

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Eastern Interconnection Update Discussion
June 28, 2010

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Reliability-Based Control Standard Drafting Team

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 (CSW)	-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		May 2010 Performance under BAL-007	
	Max MinCtLow	Max MinCtHigh	Max MinCtLow	Max MinCtHigh
BA01	26	16	5	6
BA02	17	17	6	6
BA03	19	19	11	13
BA04	27	19	22	19
BA05	10	20	6	11
BA06	16	22	8	13
BA07	15	23	5	12
BA08	20	24	7	9
BA09	28	26	17	15
BA10	21	31	17	31
BA11	14	32	5	5
BA12	29	40	29	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	4.44%	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

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	Total FTL_Low Minutes	Percentage Low During TEC	FTL_Low Events	FTL_Low Max Duration	FTL_High Max Duration	Total FTL_Low and FTL_High Minutes at 60 Hz SF	Total FTL_Low and FTL_High Minutes
2007	1	59	29	88	67.05%	44	7			
2007	2	17	31	48	35.42%	33	3			
2007	3	75	83	158	47.47%	76	15			
2007	4	36	41	77	46.75%	45	5			
2007	5	70	46	116	60.34%	64	5			
2007	6	62	30	92	67.39%	47	6			
2007	7	47	20	67	70.15%	33	6			
2007	8	37	25	62	59.68%	31	6			
2007	9	20	75	95	21.05%	41	8			
2007	10	57	65	122	46.72%	73	5			
2007	11	74	21	95	77.89%	60	4			
2007	12	37	22	59	62.71%	38	6			
2008	1	0	75	75	0.00%	34	8			
2008	2	18	71	89	20.22%	46	8			
2008	3	37	65	102	36.27%	55	6			
2008	4	41	65	106	38.68%	60	5			
2008	5	67	39	106	63.21%	63	4			
2008	6	40	21	61	65.57%	34	5			
2008	7	42	17	59	71.19%	29	7			
2008	8	41	19	60	68.33%	35	5			
2008	9	25	44	69	36.23%	39	4			
2008	10	35	33	68	51.47%	38	5			
2008	11	13	9	22	59.09%	13	5			
2008	12	16	34	50	32.00%	35	4			
2009	1	2	26	28	7.14%	16	4			
2009	2	0	34	34	0.00%	18	4			
2009	3	0	41	41	0.00%	23	5			
2009	4	0	59	59	0.00%	37	5			
2009	5	8	35	43	18.60%	31	4			
2009	6	30	28	58	51.72%	28	5			
2009	7	14	22	36	38.89%	22	3			
2009	8	16	10	26	61.54%	20	2			
2009	9	11	22	33	33.33%	21	3			
2009	10	44	45	89	49.44%	44	6			
2009	11	30	19	49	61.22%	33	3			
2009	12	11	23	34	32.35%	20	5			
2010	1	36	26	62	58.06%	35	6			
2010	2	23	16	39	58.97%	24	3			
2010	3	38	71	109	34.86%	65	6			
2010	4	63	38	101	62.38%	65	5			
2010	5	72	30	102	70.59%	60	6			

