

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

Eastern Interconnection Update Discussion
March 29, 2011

DISCUSSION STARTING AT 2:30 PM EDT

Bob Klueber – Midwest ISO

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		February 2011 Performance under Field Trial					
	Max	MinCtLow	Max	MinCtHigh	Max	MinCtLow	Max	MinCtHigh
BA01	26		16		5		6	
BA02	17		17		7		8	
BA03	19		19		19		7	
BA04	10		20		6		6	
BA05	16		22		5		9	
BA06	28		22		16		11	
BA07	15		23		7		6	
BA08	20		24		6		8	
BA09	28		26		11		10	
BA10	21		31		7		5	
BA11	14		32		3		6	
BA12	29		40		17		15	
BA13	28		43		11		10	

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.

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	4.44E-02	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	1.79E-02	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	1.75E-02	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%	20	3	85	90
2010	12	8	12	20	40.00%	18	2	3	30	33	9.09E-02	20	5	42	53
2011	1	5	30	35	14.29%	25	3	0	9	9	0.00%	6	4	39	44
2011	2	5	21	22	4.55%	18	2	0	22	22	0.00%	15	3	43	44

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	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 Max ration	Total FTL_Low and FTL_High Minutes at 60 Hz SF	Total FTL_Low and FTL_High Minutes
2005	7	28	30									3	46	74
2005	8	47	97									5	126	173
2005	9	32	39									7	78	110
2005	10	42	48									5	81	123
2005	11	65	43	2008	1	0	75	75	0.00%	34	8	7	78	143
2005	12	37	36	2008	2	18	71	89	20.22%	46	8	3	63	100
2006	1	42	33	2008	3	37	65	102	36.27%	55	6	5	94	136
2006	2	0	64	2008	4	41	65	106	38.68%	60	5	8	107	109
2006	3	28	57	2008	5	67	39	106	63.21%	63	4	5	88	133
2006	4	19	88	2008	6	40	21	61	65.57%	34	5	10	162	181
2006	5	52	67	2008	7	42	17	59	71.19%	29	7	4	139	191
2006	6	45	34	2008	8	41	19	60	68.33%	35	5	8	93	138
2006	7	31	40	2008	9	25	44	69	36.23%	39	4	4	90	121
2006	8	16	89	2008	10	35	33	68	51.47%	38	5	8	143	159
2006	9	19	60	2008	11	13	9	22	59.09%	13	5	4	113	132
2006	10	53	42	2008	12	16	34	50	32.00%	35	4	8	96	149
2006	11	56	39	2009	1	2	26	28	7.14%	16	4	3	71	128
2006	12	34	18	2009	2	0	34	34	0.00%	18	4	6	72	106
2007	1	59	28	2009	3	0	41	41	0.00%	23	5	7	84	143
2007	2	17	37	2009	4	0	59	59	0.00%	37	5	4	70	87
2007	3	75	63	2009	5	8	35	43	18.60%	31	4	8	161	236
2007	4	36	47	2009	6	30	28	58	51.72%	28	5	4	99	135
2007	5	70	46	2009	7	14	22	36	38.89%	22	3	5	141	211
2007	6	62	30	2009	8	16	10	26	61.54%	20	2	7	81	143
2007	7	47	20	2009	9	11	22	33	33.33%	21	3	4	59	106
2007	8	37	25	2009	10	44	45	89	49.44%	44	6	5	80	118
2007	9	20	75	2009	11	30	19	49	61.22%	33	3	3	102	122
2007	10	57	65	2009	12	11	23	34	32.35%	20	5	5	121	179
2007	11	74	27	2010	1	36	26	62	58.06%	35	6	5	55	129
2007	12	37	22	2010	2	23	16	39	58.97%	24	3	4	83	120
2008	1	0	75	2010	3	38	71	109	34.86%	65	6	4	123	123
2008	2	18	77	2010	4	63	38	101	62.38%	65	5	8	122	140
2008	3	37	65	2010	5	72	30	102	70.59%	60	6	2	105	142
2008	4	41	65	2010	6	10	28	38	26.32%	27	2	6	124	166
2008	5	67	39	2010	7	8	19	27	29.63%	17	4	5	79	146
2008	6	40	27	2010	8	16	29	45	35.56%	24	4	5	56	96
2008	7	42	17	2010	9	0	56	56	0.00%	31	4	6	34	76
2008	8	41	19	2010	10	1	60	61	1.64%	40	5	3	48	89
2008	9	25	44	2010	11	0	59	59	0.00%	44	3	11	99	124
2008	10	35	33	2010	12	8	12	20	40.00%	18	2	3	60	95
2008	11	13	9	2011	1	5	30	35	14.29%	25	3	4	22	35
2008	12	16	34	2011	2	1	21	22	4.55%	18	2	3	45	61
2009	1	2	26									3	45	47
2009	2	0	34									3	45	52
2009	3	0	47									6	52	52
2009	4	0	69									9	66	66
2009	5	8	39									3	86	86
2009	6	30	28									8	62	70
2009	7	14	22									3	53	83
2009	8	16	10									6	50	64
2009	9	11	22									2	23	39
2009	10	44	45									4	42	53
2009	11	30	19									3	63	107
2009	12	11	23									4	53	83
2010	1	36	26									3	45	56
2010	2	23	16									4	42	78
2010	3	38	71									2	42	66
2010	4	63	38									6	111	149
2010	5	72	30									4	92	155
2010	6	10	28									4	70	142
2010	7	8	19									2	38	48
2010	8	16	29									5	49	57
2010	9	0	56									3	46	62
2010	10	1	60									4	78	78
2010	11	0	59									3	49	57
2010	12	8	12									4	79	80
2011	1	5	30									3	85	90
2011	2	1	21									5	42	53
2011	1	5	30									4	39	44
2011	2	1	21									3	43	44

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

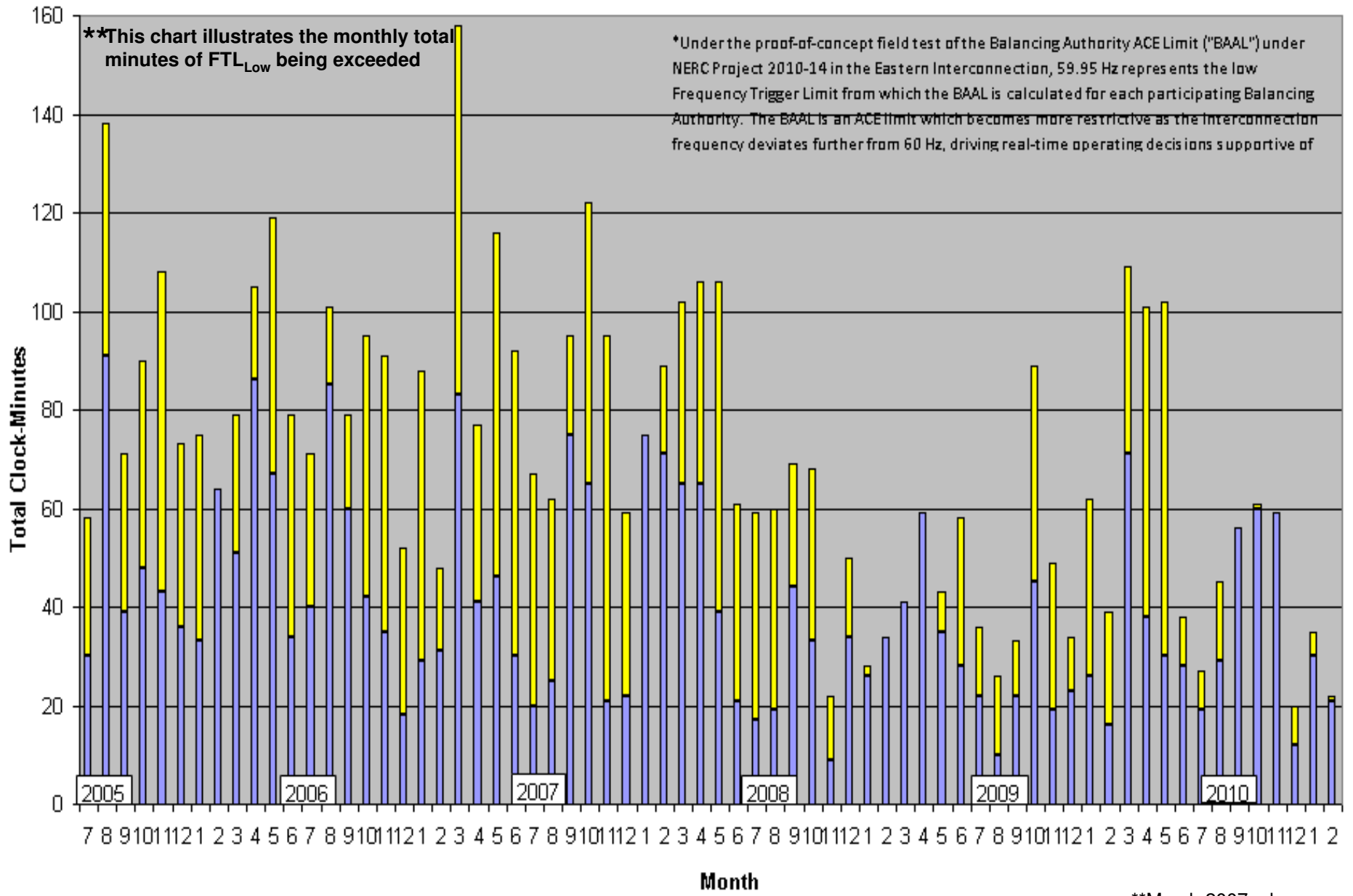
Eastern Interconnection

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	Low High at 60	Total FTL_Low and FTL_High Minutes
2005	7									46	74
2005	8									126	173
2005	9									78	110
2005	10									81	123
2005	11									78	143
2005	12									63	100
2006	1									94	136
2006	2									107	109
2006	3									88	133
2006	4									162	181
2006	5									139	191
2006	6									93	138
2006	7									90	121
2006	8									143	159
2006	9									113	132
2006	10									96	149
2006	11									71	128
2006	12									72	106
2007	1									84	143
2007	2									70	87
2007	3									161	236
2007	4									99	135
2007	5									141	211
2007	6									81	143
2007	7									59	106
2007	8									80	118
2007	9									102	122
2007	10									121	179
2007	11									55	129
2007	12									83	120
2008	1									123	123
2008	2									122	140
2008	3									105	142
2008	4									124	166
2008	5									79	146
2008	6									56	96
2008	7									34	76
2008	8									48	89
2008	9									99	124
2008	10									60	95
2008	11									22	35
2008	12									45	61
2009	1									45	47
2009	2									52	52
2009	3									66	66
2009	4									86	86
2009	5									62	70
2009	6									53	83
2009	7									50	64
2009	8									23	39
2009	9									42	53
2009	10									63	107
2009	11									53	83
2009	12									45	56
2010	1									42	78
2010	2									42	66
2010	3									111	149
2010	4									92	155
2010	5									70	142
2010	6									38	48
2010	7									42	57
2010	8									46	62
2010	9									78	78
2010	10									38	48
2010	11									49	57
2010	12									46	62
2011	1									78	78
2011	2									79	80
2011	1									85	90
2011	2									42	53
2011	2									39	44
2011	2									43	44

