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# Purpose

The IRO-002-7 WECC regional variance requires Reliability Coordinators (RCs) providing Reliability Coordinator service(s) to entities operating within the Western Interconnection to develop a common Interconnection-wide methodology (henceforth referred to as the 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 operational awareness of the impacts on Bulk Electric System Facilities within its Reliability Coordinator Area.

# 1. Responsibilities

- Operations Planning Engineers
- Network Applications Engineers
- RC Operators

# 2. Scope/Applicability

The Methodology addresses the requirements of the Standard as follows:

- Modeling considerations, including the full Western Interconnection reference model, practices for the derivation of RC operational models used for Real-time Assessments (RTAs) and Operational Planning Analyses (OPAs), and validation and review processes for the RC's operational models. This addresses requirement D.A.7.1 and D.A.7.6.
- Analyses and assessment considerations, including methods for identifying RAS contingencies and forecast data to be included in RTAs and OPAs. This addresses requirements D.A.7.1, D.A.7.2, D.A.7.3, D.A.7.4, and D.A.7.5.
- Inter-area oscillation considerations, including offline and real-time assessment methods for identifying RC Area risks due to inter-area oscillations. This addresses requirement D.A.7.2.
- Monitoring considerations, including general BES monitoring of pre- and post-contingency SOLs and IROLs in the RCs Wide Area (including RAS status and impacts) and monitoring the BES for impacts due to inter-area oscillations. This addresses a subset of requirement D.A.7.

# 3. Procedure Detail

## 3.1. Modeling Considerations

Section 2 of the Methodology requires that each RC will utilize the reference model as the primary source for the derivation of its external model. Each RC will decide how to best integrate the external model details and changes into their RC operational model. RC West is the Model Administrator for the Western Interconnection and it utilizes the full Western Interconnection Model (WIM) as its operational model.

Section 2.1 of the Methodology requires that each RC will work with their respective TOPs and BAs to determine which non-BES transmission equipment, generation, and load are important to model and monitor within their RC Area. In accordance with the RC West IRO-010 Data Specification, TOPs and BAs are expected to provide modeling information for all BES equipment and non-BES equipment that impacts the BES. RC West works with each of the TOPs and BAs to determine which non-BES transmission equipment, generation, and load are important to model and monitor within the RC West Area.

Section 2.1 of the Methodology requires that each RC must review exclusions provided by their TOPs to ensure that important facilities are not erroneously excluded from modeling and/or monitoring. In accordance with the RC West IRO-010 Data Specification, TOPs and BAs are expected to provide an initial list, and updates as needed, of BES exceptions for inclusions or exclusions that are “Not in the normal bright line 100 kV” in accordance with NERC’s BES definition and guidelines.

Section 2.1.1 of the Methodology requires each RC to pass along model changes to the Model Administrator (which is RC West) for incorporation into the WIM. In accordance with the RC West IRO-010 Data Specification, each RC provides their updates via the RIMS application or an alternate secure site as agreed to amongst RCs.

RC West creates the WIM in accordance to its DB model build timeline posted on the CAISO website. As part of this process, RC West reviews the model for accuracy as part of its model integration processes. In addition to creating the network model itself, this DB promotion process includes contingency lists and RAS descriptions, including a mapping between RAS and contingency definitions (to identify which contingencies trigger which RAS):

- The contingency definitions provided by RC West contain the following information:
  - Contingency Name/Description
  - Equipment type of Facility(ies) changing state in the contingency (line, transformer, unit, breaker/switch, etc.)
  - Facility name(s) that change state in the contingency
  - Conditionally credible indication – explanation of conditions leading to credibility is expected

- The combined RAS plus automatic protection scheme list provided by RC West contains the following information:
  - RAS Name/Description
  - RAS Trigger Conditions

- RAS Actions
- ICCP arming status information – object IDs available to support RAS monitoring and simulation

RC West makes available its respective contingency and RAS lists, as noted above, and corresponding network and SCADA models for review and inclusion into other RC RAS models via its posting in the RC Portal > Western Interconnection Model library.

Since RC West utilizes the full Western Interconnection Model, there is no need for RC West to compare and validate its operational model against the Western Interconnection reference model. The reference model is the same as the operational model.

### 3.2. Analyses and Assessment Considerations

Section 3.1 of the Methodology provides methods for determining external contingencies. RC West utilizes the LODF approach to identify the external contingencies to include in its model, OPAs, and RTAs as follows:

- Utilize an approved WECC operational base case
- Run a full contingency analysis and identify external contingency that have LODF impact of greater than 3%. RC West utilizes 3%, which is more limiting than the 10% LODF that is required of the Methodology.

