NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

# Periodic Review Recommendation

FAC-011-3 - System Operating Limits Methodology for the Operations Horizon

**Introduction**

NERC is required to conduct a periodic review of each NERC Reliability Standard at least once every ten years, or once every five years for Reliability Standards approved by the American National Standards Institute as an American National Standard.[1] The Reliability Standard identified below has been included in the current cycle of periodic reviews. The Review Team is instructed to use the background information and the questions below, along with any associated worksheets or reference documents, to guide a comprehensive review that results in a recommendation that the Reliability Standard should be: (1) reaffirmed as is (i.e., no changes needed); (2) revised (which may include revising or retiring one or more requirements); or (3) retired. If the Review Team recommends a revision to the Reliability Standard, it must also develop a draft Standard Authorization Request (SAR) outlining the proposed scope and technical justification for the revision.

A completed Periodic Review Template and any associated documentation should be submitted by email to the NERC Standards Developer assigned to the project.

| **Applicable Reliability Standard: FAC-011-3 - System Operating Limits Methodology for the Operations Horizon** |
|---|
| **Review Team Members (include name and organization):**<br>1. Chair - Jason Smith, Southwest Power Pool<br>2. Vice Chair - Vic Howell, Peak Reliability<br>3. Baj Agrawal, Arizona Public Service Company<br>4. David Bueche, CenterPoint Energy Houston Electric<br>5. David Hislop, PJM Interconnection<br>6. Ruth Kloecker, ITC Holdings<br>7. Dean LaForest, ISO New England<br>8. Linwood Ross, Duke Energy<br>9. Aaron Staley, Orlando Utilities Commission<br>10. Michael Steckelberg, Great River Energy<br>11. Dede Subakti, California Independent System Operator |
| **Date Review Completed:** July 29, 2015 |

[1] NERC Standard Processes Manual 45 (2013), posted at http://www.nerc.com/pa/Stand/Documents/Appendix_3A_StandardsProcessesManual.pdf.

## Executive Summary of Periodic Review of SOL Standards

The FAC Standard Periodic Review Team (PRT) has completed its ~~initial~~ review of the FAC-010-3, FAC-011-3, and FAC-014-2 Reliability Standards. In addition to the specific periodic review areas presented in the sections below, the review focused on reconciling these three standards with new and revised TPL, TOP and IRO standards that did not exist at the time that the three FAC Standards were drafted and approved.

The PRT concluded that ~~System Operating Limits (SOLs) and~~ the requirements in FAC-010-3 which specify development of an SOL methodology for the planning horizon are not necessary inputs to the Bulk-Electric System (BES) planning process. BES planning is covered under the new TPL-001-4 Standard which provides comprehensive requirements for a variety of contingencies. Therefore, the PRT recommends initiation of a FAC standards project to retire FAC-010-3 as discussed in the separate FAC-010-3 Periodic Review Recommendation (PRR).

The PRT also recommends initiation of a FAC standards project to revise requirements in FAC-011-3 and FAC-014-2 and to revise the definition of SOL as discussed in two PRRs. The PRT believes that existing requirements in these standards and the SOL definition contribute to confusion and a lack of consistency in establishing, communicating, and operating within SOLs. The PRT recommends revising the SOL definition to eliminate confusion and to align with the concepts described in the NERC *System Operating Limit Definition and Exceedance Clarification* White Paper[2] ("NERC SOL White Paper") as discussed below. They also recommend the development of requirements to clearly delineate specific functional entity responsibility for determining and communicating each type of SOL (Facility Rating, voltage limits, voltage Stability, transient Stability) where not already addressed in existing standards (e.g. FAC-008) as well as additional clarification on what qualifies as an Interconnection Reliability Operating Limit (IROL).

## Background Information *(to be completed initially by NERC staff)*

1. Are there any outstanding Federal Energy Regulatory Commission directives associated with the Reliability Standard? (If so, NERC staff will attach a list of the directives with citations to associated FERC orders for inclusion in a SAR.)

   ☐ Yes

   ☒ No

2. Have stakeholders requested clarity on the Reliability Standard in the form of an Interpretation (outstanding, in progress, or approved), Compliance Application Notice (CAN) (outstanding, in

[2] http://www.nerc.com/pa/Stand/Prjct201403RvsnstoTOPandIROStndrds/2014_03_fifth_posting_white_paper_sol_exceedance_20150108_clean.pdf

progress, or approved), or an outstanding submission to NERC's Issues Database? (If there are, NERC staff will include a list of the Interpretation(s), CAN(s), or stakeholder-identified issue(s) contained in the NERC Issues Database that apply to the Reliability Standard.)