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*

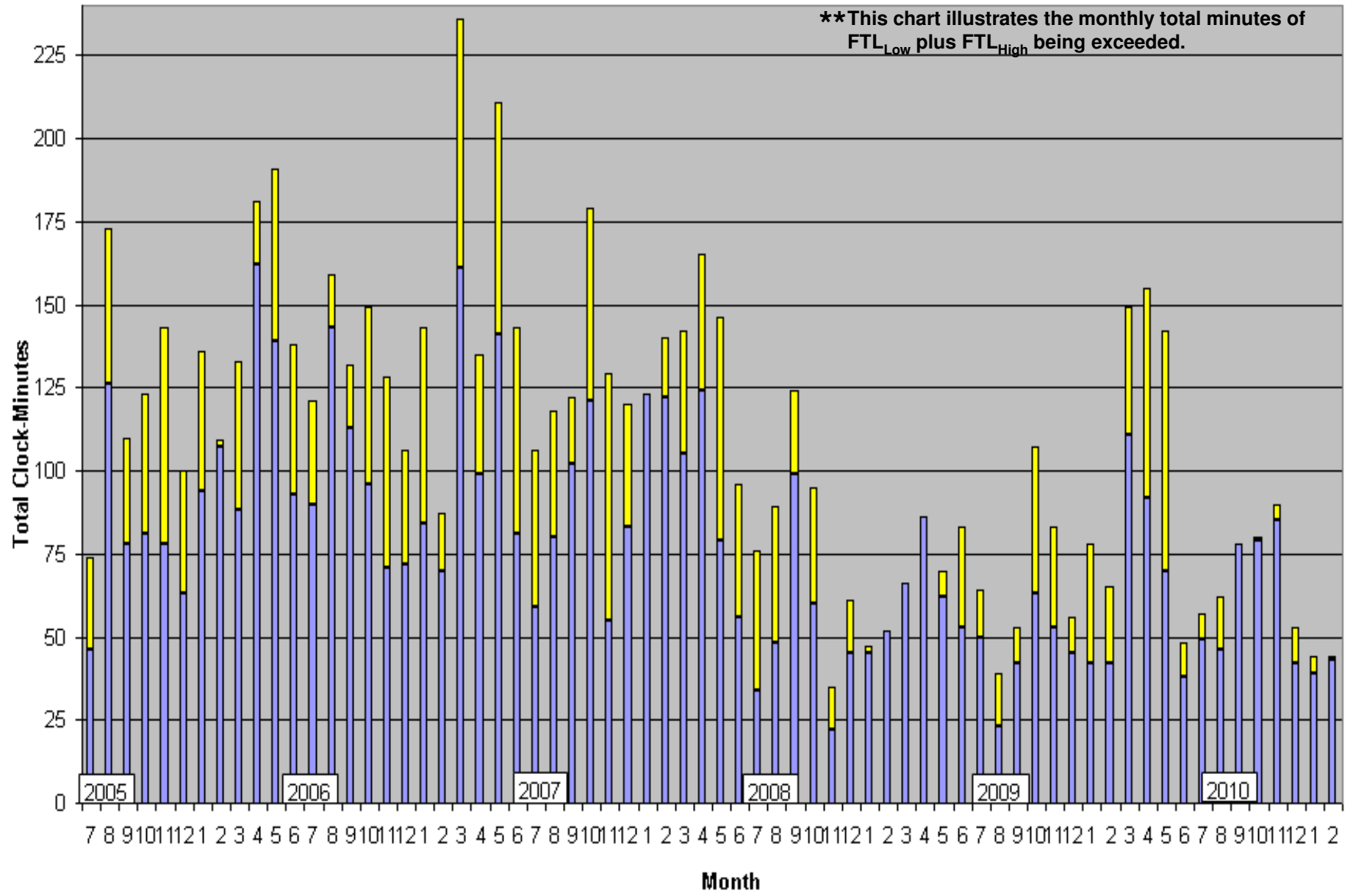
Eastern Interconnection



■ Total Minutes at 60 Hz ■ Addition Minutes During Time-Error Corrections

**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



■ Total Minutes at 60 Hz
 ■ Addition Minutes During Time-Error Corrections

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

Date	Time	TimeZone	FreqError	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	ACPS1
02/14/11	18:31	EST	-0.0238	59.9762	60	11	0	-1966.05
02/14/11	18:32	EST	-0.0227	59.9773	60	12	0	-1776.10
02/14/11	18:33	EST	-0.0255	59.9745	60	13	0	-1471.51
02/14/11	18:34	EST	-0.0218	59.9783	60	14	0	-1304.42
02/14/11	18:35	EST	-0.0359	59.9641	60	15	0	-2480.56
02/14/11	18:36	EST	-0.0284	59.9716	60	16	0	-1348.52
02/14/11	18:37	EST	-0.0191	59.9809	60	17	0	-726.80
02/15/11	6:34	EST	-0.0065	59.9935	60	11	0	-697.23
02/15/11	6:35	EST	-0.0067	59.9933	60	12	0	-717.38
02/15/11	6:36	EST	-0.0168	59.9832	60	13	0	-2121.20
02/15/11	6:37	EST	-0.0179	59.9821	60	14	0	-2354.07
02/15/11	6:38	EST	-0.0292	59.9708	60	15	0	-3711.99
02/15/11	6:39	EST	-0.0481	59.9519	60	16	0	-6776.99
02/15/11	6:40	EST	-0.0495	59.9505	60	17	0	-7327.40
02/15/11	6:41	EST	-0.0305	59.9695	60	18	0	-4365.79
02/15/11	6:42	EST	-0.0214	59.9786	60	19	0	-2627.97
02/19/11	9:09	EST	-0.032	59.968	60	11	0	-2481.04
02/19/11	9:10	EST	-0.035	59.965	60	12	0	-2946.76
02/19/11	9:11	EST	-0.0251	59.9749	60	13	0	-2022.37
02/19/11	9:12	EST	-0.0311	59.9689	60	14	0	-2496.99
02/19/11	9:13	EST	-0.0367	59.9633	60	15	0	-2930.50
02/19/11	9:14	EST	-0.0273	59.9727	60	16	0	-2023.22
02/20/11	16:44	CST	-0.024	59.976	60	11	0	-1527.38
02/20/11	16:45	CST	-0.0237	59.9763	60	12	0	-1600.73
02/20/11	16:46	CST	-0.0279	59.9721	60	13	0	-2109.19
02/20/11	16:47	CST	-0.0316	59.9684	60	14	0	-2628.55
02/20/11	16:48	CST	-0.0333	59.9667	60	15	0	-2716.65
02/20/11	16:49	CST	-0.022	59.978	60	16	0	-1819.25
02/25/11	18:00	EST	0.0186	60.0186	60	0	11	-1917.26
02/25/11	18:01	EST	0.0393	60.0393	60	0	12	-3113.32
02/25/11	18:02	EST	0.0469	60.0469	60	0	13	-3374.03
02/25/11	18:03	EST	0.0589	60.0589	60	0	14	-3554.17
02/25/11	18:04	EST	0.058	60.058	60	0	15	-1160.10

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

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

PrevailingTime	PTimeZone	FreqError	ActualFreq	SchedFreq
2/12/2011 16:59	EST	0.0548	60.0548	60
2/12/2011 17:00	EST	0.0589	60.0589	60
2/12/2011 17:01	EST	0.0529	60.0529	60
2/13/2011 10:49	EST	0.0552	60.0552	60
2/13/2011 10:50	EST	0.0505	60.0505	60
2/13/2011 10:51	EST	0.0565	60.0565	60
2/22/2011 0:03	EST	0.0521	60.0521	60
2/22/2011 0:04	EST	0.0661	60.0661	60
2/22/2011 0:05	EST	0.067	60.067	60

Date	Time	TimeZone	FreqError	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	ACPS1
02/14/11	18:31	EST	-0.0238	59.9762	60	11	0	-1966.05
02/14/11	18:32	EST	-0.0227	59.9773	60	12	0	-1776.10
02/14/11	18:33	EST						
02/14/11	18:34	EST						
02/14/11	18:35	EST						
02/14/11	18:36	EST						
02/14/11	18:37	EST						
02/15/11	6:34	EST						
02/15/11	6:35	EST						
02/15/11	6:36	EST						
02/15/11	6:37	EST						
02/15/11	6:38	EST						
02/15/11	6:39	EST						
02/15/11	6:40	EST						
02/15/11	6:41	EST						
02/15/11	6:42	EST						
02/19/11	9:09	EST						
02/19/11	9:10	EST						
02/19/11	9:11	EST						
02/19/11	9:12	EST						
02/19/11	9:13	EST						
02/19/11	9:14	EST						
02/20/11	16:44	EST						
02/20/11	16:45	EST						
02/20/11	16:46	EST						
02/20/11	16:47	EST						
02/20/11	16:48	EST						
02/20/11	16:49	EST						
02/25/11	18:00	EST						
02/25/11	18:01	EST						
02/25/11	18:02	EST						
02/25/11	18:03	EST						
02/25/11	18:04	EST						

All durations of the BAAL being exceeded for more than 15 consecutive

Dates in this presentation:

Clock-minute Frequency greater than the FTL_{High} on February 12, 2011, ending 17:01 EST: 3 consecutive clock-minutes.

Clock-minute Frequency greater than the FTL_{High} on February 22, 2011, ending 00:05 EST: 3 consecutive clock-minutes.

Clock-minute ACE less than the $BAAL_{Low}$ on February 14, 2011, ending 18:37 EST: 17 consecutive clock-minutes.