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Frequency Statistics

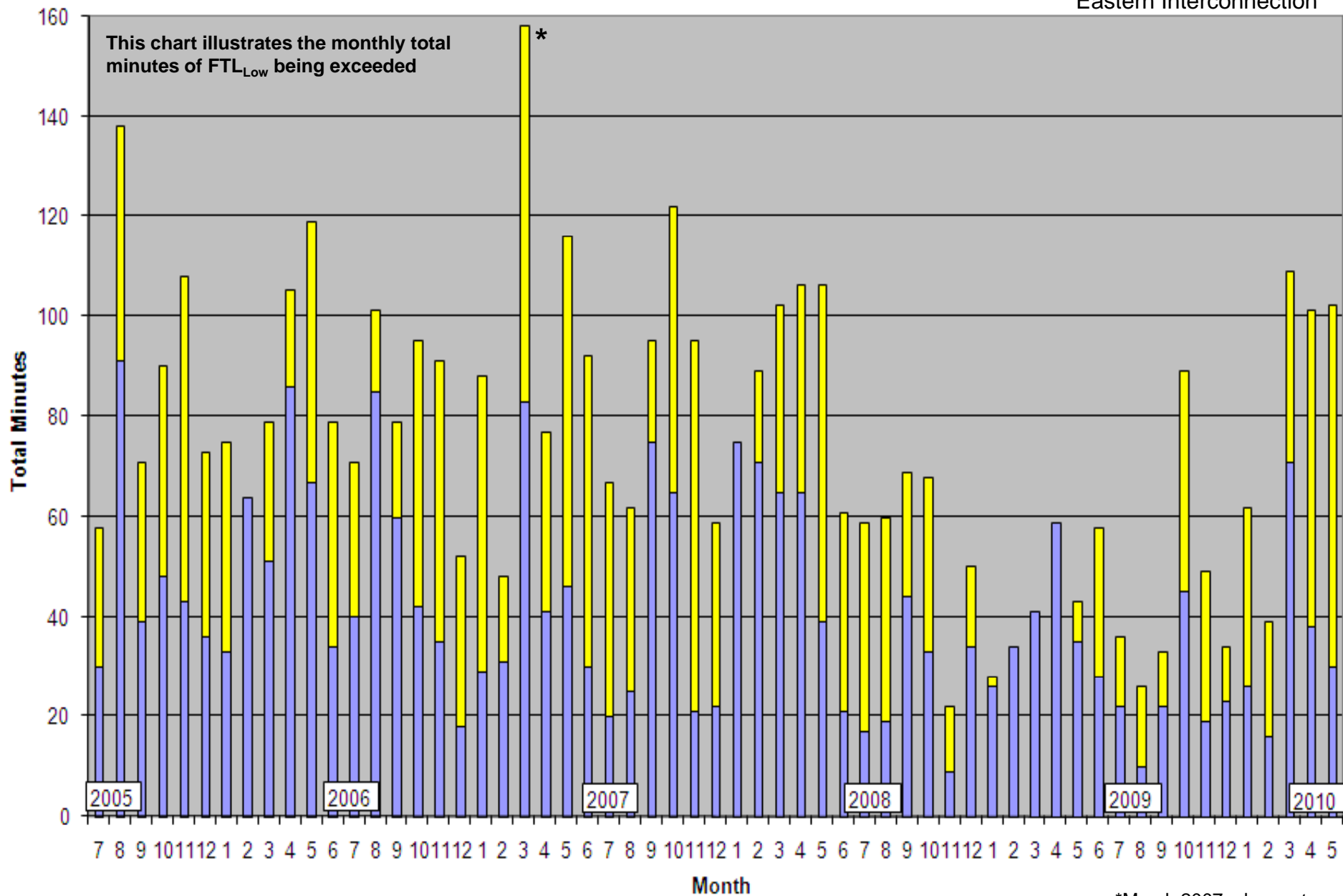
Eastern Interconnection

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	1	0	55	55	0.00%	31	7	84	143
2007	2	0	39	39	0.00%	21	4	70	87
2007	3	0	78	78	0.00%	38	8	161	236
2007	4	0	58	58	0.00%	31	4	99	135
2007	5	0	95	95	0.00%	49	7	141	211
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2007	8	1	55	56	1.79%	32	5	80	118
2007	9	0	27	27	0.00%	16	5	102	122
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2007	11	0	34	34	0.00%	24	5	55	129
2007	12	0	61	61	0.00%	38	4	83	120
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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

