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NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Project 2017-01

Modifications to BAL-003-1.1 – Frequency Response and
Frequency Bias Setting

Industry Webinar

December 18, 2018

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- North American Electric Reliability Corporation (NERC) Antitrust Guidelines
 - It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition
- Notice of Open Meeting
 - Participants are reminded that this webinar is public. The access number was widely distributed. Speakers on the call should keep in mind that the listening audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders.

- Introduction - **Laura Anderson**, NERC Standards Developer
- Review of Agenda - **Laura Anderson**, NERC Standards Developer
- Project 2017-01 – Modifications to BAL-003-1.1 – **David Lemmons**, EthosEnergy Group, Project Chair
 - Project Overview
 - Project Phases
 - Phase I
 - Modifications to BAL-003-1.1 and BAL-003-1.1, Attachment A

- Resource Loss Protection Criteria (RLPC) – **Rich Hydzik**, Avista,
 - Background and Current Methodology
 - Existing Processes and Terms
 - RLPC Proposal
 - RLPC Examples
 - RLPC Values
- Modifications to FRS Form 1 – **Greg Park**, NWPP

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Project 2017-01

Modifications to BAL-003-1.1

David Lemmons, Manager, NERC Compliance
EthosEnergy Group
December 18, 2018

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- BAL-003 sets a Frequency Response requirement and provides the means to set the Frequency Bias range for Balancing Authorities (BAs)
- Project 2017-01 will have two Phases
 - Phase 1 is addressing issues identified since the implementation of BAL-003-1, but leaves the requirements as they are today
 - Phase 2 will look at the requirements with the potential to add requirements, restructure allocation and modify the measurement of Frequency Response
- Current posting only looks at Phase 1 issues

- Phase 1 looks at essentially three issues:
 - Removing Administrative Processes from Attachment A
 - Addressing Frequency Response Sharing Group (FRSG) Forms
 - Event that the standard is designed to protect against in each Interconnection

Modifications to the Standard

- Under Phase 1, the Standards Drafting Team (SDT) is not recommending any changes to the requirements
- Most changes to the standard are related to Attachment A:
 - Minor modification to the Violation Severity Level (VSL) table for Requirement R1 also identified.
- SDT moved administrative items to the Procedure for Electric Reliability Organization (ERO) Support of the Frequency Response and Frequency Bias Setting Standard
 - This document:
 - Is not part of the standard
 - Must be posted for comment prior to any modifications
 - Has modifications approved by the Board of Trustees (BOT)
- Additional Attachment A modifications address changes proposed to the process

- The SDT is recommending some changes to the Administrative Processes:
 - Allow events with the C point out to 20 seconds, up from 12 seconds;
 - Removes reference to a monthly posting of candidate events; and
 - Modifies the RLPC process.

- Interconnection Frequency Response Obligation (IFRO) modifications:
 - Removes the RLPC calculation from the IFRO section;
 - Addresses the changes related to RLPC; and
 - Sets the IFRO for each Interconnection to remain the same unless material change occurs
 - IFRO will no longer change by a few Megawatts (MWs).
- Addresses the significant drop in the Eastern Interconnection RLPC:
 - SDT recommends that the change be implemented over three years so review of performance can be used to ensure the changes does not cause unexpected reliability issues.



Questions and Answers

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Proposed Resource Loss Protection Criteria

Rich Hydzik, Avista
December 18, 2018

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- RLPC is the designed resource loss used to determine:
 - IFRO; and
 - Several terms used in the past for this concept.
- Goal is to avoid underfrequency load shedding
- “N-2” event has been used to determine RLPC:
 - Leads to two or more electrical facilities removed from service; and
 - Breaker failures, bus faults, double circuit tower outages, etc.
- Eastern Interconnection uses worst event in previous 10 years
- Inconsistencies with current methodology:
 - Eastern Interconnection event that is used did not occur in previous 10 years; and
 - Western Interconnection Remedial Action Scheme (RAS) events exceed the RLPC.

