Balancing Authority ACE Limit Proof-of-Concept Field Trial
Project 2010-14

Eastern Interconnection Update Discussion

December 27, 2010

Starting at 2:30 PM EST

Doug Hils – Duke Energy

Balancing Authority Reliability-based Control Standard Drafting Team (BARCSDT)

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Eastern Interconnection Field Trial Participation

Participation reflects approximately 67% of the projected 2010 peak load for the Eastern Interconnection

Eastern Interconnection Balancing Authority Participants	2010 Frequency Bias	Region	Reliability Coordinator	Start Date
American Electric Power (CSWS)	-103.4	SPP	SPP	September 1, 2005
Associated Electric Cooperative, Inc. (AECI)	-45	SERC	TVA	April 1, 2010
Duke Energy Carolinas (DUK)	-196	SERC	VACS	April 1, 2009
East Kentucky Power Cooperative (EKPC)	-42.73	SERC	TVA	July 6, 2005
Entergy (EES)	-227.1	SERC	ICTE	July 6, 2005
EON-US (LGEE)	-74	SERC	TVA	April 1, 2008
Independent Electricity System Operator (IESO)	-245.8	NPCC	IESO	March 1, 2008
Manitoba Hydro (MHEB)	-43.3	MRO	MISO	July 6, 2005
Midwest Independent Transmission System Operator (MISO)	-1038.6	MRO, RFC, SERC	MISO	January 6, 2009
PJM Interconnection (PJM)	-1358	RFC	PJM	August 1, 2005
Santee Cooper (SC)	-61.52	SERC	VACS	March 1, 2006
Southern Company (SOCO)	-445	SERC	SOCO	October 15, 2005
Tennessee Valley Authority (TVA)	-317.6	SERC	TVA	October 1, 2005

Balancing Authority ACE Limit Proof-of-Concept Field Trial

The Balancing Authority ACE Limit (BAAL) shall not be exceeded for more than 30 consecutive clock-minutes*

	Longest exceedance of the Balancing Authority ACE Limit since starting operation under the Field Trial		November 2010 Performance under Field Trial	
	Max MinCtLow	Max MinCtHigh	Max MinCtLow	Max MinCtHigh
BA01	26	16	7	5
BA02	17	17	9	7
BA03	19	19	7	12
BA04	10	20	4	9
BA05	16	22	6	9
BA06	28	22	16	19
BA07	15	23	4	7
BA08	20	24		
BA09	28	26	12	14
BA10	21	31	10	10
BA11	14	32	5	4
BA12	29	40	14	15
BA13	28	43	8	7

MinCtLow = Count of consecutive clock-minutes $BAAL_{Low}$ was exceeded

MinCtHigh = Count of consecutive clock-minutes $BAAL_{High}$ was exceeded

***BAAL being exceeded for more than 30 consecutive clock-minutes would be a violation under the proposed BAL-007 standard.**

Date	Time	TimeZone	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	ACPS1
11/8/2010	13:58	EST	60.03213	60	0	11	-2139.17
11/8/2010	13:59	EST	60.02383	60	0	12	-1563.49
11/8/2010	14:00	EST	60.01552	60	0	13	-975.636
11/8/2010	14:01	EST	60.02198	60	0	14	-1398.84
11/8/2010	14:02	EST	60.0142	60	0	15	-726.123
11/25/2010	12:45	CST	60.0344	60.02	0	11	-2720.3
11/25/2010	12:46	CST	60.0118	60.02	0	12	-745.916
11/25/2010	15:15	CST	60.0155	60.02	0	11	-2358.31
11/25/2010	15:28	CST	60.0195	60.02	0	11	-1719.33
11/25/2010	15:29	CST	60.0153	60.02	0	12	-1307.46
11/25/2010	15:30	CST	60.0255	60.02	0	13	-2200.26
11/25/2010	15:31	CST	60.0273	60.02	0	14	-2184.98
11/25/2010	15:32	CST	60.0316	60.02	0	15	-2409.88
11/25/2010	15:33	CST	60.0392	60.02	0	16	-2834.35
11/25/2010	15:34	CST	60.032	60.02	0	17	-1905.46
11/25/2010	15:35	CST	60.0239	60.02	0	18	-950.746
11/25/2010	15:36	CST	60.0248	60.02	0	19	-836.521
11/26/2010	17:30	CST	59.9804	60	11	0	-2305.55
11/26/2010	17:31	CST	59.9925	60	12	0	-772.042
11/26/2010	17:32	CST	59.9902	60	13	0	-1088.22
11/26/2010	17:33	CST	59.9847	60	14	0	-1803.39
11/26/2010	17:34	CST	59.9759	60	15	0	-3010.91
11/26/2010	17:35	CST	59.9888	60	16	0	-1264.65

All minutes of the BAAL being exceeded for 15 consecutive clock-minutes or more noted on left.

Periods of the FTL being exceeded for 3 consecutive clock minutes or more:

PrevailingTime	PTime Zone	FreqError	ActualFreq	SchedFreq	FTL_Low and TEC	FTL_Low and 60	Minute_Count	Max_Duration
11/22/10 6:31	EST	-0.0534	59.947	60	0	1	1	
11/22/10 6:32	EST	-0.0601	59.940	60	0	1	2	
11/22/10 6:33	EST	-0.0549	59.945	60	0	1	3	3
11/24/10 8:01	EST	-0.0524	59.948	60	0	1	1	
11/24/10 8:02	EST	-0.0628	59.937	60	0	1	2	
11/24/10 8:03	EST	-0.0565	59.944	60	0	1	3	3
11/26/10 9:21	EST	-0.0617	59.938	60	0	1	1	
11/26/10 9:22	EST	-0.0568	59.943	60	0	1	2	
11/26/10 9:23	EST	-0.0502	59.950	60	0	1	3	3
11/23/10 17:00	EST	0.0551	60.055	60	0	1	1	
11/23/10 17:01	EST	0.0564	60.056	60	0	1	2	
11/23/10 17:02	EST	0.0513	60.051	60	0	1	3	3
11/25/10 16:07	EST	0.0385	60.059	60.02	1	0	1	
11/25/10 16:08	EST	0.0393	60.059	60.02	1	0	2	
11/25/10 16:09	EST	0.0326	60.053	60.02	1	0	3	3

