
 California ISO	Reliability Coordinator Procedure	Procedure No.	RC0210
		Version No.	1.0
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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"> • Monitor real-time frequency and Area Control Error (ACE) of each BA within the RC area. • Identify BAs with large ACE excursions that may be contributing to a frequency excursion, SOL or IROL exceedances, and excessive inadvertent interchange. • Respond to frequency excursions outside of Frequency Trigger Limits (FTL).

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
60.068 (>5 minutes)	FTL High	1,2,3
60.068 (>10 minutes)	FTL High	1,4
59.932 (>5 minutes)	FTL Low	1,2,3
59.932 (>10 minutes)	FTL Low	1,4

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Reliability Coordinator Actions
<ul style="list-style-type: none"> • RC Operator should take recommended actions according to the above table: <ol style="list-style-type: none"> 1. Monitor individual ACE of each BA in the RC area and identify significant contributing sources of the FTL. 2. Contact all BAs within RC area with ACE significantly contributing to FTL, and validate contribution. Discuss current and anticipated mitigating actions with an expected timeframe when corrective action should be completed. Notify affected entities of the FTL and general cause through the Grid Messaging System (GMS). Notify other affected RCs through the Reliability Coordinator Information System (RCIS). 3. Evaluate mitigation steps being taken by BA(s). If inadequate progress has been made or if, based on RC judgement, it is unlikely to be made, recommend alternative or additional mitigating steps. Consider issuing Operating Instructions with an expected timeline to correct situation (See Section 3.5). 4. Issue Operating Instructions describing 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 (See Section 3.5). • Notify BAs that they may resume normal operations when frequency returns to acceptable ranges. • Log a summary of all <i>communications</i> and <i>actions</i>.

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.¹

Reliability Coordinator Actions
<ul style="list-style-type: none"> • Perform real-time assessment and contact BAs with abnormally high or low ACE contributing to an SOL or IROL exceedance. Discuss BA role in the SOL/IROL, and request that BA adjust generation back to normal parameters to help mitigate Unscheduled Flow. • Consider issuing Operating Instructions to contributing BAs to maintain more restrictive AGC bands (e.g. controlling to L₁₀) if high Inadvertent Interchange continues to contribute to an SOL or IROL exceedance, and other mitigation methods have been exhausted,. • Contact impacting BA(s) and allow them to resume normal operations when SOL/IROL exceedance is no longer an issue. • Log a summary of all <i>communications</i> and <i>actions</i>.

¹ See RC0310 Mitigating SOL and IROL Exceedances

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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 minutes². 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"> • Notify other affected entities in RC Area via GMS upon BA loss of visibility to ACE. Notify other affected RCs using RCIS. • Coordinate with adjacent BAs to ensure affected BA is notified of changes to tie-line flows by using alternate tie-line readings. Consider periodic notification (e.g. every 10 to 15 minutes) or notification of changes of a certain percentage or MW threshold. • Notify affected BA if causing unacceptable frequency deviation, and inform them of mitigating action needed (e.g. raise or lower generation). • Issue operating instructions as necessary to return frequency and/or tie-line flows to acceptable ranges. • Log a summary of all <i>communications</i> and <i>actions</i>.

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 generation³.

Each BA and each RSG shall maintain at least half of its minimum amount of Contingency Reserves identified as Operating Reserve – Spinning⁴.

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

² BAL-005-0.2b R6 (Applicable to BA)

³ BAL-002-WECC-2a R1 (Applicable to BA)

⁴ BAL-002-WECC-2a R2 (Applicable to BA). WECC is currently undergoing a field test waiving compliance to BAL-002-WECC-2a R2. The field test will continue in effect until the earliest of (a) March 30, 2019, or (b) the termination of the field test due to negative reliability impacts. During the period of the field test, the RC operator will not enforce this requirement.

⁵ EOP-011-1 R6

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3.4.1. RC Actions for Non RSG Member BAs

The RC Operator will monitor the Contingency Reserves of all BAs in the CAISO RC 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"> • Monitor BAs within RC area for actual and required Contingency Reserve values. • Contact deficient BA to verify actual and required Contingency Reserve values. Discuss cause of deficiency, mitigation plan, and timeframe for recovery. • Evaluate BA plan and if not viable, advise of alternative or additional measures (identification of fast start resources, arrangement of assistance from neighboring BAs). • Continue monitoring BA and evaluate impacts of their mitigation plan. If actions taken are not sufficient to recover Contingency Reserves within the expected timeframe, issue Operating Instructions as necessary for BA to recover reserves. • Determine the need to declare an EEA and assist BA to obtain emergency assistance, if BA is still unable to recover reserves. See Procedure RC0410 - System Emergencies for details in declaring an EEA. • Log a summary of all <i>communications</i> and <i>actions</i>.