Clock-minute ACE less than the $BAAL_{Low}$ on February 15, 2011, ending 06:42 EST: 19 consecutive clock-minutes.

Clock-minute ACE greater than the $BAAL_{High}$ on February 25, 2011, ending 18:04 EST: 15 consecutive clock-minutes.

Under the draft requirement, a proposed $BAAL_{Low}$ violation would occur when the ACE is lower than $BAAL_{Low}$ for more than 30 consecutive clock-minutes and a proposed $BAAL_{High}$ violation would occur when the ACE is greater than $BAAL_{High}$ for more than 30 consecutive clock-minutes.

Under prior work on draft BAL-008, a proposed FTL_{Low} violation would occur when the Frequency is lower than FTL_{Low} for more than 30 consecutive clock-minutes and a proposed FTL_{High} violation would occur when the Frequency is greater than FTL_{High} for more than 30 consecutive clock-minutes.

ed for
more:

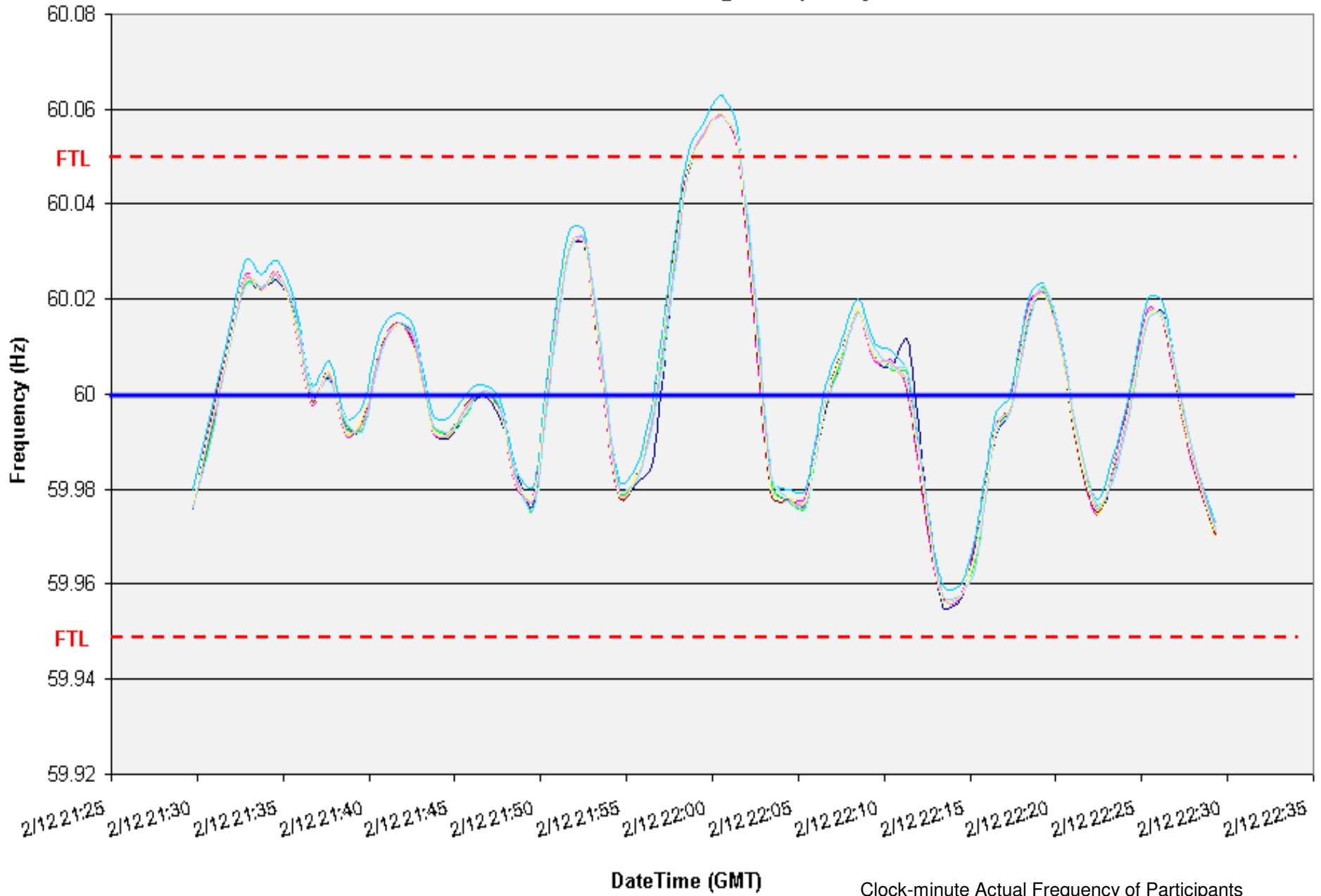
req	SchedFreq
0548	60
0589	60
0529	60
0552	60
0505	60
0565	60
0521	60