Frequency Statistics

Eastern Interconnection

Year	Month	Total Minutes FTL_Low at 59.98 Hz SF	Total Minutes FTL_Low at 60 Hz SF	Total FTL_Low Minutes	Percentage Low During TEC	FTL_Low Events	FTL_Low Max Duration	Total Minutes FTL_High at 60.02 Hz SF	Total Minutes FTL_High at 60 Hz SF	Total FTL_High Minutes	Percentage High During TEC	FTL_High Events	FTL_High Max Duration	Total FTL_Low and FTL_High Minutes at 60 Hz SF	Total FTL_Low and FTL_High Minutes
2005	7	28	30	58	48.28%	32	5	0	16	16	0.00%	11	3	46	74
2005	8	47	91	138	34.06%	56	10	0	35	35	0.00%	21	5	126	173
2005	9	32	39	71	45.07%	33	8	0	39	39	0.00%	21	7	78	110
2005	10	42	48	90	46.67%	43	11	0	33	33	0.00%	23	5	81	123
2005	11	65	43	108	60.19%	58	6	0	35	35	0.00%	22	7	78	143
2005	12	37	36	73	50.68%	41	7	0	27	27	0.00%	19	3	63	100
2006	1	42	33	75	56.00%	43	6	0	61	61	0.00%	27	5	94	136
2006	2	0	64	64	0.00%	39	6	2	43	45	4.44%	24	4	107	109
2006	3	28	51	79	35.44%	50	4	17	37	54	31.48%	33	8	88	133
2006	4	19	86	105	18.10%	58	5	0	76	76	0.00%	46	8	162	181
2006	5	52	67	119	43.70%	54	8	0	72	72	0.00%	39	5	139	191
2006	6	45	34	79	56.96%	41	5	0	59	59	0.00%	24	10	93	138
2006	7	31	40	71	43.66%	34	9	0	50	50	0.00%	29	4	90	121
2006	8	16	85	101	15.84%	49	5	0	58	58	0.00%	26	8	143	159
2006	9	19	60	79	24.05%	39	6	0	53	53	0.00%	33	4	113	132
2006	10	53	42	95	55.79%	51	6	0	54	54	0.00%	28	8	96	149
2006	11	56	35	91	61.54%	47	5	1	36	37	2.70%	22	3	71	128
2006	12	34	18	52	65.38%	34	4	0	54	54	0.00%	29	6	72	106
2007	1	59	29	88	67.05%	44	7	0	55	55	0.00%	31	7	84	143
2007	2	17	31	48	35.42%	33	3	0	39	39	0.00%	21	4	70	87
2007	3	75	83	158	47.47%	76	15	0	78	78	0.00%	38	8	161	236
2007	4	36	41	77	46.75%	45	5	0	58	58	0.00%	31	4	99	135
2007	5	70	46	116	60.34%	64	5	0	95	95	0.00%	49	7	141	211
2007	6	62	30	92	67.39%	47	6	0	51	51	0.00%	25	7	81	143
2007	7	47	20	67	70.15%	33	6	0	39	39	0.00%	20	4	59	106
2007	8	37	25	62	59.68%	31	6	1	55	56	1.79%	32	5	80	118
2007	9	20	75	95	21.05%	41	8	0	27	27	0.00%	16	5	102	122
2007	10	57	65	122	46.72%	73	5	1	56	57	1.75%	36	5	121	179
2007	11	74	21	95	77.89%	60	4	0	34	34	0.00%	24	5	55	129
2007	12	37	22	59	62.71%	38	6	0	61	61	0.00%	38	4	83	120
2008	1	0	75	75	0.00%	34	8	0	48	48	0.00%	24	4	123	123
2008	2	18	71	89	20.22%	46	8	0	51	51	0.00%	24	8	122	140
2008	3	37	65	102	36.27%	55	6	0	40	40	0.00%	34	2	105	142
2008	4	41	65	106	38.68%	60	5	0	59	59	0.00%	33	6	124	165
2008	5	67	39	106	63.21%	63	4	0	40	40	0.00%	20	5	79	146
2008	6	40	21	61	65.57%	34	5	0	35	35	0.00%	19	5	56	96
2008	7	42	17	59	71.19%	29	7	0	17	17	0.00%	12	3	34	76
2008	8	41	19	60	68.33%	35	5	0	29	29	0.00%	17	6	48	89
2008	9	25	44	69	36.23%	39	4	0	55	55	0.00%	21	11	99	124
2008	10	35	33	68	51.47%	38	5	0	27	27	0.00%	19	3	60	95
2008	11	13	9	**22**	59.09%	13	5	0	13	13	0.00%	9	4	**22**	**35**
2008	12	16	34	50	32.00%	35	4	0	11	**11**	0.00%	8	3	45	61
2009	1	2	26	28	7.14%	16	4	0	19	19	0.00%	9	3	45	47
2009	2	0	34	34	0.00%	18	4	0	18	18	0.00%	11	6	52	52
2009	3	0	41	41	0.00%	23	5	0	25	25	0.00%	11	9	66	66
2009	4	0	59	59	0.00%	37	5	0	27	27	0.00%	20	3	86	86
2009	5	8	35	43	18.60%	31	4	0	27	27	0.00%	15	8	62	70
2009	6	30	28	58	51.72%	28	5	0	25	25	0.00%	16	3	53	83
2009	7	14	22	36	38.89%	22	3	0	28	28	0.00%	16	6	50	64
2009	8	16	10	**26**	61.54%	20	2	0	13	**13**	0.00%	10	2	**23**	**39**
2009	9	11	22	33	33.33%	21	3	0	20	20	0.00%	14	4	42	53
2009	10	44	45	89	49.44%	44	6	0	18	18	0.00%	10	3	63	107
2009	11	30	19	49	61.22%	33	3	0	34	34	0.00%	21	4	53	83
2009	12	11	23	34	32.35%	20	5	0	22	22	0.00%	15	3	45	56
2010	1	36	26	62	58.06%	35	6	0	16	16	0.00%	9	3	42	78
2010	2	23	16	39	58.97%	24	3	0	26	26	0.00%	16	2	42	65
2010	3	38	71	109	34.86%	65	6	0	40	40	0.00%	22	6	111	149
2010	4	63	38	101	62.38%	65	5	0	54	54	0.00%	34	6	92	155
2010	5	72	30	102	70.59%	60	6	0	40	40	0.00%	29	4	70	142
2010	6	10	28	38	26.32%	27	2	0	10	10	0.00%	9	2	38	48
2010	7	8	19	27	29.63%	17	4	0	30	30	0.00%	13	5	49	57
2010	8	16	29	45	35.56%	24	4	0	17	17	0.00%	11	3	46	62
2010	9	0	56	56	0.00%	31	4	0	22	22	0.00%	11	4	78	78
2010	10	1	60	61	1.64%	40	5	0	19	19	0.00%	15	4	79	80
2010	11	0	59	59	0.00%	44	3	5	26	31	16.13%	21	3	85	90

