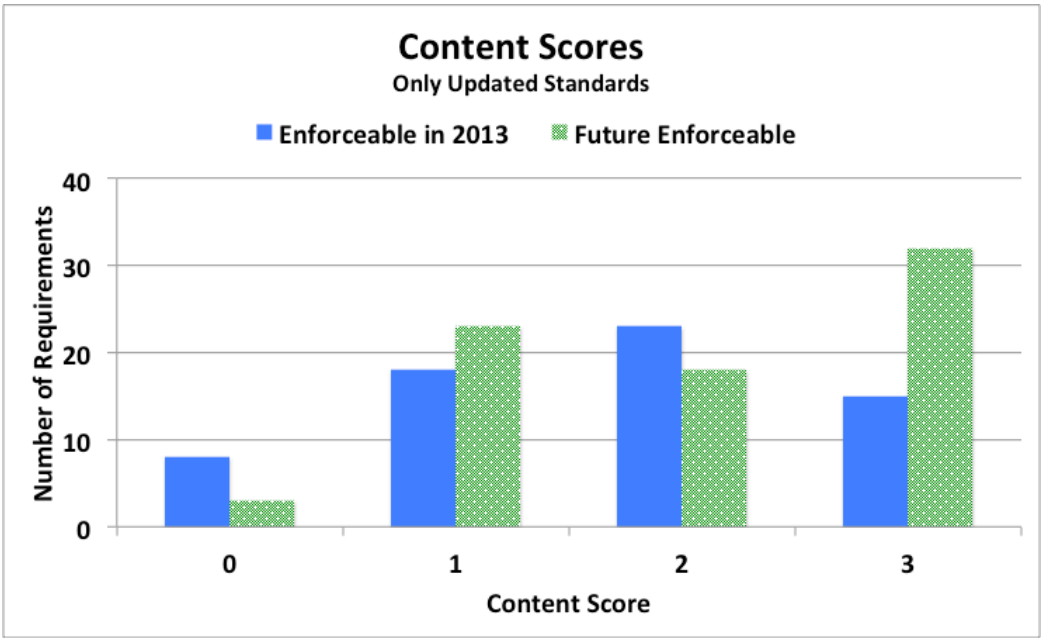

Figure 8: Content Scores for Updated Standards

Requirements in updated standards with the lowest content scores have improved. Nevertheless, the Team believes all requirements should be technically correct in the three criteria areas. Only 42 percent of the updated requirements meet this mark compared to 48 percent when looking at all standards.

Figure 9: Quality Scores for Updated Standards

The updated standards have cleaned up the lowest quality scores. Nevertheless, only 57 percent of requirements are at an acceptable score of 11 or 12, which is about the same as when looking at all standards.

Chapter 4 – New Construct

After evaluating the Enforceable in 2013 and Future Enforceable Reliability Standards, the Team determined that the requirements should be organized into a New Construct to facilitate a needed fundamental change. There are several ways to organize the body of requirements into standards and families, as shown below. To some extent, all of these approaches are used in the existing standards, which often lead to duplication and confusion when related matters appear in different standards.

- By Functional Entity (Reliability Coordinator (RC), Transmission Operator (TOP), Balancing Authority (BA), etc.)
- By Function (Balance, Operate, Plan, Maintain, etc.)
- By Activity (i.e., develop a plan or policy, disseminate, train, maintain, execute, communicate, evaluate and report)
- By Timeframe (near-term, long-term)

Development of standards under the ERO framework began with legacy standards assembled over decades. A 2002 White Paper on NERC's Set of Organization Standards[20] identified 11 families of standards:

1. Assess Transmission Future Needs and Develop Transmission Plans
2. Determine Facility Ratings, Operating Limits, and Transfer Capabilities
3. Design, Install, and Coordinate Control and Protection Systems
4. Define (Physical) Connection requirements
5. Balance Resources and Demand
6. Monitor and Assess Short-term Transmission Reliability - Operate Within Limits
7. Coordinate Interchange
8. Coordinate Operations
9. Prepare for and Respond to Abnormal or Emergency Conditions
10. Prepare for and Respond to Blackout or Island Conditions
11. Monitor and Analyze Disturbances, Events, and Conditions

The current set of standards is organized into 14 families:

1. Communications (COM)
2. Critical Infrastructure Protection (CIP)
3. Emergency Preparedness and Operations (EOP)
4. Facilities Design, Connections, and Maintenance (FAC)
5. Interchange Scheduling and Coordination (INT)
6. Interconnection Reliability Operations and Coordination (IRO)
7. Modeling, Data, and Analysis (MOD)
8. Nuclear (NUC)
9. Personnel Performance, Training, and Qualifications (PER)
10. Protection and Control (PRC)
11. Resource and Demand Balancing (BAL)

[20] Located at: http://www.nerc.com/docs/standards/sc/WhitePaperSetOrgStds.pdf

12. Transmission Operations (TOP)
13. Transmission Planning (TPL)
14. Voltage and Reactive (VAR)

Based on a life-cycle approach, the Team is recommending a New Construct with the following standard families (see Appendix C for graphical representation).

1. Transmission Planning
2. Facility Limits and Capabilities
3. Protection Systems
4. Infrastructure Maintenance
5. Operations
    - Interchange and Balancing
    - Operate Within Limits
    - Emergency Response
6. System Recovery
7. Authority, Communication and Human Factors
8. Control Center and Communication Capabilities
9. Critical Infrastructure Protection
10. Nuclear Interface

This New Construct will facilitate the development of standards around common topics or 'themes.' This would eliminate overlap, duplication and potentially conflicting language found in the requirements today. An example of this is the development of a single standard related to 'Authority' of the RC, BA and TOP. Currently, language related to an Authority is covered in various requirements in the EOP, IRO, TOP, and PER standards. A single Authority standard brings all the requirements related to Authority into one standard.

Chapter 5 – Findings, Recommendations and Conclusions

Current State of Standards

The state of the Enforceable in 2013 and Future Enforceable Reliability Standards is shown on the chart below. The content and quality score for each is an average for those Requirements not recommended for retirement. The resulting average scores are below the acceptable levels of 3 for Content and 11 or 12 for Quality which indicates that fundamental change must occur to move the current body of standards to Steady-State. The last bubble on the chart shows the Steady-State goal. The number of requirements inside of each bubble represents all requirements in the Enforceable in 2013 and Future Enforceable standards (both those that are retained and those recommended for retirement).

The average for the Future Enforceable body of standards shows incremental movement. Although some individual standards or requirements have made significant progress, there has not been enough to demonstrate movement toward Steady-State.