2/22/2011 0:04	EST	0.0661	60.0661	60
2/22/2011 0:05	EST	0.067	60.067	60

02/12/2011 ending 17:01 EST

3-minute duration above FTL_{High}

EI Clock-Minute Average Frequency

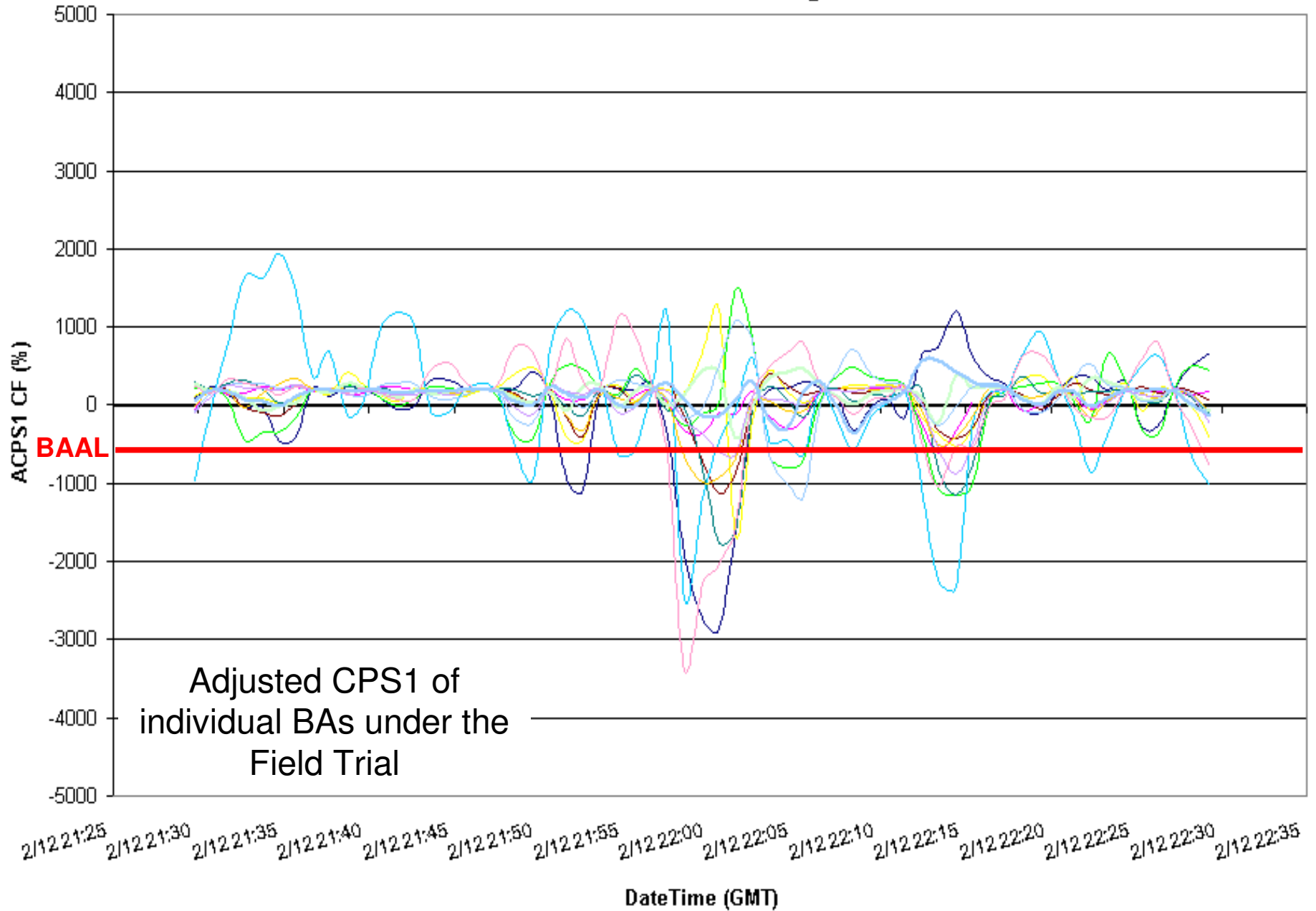


Clock-minute Actual Frequency of Participants

02/12/2011 ending 17:01 EST

3-minute duration above FTL_{High}

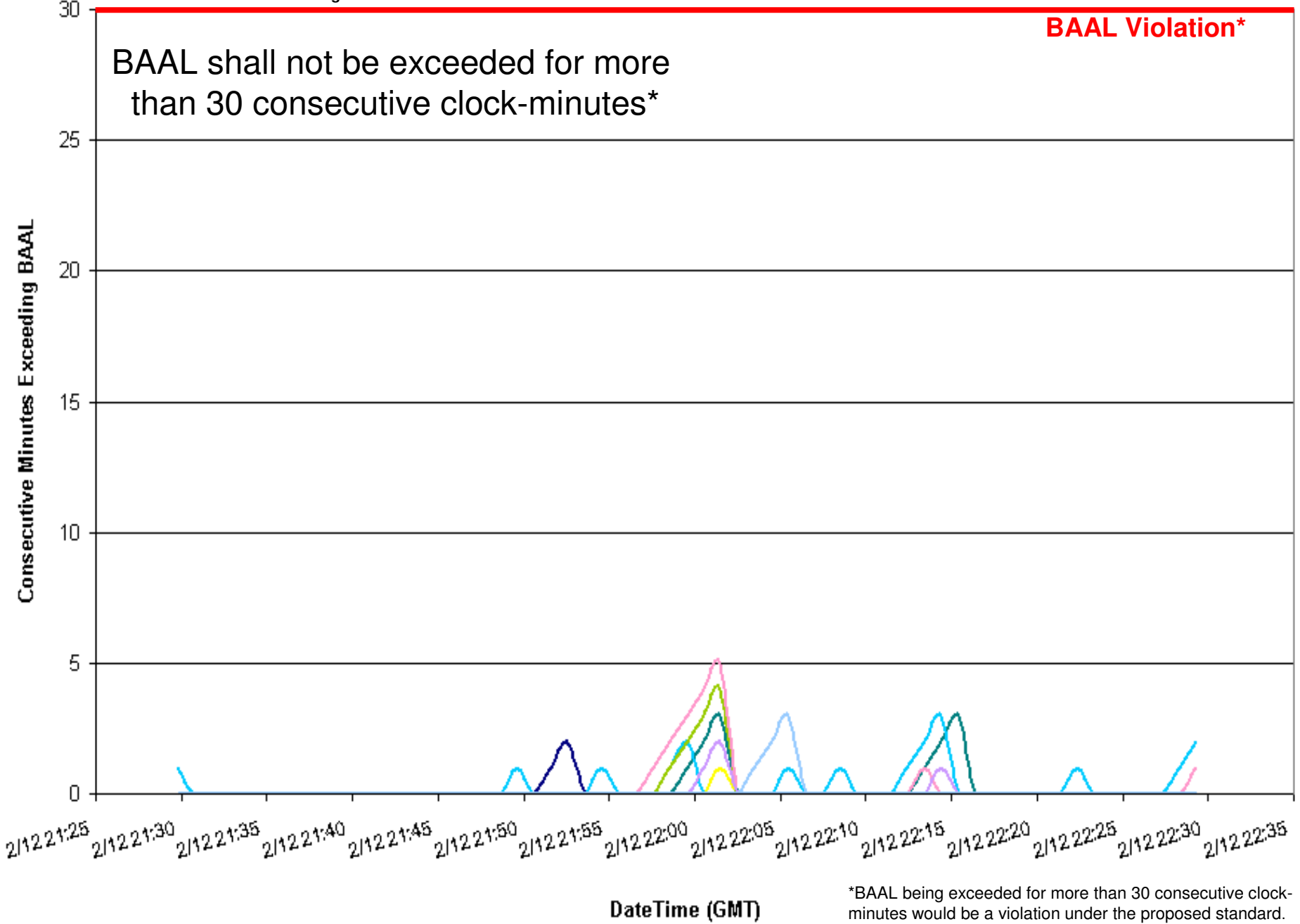
ACPS1 Clock-Minute Averages



02/12/2011 ending 17:01 EST

3-minute duration above FTL_{High}

Consecutive Minutes Exceeding BAAL

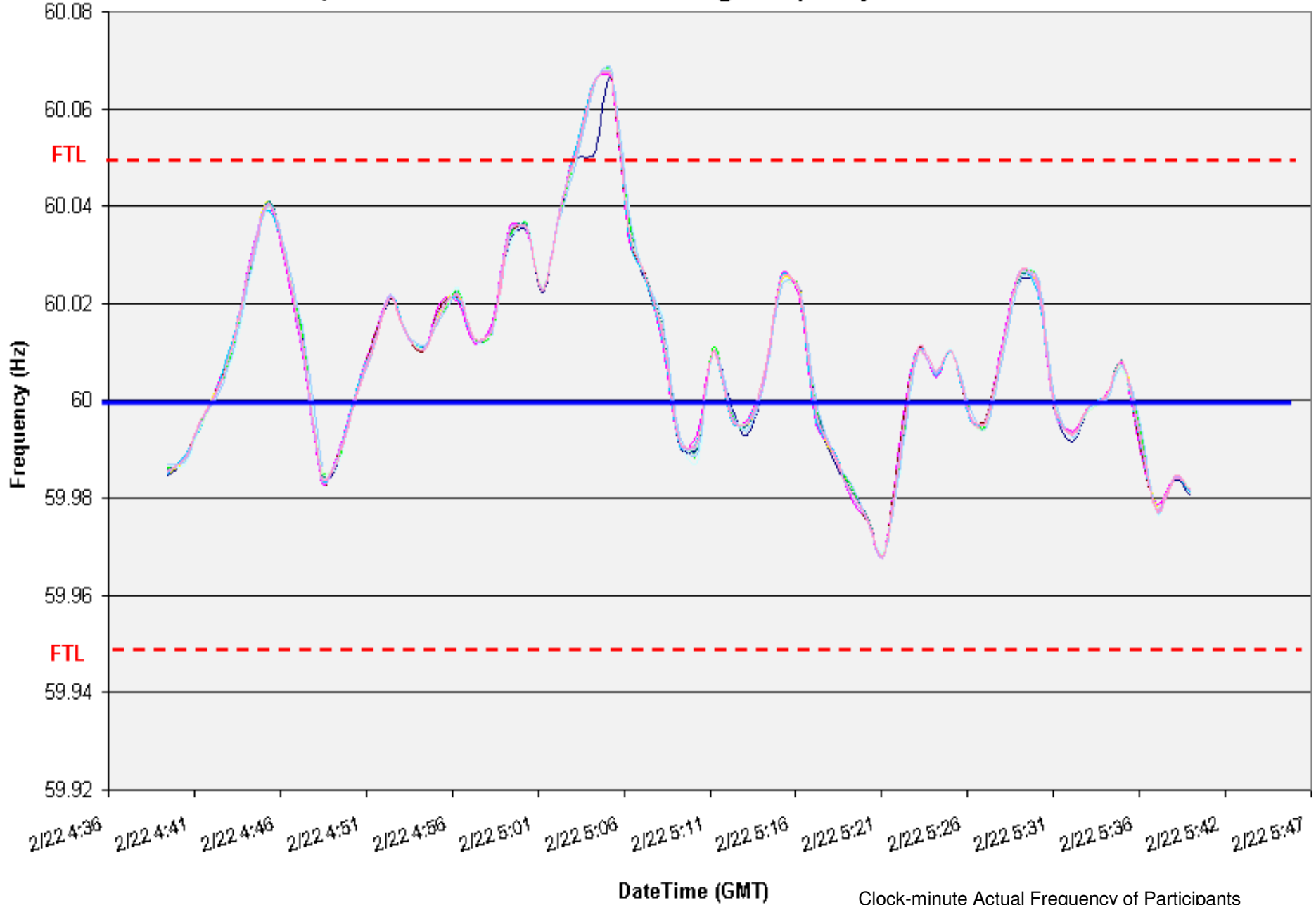


*BAAL being exceeded for more than 30 consecutive clock-minutes would be a violation under the proposed standard.