This chart is a summary of frequency-related statistics gathered since the start of the Field Trial. Of particular interest is the drop in operation outside of the FTL bounds, trending lower in the latter part of 2008 with November 2008 having the least number of clock-minutes of operation outside the FTL bounds, followed by August 2009, over the dataset.

Frequency Statistics

Eastern Interconnection

Year	Month	Total Minutes FTL_Low at 59.98 Hz SF	Total Minutes FTL_Low at 60 Hz SF
2005	7	28	30
2005	8	47	91
2005	9	32	35
2005	10	42	48
2005	11	65	43
2005	12	37	36
2006	1	42	33
2006	2	0	64
2006	3	28	51
2006	4	19	86
2006	5	52	67
2006	6	48	34
2006	7	31	40
2006	8	16	85
2006	9	19	60
2006	10	53	42
2006	11	56	35
2006	12	34	18
2007	1	59	29
2007	2	17	31
2007	3	75	83
2007	4	36	41
2007	5	70	46
2007	6	62	30
2007	7	47	20
2007	8	37	25
2007	9	20	75
2007	10	57	65
2007	11	74	21
2007	12	37	22
2008	1	0	75
2008	2	18	71
2008	3	37	65
2008	4	41	65
2008	5	67	39
2008	6	40	21
2008	7	42	17
2008	8	41	19
2008	9	25	44
2008	10	35	33
2008	11	13	9
2008	12	16	34
2009	1	2	26
2009	2	0	34
2009	3	0	41
2009	4	0	59
2009	5	8	35
2009	6	30	28
2009	7	14	22
2009	8	16	10
2009	9	11	22
2009	10	44	45
2009	11	30	19
2009	12	11	23
2010	1	36	26
2010	2	23	16
2010	3	38	71
2010	4	63	38
2010	5	72	30
2010	6	10	28
2010	7	8	19
2010	8	16	29
2010	9	0	56
2010	10	1	60
2010	11	0	59

Year	Month	Total Minutes FTL_Low at 59.98 Hz SF	Total Minutes FTL_Low at 60 Hz SF	Total FTL_Low Minutes	Percentage Low During TEC	FTL_Low Events	FTL_Low Max Duration	High ts	FTL_High Max Duration	Total FTL_Low and FTL_High Minutes at 60 Hz SF	Total FTL_Low and FTL_High Minutes
2007	12	37	22	59	62.71%	38	6	22	7	78	143
2008	1	0	75	75	0.00%	34	8	19	3	83	100
2008	2	18	71	89	20.22%	46	8	27	5	94	136
2008	3	37	65	102	36.27%	55	6	24	4	107	105
2008	4	41	65	106	38.68%	60	5	33	8	88	133
2008	5	67	39	106	63.21%	63	4	46	8	102	181
2008	6	40	21	61	65.57%	34	5	35	5	139	191
2008	7	42	17	59	71.19%	29	7	24	10	93	138
2008	8	41	19	60	68.33%	35	5	25	4	90	121
2008	9	25	44	69	36.23%	39	4	26	8	143	165
2008	10	35	33	68	51.47%	38	5	33	4	113	132
2008	11	13	9	22	59.09%	13	5	28	8	96	148
2008	12	16	34	50	32.00%	35	4	22	3	71	128
2009	1	2	26	28	7.14%	16	4	25	6	72	106
2009	2	0	34	34	0.00%	18	4	31	7	84	143
2009	3	0	41	41	0.00%	23	5	21	4	70	87
2009	4	0	59	59	0.00%	37	5	38	8	161	236
2009	5	8	35	43	18.60%	31	4	31	4	99	139
2009	6	30	28	58	51.72%	28	5	45	7	141	211
2009	7	14	22	36	38.89%	22	3	26	7	81	143
2009	8	16	10	26	61.54%	20	2	20	4	69	106
2009	9	11	22	33	33.33%	21	3	32	5	80	118
2009	10	44	45	89	49.44%	44	6	16	5	102	122
2009	11	30	19	49	61.22%	33	3	36	5	121	175
2009	12	11	23	34	32.35%	20	5	24	5	95	125
2010	1	36	26	62	58.06%	35	6	38	4	83	120
2010	2	23	16	39	58.97%	24	3	24	4	123	123
2010	3	38	71	109	34.86%	65	6	24	8	124	140
2010	4	63	38	101	62.38%	65	5	34	2	109	142
2010	5	72	30	102	70.59%	60	5	33	6	134	165
2010	6	10	28	38	26.32%	27	2	20	5	79	146
2010	7	8	19	27	29.63%	17	4	15	5	96	96
2010	8	16	29	45	35.56%	24	4	12	3	34	75
2010	9	0	56	56	0.00%	31	4	17	6	48	85
2010	10	1	60	61	1.64%	40	5	21	11	99	124
2010	11	0	59	59	0.00%	44	3	15	3	80	95
								5	4	22	36
								8	3	45	61
								9	3	45	47
								11	6	65	65
								11	9	66	66
								20	3	85	85
								15	8	62	70
								16	3	53	83
								16	6	50	64
								10	2	23	38
								14	4	42	53
								10	3	63	107
								21	4	53	83
								15	3	46	66
								9	3	42	78
								16	2	42	66
								22	6	111	145
								34	6	92	155
								25	4	70	142
								9	2	38	48
								13	5	49	67
								11	3	48	62
								11	4	78	78
								15	4	79	80
								21	3	85	90