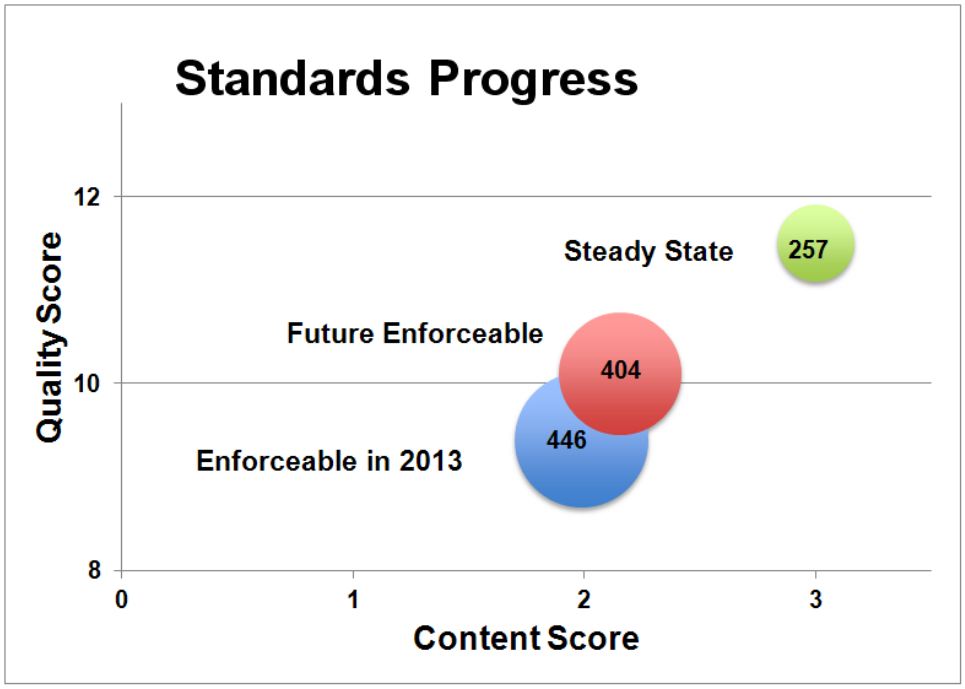

Figure 10: Current State of Standards

Findings

1. One hundred forty seven requirements should be retired and an additional twenty-five consolidated, with a further recommendation to consider additional consolidations.[21]
2. A number of areas were identified where risks to the BPS are not adequately mitigated in the Reliability Standards (gaps); key areas of concern are: (*see,* Appendix F for a complete list):
    a. Outage Coordination[22]
    b. Governor Frequency Response

[21] The Team is recommending consolidation of 25 requirements. The Team also recommended that consolidation of additional requirements be considered.
[22] See draft Authority Standard in Appendix H.

c. Situational awareness tools, such as Real-Time Contingency Analysis (RTCA) in Energy Management Systems (EMS) (recommendation 22 of the 2003 Blackout report[23])

d. Lack of requirement for use of three-part communications[24]

3. Twenty percent of Future Enforceable requirements currently meet the Steady-State[25] criteria for quality and content (scores of 11 or 12 for quality and 3 for content).

4. Current Reliability Standards revision processes, though they have resulted in requirements consolidation and reduction, are not significantly changing the content and quality of the requirements needed to create a final body of standards in Steady-State.

5. The current standard organizational construct can create duplication of requirements in various standards families. They should be reorganized to eliminate this duplication.

6. There are market-based and other non-reliability requirements (e.g., administrative) in the NERC Reliability Standards.

7. Throughout the standards, registered entities are required to put in place plans, policies, procedures and methodologies. There are often requirements to develop, solicit, and incorporate feedback, as well as disseminate, post, maintain and train personnel on the documents. These activities can be administrative and the requirements are not consistent.

Recommendations

Based on the above findings, the Team made the following specific recommendations to NERC regarding the non-CIP standards:

Near-Term

1. Pursue actions to retire 147 of 404 Future Enforceable requirements - these specific requirements are in listed in Appendix E. (Finding #1 and #6)

2. Remove requirements that are recommended for retirement in the Enforceable in 2013 and Future Enforceable sets of requirements from the Actively Monitored List for compliance assessment. (Finding #1)

3. Initiate actions to address gaps identified by the Team - see Appendix F for specific details. (Finding #2)

4. Focus improvement efforts on the 16 high-risk standards with lower content scores - see Appendix G for a list of standards. (Findings #3 and #4)

5. All future changes to requirements must meet the criteria used in this project, with a goal of 3 in content and 11 or 12 in quality. (Finding #3)

6. Pursue consolidation and organization of certain standards or requirements around the 'themes' of Authority, Emergency Operations (EOP) and Interconnected Reliability Operations (IRO)[26] - see Appendix H for the proposed Authority standard. (Finding #5)

[23] *Final Report on the August 14, 2003 Blackout in the United States and Canada*, issued by the U.S.-Canada Power System Outage Task Force in April 2004.

[24] Id., Communications Protocols, Recommendation #26

[25] Steady State was defined as standards that meet the quality and content criteria defined in this report. They are clear, concise, sustainable (stable), necessary for accountability and sufficient to maintain the reliability of the bulk power system. These standards do not require further work absent a change in technology, practice, or other impetus.

[26] 1) Authority of the RC, BA, TOP and other entities tasked with the reliable operations of the BPS. (see Appendix H for draft language)
2) EOP 001, EOP 002 and EOP 003 standards that deal with the non-blackstart or non-system restoration aspects of emergency operations.
3) IR0 003-2, 005-4, 008-1, 009-1, 014-2 standards that deal with the theme of Monitor, Analysis and Actions to address Adverse Reliability Impacts, and potential or actual SOL/IROL violations. See the Requirement Evaluations spreadsheet for details regarding additional work needed on these standards.

7. NERC, in conjunction with industry, should continue to develop its risk-based approach for identifying reliability issues and appropriate solutions, which could include standards, guidelines, alerts, etc. NERC should consult with RISC and the technical committees to determine when the development of a standard is the appropriate solution to maintain a focused, concise number of standards or requirements. NERC should consider ways to better link this into the standards process. (Findings #1, #2, #5 and #6)

Longer-Term

1. Move to the New Construct for the standards in a measured manner - see Appendix C for details. (Finding #5)
2. Review and update the NERC Functional Model. Use process mapping to expand the tasks identified in the Functional Model to facilitate maintenance of a focused, concise number of standards or requirements. (Findings #2, #3, #4 and #5)
3. Explore dashboards to measure reliability and trends to monitor potential risks to the reliability of the BPS and use this information to deploy other mechanisms to address reliability (e.g., alerts, guides, etc.). Dashboard monitoring can assist in mitigating the growth of the number of standards, reduce the number of existing standards and associated compliance monitoring. (Findings #2, #3, #4 and #5)

Additional Recommendations

In addition, the Team made the following recommendations:

1. NERC should, at an appropriate time in the CIP standards development, commission a team of experts to review and evaluate the CIP requirements similar to the review accomplished herein, with physical security, cyber security and power system operations experts on the team.
2. The Team determined that registration was outside of the scope of this project, but recognizes that it will become an issue. The Team recommends that NERC investigate registration solutions ("light" functions, registration by requirement, by asset, by personnel, etc.).
3. The Team determined that evaluation of the regional standards was outside of the scope of this project. However, the Team recommends that NERC or the Regional Entities review them to identify candidates for retirement or consolidation with continent-wide standards. If not, these standards should, at a minimum, be aligned with continent-wide standards. Finally, the regional standards will need to align with the new family construct.
4. Expectations for compliance assessment, whether through clear measures, Reliability Standard Audit Worksheets (RSAWs) or other tools, should be clarified during the standards development process.
5. As standards are revised, do not include requirements that do not mitigate risks to reliability, do not support a reliability principle, or meet Paragraph 81 criteria, as outlined in the content tests for this review.
6. Standard Authorization Requests (SARs) must provide clear reliability direction consistent with the recommendations contained herein to drafting teams so expected outcomes are achieved.
7. Retain requirements to have plans, policies, procedures, methods, etc., where needed. Retire requirements that describe their administration, develop a guideline that describes good practices, and clean-up terminology for names, including NERC glossary definitions. For example, clarify requirements to "have" versus "implement" a plan, policy, procedure, methodology, etc.

