

# Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard

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

### Event Selection Process

This procedure outlines the ERO process for supporting the Frequency Response Standard (FRS). A Procedure revision request may be submitted to the ERO for consideration. The revision request must provide a technical justification for the suggested modification. The ERO shall post the suggested modification for a 45-day comment period and discuss the revision request in a public meeting. The ERO will make a recommendation to the NERC BOT, which may adopt the revision request, reject it, or adopt it with modifications. Any approved revision to this Procedure shall be filed with FERC for informational purposes.

### Event Selection Objectives

The goals of this procedure are to outline a transparent, repeatable process to annually identify a list of frequency events to be used by Balancing Authorities (BA) to calculate their Frequency Response to determine:

- Calculate their Frequency Response Measure to determine whether the BA met its Frequency Response Obligation, and;
- Estimate the average Frequency Response provided during the year to determine an appropriate fixed Bias Setting.

### Event Selection Criteria

The ERO will use the following criteria to select FRS frequency excursion events for analysis. The events that best fit the criteria will be used to support the FRS. All events that meet the selection criterion will be included in the evaluation process.

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 at least 20 to 35 frequency excursion events in each Interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify in a given evaluation period 20 frequency excursion events in a 12 month evaluation period satisfying the limits specified in criteria 3 below, then similar acceptable events from the subsequent year's previous evaluation period also satisfying listed criteria will be included will be included with the data set by the ERO for determining FRS compliance. This is described later.
3. The ERO will use three criteria limits to determine if an acceptable frequency excursion event for determining the FRM has occurred:
  - a. The change in frequency as defined by the difference from the A Value to Point C and the arresting frequency Point C exceeds the excursion threshold values specified for the Interconnection in Table 1 below.

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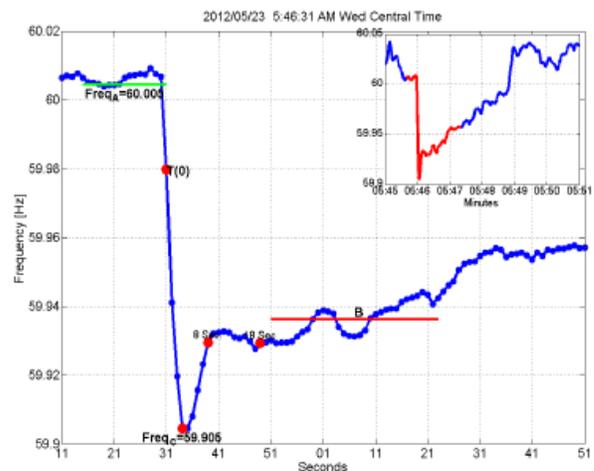
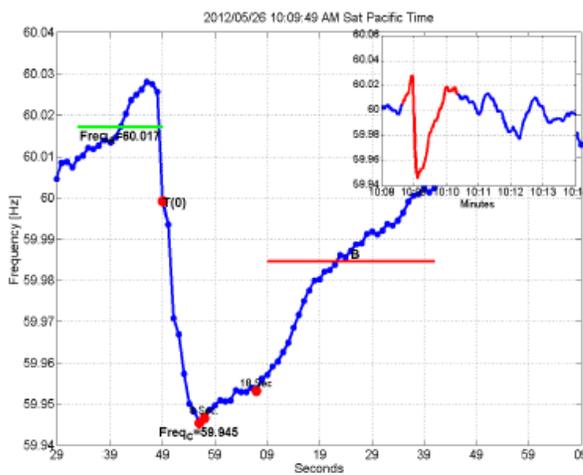
i. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline.

ii. Point C is the arrested value of frequency observed within 128 seconds following the start of the excursion.

