

**Reliability Standard Audit Worksheet[[1]](#footnote-2)**

# IRO-018-1(i) – Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities

***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-3):** | 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** | **RC** | **RP** | **RSG** | **TO** | **TOP** | **TP** | **TSP** |
| **R1** |  |  |  |  |  | X |  |  |  |  |  |  |
| **R2** |  |  |  |  |  | X |  |  |  |  |  |  |
| **R3** |  |  |  |  |  | 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** |  |  |  |

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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

1. Each Reliability Coordinator shall implement an Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform its Real-time monitoring and Real-time Assessments. The Operating Process or Operating Procedure shall include:
   1. Criteria for evaluating the quality of Real-time data;
   2. Provisions to indicate the quality of Real-time data to the System Operator; and
   3. Actions to address Real-time data quality issues with the entity(ies) responsible for providing the data when data quality affects Real-time Assessments.
2. Each Reliability Coordinator shall have evidence it implemented its Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform its Real-time monitoring and Real-time Assessments. This evidence could include, but is not limited to: 1) an Operating Process or Operating Procedure in electronic or hard copy format meeting all provisions of Requirement R1; and 2) evidence Reliability Coordinator implemented the Operating Process or Operating Procedure as called for in the Operating Process or Operating Procedure, such as dated operator or supporting logs, dated checklists, voice recordings, voice transcripts, or other evidence.

**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-2)

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform Real-time monitoring and Real-time Assessments. |
| Evidence of implementation of the Operating Process or Operating Procedure which addresses the quality of the Real-time data necessary to perform Real-time monitoring and Real-time Assessments. |

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 IRO-018-1(i), R1

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

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|  | Review and verify the entity’s Operating Process or Operating Procedure addresses the Real-time data necessary to perform Real-time monitoring and Real-time Assessments. |
|  | Review and verify the entity’s Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform Real-time monitoring and Real-time Assessments includes: |
|  | (Part 1.1) Criteria for evaluating the quality of Real-time data; |
|  | (Part 1.2) Provisions to indicate the quality of Real-time data to the System Operator; and |
|  | (Part 1.3) Actions to address Real-time data quality issues with the entity(ies) responsible for providing the data when data quality affects Real-time Assessments. |
|  | Verify implementation of the Operating Process or Operating Procedure which addresses the quality of the Real-time data necessary to perform Real-time monitoring and Real-time Assessments. |
| **Note to Auditor:**  The Reliability Coordinator (RC) uses a set of Real-time data identified in IRO-010-1a Requirement R1 and IRO-010-2 Requirement R1 to perform its Real-time monitoring and Real-time Assessments. Requirements to perform Real-time monitoring and Real-time Assessments appear in other Reliability Standards. Real-time monitoring includes the following activities performed in Real-time:   * Acquisition of operating data; * Display of operating data as needed for visualization of system conditions; * Audible or visual alerting when warranted by system conditions; and * Audible or visual alerting when monitoring and analysis capabilities degrade or become unavailable.   As specified in Requirement R1 Part 1.1, the Operating Process or Operating Procedure must contain criteria for evaluating the quality of Real-time data. The criteria support identification of applicable data quality issues, such as:   * Data outside of a prescribed data range; * Analog data not updated within a predetermined time period; * Data entered manually to override telemetered information; or * Data otherwise identified as invalid or suspect.   As specified in Requirement R1 Part 1.2, the Operating Process or Operating Procedure must include provisions for indicating the quality of Real-time data to operating personnel. Descriptions of quality indicators such as display color codes, data quality flags, or other such indicators as found in Real-time monitoring specifications could be used.  As specified in Requirement R1 Part 1.3, the RC shall include actions to address Real-time data quality issues affecting its Real-time Assessments in its Operating Process or Operating Procedure. These actions could be the same as the process used to resolve data conflicts required by IRO-010-2 Requirement R3 Part 3.2, provided that the process addresses Real-time data quality issues.  Additionally, some data and data quality issues do not affect Real-time Assessments and will not need to be addressed by the actions contained in the Operating Process or Operating Procedures specified in this Requirement. The Operating Process or Operating Procedure must clearly identify to operating personnel how to determine the data that affects the quality of the Real-time Assessment so that effective actions can be taken to address data quality issues in an appropriate timeframe. | |

Auditor Notes:

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R2 Supporting Evidence and Documentation

1. Each Reliability Coordinator shall implement an Operating Process or Operating Procedure to address the quality of analysis used in its Real-time Assessments. The Operating Process or Operating Procedure shall include:
   1. Criteria for evaluating the quality of analysis used in its Real-time Assessments;
   2. Provisions to indicate the quality of analysis used in its Real-time Assessments; and
   3. Actions to address analysis quality issues affecting its Real-time Assessments.
2. Each Reliability Coordinator shall have evidence it implemented its Operating Process or Operating Procedure to address the quality of analysis used in its Real-time Assessments as specified in Requirement R2. This evidence could include, but is not limited to: 1) an Operating Process or Operating Procedure in electronic or hard copy format meeting all provisions of Requirement R2, and 2) evidence the Reliability Coordinator implemented the Operating Process or Operating Procedure as called for in the Operating Process or Operating Procedure, such as dated operator logs, dated checklists, voice recordings, voice transcripts, or other evidence.

