

# NERC

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# 2019 Generator Operator Survey

September 26, 2019

Tom Pruitt, NERC RS Chair

Troy Blalock, SERC Rep

David Deerman, SOCO

Greg Park, NWPP

**RELIABILITY | RESILIENCE | SECURITY**



- 2010 NERC Advisory requested dead band and droop setting
- 2013 Eastern Interconnection survey on dead band and droop setting
- November 2014 OEM meetings
- February 5, 2015 NERC Alert
- December 2015 NERC OC Reliability Guideline: Primary Frequency Response
- December 2016 NERC OC approves multi year GO survey to measure governor response
- 2017 Quebec followed by Western, followed by Eastern Interconnection conducted surveys
- FERC Order 842 – ERS and the Evolving BPS – Primary Frequency Response

# NERC

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# 2017 Generator Survey Results

Troy Blalock

Dominion Energy South Carolina

SERC NERC Resource Subcommittee Representative

**RELIABILITY | RESILIENCE | SECURITY**





## Survey Participation Request

### Eastern Interconnection Generator Operator Survey

**To: Eastern Interconnection Generator Operators:**

The Eastern Interconnection (EI) representatives from the NERC Resources Subcommittee request your participation in an event survey. The event selected for the survey occurred in the EI on November 20, 2017 at 16:12:15 EST (11/20/2017 21:12:15 UTC). The approximate generation loss was 852 MW.

This survey is an industry lead effort to gather information to address reliability issues regarding frequency response, and has been endorsed by the NERC Operating Committee and the North American Generator Forum. As this survey is voluntary, it is being requested that every Generator Operator participate to demonstrate, as an industry, that reliability issues can be addressed outside of mandatory requirements. To participate in the survey, please review the attached documents and submit the spreadsheet with the requested information to [FrequencyEventData-El@nerc.net](mailto:FrequencyEventData-El@nerc.net) by January 12, 2018.

For questions regarding how to use the spreadsheet, please contact [David Deerman](mailto:David.Deerman@nerc.net) (via email) for assistance. For general questions about the survey, please contact [Troy Blalock](mailto:Troy.Blalock@nerc.net) (via email).

For additional reference, the presentation and streaming webinar from the November 14, 2017 Eastern Interconnection Generator Operator webinar have been posted on the NERC website and can be accessed at the links below.

**Click here for:** Presentation | Streaming Webinar

For more information or assistance, please send an email to [FrequencyEventData-El@nerc.net](mailto:FrequencyEventData-El@nerc.net).

3353 Peachtree Road NE  
Suite 600, North Tower  
Atlanta, GA 30326  
404-446-2560 | [www.nerc.com](http://www.nerc.com)

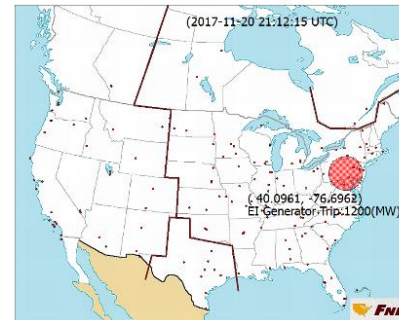


## FNET Event Report

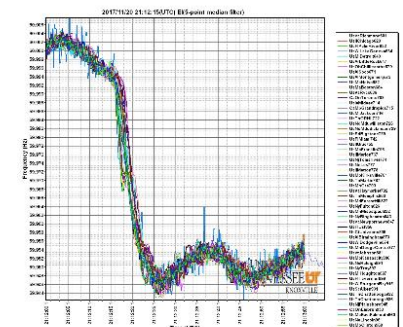
### Basic Event Information

Event Date	Event Time	Event Type	Estimated Amount
2017-11-20	21:12:15 UTC	Generation Trip	1200 MW
Point A	Point B	Point C	Point C Prime
59.9965 Hz	59.9511 Hz	59.9465 Hz	59.9455 Hz
MOD-027-1 Event	Inter Connection	Estimated Reliability Coordinator	ROCOF
NO	EI	RFC	8.21 mHz/s
Estimated Event Location		Additional Location Information	
<a href="tel:400961766962">(40.0961, -76.6962)</a>		near Brunner Island power plant (RFC) in (York Haven, PA, 17370).	

### Location Map



### Frequency Plot of All FDRs



© 2012-2018 Power Information Technology Laboratory, University of Tennessee

Eastern	Interconnection	SMILEY FACES	FROWNY FACES	UNITS at PMAX
Event ID:	EI_2017-11-20_211215	☺	☹	
Event Date & Local Time:	11/20/2017 21:12:15	213	526	11

*752 out of 2877 \*\* Online Generators responded to the Survey or 25.8%.*

## Summary:

- 1) *Outer Loop Controls preventing or squelching #1 issue.*
- 2) *GO understanding of PFR and GO data quality*

