
 California ISO RC West	Reliability Coordinator Procedure	Procedure No.	RC0210
		Version No.	1.5
		Effective Date	2/01/25
Monitoring Frequency and Balancing Authority Performance		Distribution Restriction: None	

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## Purpose

Provide guidance on monitoring system frequency and Balancing Authority (BA) area performance in order to identify sources of large ACE excursions that may be contributing to frequency error, excessive inadvertent Interchange, and SOL or IROL exceedances.

## 1. Responsibilities

- Reliability Coordinator Operator

## 2. Scope/Applicability

- Reliability Coordination


## 3. Procedure Detail

### 3.1. Monitoring System Frequency

The RC Operator shall monitor frequency under normal and abnormal conditions, and take corrective action to prevent frequency-related instability, unplanned tripping of load or generation, uncontrolled separation or cascading outages that adversely impact the reliability of its area.

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Monitor</b> real-time frequency and Area Control Error (ACE) of each BA within the RC area.</li> <li>• <b>Identify</b> BAs with large ACE excursions that may be contributing to a frequency excursion, SOL or IROL exceedances, and excessive inadvertent Interchange.</li> <li>• <b>Respond</b> to frequency excursions outside of Frequency Trigger Limits (FTL).<sup>1</sup></li> <li>• <b>Notify</b> all RC Area BAs and TOPs via GMS of any frequency excursions outside of FTLs. <b>Include</b> general information of the cause, but <u>do not</u> include specific resources.</li> <li>• <b>Notify</b> all Western Interconnection RCs of any frequency excursions outside of FTLs that are caused by entities within the RC West Area. When using messaging systems, <b>include</b> general information of the cause, but <u>do not</u> include specific resources. More detailed information may be given during phone conversations.</li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

<sup>1</sup> FTL High = 60.068 Hz, FTL Low = 59.932 Hz


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### 3.1.1. Frequency Trigger Limits and Actions

The RC Operator will take action upon identifying BAs within the RC area that are significantly contributing to the exceedance of a Frequency Trigger Limit (FTL). The following table outlines recommended actions.

Frequency	Limit	Actions
<b>60.068 (&gt;5 minutes)</b>	FTL High	1,2,3
<b>60.068 (&gt;10 minutes)</b>	FTL High	1,4
<b>59.932 (&gt;5 minutes)</b>	FTL Low	1,2,3
<b>59.932 (&gt;10 minutes)</b>	FTL Low	1,4

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>RC Operator should take recommended actions according to the above table: <ol style="list-style-type: none"> <li><b>Monitor</b> individual ACE of each BA in the RC area <u>and</u> <b>identify</b> significant contributing sources of the FTL.</li> <li><b>Contact</b> all BAs within RC area with ACE significantly contributing to FTL, <u>and</u> <b>validate</b> contribution. <ol style="list-style-type: none"> <li><b>Discuss</b> current and anticipated mitigating actions with an expected timeframe when corrective action should be completed.</li> <li><b>Notify</b> affected entities, including impacted RCs, of the FTL and general cause through the Grid Messaging System (GMS).</li> </ol> </li> <li><b>Evaluate</b> mitigation steps being taken by BA(s). <ol style="list-style-type: none"> <li>If inadequate progress has been made, or if based on RC judgement it is unlikely to be made, <b>recommend</b> alternative or additional mitigating steps. <b>Consider issuing</b> Operating Instructions with an expected timeline to correct situation (<a href="#">See Section 3.5</a>).</li> </ol> </li> <li><b>Issue</b> Operating Instructions, <b>describing</b> corrective action to be taken, as well as a timeframe of completion, to all BAs within RC Area that have an ACE significantly contributing to the frequency deviation (<b>See</b> Section 3.5).</li> </ol> </li> <li><b>Notify</b> BAs that they may resume normal operations when frequency returns to acceptable ranges.</li> <li><b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

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### 3.1.2. Persistent Abnormal Frequency Due to Incorrect ACE

In addition to monitoring frequency outside of FTLs, RC West will also monitor and respond to abnormal frequency patterns that persist for an extended period, such as when frequency is not correlating with the combined Western Interconnection ACE. RC West will send a GMS message requesting all BAs to review their ACE calculations and interchange schedules, if unable to identify the BA(s) contributing to the incorrect WECC ACE.

A BA must notify the RC Operator if after review, determines errors that contributed to incorrect ACE, and the actions taken to resolve the calculation.


Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Investigate</b> persistent off-nominal low or high frequency greater than <b>+/-0.04 Hz</b>, lasting <b>30 minutes</b> or longer. <ul style="list-style-type: none"> <li>○ <b>Review</b> WECC ACE trends to determine if incorrect ACE may be contributing to the persistent abnormal frequency.</li> </ul> </li> <li>• If incorrect ACE is contributing to the persistent abnormal frequency, <ul style="list-style-type: none"> <li>○ <b>Contact</b> the impacting RC West BA directly if the BA with the incorrect ACE calculation can be identified.</li> <li>○ <b>Send</b> a GMS message requesting all RC West BAs to review their ACE calculations and interchange schedules for discrepancies, if the BA with the incorrect ACE calculation cannot be identified.</li> <li>○ <b>Contact</b> neighboring RCs to request their BAs to review ACE calculations and Interchange schedules for discrepancies.</li> </ul> </li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

### 3.2. Inadvertent Contribution to SOL and IROL Exceedances

Significantly high or low ACE can contribute to unscheduled Flow or inadvertent Interchange leading to the exceedance of an SOL or IROL.<sup>2</sup>

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Perform</b> real-time assessment <u>and</u> <b>contact</b> BAs with abnormally high or low ACE contributing to an SOL or IROL exceedance. <ul style="list-style-type: none"> <li>○ <b>Discuss</b> BA role in the SOL/IROL <u>and</u> <b>request</b> that BA adjust generation back to normal parameters to help mitigate Unscheduled Flow.</li> </ul> </li> <li>• <b>Consider issuing</b> Operating Instructions to contributing BAs to maintain more restrictive AGC bands (e.g., controlling to L<sub>10</sub>) if high Inadvertent Interchange continues to contribute to an SOL or IROL exceedance, and other mitigation methods have been exhausted.</li> </ul>

<sup>2</sup> See RC0310 Mitigating SOL and IROL Exceedances

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Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Contact</b> impacting BA(s) <u>and</u> <b>allow</b> them to resume normal operations when SOL/IROL exceedance is no longer an issue.</li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

### 3.3. BA Inability to Calculate ACE

A BA must notify its Reliability Coordinator if it loses the ability to Calculate ACE for more than 30 minutes.<sup>3</sup> This may be due to the loss of visibility of frequency or tie-line data, or EMS failure. RC shall coordinate with other entities to help BA maintain system visibility and keep frequency within acceptable ranges.

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Notify</b> other affected entities in RC Area via GMS upon BA loss of visibility to ACE. <ul style="list-style-type: none"> <li>○ <b>Notify</b> other affected RCs.</li> </ul> </li> <li>• <b>Coordinate</b> with adjacent BAs to <b>ensure</b> affected BA is notified of changes to tie-line flows by using alternate tie-line readings. <ul style="list-style-type: none"> <li>○ <b>Consider</b> periodic notification (e.g., every 10 to 15 minutes) or notification of changes of a certain percentage or MW threshold.</li> </ul> </li> <li>• <b>Notify</b> affected BA if causing unacceptable frequency deviation, <u>and</u> <b>inform</b> them of mitigating action needed (e.g., raise or lower generation).</li> <li>• <b>Issue</b> operating instructions, as necessary to return frequency and/or tie-line flows to acceptable ranges.</li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

### 3.4. Monitoring Contingency Reserves

Each BA or Reserve Sharing Group (RSG) must maintain a minimum amount of Contingency Reserves, except within the first 60 minutes following a qualifying event requiring the activation of Contingency Reserves, equal to the greater of either:


1. An amount equal to the loss of its Most Severe Single Contingency (MSSC), or
2. The sum of three percent of its hourly-integrated load, plus three percent of its hourly-integrated generation.<sup>4</sup>

A BA that is unable to maintain adequate Contingency Reserves may require the declaration of an Energy Emergency Alert (EEA).<sup>5</sup> This may be done either at the request of the BA or at the RC

<sup>3</sup> BAL-005-1 R2 (Applicable to BA)

<sup>4</sup> BAL-002-WECC-2a R1 (Applicable to BA)

<sup>5</sup> EOP-011-4 R6

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Operator's discretion, if the RC Operator, after discussion with the BA determines that the BA meets the Criteria.

The RC Operator's actions may vary, depending on whether or not the BA belongs to an RSG.

