

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

### Standard Development Roadmap

*This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.*

#### Development Steps Completed:

1. The SAR for Project 2007-18, Reliability Based Controls, was posted for a 30-day formal comment period on May 15, 2007.
2. A revised SAR for Project 2007-05, Reliability Based Controls, was posted for a second 30-day formal comment period on September 10, 2007.
3. The Standards Committee approved Project 2007-18, Reliability Based Controls, to be moved to standard drafting on December 11, 2007.
4. The SAR for Project 2007-05, Balancing Authority Controls, was posted for a 30-day formal comment period on July 3, 2007.
5. The Standards Committee approved Project 2007-05, Balancing Authority Controls, to be moved to standard drafting on January 18, 2008.
6. The Standards Committee approved the merger of Project 2007-05, Balancing Authority Controls, and Project 2007-18, Reliability-based Control, as Project 2010-14, Balancing Authority Reliability-based Controls on July 28, 2010.
7. The NERC Standards Committee approved breaking Project 2010-14, Balancing Authority Reliability-based Controls, into two phases and moving Phase 1 (Project 2010-14.1, Balancing Authority Reliability-based Controls – Reserves) into formal standards development on July 13, 2011.
8. The draft standard was posted for 30-day formal industry comment period from June 4, 2012 through July 3, 2012.
9. The draft standard was posted for 45-day formal industry comment period and initial ballot from March 12, 2013 through April 25, 2013.

#### Proposed Action Plan and Description of Current Draft:

This is the third posting of the proposed standard. This proposed draft standard will be posted for a 45-day formal comment period and 10-day successive ballot.

#### Future Development Plan:

Anticipated Actions	Anticipated Date
1. Third posting	July/August 2013
2. Successive Ballot	August 2013

**Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event**

---

3. Recirculation Ballot	October 2013
4. NERC BOT adoption.	November 2013

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

### Definitions of Terms Used in Standard

*This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.*

**Balancing Contingency Event:** Any single event described in Subsections (A), (B), or (C) below, or any series of such otherwise single events, with each separated from the next by less than one minute.

- A. Sudden Loss of generation:
  - a. Due to
    - i. Unit tripping,
    - ii. Loss of generator Interconnection Facility resulting in isolation of the generator from the Bulk Electric System or from the responsible entity's electric system, or
    - iii. Sudden unplanned outage of transmission Facility;
  - b. And, that causes an unexpected change to the responsible entity's ACE;
- B. Sudden loss of an import, due to forced outage of transmission equipment that causes an unexpected imbalance between generation and load on the Interconnection.
- C. Sudden restoration of a load that was used as a resource that causes an unexpected change to the responsible entity's ACE.

**Most Severe Single Contingency (MSSC):** The Balancing Contingency Event, due to a single contingency, that would result in the greatest loss (measured in MW) of resource output used by the Reserve Sharing Group (RSG) or a Balancing Authority that is not participating as a member of a RSG at the time of the event to meet firm system load and export obligation (excluding export obligation for which Contingency Reserve obligations are being met by the sink Balancing Authority).

**Reportable Balancing Contingency Event:** Any Balancing Contingency Event resulting in a loss of MW output greater than or equal to the lesser amount of 80 percent of the Most Severe Single Contingency or the amount listed below for the applicable Interconnection and occurring within a rolling one-minute interval based on EMS scan rate data. The 80% threshold may be reduced upon written notification to the Regional Entity.

- Eastern Interconnection - 900 MW
- Western Interconnection – 500 MW
- ERCOT – 800 MW
- Quebec – 500 MW

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

**Contingency Event Recovery Period:** A period beginning at the time that the resource output begins to decline within the first one-minute interval that defines a Balancing Contingency Event, and extends for fifteen minutes thereafter.

**Contingency Reserve Restoration Period:** A period not exceeding 90 minutes following the end of the Contingency Event Recovery Period.

**Pre-Reporting Contingency Event ACE Value:** The average value of Reporting ACE, or Reserve Sharing Group Reporting ACE when applicable, in the 16 second interval immediately prior to the start of the Contingency Event Recovery Period based on EMS scan rate data.