Combustion Turbine - Combined Cycle
Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
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Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
Steam Turbine - Coal Fired
Steam Turbine - Combined Cycle
Combustion Turbine - Combined Cycle
Combustion Turbine - Combined Cycle
Steam Turbine - Coal Fired
Wind
Steam turbine-Coal fired
Combustion Turbine - Combined Cycle
Combustion Turbine - Combined Cycle
Combustion Turbine - Combined Cycle
Combustion Turbine - Combined Cycle
Steam Turbine - Combined Cycle
Steam Turbine - Combined Cycle

*\*\* the total number of units 2877 includes BES and NON-BES generators on-line*

## Webinar Announcement

### Western Interconnection Generator Operator Call and Webinar

July 11, 2017 | 11:00 a.m. – 12:00 p.m. MDT

Dial-In Information: 415-655-0002 | Access Number: 737 185 988

Click here to: [Join WebEx meeting](#)

The Western Interconnection (WI) members of the NERC Resources Subcommittee (RS) are inviting WI Generator Operators (GOP) to a webinar on July 11, 2017 at 11:00 a.m. MDT

This webinar is to provide WI GOPs information regarding the WI GOP Frequency Response Survey.

Agenda topics include:

- Purpose of the Survey
- Overview of the spreadsheets used for data collection
- Who to contact with questions
- How to submit the data

For more information or assistance, please contact [Sandy Shiflett](#) (via email) or at 404-446-2575.

3353 Peachtree Road NE  
Suite 600, North Tower  
Atlanta, GA 30326  
404-446-2560 | [www.nerc.com](http://www.nerc.com)

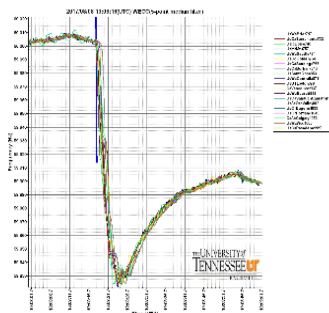
#### Basic Event Information

Event Date	2017-08-08	Event Time	10:08:16 UTC	Event Type	Generation Trip	Estimated Amount	1200 MW
Point A	60.0059 Hz	Point B	59.8975 Hz	Point C	59.8258 Hz	Point C Prime	59.8931 Hz
MOD-027-1 Event	YES	InterConnection	WECC	Estimated Reliability Coordinator	WECC	ROCOF	
Estimated Event Location	(46.9114, -115.557)	Additional Location Information			not available		

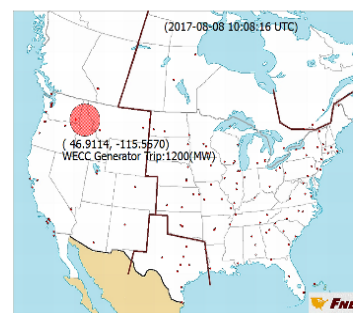
#### Event Data Plots

(Click Images to View in Full Size)

Frequency plot of All FDRs



Location Map







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NORTH AMERICAN ELECTRIC  
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# 2019 Generator Survey Details

Troy Blalock

Dominion Energy South Carolina

SERC NERC Resource Subcommittee Representative

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**NERC**  
NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

August 27, 2019

To: Balancing Authorities (BAs), Generator Operators (GOPs), and Generator Owners (GOs) in the Eastern Interconnection (EI) and Western Interconnection (WI)

**NERC**  
NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

Although this effort is voluntary, it is recognized that it will involve potentially significant effort on behalf of both GOPs and BAs, all GOPs and BAs are highly encouraged to participate. This continued effort is an example of how industry can collaborate and address potential reliability issues without the addition of mandatory standards. NERC Regions are requested to emphasize the GOP Survey to their respective BA and GOP members. On behalf of the NERC RS and NAGF your support is greatly appreciated.

Sincerely,

X Tom Pruitt

Tom Pruitt  
Chair, Resources Subcommittee

X Allen Schriver

Allen Schriver  
OOO, North American Generator Forum

## NERC/ NERC RS

Webinar September 19, 2019

- EI and WI Events
- GO and BA Form Review
- Frequently Asked Questions

Webinar September 26, 2019

- EI and WI Events
- GO and BA Form Review
- Frequently Asked Questions

Produce Summary Report of 2019 GO Survey – 2<sup>nd</sup> quarter 2020

## Generator Operator

Select one event where generator was online and had headroom

Perform analysis using designated form

For multiple units summarize information and submit information to Balancing Authority contact by November 22, 2019

## Balancing Authority

Send communication to all GO's within BA and containing at least the following:

GO Survey Information  
Survey results contact and any process details

Determine the number of BES units online per event

Summarize all GO submittals

Submit Summary Form on NERC BASS site by December 22, 2019

## Balancing Authorities /NERC RS

Balancing Authorities are asked to support GO with Frequency data if needed

NERC RS Regional Reps to support GO and BA's with survey forms

## The Eastern Regional Representatives

Region	Contact	Work Phone	Email
SERC	Troy Blalock	803-217-2040	jblalock@scana.com
NPCC	Bill Henson	413-540-4716	whenson@iso-ne.com
RF	Danielle Croop	610-666-4402	danielle.croop@pjm.com
SPP	Dan Baker	501-614-3974	dbaker@spp.org
MRO	Christina Drake	317-249-5742	cdrake@misoenergy.org