Next Steps

The recommendations in this report will inform the 2014–2016 RSDP. A projected schedule for the development and endorsement of the 2014–2016 RSDP is as follows:

July/August:	The Team's report will be posted on the NERC website with the Member Representatives Committee (MRC), the Standards Oversight and Technology Committee (SOTC) and the materials for the August Board meeting.
July/August:	NERC staff, in conjunction with selected members from the SC, will develop a draft 2014–2016 RSDP.
August 14:	The Team's report will be presented to the Board.
August:	The Team's report and supporting materials will be posted in a permanent location on the NERC website.
August through Early September:	The draft 2014–2016 RSDP will be posted on the NERC website for industry comment.
September:	The draft 2014–2016 RSDP will be revised.
October:	The 2014–2016 RSDP will be presented to the SC.
November:	The 2014–2016 RSDP will be presented to the Board.

Conclusion

The Team completed its review and scoring of all Enforceable in 2013 and Future Enforceable requirements, excluding CIP and the regional standards. Recommendations were made to retire requirements that were insignificant to reliability, duplicative, or that could be appropriately consolidated into other standards. A plan was developed to prioritize and reform the requirements that were retained to meet the defined Steady State quality and content grade. Lastly, a new standard family construct was presented which will improve understanding, simplify enforcement, and minimize duplicate requirements from being created.

Although the Team's recommendations resulted in a reduction of the Future Enforceable Reliability Standards' requirements from 404 to 232, the reliability of the BPS will be improved, not degraded. The remaining standards and their requirements are, or recommended to be, results-based that directly impact BPS reliability. Steady State quality and content in each standard will further ensure that the requirement is clearly understood, facilitates compliance and improves enforcement for all. This focus towards only results-based Reliability Standards will improve the overall BPS reliability. Further, moving to a body of stable standards enable registered entities to improve BPS reliability by focusing scarce resources on activities that directly impact reliability such as operations, planning and maintenance, rather than (1) modifying processes and procedures in order to be compliant with new or revised standards, and (2) commenting on numerous versions of standards that are under development.

Appendix A – Independent Expert Biographies

Ed Ernst

Henry Edwin Ernst's (Ed) career in electric power system planning and operations spans 25 years, and he has 12 years of experience in marketing, sales, service, financial analysis, and business strategy development. Most recently, Ernst served as a Director of Transmission Planning at Duke Energy Company. In that role, Ernst directed a team that was responsible for the long-range transmission plan for Duke Energy Carolinas, compliance with relevant NERC and regional standards, and compliance with FERC OATT requirements.

Prior to his position as director, Ernst served as Manager of Grid Operations Engineering at Duke, responsible for overseeing the team who provided technical and OATT tariff support for real-time control area operations and reliability coordinator services for Duke Energy and neighboring interconnected utilities. Ernst also held positions providing engineering support to Duke's real-time System Operations Center, training for Duke's Control Center System Operators and Substation Operators, and software application development for Duke's System Operations Center.

In addition to his 25 years in electric power system planning and operations, Ernst has 12 years of experience in Duke's retail operations area. During those years, Ernst led Duke's efforts on Demand Side Management programs, as well as leading or overseeing a variety of positions in Duke's retail operations area including product and program development, market research and marketing strategy.

Ernst currently serves as a Duke Energy representative to several industry groups, including the SERC Engineering Committee, VACAR Reliability Agreement Executive Committee, North Carolina Transmission Planning Collaborative, and Eastern Interconnection Planning Collaborative Technical Committee.

He earned a bachelor of science in electrical engineering from North Carolina State University, a master of electric power engineering from Rensselaer Polytechnic Institute, and a master of business administration from the University of North Carolina at Charlotte.

Jim McIntosh

Jim McIntosh (Mac) is ZGlobal's Senior Vice President of Operations. Mac has more than 40 years of California Grid Operations Management experience and has played an important role on both WECC and NERC Operating Committees. His focus at ZGlobal has been in Renewable Resource Integrations, Expert Witness testimony relative to Grid Operations, Synchrophasor technology, hydro, pumped storage, steam plant, scheduling, and Balancing Area Operations.

As California ISO Director and Executive Operations Advisor, Jim McIntosh worked to solve the operational challenges of renewable resource integration. He was also involved with creating renewable interconnection standards to meet grid reliability requirements. Mr. McIntosh oversaw the design of the critical asset wing of the new CAISO control center and brought on line the first renewables dispatch desk in the United States. In helping to create the most modern control center in the world, Mr. McIntosh also facilitated a unique partnership with Google to develop situational awareness screens to equip operators with high-tech visualization tools that are integral to maintaining reliability as California achieves its 33 percent renewable goals.

For most of Mr. McIntosh's decade-long career at the ISO, he served as Director of Grid Operations and was at the helm of the control center for much of the duration of the California energy crisis before switching his focus to renewable integration and becoming Director of Renewable Resource Integration and Grid Architecture.

Prior to joining the ISO as the Director of Scheduling in 2000, Mr. McIntosh worked for Pacific Gas and Electric Company for 29 years in various capacities including grid operations, hydro system, steam plant operations and substation operations. He has been a transmission dispatcher, scheduler, generation dispatcher and shift supervisor, as well as Manager of Operations and Director of Grid Outage Coordination and Scheduling. He is certified by NERC as a Reliability Coordinator.

Between 2005 and 2010, Mr. McIntosh represented the ISO on the NERC Operating Committee. In addition, he has served as the ISO representative to the WECC Operating Committee and he represented WECC on the NERC Variable Generation

Task Force. Mr. McIntosh is the past chair of the WECC Interchange Subcommittee. He was also the vice chair for the NERC Interchange Committee.

Mr. McIntosh is a 30-year member of the American Power Dispatcher's Association. He holds a B.A. in business management from Saint Mary's College.