For those areas that are known to have voltage and stability impacts (such as the NW Washington Area Import IROL), RC West utilizes a full study and analysis on an appropriate range of credible system conditions (generation, load, Interchange, topology) to determine the subset of critical contingencies. This process includes coordination with impacted BAs, TOPs, and RCs, as follows:

- Utilize an approved WECC operational base case

The list of the external contingencies to be utilized for both steady state thermal analysis and stability analysis are then coordinated and discussed with impacted BAs, TOPs, and RCs.

Following determination of external contingencies, RC West then models all RAS associated with those contingencies in its models, OPAs, and RTAs.

***Note:*** *The official list of contingencies simulated in the RC West's Real-Time Contingency Analysis (RTCA) resides in Enterprise Model Management System (EMMS) and can be viewed in the RTCA. Refer to RC0330B Contingency Monitored for Neighboring RC Area table for the reference group numbers viewable in RTCA.*

With regards to its OPA, Section 3.3 of the Methodology requires RC West to determine Forecast Data Needed for Assessments and Analysis. Since RC West utilizes a full Western Interconnection Model, RC West requires the utilization of Load Forecasts, Generation Forecasts, as well as outage plans for all areas in the Western Interconnection, including both its internal RC Area and external RC Areas.

### 3.3. Inter-area Oscillation Considerations

RC West calculates and monitors frequency, damping, and energy for all five (5) modes detailed in the Methodology. Since RC West monitors all five (5) modes, RC West will not need to perform offline analyses to eliminate the need to monitor any of the modes.

For monitoring the five (5) modes, refer to RC West Operating Guide RC9030 Mitigating Forced and Inter-area Oscillations.

### 3.4. Monitoring Considerations

For Internal RC Area SOL Monitoring, RC West monitors pre- and post-contingency conditions in its internal RC Area consistent with its SOL methodology. This is accomplished by:

- SCADA alarms for pre-contingency monitoring
- State Estimator alarms for pre-contingency monitoring
- Real-Time Contingency Analysis for post-contingency monitoring
- Real-Time Voltage Stability Analysis for pre- and post- contingency monitoring
- Real-Time Transient Stability Analysis for pre- and post- contingency monitoring

For External RC Area SOL Monitoring, RC West monitors:

- Direct RC ties in SCADA, SE, and RTCA
- Critical coordinated facilities in SE and RTCA
- Stability-rated Paths and Interfaces in SCADA and PI

In monitoring transmission facilities both in pre-and post-contingency monitoring, the RC West's Real-Time Contingency Analysis (RTCA) simulates all internal single and credible multiple contingency as well as the external contingencies documented in RC West Operating Procedure RC0330B Contingency Monitored for Neighboring RC Area.

RC West monitors further into external RC Areas due to the following unique system conditions:

- Unscheduled flow across Path 30, 31, 36 within the SPP footprint
- Coordinated phase shifter operations within the SPP footprint
- Major facilities affecting Path 1 between BCRC and AESO along with its RAS
- Critical facilities that impact the NW Washington Area Import IROL and the El Paso Adjusted Actual Net Interchange including those facilities not fully inside the RC West area

Concerning Inter-area oscillations, RC West employs Operating Procedure RC9030 to monitor inter-area oscillations.

# 4. Supporting Information

### Operationally Affected Parties

Shared with the Public.

### References

| | |
|---|---|
| NERC Requirements | IRO-002-7 WECC Regional Variance D.A.7.1 – D.A.7.6 |
| RC Operating Procedure | RC0330B Contingency Monitored for Neighboring RC Area<br>RC0600A Western Interconnection Modeling and Monitoring Common Methodology<br>RC9030 Mitigating Forced and Inter-area Oscillations |
| Other References | |

### Definitions

The following terms capitalized in this Operating Procedure when used are defined below:

| Term | Description |
|---|---|
| None | |

### Version History

| Version | Change | Date |
|---|---|---|
| 1.0 | Initial version | 1/01/20 |
| 1.1 | Section 3.2: added a note regarding procedure RC0330B.<br>Section 3.4: Added content.<br>References: Added reference to procedure RC0330B. | 7/01/20 |
| 2.0 | Annual Review: Minor correction of procedure reference at the end of Section 3.4. Minor format and grammar updates. | 1/01/21 |
| 3.0 | Annual Review:<br>Purpose & References sections: Updated NERC standard IRO-002 references. Minor format and grammar updates. | 1/01/22 |
| 3.1 | Annual Review: Minor formatting and punctuation edits only. | 1/01/23 |
| 3.2 | Annual Review: Minor formatting and update in references section. | 1/01/24 |

| Version | Change | Date |
|---|---|---|
| 3.3 | Annual Review: Minor formatting and grammar edits and updated procedure references. | 1/01/25 |

# 5. Periodic Review Procedure

### Review Criteria & Incorporation of Changes

There are no specific review criteria identified for this document.

### Frequency

Annually (Review at least once per year).

# Appendix

RC0600A Western Interconnection Modeling and Monitoring Common Methodology