

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

IRO-002-6 – Reliability Coordination – Monitoring and Analysis

**Note: This RSAW incorporates the WECC Regional Variance**

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

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| **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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| **R1** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **R2** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **R3** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **R4** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **R5** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **R6** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **D.A.7** |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **D.A.8** |  |  |  |  |  |  |  |  | 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](#R1) |  |  |  |
| [R2](#R2) |  |  |  |
| [R3](#R3) |  |  |  |
| [R4](#R4) |  |  |  |
| [R5](#R5) |  |  |  |
| [R6](#R6) |  |  |  |
| [D.A.7](#db7) |  |  |  |
| [D.A.8](#db8) |  |  |  |

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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.** Each Reliability Coordinator shall have data exchange capabilities with its Balancing Authorities and Transmission Operators, and with other entities it deems necessary, for it to perform its Operational Planning Analyses.

**M1.** Each Reliability Coordinator shall have, and provide upon request, evidence that could include, but is not limited to, a document that lists its data exchange capabilities with Balancing Authorities and Transmission Operators, and with other entities it deems necessary, for it to perform its Operational Planning Analyses.

**Compliance Narrative (Required)**:

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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| **Provide the following evidence, or other evidence to demonstrate compliance.**  |
| Provide a list(s) of data exchange capabilities with Transmission Operators, Balancing Authorities, and other entities the Reliability Coordinator deemed necessary, for it to perform its Operational Planning Analyses. |

Registered Entity Evidence (Required):

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| The following information is requested for each document submitted as evidence. 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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Evidence Reviewed by Audit Team

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Compliance Assessment Approach Specific to IRO-002-6, R1

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|  | (R1) Review a list of Transmission Operators and Balancing Authorities within the Reliability Coordinator Area, and other entities deemed necessary by the Reliability Coordinator, and ensure data exchange capabilities exist for performing Operational Planning Analyses as required in Requirement R1.  |
| **Note to Auditor**: IRO-010-2 requires the RC to have a data specification for all the data it needs for Operational Planning Analysis, Real-time Assessment, and Real-time monitoring. |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

**R2 Supporting Evidence and Documentation**

**R2.**  Each Reliability Coordinator shall have data exchange capabilities, with redundant and diversely routed data exchange infrastructure within the Reliability Coordinator's primary Control Center, for the exchange of Real-time data with its Balancing Authorities and Transmission Operators, and with other entities it deems necessary, for performing its Real-time monitoring and Real-time Assessments.

**M2.**  Each Reliability Coordinator shall have, and provide upon request, evidence that could include, but is not limited to, system specifications, system diagrams, or other documentation that lists its data exchange capabilities, including redundant and diversely routed data exchange infrastructure within the Reliability Coordinator's primary Control Center, for the exchange of Real-time data with its Balancing Authorities and Transmission Operators, and with other entities it deems necessary, as specified in the requirement.

**Compliance Narrative (Required)**:

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.**  |
| Provide a list(s) of data exchange capabilities with Transmission Operators, Balancing Authorities, and other entities the Reliability Coordinator deemed necessary, for performing its Real-time monitoring and Real-time Assessment. |
| Evidence that data exchange capabilities have redundant and diversely routed data exchange infrastructure within the Reliability Coordinator's primary Control Center. |

Registered Entity Evidence (Required):

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| The following information is requested for each document submitted as evidence. 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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Evidence Reviewed by Audit Team

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Compliance Assessment Approach Specific to IRO-002-6, R2

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

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|  | (R2) Review a list of Transmission Operators and Balancing Authorities within the Reliability Coordinator Area, and other entities deemed necessary by the Reliability Coordinator, and ensure data exchange capabilities exist for performing Real-time monitoring and Real-time Assessments as required in Requirement R2. |
|  | (R2) Verify that data exchange capabilities have redundant and diversely routed data exchange infrastructure within the Reliability Coordinator's primary Control Center.  |
| **Note to Auditor**: Redundant and diversely routed data exchange capabilities consist of data exchange infrastructure components (e.g. switches, routers, file servers, power supplies, and network cabling and communication paths between these components in the primary Control Center for the exchange of system operating data) that will provide continued functionality despite failure or malfunction of an individual component within the Reliability Coordinator's primary Control Center. Redundant and diversely routed data exchange capabilities preclude single points of failure in primary Control Center data exchange infrastructure from halting the flow of Real-time data. Requirement R2 does not require automatic or instantaneous fail-over of data exchange capabilities. Redundancy and diverse routing may be achieved in various ways depending on the arrangement of the infrastructure or hardware within the RC's primary Control Center.The reliability objective of redundancy is to provide for continued data exchange functionality during outages, maintenance, or testing of data exchange infrastructure. Additional redundant data exchange infrastructure components solely to provide for redundancy during planned or unplanned outages of individual components is not required.Infrastructure that is not within the RC's primary Control Center is not addressed by Requirement R2.IRO-010-2 requires the RC to have a data specification for all the data it needs for performing a Real-time Assessment and Real-time monitoring. |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