This chart is a summary of frequency-related statistics gathered since the start of the Field Trial. Of particular interest is the drop in operation outside of the FTL bounds, trending lower in the latter part of 2008 with November 2008 having the least number of clock-minutes of operation outside the FTL bounds, followed by August 2009, over the dataset.

Frequency Statistics

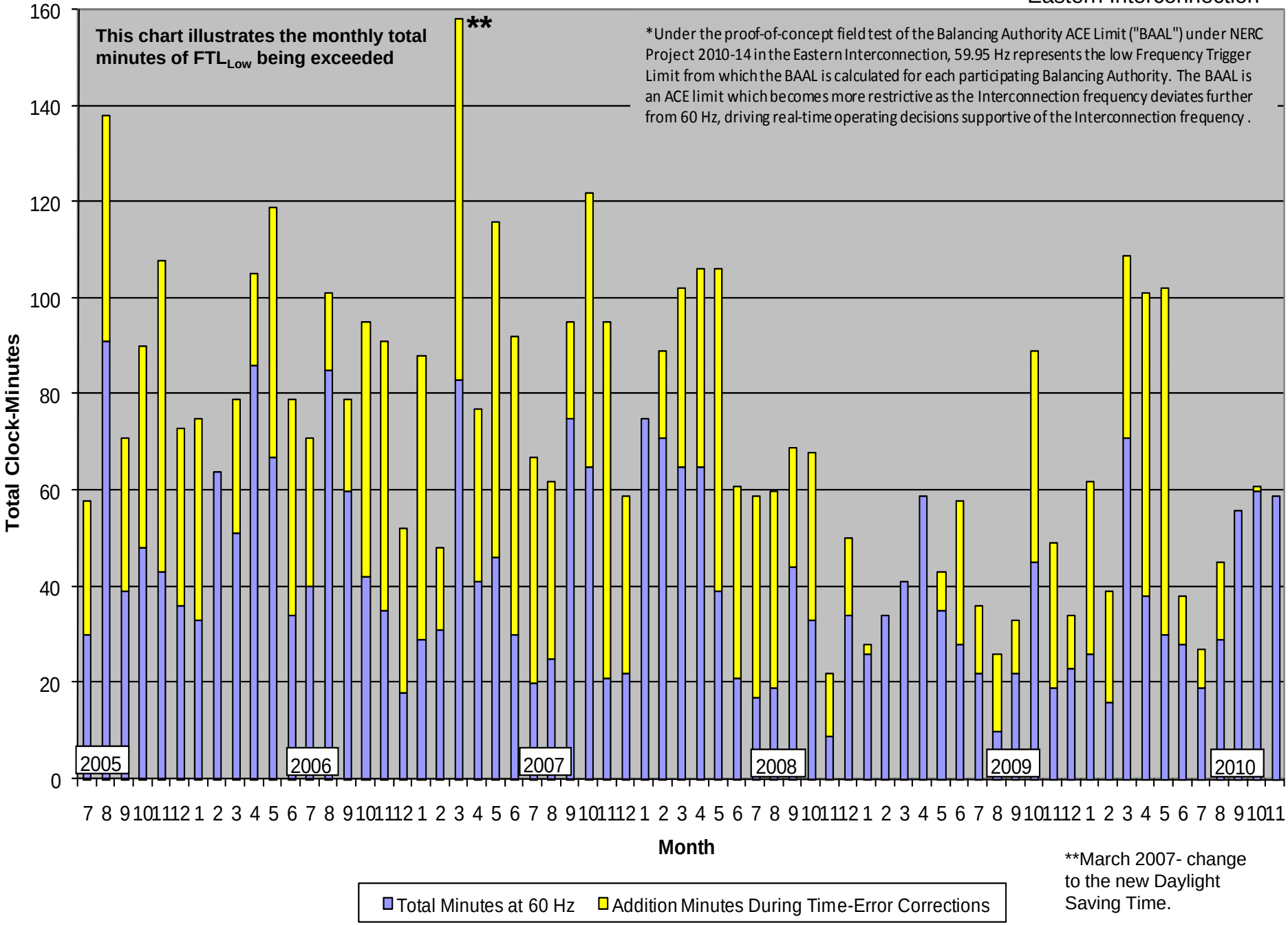
Eastern Interconnection

Year	Month	Total Minutes FTL_High at 60.02 Hz SF	Total Minutes FTL_High at 60 Hz SF	Total FTL_High Minutes	Percentage High During TEC	FTL_High Events	FTL_High Max Duration	Total FTL_Low and FTL_High Minutes at 60 Hz SF	Total FTL_Low and FTL_High Minutes
2007	12	0	61	61	0.00%	38	4	83	120
2008	1	0	48	48	0.00%	24	4	123	123
2008	2	0	51	51	0.00%	24	8	122	140
2008	3	0	40	40	0.00%	34	2	105	142
2008	4	0	59	59	0.00%	33	6	124	165
2008	5	0	40	40	0.00%	20	5	79	146
2008	6	0	35	35	0.00%	19	5	56	96
2008	7	0	17	17	0.00%	12	3	34	76
2008	8	0	29	29	0.00%	17	6	48	89
2008	9	0	55	55	0.00%	21	11	99	124
2008	10	0	27	27	0.00%	19	3	60	95
2008	11	0	13	13	0.00%	9	4	**22**	**35**
2008	12	0	11	**11**	0.00%	8	3	45	61