### 3.4.1. RC Actions for Non RSG Member BAs

The RC Operator will monitor the Contingency Reserves of all BAs in the RC West Area, and should take the following actions upon recognizing a Contingency Reserve-deficient BA that is not a member of an RSG.

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Monitor</b> BAs within RC area for actual and required Contingency Reserve values.</li> <li>• <b>Contact</b> deficient BA to <b>verify</b> actual and required Contingency Reserve values. <ul style="list-style-type: none"> <li>○ <b>Determine</b> cause of deficiency, mitigation plan, and timeframe for recovery.</li> <li>○ <b>Determine</b> whether the BA will be utilizing demand response, emergency assistance or other qualifying resources to meet its reserve requirements. <ul style="list-style-type: none"> <li>▪ If so, <b>request</b> the BA to update the "available reserves" ICCP value being sent to RC West. <ul style="list-style-type: none"> <li>– If not possible to update the ICCP value, at a minimum the BA <b>should provide</b> hourly updates to the RC Operator.</li> </ul> </li> </ul> </li> <li>○ <b>Determine</b> whether there are transmission or generation outages that can be returned to help recover reserves.</li> <li>○ <b>Determine</b> if the BA will require an EEA.</li> </ul> </li> <li>• <b>Evaluate</b> BA plan and if not viable, <b>advise</b> of alternative or additional measures (identification of fast start resources, arrangement of assistance from neighboring BAs).</li> <li>• <b>Continue monitoring</b> BA <u>and</u> <b>evaluate</b> impacts of the mitigation plan.</li> <li>• <b>Declare</b> appropriate EEA level, if actions taken are not sufficient to recover Contingency Reserves within the expected timeframe, or if the BA requests EEA. <ul style="list-style-type: none"> <li>○ <b>Determine</b> appropriate EEA level, per guidelines in RC West Operating Procedure <a href="#">RC0410 System Emergencies</a>.</li> <li>○ <b>Assist</b> BA to <b>obtain</b> emergency assistance from neighboring BAs, as needed.</li> </ul> </li> <li>• <b>Issue</b> Operating Instructions as needed, <b>with</b> expected timeframe to recover reserves if actions being taken are not sufficient; or to assist the BA in recovering reserves.</li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

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### 3.4.2. RC Actions for RSG Member BAs

While an RSG is responsible for the compliance of BAL-002-WECC-3 for its members, each BA belonging to an RSG still has a Contingency Reserve Obligation (CRO) that should be maintained. An RSG as a whole should never be deficient in Contingency Reserves when all of its individual members are meeting their CROs. In accordance to NERC EOP-011-4 R6, the RC Operator that has a BA experiencing a potential or actual Energy Emergency within its RC Area shall declare an EEA. An RSG member that is not meeting its CRO may avoid being placed in an EEA by the RC Operator, as long as:

1. The RSG as a whole, still has adequate Contingency Reserves, and
2. Adequate Contingency Reserves from the RSG can be delivered to the BA upon the event of a Balancing Contingency Event, and
3. The BA has resource options to meet its expected Load obligations.

Depending on the rules of its RSG, an RSG member may still elect to request an EEA even if it does meet the above criteria. If an RSG's Contingency Reserve as a whole or in a zone should be deficient, the RC Operator should identify the BAs that are causing the deficiency and take the appropriate actions.

Reliability Coordinator Actions	
<ul style="list-style-type: none"> <li>• <b>Monitor</b> RSG member BA within RC area for actual and required Contingency Reserve values.</li> <li>• <b>Contact</b> deficient BA to <b>verify</b> actual and required Contingency Reserve values. <ul style="list-style-type: none"> <li>○ <b>Discuss</b> cause of deficiency, mitigation plan, and timeframe for recovery.</li> <li>○ <b>Determine</b> whether adequate Contingency Reserves from the RSG can be delivered upon the event of a Balancing Contingency Event.</li> <li>○ If the BA is relying on the RSG, <ul style="list-style-type: none"> <li>▪ <b>Request</b> the BA to <b>update</b> the "available reserves" ICCP value being sent to RC West. If not possible to update the ICCP value, at a minimum the BA should <b>provide</b> hourly updates to the RC Operator.</li> </ul> </li> </ul> </li> <li>• <b>Coordinate</b> with adjacent RCs, as appropriate.</li> <li>• <b>Evaluate</b> BA plan and if not viable, <b>advise</b> of alternative or additional measures (identification of fast start resources, arrangement of assistance from neighboring BAs). <ul style="list-style-type: none"> <li>○ <b>Determine</b> the amount of MW to be received from the RSG, and the process and timeframe to dispatch it.</li> </ul> </li> <li>• <b>Continue monitoring</b> BA <u>and</u> <b>evaluate</b> impacts of their mitigation plan.</li> <li>• <b>Determine</b> the need to declare an EEA <u>and</u> <b>assist</b> BA to obtain emergency assistance, if BA is still unable to recover reserves. <b>See</b> RC West Operating Procedure <a href="#">RC0410 System Emergencies</a> for details and criteria on declaring an EEA.</li> <li>• <b>Issue</b> Operating Instructions as needed, <b>with</b> expected timeframe, to recover reserves if actions being taken are not sufficient; or to assist the BA in recovering reserves.</li> </ul>	