**R3 Supporting Evidence and Documentation**

**R3.**  Each Reliability Coordinator shall test its primary Control Center data exchange capabilities specified in Requirement R2 for redundant functionality at least once every 90 calendar days. If the test is unsuccessful, the Reliability Coordinator shall initiate action within two hours to restore redundant functionality.

**M3.**  Each Reliability Coordinator shall have, and provide upon request, evidence that it tested its primary Control Center data exchange capabilities specified in Requirement R2 for redundant functionality, or experienced an event that demonstrated the redundant functionality; and if the test was unsuccessful, initiated action within two hours to restore redundant functionality as specified in Requirement R3. Evidence could include, but is not limited to: dated and time-stamped test records, operator logs, voice recordings, or electronic communications.

**Registered Entity Response (Required):**

**Question:** Were any of the data exchange capability tests for redundant functionality unsuccessful?

 [ ]  Yes [ ]  No

If Yes, provide a list of such instances and evidence and evidence the entity initiated action within two hours to restore redundant functionality. If No, describe how this was determined in the narrative section below.

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

**Compliance Narrative (Required)**:

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.**  |
| Provide a list(s) of data exchange capabilities specified in Requirement R2. |
| Evidence that the entity tested its data exchange capabilities specified in Requirement R2 for redundant functionality, or experienced an event that demonstrated the redundant functionality. |

Registered Entity Evidence (Required):

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| The following information is requested for each document submitted as evidence. 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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Evidence Reviewed by Audit Team

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Compliance Assessment Approach Specific to IRO-002-6, R3

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|  | (R3) Verify the entity tests its data exchange capabilities specified in Requirement R2 for redundant functionality at least once every 90 calendar days.  |
|  | (R3) Verify that for each unsuccessful test, the entity initiated action within two hours to restore redundant functionality. |
| **Note to Auditor**:A test for redundant functionality demonstrates that data exchange capabilities will continue to operate despite the malfunction or failure of an individual component. An entity's testing practices should, over time, examine the various failure modes of its data exchange capabilities. When an actual event successfully exercises the redundant functionality, it can be considered a test for the purposes of the proposed requirement. |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

**R4 Supporting Evidence and Documentation**

**R4.** Each Reliability Coordinator shall provide its System Operators with the authority to approve planned outages and maintenance of its telecommunication, monitoring and analysis capabilities.

**M4.** Each Reliability Coordinator shall have and provide upon request evidence that could include, but is not limited to, a documented procedure or equivalent evidence that will be used to confirm that the Reliability Coordinator has provided its System Operators with the authority to approve planned outages and maintenance of its telecommunication, monitoring and analysis capabilities.

**Compliance Narrative (Required)**:

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.**  |
| Provide documented procedure(s) or equivalent evidence that confirms that the entity has provided its System Operators with the authority to approve planned outages and maintenance of its telecommunications, monitoring, and analysis capabilities.  |

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

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Compliance Assessment Approach Specific to IRO-002-6, R4

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|  | (R4) Verify the entity has provided its System Operators with the authority to approve planned outages and maintenance of its telecommunications, monitoring, and analysis capabilities. |
| **Note to Auditor**: This can be verified through System Operator interview questions. |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

**R5 Supporting Evidence and Documentation**

**R5.** Each Reliability Coordinator shall monitor Facilities, the status of Remedial Action Schemes, and non-BES facilities identified as necessary by the Reliability Coordinator, within its Reliability Coordinator Area and neighboring Reliability Coordinator Areas to identify any System Operating Limit exceedances and to determine any Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area.

**M5.** Each Reliability Coordinator shall have, and provide upon request, evidence that could include, but is not limited to, Energy Management System description documents, computer printouts, SCADA data collection, or other equivalent evidence that will be used to confirm that it has monitored Facilities, the status of Remedial Action Schemes, and non-BES facilities identified as necessary by the Reliability Coordinator, within its Reliability Coordinator Area and neighboring Reliability Coordinator Areas to identify any System Operating Limit exceedances and to determine any Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area.