**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:i

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| Operating Process or Operating Procedure to address the quality of analysis used in its Real-time Assessments. |
| Evidence of implementation of the Operating Process or Operating Procedure which addresses the quality of analysis used in its Real-time Assessments. |

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 IRO-018-1(i), R2

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

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|  | Verify that the Operating Process or Operating Procedure to address the quality of analysis used in its Real-time Assessments includes: |
|  | (Part 2.1) Criteria for evaluating the quality of analysis used in its Real-time Assessments; |
|  | (Part 2.2) Provisions to indicate the quality of analysis used in its Real-time Assessments; and |
|  | (Part 2.3) Actions to address analysis quality issues affecting its Real-time Assessments. |
|  | Verify implementation of the Operating Process or Operating Procedure which addresses the quality of analysis used in its Real-time Assessments. |
| **Note to Auditor:**  Requirement R2 ensures RCs have procedures to address issues related to the quality of the analysis results used for Real-time Assessments. Requirements to perform Real-time Assessments appear in other Reliability Standards. Examples of the types of analysis used in Real-time Assessments may include, as applicable:   * State estimation; * Real-time Contingency analysis; * Stability analysis; and * Other studies used for Real-time Assessments.   As specified in Requirement R2 Part 2.1, the entity must specify criteria for evaluating the quality of analysis used in its Real-time Assessments. Examples of the type of criteria may include, as applicable:   * Solution tolerances; * Mismatches with Real-time data; and * Convergences.   Per the “Rationale for Requirement R2,” the Operating Process or Operating Procedure must include provisions for how the quality of analysis results used in Real-time Assessment will be shown to operating personnel. Operating personnel includes System Operators and staff responsible for supporting Real-time operations. | |

Auditor Notes:

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R3 Supporting Evidence and Documentation

1. Each Reliability Coordinator shall have an alarm process monitor that provides notification(s) to its System Operators when a failure of its Real-time monitoring alarm processor has occurred.
2. Each Reliability Coordinator shall have evidence of an alarm process monitor that provides notification(s) to its System Operators when a failure of its Real-time monitoring alarm processor has occurred. This evidence could include, but is not limited to, operator logs, computer printouts, system specifications, or other evidence.

**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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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| Evidence of the alarm process monitor used by the entity. |
| Evidence of the notification(s) received by System Operators when a failure of its Real-time monitoring alarm processor has occurred. |

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 IRO-018-1(i), R3

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

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|  | Verify the entity has an alarm process monitor. |
|  | Verify the notification(s) when a failure of its Real-time monitoring alarm processor has occurred exists. |
|  | Verify that these notification(s) are provided to the entity’s System Operators. |
| **Note to Auditor:**  The alarm process monitor must be able to provide notification of failure of the Real-time monitoring alarm processor. This capability could be provided by an application within a Real-time monitoring system or by a separate component used by the System Operator. The alarm process monitor must not fail with a simultaneous failure of the Real-time monitoring alarm processor.  'Heartbeat' or 'watchdog' monitors are examples of an alarm process monitor. | |

Auditor Notes:

Additional Information:

Reliability Standard



In addition to the Reliability Standard, there is background information 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

**Federal Energy Regulatory Commission, Letter Order Approving Proposed Reliability Standards IRO-018-1**

**(Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities) and TOP-010-1 (Real-time Reliability Monitoring and Analysis Capabilities) Docket No. RD16-6-000 (September 22, 2016).**

The Commission approved Reliability Standards IRO-018-1 and TOP-010-1 and NERC’s proposed implementation plan, violation severity levels and, with the exceptions identified below, violation risk factors.

NERC contends that the proposed Reliability Standards address: (1) the directives in Order No. 693 requiring operators to have a minimum set of capabilities; (2) recommendations contained in the NERC Operating Committee Real-time Tools Best Practices Task Force Report published in 2008; and (3) a recommendation from the joint Commission-NERC report on the 2011 Arizona-Southern California outage. NERC explains that it developed the proposed Reliability Standards to improve real-time situational awareness capabilities and enhance reliable operations by requiring reliability coordinators, transmission operators, and balancing authorities to provide operators with awareness of monitoring and analysis capabilities, including alarm availability, so that operators may take appropriate steps to protect reliability. NERC states that the 2003

Blackout Report identified inadequate situational awareness as one of the key causes of that blackout, leading to a recommendation (Recommendation 22) for the evaluation of existing and adoption of new and better real-time tools for transmission operators and reliability coordinators. NERC adds that a recommendation (Recommendation 12) from the joint report on the 2011 Arizona-Southern California outage provided that entities “should take measures to ensure their real-time tools are adequate, operational, and run frequently enough to provide their operators the situational awareness necessary to identify and plan for contingencies and reliably operate their systems.”