2009	1	0	19	19	0.00%	9	3	45	47
2009	2	0	18	18	0.00%	11	6	52	52
2009	3	0	25	25	0.00%	11	9	66	66
2009	4	0	27	27	0.00%	20	3	86	86
2009	5	0	27	27	0.00%	15	8	62	70
2009	6	0	25	25	0.00%	16	3	53	83
2009	7	0	28	28	0.00%	16	6	50	64
2009	8	0	13	**13**	0.00%	10	2	**23**	**39**
2009	9	0	20	20	0.00%	14	4	42	53
2009	10	0	18	18	0.00%	10	3	63	107
2009	11	0	34	34	0.00%	21	4	53	83
2009	12	0	22	22	0.00%	15	3	45	56
2010	1	0	16	16	0.00%	9	3	42	78
2010	2	0	26	26	0.00%	16	2	42	65
2010	3	0	40	40	0.00%	22	6	111	149
2010	4	0	54	54	0.00%	34	6	92	155
2010	5	0	40	40	0.00%	29	4	70	142
2010	6	0	10	10	0.00%	9	2	38	48
2010	7	0	30	30	0.00%	13	5	49	57
2010	8	0	17	17	0.00%	11	3	46	62
2010	9	0	22	22	0.00%	11	4	78	78
2010	10	0	19	19	0.00%	15	4	79	80
2010	11	5	26	31	16.13%	21	3	85	90

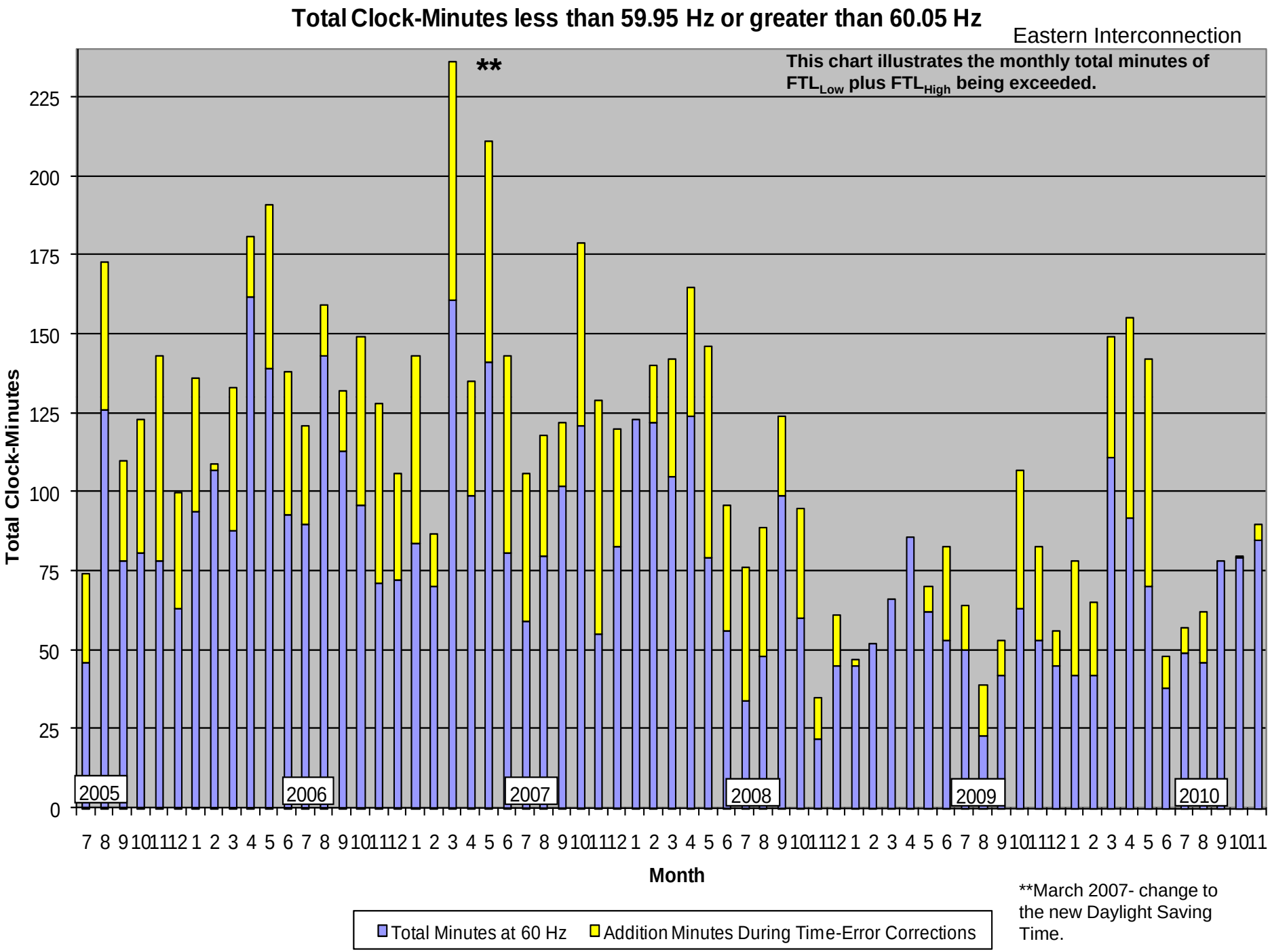
This chart is a summary of frequency-related statistics gathered since the start of the Field Trial. Of particular interest is the drop in operation outside of the FTL bounds, trending lower in the latter part of 2008 with November 2008 having the least number of clock-minutes of operation outside the FTL bounds, followed by August 2009, over the dataset.