02/22/2011 ending 00:05 EST

3-minute duration above FTL_{High}

EI Clock-Minute Average Frequency

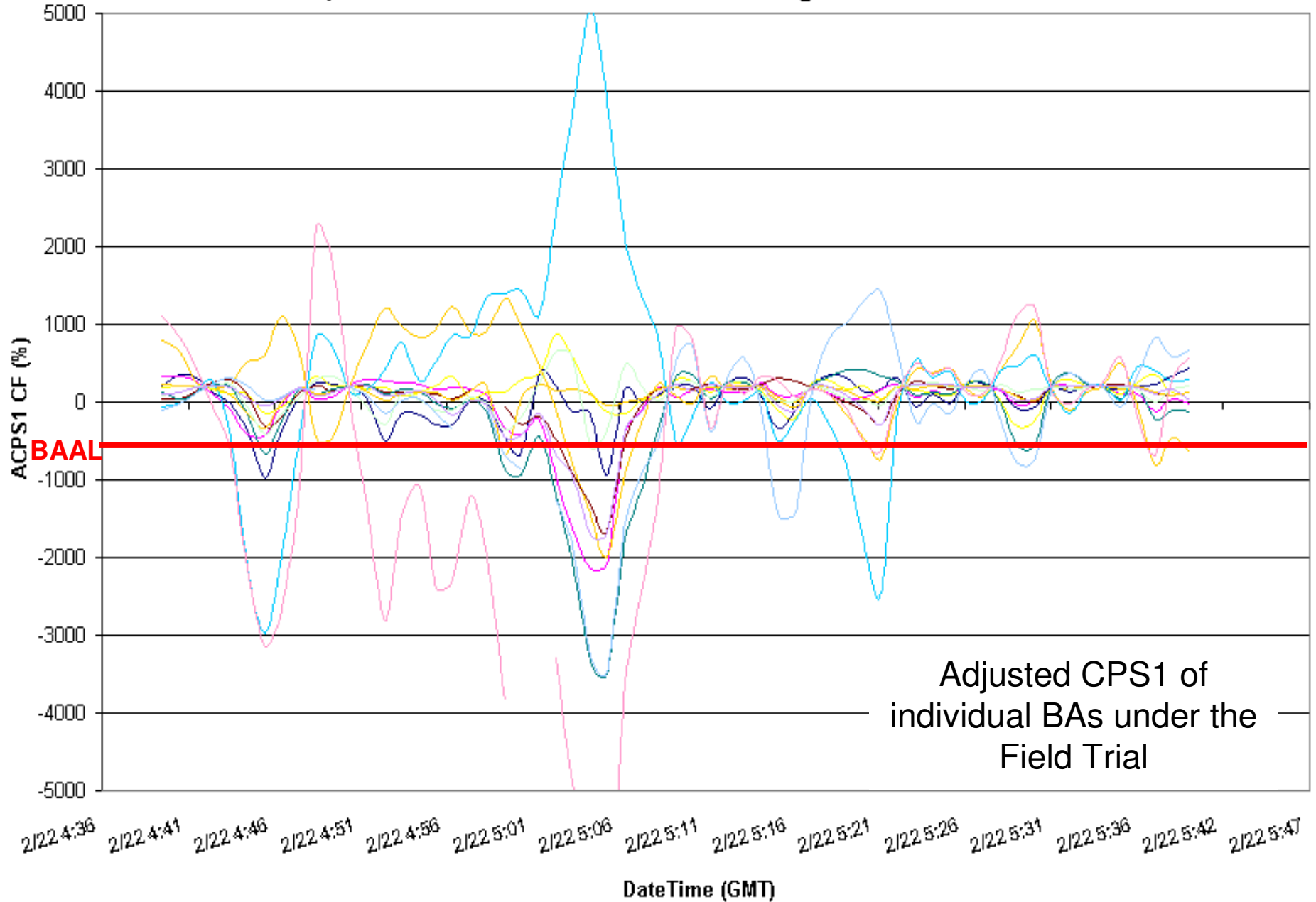


Clock-minute Actual Frequency of Participants

02/22/2011 ending 00:05 EST

3-minute duration above FTL_{High}

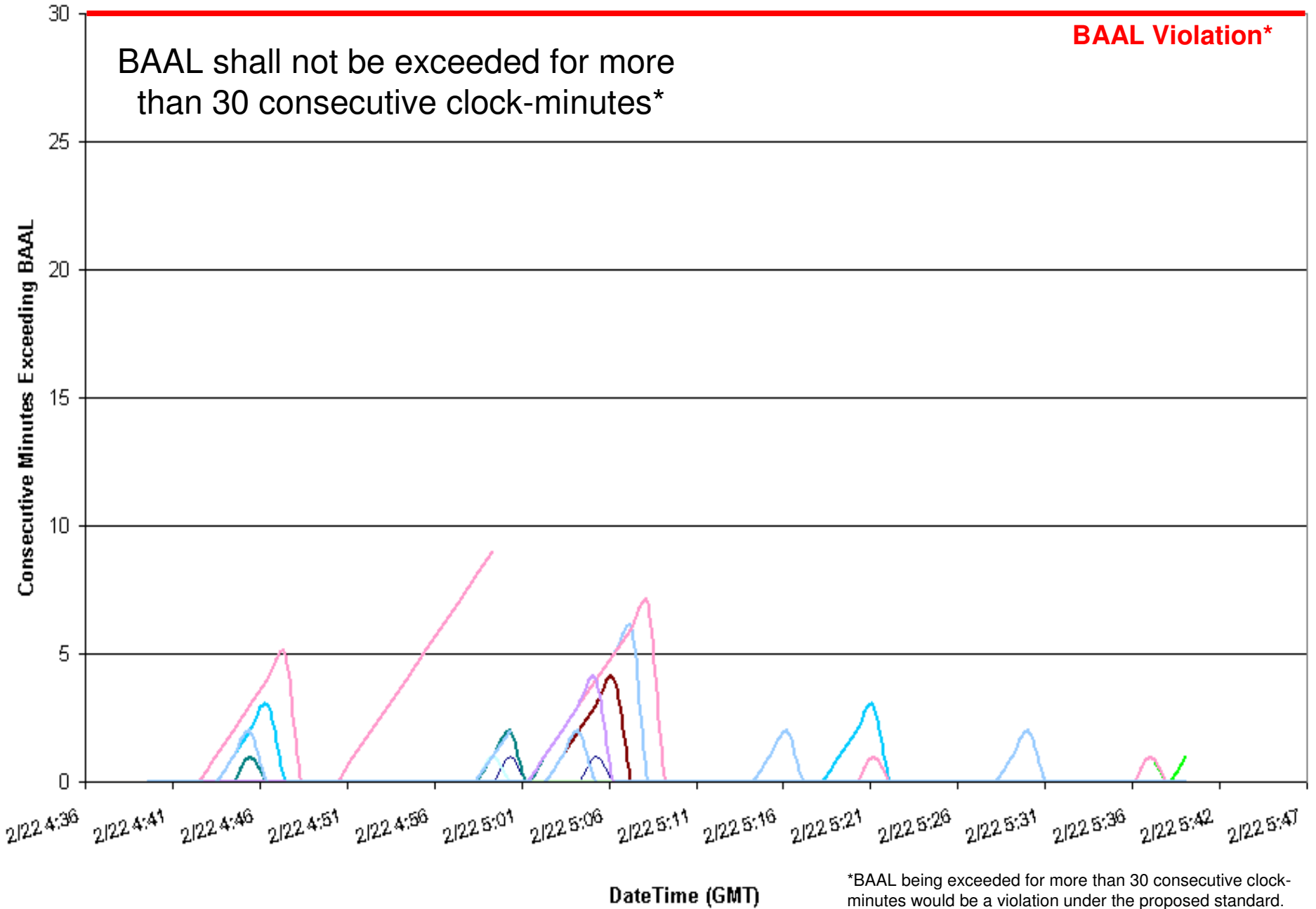
ACPS1 Clock-Minute Averages



02/22/2011 ending 00:05 EST

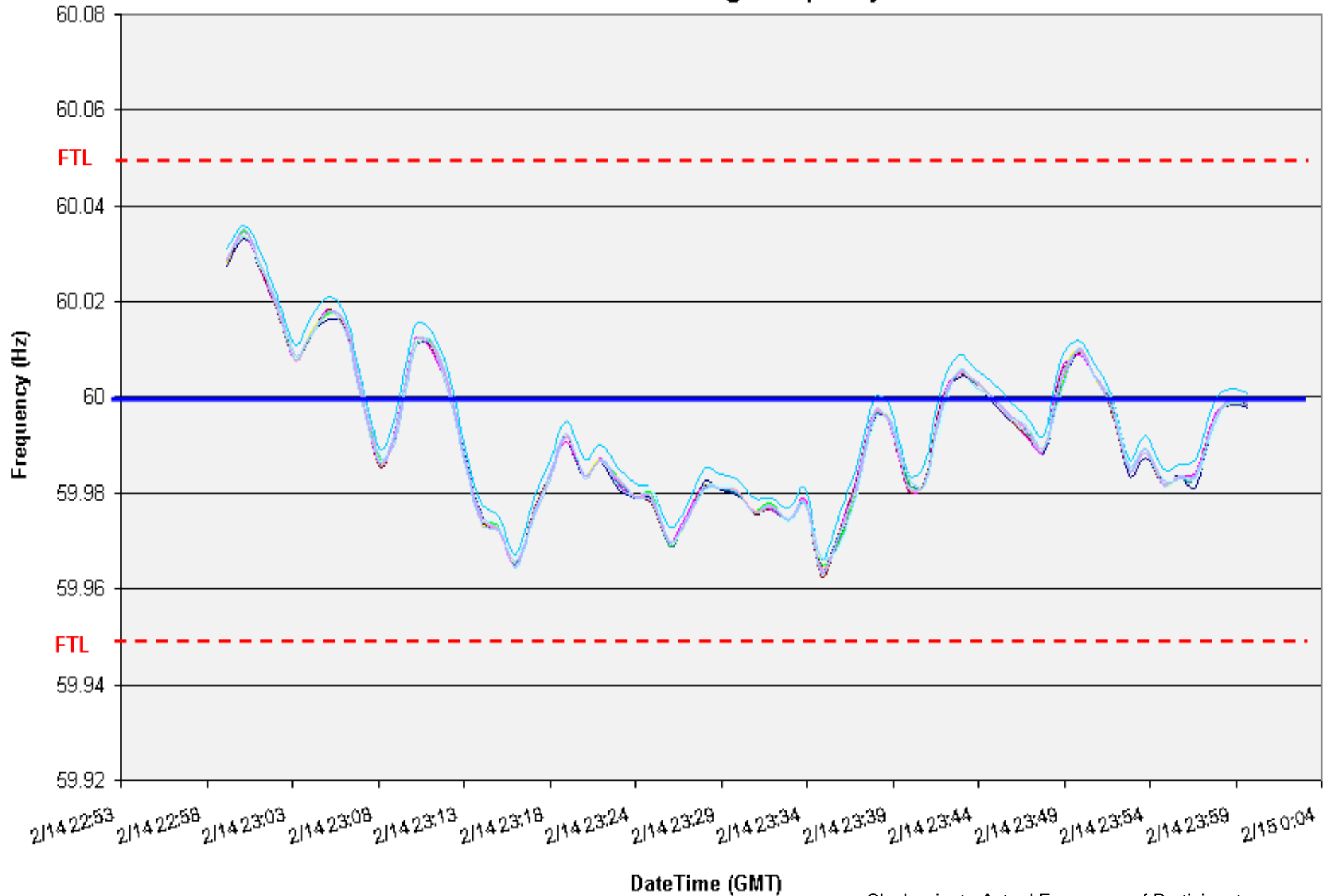
3-minute duration above FTL_{High}

Consecutive Minutes Exceeding BAAL



02/14/2011 ending 18:37 EST
17-minute duration below BAAL_{Low}

EI Clock-Minute Average Frequency

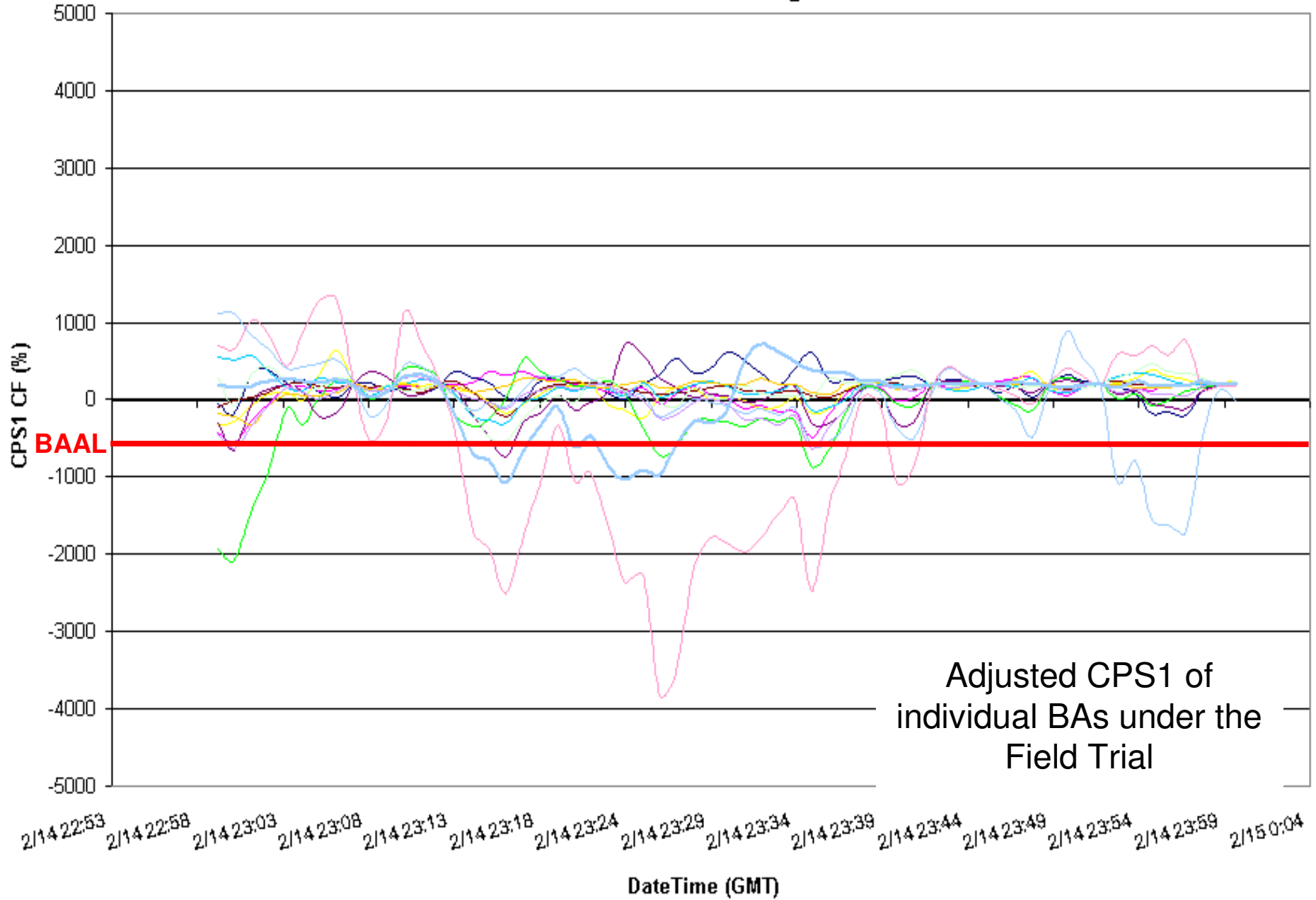


Clock-minute Actual Frequency of Participants

02/14/2011 ending 18:37 EST

17-minute duration below BAAL_{Low}

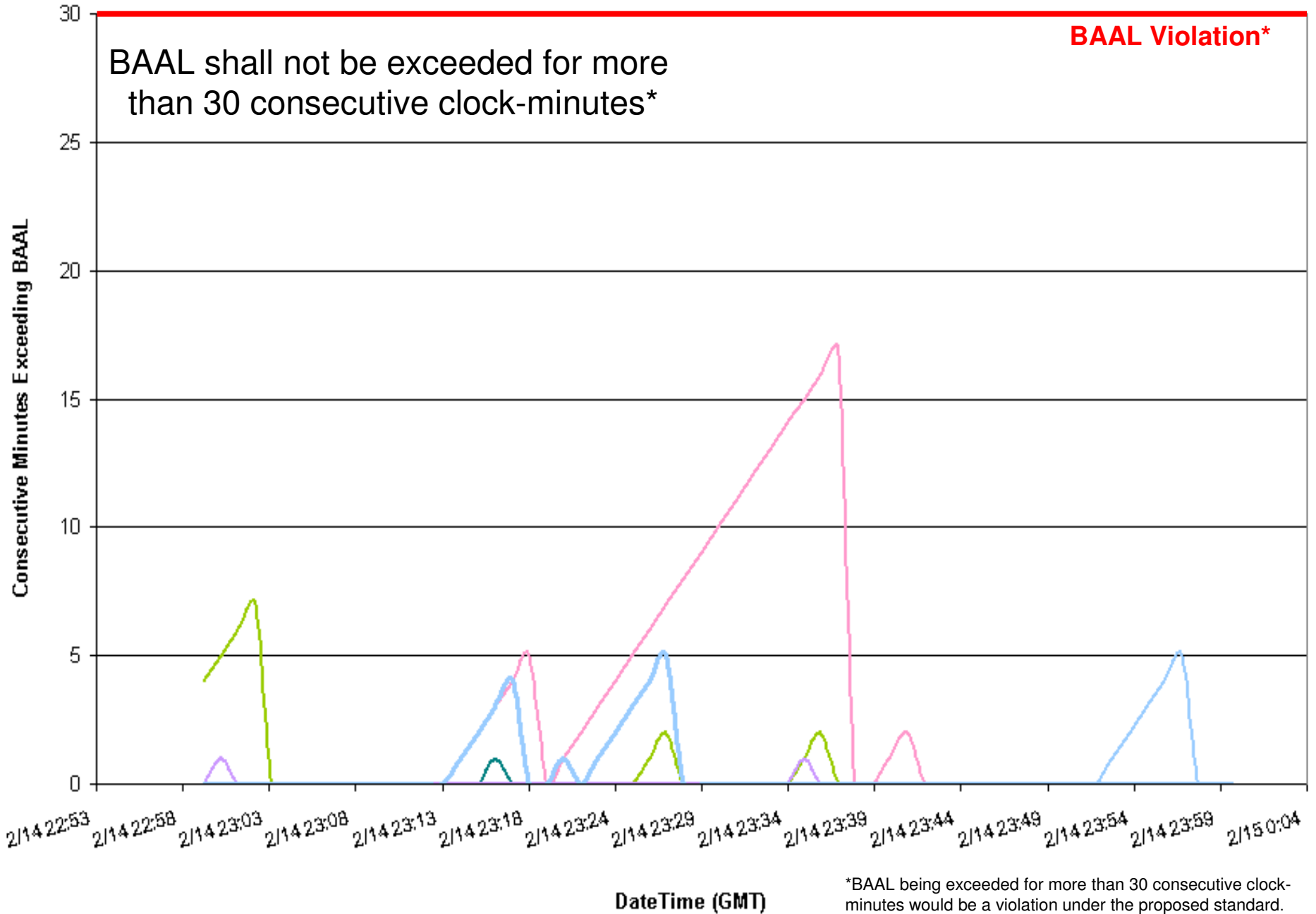
ACPS1 One-Minute Averages



02/14/2011 ending 18:37 EST

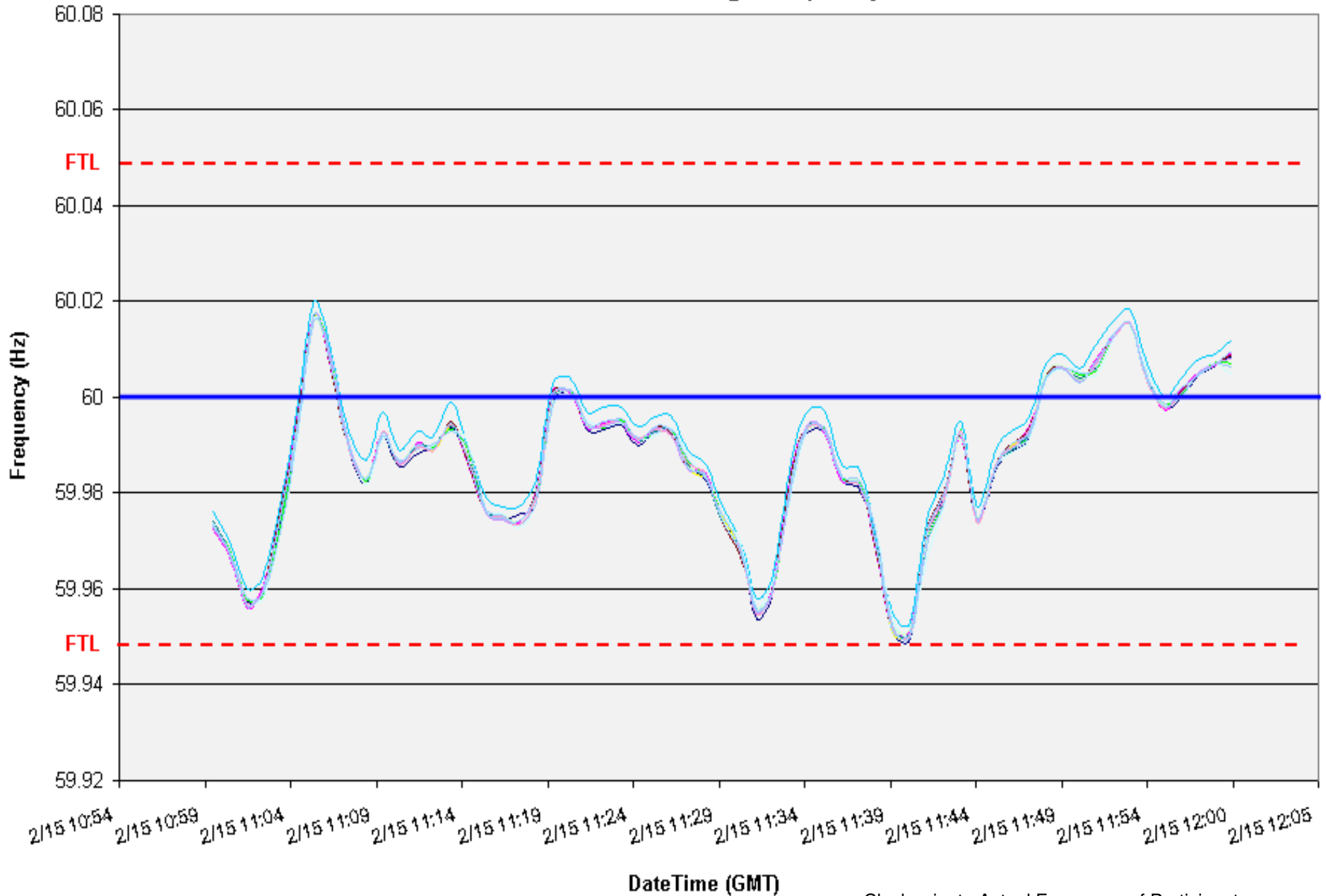
17-minute duration below BAAL_{Low}

