

**Reliability Standard Audit Worksheet[[1]](#footnote-1)**

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

***This section to be completed by the Compliance Enforcement Authority.***

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| **Audit ID:** | Audit ID if available; or REG-NCRnnnnn-YYYYMMDD |
| **Registered Entity:**  | Registered name of entity being audited |
| **NCR Number:**  | NCRnnnnn |
|  **Compliance Enforcement Authority:** | Region or NERC performing audit |
| **Compliance Assessment Date(s)[[2]](#footnote-2):** | Month DD, YYYY, to Month DD, YYYY |
| **Compliance Monitoring Method:**  | [On-site Audit | Off-site Audit | Spot Check] |
| **Names of Auditors:**  | Supplied by CEA |

# **Applicability of Requirements**

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|  | **BA** | **DP** | **GO** | **GOP** | **PA/PC** | **RC** | **RP** | **RSG** | **TO** | **TOP** | **TP** | **TSP** |
| **R1** |  |  |  |  |  | X |  |  |  |  |  |  |
| **R2** |  |  |  |  |  | X |  |  |  |  |  |  |
| **R3** |  |  |  |  |  | X |  |  |  |  |  |  |
| **R4** |  |  |  |  |  | X |  |  |  |  |  |  |

**Legend:**

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| Text with blue background: | Fixed text – do not edit |
| Text entry area with Green background: | Entity-supplied information |
| Text entry area with white background: | Auditor-supplied information |

Findings

**(This section to be completed by the Compliance Enforcement Authority)**

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| **Req.** | **Finding** | **Summary and Documentation** | **Functions Monitored** |
| **R1** |  |  |  |
| **R2** |  |  |  |
| **R3** |  |  |  |
| **R4** |  |  |  |

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| **Req.** | **Areas of Concern** |
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| **Req.** | **Recommendations** |
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| **Req.** | **Positive Observations** |
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Subject Matter Experts

Identify the Subject Matter Expert(s) responsible for this Reliability Standard.

**Registered Entity Response (Required; Insert additional rows if needed):**

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| **SME Name** | **Title** | **Organization** | **Requirement(s)** |
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R1 Supporting Evidence and Documentation

**R1.** The Reliability Coordinator shall have a documented methodology for use in developing SOLs (SOL Methodology) within its Reliability Coordinator Area. This SOL Methodology shall:

**R1.1.** Be applicable for developing SOLs used in the operations horizon.

**R1.2.** State that SOLs shall not exceed associated Facility Ratings.

**R1.3.** Include a description of how to identify the subset of SOLs that qualify as IROLs.

**M1.** The Reliability Coordinator’s SOL Methodology shall address all of the items listed in Requirement 1 through Requirement 3.

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested[[3]](#endnote-1):

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| The entity’s documented SOL Methodology. |

Registered Entity Evidence (Required):

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| **The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.** |
| **File Name** | **Document Title** | **Revision or Version** | **Document Date** | **Relevant Page(s) or Section(s)** | **Description of Applicability of Document** |
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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

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Compliance Assessment Approach Specific to FAC-011-3, R1

***This section to be completed by the Compliance Enforcement Authority***

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|  | Confirm that the Reliability Coordinator has a documented SOL Methodology to be used for developing SOLs within its Reliability Coordinator Area. Verify the SOL Methodology: |
|  |  Is applicable for developing SOLs used in the operations horizon. |
|  | States the SOLs do not exceed associated Facility Ratings. |
|  | Includes a description of how to identify the subset of SOLs that qualify as IROLs. |

Auditor Notes:

R2 Supporting Evidence and Documentation

**R2.** The Reliability Coordinator’s SOL Methodology shall include a requirement that SOLs provide BES performance consistent with the following:

**R2.1.** In the pre-contingency state, the BES shall demonstrate transient, dynamic and voltage stability; all Facilities shall be within their Facility Ratings and within their thermal, voltage and stability limits. In the determination of SOLs, the BES condition used shall reflect current or expected system conditions and shall reflect changes to system topology such as Facility outages.

**R2.2.** Following the single Contingencies identified in Requirement 2.2.1 through Requirement 2.2.3, the system shall demonstrate transient, dynamic and voltage stability; all Facilities shall be operating within their Facility Ratings and within their thermal, voltage and stability limits; and Cascading or uncontrolled separation shall not occur.