☐ Yes

☒ No

3. Is the Reliability Standard one of the most violated Reliability Standards? If so, does the root cause of the frequent violation appear to be a lack of clarity in the language?

☐ Yes

☒ No

Please explain:

4. Does the Reliability Standard need to be modified or converted to the results-based standard (RBS) format as outlined in *Attachment 1: Results-Based Standards*? Note that this analysis is twofold and requires collaboration among NERC staff and the Review Team. First, does the *substance* of the Reliability Standard comport to the RBS principles described in Attachment 1? Second, does the *formatting* of the Reliability Standard need to be changed to comply with the RBS format used for new and revised Reliability Standards? If the answer to either part of this question is "Yes," the standard should be revised. In the comment field, please indicate what kind of revision will be necessary.

☒ Yes

☐ No

Please explain:

Requirements throughout the standard should be revised to RBS format as recommended by The Independent Experts Review Project (IERP) Report.

**Requirement R3:** The IERP concluded that this Requirement is more appropriate as a guideline. A Standards Drafting Team (SDT) should consider this recommendation and review each subpart in Requirement R3 to determine which are appropriate for a guideline and which should remain in the RC's methodology.

## Questions for the Subject Matter Expert (SME) Review Team

If NERC staff answered "Yes" to any of the questions above, the Reliability Standard probably requires revision. The questions below are intended to further guide the SME review. Some of the questions reference documents provided by NERC staff as indicated in the Background questions above.

1. **Paragraph 81**: Does one or more of the requirements in the Reliability Standard meet criteria for retirement or modification based on Paragraph 81 concepts? Use *Attachment 2: Paragraph 81 Criteria* to make this determination.

   ☐ Yes

   ☒ No

   Please summarize your application of Paragraph 81 Criteria, if any:

2. **Clarity:** If the Reliability Standard has an Interpretation, CAN, or issue associated with it, or is frequently violated because of ambiguity, it probably needs to be revised for clarity. Beyond these indicators, is there any reason to believe that the Reliability Standard should be modified to address a lack of clarity? Consider:

   a. Is this a Version 0 Reliability Standard? No
   b. Does the Reliability Standard have obviously ambiguous language or language that requires performance that is not measurable? Yes (see below)
   c. Are the requirements consistent with the purpose of the Reliability Standard? No (see below)

   Should the Reliability Standard should be modified to address a lack of clarity?

   ☒ Yes

   ☐ No

   Please summarize your assessment:

   **Purpose:** The purpose of FAC-011-3 is *"To ensure that System Operating Limits (SOLs) used in the reliable operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies."* Requirement R2 is not well aligned with the purpose statement as it prescribes specific performance in pre- and post-contingency conditions. The purpose and requirements should be consistent.

   **Requirement R2**: Part R2.3 and subparts are ambiguous and require performance that is not measurable. It is not possible to clearly measure performance for planned or controlled

interruption of “some local network customers” as stated in Part R2.3.1. Likewise, in Part 2.3.2 it is not possible to measure "other network customers." This should be clarified.

3. **Definitions**: Do any of the defined terms used within the Reliability Standard need to be refined?

☒ Yes

☐ No

Please explain:

**System Operating Limit.** The currently-approved definition when applied to Real-time operations results in widely varied interpretations. Accordingly, the SOL definition should be revised to 1) eliminate confusion and the wide-ranging variations in the interpretation and application of the term, and 2) align with the concepts described in the NERC SOL White Paper, which served as a basis and context for the development of the revised TOP/IRO standards in Project 2014-03. These concepts provide clarity and consistency to establishing SOLs, exceeding SOLs, and implementing Operating Plans to mitigate SOL exceedances. The *Rationale for Revising the Definition of System Operating Limit* provides further justification and is posted on the project page[3]. The PRT believes a revision to the SOL definition can be accomplished without disrupting the existing use of the term in the Reliability Standards and the industry.