Total Clock-Minutes of Frequency below 59.95 Hz*

Eastern Interconnection



**March 2007- change to the new Daylight Saving Time.


Total Clock-Minutes less than 59.95 Hz or greater than 60.05 Hz
Eastern Interconnection
This chart illustrates the monthly total minutes of FTL$_{Low}$ plus FTL$_{High}$ being exceeded.
**
Total Clock-Minutes
0
25
50
75
100
125
150
175
200
225
2005
2006
2007
2008
2009
2010
7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11
Month
Total Minutes at 60 Hz
Addition Minutes During Time-Error Corrections
**March 2007- change to the new Daylight Saving Time.

Clock-Minutes of Actual Frequency <= FTL_Low (59.95 Hz)												
Year	Month	>=1 Min	>=2 Min	>=3 Min	>=4 Min	>=5 Min	>=6 Min	>=7 Min	>=8 Min	>=9 Min	>=10 Min	Max_Duration
2005	7	32	14	7	3	2						5
2005	8	56	36	20	12	8	2	1	1	1	1	10
2005	9	33	20	9	4	2	1	1	1			8
2005	10	43	21	12	5	2	2	1	1	1	1	11
2005	11	58	26	14	5	4	1					6
2005	12	41	18	5	4	2	2	1				7
2006	1	43	20	7	2	2	1					6
2006	2	39	17	4	2	1	1					6
2006	3	50	23	4	2							4
2006	4	58	30	10	5	2						5
2006	5	54	30	15	10	4	4	1	1			8
2006	6	41	22	11	4	1						5
2006	7	34	18	9	4	2	1	1	1	1		9
2006	8	49	26	15	8	3						5
2006	9	39	21	11	4	3	1					6
2006	10	51	26	9	6	2	1					6
2006	11	47	22	10	8	4						5
2006	12	34	14	3	1							4
2007	1	44	21	10	7	3	2	1				7
2007	2	33	13	2								3
2007	3	76	39	18	10	3	2	2	1	1	1	15*
2007	4	45	18	7	4	3						5
2007	5	64	32	10	7	3						5
2007	6	47	24	12	6	2	1					6
2007	7	33	19	8	4	2	1					6
2007	8	31	16	9	3	2	1					6
2007	9	41	27	12	6	4	2	2	1			8
2007	10	73	25	15	8	1						5
2007	11	60	23	10	2							4
2007	12	38	13	4	2	1	1					6
2008	1	34	21	11	4	2	1	1	1			8
2008	2	46	27	8	4	1	1	1	1			8
2008	3	55	27	10	7	2	1					6
2008	4	60	28	11	4	3						5
2008	5	63	31	9	3							4
2008	6	34	16	6	4	1						5
2008	7	29	17	9	1	1	1	1				7
2008	8	35	18	5	1	1						5
2008	9	39	20	9	1							4
2008	10	38	18	8	3	1						5
2008	11	13	5	2	1	1						5
2008	12	35	11	3	1							4
2009	1	16	7	3	2							4
2009	2	18	10	5	1							4
2009	3	23	10	4	2	2						5
2009	4	37	14	5	2	1						5
2009	5	31	9	2	1							4
2009	6	28	19	8	2	1						5
2009	7	22	12	2								3
2009	8	20	6									2
2009	9	21	10	2								3
2009	10	44	24	12	5	2	2					6
2009	11	33	12	4								3
2009	12	20	9	3	1	1						5
2010	1	35	14	6	3	2	2					6
2010	2	24	11	4								3
2010	3	65	28	11	3	1	1					6
2010	4	65	22	10	3	1						5
2010	5	60	22	11	5	3	1					6
2010	6	27	11									2
2010	7	17	8	1	1							4
2010	8	24	12	6	3							4
2010	9	31	13	10	2							4
2010	10	40	14	4	2	1						5
2010	11	44	12	3								3
SUM		2613	1222	499	220	96	37	14	9	4	3	

This chart lists the number of times that the duration of the FTL_{LOW} exceedance was greater than or equal to 1 minute, 2 minutes, 3 minutes and so on, with the maximum duration for the month noted in the right column. *The 15-minute duration in March 2007 was for the Monday morning after the change to the new Daylight Saving Time.