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 Minutes Exceeding Low FTL

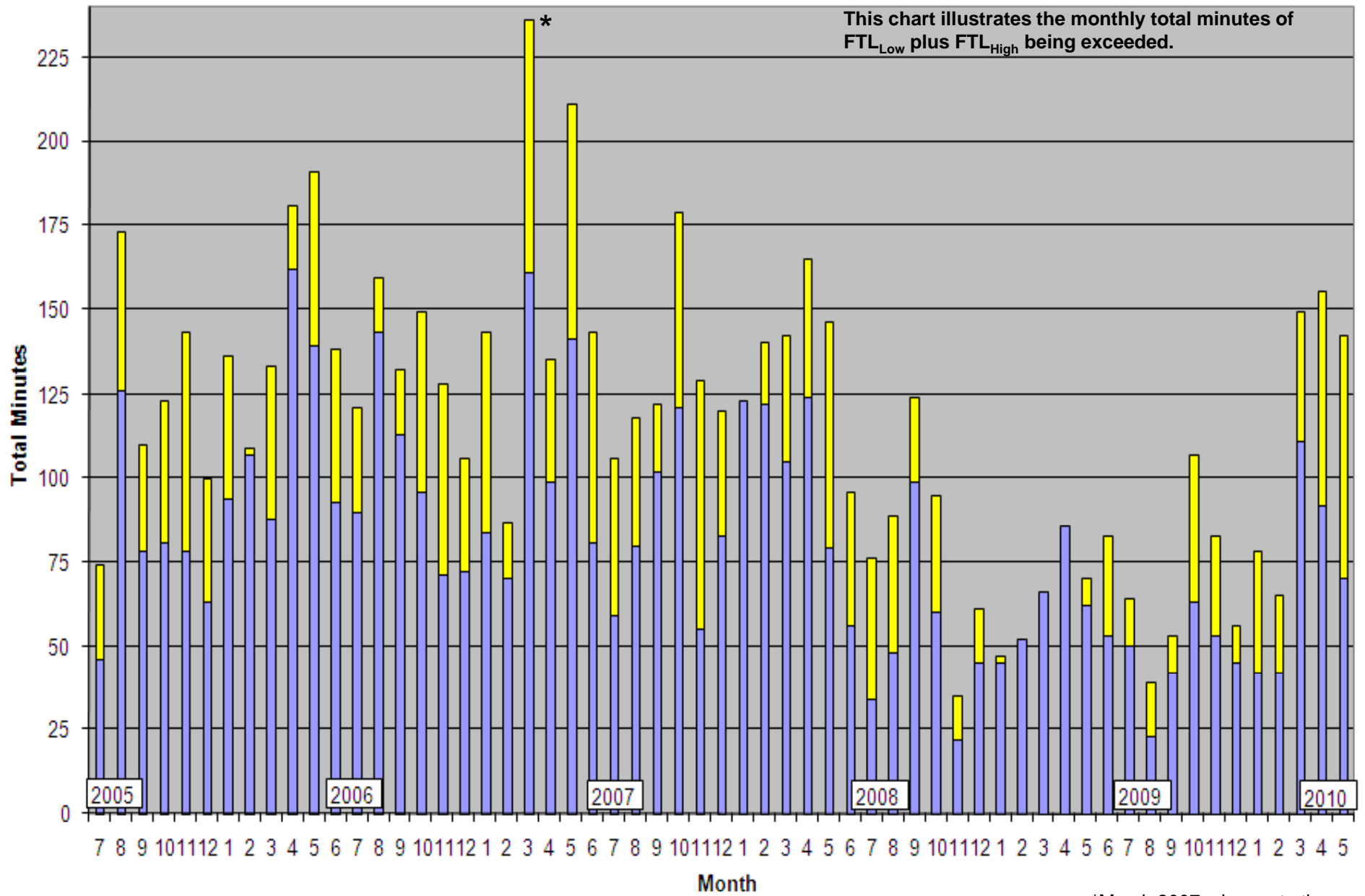
Eastern Interconnection



■ 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 Low FTL or greater than High FTL Eastern Interconnection