Consecutive Minutes Exceeding BAAL



02/15/2011 ending 06:42 EST
19-minute duration below BAAL_{Low}

EI Clock-Minute Average Frequency

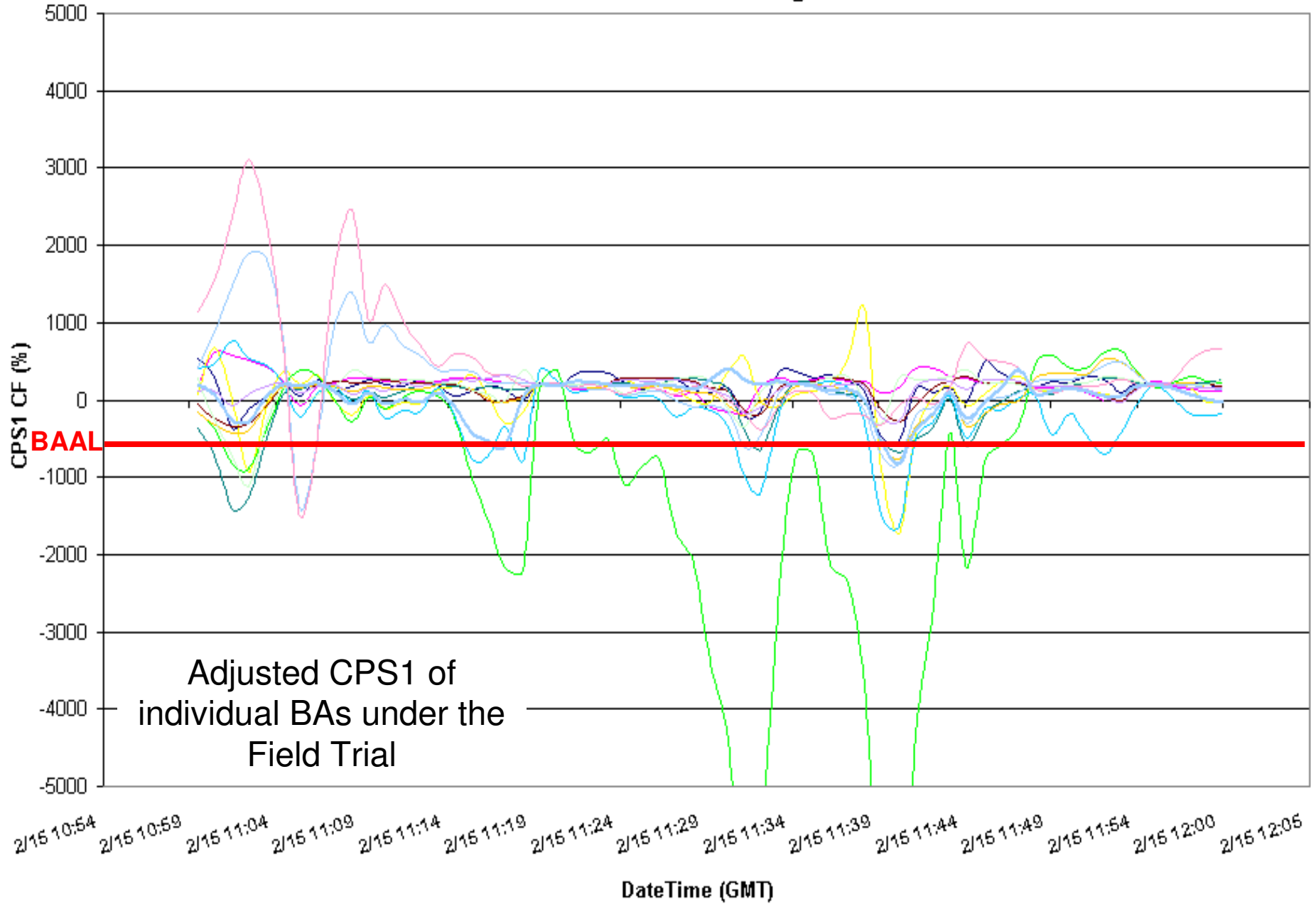


Clock-minute Actual Frequency of Participants

02/15/2011 ending 06:42 EST

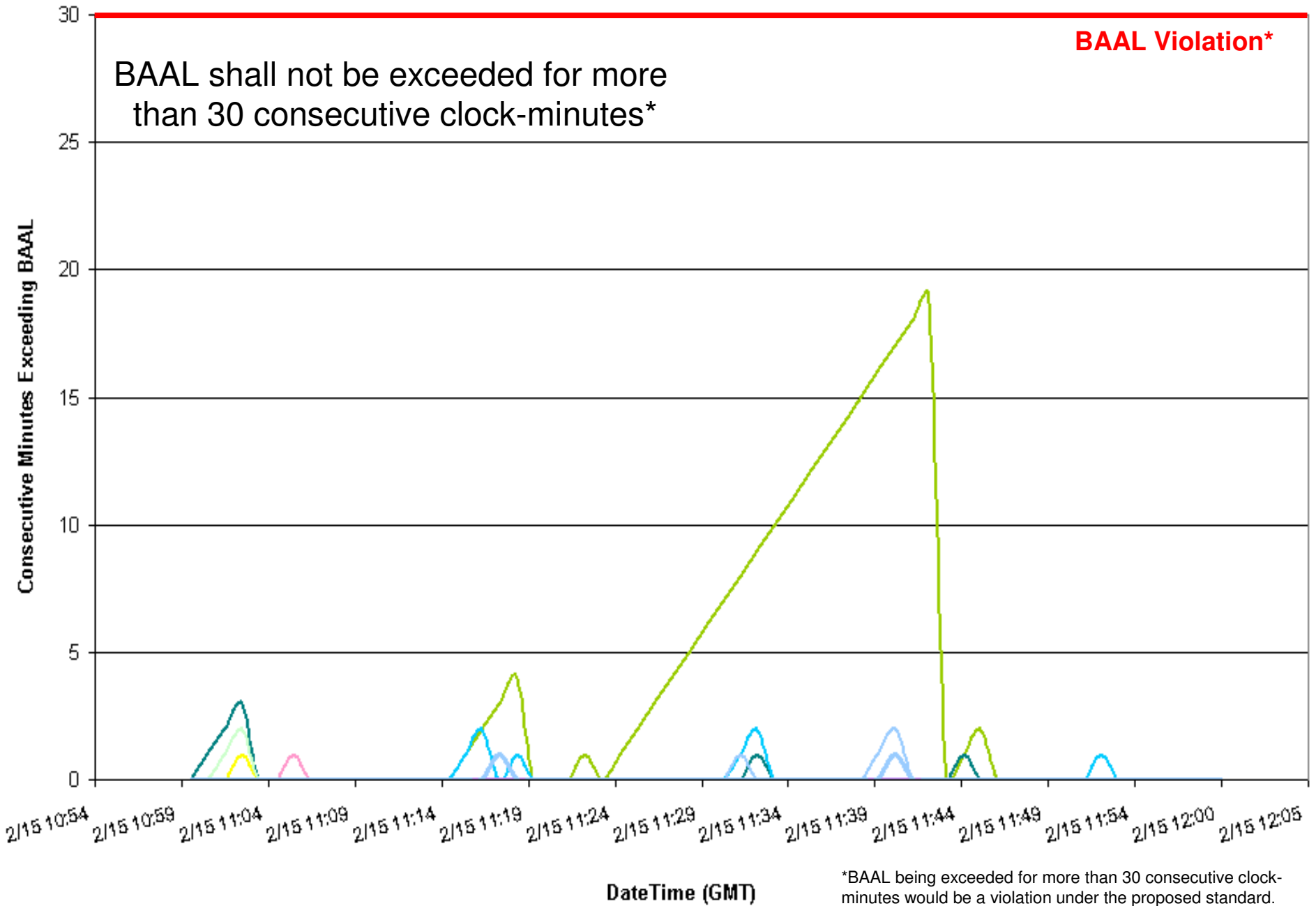
19-minute duration below BAAL_{Low}

ACPS1 One-Minute Averages



02/15/2011 ending 06:42 EST
19-minute duration below BAAL_{Low}

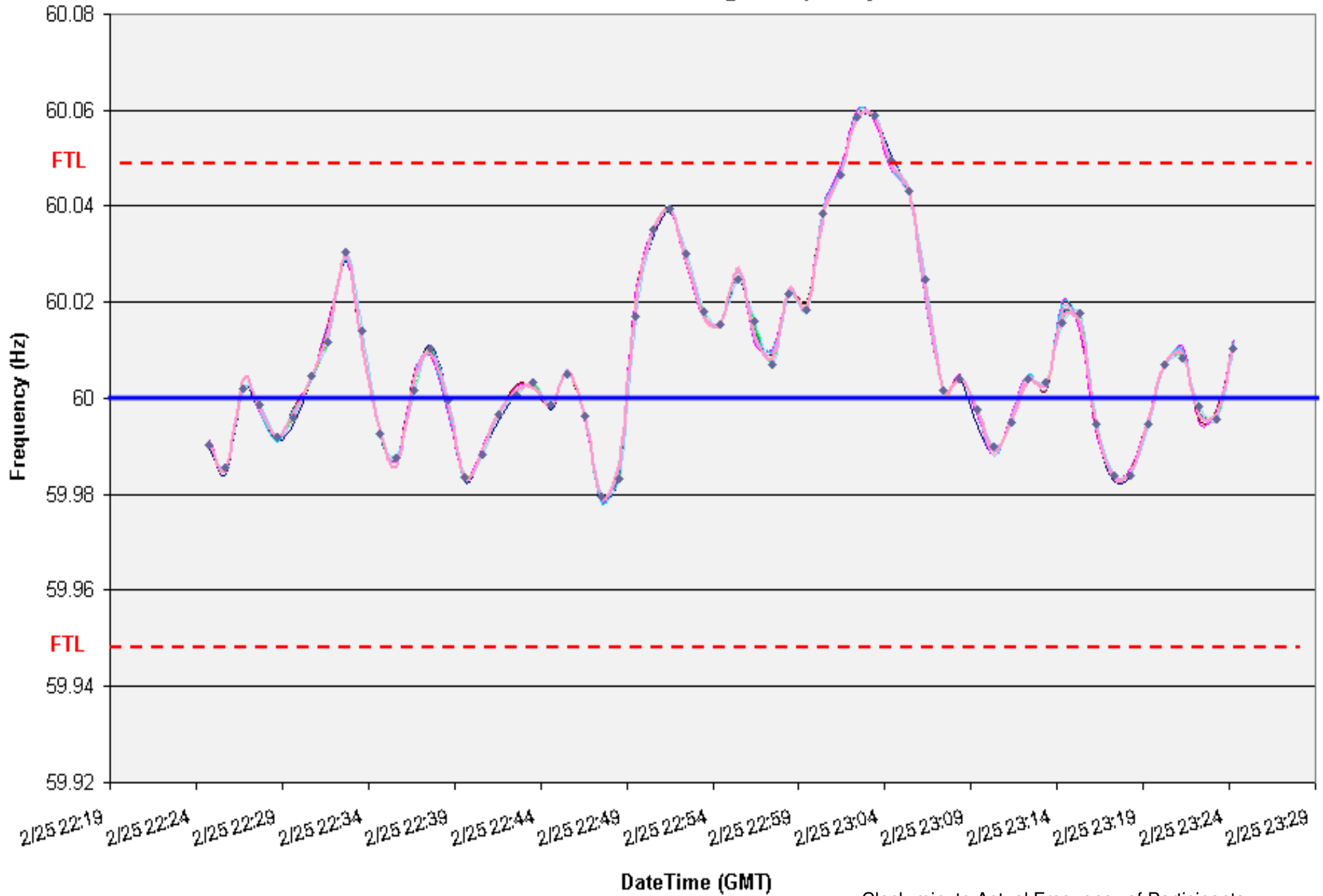
Consecutive Minutes Exceeding BAAL



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

02/25/2011 ending 18:04 EST
15-minute duration above BAAL_{High}

EI Clock-Minute Average Frequency

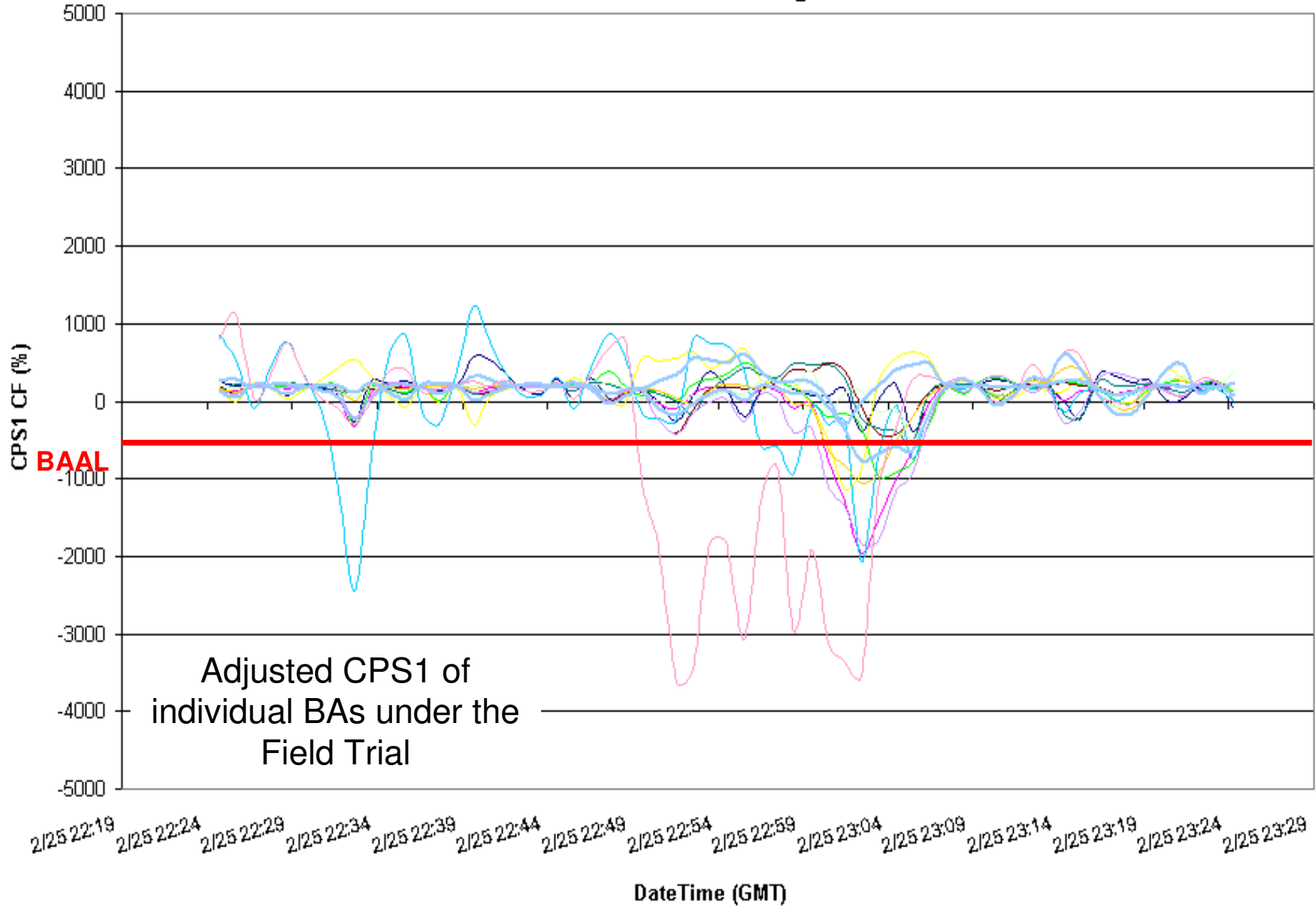


Clock-minute Actual Frequency of Participants

02/25/2011 ending 18:04 EST

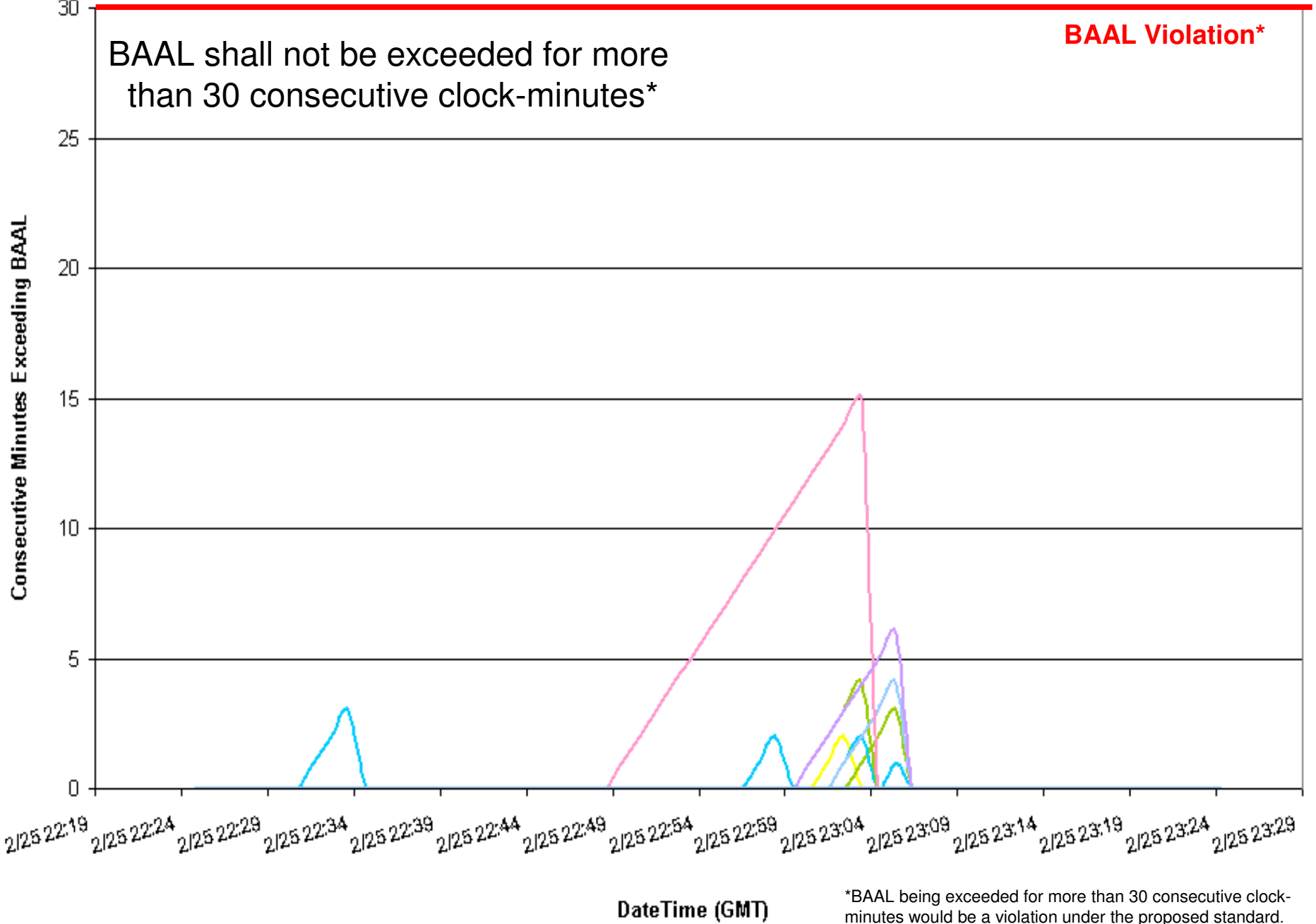
15-minute duration above BAAL_{High}

ACPS1 One-Minute Averages



02/25/2011 ending 18:04 EST
15-minute duration above BAAL_{High}