***System Operating Limit (approved)***

*The value (such as MW, MVar, Amperes, Frequency or Volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria. These include, but are not limited to:*

- *Facility Ratings (Applicable pre- and post-Contingency equipment or facility ratings)*
- *Transient Stability Ratings (Applicable pre- and post-Contingency Stability Limits)*
- *Voltage Stability Ratings (Applicable pre- and post-Contingency Voltage Stability)*
- *System Voltage Limits (Applicable pre- and post-Contingency Voltage Limits)*

***System Operating Limit (proposed)***

*Any applicable limit among the following types of reliability limits:*

- *Facility Ratings*
- *Voltage Limits*
- *Transient Stability Limits*
- *Voltage Stability Limits*

[3] See the Project 2015-03 Project Page: http://www.nerc.com/pa/Stand/Pages/Project-2015-03-Periodic-Review-of-System-Operating-Limit-Standards.aspx

**Interconnection Reliability Operating Limit (IROL).** The currently-approved definition leads to inconsistency in determination of IROLs due to lack of clarity. The use of the term *instability* in the current definition of IROL can be broadly interpreted to include the entire spectrum of scenarios ranging from widespread instability to localized instability. The term can be interpreted to mean that any instance of BES instability is expected to be prevented via an IROL regardless of the consequences of that action or the severity and extent of adverse impact to the BES. For example, a planned outage may result in a scenario where the next worst Contingency could result in voltage collapse for a localized 90 MW load pocket. Per the definition, an IROL needs to be established that prevents the Contingency from resulting in voltage collapse. Per IRO-009-1, an IROL requires procedures to prevent and mitigate the IROL within the IROL $T_V$ up to and including shedding load. In certain cases, the only way to mitigate certain instances of instability is to shed load pre-Contingency due to the absence of other mitigation options. The PRT believes that such drastic measures for local, contained instances of instability are not warranted and conflict with the principles of good utility practice. A better approach is to treat this situation as an SOL which must be managed with an appropriate Operating Plan as required by proposed TOP-001-3. The PRT recommends that the SDT consider addressing this issue that may be caused by application of the IROL definition. A potential approach to resolve the issue is to revise FAC-011-3 to require the Reliability Coordinator (RC) to describe in the RC's SOL Methodology the extent and degree of instability that warrants establishment of an IROL. This approach clarifies the RC's flexibility for managing issues of local instability via Operating Plans without establishing an IROL. Alternatively, the SDT may consider revising the IROL definition to address this issue.

***Interconnection Reliability Operating Limit (approved)***
*A System Operating Limit that, if violated, could lead to instability, uncontrolled separation, or Cascading outages that adversely impact the reliability of the Bulk Electric System.*

**New Defined Term.** A new definition should be developed to define the term 'System Operating Limit Exceedance or SOL Exceedance'. The definition would provide clarity and alignment with TOP and IRO standards, the NERC SOL white paper, and the proposed definition of SOL. These definitions and the proposed TOP and IRO standards developed in Project 2014-03 are aligned to adhere to the principle that the BES is to be operated within System Operating Limits, which are Facility Ratings, voltage limits, transient Stability Limits, and voltage Stability Limits. Operational Planning Analyses and Real-time Assessments are the means to ensure that SOLs are observed in both the pre- and post-Contingency state. Operating Plans developed by operating entities are used to prevent or mitigate SOL exceedance in Real-time. The new TOP and IRO standards use the phrase 'SOL exceedance' or to 'exceed a SOL' extensively. The use of this terminology was intended by the Project 2014-03 SDT to reflect the definition/description of SOL Exceedance provided in the NERC SOL White Paper. Defining the 'SOL Exceedance' concept in the NERC Glossary provides explicit clarity and prevents wide-ranging and unintended interpretations.

***System Operating Limit Exceedance or SOL Exceedance (Proposed)***
*When any of the following occur or are observed as part of Real-time monitoring or a Real-time Assessment:*

- *Actual flow on a Facility is above the Facility Rating for an unacceptable time duration*
- *Calculated Post-Contingency flow on a Facility is above the highest available Facility Rating*
- *Actual bus voltage is outside acceptable pre-Contingency (normal) bus voltage limits*
- *Calculated Post-Contingency bus voltage is outside acceptable post-Contingency (emergency) bus voltage limits*
- *The pre or post-Contingency System exhibits either transient or voltage instability (techniques for determining and observing Stability Limits can vary)*

4. **Compliance Elements:** Are the compliance elements associated with the requirements (Measures, Data Retention, Violation Risk Factors (VRF), and Violation Severity Levels (VSL)) consistent with the direction of the Reliability Assurance Initiative and FERC and NERC guidelines? If you answered "No," please identify which elements require revision, and why:

☐ Yes

☒ No

In revised FAC standards, each Requirement should have a corresponding Measure.