**R2.2.1.** Single line to ground or 3-phase Fault (whichever is more severe), with Normal Clearing, on any Faulted generator, line, transformer, or shunt device.

**R2.2.2.** Loss of any generator, line, transformer, or shunt device without a Fault.

**R2.2.3.** Single pole block, with Normal Clearing, in a monopolar or bipolar high voltage direct current system.

**R2.3.** In determining the system’s response to a single Contingency, the following shall be acceptable:

**R2.3.1.** Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the Faulted Facility or by the affected area.

**R2.3.2.** Interruption of other network customers, (a) only if the system has already been adjusted, or is being adjusted, following at least one prior outage, or

(b) if the real-time operating conditions are more adverse than anticipated in the corresponding studies

**R2.3.3.** System reconfiguration through manual or automatic control or protection actions.

**R2.4.** To prepare for the next Contingency, system adjustments may be made, including changes to generation, uses of the transmission system, and the transmission system topology.

**M1.** The Reliability Coordinator’s SOL Methodology shall address all of the items listed in Requirement 1 through Requirement 3.

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requestedi:

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| Annotated document highlighting how each of the required R2 conditions are met within the entity’s SOL Methodology document. |

Registered Entity Evidence (Required):

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| **The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.** |
| **File Name** | **Document Title** | **Revision or Version** | **Document Date** | **Relevant Page(s) or Section(s)** | **Description of Applicability of Document** |
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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

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Compliance Assessment Approach Specific to FAC-011-3, R2

***This section to be completed by the Compliance Enforcement Authority***

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|  | Verify that the Reliability Coordinator’s SOL Methodology included a requirement that SOLs provide BES performance consistent with: |
|  | [R2.1] In the pre contingency state with BES conditions reflecting expected system conditions and changes to system topology, such as Facility outages. |
|  | * The BES shall demonstrate transient stability, dynamic stability and voltage stability;
 |
|  | * All Facilities shall be within their Facility Ratings;
 |
|  | * All Facilities shall be within their thermal, voltage and stability limits and;
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|  | [R2.2] Following the single Contingencies identified in Requirement 2.2.1 through Requirement 2.2.3,  |
|  | [R2.2.1] Single line to ground or 3-phase Fault (whichever is more severe), with Normal Clearing, on any Faulted generator, line, transformer, or shunt device. |
|  | [R2.2.2] Loss of any generator, line, transformer, or shunt device without a Fault. |
|  | [R2.2.3] Single pole block, with Normal Clearing, in a monopolar or bipolar high voltage direct current system. |
|  | * The BES system shall demonstrate transient stability, dynamic stability and voltage stability and:
 |
|  | * All Facilities shall be within their Facility Ratings
 |
|  | * All Facilities shall be within their thermal, voltage and stability limits.
 |
|  | * Cascading Outages or uncontrolled separation shall not occur.
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|  | [R2.3] In determining the system’s response to a single Contingency, the following shall be acceptable:  |
|  | [R2.3.1] Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the Faulted Facility or by the affected area. |
|  | [R2.3.2] Interruption of other network customers, (a) only if the system has already been adjusted, or is being adjusted, following at least one prior outage, or (b) if the real-time operating conditions are more adverse than anticipated in the corresponding studies. |
|  | [R2.3.3] System reconfiguration through manual or automatic control or protection actions. |
|  | [R2.4] To prepare for the next Contingency, system adjustments may be made, including changes to generation, uses of the transmission system, and the transmission system topology. |

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| **Note to Auditor:** The Contingencies identified in FAC-011 R2.2.1 through R2.2.3 are the minimum contingencies that must be studied but are not necessarily the only Contingencies that should be studied. |

Auditor Notes:

R3 Supporting Evidence and Documentation

**R3.** The Reliability Coordinator’s methodology for determining SOLs, shall include, as a minimum, a description of the following, along with any reliability margins applied for each:

**R3.1.** Study model (must include at least the entire Reliability Coordinator Area as well as the critical modeling details from other Reliability Coordinator Areas that would impact the Facility or Facilities under study.)

**R3.2.** Selection of applicable Contingencies

**R3.3.** 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 given the actual or expected system conditions.

**R3.3.1.** This process shall address the need to modify these limits, to modify the list of limits, and to modify the list of associated multiple contingencies.