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Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>


### 3.4.3. Addressing RSG Issues Across RC Areas

As long as all members of an RSG are meeting their CROs, the RSG should not be Contingency Reserve-deficient. However, should an RSG's Contingency Reserve as a whole or in a zone be deficient, the RC Operator should identify the BAs that are causing the deficiency. If the RSG or RSG zone falls between multiple RC Areas, the RC Operator shall coordinate with neighboring RCs to identify the cause of the RSG or RSG zone deficiency, as well as actions taken to mitigate the issue.

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Notify</b> Neighboring RC Area upon identifying a Contingency Reserve deficient RSG or a Contingency Reserve deficient RSG zone who's Area is in both RC West and Neighboring RC Areas. <ul style="list-style-type: none"> <li>○ <b>Coordinate</b> with Neighboring RC to <b>identify</b> individual BAs that are responsible for the deficiency, as well as actions taken to mitigate the issue.</li> </ul> </li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

### 3.4.4. Monitoring Contingency Reserve Recovery

Following the activation of Contingency Reserves, a BA or Reserve Sharing group must recover Contingency Reserves within 60 minutes following a qualifying event requiring activation. If there is an additional event that takes place during this recovery period, the 60-minute recovery period resets. The RC Operator should **not** declare an EEA for a BA during this recovery period, unless requested by the BA or if the RC Operator, after consultation with the BA, has reason to believe that the BA will not be able to recover its Contingency Reserves within the recovery period.

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An RSG member may continue to request reserves beyond the 60-minute recovery period, depending on the rules of the RSG. Such instances should be discussed with the BA, but will usually require the initiation of an EEA.


Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Monitor</b> BA reserves to <b>ensure</b> recovery within 60 minutes, following an event requiring the activation of Contingency Reserves. <b>Validate</b> Contingency Reserve values with BA.</li> <li>• <b>Assess</b> BA plan, <u>and</u> if it does not seem adequate or viable, <b>assist</b> BA by identifying resources that might be used for Contingency Reserves, and/or helping BA arrange for emergency assistance from neighboring BAs.</li> <li>• <b>Evaluate</b> BA conditions, according to <a href="#">Section 3.4.2</a> if the BA is an RSG member, <u>and</u> <b>discuss</b> if RSG Contingency Reserves can be used under their agreements.</li> <li>• <b>Contact</b> BA <u>and</u> <b>discuss</b> current situation and recovery plan, if after 60 minutes the BA has failed to recover Contingency Reserves.</li> <li>• <b>Declare</b> an EEA if BA still has not recovered their Contingency Reserves in a timely manner after the recovery period. <b>See</b> Procedure <a href="#">RC0410-System Emergencies</a> for details in declaring an EEA.</li> <li>• <b>Log</b> a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

### 3.5. Operating Instructions

The Reliability Coordinator must act to address the reliability of its area, either by direct actions or by issuing Operating Instructions.<sup>6</sup>

Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>• <b>Identify</b> <u>and</u> <b>contact</b> responsible BA(s) in RC area following a disturbance or FTL event.</li> <li>• <b>Discuss</b> mitigation plan with an effective timeline of completion, with BA. <b>Ensure</b> that mitigation plan is adequate, timely, and viable. <b>Recommend</b> alternative or additional mitigation, if needed.</li> <li>• <b>Continue to monitor</b> <u>and</u> <b>evaluate</b> system conditions for progress during expected timeline. If mitigating measures are ineffective or insufficient, the RC Operator should <b>consider issuing</b> Operating Instructions to ensure the reliability of the RC area. Possible Operating Instructions may include: <ul style="list-style-type: none"> <li>○ <b>Return</b> ACE to within L<sub>10</sub> boundaries</li> <li>○ <b>Return</b> ACE to within BAAL parameters</li> </ul> </li> <li>• <b>Shed load</b> (Before issuing Operating Instruction to shed load, <b>ensure</b> that the Instruction meets the load shedding philosophy in Procedure <a href="#">RC0410 System Emergencies</a>).</li> </ul>

<sup>6</sup> IRO-001-4 R1.