5. **Consistency with Other Reliability Standards:** Does the Reliability Standard need to be revised for formatting and language consistency among requirements within the Reliability Standard or consistency with other Reliability Standards? If you answered "Yes," please describe the changes needed to achieve formatting and language consistency:

☒ Yes

☐ No

**Summary:** In general, the principles for SOL establishment as described in FAC-011-3 should be revised to align with the concepts in proposed TOP/IRO Standards developed in Project 2014-03. See the NERC SOL White Paper, which served as a basis for the development of the new TOP/IRO standards. The methodology concepts in existing FAC standards do not adequately reflect current operating practice.

- In current FAC-011-3, SOLs are established to meet defined pre- and post-Contingency reliability criteria (Requirement R2). Operating within these SOLs in Real-time operations is intended to ensure acceptable pre- and post-Contingency system performance. This approach

~~is flawed because it does~~may not adequately account for the changing nature of the system in Real-time~~, which impacts the system limits~~. ~~Furthermore, the PRT believes that there needs to be a distinction between 1) what an SOL is, 2) what constitutes acceptable system performance, and 3) the mechanisms or processes by which entities achieve acceptable system performance in real-time operations.~~

- The new TOP/IRO standards address the Real-time changing nature of the BES. Operating Plans are established to prevent or mitigate SOL exceedances, where the Facility Ratings, voltage limits, transient Stability Limits, and voltage Stability Limits are the SOLs which are to be operated within pre- and post-Contingency as described in the proposed SOL Exceedance definition.

Incorporating the proposed definitions from section 3 and considering a broad revision to FAC standards are recommended to provide for consistent application of SOL methodology.

**Requirement R2 and R3.3:** Acceptable system performance requirements for the operations horizon need to be maintained and more clearly defined. The PRT believes a standards project should consider writing system performance requirements directly into the continent-wide Reliability Standards instead of requiring the RC's methodology to specify acceptable system performance as done in FAC-011-3.

~~-~~Requirement R2 in FAC-011-3 describes acceptable system performance requirements for operations horizon ~~much in the same way that~~just as TPL-001-4 Table 1 defines acceptable performance requirements for the planning horizon. Similarly, Requirement R3.3 requires that the RC's SOL methodology include a process for determining which of the stability limits associated with the list of multiple contingencies provided by the Planning Authority in accordance with FAC-014 Requirement 6 are applicable for use in the operating horizon. TPL-001-4 Table 1 categories P3 through P7 (multiple contingencies) provide a detailed list of multiple contingency events used in the planning horizon, some of which may also be applicable in the operations horizon.

To improve consistency and clarity, the PRT recommends that Requirement R2, ~~and~~ its subparts, and Requirement R3 Part ~~-~~R3.3 be revised to define acceptable system performance requirements for the operating horizon in a table similar to the way TPL-001-4 Table 1 defines acceptable performance requirements for the planning horizon. This operations table should include the ~~multiple~~ contingency events from TPL-001-4 Table 1 that are applicable to the operations horizon to improve clarity of expectations for assessments and to avoid potential reliability inconsistencies between Real-time operations and planning time horizons. There should also be a requirement for the RC to determine criteria or have a methodology to identify ~~S~~system instability (localized v. non-localized) as discussed in section 3.

~~**Requirement R3:** Part 3.3 requires the RC's methodology for determining SOLs to include a process for determining Stability Limits associated with some multiple contingencies. TPL-001-4 Table 1 categories P3 through P7 (multiple contingencies) provide a detailed list of multiple contingency events used in the planning horizon, some of which may also be applicable in the operations~~

~~horizon. Revised FAC standards should include the multiple contingency events from TPL-001-4 Table 1 that are applicable to the operations horizon to avoid potential reliability inconsistencies between Real-time operations and planning time horizons.~~

**Requirement R4**: References to the *Planning Authority* in Requirement R4 should be replaced with *Planning Coordinator* for consistency with the NERC Functional Model.