**Reserve Sharing Group Reporting ACE:** At any given time of measurement for the applicable Reserve Sharing Group, the algebraic sum of the ACEs (or equivalent as calculated at such time of measurement) of the Balancing Authorities participating in the Reserve Sharing Group at the time of measurement.

**Contingency Reserve:** The provision of capacity that may be deployed by the Balancing Authority to respond to a Balancing Contingency Event and other contingency requirements (such as Energy Emergency Alerts Level 2 or Level 3 as specified in the associated EOP standard). The capacity may be provided by resources such as Demand Side Management (DSM), Interruptible Load and unloaded generation.

**Reporting ACE:** The scan rate values of a Balancing Authority's Area Control Error (ACE) measured in MW, which includes the difference between the Balancing Authority's Net Actual Interchange and its Net Scheduled Interchange, plus its Frequency Bias obligation, plus any known meter error. In the Western Interconnection, Reporting ACE includes Automatic Time Error Correction (ATEC).

Reporting ACE is calculated as follows:

$$\text{Reporting ACE} = (NI_A - NI_S) - 10B (F_A - F_S) - I_{ME}$$

Reporting ACE is calculated in the Western Interconnection as follows:

$$\text{Reporting ACE} = (NI_A - NI_S) - 10B (F_A - F_S) - I_{ME} + I_{ATEC}$$

Where:

**NI<sub>A</sub> (Actual Net Interchange)** is the algebraic sum of actual megawatt transfers across all Tie Lines and includes Pseudo-Ties. Balancing Authorities directly connected via asynchronous ties to another Interconnection may include or exclude megawatt transfers on those Tie Lines in their actual interchange, provided they are implemented in the same manner for Net Interchange Schedule.

**NI<sub>S</sub> (Scheduled Net Interchange)** is the algebraic sum of all scheduled megawatt transfers, including Dynamic Schedules, with adjacent Balancing Authorities, and taking into account the effects of schedule ramps. Balancing Authorities directly connected via asynchronous ties to another Interconnection may include or exclude megawatt

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

transfers on those Tie Lines in their scheduled Interchange, provided they are implemented in the same manner for Net Interchange Actual.

**B (Frequency Bias Setting)** is the Frequency Bias Setting (in negative MW/0.1 Hz) for the Balancing Authority.

**10** is the constant factor that converts the Frequency Bias Setting units to MW/Hz.

**F<sub>A</sub> (Actual Frequency)** is the measured frequency in Hz.

**F<sub>S</sub> (Scheduled Frequency)** is 60.0 Hz, except during a time correction.

**I<sub>ME</sub> (Interchange Meter Error)** is the meter error correction factor and represents the difference between the integrated hourly average of the net interchange actual (NIA) and the cumulative hourly net interchange energy measurement (in megawatt-hours).

**I<sub>ATEC</sub> (Automatic Time Error Correction)** is the addition of a component to the ACE equation for the Western Interconnection that modifies the control point for the purpose of continuously paying back Primary Inadvertent Interchange to correct accumulated time error. Automatic Time Error Correction is only applicable in the Western Interconnection.

$$I_{ATEC} = \frac{PII_{accum}^{on/off\ peak}}{(1-Y)*H} \text{ when operating in Automatic Time Error Correction control mode.}$$

**I<sub>ATEC</sub>** shall be zero when operating in any other AGC mode.

- $Y = B / B_S$ .
- H = Number of hours used to payback Primary Inadvertent Interchange energy. The value of H is set to 3.
- $B_S$  = Frequency Bias for the Interconnection (MW / 0.1 Hz).
- Primary Inadvertent Interchange ( $PII_{hourly}$ ) is  $(1-Y) * (I_{actual} - B * \Delta TE/6)$
- $I_{actual}$  is the hourly Inadvertent Interchange for the last hour.
- $\Delta TE$  is the hourly change in system Time Error as distributed by the Interconnection Time Monitor. Where:
 
$$\Delta TE = TE_{end\ hour} - TE_{begin\ hour} - TD_{adj} - (t)*(TE_{offset})$$
- $TD_{adj}$  is the Reliability Coordinator adjustment for differences with Interconnection Time Monitor control center clocks.
- t is the number of minutes of Manual Time Error Correction that occurred during the hour.
- $TE_{offset}$  is 0.000 or +0.020 or -0.020.
- $PII_{accum}$  is the Balancing Authority's accumulated  $PII_{hourly}$  in MWh. An On-Peak and Off-Peak accumulation accounting is required.