John Meyer

Frederick John Meyer (John) retired in 2007 after working 37 years in the power industry for Houston Lighting and Power (HL&P) and Reliant Energy. He is currently chair of the SPP Regional Entity Board of Trustees and is a non-affiliated Director since 2011 of WECC. In addition, since retirement Meyer has performed consulting services for South Texas Electric Cooperative (STEC), a G&T Coop in ERCOT. In this consulting role he provided testimony in transmission need and reliability before the Public Utility of Texas (PUCT) as well as testimony in Renewable Transmission Development and reliable system operations following renewable integration.

Prior to his retirement from Reliant Energy, Meyer was the Vice President of Regional Transmission Organization Activities for Reliant Resources and served on WECC's Reliability Policy Issues Committee. In this role for Reliant, he developed policy on market design relating to all U. S. Regional Transmission Organizations (RTO) and Independent System Operators (ISO). He also was the contact person with FERC on Reliant filings and FERC Standard Market Design. Previously, Meyer was the Vice President of Asset Commercialization for Reliant Energy.

Before working for the unregulated part of Reliant Energy, Meyer worked 25 years for the regulated utility, Houston Lighting & Power (HL&P). His various assignments and experience at HL&P included General Manager of Engineering, General Manager of Energy Control & Dispatch, Manager of System Planning and Relaying and General Manager of Gas/Oil Power Plant Operations.

Meyer's industry involvement includes NERC's Planning Committee, Market Interface Committee and Stakeholders (Members) Committee. Meyer previously served as vice chair of IEEE's Houston Chapter, was chair of the ERCOT Stakeholder Committee and was twice chair of ERCOT's Technical Advisory Committee.

Meyer received the Gulf Coast Power Association Power Star Award in 2008 for his contributions to the ERCOT energy markets. He also received the PUCT Commissioner's Award for leading the stakeholders in ERCOT and getting an agreement among them for the ERCOT energy market protocols. He earned a bachelor of science in electrical engineering with honors from Lamar University and a master of science in electrical engineering from the University of Houston. He completed the executive develop program in business administration from the University of Michigan.

Brian Silverstein

Brian Silverstein recently retired from 33 years at Bonneville Power Administration, where he focused on transmission reliability, market and policy issues. As Senior Vice President for Transmission Services, Silverstein was responsible for planning, design, construction, operations, maintenance, and sales for 15,000 miles of 115-kV through 500-kV transmission in six states. He also was accountable for meeting safety, reliability, financial, risk management and customer satisfaction objectives.

Prior to his role as SVP, Silverstein served as Vice President for Planning and Asset Management at Bonneville. His duties included grid planning for expansion, interregional interconnections, generation integration, and customer service. Silverstein sponsored deploying an asset management framework to sustain existing funds in transmission assets and expand the grid to meet agency objectives at lowest life cycle costs.

This year Silverstein was elected to serve as chair of the interim Board Committee for the WECC Reliability Coordinator and was on the WECC Board of Directors for three years. He was previously a member of the Reliability Issues Steering Committee for NERC.

Silverstein obtained his bachelor of engineering in electrical engineering from The Cooper Union and his master of engineering in electric power from Rensselaer Polytechnic Institute.

Bill Thompson

William L. Thompson (Bill) most recently was Director of the System Operations Center for Dominion Virginia Power, where he was responsible for the safe, reliable, and economic operation of the company's bulk power system. His responsibilities included generation dispatch, transmission operations (including transmission switching), transmission access sales and marketing, management of the Energy Management System, and the statistical analysis and reports associated with energy delivery. In 2005, Mr. Thompson directed the transition of Dominion's transmission operations as Dominion joined PJM, the Regional Transmission Operator in 13 states. He has served on the Board of Directors at SERC, where he also served as chair of the SERC Board Compliance Committee for three years prior to his retirement.

Prior to his position as director, Thompson, who had been with Dominion for 38 years until retiring, worked in relay protection in Transmission and Distribution; he also served as Chief Electrical Engineer in the Power Station Engineering Department (Fossil, Hydro, and Nuclear), and then Director of Electrical Engineering in the Nuclear Department. A previous chair of the SERC Operating Committee, he obtained a Green Belt in the Six Sigma Program at Dominion, and he currently serves as a member of the Board of Advisors for SOS Intl LLC. He is a licensed Professional Engineer in the State of Virginia.

Thompson earned a bachelor of science degree in electrical engineering from Virginia Polytechnic Institute and State University and a master of business administration from Averett College.

Appendix B – Reliability Principles

Reliability Principles[27]

1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC standards.
2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained, and implemented.
5. Facilities for communication, monitoring, and control shall be provided, used, and maintained for the reliability of interconnected bulk power systems.
6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
7. The reliability of the interconnected bulk power systems shall be assessed, monitored, and maintained on a wide-area basis.
8. Bulk power systems shall be protected from malicious physical or cyber attacks.

In addition, after review of the aforementioned principles, the Team identified two needed additions:

9. Equipment shall be maintained as required for reliable Bulk-Power System operation.
10. Information necessary for the identification, analysis, prevention of, or response to, events and issues relating to the reliability of the Bulk-Power System shall be developed, maintained and shared with appropriate Functional Entities.

[27] http://www.nerc.com/files/Reliability_Principles.pdf

Appendix C – New Construct

Transmission Planning	Facility Limits and Capabilities	Protection Systems	Infrastructure Maintenance	Operations			System Recovery	Authority, Communication and Human Factors	Control Center and Communication Capabilities	Cyber Security	Nuclear Interface
Assess Transmission Future Needs and Develop Transmission Expansion Plans--- not Operational Planning	Determine Facility Ratings, Operating Limits, and Transfer Capabilities	Design, Install, and Coordinate Control and Protection Systems	Maintain BPS infrastructure, including adequate vegetation mgt.	Coordinate Interchange and Balance Resources and Demand	Operate within Limits - Monitor and Assess Short-term Transmission Reliability/	Prepare for and Respond to Abnormal or Emergency Conditions	Prepare for and Respond to Blackout or Island Conditions	Staff real-time operations with trained and certified personnel who have authority to act and have clarity of communication protocols	Have adequate control center, communication capabilities, etc to support real-time operations	Ensure BPS assets are appropriately protected from Cyber Security threats	Ensure reliable interface between Nuclear Plants and BPS
TPL, MOD 10-15, MOD 24-27	All FAC's except FAC003; possibly MOD 004 and MOD 008	All PRC's except PRC-001 R1 (training) 005,008,011.017 (Maintenance & Testing)	FAC 003, PRC 005, PRC 008, PRC 011, PRC 017	INT and BAL	IRO, TOP, VAR	EOP related to emergency operation of an 'intact' system, EOP 004	EOP related to blackstart	PER, COM related to Communication protocol	EOP, TOP. IRO COM- related to hardware	CIP	NUC