Clock-Minutes of Actual Frequency <= FTL_Low (59.95 Hz) and 60 Hz Scheduled Frequency												
Year	Month	>=1 Min	>=2 Min	>=3 Min	>=4 Min	>=5 Min	>=6 Min	>=7 Min	>=8 Min	>=9 Min	>=10 Min	Max_Duration
2005	7	16	8	4	1	1						5
2005	8	39	23	13	9	6	1					6
2005	9	16	9	6	3	2	1	1	1			8
2005	10	22	10	5	2	2	2	1	1	1	1	11
2005	11	26	10	4	1	1	1					6
2005	12	23	8	2	1	1	1					6
2006	1	21	7	2	1	1	1					6
2006	2	39	17	4	2	1	1					6
2006	3	33	15	2	1							4
2006	4	46	25	9	4	2						5
2006	5	33	19	8	5	1	1					6
2006	6	19	9	5	1							4
2006	7	22	11	6	1							4
2006	8	38	22	14	8	3						5
2006	9	30	17	8	2	2	1					6
2006	10	24	14	2	2							4
2006	11	19	8	4	3	1						5
2006	12	10	5	2	1							4
2007	1	14	7	3	2	1	1	1				7
2007	2	22	8	1								3
2007	3	41	17	7	6	2	1	1	1	1	1	15*
2007	4	21	10	4	3	3						5
2007	5	26	10	4	4	2						5
2007	6	18	10	2								3
2007	7	12	5	2	1							4
2007	8	9	6	5	2	2	1					6
2007	9	28	22	10	6	4	2	2	1			8
2007	10	33	14	11	6	1						5
2007	11	14	5	2								3
2007	12	14	5	1	1	1	1					6
2008	1	34	21	11	4	2	1	1	1			8
2008	2	39	21	5	2	1	1	1	1			8
2008	3	38	19	4	3	1						5
2008	4	38	16	6	3	2						5
2008	5	23	12	3	1							4
2008	6	13	6	1	1							4
2008	7	10	5	2								3
2008	8	13	5	1								3
2008	9	25	11	7	1							4
2008	10	19	9	3	2							4
2008	11	6	2	1								3
2008	12	23	7	3	1							4
2009	1	15	6	3	2							4
2009	2	18	10	5	1							4
2009	3	23	10	4	2	2						5
2009	4	37	14	5	2	1						5
2009	5	25	7	2	1							4
2009	6	17	8	3								3
2009	7	14	7	1								3
2009	8	8	2									2
2009	9	13	8	1								3
2009	10	22	12	6	3	1	1					6
2009	11	14	4	1								3
2009	12	12	6	3	1	1						5
2010	1	13	7	2	2	1	1					6
2010	2	11	5									2
2010	3	40	19	7	3	1	1					6
2010	4	24	8	4	2							4
2010	5	19	8	2	1							4
2010	6	21	7									2
2010	7	14	5									2
2010	8	15	8	4	2							4
2010	9	31	13	10	2							4
2010	10	39	14	4	2	1						5
2010	11	44	12	3								3
SUM		1498	690	269	123	54	21	8	6	2	2	

This chart lists the number of times that the duration of the FTL_{LOW} exceedance was greater than or equal to 1 minute, 2 minutes, 3 minutes and so on, when Scheduled Frequency = 60 Hz, with the maximum duration for the month noted in the right column. *The 15-minute duration in March 2007 was for the Monday morning after the change to the new Daylight Saving Time.

Clock-Minutes of Actual Frequency >= FTL_High (60.05 Hz)												
Year	Month	>=1 Min	>=2 Min	>=3 Min	>=4 Min	>=5 Min	>=6 Min	>=7 Min	>=8 Min	>=9 Min	>=10 Min	Max_Duration
2005	7	11	4	1								3
2005	8	21	7	4	2	1						5
2005	9	21	9	3	2	2	1	1				7
2005	10	23	6	2	1	1						5
2005	11	22	7	4	1	1	1	1				7
2005	12	19	6	2								3
2006	1	27	15	11	6	2						5
2006	2	24	10	7	5							4
2006	3	33	12	4	2	1	1	1	1			8
2006	4	46	22	3	1	1	1	1	1			8
2006	5	39	20	9	4	1						5
2006	6	24	10	7	4	4	3	3	2	1	1	10
2006	7	29	11	8	2							4
2006	8	26	13	10	5	1	1	1	1			8
2006	9	33	14	4	2							4
2006	10	28	14	4	3	2	1	1	1			8
2006	11	22	11	4								3
2006	12	29	12	7	3	2	1					6
2007	1	31	14	5	2	1	1	1				7
2007	2	21	13	4	1							4
2007	3	38	21	10	4	2	1	1	1			8
2007	4	31	15	8	4							4
2007	5	49	20	11	7	4	4	1				7
2007	6	25	14	7	2	1	1	1				7
2007	7	20	12	8	2							4
2007	8	32	14	7	3	2						5
2007	9	16	6	4	2	1						5
2007	10	36	16	4	1	1						5
2007	11	24	7	5	2	1						5
2007	12	38	16	7	2							4
2008	1	24	16	8	1							4
2008	2	24	11	6	3	3	2	1	1			8
2008	3	34	6									2
2008	4	33	12	8	3	3	1					6
2008	5	20	10	6	4	1						5
2008	6	19	10	3	2	1						5
2008	7	12	4	1								3
2008	8	17	6	3	1	1	1					6
2008	9	21	11	6	5	3	3	3	3	2	1	11
2008	10	19	7	1								3
2008	11	9	2	1	1							4
2008	12	8	2	1								3
2009	1	9	6	4								3
2009	2	11	3	1	1	1	1					6
2009	3	11	4	3	2	1	1	1	1	1		9
2009	4	20	6	1								3
2009	5	15	4	2	2	1	1	1	1			8
2009	6	16	8	1								3
2009	7	16	7	2	1	1	1					6
2009	8	10	3									2
2009	9	14	4	1	1							4
2009	10	10	5	3								3
2009	11	21	8	4	1							4
2009	12	15	5	2								3
2010	1	9	6	1								3
2010	2	16	10									2
2010	3	22	9	3	3	2	1					6
2010	4	34	16	4	1	1	1					6
2010	5	29	9	2	1							4
2010	6	9	1									2
2010	7	13	7	4	4	2						5
2010	8	11	4	2								3
2010	9	11	5	4	2							4
2010	10	15	2	1	1							4
2010	11	21	8	2								3
SUM		1436	608	265	115	53	30	19	13	4	2	

This chart lists the number of times that the duration of the FTL_{HIGH} exceedance was greater than or equal to 1 minute, 2 minutes, 3 minutes and so on, with the maximum duration for the month noted in the right column.