**Compliance Narrative (Required)**:

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.**  |
| Evidence the entity has monitored Facilities within its Reliability Coordinator Area and neighboring Reliability Coordinator Areas necessary to identify any System Operating Limit exceedances and to determine any Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area. |
| Evidence the entity has monitored Remedial Action Schemes within the Reliability Coordinator’s area and neighboring Reliability Coordinator Areas necessary to identify System Operating Limit exceedances or to determine Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area. |
| Evidence the entity has monitored non-BES facilities within the Reliability Coordinator’s area and neighboring Reliability Coordinator Areas necessary to identify System Operating Limit exceedances or to determine Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area. |

Registered Entity Evidence (Required):

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| **The following information is requested for each document submitted as evidence. 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

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Compliance Assessment Approach Specific to IRO-002-6, R5

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|  | (R5) For all, or a sample of, Facilities, Remedial Action Schemes, and non-BES facilities identified as necessary by the entity, within its Reliability Coordinator Area and neighboring Reliability Coordinator Areas, review evidence and determine if the entity monitored them to identify any System Operating Limit exceedances and to determine any Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area.  |
| **Note to Auditor**: This can also be confirmed through observation during the Control Center observation and/or System Operator interview. |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

**R6 Supporting Evidence and Documentation**

**R6.** Each Reliability Coordinator shall have monitoring systems that provide information utilized by the Reliability Coordinator’s operating personnel, giving particular emphasis to alarm management and awareness systems, automated data transfers, and synchronized information systems, over a redundant infrastructure.

**M6.** The Reliability Coordinator shall have, and provide upon request, evidence that could include, but is not limited to, Energy Management System description documents, computer printouts, SCADA data collection, or other equivalent evidence that will be used to confirm that it has monitoring systems consistent with the requirement.

**Compliance Narrative (Required)**:

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.**  |
| Reliability Coordinator Energy Management System (EMS) description documents, computer printouts, summary of Supervisory Control and Data Acquisition (SCADA) data collection of Real-time telemetry, or other equivalent evidence that will be used to confirm that it has monitoring systems consistent with Requirement R6. Evidence must be specific to alarm management and awareness systems, automated data transfers, and synchronized information systems. Documentation should be specific and detailed showing how infrastructure is provisioned to operate in a redundant manner. |

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

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Compliance Assessment Approach Specific to IRO-002-6, R6

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|  | (R6) Review evidence and determine if the entity had redundant monitoring systems that:  |
|  | * Provide information utilized by the Reliability Coordinator’s operating personnel.
 |
|  | * Emphasize alarm management and awareness systems.
 |
|  | * Emphasize automated data transfers.
 |
|  | * Emphasize synchronized information systems.
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| **Note to Auditor**: This can also be confirmed through observation during the Control Center observation and/or System Operator interview. |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

WECC Variance Requirement D.A.7. Supporting Evidence and Documentation

**D.A.7.** Each Reliability Coordinator shall, in coordination with other Reliability Coordinators, develop a common Interconnection-wide methodology to determine the modeling and monitoring of BES and non-BES Elements that are internal and external to its Reliability Coordinator Area, necessary for providing operationalawareness of the impacts on Bulk Electric System Facilities within its Reliability Coordinator Area, including at a minimum:

**D.A.7.1.** A method for development, maintenance, and periodic review of a Western Interconnection-wide reference model to serve as the baseline from which Reliability Coordinator’s operational models are derived;

**D.A.7.2.** The impacts of Inter-area oscillations;

**D.A.7.3.** A method to determine Contingencies included in analyses and assessments;

**D.A.7.4.** A method to determine Remedial Action Schemes included in analyses and assessments;

**D.A.7.5.** A method to determine forecast data included in analyses and assessments; and

**D.A.7.6.** A method for the validation and periodic review of the Reliability Coordinator’s operational model for steady state and dynamic/oscillatory system response.

**M.D.A.7.** Each Reliability Coordinator will have evidence that it developed a common Western Interconnection-wide methodology, addressing modeling and monitoring, in coordination with other Reliability Coordinators, that includes the features required in D.A.7.