Transmission Planning		Facilities Limits and Capabilities		Protections Systems		Infrastructure Maintenance		Operations				System Recovery		Authority, Communication and Human Factors		Control Center and Communication Capabilities		Cyber Security		Nuclear Interface		
Assess Transmission Future Needs and Develop Transmission Expansion Plans---not Operational Planning		Determine Facility Ratings, Operating Limits, and Transfer Capabilities		Design, Install, and Coordinate Control and Protection Systems		Maintain BES infrastructure, including adequate vegetation mgt.		Coordinate Interchange and Balance Resources nd Demand		Operate within Limits - Monitor and Assess Short-term Transmission Reliability/		Prepare for and Respond to Abnormal or Emergency Conditions		Prepare for and Respond to Blackout or Island Conditions		Staff real-time operations with trained and certified personnel who have authority to act and have clarity of communcation protocols		Have adequate control center, communication capabilites, etc to support real-time operations		Ensure BES/ BPS assets are approriately protected from Cyber Security threats		Ensure reliable interface between Nuclear Plants and BES		# of Req.
TPL, MOD 10-15, MOD 24-27		All FAC's except FAC003; possibly MOD 004 and MOD 008		All PRC's except PRC-001 R1 (training) 005,008,011.017 (Maintenance & Testing)		FAC 003, PRC 005, PRC 008, PRC 011, PRC 017		INT and BAL		IRO, TOP, VAR		EOP related to emergency operation of an 'intact' system, EOP 004		EOP related to blackstart		PER, COM related to Communication protocol		EOP, TOP. IRO COM-related to hardware		CIP		NUC		
MOD-010-0	R1.	FAC-008-3	R1.	PRC-001-2	R3.	FAC-003-3	R1.	BAL-001-1	R1.	New IRO Std		EOP-001-	R1.	EOP-005-2	R1.	Authority Std	R1.	COM-001-2	R1.	CIP-002-5	R1.	NUC-001-2	R1.	
MOD-010-0	R2.	FAC-008-3	R2.	PRC-001-2	R2.	FAC-003-3	R2.	BAL-001-1	R2.	New IRO Std		EOP-001-	R2.	EOP-005-2	R2.	Authority Std	R2.	COM-001-2	R2.	CIP-002-5	R2.	NUC-001-2	R2.	
MOD-012-0	R1.	FAC-008-3	R3.	PRC-004-	R1.	FAC-003-3	R3.	BAL-002-1a	R1.	New IRO Std		EOP-001-	R3.	EOP-005-2	R3.	Authority Std	R3.	COM-001-2	R3.	CIP-003-5	R1.	NUC-001-2	R3.	
MOD-012-0	R2.	FAC-008-3	R6.	PRC-004-	R2.	FAC-003-3	R4.	BAL-002-1a	R2.	New IRO Std		EOP-001-	R4.	EOP-005-2	R4.	Authority Std	R4.	COM-001-2	R4.	CIP-003-5	R2.	NUC-001-2	R4.	
MOD new		FAC-008-3	R7.	PRC-006-1	R1.	FAC-003-3	R5.	BAL-002-1a	R3.	PRC-001-1.1	R6.	EOP-001-	R5.	EOP-005-2	R5.	Authority Std	R5.	COM-001-2	R5.	CIP-003-5	R3.	NUC-001-2	R5.	
MOD new		FAC-010-2.1	R1.	PRC-006-1	R2.	FAC-003-3	R6.	BAL-002-1a	R4.	TOP-001-2	R3.	EOP-002-3.1	R4.	EOP-005-2	R6.	COM-002-3	R1.	COM-001-2	R6.	CIP-003-5	R4.	NUC-001-2	R6.	
MOD-025-2	R1.	FAC-010-2.1	R2.	PRC-006-1	R3.	FAC-003-3	R7.	BAL-002-1a	R6.	TOP-001-2	R4.	EOP-002-3.1	R5.	EOP-005-2	R9.	EOP-005-2	R10.	COM-001-2	R7.	CIP-004-5	R1.	NUC-001-2	R7.	
MOD-025-2	R2.	FAC-011-2	R1.	PRC-006-1	R4.	PRC-005-2	R1.	BAL-003-1	R1	TOP-001-2	R5.	EOP-002-3.1	R7.	EOP-005-2	R13.	EOP-005-2	R11.	COM-001-2	R8.	CIP-004-5	R2.	NUC-001-2	R8.	
MOD-025-2	R3.	FAC-011-2	R2.	PRC-006-1	R5.	PRC-005-2	R2.	BAL-003-1	R2.	TOP-001-2	R6.	EOP-002-3.1	R8.	EOP-005-2	R14.	IRO-009-1	R6	COM-001-2	R9.	CIP-004-5	R3.	NUC-001-2	R9.	
MOD-026-1	R1.	FAC-013-2	R1.	PRC-006-1	R7.	PRC-005-2	R3.	BAL-003-1	R3.	TOP-001-2	R7.	EOP-003-2	R1.	EOP-005-2	R15.	PER-003-1	R1.	COM-001-2	R10.	CIP-004-5	R4.			
MOD-026-1	R2.	FAC-013-2	R4.	PRC-006-1	R8.	PRC-005-2	R4.	BAL-003-1	R4.	TOP-001-2	R8.	EOP-003-2	R3.	EOP-005-2	R16.	PER-003-1	R2.	COM-001-2	R11.	CIP-004-5	R5.			
MOD-026-1	R3.	FAC-014-2	R1.	PRC-006-1	R9.	PRC-005-2	R5.	BAL-005-	R1.	TOP-001-2	R9.	EOP-003-2	R8.	EOP-005-2	R17.	PER-003-1	R3.	new COM-004		CIP-005-5	R1.			
MOD-026-1	R4.	FAC-014-2	R2.	PRC-006-1	R11.			BAL-005-	R4.	TOP-001-2	R10.	EOP-004-2	R1.	EOP-005-2	R18.	PER-004-2	R1.	IRO-002-3	R2.	CIP-005-5	R2.			
MOD-026-1	R6.	FAC-014-2	R3.	PRC-006-1	R12.			BAL-005-	R5.	TOP-001-2	R11.	EOP-004-2	R2.	EOP-006-2	R1.	PER-005-1	R1.	BAL-005-0.2b	R14.	CIP-006-5	R1.			
MOD-027-1	R1.	FAC-014-2	R4.	PRC-006-1	R13.			BAL-005-	R6.	TOP-002-3	R1.			EOP-006-2	R2.	PER-005-1	R2.	BAL-005-0.2b	R15.	CIP-006-5	R2.			
MOD-027-1	R2.	FAC-014-2	R5.	PRC-010-0	R1.			BAL-005-	R7.	TOP-002-3	R2.			EOP-006-2	R3.	PER-005-1	R3.	BAL-005-0.2b	R17.	CIP-006-5	R3.			
MOD-027-1	R3	FAC-014-2	R6.	PRC-015-0	R1.			INT-001-3	R1.	TOP-002-3	R3.			EOP-006-2	R4.	TOP-001-2	R2.	EOP-008-1	R1.	CIP-007-5	R1.			
MOD-026-1	R4.	MOD-004-1	R1.	PRC-015-0	R2.			INT-003-3	R1.	TOP-003-2	R1.			EOP-006-2	R5.			EOP-008-1	R2.	CIP-007-5	R2.			
MOD-027-1	R5.	MOD-004-1	R3.	PRC-016-0.1	R1.					TOP-003-2	R2.			EOP-006-2	R6.			EOP-008-1	R3.	CIP-007-5	R3.			
TPL-001-4	R2.	MOD-004-1	R5.	PRC-016-0.1	R2.					TOP-003-2	R3.			EOP-006-2	R8.			EOP-008-1	R4.	CIP-007-5	R4.			
TPL-001-4	R3.	MOD-004-1	R6.	PRC-018-1	R1.					TOP-003-2	R4.							EOP-008-1	R5.	CIP-007-5	R5.			
TPL-001-4	R4.	MOD-004-1	R10.	PRC-018-1	R4.					VAR-001-3	R1.							EOP-008-1	R6.	CIP-008-5	R1.			
TPL-001-4	R5.	MOD-004-1	R11.	PRC-018-1	R5.					VAR-001-3	R2.							EOP-008-1	R7.	CIP-008-5	R2.			
TPL-001-4	R6.	MOD-008-1	R1.	PRC-018-1	R6.					VAR-001-3	R3.							EOP-008-1	R8.	CIP-008-5	R3.			
TPL-001-4	R8.	MOD-008-1	R2.	PRC-019-1	R1.					VAR-001-3	R4.									CIP-009-5	R1.			
FAC-001-1	R1.	MOD-008-1	R4.	PRC-019-1	R2.					VAR-002-2b	R1.									CIP-009-5	R2.			
FAC-001-1	R2.			PRC-022-1	R1.					VAR-002-2b	R2.									CIP-009-5	R3.			
FAC-001-1	R3.			PRC-023-2	R1.					VAR-002-2b	R3.									CIP-010-1	R1.			
FAC-002-1	R1.			PRC-023-2	R2.															CIP-010-1	R2.			
				PRC-023-2	R3.															CIP-010-1	R3.			
				PRC-023-2	R4.															CIP-011-1	R1.			
				PRC-023-2	R6.															CIP-011-1	R2.			
				PRC-024-1	R1.																			
				PRC-024-1	R2.																			
				PRC-024-1	R3.																			
				PRC-024-1	R4.																			
29		26		36		12		18		28		14		20		17		23				9		232