## The Western Regional Representatives

Region	Contact	Work Phone	Email
WECC	Greg Park	503-445-1089	greg@nwpp.org
WECC	Tony Nguyen	604-455-1780	tony.nguyen@bchydro.com
WECC	Sam Rugel	520-745-3265	srugel@tep.com
WECC	Scott Rowley	801-819-7643	srowley@wecc.org



## FNET Event Report

1) *09/03/2019 13:35:29 UTC*

Basic Event Information					
Event Date	2019-09-03	Event Time	13:35:29 UTC	Event Type	Generation Trip
Point A	59.9807 Hz	Point B	59.9501 Hz	Point C	59.9401 Hz

## FNET Event Report

2) *07/26/2019 22:11:05 UTC*

Basic Event Information					
Event Date	2019-07-26	Event Time	22:11:05 UTC	Event Type	Generation Trip
Point A	59.9876 Hz	Point B	59.9573 Hz	Point C	59.9434 Hz

## FNET Event Report

3) *07/12/2019 00:45:14 UTC*

Basic Event Information					
Event Date	2019-07-12	Event Time	00:45:14 UTC	Event Type	Generation Trip
Point A	59.9975 Hz	Point B	59.9485 Hz	Point C	59.9437 Hz

## FNET Event Report

4) *05/09/2019 08:48:12 UTC*

Basic Event Information					
<b>Event Date</b>	2019-05-09	<b>Event Time</b>	08:48:12 UTC	<b>Event Type</b>	Generation Trip
<b>Point A</b>	59.9949 Hz	<b>Point B</b>	59.9628 Hz	<b>Point C</b>	59.9466 Hz

## FNET Event Report

5) *05/03/2019 19:54:08 UTC*

Basic Event Information					
<b>Event Date</b>	2019-05-03	<b>Event Time</b>	19:54:08 UTC	<b>Event Type</b>	Generation Trip
<b>Point A</b>	60.005 Hz	<b>Point B</b>	59.9518 Hz	<b>Point C</b>	59.9488 Hz

## FNET Event Report

1) *08/23/2019 17:43:01 UTC*

Basic Event Information					
<b>Event Date</b>	2019-08-23	<b>Event Time</b>	17:43:01 UTC	<b>Event Type</b>	Generation Trip
<b>Point A</b>	59.9864 Hz	<b>Point B</b>	59.9277 Hz	<b>Point C</b>	59.8555 Hz

## FNET Event Report

2) *08/16/2019 15:21:06 UTC*

Basic Event Information					
<b>Event Date</b>	2019-08-16	<b>Event Time</b>	15:21:06 UTC	<b>Event Type</b>	Generation Trip
<b>Point A</b>	60.0094 Hz	<b>Point B</b>	59.9381 Hz	<b>Point C</b>	59.8857 Hz

## FNET Event Report

3) *07/26/2019 07:12:13 UTC*

Basic Event Information					
<b>Event Date</b>	2019-07-26	<b>Event Time</b>	07:12:13 UTC	<b>Event Type</b>	Generation Trip
<b>Point A</b>	59.9987 Hz	<b>Point B</b>	59.9553 Hz	<b>Point C</b>	59.9058 Hz

# NERC

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# 2019 Generator Survey Form Review

David Deerman  
Southern Company

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1 Unit Information & Characteristics						
2						
3	Contributor Name:	John Doe				
4	Contributor Phone Number:	111-222-3333				
5	Contributor Email:	<a href="mailto:John.Doe@Acme.Power">John.Doe@Acme.Power</a>				
6	Generator Operator:	ACME POWER				
7	EIA 860 Plant Name (US Only):	Plant XYZ				
8	EIA 860 Plant Code (US Only):					
9	EIA 860 Generator ID (US Only):	Unit 3				
10	GADS Generator Unit ID:					
11	Planning Case Bus Number:					
12	Interconnection:	Eastern				
13	Balancing Authority:	SOCO				
14	Generator Type:	Steam Turbine - Coal Fired				
15	Generator Machine Base (MVA)(MVA):	700				
16	Inertia Constant (H):					
17	Unit Droop Setting @ Time of Event:	5%	%			
18	Unit Deadband Setting @ Time of Event:	0.036	Hz			
19	Unit Operating Mode @ Time of Event:	Outer Loop Control		Hz Span	3.0000 Hz	
20	Maximum Operating Level (Pmax)(HSL) @ Time of Event:	700	MW	Hz Span (dB)	2.9640 Hz	
21	Minimum Operating Level (Pmin)(LSL) @ Time of Event:	400	MW	Turbine NDC	700.0 MW	
22	Expected Droop Setting:		5.00%			
23	Expected Deadband Setting:		0.0360 Hz			
24						
25 System & Event Characteristics						
26						
27	Time of Frequency Event (UTC):	7/26/2019 22:11:05	Date	Time		
28	Grid Nominal Frequency:	60	Friday, July 26, 2019	22:11:05		
29						
30 Report Options						
31	Data Source:	Historian				
32	Time Zone of Historian Data:	UTC			Read Historian Data	
33						
34 Manual Data Entry						
35						
36	Pre-Perturbation Average Frequency [T(-16) to T(-2)]			Hz		
37	Post-Perturbation Average Frequency [T(+20) to T(+52)]			Hz		
38	Post-Perturbation Frequency [T(+46)]			Hz		
39	Pre-Perturbation Average MW [T(-2) to T(-16)]			MW		
40	Post-Perturbation Average MW [T(+20) to T(+52)]			MW		
41	Maximum MW Response [T(+46) to T(+60)]			MW		
42	MW Output [T(-4)]			MW		
43	MW Output [T(+60)]			MW		