Interconnection	A Value to Pt C	Frequency Point Prior to B Value Measurement	
		Under Frequency Point C (Low)	Over Frequency Point C (High)
East	0.04Hz	< 59.967	> 60.043
West	0.07Hz	< 59.95	> 60.05
ERCOT	0.15Hz	< 59.90	> 60.10
HQ	0.30Hz	< 59.85	> 60.15

**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 should be less than 18 seconds.
  - c. If any data pointvalue in the B Value average recovers to the A Value, the event will not be includedevaluated.
4. Pre-disturbance frequency should be relatively steady and near 60.000 Hz for the A Value. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline. For example, given the choice of the two events below, the one on the right is preferred as the pre-disturbance frequency is stable and also closer to 60 Hz.



4.5. Excursions that include 2 or more events that do not stabilize within 18 seconds will not be considered.

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- ~~5. Events that coincide with a second event that does not stabilize before the first scan used in the B-Value will 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, will be excluded from consideration if other acceptable frequency excursion events from the same quarter are available.~~can be used for analysis.~~
7. The ERO will select the largest ((A Value to Point C) cleanest 2 or 3 frequency excursion events occurring each month that satisfy selection criteria. If there are not 2 frequency excursion events satisfying the selection criteria in a occurring during the month, then other frequency excursion events should be picked in the following sequence:
  - ~~a. From the same event quarter~~season of the year, satisfying selection criteria should be considered for use if necessary.
  - b. From an adjacent month.
  - c. From a similar load season in the year (shoulder vs. summer/winter)
  - d. The largest unused event.

As noted earlier, if a total of 20 events are not available in an evaluation year, then similar acceptable events from the next subsequent year's evaluation period will be included with the data set by the ERO for determining FRO compliance. The first year's small set of data will be reported and used for Bias Setting purposes, but compliance evaluation on the FRO will be done using a 24 month data set.

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~~**NOTE:** The ERO may use for analysis of Interconnection frequency performance, but not for Balancing Authority Frequency Response compliance, additional frequency excursion events not satisfying the criteria specified, but not for Balancing Authority Frequency Response compliance.~~

To assist Balancing Authority preparation for complying with this standard, the ERO will provide quarterly posting of candidate frequency excursion events for the current year FRM calculation. The ERO will post the final list of frequency excursion events used for standard compliance ~~by December~~ January 10 each year as specified in Attachment A of BAL-003-1. ~~Balancing Authorities are encouraged to develop scanning tools that identify candidate frequency excursion events so they are ready to access data files when needed.~~ The following is a general description of the full process that the ERO will use to ensure that BAs can evaluate events during the year in order to monitor their performance throughout the year.

### Monthly

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Candidate events will be initially screened by the "Frequency Event Detection Methodology" shown on the following link located on the NERC Resources Subcommittee area of the NERC website: [http://www.nerc.com/docs/oc/rs/Frequency\\_Event\\_Detection\\_Methodology\\_and\\_Criteria\\_Oct\\_2011.pdf](http://www.nerc.com/docs/oc/rs/Frequency_Event_Detection_Methodology_and_Criteria_Oct_2011.pdf). Each month's list will be posted by the end of the following month on the NERC website, <http://www.nerc.com/filez/rs.html> and listed under "Candidate Frequency Events".

### Quarterly

The monthly event lists will be reviewed quarterly with the quarters defined as:

- December through February
- March through May
- June through August
- September through November

Based on criteria established in the "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard", events will be selected to populate the FRS Form 1 for each interconnection. The Form 1's will also be posted on the NERC website, in the Resources Subcommittee area under the title "Frequency Response Standard Resources". The updated Form 1's will be posted at the end of each quarter listed above after a review by the NERC RS' Frequency Working Group. While the events on this list are expected to be final, as outlined in the selection criteria, additional events may be considered, if the number of events throughout the year do not create a list of at least 20 events. It is intended that this quarterly posting of updates to the FRS Form 1 would allow BAs to evaluate the events throughout the year, lessening the burden when the yearly posting is made.

### Yearly/Annually

The final yearly FRS Form 1 for each interconnection, which would contain the events from all four quarters listed above, will be posted by January 10th as specified in Attachment A. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO by February 10th as specified in Attachment A using the final FRS Form 1. The ERO will error check and use the FRS Form 1 data to calculate CPS limits and FROs for the upcoming year each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1.