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

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

DateTime_EDT	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	DateTimeGMT_shift
5/5/10 14:53	59.9595	59.98	16	0	5/5/10 20:53
5/5/10 14:54	59.9595	59.98	17	0	5/5/10 20:54
5/5/10 14:55	59.962	59.98	18	0	5/5/10 20:55
5/5/10 14:56	59.9806	59.98	19	0	5/5/10 20:56
5/5/10 14:57	59.9787	59.98	20	0	5/5/10 20:57
5/5/10 14:58	59.9862	59.98	21	0	5/5/10 20:58
5/5/10 14:59	59.9813	59.98	22	0	5/5/10 20:59
5/23/10 10:14	59.97976	59.98	16	0	5/23/10 16:14
5/23/10 10:15	59.9801	59.98	17	0	5/23/10 16:15
5/23/10 10:16	59.96243	59.98	18	0	5/23/10 16:16
5/23/10 10:17	59.95224	59.98	19	0	5/23/10 16:17
5/23/10 10:18	59.95909	59.98	20	0	5/23/10 16:18
5/23/10 10:19	59.96748	59.98	21	0	5/23/10 16:19
5/23/10 10:20	59.96982	59.98	22	0	5/23/10 16:20
5/23/10 10:21	59.97226	59.98	23	0	5/23/10 16:21
5/23/10 10:22	59.97044	59.98	24	0	5/23/10 16:22
5/23/10 10:23	59.97275	59.98	25	0	5/23/10 16:23
5/23/10 10:24	59.97024	59.98	26	0	5/23/10 16:24
5/23/10 10:25	59.9613	59.98	27	0	5/23/10 16:25
5/23/10 10:26	59.95693	59.98	28	0	5/23/10 16:26
5/23/10 10:27	59.96132	59.98	29	0	5/23/10 16:27
5/25/10 13:57	59.9815	59.98	16	0	5/25/10 19:57
5/25/10 13:58	59.9805	59.98	17	0	5/25/10 19:58
5/25/10 13:59	59.9811	59.98	18	0	5/25/10 19:59
5/25/10 14:00	59.9856	59.98	19	0	5/25/10 20:00
5/25/10 14:01	59.9712	59.98	20	0	5/25/10 20:01
5/25/10 14:02	59.9889	59.98	21	0	5/25/10 20:02
5/29/10 5:20	60.00854149	60	0	16	5/29/10 11:20
5/29/10 5:21	60.00889663	60	0	17	5/29/10 11:21
5/29/10 5:22	60.01592216	60	0	18	5/29/10 11:22
5/29/10 5:23	60.02962974	60	0	19	5/29/10 11:23
5/29/10 5:24	60.03355594	60	0	20	5/29/10 11:24
5/29/10 5:25	60.03901514	60	0	21	5/29/10 11:25
5/29/10 5:26	60.0325182	60	0	22	5/29/10 11:26
5/29/10 5:27	60.0364884	60	0	23	5/29/10 11:27
5/29/10 5:28	60.03297791	60	0	24	5/29/10 11:28
5/29/10 5:29	60.01784286	60	0	25	5/29/10 11:29
5/29/10 5:30	60.01337333	60	0	26	5/29/10 11:30
5/29/10 5:31	60.01500843	60	0	27	5/29/10 11:31
5/29/10 5:32	60.01557652	60	0	28	5/29/10 11:32
5/29/10 5:33	60.01586473	60	0	29	5/29/10 11:33
5/29/10 5:34	60.02176568	60	0	30	5/29/10 11:34
5/29/10 5:35	60.0141547	60	0	31	5/29/10 11:35

DateTime_EDT	FreqError	ActualFreq	SchedFreq	MinuteCount	DateTime_GMT
5/2/10 10:00	-0.0515	59.9485	60	1	5/2/10 14:00
5/2/10 10:01	-0.068	59.932	60	2	5/2/10 14:01
5/2/10 10:02	-0.0697	59.9303	60	3	5/2/10 14:02
5/2/10 10:03	-0.0569	59.9431	60	4	5/2/10 14:03
5/14/10 23:02	-0.0491	59.9309	59.98	1	5/15/10 3:02
5/14/10 23:03	-0.0625	59.9175	59.98	2	5/15/10 3:03
5/14/10 23:04	-0.0639	59.9161	59.98	3	5/15/10 3:04
5/14/10 23:05	-0.0464	59.9336	59.98	4	5/15/10 3:05
5/14/10 23:06	-0.0309	59.9491	59.98	5	5/15/10 3:06
5/20/10 23:01	-0.0415	59.9385	59.98	1	5/21/10 3:01
5/20/10 23:02	-0.0533	59.9267	59.98	2	5/21/10 3:02
5/20/10 23:03	-0.0552	59.9248	59.98	3	5/21/10 3:03
5/20/10 23:04	-0.0491	59.9309	59.98	4	5/21/10 3:04
5/20/10 23:05	-0.0363	59.9437	59.98	5	5/21/10 3:05
5/23/10 11:59	-0.0328	59.9472	59.98	1	5/23/10 15:59
5/23/10 12:00	-0.0569	59.9231	59.98	2	5/23/10 16:00
5/23/10 12:01	-0.0586	59.9214	59.98	3	5/23/10 16:01
5/23/10 12:02	-0.0433	59.9367	59.98	4	5/23/10 16:02
5/23/10 12:03	-0.0381	59.9419	59.98	5	5/23/10 16:03
5/23/10 12:04	-0.0309	59.9491	59.98	6	5/23/10 16:04

Periods of the BAAL being exceeded for more than 20 consecutive clock-minutes noted on left.