Appendix D – Updated Future Enforceable Standards

Future Enforceable Standards that have been updated
BAL-001-1
BAL-003-1
COM-001-2
COM-002-3
EOP-004-2
FAC-001-1
FAC-003-3
IRO-001-3
IRO-002-3
IRO-005-4
IRO-014-2
PRC-001-2
PRC-004-2.1a
PRC-005-2
TOP-001-2
TOP-002-3
TOP-003-2
VAR-001-3

Appendix E – Requirements Recommended for Retirement

Standard	Req.	Rationale
BAL-001-1	R3.	This is a definition; not a requirement. Definition in Glossary of Overlap Regulation Service needs to be updated to cover R3 and R4 implementation
BAL-001-1	R4.	This is a definition; not a requirement. Definition in Glossary of Overlap Regulation Service needs to be updated to cover R3 and R4 implementation
BAL-002-1a	R5.	Administrative. This is a compliance reporting measure, not a unique performance requirement.
BAL-004-0	R1.	Does not support a reliability objective as defined by the Reliability Principles.
BAL-004-0	R2.	Does not support a reliability objective as defined by the Reliability Principles.
BAL-004-0	R3.	Does not support a reliability objective as defined by the Reliability Principles.
BAL-004-0	R4.	Does not support a reliability objective as defined by the Reliability Principles.
BAL-005-0.2b	R2.	P81 Phase 1.
BAL-005-0.2b	R3.	P81. Duplicative of R1.
BAL-005-0.2b	R8.	P81. Outdated due to technology.
BAL-005-0.2b	R9.	P81. This is a definition not a requirement
BAL-005-0.2b	R10.	P81. This is a definition not a requirement
BAL-005-0.2b	R11.	P81. This is a business practice and is automated in most EMS software.
BAL-005-0.2b	R12.	P81. This in the ACE equation so does not need to be repeated.
BAL-005-0.2b	R13.	P81. This is after the fact and is automated in most EMS software.
BAL-005-0.2b	R16.	This is a guide for the quality of the EMS system. Provide to the 2009-02 team for consideration.
BAL-006-2	R1.	This is only for energy accounting. Covered by tagging requirements
BAL-006-2	R2.	This is only for energy accounting. Covered by tagging requirements
BAL-006-2	R3.	This is only for energy accounting. Covered by tagging requirements (automated)
BAL-006-2	R4.	This is only for energy accounting. Covered by tagging requirements (automated)
BAL-006-2	R5.	This is only for energy accounting. Covered by tagging requirements (automated)
EOP-001-2.1b	R6.	P81. Duplicative of R4 and the Attachment
EOP-002-3.1	R2.	P81. Duplicative - requirement to take action is in R1.
EOP-002-3.1	R3.	P81. Duplicative of what is required to be in the plan under attachment 1 of EOP-001.
EOP-002-3.1	R6.	P81. Duplicative of BAL standards to meet CPS and DPS
EOP-002-3.1	R9.	P81. This is a market (tariff) issue.
EOP-003-2	R2.	P81. Duplicative of PRC-010 and TPL standards
EOP-003-2	R4.	P81. Duplicative of PRC-010 and TPL standards
EOP-003-2	R5.	P81. Duplicative of R1 and also covered under standards for TOP (TOP-002-3)
EOP-003-2	R6.	P81. Duplicative; an entity does the same actions as when not islanded.
EOP-003-2	R7.	P81. Duplicative of PRC-010 R1
EOP-004-2	R3.	P81. Administrative. Could also combine into R1
EOP-005-2	R7.	P81. This is a logical action that does not require a std.
EOP-005-2	R8.	P81. Duplicative with EOP-005-2 R1.3 (have a plan) and RC authority in IRO-001-1.1b R3
EOP-005-2	R12.	P81. Duplicative with PER-005 R3
EOP-006-2	R10.	P81. Duplicative of PER-005 R3
EOP-006-2	R7.	P81. This is a logical action that should be in the plan and does not require a std.
EOP-006-2	R8.	P81. This is a logical action that should be in the plan and does not require a std.
EOP-006-2	R9.	P81. Duplicative of PER-005 R3.
FAC-001-1	R4.	P81. Administrative.
FAC-002-1	R2.	P81 Phase 1.
FAC-008-3	R4.	P81 Phase 1.
FAC-008-3	R5.	P81 Phase 1.
FAC-010-2.1	R3.	More appropriate as a Guideline. This is a checklist.
FAC-010-2.1	R4.	More appropriate as a Guideline. Description of appropriate coordination does not rise to a Standard.
FAC-010-2.1	R5.	P81 Phase 1.
FAC-011-2	R3.	More appropriate as a Guideline. This is a checklist.
FAC-011-2	R4.	More appropriate as a Guideline. Description of appropriate coordination does not rise to a Standard.
FAC-011-2	R5.	P81 Phase 1.
FAC-013-2	R2.	P81. Administrative.
FAC-013-2	R3.	P81. Administrative.
INT-001-3	R2.	P81. A guideline exists in the functional spec for electronic tagging.