**R3.4.** Level of detail of system models used to determine SOLs.

**R3.5.** Allowed uses of Remedial Action Schemes.

**R3.6.** Anticipated transmission system configuration, generation dispatch and Load level

**R3.7.** Criteria for determining when violating a SOL qualifies as an Interconnection Reliability Operating Limit (IROL) and criteria for developing any associated IROL Tv.

**M1.** The Reliability Coordinator’s SOL Methodology shall address all of the items listed in Requirement 1 through Requirement 3.

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requestedi:

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| Annotated document highlighting how each of the required R3 conditions are met within the entity’s SOL Methodology document. |

Registered Entity Evidence (Required):

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| **The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.** |
| **File Name** | **Document Title** | **Revision or Version** | **Document Date** | **Relevant Page(s) or Section(s)** | **Description of Applicability of Document** |
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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

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Compliance Assessment Approach Specific to FAC-011-3, R3

***This section to be completed by the Compliance Enforcement Authority***

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|  | Confirm that the Reliability Coordinator’s methodology for determining SOLs includes at a minimum, a description of the following, along with any reliability margins applied for each: |
|  |  [R3.1] Study model (must include at least the entire Reliability Coordinator Area as well as the critical modeling details from other Reliability Coordinator Areas that would impact the Facility or Facilities under study). |
|  | [R3.2] Selection of applicable Contingencies. |
|  |  [R3.3] 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 given the actual or expected system conditions. |
|  |  [R3.3.1] This process shall address the need to modify these limits, to modify the list of limits, and to modify the list of associated multiple contingencies. |
|  | [R3.4] Level of detail of system models used to determine SOLs. |
|  | [R3.5] Allowed uses of Remedial Action Schemes. |
|  | [R3.6] Anticipated transmission system configuration, generation dispatch and Load level. |
|  | [R3.7] Criteria for determining when violating a SOL qualifies as an Interconnection Reliability Operating Limit (IROL) and criteria for developing any associated IROL Tv. |

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| **Note to Auditor:**  |

Auditor Notes:

R4 Supporting Evidence and Documentation

**R4.** The Reliability Coordinator shall issue its SOL Methodology and any changes to that methodology, prior to the effectiveness of the Methodology or of a change to the Methodology, to all of the following:

**R4.1.** Each adjacent Reliability Coordinator and each Reliability Coordinator that indicated it has a reliability-related need for the methodology.

**R4.2.** Each Planning Authority and Transmission Planner that models any portion of the Reliability Coordinator’s Reliability Coordinator Area.

**R4.3.** Each Transmission Operator that operates in the Reliability Coordinator Area.

**M2.** The Reliability Coordinator shall have evidence it issued its SOL Methodology, and any changes to that methodology, including the date they were issued, in accordance with Requirement 4.

**Registered Entity Response (Required):**

**Question:** Did any non-adjacent Reliability Coordinator indicate it has a reliability-related need for the SOL methodology? [ ]  Yes [ ]  No

Please list each such Reliability Coordinator

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requestedi:

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| A list of Reliability Coordinators adjacent to the entity’s Reliability Coordinator Area |
| A list identifying each Planning Authority and Transmission Planner that models any portion of the entity’s Reliability Coordinator Area |
| A list identifying each Transmission Operator that operates in the Reliability Coordinator Area. |
| A dated list identifying any changes to the SOL Methodology that occurred during the compliance audit period.  |
| Evidence that the entity issued its SOL Methodology and any changes to that methodology, including the date they were issued, in accordance with Requirement 4. |

Registered Entity Evidence (Required):

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| **The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.** |
| **File Name** | **Document Title** | **Revision or Version** | **Document Date** | **Relevant Page(s) or Section(s)** | **Description of Applicability of Document** |
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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

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Compliance Assessment Approach Specific to FAC-011-3, R4

***This section to be completed by the Compliance Enforcement Authority***

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|  | Verify that the entity issued its SOL Methodology and any changes to that methodology, prior to the effectiveness of the Methodology or of a change to the Methodology, to all of the following: |
|  | [R4.1] Each adjacent Reliability Coordinator and each Reliability Coordinator that indicated it has a reliability-related need for the methodology.  |
|  | [R4.2] Each Planning Authority and Transmission Planner that models any portion of the Reliability Coordinator’s Reliability Coordinator Area. |
|  | [R4.3] Each Transmission Operator that operates in the Reliability Coordinator Area. |

Auditor Notes:

Additional Information:

Reliability Standard



The full text of FAC-011-3 may be found on the NERC Web Site (www.nerc.com) under “Program Areas & Departments”, “Reliability Standards.”