**Regional Differences Section**: WECC has initiated a project to review the regional differences section as applicable to their region. Proposed removal or revisions from WECC's review should be incorporated into revised FAC standards.

**Potential for inconsistency with FAC-010-3.** FAC-010-3 requires Planning Coordinators to have a methodology for establishing SOLs in the planning horizon. FAC-011-3 requires the RC to have a methodology for establishing SOLs in the operations horizon. Differences in these two methodologies could result in inconsistencies and could create reliability gaps. For example, FAC-010-3 R3.4 requires that the PC's SOL Methodology describe allowed uses of Remedial Action Schemes. FAC-011-3 R3.5 requires that the RC's SOL methodology describe allowed uses of Remedial Action Schemes. It is possible that these two methodologies could conflict with one another on this issue. The PRT proposes to retire FAC-010 as discussed separately. If FAC-010 is not retired, a Requirement should be added to the FAC standards to avoid inconsistencies between PC and RC SOL methodologies.

**Voltage Limits in the Operating Time Horizon.** Currently-approved Reliability Standards do not adequately address establishing voltage limits for use in operations. VAR-001-4 requires Transmission Operators (TOPs) to establish voltage schedules, but not voltage limits. Reliability Standards ~~FAC standards~~ should ~~be revised to~~ include a requirement(s) for the appropriate functional entity or entities ~~(Transmission Operator, Transmission Owner, Generator Operator, or Generator Owner)~~ to establish and communicate ~~BES~~ voltage limits (normal and emergency) for use in operations. Voltage limits established for ~~by~~ both system and equipment performance may need to be considered for reliable operations ~~are needed, and should be the specific responsibility of the~~by the appropriate functional entity or entities.

6. **Changes in Technology, System Conditions, or other Factors:** Does the Reliability Standard need to be revised to account for changes in technology, system conditions, or other factors? If you answered "Yes," please describe the changes and specifically what the potential impact is to reliability if the Reliability Standard is not revised:

   ☒ Yes

   ☐ No

The FAC-011 and FAC-014 version 0 standards were approved in 2006, and minimal changes have occurred in subsequent revisions. Both standards presumed an operations paradigm characterized by the following:

1. A study, assessment, or analysis needs to be performed ahead of time to establish an SOL (and IROL as needed) that achieves acceptable BES system performance per FAC-011-3 R2 and subparts.
2. The established SOL is then communicated and coordinated with operators and other impacted entities prior to implementation.
3. Operators are then given Operating Plans to operate below the SOL with the presumption that doing so will result in acceptable pre- and post-Contingency system performance in Real-time operations.

The common practice given the prevailing technologies and tools at the time was to establish SOLs in advance (day ahead or earlier) to support Real-time operations. However, as more advanced applications have come into prominent use, it is possible to establish SOLs in Real-time based on actual operating conditions. For example, many entities have the ability to calculate Real-time Facility Ratings (based on wind, temperature, sag, etc.), Voltage Stability Limits, and transient Stability Limits in Real-time or very close to Real-time. Additionally, advanced applications such as state estimation and Real-time contingency analysis (which are widely used in the industry today) allow entities to assess pre- and post-Contingency performance and to identify potential Cascading events in Real-time based on actual operating conditions. The wide use of these technologies today brings into question the relevance and validity of the past presumptions and paradigms associated with the historical SOL concept as conveyed in FAC-011, FAC-014, and the SOL definition.

When entities determine SOLs and IROLs in Real-time, conflicts can arise with existing standards. Requirements for communicating and acting on IROLs found in FAC, TOP, and IRO standards may be unreasonable or they may have negative consequences when unexpected IROL conditions are identified as a result of Real-time monitoring or Real-time Assessment. For example, situations can arise where the System Operators identify a potential IROL condition following a Contingency that requires time for analysis and validation. Determination of viable mitigating actions to address this potential IROL may take additional analysis. Existing standards are unclear on how $T_v$ is applied in this circumstance, which could lead to premature operator actions based on incomplete analysis. Another example involves operator actions in response to potential IROL conditions that are identified in Real-time Assessments and are clearly temporary in nature.