1	Unit Information & Characteristics					
2						
3	Contributor Name:	John Doe				
4	Contributor Phone Number:	111-222-3333				
5	Contributor Email:	<a href="mailto:John.Doe@Acme.Power">John.Doe@Acme.Power</a>				
6	Generator Operator:	ACME POWER				
7	EIA 860 Plant Name (US Only):	Plant XYZ				
8	EIA 860 Plant Code (US Only):					
9	EIA 860 Generator ID (US Only):	Unit 3				
10	GADS Generator Unit ID:					
11	Planning Case Bus Number:					
12	Interconnection:	Eastern				
13	Balancing Authority:	SOCO				
14	Generator Type:	Steam Turbine - Coal Fired				
15	Generator Machine Base (MBase)(MVA):	700				
16	Inertia Constant (H):					
17	Unit Droop Setting @ Time of Event:	5%		%		
18	Unit Deadband Setting @ Time of Event:	0.036		Hz		
19	Unit Operating Mode @ Time of Event:	Outer Loop Control			Hz Span	3.0000 Hz
20	Maximum Operating Level (Pmax)(HSL) @ Time of Event:	700		MW	Hz Span (dB)	2.9640 Hz
21	Minimum Operating Level (Pmin)(LSL) @ Time of Event:	400		MW	Turbine NDC	700.0 MW
22	Expected Droop Setting:			5.00%		
23	Expected Deadband Setting:			0.0360 Hz		
24						

- Enter information in the yellow cells for the unit or plant being analyzed.

25	<b>System &amp; Event Characteristics</b>			
26				
27	Time of Frequency Event (UTC):	<input type="text" value="7/26/2019 22:11:05"/>	Date	Time
28	Grid Nominal Frequency:	60	Friday, July 26, 2019	22:11:05
29				

- Enter  $t(0)$ , in UTC, in the field “Time of Frequency Event” for the event being analyzed.
- *Click Save, so that the Date and Time (circled) update.*

30	<b>Report Options</b>			
31		Data Source:	Historian	<input type="button" value="Read Historian Data"/>
32		Time Zone of Historian Data:	UTC	
33				

- *Select your Data Source (either Historian or Manual) and then choose the Time Zone associated with your Historian data.*



30	<b>Report Options</b>		
31	Data Source:	Manual	<input type="button" value="Read Historian Data"/>
32	Time Zone of Historian Data:	UTC	
33			
34	<b>Manual Data Entry</b>		
35			
36	Pre-Perturbation Average Frequency [T(-16) to T(-2)]		Hz
37	Post-Perturbation Average Frequency [T(+20) to T(+52)]		Hz
38	Post-Perturbation Frequency [(T+46)]		Hz
39	Pre-Perturbation Average MW [T(-2 ) to T(-16)]		MW
40	Post-Perturbation Average MW [T(+20) to T(+52)]		MW
41	Maximum MW Response [T(+46) to T(+60)]		MW
42	MW Output [T(-4)]		MW
43	MW Output [T(-60)]		MW

- Select “Manual” from the “Data Source” dropdown to allow manual entry for the data for the time periods needed. (not recommended)

Start (2mins before T(0))	7/26/2019 22:09:05
Offset	-1

- 3 -Data should be pulled for **NO LESS THAN 1** minute before t(0) and **NO LESS THAN 2** minutes after t(0).
- 4 -Data may be pulled at any sample interval from 1s to 8s, as long as it is in the proper format.
- 5 -Note that the resulting Primary Frequency Response (PFR) calculations are a product of the Data provided. **Faster sampled data** will provide a result most representative of the units response.
- 6 -Any data beyond Row 4000 of this sheet will not be sampled or used in the calculation.