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

Where:

$$PII_{accum}^{on/off\ peak} = \text{last period's } PII_{accum}^{on/off\ peak} + PII_{hourly}$$

All NERC Interconnections with multiple Balancing Authorities operate using the principles of Tie-line Bias (TLB) Control and require the use of an ACE equation similar to the Reporting ACE defined above. Any modification(s) to this specified Reporting ACE equation that is(are) implemented for all BAs on an Interconnection and is(are) consistent with the following four principles will provide a valid alternative Reporting ACE equation consistent with the measures included in this standard.

1. All portions of the Interconnection are included in one area or another so that the sum of all area generation, loads and losses is the same as total system generation, load and losses.
2. The algebraic sum of all area Net Interchange Schedules and all Net Interchange actual values is equal to zero at all times.
3. The use of a common Scheduled Frequency  $F_S$  for all areas at all times.
4. The absence of metering or computational errors. (The inclusion and use of the  $I_{ME}$  term to account for known metering or computational errors.)

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

### A. Introduction

1. **Title:** Disturbance Control Performance - Contingency Reserve for Recovery From a Balancing Contingency Event
2. **Number:** BAL-002-2
3. **Purpose:** To ensure the Balancing Authority or Reserve Sharing Group balances resources and demand and returns the Balancing Authority's or Reserve Sharing Group's Area Control Error to defined values (subject to applicable limits) following a Reportable Balancing Contingency Event.
4. **Applicability:**

Applicability is determined on an individual event basis, but this standard does not apply to a Responsible Entity during periods when the Responsible Entity is in Energy Emergency Alert Level 2 or Level 3.

#### 4.1. Balancing Authority

- 4.1.1 A Balancing Authority that is a member of a Reserve Sharing Group is the Responsible Entity only in periods during which the Balancing Authority is not in active status under the applicable agreement or governing rules for the Reserve Sharing Group.

#### 4.2. Reserve Sharing Group

### 5. (Proposed) Effective Date:

- 5.1. First day of the first calendar quarter that is six months beyond the date that this standard is approved by applicable regulatory authorities, or in those jurisdictions where regulatory approval is not required, the standard becomes effective the first day of the first calendar quarter that is six months beyond the date this standard is approved by the NERC Board of Trustees', or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.

### B. Requirements

- R1. The Responsible Entity experiencing a Reportable Balancing Contingency Event shall, within the Contingency Event Recovery Period, return its ACE to at least: *[Violation Risk Factor: Medium][Time Horizon: Real-time Operations]*
  - Zero, (if its Pre-Reporting Contingency Event ACE Value was positive or equal to zero):
    - less the sum of the magnitudes of all subsequent Balancing Contingency Events that occur prior to that value of Reporting ACE within the Contingency Event Recovery Period, and
    - Further reduced by the magnitude of the difference between (i) the Responsible Entity's Most Severe Single Contingency (MSSC) and (ii) the sum

## Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event

---

of the magnitudes of the Reportable Balancing Contingency Event and all previous Balancing Contingency Events that have not completed their Contingency Reserve Restoration Period when the sum referenced in clause (ii) of this bullet is greater than MSSC,

Or,

- Its Pre-Reporting Contingency Event ACE Value, (if its Pre-Reporting Contingency Event ACE Value was negative),
  - less the sum of the magnitudes of all subsequent Balancing Contingency Events that occur prior to that value of Reporting ACE within the Contingency Event Recovery Period, and
  - Further reduced by the magnitude of the difference between (i) the Responsible Entity's Most Severe Single Contingency (MSSC) and (ii) the sum of the magnitudes of the Reportable Balancing Contingency Event and all previous Balancing Contingency Events that have not completed their Contingency Reserve Restoration Period when the sum referenced in clause (ii) of this bullet is greater than MSSC.

