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Background

The NERC Resources Subcommittee (RS) has been concerned with the trend in Frequency Response for several years. The RS initiated the Standards Authorization Request (SAR) for BAL-003 to put a measurement process in place so engineers can objectively analyze the adequacy of Frequency Response and underlying issues to enable informed decisions.

From an Interconnection perspective, most in the industry agree that there is adequate Frequency Response at this point in time, but it is important we have facts and an objective process to be prepared to adjust regionally or turn things around globally if warning signs develop.

Target Minimum Frequency Response

The Frequency Response Standard drafting team is proposing a standard with performance goal that each Interconnection can withstand at least an N-2 event without encroaching on the first tier of Under Frequency Load Shedding (UFLS). The Interconnection may include an additional safety margin in the standard's Contingency Protection Criteria.

	Eastern	Western	Texas	HQ	
Starting Frequency	59.98	59.98	59.98	59.98	Hz
Highest UFLS*	59.6	59.1	59.3	59.3	Hz
Contingency Protection Criteria	5000	4000	2500	2000	MW
Frequency Response Obligation	1316	455	368	294	MW/0.1Hz

The standard assumes that the given Interconnection is in a Time Error Correction at the time of the event. The target Frequency Response Obligation (FRO) is based on points A and B of the frequency excursion. The Contingency Protection Criteria has a safety margin to address the difference between Points B and C.

Note: The table above is illustrative. The values have not yet been vetted in the standards process.

*The Eastern Interconnection setpoint presented in the table is based on a compromise of the general first step of UFLS in the East (59.5Hz) and a special protection setting in Florida (59.7Hz). It is extremely unlikely there would be an event elsewhere in the Eastern Interconnection that would cause a "false trip" of the Florida UFLS.

Once established, the Frequency Response obligation for each Interconnection could be allocated to Balancing Authorities in proportion to their size. The Balancing Authorities would need to demonstrate their annual average performance was equal to their local obligation.

It is expected the data collected in BAL-003 will be used by planners to validate models and test the adequacy of their respective Interconnection's Contingency Protection Criterion.

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Once the Frequency Response Obligations have been vetted, it would be fairly simple to set Red-Yellow-Green risk levels at the Balancing Authorities (BAs) to communicate to the industry the state of Frequency Response and to better target mitigating actions.

Obtaining Frequency Response

Order No. 693 directed NERC to modify BAL-003 to identify methods of obtaining Frequency Response. A simple approach to achieve this objective is to allow BAs to obtain response by participation in a Reserve Sharing Group (RSG) similar to the acquisition of contingency reserves. Performance could be aggregated similar to the Disturbance Control Standard.

Additionally, there appears to be an existing mechanism through transmission tariffs and markets. Regulation and Frequency Response is an approved ancillary service. The FERC has also previously given the Transmission Provider authority to determine the amount and location of required ancillary services and if necessary sanction the overutilization of such services. BAL-003 could be used to objectively determine the need for additional services.

Focus of BAL-003

While it is true that generators are the primary source of Frequency Response, the focus of BAL-003 should not be generators. Assuming there is presently an acceptable amount of Frequency Response, resources would be better applied by initially evaluating performance at the Balancing Authority level and address local action in areas where Frequency Response is low.

A generator-centric standard would be costly and likely take years to implement. The *Form EIA-860 Database Annual Electric Generator Report* for 2008 lists over 7000 generators 25 MW or larger in the US. This does not include plants with small units with capacity greater than 75 MW, which would also be subject to a generator-centric standard. Monitoring and validating performance of all these generators would be difficult at best.

There is a need for a common sense generator verification standard and supporting guidelines. Such a standard should also consider on-line testing of ongoing governor response rather than an arbitrary schedule of governor testing and maintenance.

The results of NERC's recently announced governor survey will provide useful fodder for near-term guidelines. For example, it likely recommendations on tighter deadband settings will provide near term results.

Field Test

Assuming BAL-003 will be a Balancing Authority-centric standard, there are several reasons why a field Test is needed, including:

- The drafting team is proposing to adjust the floor for Bias to address concerns raised in the 2003 Blackout Report. Control theory says frequency performance will improve if Bias and natural Frequency Response are nearly equal. Still, the interaction between Bias and the calculated

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performance in the other Balancing Standards could cause an unexpected interaction, and could negatively impact frequency performance.

- There has never been a continent-wide methodology for measuring Frequency Response. There are likely factors the drafting team hasn't considered (impact of non-conforming load, seasonal impact, Frequency Response variability, etc.).
- The event selection and measurement processes have not been tested and could have flaws.
- The drafting team is evaluating other more technically based approaches to evaluate risk and performance obligation. This evaluation will be done in parallel with Field Test.

The Frequency Response Standard drafting Team is recommending the 2011 Bias calculation (using 2010 frequency excursions as the basis) as a field test of the standard.

Summary Points

- The Interconnections appear to have sufficient Frequency Response at this time.
- The focus of BAL-003 should be to determine if there are areas that need additional response.
- Regions have the authority to develop local standards should they choose to have a more stringent standard or if there is something unique about the Region that requires more response.
- An overly- stringent standard will increase customer costs for marginal increases in reliability.
- The BAL-003 standard should lay the groundwork for informed decisions and be "tunable" such that performance targets are increased if risk increases.
- It appears that Transmission Providers may already have the ability through tariffs and markets to set the necessary amount of frequency response.
- To expedite the standard, there should be a field trial using a defined set of 2010 frequency excursions as a basis for an objective Bias calculation for 2011 and allow analysis of data. An improved standard could be deployed in 2012.
- There is a need for a basic generator verification standard and supporting guidelines. Such a standard or guidelines should also consider on-line testing of ongoing governor response rather than an arbitrary schedule of governor testing and maintenance.
- Assuming the Commission believes Frequency Response is a priority issue, the FERC should take a leadership role to encourage Smart Grid technologies to include Frequency Response as one of the services provided.

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