If the ERO posts the official list of events after January 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.

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~~Once the ERO validates the data submitted in FRS Form 1 and FRS Form 2 for all Balancing Authorities, the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year:~~

~~— Frequency Bias Setting~~

~~— Frequency Response Obligation (FRO)~~

~~Once the data listed above is fully reviewed fully posted, the ERO will announce may adjust the three-day implementation period specified in Attachment A for changing the Frequency Bias Settings and CPS limits. This allows ,allowing flexibility in when how each BA implements its settings. It is anticipated that this date will be April 1<sup>st</sup> of each year.~~

~~**NOTE:** — The ERO may use for analysis of Interconnection frequency performance, but not for Balancing Authority Frequency Response compliance, additional frequency excursion events not satisfying the criteria specified.~~

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**Process for Adjusting Interconnection Minimum Frequency Bias Setting**

This procedure outlines the process the ERO is to use for modifying minimum Frequency Bias Settings to better meet reliability needs. The ERO will adjust the Frequency Bias Setting minimum in accordance with this procedure.

The ERO will post the minimum Frequency Bias Setting values on the ERO website along with other balancing standard limits.

Under BAL-003-1, the minimum Frequency Bias Settings will be moved toward the natural Frequency Response in each interconnection. In the first year, the minimum Frequency Bias Setting for each interconnection is shown in Table ~~21~~ below. Each Interconnection Minimum Frequency Bias Setting is based on the sum of the non-coincident peak loads for each BA from the currently available FERC 714 Report or equivalent. This non-coincident peak load sum is multiplied by the percentage shown in Table 1 to get the Interconnection Minimum Frequency Bias Setting. The Interconnection Minimum Frequency Bias Setting is allocated among the BAs on an interconnection using the same allocation method as is used for the allocation of the Frequency Response Obligation (FRO).

Interconnection	Interconnection Minimum Frequency Bias Setting (in MW/0.1Hz)	
<del>Eastern</del> Eastern	<del>BAs with Load</del> <u>0.9% of non-coincident peak load</u> <del>of peak load</del>	<del>Generation-only BAs</del> <u>0.9% of peak generation</u>
<del>Western</del> Western	<del>BAs with Load</del> <u>0.9% of non-coincident peak load</u> <del>of peak load</del>	<del>Generation-only BAs</del> <u>0.9% of peak generation</u>
<del>ERCOT</del> * ERCOT*	<del>N/A</del>	<del>N/A</del>
<del>HQ</del> * HQ*	<del>N/A</del>	<del>N/A</del>

**Table ~~21~~. Frequency Bias Setting Minimums**

\*The minimum Frequency Bias Setting requirement does not apply to a Balancing Authority that is the only Balancing Authority in its Interconnection. These Balancing Authorities are solely responsible for providing reliable frequency control of their Interconnection. These Balancing Authorities are responsible for converting frequency error into a megawatt error to provide reliable frequency control, and the imposition of a minimum bias setting greater than the magnitude the Frequency Response Obligation may have the potential to cause control system hunting, and instability in the extreme.

The ERO, in coordination with the regions of each interconnection, will annually review Frequency Bias Setting data submitted by BAs. If an Interconnection’s total minimum Frequency Bias Setting exceeds (in absolute value) the Interconnection’s total natural Frequency Response by more (in absolute value) than 0.2 percentage points (of peak load expressed in MW/0.1Hz), the minimum Frequency Bias Setting for BAs within that Interconnection may be reduced (in absolute value) based on the technical evaluation and consultation with the regions affected by 0.1 percentage point to better match that Frequency Bias Setting and natural Frequency Response.

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The ERO, in coordination with the regions of each Interconnection, will monitor the impact of the reduction of minimum frequency bias settings, if any, on frequency performance, control performance, and system reliability. If unexpected and undesirable impacts such as, but not limited to, sluggish post-contingency restoration of frequency to schedule or control performance problems occur, then the prior reduction in the minimum frequency bias settings may be reversed, and/or the prospective reduction based on the criterion stated above may not be implemented.