1.1. The required reporting form is CR Form 1.

1.2. This requirement (in its entirety) does not apply when the Responsible Entity experiencing a Reportable Balancing Contingency Event is experiencing an Energy Emergency Alert Level 2 or Level 3.

- R2.** Except during the Responsible Entity's Contingency Event Recovery Period and the Responsible Entity's Contingency Reserve Restoration Period, or during an Energy Emergency Alert Level 2 or 3 for the Responsible Entity and for an additional five hours during a given calendar quarter, the Responsible Entity shall maintain an amount of Contingency Reserve at least equal to its Most Severe Single Contingency. *[Violation Risk Factor: Medium] [Time Horizon: Real-time Operations]*

### C. Measures

- M1.** Each Responsible Entity shall have, and provide upon request, as evidence, a CR Form 1 with date and time of occurrence to show compliance with Requirement R1 and additional documentation of any Balancing Contingency Event that has not completed its Contingency Reserve Restoration Period and that is used to reduce the recovery to the amount limited by MSSC.
- M2.** Each Responsible Entity shall have dated documentation that demonstrates its Contingency Reserve, averaged over each Clock Hour, was maintained in accordance with Requirement R2.



## **D. Compliance**

### **1. Compliance Monitoring Process**

#### **1.1. Compliance Enforcement Authority**

As defined in the NERC Rules of Procedure, “Compliance Enforcement Authority” means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

#### **1.2. Data Retention**

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The Responsible Entity shall retain data or evidence to show compliance for the current year, plus three previous calendar years, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Responsible Entity is found noncompliant, it shall keep information related to the noncompliance until found compliant, or for the time period specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all subsequent requested and submitted records.

#### **1.3. Compliance Monitoring and Assessment Processes**

Compliance Audits

Self-Certifications

Spot Checking

Compliance Investigations

Self-Reporting

Complaints

#### **1.4. Additional Compliance Information**

The Responsible Entity may use Contingency Reserve for any Balancing Contingency Event and as required for any other applicable standards.

A Responsible Entity is not subject to compliance with this standard in any period during which the Responsible Entity is in an Energy Emergency Alert Level 2 or Level 3.

**Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event**

---

**2. Violation Severity Levels**

R #	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	The Responsible Entity recovered partially from a Reportable Balancing Contingency Event during the Contingency Event Recovery Period but recovered less than 100% but more than 90% of required recovery.	The Responsible Entity recovered partially from a Reportable Balancing Contingency Event during the Contingency Event Recovery Period but recovered 90% or less but more than 80% of required recovery.	The Responsible Entity recovered partially from a Reportable Balancing Contingency Event during the Contingency Event Recovery Period but recovered 80% or less but more than 70% of required recovery.	The Responsible Entity recovered partially from a Reportable Balancing Contingency Event during the Contingency Event Recovery Period but recovered 70% or less of required recovery.
R2	In each calendar quarter, the Responsible Entity had Contingency Reserves but its Contingency Reserve was deficient for more than 5 hours but less than or equal to 15 hours.	In each calendar quarter, the Responsible Entity had Contingency Reserves but its Contingency Reserve was deficient for more than 15 hours but less than or equal to 25 hours.	In each calendar quarter, the Responsible Entity had Contingency Reserves but its Contingency Reserve was deficient for more than 25 hours but less than or equal to 35 hours.	In each calendar quarter, the Responsible Entity had Contingency Reserves but its Contingency Reserve was deficient for more than 35 hours.

**E. Regional Variances**

None.

**F. Associated Documents**

BAL-002-2 Contingency Reserve for Recovery from a Balancing Contingency Event  
Background Document

CR Form 1

**Standard BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event**

---

**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>
0	April 1, 2005	Effective Date	New
0	August 8, 2005	Removed "Proposed" from Effective Date	Errata
0	February 14, 2006	Revised graph on page 3, "10 min." to "Recovery time." Removed fourth bullet.	Errata
2		NERC BOT Adoption	Complete revision