Periods of the Frequency Trigger Limit being exceeded for 5 or more minutes noted above, along with one event lasting only 4 minutes where the maximum frequency error was greater than the other periods noted.

DateTime_EDT	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	DateTimeGMT_shift		DateTime_EDT	FreqError	ActualFreq	SchedFreq	MinuteCount	DateTime_GMT
5/5/10 14:53	59.9595	59.98	16	0	5/5/10 20:53		5/2/10 10:00	-0.0515	59.9485	60	1	5/2/10 14:00
5/5/10 14:54	59.9595	59.98	17	0	5/5/10 20:54		5/2/10 10:01	-0.068	59.932	60	2	5/2/10 14:01
5/5/10 14:55	59.962	59.98	18	0	5/5/10 20:55		5/2/10 10:02	-0.0697	59.9303	60	3	5/2/10 14:02
5/5/10 14:56												5/2/10 14:03
5/5/10 14:57												
5/5/10 14:58												5/15/10 3:02
5/5/10 14:59												5/15/10 3:03
5/23/10 10:14												5/15/10 3:04
5/23/10 10:15												5/15/10 3:05
5/23/10 10:16												5/15/10 3:06
5/23/10 10:17												
5/23/10 10:18												5/21/10 3:01
5/23/10 10:19												5/21/10 3:02
5/23/10 10:20												5/21/10 3:03
5/23/10 10:21												5/21/10 3:04
5/23/10 10:22												5/21/10 3:05
5/23/10 10:23												
5/23/10 10:24												5/23/10 15:59
5/23/10 10:25												5/23/10 16:00
5/23/10 10:26												5/23/10 16:01
5/23/10 10:27												5/23/10 16:02
5/25/10 13:57												5/23/10 16:03
5/25/10 13:58												5/23/10 16:04
5/25/10 13:59												
5/25/10 14:00												
5/25/10 14:01												
5/25/10 14:02												
5/29/10 5:20	60.0178200	60	0	25	5/29/10 11:20							
5/29/10 5:21	60.01337333	60	0	26	5/29/10 11:30							
5/29/10 5:22	60.01500843	60	0	27	5/29/10 11:31							
5/29/10 5:23	60.01557652	60	0	28	5/29/10 11:32							
5/29/10 5:24	60.01586473	60	0	29	5/29/10 11:33							
5/29/10 5:25	60.02176568	60	0	30	5/29/10 11:34							
5/29/10 5:26	60.0141547	60	0	31	5/29/10 11:35							
5/29/10 5:27												
5/29/10 5:28												
5/29/10 5:29												
5/29/10 5:30												
5/29/10 5:31												
5/29/10 5:32												
5/29/10 5:33												
5/29/10 5:34												
5/29/10 5:35												

Dates in this presentation:
Clock-minute Frequency less than FTL_{Low} on May 2, 2010, ending 10:03 EDT: 4 consecutive clock-minutes¹

Clock-minute ACE less than the $BAAL_{Low}$ on May 5, 2010, ending 14:59 EDT: 22 consecutive clock-minutes, 59.98 Hz Scheduled Freq.

Clock-minute Frequency less than FTL_{Low} on May 14, 2010, ending 23:06 EDT: 5 consecutive clock-minutes, 59.98 Hz Scheduled Freq.

Clock-minute ACE less than the $BAAL_{Low}$ on May 23, 2010, ending 10:27 EDT: 29 consecutive clock-minutes, 59.98 Hz Scheduled Freq.

