Text highlighted in yellow is written in passive language – recommend revising to use the active voice.

Formatted: Space After: 6 pt, Line spacing: single

Attachment A

BAL-003-1 Frequency Response & Frequency Bias Setting Standard

Supporting Document

Background

This document outlines the ERO process for supporting the Frequency Response Standard (FRS).

Event Selection Criteria

The ERO will use the following criteria to select FRS frequency excursion events for analysis.

1. The evaluation period for performing the annual Frequency Bias Setting and the Frequency Response Measure (FRM) calculation is December 1 of the prior year through November 30 of the current year.

2. The ERO will identify aAt least 25 frequency excursion events in each Interconnection will be identified for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify in a given evaluation period 25 frequency excursion events cannot be identified satisfying the limits specified in criteria 3 below, then similar acceptable events from the previous evaluation period also satisfying listed criteria will be included with the data set by the ERO for determining FRS compliance.

3. The ERO will use Ttwo limits will be used to determine if an acceptable frequency excursion event for determining FRM has occurred:

    Formatted: Not Highlight

    a. The change in frequency (delta F) and the arresting frequency (Point C) must exceed the excursion threshold values specified for the Interconnection in Table 1 below. Point C is the arrested value of frequency observed within 8 seconds following the start of the excursion.

Interconnection	Delta F	Point C	
		Under Frequency	Over Frequency
East	0.04Hz	< 59.97	> 60.03
West	0.04Hz	< 59.97	> 60.03
Texas	0.15Hz	< 59.97	> 60.03
HQ	0.04Hz	< 59.97	> 60.03

Table 1: Interconnection Frequency Excursion Threshold Values

      b. The time from the start of the rapid change in frequency until the point at which Frequency has stabilized within a narrow range~~largely stabilized~~ should be less than 18 seconds.

> **Comment [ML1]:** this is ambiguous - can you identify what this looks like? - FR constantly changing
>
> **Formatted:** Not Highlight

4. Pre-disturbance frequency should be relatively steady and near 60.000 Hz. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline.

5. Events that coincide with a second event that does not stabilize before the first scan used in the B-Value should not be considered.

6. Frequency excursion events occurring during periods when large interchange schedule ramping or load change is happening, and frequency excursion events occurring within 5 minutes of the top of the hour, should be excluded from consideration if other acceptable frequency excursion events can be used for analysis.

7. Select the cleanest 2 or 3 frequency excursion events occurring monthly that satisfy selection criteria. If there are not 2 frequency excursion events satisfying selection criteria occurring during the month, then other frequency excursion events from the same season of the year satisfying selection criteria will be used.

To assist Balancing Authority preparation for complying with this standard, the ERO will provide quarterly posting of candidate frequency excursion events ~~likely to be used~~ for the current year FRM calculation. The ERO will post the final list of frequency excursion events used for standard compliance by December 15 each year. Balancing Authorities are encouraged to develop scanning tools that identify candidate frequency excursion events so they are ready to access data files when needed.

> **NOTE:** *The ERO may use for analysis of Interconnection frequency performance, but not for Balancing Authority Frequency Response, a*~~A~~*dditional frequency excursion events not satisfying the criteria ~~specified may be used by the ERO for analysis of Interconnection performance~~specifie ~~however these events will not be used to calculate Balancing Authority frequency response~~d.*

Frequency Response Obligation (FRO) for the Interconnection

Each Interconnection will establish target contingency protection criteria. The default target listed in Table 2 is based on the largest category C (N-2) event identified. However, this contingency protection criterion includes a safety margin to prevent Point C from encroaching on the interconnection's highest Under Frequency Load Shed (UFLS) step for credible contingencies.

	Eastern	Western	Texas	HQ	
Starting Frequency	60	60	60	60	Hz
*Highest UFLS	59.6	59.5	59.3	58.5	Hz
Contingency Protection Criteria	4500	2740	2750	1700	MW
**Base Obligation	1125	548	229	113	MW/0.1Hz
With 25% Safety Margin	1406	685	286	141	MW/0.1Hz

Table 2: Interconnection Frequency Response Obligations

*The Eastern Interconnection set point listed is a compromise value for the highest UFLS step setting of 59.5Hz used in the east and the special protection scheme's highest UFLS step setting of 59.7Hz used in Florida. It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS special protection scheme to "false trip".

**In the Base Obligation measure for Texas, 1150 MW (Load Resources triggered byunder Under Frequency RelaysUFR at 59.70 Hz) was reduced from their its Contingency Protection Criteria of 2750 MW to get 229 MW/0.1 Hz. This was reduced to accurately account for designed response from Load Resources within 30 cycles.

An Interconnection may propose alternate FRO protection criteria to the ERO. The ERO will confirm theseek endorsement from the NERC Operating Committee and the NERC Planning Committee for proposed alternate FRO protection criteria proposed.

Balancing Authority Frequency Response Obligation (FRO) and Frequency Bias Setting

The ERO and the NERC Resources Subcommittee (RS) will manage the administrative procedure for annually assigning an FRO and Frequency Bias Setting to each Balancing Authority.

For a multiple Balancing Authority interconnection, the Interconnection Frequency Response Obligation is allocated based on Balancing Authority size. Initial FRO allocation will be based on the following method:

$$\text{(Projected Balancing Authority Peak Load + installed capacity)}/2^1$$

Each Balancing Authority shall report its previous year's Frequency Response Measure (FRM) to the ERO on FRS Form 1 by January 10 each year. If the ERO posts the official list of events after December 10, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1.

The ERO will collect peak load and capacity data on FRS Form 1 during January of each year. Once the ERO validates the data for all Balancing Authorities has been validated, the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year:

- Frequency Bias Setting
- CPS Limits

[1] This allocation methodology is being evaluated as part of the draft standard field trial together with an eventual risk-based methodology for basing the Interconnection Frequency Response Obligation on an historic probability density of frequency error, and for allocating the obligation on the basis of the Balancing Authority's average annual ACE share of frequency error.

Attachment A
BAL-003-1 Frequency Response and Frequency Bias Setting
Supporting Document

- Frequency Response Obligation (FRO)

Frequency Bias Setting will be the greater of (in absolute terms) the FRM or the Interconnection minimum (as defined in Attachment B). FRS Form 1 will automatically calculate the Balancing Authority's Bias Settings.   Balancing Authorities that provide Overlap Regulation will submit a FRS Form 1 that represents both the provider's and the recipient(s)' footprint. Once the data listed above is fully posted, the ERO will announce the implementation date for changing the Frequency Bias Setting.

Frequency Response Measure (FRM)

Assuming data entry is correct FRS Form 1 will automatically calculate the Balancing Authority's/sies' FRM for the past 12 months. A Balancing Authority electing to report as an RSG or a provider of Overlap Regulation Service will provide an FRS Form 1 for the aggregate of its participants. The ERO will compare the calculated FRM value to the previous year's posted FRO to verify compliance.

The FRM will be computed from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz". The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change in its Net Actual Interchange on its tie lines with its adjacent Balancing Authorities divided by the change in Interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their Net Actual Interchange values to account for factors such as nonconforming loads. FRS Form 1 shows the types of adjustments that are allowed.) The ERO will use aA standardized sampling interval of 20 to 52 seconds will be used in the computation of SEFRD values.