**Compliance Narrative (Required)**:

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:[[4]](#endnote-2)

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| **Provide the following evidence, or other evidence to demonstrate compliance.**  |
| Specified methodology |
| Evidence of the methodology was developed in coordination with other Reliability Coordinators. |

Registered Entity Evidence (Required):

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| The following information is requested for each document submitted as evidence. Evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found. |
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Evidence Reviewed by Audit Team

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Compliance Assessment Approach Specific to IRO-002-6, D.A.7.

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|  | (D.A.7) Verify the RC developd a common Interconnection-wide methodology: * in coordination with other RCs,
* to determine the modeling and monitoring of BES and non-BES Elements that are:
	+ internal to its RC Area,
	+ external to its RC Area,
	+ necessary for providing operational awareness of the impacts on BES Facilities within its RC Area.
* and includes at a minimum:
 |
|  | (D.A.7.1) A method for development, maintenance, and periodic review of a Western Interconnection-wide reference model to serve as the baseline from which RC’s operational models are derived; |
|  | (D.A.7.2) The impacts of Inter-area oscillations; |
|  | (D.A.7.3) A method to determine Contingencies included in analyses and assessments; |
|  | (D.A.7.4) A method to determine RAS included in analyses and assessments; |
|  | (D.A.7.5) A method to determine forecast data included in analyses and assessments; and |
|  | (D.A.7.6) A method for the validation and periodic review of the RC’s operational model for steady state and dynamic/oscillatory system response. |
| **Note to Auditor**:  |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

WECC Variance Requirement D.A.8. Supporting Evidence and Documentation

**D.A.8.** Each Reliability Coordinator shall, use the methodology developed in D.A.7.

**M.D.A.8.** Each Reliability Coordinator will have evidence that it uses the methodology developed in D.A.7., as required in D.A.8. above.

**Compliance Narrative (Required)**:

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:[[5]](#endnote-3)

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| **Provide the following evidence, or other evidence to demonstrate compliance.**  |
| Evidence of using methodology developed in D.A.7. |

Registered Entity Evidence (Required):

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| The following information is requested for each document submitted as evidence. Evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found. |
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Evidence Reviewed by Audit Team

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Compliance Assessment Approach Specific to IRO-002-6, D.A.8.

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|  | (D.A.8) Verify the RC used the methodology developed in *D.A.7*. *and listed below*: |
|  | *(D.A.7)* Verify the RC determines the modeling and monitoring of BES and non-BES Elements that are:* internal to its RC Area,
* external to its RC Area,
* necessary for providing operational awareness of the impacts on BES Facilities within its RC Area.

and includes at a minimum: |
|  | *(D.A.7.1)* A method for development, maintenance, and periodic review of a Western Interconnection-wide reference model to serve as the baseline from which RC’s operational models are derived; |
|  | *(D.A.7.2)* The impacts of Inter-area oscillations; |
|  | *(D.A.7.3)* A method to determine Contingencies included in analyses and assessments; |
|  | *(D.A.7.4)* A method to determine RAS included in analyses and assessments; |
|  | *(D.A.7.5)* A method to determine forecast data included in analyses and assessments; and |
|  | *(D.A.7.6)* A method for the validation and periodic review of the RC’s operational model for steady state and dynamic/oscillatory system response. |
| **Note to Auditor**:  |

**[Compliance Summary:](#Findings_Table)**

(Finding Summary):

Primary Documents Supporting Finding:

Auditor Notes:

**Additional Information:**

**The only difference between IRO-002-5 and IRO-002-6 is addition of the WECC Regional Variance. Regulatory Language below applies to both IRO-002-5 and IRO-002-6.**

Reliability Standard

The full text of IRO-002-6 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 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-002-5 and TOP-001-4 (FERC April 17, 2017).

NERC states that the proposed “Reliability Standards TOP-001-4 and IRO-002-5 build upon the improvements made in the prior versions of those standards to further advance reliability.”

NERC also revised proposed Reliability Standard TOP-001-4 to require that the operator’s and balancing authority’s data exchange capabilities for the exchange of realtime data needed for real-time monitoring and analysis have redundant and diversely routed data exchange infrastructure within the entity’s primary control center and that these capabilities be tested for redundant functionality on a regular basis. Similar revisions are reflected in Reliability Standard IRO-002-5 to clarify the obligations of the reliability coordinator. NERC states that these modifications help support reliable operations by preventing a single point of failure in primary control center data exchange infrastructure from halting the flow of real-time data used by operators to monitor and control the BES.

NERC’s uncontested petition is hereby 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.

Transmission Operations Reliability Standards and Interconnection Reliability Operations and Coordination Reliability Standards, Order No. 817, 153 FERC ¶ 61,178 (2015).