Read Historian Data

	Timestamp	Unit Frequency	MW Output
230	7/26/2019 22:12:38	59.960594	452.978851
231	7/26/2019 22:12:40	59.960762	452.751282
232	7/26/2019 22:12:42	59.958031	452.952881
233	7/26/2019 22:12:44	59.958015	452.953888
234	7/26/2019 22:12:46	59.958012	452.955048
235	7/26/2019 22:12:48	59.955051	453.726654
236	7/26/2019 22:12:50	59.957447	454.011414
237	7/26/2019 22:12:52	59.957817	454.051697
238	7/26/2019 22:12:54	59.958179	454.091248
239	7/26/2019 22:12:56	59.958546	454.130798
240	7/26/2019 22:12:58	59.957855	454.744324
241	7/26/2019 22:13:00	59.957161	454.755676
242	7/26/2019 22:13:02	59.958527	454.765228
243	7/26/2019 22:13:04	59.959892	454.774750
244	7/26/2019 22:13:06	59.961262	453.981323
245	7/26/2019 22:13:08	59.962200	453.978943
246	7/26/2019 22:13:10	59.963135	453.453369
247	7/26/2019 22:13:12	59.964069	453.452576
248	7/26/2019 22:13:14	59.965004	453.234222
249	7/26/2019 22:13:16	59.965008	453.230316

- Query your Historian for the associated Frequency and MW Output of the unit being analyzed. Data should be pulled for no less than 1 minute before t(0) and no less than 2 minutes after t(0).
- *Copy and paste your Historian data here, and then click Read Historian Data (circled).*

1				
2				
3		Calculate		
4				
5				
6	<b>Results</b>			
7				
8	P.U. Primary Frequency Response Performance (PUPFR):	305%		
9	P.U. Sustained Primary Frequency Response Performance (PUSPFR):	448%		
10	<b>Overall Unit Performance:</b>	😊		
11	Minimum Acceptable Score (PU):	75%		
12	<b>For Generators between Pmin and % of Pmax and eligible to provide PFR;</b>			
13	-Generators who provide response in the proper direction and sustained it for the lessor of the event duration or for 1 minute: 😊			
14	-Generators whose MW output remained unchanged or was in the wrong direction: ☹️			
15				
16	<b>Reason for Performance (optional)</b>			
17				
18	comments			
19				
20				
21				
22				
23				
24				
25				
26				
27				

- Click “Calculate” to determine the units PUPFR and PUSPFR scores.
- Enter any notes necessary to describe the units’ performance scores.
- Click Save and save as you exit the analysis.

1	Offset (s)	-14		Date (UTC):	Friday, July 26, 2019				
2	*Offset should not be more than +/-38s			Time of T(0) (UTC)	22:11:05			Calculate	
3									
4	Calculated using Generator provided Historian Data							Calculated using Generator	
5		Pre-Perturbation Average Frequency [T(-16) to T(-2)]	59.988						Pre-Py
6		Post-Perturbation Average Frequency [T(+20) to T(+52)]	59.956						Post-Pe
7		Pre to Post Perturbation Delta Frequency Actual	-0.032						P
8		Post-Perturbation Frequency (T+46)	59.959						P
9		Pre to Post-Event Delta Frequency Actual (T+46)	-0.029						P
10		High or Low Frequency Event?	Low						
11									
12		Pre-Perturbation Average MW [T(-2) to T(-16)]	448.341	Headroom Available:	251.66				
13		Post-Perturbation Average MW [T(+20) to T(+52)]	453.848	Footroom Available:	48.34				Pe
14		Pre to Post-Perturbation Delta MW Actual	5.51	Adequate Margin?	Yes				
15									
16		RampMagnitude_initial	-0.17						
17		Actual Primary Frequency Response (adjusted)	5.68						
18		Expected Primary Frequency Response (Pre)	0.00						
19		Expected Primary Frequency Response (Post)	1.86						
20		Expected Primary Frequency Response (Ideal)	1.86						
21		Expected Primary Frequency Response (Final)	1.86						
22									
23		PUPFR Performance	304.75%	Final PUPFR Performance	304.75%				
24									
25		Maximum MW Response [T(+46) to T(+60)]	453.44						
26		Actual Sustained Primary Frequency Response	5.10						
27		RampMagnitude_sustained	-0.24						
28		Actual Sustained Primary Frequency Response (adjusted)	5.34						Actual Su
29		Expected Sustained Primary Frequency Response [T(+46)]	1.19						Expected \$
30		Expected Sustained Primary Frequency Response (Ideal)	1.19						Expected
31		Expected Sustained Primary Frequency Response (Final)	1.19						Expected
32									
33		PUSPFR Performance	448.13%	Final PUSPFR Performance	448.13%				
34									
35									
36									
37									
38									