In addition to the Reliability Standard, there is an applicable Implementation Plan available on the NERC Web Site.

Capitalized terms in the Reliability Standard refer to terms in the NERC Glossary, which may be found on the NERC Web Site.

Regulatory Language

[Order No. 818](http://www.nerc.com/FilingsOrders/us/FERCOrdersRules/Order%20No.%20818%20approving%20revised%20reliability%20standards.pdf), *Revisions to Emergency Operations Reliability Standards; Revisions to Undervoltage*

*Load Shedding Reliability Standards; Revisions to the Definition of “Remedial Action*

*Scheme” and Related Reliability* Standards, 153 FERC ¶ 61,228 (2015).

P. 23. On February 3, 2015, NERC filed a petition seeking approval of a revised definition of Remedial Action Scheme in the NERC Glossary, as well as modified Reliability Standards that incorporate the new Remedial Action Scheme definition and eliminate use of the term Special Protection System, and the associated implementation plan. The Commission approved these Standards, including FAX-011-3 in n.31.

The NERC Glossary of Terms is available at <http://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf>.

Revision History

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| **Version** | **Date** | **Reviewers** | **Revision Description** |
| 1.1 | 7/1/2010 | RSAW Working Group | Effective dates and version # change |
| 1.1 | 9/1/2010 | NERC Legal & NERC Compliance | Added regulatory language & reviewed for formatting consistency. |
| 1.1 | 12/1/2010 | QRSAW WG | Revised Findings Table, modified Supporting Evidence tables and Added Revision History |
| 1.1 | 1/1/2011 | Craig Struck | Reviewed for format consistency and content. |
| 2 | 1/20/2017 | NERC Compliance Assurance, RSAW Task Force | Revised for new Standard Version, and reformatted to latest RSAW Template. |

1. NERC developed this Reliability Standard Audit Worksheet (RSAW) language in order to facilitate NERC’s and the Regional Entities’ assessment of a registered entity’s compliance with this Reliability Standard. The NERC RSAW language is written to specific versions of each NERC Reliability Standard. Entities using this RSAW should choose the version of the RSAW applicable to the Reliability Standard being assessed. While the information included in this RSAW provides some of the methodology that NERC has elected to use to assess compliance with the requirements of the Reliability Standard, this document should not be treated as a substitute for the Reliability Standard or viewed as additional Reliability Standard requirements. In all cases, the Regional Entity should rely on the language contained in the Reliability Standard itself, and not on the language contained in this RSAW, to determine compliance with the Reliability Standard. NERC’s Reliability Standards can be found on NERC’s website. Additionally, NERC Reliability Standards are updated frequently, and this RSAW may not necessarily be updated with the same frequency. Therefore, it is imperative that entities treat this RSAW as a reference document only, and not as a substitute or replacement for the Reliability Standard. It is the responsibility of the registered entity to verify its compliance with the latest approved version of the Reliability Standards, by the applicable governmental authority, relevant to its registration status.

The NERC RSAW language contained within this document provides a non‑exclusive list, for informational purposes only, of examples of the types of evidence a registered entity may produce or may be asked to produce to demonstrate compliance with the Reliability Standard. A registered entity’s adherence to the examples contained within this RSAW does not necessarily constitute compliance with the applicable Reliability Standard, and NERC and the Regional Entity using this RSAW reserves the right to request additional evidence from the registered entity that is not included in this RSAW. Additionally, this RSAW includes excerpts from FERC Orders and other regulatory references. The FERC Order cites are provided for ease of reference only, and this document does not necessarily include all applicable Order provisions. In the event of a discrepancy between FERC Orders, and the language included in this document, FERC Orders shall prevail. [↑](#footnote-ref-1)
2. Compliance Assessment Date(s): The date(s) the actual compliance assessment (on-site audit, off-site spot check, etc.) occurs. [↑](#footnote-ref-2)
3. Items in the Evidence Requested section are suggested evidence that may, but will not necessarily, demonstrate compliance. These items are not mandatory and other forms and types of evidence may be submitted at the entity’s discretion. [↑](#endnote-ref-1)