- Single Contingency or N-1 Event (paraphrased from FAC-011-3):
 - Loss of generator, line, transformer, or shunt device;
 - Single pole block in a monopolar or bipolar High Voltage Direct Current (HVDC) system; and
 - Loss of asynchronous Direct Current (DC) tie.
- Balancing Contingency Event (BCE):
 - Single events (N-1) or series of events separated by one minute or less; and
 - Sudden loss of import resulting in imbalance between generation and demand on the Interconnection (frequency change).
- Most Severe Single Contingency (MSSC):
 - BCE due to a single contingency (N-1) that results in the greatest resource loss (MW) to a Balancing Authority.
- Interconnections - Western, Eastern, Quebec, and ERCOT

- RLPC
 - The two largest individual BCE due to a single contingency identified using system models in terms of loss measured by MW loss in a normal system configuration (N-0). (An abnormal system configuration is not used to determine the RLPC).
- The two largest units in the BA Area, regardless of shared ownership/responsibility:
 - Multi-ownership resources will need to determine a single reporting BA; and
 - Full rating of the resource should be reported.
- The two largest values are reported on FRS Form 1

- Resource loss due to RAS initiated by multiple contingency (N-2)
 - RAS affecting multiple BAs should be reported by a single BA
 - N-2 RAS is reported on FRS Form 1
- FRS Form 1 Data Contains (for each BA)
 - Largest potential resource loss due to N-1 event
 - Second largest potential resource loss due to N-1 event
 - Largest resource loss due to RAS initiated by N-2 event
- For each Interconnection
 - Largest and second largest potential resource losses are summed
 - Largest resource loss due to RAS initiated by N-2 event is compared to sum
 - Larger value becomes RLPC
- Calculated RLPC should equal or exceed any credible N-2 event

BA1	Resource Loss A = 1200 MW Resource Loss B = 1200 MW	Both at same plant (N-2)
BA2	Resource Loss A = 1400 MW Resource Loss B = 1000 MW	Electrically separate
BA3	Resource Loss A = 1000 MW Resource Loss B = 800 MW	Electrically separate
BA4	Resource Loss A = 1500 MW (DC TIE) Resource Loss B = 500 MW	Electrically separate

- Largest resource loss = 1500 MW
- Second largest resource loss = 1400 MW
- RAS initiated by N-2 = 0 MW
- Summation of two largest resource losses = 2900 MW
 - Largest N-2 resource loss = 2400 MW
- RLPC = 2900 MW

BA1	RAS = 2850 MW Resource Loss A = 1150 MW Resource Loss B = 800 MW	N-2 RAS event Electrically separate
BA2	Resource Loss A = 1380 MW Resource Loss B = 1380 MW	Both at same plant (N-2)
BA3	Resource Loss A = 800 MW Resource Loss B = 700 MW	Electrically separate

- Largest resource loss = 1380 MW
- Second largest resource loss = 1380 MW
- RAS initiated by N-2 = 2850 MW
- Summation of two largest resource losses = 2760 MW
 - Largest N-2 resource loss = 2760 MW
- RLPC = 2850 MW

Eastern Interconnection

Present RLPC = 4500 MW

RESOURCE LOSS A = 1732 MW

RESOURCE LOSS B = 1477 MW

Proposed RLPC = 3209 MW

Western Interconnection

Present RLPC = 2626 MW

RESOURCE LOSS A = 1505 MW

RESOURCE LOSS B = 1344 MW

N-2 RAS = 2850 MW

Proposed RLPC = 2850 MW

ERCOT

Present RLPC = 2750 MW

RESOURCE LOSS A = 1375 MW

RESOURCE LOSS B = 1375 MW

Proposed RLPC = 2750 MW

Quebec Interconnection

Present RLPC = 1700 MW

RESOURCE LOSS A = 1000 MW

RESOURCE LOSS B = 1000 MW

Proposed RLPC = 2000 MW



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Modifications to FRS Form 1

Greg Park, NWPP
December 18, 2018

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- Each BA will provide the following data for the determination of the RLPC:
 - Largest resource losses within their BA Footprint.
 - For BAs that have Joint Owned Units within their footprint, the BA, in which the resource physically resides, will be responsible for reporting that resource loss.
 - Largest resource loss due to N-2 RAS actions.
 - BA may need to get this information from the Reliability Coordinators (RCs), Transmission Owners (TOs), Generation Owners (GOs), and Distribution Providers (DPs)