1. Pursuant to section 215 of the Federal Power Act (FPA),the Commission approves revisions to the Transmission Operations (TOP) and Interconnection Reliability Operations and Coordination (IRO) Reliability Standards, developed by the North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization (ERO). The TOP and IRO Reliability Standards improve on the currently-effective standards by providing a more precise set of Reliability Standards addressing operating responsibilities and improving the delineation of responsibilities between applicable entities. The revised TOP Reliability Standards eliminate gaps and ambiguities in the currently-effective TOP requirements and improve efficiency by incorporating the necessary requirements from the eight currently-effective TOP Reliability Standards into three comprehensive Reliability Standards. Further, the standards clarify and improve upon the currently-effective TOP and IRO Reliability Standards by designating requirements in the proposed standards that apply to transmission operators for the TOP standards and reliability coordinators for the IRO standards. Thus, we conclude that there are benefits to clarifying and bringing efficiencies to the TOP and IRO Reliability Standards, consistent with the Commission’s policy promoting increased efficiencies in Reliability Standards and reducing requirements that are either redundant with other currently-effective requirements or have little reliability benefit.

2. The Commission also finds that NERC has adequately addressed the concerns raised by the Commission in the Notice of Proposed Rulemaking issued in November 2013 concerning the proposed treatment of system operating limits (SOLs) and interconnection reliability operating limits (IROLs) and concerns about outage coordination.Further, the Commission approves the definitions for operational planning analysis and real-time assessment, the implementation plans and the violation severity level and violation risk factor assignments. However, the Commission directs NERC to make three modifications to the standards as discussed below within 18 months of the effective date of this Final Rule.

5. The Commission approved the initial TOP and IRO Reliability Standards in Order No. 693.On April 16, 2013, in Docket No. RM13-14-000, NERC submitted for Commission approval three revised TOP Reliability Standards to replace the eight currently-effective TOP standards.Additionally, on April 16, 2013, in Docket No. RM13-15-000, NERC submitted for Commission approval four revised IRO Reliability Standards to replace six currently-effective IRO Reliability Standards. On November 21, 2013, the Commission issued the Remand NOPR in which the Commission expressed concern that NERC had “removed critical reliability aspects that are included in the currently-effective standards without adequately addressing these aspects in the proposed standards.”The Commission identified two main concerns and asked for clarification and comment on a number of other issues. Among other things, the Commission expressed concern that the proposed TOP Reliability Standards did not require transmission operators to plan and operate within all SOLs, which is a requirement in the currently-effective standards. In addition, the Commission expressed concern that the proposed IRO Reliability Standards did not require outage coordination.

13. Pursuant to section 215(d) of the FPA, we adopt our NOPR proposal and approve NERC’s revisions to the TOP and IRO Reliability Standards, including the associated definitions, violation risk factors, violation severity levels, and implementation plans, as just, reasonable, not unduly discriminatory or preferential and in the public interest. We note that all of the commenters that address the matter support, or do not oppose, approval of the revised suite of TOP and IRO Reliability Standards. We determine that NERC’s approach of consolidating requirements and removing redundancies generally has merit and is consistent with Commission policy promoting increased efficiencies in Reliability Standards and reducing requirements that are either redundant with other currently-effective requirements or have little reliability benefit.

14. We also determine that the proposed TOP and IRO Reliability Standards should improve reliability by defining an appropriate division of responsibilities between reliability coordinators and transmission operators.The proposed TOP Reliability Standards will eliminate multiple TOP standards, resulting in a more concise set of standards, reducing redundancy and more clearly delineating responsibilities between applicable entities. In addition, we find that the proposed Reliability Standards provide a comprehensive framework as well as important improvements to ensure that the bulk electric system is operated within pre-established limits while enhancing situational awareness and strengthening operations planning. The TOP and IRO Reliability Standards address the coordinated efforts to plan and reliably operate the bulk electric system under both normal and abnormal conditions.

16. [T]he TOP/IRO Standards approved herein address the possibility that additional SOLs could develop or occur in the same-day or real-time operational time horizon and, therefore, would pose an operational risk to the interconnected transmission network if not addressed. Likewise, the Reliability Standards give reliability coordinators the authority to direct actions to prevent or mitigate instances of exceeding IROLs because the primary decision-making authority for mitigating IROL exceedances is assigned to reliability coordinators while transmission operators have the primary responsibility for mitigating SOL exceedances.