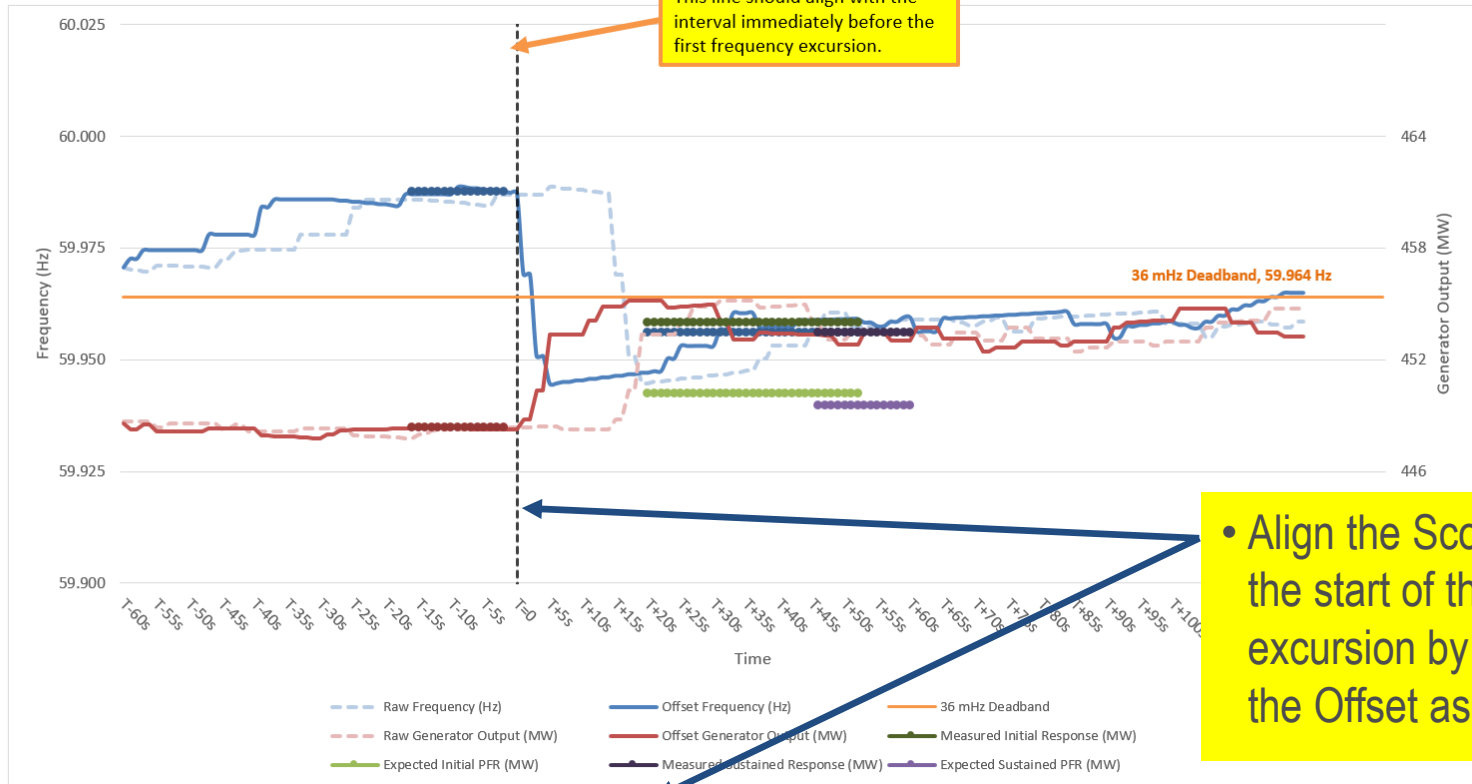


## Alignment Chart for Historian Data

Plant XYZ Unit 3

7/26/2019 22:11:05

-Users may use this chart to align their frequency and MW data to the t(0) of the event provided by NERC staff.  
-Chart will not be available for manually entered data.



This line should align with the interval immediately before the first frequency excursion.

• Align the Scooter with the start of the frequency excursion by adjusting the Offset as needed.

OFFSET (s):  Adjust offset of data here.

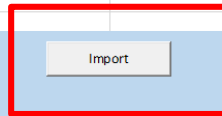
1	<b>Unit Information &amp; Characteristics</b>		
2			
3	Contributor Name:	John Doe	
4	Contributor Phone Number:	111-222-3333	
5	Contributor Email:	<a href="mailto:John.Doe@Acme_Power">John.Doe@Acme_Power</a>	
6	Generator Operator:	ACME POWER	
7	EIA 860 Plant Name (US Only):	Plant XYZ	
8	EIA 860 Plant Code (US Only):		
9	EIA 860 Generator ID (US Only):	Unit 3	
10	GADS Generator Unit ID:		
11	Planning Case Bus Number:		
12	Interconnection:	Eastern	
13	Balancing Authority:	SOCO	
14	Generator Type:	Steam Turbine - Coal Fired	
15	Generator Machine Base (MBase)(MVA):	700	
16	Inertia Constant (H):		
17	Unit Droop Setting @ Time of Event:	5%	%
18	Unit Deadband Setting @ Time of Event:	0.036	Hz
19	Unit Operating Mode @ Time of Event:	OFFLINE	
20	Maximum Operating Level (Pmax)(HSL) @ Time of Event:	(Blank)	
21	Minimum Operating Level (Pmin)(LSL) @ Time of Event:	OFFLINE	
22	Expected Droop Setting:	Valves Wide Open	
23	Expected Deadband Setting:	Outer Loop Control	
24		Turbine-follow Mode	
		Sliding Pressure Control	
		Steam Turbine Inlet Pressure Control	
		Temperature Limit or Temp Matching	
25	<b>System &amp; Event Characteristics</b>		
26			
27	Time of Frequency Event (UTC):	7/26/2019 22:11:05	
28	Grid Nominal Frequency:	60	