Consecutive Minutes Exceeding BAAL



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

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
2/3/11 6:01	2/3/11 6:11	CST	0:11	0	1	BAAL Low 1) Unexpected large schedule change; loss of unit due to tube leak; QF Put sold off; plus various other unit issues due to cold weather. 2) Manually moved units to correct ACE.
2/16/11 22:47	2/16/11 22:56	CST	0:10	0	1	BAAL High 1) Declared Low Low Alert @ 22:45; heavy re-dispatch in two areas. High min gen levels. 2) No immediate action taken. Frequency dropped and reduction of steel mill load ended event @ 22:55. Sent manual instructions to 2 units. Reduced a third unit's schedule beginning @ 23:00 and notified Generator Operator at approximately 22:30. Declared a Low Low Event at 23:15.
2/15/11 6:23	2/15/11 6:42	EST	0:19	0	0	BAAL Low Large coal unit experienced ramping problems due to real time control issues - committed two large frame CT's
2/19/11 4:46	2/19/11 4:57	EST	0:11	0	0	BAAL-low System Operator increased generation to return ACE within limits.
2/19/11 0:03	2/19/11 0:13	EST	0:10	0	0	BAAL-low
2/12/11 13:33	2/12/11 13:43	EST	0:10	0	0	BAAL-high
2/21/11 20:20	2/21/11 20:30	EST	0:10	0	0	BAAL-high
2/20/11 16:34	2/20/11 16:50	CST	0:16	0	0	BAAL Low Negative ACE, mostly due to wind falling out. Interchange scheduled in at the top of the hour. Frequency crossed 60 and reset exceedance.
2/14/11 18:21	2/14/11 18:38	EST	0:17	0	0	BAAL Low The frequency and load were low. Recovery was impacted by the units reaching their desired generation and the frequency returning to 60 Hz. The controller attempted to mitigate the situation by increasing the generation of all units on control.

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Discussion

Bob Klueber

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