NERC Eastern FRS FORM 1 - Data Entry for Operating Year 2018													Enter Addition Data in columns V through X ==>				
Select Balancing Authority		AEC											Enter Data in Green Highlighted Cells Grey and light blue cells are calculated or set by the ERO.				
Event Number	UTC (t-0) Date / Time MM/DD/YYYY HH:MM:SS	Date/Time (t-0) BA Time	BA Time Zone	B to A DelFreq	BA Time	BA Bias DelFreq	Value "A" Information NAI	Adj.	Value "B" Information NAI	Adj.	SEFRD (FRM) for Bias MW/0.1Hz	for R1 MW/0.1Hz	Exclude for data error				
1	12/05/2017 22:18:52	12/05/2017 17:18:52	EST	-0.039	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
2	12/06/2017 23:27:12	12/06/2017 18:27:12	EST	-0.048	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
3	12/11/2017 13:58:57	12/11/2017 08:58:57	EST	-0.052	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
4	1/03/2018 07:53:40	1/03/2018 02:53:40	EST	-0.056	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
5	1/27/2018 21:17:41	1/27/2018 16:17:41	EST	-0.044	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
6	2/03/2018 13:35:19	2/03/2018 08:35:19	EST	-0.052	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
7	2/16/2018 15:14:21	2/16/2018 10:14:21	EST	-0.050	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
8	2/23/2018 00:17:40	2/20/2018 19:17:40	EST	-0.034	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
9	3/8/2018 5:15:50	3/08/2018 00:15:50	EST	-0.057	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
10	3/14/2018 12:38:10	3/14/2018 08:38:10	EDT	-0.046	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
11	3/18/2018 16:53:10	3/18/2018 12:53:10	EDT	-0.046	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
12	4/7/2018 12:36:00	4/07/2018 08:36:00	EDT	-0.056	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
13	4/12/2018 17:26:13	4/12/2018 13:26:13	EDT	-0.031	0.00:00	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N				
14					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
15					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
16					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
17					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
18					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
19					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
20					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
21					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
22					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
23					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
24					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
25					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
26					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
27					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
28					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
29					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
30					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
31					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
32					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
33					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				
34					0.00:00	0.000	0.0	0.0	0.0	0.0			Y				

BA and Contact information	
Eastern	Interconnection
AEC	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail

Interconnection RLPC Data Submittal	
	Largest potential resource loss within the Balancing Authority Area for the next operating year as detailed in the "Procedure for ERO Support of Frequency Response and Frequency Bias Settings Standard"
	Second largest potential resource loss within the Balancing Authority Area for the next operating year as detailed in the Procedure for ERO Support of Frequency Response and Frequency Bias Settings Standard
	The largest resource loss within the Balancing Authority Area that results from a RAS action initiated by a multiple contingency (N-2) event as detailed in the Procedure for ERO Support of Frequency Response and Frequency Bias Settings Standard

FRM Performance Results for 2018	
0.00	2018 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response
-2.0	2018 BA Frequency Response Obligation (FRO)
0.00	2018 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1

FRO Calculation Worksheet for 2019	
AEC	Balancing Authority
-1.015	Interconnection Frequency Response Obligation (FRO) MW/0.1Hz - Determined by ERO.
2018	Operating Year FRM (December thru November) for calculating 2017 Bias
0.0	Operating Year 2019 BA Frequency Response Obligation (FRO) for next year's FRM
-2.0	Operating Year 2018 BA Frequency Response Obligation (FRO).

Selected section for RLPC determination

Contact e-mail

Interconnection RLPC Data Submittal

Largest potential resource loss within the Balancing Authority Area for the next operating year as detailed in the "Procedure for ERO Support of Frequency Response and Frequency Bias Settings Standard"

Second largest potential resource loss within the Balancing Authority Area for the next operating year as detailed in the Procedure for ERO Support of Frequency Response and Frequency Bias Settings Standard

The largest resource loss within the Balancing Authority Area that results from a RAS action initiated by a multiple contingency (N-2) event as detailed in the Procedure for ERO Support of Frequency Response and Frequency Bias Settings Standard

FRM Performance Results for 2018

0.00 2018 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response

-2.0 2018 BA Frequency Response Obligation (FRO)

0.00 2018 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1

FRO Calculation Worksheet for 2019

AEC Balancing Authority

-1,015 Interconnection Frequency Response Obligation (FRO) Mw/0.1Hz. Determined by ERO.

2018 Operating Year FRM (December thru November) for calculating 2017 Bias

0.0 Operating Year 2019 BA Frequency Response Obligation (FRO) for next year's FRM

-2.0 Operating Year 2018 BA Frequency Response Obligation (FRO).

- BAL-003-2 is posted for a 45-day concurrent comment and ballot period through January 17, 2019.
- The BAL drafting team will review and respond to comments and, depending on the outcome of the first ballot, either:
 - Re-post for a 45-day concurrent comment and ballot period; or
 - a 10-day final ballot.

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Questions and Answers