NERC states that, while existing Reliability Standards contain requirements to perform monitoring and real-time assessments, proposed Reliability Standards IRO-018-1 and TOP-010-1 build on these requirements to support effective situational awareness. NERC explains that the proposed Reliability Standards accomplish this by requiring applicable entities to: (1) provide notification to operators of real-time monitoring alarm failures; (2) provide operators with indications of the quality of information being provided by their monitoring and analysis capabilities; and (3) address deficiencies in the quality of information being provided by their monitoring and analysis capabilities.

Specifically, NERC states that proposed Reliability Standards IRO-018-1, Requirement R3 and TOP-010-1, Requirement R4 address situational awareness objectives by providing for operator awareness when key alarming tools are not performing as intended. Proposed Reliability Standard IRO-018-1, Requirement R3 requires reliability coordinators to have an alarm process monitor that provides notification to system operators when the failure of a real-time monitoring alarm processor has occurred. Proposed Reliability Standard TOP-010-1, Requirement R4 contains an identical requirement applicable to transmission operators and balancing authorities.

In addition, NERC states that proposed Reliability Standard IRO-018-1, Requirement R1 obligates each reliability coordinator to implement an operating process or procedure to address the quality of the real-time data necessary to perform its real-time monitoring and real-time assessments. Proposed Reliability Standard TOP-010-1, Requirement R1 contains identical requirements applicable to transmission operators; Requirement R2 requires the same of balancing authorities.

Further, NERC explains that Reliability Standards IRO-018-1, Requirement R2 and TOP-010-1, Requirement R3 ensure that reliability coordinators and transmission operators, respectively, implement operating processes or procedures to address issues related to the quality of the analysis used in real-time assessments.

Pursuant to section 215(d)(2) of the FPA, the Commission approved Reliability Standards IRO-018-1 and TOP-010-1 as just, reasonable, not unduly discriminatory or preferential and in the public interest. Reliability Standards IRO-018-1 and TOP-010-1 improve real-time situational awareness capabilities and enhance reliable operations by requiring reliability coordinators, transmission operators, and balancing authorities to provide operators with an improved awareness of system conditions analysis capabilities, including alarm availability, so that operators may take appropriate steps to ensure reliability. The Reliability Standards accomplish this by requiring that applicable entities provide notification to operators of real-time system awareness and monitoring alarm failures. We agree with NERC that requiring applicable entities to implement operating processes or operating procedures governing the quality of the information they are providing on monitoring and analysis capabilities will enhance reliability.

**Federal Energy Regulatory Commission, Letter Order Approving Proposed Revisions to the Violation Risk Factors for Reliability Standards IRO-018-1 and TOP-010-1, Docket No. RD16-6-001 (December 14, 2016).**

On September 22, 2016, in Docket No. RD16-6-000,1 the Commission approved Reliability Standards IRO-018-1 (Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities) and TOP-010-1 (Real-time Reliability Monitoring and Analysis Capabilities) and associated implementation plan, Violation Severity Levels, and several of the proposed Violation Risk Factors (VRF). The Commission also directed NERC to submit a compliance filing within 60 days of issuance of the September 22 Order revising the VRF designations for Requirement R1 in Reliability Standard IRO-018-1 and Requirements R1 and R2 in Reliability Standard TOP-010-1 from “medium” to “high”.

On November 2, 2016, NERC filed for Commission approval the revised VRF designations, consistent with the Commission’s directive in the September 22 Order.

NERC’s uncontested petition was approved pursuant to the relevant authority delegated to the Director, Office of Electric Reliability under 18 C.F.R. § 375.303 (2016), effective as of the date of this order.

Revision History for RSAW

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| --- | --- | --- | --- |
| **Version** | **Date** | **Reviewers** | **Revision Description** |
| 1 | 09/14/2015 | RSAW Task Force, Standards Drafting Team, NERC Compliance Assurance | New Document |
| 2 | 12/17/2015 | RSAW Task Force, NERC Compliance Assurance | Revised to address changes made to the proposed Reliability Standard |
| 3 | 10/6/2017 | RSAW Task Force, NERC Compliance Assurance | Revised to address changes made to the proposed Reliability Standard |

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-2)
2. Compliance Assessment Date(s): The date(s) the actual compliance assessment (on-site audit, off-site spot check, etc.) occurs. [↑](#footnote-ref-3)
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-2)