The PRT believes that FAC-011~~0~~ and FAC-014 should be revised so that they are technology-neutral. The standards should not mandate the use of more advanced applications for establishing SOLs in Real-time, nor should they prevent entities from taking advantage of the reliability improvements, accuracies, and efficiencies gained by the use of advanced technologies. These standards should not presume operations paradigms, and should allow entities more flexibility in determining how to achieve the ultimate reliability objective of maintaining pre- and post-Contingency acceptable

system performance in Real-time. The standards need to be revised to align with the new definition of *Operational Planning Analysis* and *Real-time Assessment*, while ensuring that coordination among reliability entities is maintained.

7. **Consideration of Generator Interconnection Facilities:** Is responsibility for generator interconnection Facilities appropriately accounted for in the Reliability Standard?

   ☒ Yes
   ☐ No

   *Guiding Questions:*

   If the Reliability Standard is applicable to GOs/GOPs, is there any ambiguity about the inclusion of generator interconnection Facilities? (If generation interconnection Facilities could be perceived to be excluded, specific language referencing the Facilities should be introduced in the Reliability Standard.)

   If the Reliability Standard is not applicable to GOs/GOPs, is there a reliability-related need for treating generator interconnection Facilities as transmission lines for the purposes of this Reliability Standard? (If so, GOs and GOPs that own or operate relevant generator interconnection Facilities should be explicit in the applicability section of the Reliability Standard.)

## Recommendation

The answers to the questions above, along with a preliminary recommendation of the Review Team, will be posted for a 45-day comment period, and the comments will be publicly posted. The Review Team will review the comments to evaluate whether to modify the initial recommendation, and will document the final recommendation, which will be presented to the Standards Committee.

**Preliminary Recommendation (to be completed by the Review Team after its review and prior to posting the results of the review for industry comment):**

☐ REAFFIRM
☒ REVISE
☐ RETIRE

Technical Justification *(If the Review Team recommends that the Reliability Standard be revised, a draft SAR may be included and the technical justification included in the SAR)*:

**Preliminary Recommendation posted for industry comment (date):** May 4, 2015 - June 17, 2015

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**Final Recommendation (to be completed by the Review Team after it has reviewed industry comments on the preliminary recommendation):**

☐ REAFFIRM *(This should only be checked if there are no outstanding directives, interpretations or issues identified by stakeholders.)*

☒ REVISE

☐ RETIRE

Technical Justification *(If the Review Team recommends that the Reliability Standard be revised, a draft SAR may be included and the technical justification included in the SAR)*: ——SAR Included

**Date submitted to NERC Staff:** ——July 29, 2015

# Attachment 1: Results-Based Standards

The fourth question for NERC staff and the Review Team asks if the Reliability Standard needs to be converted to the results-based standards (RBS) format. The information below will be used by NERC staff and the Review Team in making this determination.

Transitioning the current body of standards into a clear and concise body of world-class standards will require a comprehensive application of the RBS concept. RBS concepts employ a defense-in-depth strategy for Reliability Standards development where each requirement has a role in preventing system failures, and the roles are complementary and reinforcing. Reliability Standards should be viewed as a portfolio of requirements designed to achieve an overall defense-in-depth strategy and comply with the quality objectives identified in the resource document titled, "Acceptance Criteria of a Reliability Standard."

Accordingly, the Review Team shall consider whether the Reliability Standard contains results-based requirements with sufficient clarity to hold entities accountable without being overly prescriptive as to how a specific reliability outcome is to be achieved. The RBS concept, properly applied, addresses the clarity and effectiveness aspects of a standard.

A Reliability Standard that adheres to the RBS format should strive to achieve a portfolio of performance-, risk-, and competency-based mandatory reliability requirements that support an effective defense-in-depth strategy. Each requirement should identify a clear and measurable expected outcome, such as: a) a stated level of reliability performance, b) a reduction in a specified reliability risk, or c) a necessary competency.

a. **Performance-Based**—defines a particular reliability objective or outcome to be achieved. In its simplest form, a results-based requirement has four components: who, under what conditions (if any), shall perform what action, to achieve what particular result or outcome?

b. **Risk-Based**—preventive requirements to reduce the risks of failure to acceptable tolerance levels. A risk-based reliability requirement should be framed as: who, under what conditions (if any), shall perform what action, to achieve what particular result or outcome that reduces a stated risk to the reliability of the bulk power system?

c. **Competency-Based**—defines a minimum set of capabilities an entity needs to have to demonstrate it is able to perform its designated reliability functions. A competency-based reliability requirement should be framed as: who, under what conditions (if any), shall have what capability, to achieve what particular result or outcome to perform an action to achieve a result or outcome or to reduce a risk to the reliability of the bulk power system?