Clock-Minutes of Actual Frequency >= FTL_High (60.05 Hz) and 60 Hz Scheduled Frequency												
Year	Month	>=1 Min	>=2 Min	>=3 Min	>=4 Min	>=5 Min	>=6 Min	>=7 Min	>=8 Min	>=9 Min	>=10 Min	Max_Duration
2005	7	11	4	1								3
2005	8	21	7	4	2	1						5
2005	9	21	9	3	2	2	1	1				7
2005	10	23	6	2	1	1						5
2005	11	20	7	4	1	1	1	1				7
2005	12	19	6	2								3
2006	1	27	15	11	6	2						5
2006	2	22	9	7	5							4
2006	3	20	8	3	2	1	1	1	1			8
2006	4	46	22	3	1	1	1	1	1			8
2006	5	38	20	9	4	1						5
2006	6	24	10	7	4	4	3	3	2	1	1	10
2006	7	29	11	8	2							4
2006	8	26	13	10	5	1	1	1	1			8
2006	9	33	14	4	2							4
2006	10	28	14	4	3	2	1	1	1			8
2006	11	21	11	4								3
2006	12	29	12	7	3	2	1					6
2007	1	31	14	5	2	1	1	1				7
2007	2	21	13	4	1							4
2007	3	38	21	10	4	2	1	1	1			8
2007	4	31	15	8	4							4
2007	5	48	20	11	7	4	4	1				7
2007	6	25	14	7	2	1	1	1				7
2007	7	19	11	7	2							4
2007	8	29	14	7	3	2						5
2007	9	15	5	4	2	1						5
2007	10	34	16	4	1	1						5
2007	11	21	6	4	2	1						5
2007	12	36	15	7	2							4
2008	1	24	16	8	1							4
2008	2	24	11	6	3	3	2	1	1			8
2008	3	34	6									2
2008	4	32	12	8	3	3	1					6
2008	5	19	10	6	4	1						5
2008	6	19	10	3	2	1						5
2008	7	12	4	1								3
2008	8	17	6	3	1	1	1					6
2008	9	20	10	5	4	3	3	3	3	2	1	11
2008	10	19	7	1								3
2008	11	9	2	1	1							4
2008	12	8	2	1								3
2009	1	9	6	4								3
2009	2	11	3	1	1	1	1					6
2009	3	11	4	3	2	1	1	1	1	1		9
2009	4	20	6	1								3
2009	5	15	4	2	2	1	1	1	1			8
2009	6	16	8	1								3
2009	7	16	7	2	1	1	1					6
2009	8	10	3									2
2009	9	14	4	1	1							4
2009	10	10	5	3								3
2009	11	21	8	4	1							4
2009	12	15	5	2								3
2010	1	9	6	1								3
2010	2	16	10									2
2010	3	22	9	3	3	2	1					6
2010	4	31	16	4	1	1	1					6
2010	5	28	9	2	1							4
2010	6	9	1									2
2010	7	13	7	4	4	2						5
2010	8	11	4	2								3
2010	9	11	5	4	2							4
2010	10	15	2	1	1							4
2010	11	18	7	1								3
SUM		1394	597	260	114	53	30	19	13	4	2	

This chart lists the number of times that the duration of the FTL_{HIGH} exceedance was greater than or equal to 1 minute, 2 minutes, 3 minutes and so on, when Scheduled Frequency = 60 Hz, with the maximum duration for the month noted in the right column.

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Examples of circumstances when BAAL was exceeded and actions taken if appropriate

Clock-minute of ACE exceeding the BAAL (mm/dd/yy hh:mm)	Clock-minute of ACE returning within the BAAL (mm/dd/yy hh:mm)	TimeZone	Total duration of ACE exceeding the BAAL (minutes)	Event associated with a DCS-Reportable Event? (0=No, 1=Yes)	Event associated with a resource loss other than a DCS-Reportable Event? (0=No, 1=Yes)	**Brief explanation of circumstances and notable actions taken if applicable**
11/8/10 16:33	11/8/10 16:45	EST	0:12	0	0	Telemetry issues causing change in ACE, backed generation down to correct ACE
11/25/10 15:18	11/25/10 15:37	CDT	0:19	0	0	Frequency high due to time error correction, ACE high due to large schedule change. All units headed down, but wind was picking up. Largest coal unit dropping very slow due to vibration issues.
11/8/10 13:48	11/8/10 14:03	EST	0:15	0	0	BAAL High Event. An industrial customer dropped load while the territorial load was dropping. The frequency was also high. The controller reduced the generation at two generating stations in order to help resolve the situation.
11/28/10 10:35	11/28/10 10:49	EST	0:14	0	0	A large industrial customer (steel mill) experienced a brief pause in process, causing ACE to exceed BAAL-high. The operator began decreasing generation and the steel mill restarted their process returning ACE within limits.

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Discussion

Doug Hils

Balancing Authority Reliability-based Control Standard Drafting Team (BARCSDT)

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