- For an Offline Unit, complete the unit information and select “Offline” in the dropdown.
- *Once you click out of this cell, the Historian Data will be cleared and the Results will be populated with “Offline”*

1					
2					
3					
4					
5					
6	<b>Results</b>				
7					
8	<i>P.U. Primary Frequency Response Performance (PUPFR):</i>			Offline	
9	<i>P.U. Sustained Primary Frequency Response Performance (PUSPFR):</i>			Offline	
10	<b>Overall Unit Performance:</b>			<b>Offline</b>	
11	<i>Minimum Acceptable Score (PU):</i>			75%	
12	<b>For Generators between Pmin and % of Pmax and eligible to provide PFR;</b>				
13	-Generators who provide response in the proper direction and sustained it for the lessor of the event duration or for 1 minute: ☺				
	-Generators whose MW output remained unchanged or was in the wrong direction: ☹				
14					
15					
16	<b>Reason for Performance (optional)</b>				
17					

Calculate		Date (UTC):	Friday, July 26, 2019	Calculate	
Calculate		Time of T(0) (UTC)	22:11:05	Calculate	
<b>Results</b>		to T(-2])	59.988	Calculated using Gener...	
P.U. Primary Frequency Response Performance (PUPFR):		T(+52])	59.956	Pos	
No Evaluation		y Actual	-0.032		
P.U. Sustained Primary Frequency Response Performance (PUSPFR):		y (T+46)	59.959		
No Evaluation		l (T+46)	-0.029		
<b>Overall Unit Performance: No Evaluation</b>		y Event?	Low		
Minimum Acceptable Score (PU):		o T(-16])	448.341	Headroom Available:	6.66
75%		T(-52])	453.848	Footroom Available:	248.34
<i>For Generators between Pmin and % of Pmax and eligible to provide PFR;</i>		V Actual	5.51	<b>Adequate Margin?</b>	<b>No</b>
-Generators who provide response in the proper direction and sustained it for the lessor of the event duration or for 1 minute: ☺		e_initial	-0.17		
-Generators whose MW output remained unchanged or was in the wrong direction: ☹		djusted)	5.68		
		se (Pre)	0.00		
		e (Post)	1.21		
		e (Ideal)	1.21		
		e (Final)	1.21		
		rmance	468.84%	Final PUPFR Performance	No Evaluation
<b>Reason for Performance (optional)</b>		T(+60])	453.44		
Not Enough Headroom		esponse	5.10		
		ustained	-0.24		
		djusted)	5.34		
		[T(+46])	0.78		
		e (Ideal)	0.78		

ID	Time of Frequency Event (UTC)	Contributor Name	Contributor Phone Number	Contributor Email	Interconnection	Generator Operator	Balancing Authority	GADS Generator Unit ID	Planning Case Bus Number	Final PUPFR Performance	Final PUSPFR Performance	Overall Unit Performance	EIA 860 Plant Name (US Only)	EIA 860 Code (US)
1	7/26/2019 22:11	John Doe	111-222-3333	John.Doe@Acme_Power	Eastern	ACME POWER	SOCO			3.047464307	4.481289433	☹	Plant XYZ	
2	7/26/2019 22:11	John Doe	111-222-3333	John.Doe@Acme_Power	Eastern	ACME POWER	SOCO			3.047464307	4.481289433	☹	Plant XYZ	
3	7/26/2019 22:11	John Doe	111-222-3333	John.Doe@Acme_Power	Eastern	ACME POWER	SOCO			No Evaluation	No Evaluation	No Evaluation	Plant XYZ	



	PFR_Survey_Ver1_7-26-19_Plant_Y_Unit2	9/18/2019 9:57 PM	Microsoft Excel Macr...	219 KB
	PFR_Survey_Ver1_7-26-19_Plant_Y_Unit3	9/18/2019 9:11 PM	Microsoft Excel Macr...	222 KB
	PFR_Survey_Ver1_7-26-19_Plant_Y_Unit4	9/19/2019 6:25 AM	Microsoft Excel Macr...	222 KB

- Select “Import” then browse to the folder with the individual PFR\_Survey spreadsheets.
- Just select the folder, and the tool will find all files with “PRF\_Survey” with the first 10 characters of the file name to pull into the Summary Tool.