Additionally, each RBS-adherent Reliability Standard should enable or support one or more of the eight reliability principles listed below. Each Reliability Standard should also be consistent with all of the reliability principles.

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.

If the Reliability Standard does not provide for a portfolio of performance-, risk-, and competency-based requirements or consistency with NERC's reliability principles, NERC staff and the Review Team should recommend that the Reliability Standard be revised or reformatted in accordance with the RBS format.

# Attachment 2: Paragraph 81 Criteria

The first question for the Review Team asks if one or more of the requirements in the Reliability Standard meet(s) criteria for retirement or modification based on Paragraph 81 concepts.[4] Use the Paragraph 81 criteria explained below to make this determination. Document the justification for the decisions throughout and provide them in the final assessment in the Periodic Review Template.

For a Reliability Standard requirement to be proposed for retirement or modification based on Paragraph 81 concepts, it must satisfy **both**: (i) Criterion A (the overarching criterion); and (ii) at least one of the Criteria B listed below (identifying criteria). In addition, for each Reliability Standard requirement proposed for retirement or modification, the data and reference points set forth below in Criteria C should be considered for making a more informed decision.

### *Criterion A (Overarching Criterion)*

The Reliability Standard requirement requires responsible entities ("entities") to conduct an activity or task that does little, if anything, to benefit or protect the reliable operation of the BES.

Section 215(a) (4) of the United States Federal Power Act defines "reliable operation" as: "… operating the elements of the bulk power system within equipment and electric system thermal, voltage, and Stability Limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements."

### *Criteria B (Identifying Criteria)*

**B1. Administrative**

The Reliability Standard requirement requires responsible entities to perform a function that is administrative in nature, does not support reliability and is needlessly burdensome.

This criterion is designed to identify requirements that can be retired or modified with little effect on reliability and whose retirement or modification will result in an increase in the efficiency of the ERO compliance program. Administrative functions may include a task that is related to developing procedures or plans, such as establishing communication contacts. Thus, for certain requirements, Criterion B1 is closely related to Criteria B2, B3 and B4. Strictly administrative functions do not inherently negatively impact reliability directly and, where possible, should be eliminated or modified for purposes of efficiency and to allow the ERO and entities to appropriately allocate resources.

[4] In most cases, satisfaction of the Paragraph 81 criteria will result in the retirement of a requirement. In some cases, however, there may be a way to modify a requirement so that it no longer satisfies Paragraph 81 criteria. Recognizing that, this document refers to both options.

**B2. Data Collection/Data Retention**
These are requirements that obligate responsible entities to produce and retain data which document prior events or activities, and should be collected via some other method under NERC's rules and processes.

This criterion is designed to identify requirements that can be retired or modified with little effect on reliability. The collection and/or retention of data do not necessarily have a reliability benefit and yet are often required to demonstrate compliance. Where data collection and/or data retention is unnecessary for reliability purposes, such requirements should be retired or modified in order to increase the efficiency of the ERO compliance program.

**B3. Documentation**
The Reliability Standard requirement requires responsible entities to develop a document (*e.g.,* plan, policy or procedure) which is not necessary to protect reliability of the bulk power system.

This criterion is designed to identify requirements that require the development of a document that is unrelated to reliability or has no performance or results-based function. In other words, the document is required, but no execution of a reliability activity or task is associated with or required by the document.

**B4. Reporting**
The Reliability Standard requirement obligates responsible entities to report to a Regional Entity, NERC or another party or entity. These are requirements that obligate responsible entities to report to a Regional Entity on activities which have no discernible impact on promoting the reliable operation of the BES and if the entity failed to meet this requirement there would be little reliability impact.

**B5. Periodic Updates**
The Reliability Standard requirement requires responsible entities to periodically update (*e.g.,* annually) documentation, such as a plan, procedure or policy without an operational benefit to reliability.

This criterion is designed to identify requirements that impose an updating requirement that is out of sync with the actual operations of the BES, unnecessary, or duplicative.

**B6. Commercial or Business Practice**
The Reliability Standard requirement is a commercial or business practice, or implicates commercial rather than reliability issues.