Standard	Req.	Rationale
INT-004-2	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-004-2	R2.	P81. A guideline exists in the functional spec for electronic tagging.
INT-005-3	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-006-3	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-007-1	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-008-3	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-009-1	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-010-1	R1.	P81. A guideline exists in the functional spec for electronic tagging.
INT-010-1	R2.	P81. A guideline exists in the functional spec for electronic tagging.
INT-010-1	R3.	P81. A guideline exists in the functional spec for electronic tagging.
IRO-004-2	R1.	P81. The intent is covered in IRO-008 R1 and is also duplicative of other IRO standards (IRO-001-1.1 R3)
IRO-014-2	R2.	P81. Administrative.
IRO-014-2	R4.	P81. Administrative.
IRO-014-2	R7.	P81. Duplicative - covered under R6. Also supported by IRO-009-1 R5
IRO-014-2	R8.	P81. Duplicative - covered under R6. Also supported by IRO-009-1 R5
MOD-001-1a	R1.	P81. Calculation of ATC is a market (tariff) issue. Determination of TTCs for operational reliability is covered under FAC 12-1 (no longer enforced), 13-1 and 13-2. Other TOP and IRO Standards require operation within limits. NAESB or another organization will need to develop the needed business practices for ATC.
MOD-001-1a	R2.	Same as R1
MOD-001-1a	R3.	Same as R1
MOD-001-1a	R4.	Same as R1
MOD-001-1a	R5.	Same as R1
MOD-001-1a	R6.	Same as R1
MOD-001-1a	R7.	Same as R1
MOD-001-1a	R8.	Same as R1
MOD-001-1a	R9.	Same as R1
MOD-004-1	R2.	P81. This is a business practice.
MOD-004-1	R7.	P81. This is a business practice.
MOD-004-1	R8.	P81. This is a business practice.
MOD-004-1	R9.	P81. This is a business practice.
MOD-008-1	R3.	P81. Administrative.
MOD-008-1	R5.	P81. Administrative.
MOD-016-1.1	R1.	P81. Data collection/retention. Retire MODs 16-19 and 21 and gather whatever data NERC needs for assessments and reports through Section 804 of NERC Rules of Procedure.
MOD-016-1.1	R2.	Same as MOD-016, R1.
MOD-016-1.1	R3.	Same as MOD-016, R1.
MOD-017-0.1	R1.	Same as MOD-016, R1.
MOD-018-0	R1.	Same as MOD-016, R1.
MOD-018-0	R2.	Same as MOD-016, R1.
MOD-019-0.1	R1.	Same as MOD-016, R1.
MOD-021-1	R1.	Same as MOD-016, R1.
MOD-021-1	R2.	Same as MOD-016, R1.
MOD-021-1	R3.	Same as MOD-016, R1.
MOD-028-2	R1.	P81. Calculation of ATC is a market (tariff) issue. Determination of TTCs for operational reliability is covered under FAC 12-1 (no longer enforced), 13-1 and 13-2. Other TOP and IRO Standards require operation within limits. NAESB or another organization will need to develop the needed business practices for ATC.
MOD-028-2	R2.	Same as MOD-028, R1.
MOD-028-2	R3.	Same as MOD-028, R1.
MOD-028-2	R4.	Same as MOD-028, R1.
MOD-028-2	R5.	Same as MOD-028, R1.
MOD-028-2	R6.	Same as MOD-028, R1.
MOD-028-2	R7.	Same as MOD-028, R1.
MOD-028-2	R8.	Same as MOD-028, R1.
MOD-028-2	R9.	Same as MOD-028, R1.
MOD-028-2	R10.	Same as MOD-028, R1.
MOD-028-2	R11.	Same as MOD-028, R1.
MOD-029-1a	R1.	Same as MOD-028, R1.

Standard	Req.	Rationale
MOD-029-1a	R2.	Same as MOD-028, R1.
MOD-029-1a	R3.	Same as MOD-028, R1.
MOD-029-1a	R4.	Same as MOD-028, R1.
MOD-029-1a	R5.	Same as MOD-028, R1.
MOD-029-1a	R6.	Same as MOD-028, R1.
MOD-029-1a	R7.	Same as MOD-028, R1.
MOD-029-1a	R8.	Same as MOD-028, R1.
MOD-030-2	R1.	Same as MOD-028, R1.
MOD-030-2	R2.	Same as MOD-028, R1.
MOD-030-2	R3.	Same as MOD-028, R1.
MOD-030-2	R4.	Same as MOD-028, R1.
MOD-030-2	R5.	Same as MOD-028, R1.
MOD-030-2	R6.	Same as MOD-028, R1.
MOD-030-2	R7.	Same as MOD-028, R1.
MOD-030-2	R8.	Same as MOD-028, R1.
MOD-030-2	R9.	Same as MOD-028, R1.
MOD-030-2	R10.	Same as MOD-028, R1.
MOD-030-2	R11.	Same as MOD-028, R1.
PER-004-2	R2.	P81. Duplicative with currently enforceable IRO and TOPs related to managing SOLs and IROL's.
PRC-004-2.1a	R3.	P81. Administrative.
PRC-006-1	R6.	P81. Administrative. The actual study provides for reliability.
PRC-006-1	R10.	P81. Appropriate as a Guideline. Accountability is met under TPL and VAR Standards.
PRC-006-1	R14.	P81. Administrative.
PRC-010-0	R2.	P81. Administrative. Approved by BOT.
PRC-015-0	R3.	P81. Administrative/Documentation.
PRC-016-0.1	R3.	P81. Administrative/Documentation.
PRC-018-1	R3.	P81. Administrative/Documentation.
PRC-021-1	R1.	P81. Administrative/Documentation.
PRC-021-1	R2.	P81. Administrative/Documentation.
PRC-022-1	R2.	P81 Phase 1.
PRC-023-2	R5.	P81. Administrative/Documentation.
TPL-001-4	R1.	P81. Appropriate as a Guideline. Model and data requirements are in the MOD standards. This requirement is more of a best practice on considerations such as load level, generation patterns, contingencies, etc. It may often be regional in nature.
TPL-001-4	R7.	P81. Administrative.
VAR-001-3	R5.	Each Purchasing-Selling Entity and Load Serving Entity shall arrange for (self-provide or purchase) reactive resources – which may include, but is not limited to, reactive generation scheduling; transmission line and reactive resource switching;, and controllable load– to satisfy its reactive requirements identified by its Transmission Service Provider.
VAR-001-3	R6.	P81. Duplicative of TOP Standards that require Operator to have necessary information to operate reliably.
VAR-001-3	R7.	P81. Duplicative of R2 of this std and TOP 001.
VAR-001-3	R8.	P81. Duplicative of R2 of this std and TOP 001.
VAR-001-3	R9.	P81. Duplicative of R2.
VAR-001-3	R10.	P81. Duplicative of TOP-001-2 R7, R8, R9.
VAR-001-3	R11.	P81. Duplicative - covered under interconnection studies.
VAR-001-3	R12.	P81. Duplicative - covered under EOP, PRC-006.
VAR-002-2b	R4.	P81 Duplicative - covered in MODs.
VAR-002-2b	R5.	P81 Duplicative - covered under OATT.