3.4.2. RC Actions for RSG Member BAs

While an RSG is responsible for the compliance of BAL-002-WECC-2a 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-11-1 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"> • Monitor RSG member BA within RC area for actual and required Contingency Reserve values. • Contact deficient BA to verify actual and required Contingency Reserve values. Discuss cause of deficiency, mitigation plan, and timeframe for recovery. Evaluate RSG total

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Reliability Coordinator Actions

- contingency reserve values and work with BA to determine whether adequate Contingency Reserves from the RSG can be delivered upon the event of a Balancing Contingency Event. Coordinate with adjacent RCs as appropriate.
- **Evaluate** BA plan and if not viable, advise of alternative or additional measures (identification of fast start resources, arrangement of assistance from neighboring BAs).
- **Continue monitoring** BA and evaluate impacts of their mitigation plan. If actions taken are not sufficient to recover Contingency Reserves within the expected timeframe, issue Operating Instructions as necessary for BA to recover reserves.
- **Determine** the need to declare an EEA and assist BA to obtain emergency assistance, if BA is still unable to recover reserves. See Procedure RC0401-System Emergencies for details in declaring an EEA.
- **Log** a summary of all *communications* and *actions*.

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

- **Notify** Neighboring RC Area upon identifying a Contingency Reserve deficient RSG or a Contingency Reserve deficient RSG zone who's Area is in both CAISO RC and Neighboring RC Areas. Coordinate with Neighboring RC to identify individual BAs that are responsible for the deficiency as well as actions taken to mitigate the issue.
- **Log** a summary of all *communications* and *actions*.

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.

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 an EEA.

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Reliability Coordinator Actions
<ul style="list-style-type: none"> • Monitor BA reserves to ensure recovery within 60 minutes following an event requiring the activation of Contingency Reserves. Validate Contingency Reserve values with BA. • Assess BA plan, and if it does not seem adequate or viable, assist BA by identifying resources that might be used for Contingency Reserves and/or helping BA arrange for emergency assistance from neighboring BAs. • Evaluate BA conditions according to section 3.4.2 if the BA is an RSG member and discuss if RSG Contingency Reserves can be used under their agreements. • Contact BA and discuss current situation and recovery plan if, after 60 minutes, the BA has failed to recover Contingency Reserves. • Declare an EEA if BA still has not recovered their Contingency Reserves in a timely manner after the recovery period. See Procedure RC0401-System Emergencies for details in declaring an EEA. • Log a summary of all <i>communications</i> and <i>actions</i>.

3.5. Operating Instructions

The Reliability Coordinator must act to address the reliability of its area either by direct actions or by issuing Operating Instructions⁶.

Reliability Coordinator Actions
<ul style="list-style-type: none"> • Identify and contact responsible BA(s) in RC area following a disturbance or FTL event. • Discuss mitigation plan, with an effective timeline of completion, with BA. Ensure that mitigation plan is adequate, timely, and viable. Recommend alternative or additional mitigation if needed. • Continue to monitor and evaluate system conditions for progress during expected timeline. If mitigating measures are ineffective or insufficient, the RC Operator should consider issuing Operating Instructions ensure the reliability of the RC area. Possible Operating Instructions may include: <ul style="list-style-type: none"> ○ Return ACE to within L₁₀ boundaries ○ Return ACE to within BAAL parameters • Shed load (Before issuing Operating Instruction to shed load, ensure that the Instruction meets the load shedding philosophy in Procedure RC0410 - System Emergencies). • Log a summary of all <i>communications</i> and <i>actions</i>.

⁶ IRO-001-4 R1.

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4. Supporting Information

Operationally Affected Parties

Shared with Public.


References

NERC Requirements	IRO-008-2 R5; EOP-011-1 R6; IRO-001-4 R1, BAL-002-WECC-2a R1, BAL-005-0.2b R6
BA/TOP Operating Procedure	
Other References	CAISO- RC0310 Mitigating SOL and IROL Exceedances CAISO- RC0410 System Emergencies

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"> • Facility Ratings (applicable pre- and post-Contingency Equipment Ratings or Facility Ratings) • Transient stability ratings (applicable pre- and post-Contingency stability limits) • Voltage stability ratings (applicable pre- and post-Contingency voltage stability) • System voltage limits (applicable pre- and post-Contingency voltage limits)
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.

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Term	Description
L ₁₀	$L_{10} = 1.65 \epsilon_{10} \sqrt{(-10B_i)(-10B_s)}$ <p> ϵ_{10} 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, ϵ_{10}, is the same for every Balancing Authority Area within an Interconnection. </p> <p> B_i = Frequency Bias Setting for the Balancing Authority Area (MW / 0.1 Hz) </p> <p> B_s = 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

5. Periodic Review Procedure

Appendix

No references at this time.