This criterion is designed to identify those requirements that require: (i) implementing a best or outdated business practice or (ii) implicating the exchange of or debate on commercially sensitive information while doing little, if anything, to promote the reliable operation of the BES.

**B7. Redundant**
The Reliability Standard requirement is redundant with: (i) another FERC-approved Reliability Standard requirement(s); (ii) the ERO compliance and monitoring program; or (iii) a governmental regulation (*e.g.,* Open Access Transmission Tariff, North American Energy Standards Board ("NAESB"), etc.).

This criterion is designed to identify requirements that are redundant with other requirements and are, therefore, unnecessary. Unlike the other criteria listed in Criterion B, in the case of redundancy, the task or activity itself may contribute to a reliable BES, but it is not necessary to have two duplicative requirements on the same or similar task or activity. Such requirements can be retired or modified with little or no effect on reliability and removal will result in an increase in efficiency of the ERO compliance program.

***Criteria C (Additional data and reference points)***
Use the following data and reference points to assist in the determination of (and justification for) whether to proceed with retirement or modification of a Reliability Standard requirement that satisfies both Criteria A and B:

**C1. Was the Reliability Standard requirement part of a FFT filing?**
The application of this criterion involves determining whether the requirement was included in a FFT filing.

**C2. Is the Reliability Standard requirement being reviewed in an ongoing Standards Development Project?**
The application of this criterion involves determining whether the requirement proposed for retirement or modification is part of an active Standards Development Project, with consideration for the status of the project. If the requirement has been approved by Registered Ballot Body and is scheduled to be presented to the NERC Board of Trustees, in most cases it will not need to be addressed in the periodic review. The exception would be a requirement, such as the Critical Information Protection (CIP) requirements for Version 3 and 4, that is not due to be retired for an extended period of time. Also, for informational purposes, whether the requirement is included in a future or pending Standards Development Project should be identified and discussed.

**C3. What is the VRF of the Reliability Standard requirement?**
The application of this criterion involves identifying the VRF of the requirement proposed for retirement or modification, with particular consideration of any requirement that has been assigned as having a Medium or High VRF. Also, the fact that a requirement has a Lower VRF is not dispositive that

it qualifies for retirement or modification. In this regard, Criterion C3 is considered in light of Criterion C5 (Reliability Principles) and C6 (Defense in Depth) to ensure that no reliability gap would be created by the retirement or modification of the Lower VRF requirement. For example, no requirement, including a Lower VRF requirement, should be retired or modified if doing so would harm the effectiveness of a larger scheme of requirements that are purposely designed to protect the reliable operation of the BES.

**C4. In which tier of the most recent Actively Monitored List (AML) does the Reliability Standard requirement fall?**

The application of this criterion involves identifying whether the requirement proposed for retirement or modification is on the most recent AML, with particular consideration for any requirement in the first tier of the AML.

**C5. Is there a possible negative impact on NERC's published and posted reliability principles?**

The application of this criterion involves consideration of the eight following reliability principles published on the NERC webpage.

**Reliability Principles**

NERC Reliability Standards are based on certain reliability principles that define the foundation of reliability for North American bulk power systems. Each reliability standard shall enable or support one or more of the reliability principles, thereby ensuring that each standard serves a purpose in support of reliability of the North American bulk power systems. Each reliability standard shall also be consistent with all of the reliability principles, thereby ensuring that no standard undermines reliability through an unintended consequence.

Principle 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.

Principle 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.

Principle 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.

Principle 4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained, and implemented.

Principle 5. Facilities for communication, monitoring, and control shall be provided, used, and maintained for the reliability of interconnected bulk power systems.

Principle 6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.

Principle 7. The reliability of the interconnected bulk power systems shall be assessed, monitored, and maintained on a wide-area basis.

Principle 8. Bulk power systems shall be protected from malicious physical or cyber attacks. (footnote omitted).

**C6. Is there any negative impact on the defense in depth protection of the BES?**
The application of this criterion considers whether the requirement proposed for retirement or modification is part of a defense in depth protection strategy. In order words, the assessment is to verify whether other requirements rely on the requirement proposed for retirement or modification to protect the BES.

**C7. Does the retirement or modification promote results or performance based Reliability Standards?**
The application of this criterion considers whether the requirement, if retired or modified, will promote the initiative to implement results- and/or performance-based Reliability Standards.