	A	B	C	D	E	F	G	H	I
1		Name of Preparer:	Jane Doe	Phone # of Preparer:	222-333-4444		Email for Preparer:	JaneDoe@BA_1.com	
2									

## Primary Frequency Response Survey Summary Tool

ID	Time of Frequency Event (UTC)	Contributor Name	Contributor Phone Number	Contributor Email	Interconnection	Generator Operator	Balancing Authority	GADS Generator Unit ID
1	7/26/2019 22:11	John Doe	111-222-3333	John.Doe@Acme_Power	Eastern	ACME POWER	SOCO	
2	7/26/2019 22:11	John Doe	111-222-3333	John.Doe@Acme_Power	Eastern	ACME POWER	SOCO	
3	7/26/2019 22:11	John Doe	111-222-3333	John.Doe@Acme_Power	Eastern	ACME POWER	SOCO	

	J	K	L	M	N	O	P	Q
1								
2								

Import

Planning Case Bus Number	Final PUPFR Performance	Final PUSPFR Performance	Overall Unit Performance	EIA 860 Plant Name (US Only)	EIA 860 Plant Code (US Only)	EIA 860 Generator ID (US Only)	Generator Type
	3.047464307	4.481289433	☺	Plant XYZ		Unit 3	Steam Turbine - Coal Fired
	3.047464307	4.481289433	☺	Plant XYZ		Unit 3	Steam Turbine - Coal Fired
	No Evaluation	No Evaluation	No Evaluation	Plant XYZ		Unit 4	Steam Turbine - Coal Fired



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# 2019 Generator Survey Frequently Asked Questions

Greg Park  
Northwest Power Pool  
WECC Representative

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- Which event of those listed should I choose?
- Should I submit a response for each Frequency Event Selected?
- If the unit is offline, should I do an evaluation?
- Since there are no results or information from an offline unit, why take the time to enter data and submit?

- What is the NERC desired dead band and governor settings?
- Should I use Gross or Net values for the generation?
- Should the MW values entered on the historian be the same (Net or Gross) as the  $P_{\max}$  and  $P_{\min}$ ?

- What is the smallest generator that should submit a survey?
- How should I submit if I have a wind farm? Should it be per turbine or facility?
- For a wind farm, my Pmin is zero, is that ok to enter?
- The steam turbine of my combined cycle operates in following mode or valves wide open (VWO). How does that impact the droop setting?
- Nuclear units operate at Pmax most of the time. Do I need to complete a survey for Nuclear units?
- How should I make an entry for my battery storage sites? Some are frequency responsive and some are not.

- Why do I get a “No Evaluation” in the “Results” tab but everything else looks correct with the input?
- On the “Chart” tab in the spreadsheet, what is the “Offset” cell at the bottom of the chart used for?
- On the “Main Data Entry Tab” is Pmax and Pmin the unit ratings or values at the time of the event being analyzed?
- I don’t see a frequency deviation in my data for the event time specified. What are somethings to check?
- What sampling frequency should be entered in the spreadsheet?

- Is it ok to convert machine speed to frequency and use that value instead of a direct frequency measurement to correspond to the MW value, is that ok?
- Viewing the “Chart” tab, the graph shows the generator initially responds correctly (increases generation) but then begins to decrease generation. Is this normal?



- What is the “PFR\_Survey\_Summary\_Tool” spreadsheet used for?
- What is the process for using the PFR\_Survey\_Summary\_Tool?

- Where should I submit the summary data to?
- What is the deadline for submitting results to my BA?
- What is the deadline for the BA to submit results to NERC?
- I missed the Webinar. Where can I get a copy of the presentation?

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# 2019 Generator Survey Summary

Tom Pruitt  
NERC RS Chair

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## Resources Subcommittee (RS)

Archived Related Files

The Resources Subcommittee assists the NERC Operating Committee (OC) in enhancing Bulk Electric System (BES) reliability by implementing the goals and objectives of the OC Strategic Plan with respect to issues in the areas of balancing resources and demand, interconnection frequency, and control performance. The RS's responsibilities include the following functions:

- Reviewing and assisting in the development of generation and load "balancing" standards. Which may include developing any necessary reference documents.
- Reviewing and assisting in the development of interconnection balancing standards to assure problems resulting from balancing do not adversely affect reliability.
- Providing oversight and guidance to working groups and task forces.
- Providing industry leadership and guidance on matters relating to balancing resources and demand issues as well as resulting issues related to interconnection frequency.
- Addressing the reliability aspects of inadvertent interchange creation, accounting, and payback.
- Review balancing authorities' control performance (e.g., CPS and DCS) on a periodic basis.
- Address technical issues on automatic generation control (AGC), time error correction, operating reserve, and frequency response.
- Provide oversight and guidance on aspects of interchange scheduling as it applies to impacts on balancing and inadvertent interchange.

**Subcommittee Resources**

- [Agendas, Highlights, and Minutes](#)
- [Balancing Standards and Supporting Documents](#)
- [Resources Subcommittee Scope](#)
- [BASS User Manual](#)
- [2018 Frequency Response Annual Analysis Report](#)

**2019 Generator Operator Survey**

Type	Title	Date
<a href="#">2019 GOP Survey - Supporting Documents (4)</a>		
<a href="#">Eastern Interconnection (6)</a>		
<a href="#">Western Interconnection (4)</a>		

<https://www.nerc.com/comm/OC/Pages/Resources-Subcommittee.aspx>



# Questions and Answers