Appendix F – BPS Risks Not Adequately Mitigated (Gaps)

Priority	GAP	Recommendation
High	Outage Coordination	Included in proposed Authority Standard. See Appendix I - draft Authority Standard.
High	Governor Frequency Response	Develop a standard/requirement for governor frequency response for GO/GOPs for inclusion in appropriate BAL standard(s).
High	EMS RTCA models	Develop a standard that defines the requirements for EMS RTCA models or the performance expectations of the models (Project 2009-02 - Real-Time Monitoring and Analysis Capabilities).
High	Lack of requirement for use of three-part communications	Resolve COM-002 and COM-003 by requiring three-part communication for operational directives and for registered entity defined operational instructions that involve taking specific actions or steps that would cause a change in status or output of the BPS or a generator. This does not include three-part communication for myriad of conversations where information is being exchanged or options are being discussed.
Medium	Verification of accuracy of planning models	Develop a guideline for verifying the accuracy of the various planning models developed under the existing MOD 010-MOD 015 standards.
Medium	Short circuit/fault duty models	Develop a standard/requirement for short circuit/fault duty models that would fit with the existing MOD 010-MOD 015 standards.
Medium	Infrastructure maintenance	• Develop a dashboard indicator to assure adequacy of current equipment maintenance programs • Substation/switchyard equipment • Transmission line maintenance

Appendix G – High Risk Standards Requiring Improvement

Standard Number	Standard Score Content	Standard Score Quality
BAL-002-1a	1.8	9.2
COM-001-2	1.1	9.0
COM-002-3	1.0	12.0
EOP-006-2	2.3	11.7
IRO-001-3	2.0	8.0
IRO-005-4	2.0	11.0
IRO-008-1	1.3	11.0
IRO-009-1	1.0	12.0
PER-005-1	2.0	9.7
PRC-001-2	1	7.3
PRC-006-1	1.0	10.8
PRC-010-0	2.0	7.0
PRC-015-0	0.0	5.0
PRC-018-1	0.2	5.0
PRC-022-1	1.0	12.0
TOP-001-2	2.0	10.4

Appendix H – Proposed "Authority" Standard

As an example of the near-term recommendation #7 "Pursue consolidation and organization of certain standards or requirements around the 'themes' of Authority, Emergency Operations (EOP) and Interconnected Reliability Operations (IRO)" which is related to Finding #5, the below Authority standard was proposed. This proposed standard can be used by a future Standard Drafting Team.

Proposed Language - Consolidated Authority Language		
Authority	R1.	Each Reliability Coordinator, Transmission Operator and Balancing Authority shall have the requirement and authority to take actions, including issuing a Reliability Directive, to prevent, mitigate and respond to an Emergency or Adverse Reliability Impact.
Authority	R2.	Each Reliability Coordinator, Transmission Operator and Balancing Authority shall have the requirement and authority to approve, deny or cancel planned outages of its EMS, telecom and other hardware, and associated analysis tools.
Authority	R3.	Each Reliability Coordinator, Transmission Operator and Balancing Authority shall have the requirement and authority to approve, deny or cancel planned outages of its Elements and Facilities.
Authority	R4.	Each Reliability Coordinator, Transmission Operator and Balancing Authority shall provide its System Operators with the responsibility and authority to implement the actions under R1, R2 and R3.
Authority	R5.	Each Transmission Operator, Balancing Authority, Generator Operator, and Distribution Provider shall comply with directions from a Reliability Coordinator, Transmission Operator or Balancing Authority under R1 unless it communicates to the RC, TOP or BA that it cannot because the direction cannot be physically implemented or unless such actions would violate safety, equipment, regulatory, or statutory requirements.
Authority	R6.	Each Reliability Coordinator shall comply with directions from another Reliability Coordinator under R1 unless it communicates to the other RC that it cannot because compliance with the direction cannot be physically implemented or unless such actions would violate safety, equipment, regulatory, or statutory requirements.
Authority	R7.	Each RC shall have the authority and responsibility to develop and implement a generation and transmission outage coordination process across TOPs and BAs in their footprint. The authority may be delegated (not the responsibility).
Authority	R8.	Each RC shall have the authority and responsibility to develop and implement a generation and transmission outage coordination process between its adjacent RCs.
Authority	R9.	The outage coordination process described in R7 and R8 shall cover the time period from the current operating hour out through at least 36 months.

Existing Language		
EOP-002-3.1	R1.	Each Balancing Authority and Reliability Coordinator shall have the responsibility and clear decision-making authority to take whatever actions are needed to ensure the reliability of its respective area and shall exercise specific authority to alleviate capacity and energy emergencies.
IRO-001-3	R1.	Each Reliability Coordinator shall have the authority to act or direct others to act (which could include issuing Reliability Directives) to prevent identified events or mitigate the magnitude or duration of actual events that result in an Emergency or Adverse Reliability Impact.
IRO-001-3	R2.	Each Transmission Operator, Balancing Authority, Generator Operator, and Distribution Provider shall comply with its Reliability Coordinator's direction unless compliance with the direction cannot be physically implemented or unless such actions would violate safety, equipment, regulatory, or statutory requirements.
IRO-001-3	R3.	Each Transmission Operator, Balancing Authority, Generator Operator, and Distribution Provider shall inform its Reliability Coordinator upon recognition of its inability to perform as directed in accordance with requirement R2.
IRO-006-5	R1.	Each Reliability Coordinator and Balancing Authority that receives a request pursuant to an Interconnection-wide transmission loading relief procedure (such as Eastern Interconnection TLR, WECC Unscheduled Flow Mitigation, or congestion management procedures from the ERCOT Protocols) from any Reliability Coordinator, Balancing Authority, or Transmission Operator in another Interconnection to curtail an Interchange Transaction that crosses an Interconnection boundary shall comply with the request, unless it provides a reliability reason to the requestor why it cannot comply with the request.
TOP-001-2	R1.	Each Balancing Authority, Generator Operator, Distribution Provider, and Load-Serving Entity shall comply with each Reliability Directive issued and identified as such by its Transmission Operator(s), unless such action would violate safety, equipment, regulatory, or statutory requirements.
PER-001-0.2	R1.	Each Transmission Operator and Balancing Authority shall provide operating personnel with the responsibility and authority to implement real-time actions to ensure the stable and reliable operation of the Bulk Electric System.
IRO 002-3	R1.	Each Reliability Coordinator shall provide its System Operators with the authority to approve, deny or cancel planned outages of its own analysis tools.