17. Furthermore, the revised definitions of operational planning analysis and real-time assessment are critical components of the proposed TOP and IRO Reliability Standards and, together with the definitions of SOLs, IROLs and operating plans, work to ensure that reliability coordinators, transmission operators and balancing authorities plan and operate the bulk electric system within all SOLs and IROLs to prevent instability, uncontrolled separation, or cascading.

43. In the NOPR, the Commission agreed that proposed Reliability Standard TOP-001-3, Requirements R19 and R20 require some form of “data exchange capabilities” for the transmission operator and balancing authority and that proposed Reliability Standard TOP-003-3 addresses the operational data itself needed by the transmission operator and balancing authority. In addition, the Commission agreed that Reliability Standard IRO-002-4, Requirement R1 requires “data exchange capabilities” for the reliability coordinator and that proposed Reliability Standard IRO-010-2 addresses the operational data needed by the reliability coordinator and that proposed Reliability Standard IRO-002-4 Requirement R4 requires a redundant infrastructure for system monitoring. However, the Commission was concerned that it is not clear whether redundancy and diverse routing of data exchange capabilities were adequately addressed in proposed Reliability Standards TOP-001-3 and IRO-002-4 for the reliability coordinator, transmission operator, and balancing authority and sought explanation or clarification on how the standards address redundancy and diverse routing or an equally effective alternative. The Commission also stated that, if NERC or others believe that redundancy and diverse routing are not addressed, they should address whether there are associated reliability risks of the interconnected transmission network for any failure of data exchange capabilities that are not redundant and diversely routed.

47. We agree with NERC and other commenters that there is a reliability need for the reliability coordinator, transmission operator and balancing authority to have data exchange capabilities that are redundant and diversely routed. However, we are concerned that the TOP and IRO Standards do not clearly address redundancy and diverse routing so that registered entities will unambiguously recognize that they have an obligation to address redundancy and diverse routing as part of their TOP and IRO compliance obligations. NERC’s comprehensive approach to establishing Therefore, pursuant to section 215(d)(5) of the FPA, we direct NERC to modify Reliability Standards TOP-001- 3, Requirements R19 and R20 to include the requirement that the data exchange capabilities of the transmission operators and balancing authorities require redundancy and diverse routing. In addition, we direct NERC to clarify that “redundant infrastructure” for system monitoring in Reliability Standards IRO-002-4, Requirement R4 is equivalent to redundant and diversely routed data exchange capabilities.

49. In the NOPR, the Commission expressed concern that the proposed TOP and IRO Reliability Standards do not appear to address testing requirements for alternative or less frequently used mediums for data exchange to ensure they would properly function in the event that the primary or more frequently used data exchange capabilities failed. Accordingly, the Commission sought comment on whether and how the TOP and IRO Reliability Standards address the testing of alternative or less frequently used data exchange capabilities for the transmission operator, balancing authority and reliability coordinator.

51. We agree with NERC and other commenters that there is a reliability need for the reliability coordinator, transmission operator and balancing authority to test alternate data exchange capabilities. However, we are not persuaded by the commenters’ assertions that the need to test is implied in the TOP and IRO Standards. Rather, we determine that testing of alternative data exchange capabilities is important to reliability and should not be left to what may or may not be implied in the standards.Therefore, pursuant to section 215(d)(5) of the FPA, we direct NERC to develop a modification to the TOP and IRO standards that addresses a data exchange capability testing framework for the data exchange capabilities used in the primary control centers to test the alternate or less frequently used data exchange capabilities of the reliability coordinator, transmission operator and balancing authority. We believe that the structure of Reliability Standard COM-001-2, Requirement R9 could be a model for use in the TOP and IRO Standards.

Revision History for RSAW

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| **Version** | **Date** | **Reviewers** | **Revision Description** |
| 1 | 06/30/2016 | NERC Compliance Assurance, RSAW Task Force | New Document |
| 2 | 09/09/2016 | NERC Compliance Assurance, RSAW Task Force | Updated to reflect changes in draft Standard |
| 3 | 6/28/2017 | NERC Compliance Assurance, RSAW Task Force | Revised RSAW to align with revised Reliability Standard |
| 3 | 11/9/2017 | WECC Compliance | Reviewed for format consistency and content |
| 4 | 10/1/2019 | WECC Compliance | Added sections for WECC Regional Variance Section D.A --- no other changes to the 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-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)
4. 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)
5. 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-3)