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Reliability Coordinator Actions
<ul style="list-style-type: none"> <li>Log a summary of all <i>communications</i> and <i>actions</i>.</li> </ul>

## 4. Supporting Information

### Operationally Affected Parties

Shared with the Public.


### References

NERC Requirements	BAL-002-WECC-3 R1; BAL-005-1 R6; EOP-011-4 R6; IRO-001-4 R1;and IRO-008-3 R5
BATOP Operating Procedure	
RC West Operating Procedures	<a href="#">RC0310 Mitigating SOL and IROL Exceedances</a> <a href="#">RC0410 System Emergencies</a>

### Definitions

The following terms capitalized in this Operating Procedure are in accordance with the NERC Glossary, and/or otherwise when used are as defined below:


Term	Description
System Operator on mitigating System Operating Limit (SOL)	<p>The value (such as MW, Mvar, amperes, frequency or volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration, to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria. These include, but are not limited to:</p> <ul style="list-style-type: none"> <li>Facility Ratings (applicable pre- and post-Contingency Equipment Ratings or Facility Ratings)</li> <li>Transient stability ratings (applicable pre- and post-Contingency stability limits)</li> <li>Voltage stability ratings (applicable pre- and post-Contingency voltage stability)</li> </ul>

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Term	Description
	<ul style="list-style-type: none"> <li>System voltage limits (applicable pre- and post-Contingency voltage limits)</li> </ul>
Interconnection Reliability Operating Limit (IROL)	A System Operating Limit that, if violated, could lead to instability, uncontrolled separation, or Cascading outages that adversely impact the reliability of the Bulk Electric System.
L <sub>10</sub>	$L_{10} = 1.65 \epsilon_{10} \sqrt{(-10B_i)(-10B_s)}$ <p> <math>\epsilon_{10}</math> is a constant derived from the targeted frequency bound. It is the targeted root-mean-square (RMS) value of ten-minute average frequency error based on frequency performance over a given year. The bound, <math>\epsilon_{10}</math>, is the same for every Balancing Authority Area within an Interconnection. </p> <p> <math>B_i</math> = Frequency Bias Setting for the Balancing Authority Area (MW / 0.1 Hz) </p> <p> <math>B_s</math> = Sum of the minimum Frequency Bias Settings for the Interconnection (MW / 0.1 Hz). </p>

## Version History

Version	Change	Date
1.0	Approved by Steering Committee.	10/16/18
1.1	Added notification actions to Section 3.1. Modified footnotes in Section 3.4 to reflect updated NERC Standard and WECC Field Trial. Removed reference to RCIS in Section 3.3.	5/01/19
1.2	Sections 3.4.1 and 3.4.2: Updated guidelines for evaluating contingency reserve deficiency with non-RSG and RSG BAs. Clarified references to RC0410 to determine criteria for EEA level. Replaced CAISO RC with RC West and updated References section. Minor format and grammar updates. Approved by Real-Time Working Group (RTWG).	2/04/21
1.3	Periodic Review: Section 3.4: Removed line stating, "Each BA and each RSG shall maintain at least half of its minimum..." (Also removing related footnote 5). Section 3.4.1: Corrected typo under bullet 2, sub bullet 3. References: Updated NERC Requirements.	7/07/22
1.4	Updated references of EOP-011 due to standard update. Minor format and grammar edits.	7/13/23
1.5	Added new Section 3.1.2 for Persistent abnormal frequency due to incorrect ACE. Updated NERC Standards EOP-011 and IRO-008 version numbers in References section. Minor formatting and grammar edits.	2/01/25

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## 5. Periodic Review Procedure

### Review Criteria & Incorporation of Changes

There are no specific review criteria identified for this document.

### Frequency

Review at least once every three years.

## Appendix

No references at this time.