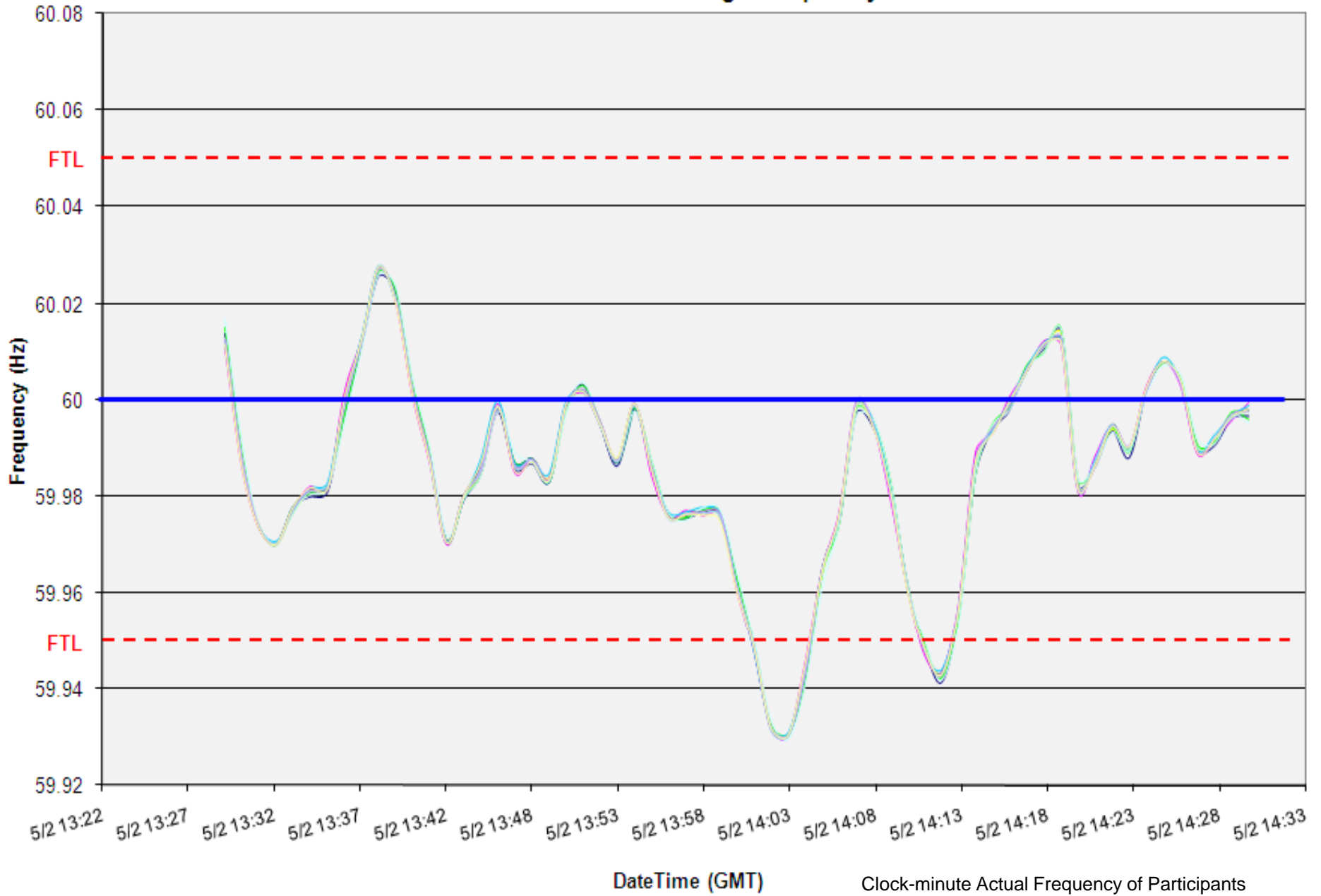
Clock-minute ACE greater than the $BAAL_{High}$ on May 29, 2010, ending 5:35 EDT: 31 consecutive clock-minutes

¹ Under draft BAL-008, a proposed FTL_{Low} violation would occur when the actual frequency is lower than FTL_{Low} for more than 30 consecutive clock-minutes and a proposed FTL_{High} violation would occur when the actual frequency is greater than FTL_{High} for more than 30 consecutive clock-minutes. Under draft BAL-007, 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.

5/02/2010 9:59-10:03 EDT

4 minute duration below FTL_{Low}

EI Clock-Minute Average Frequency

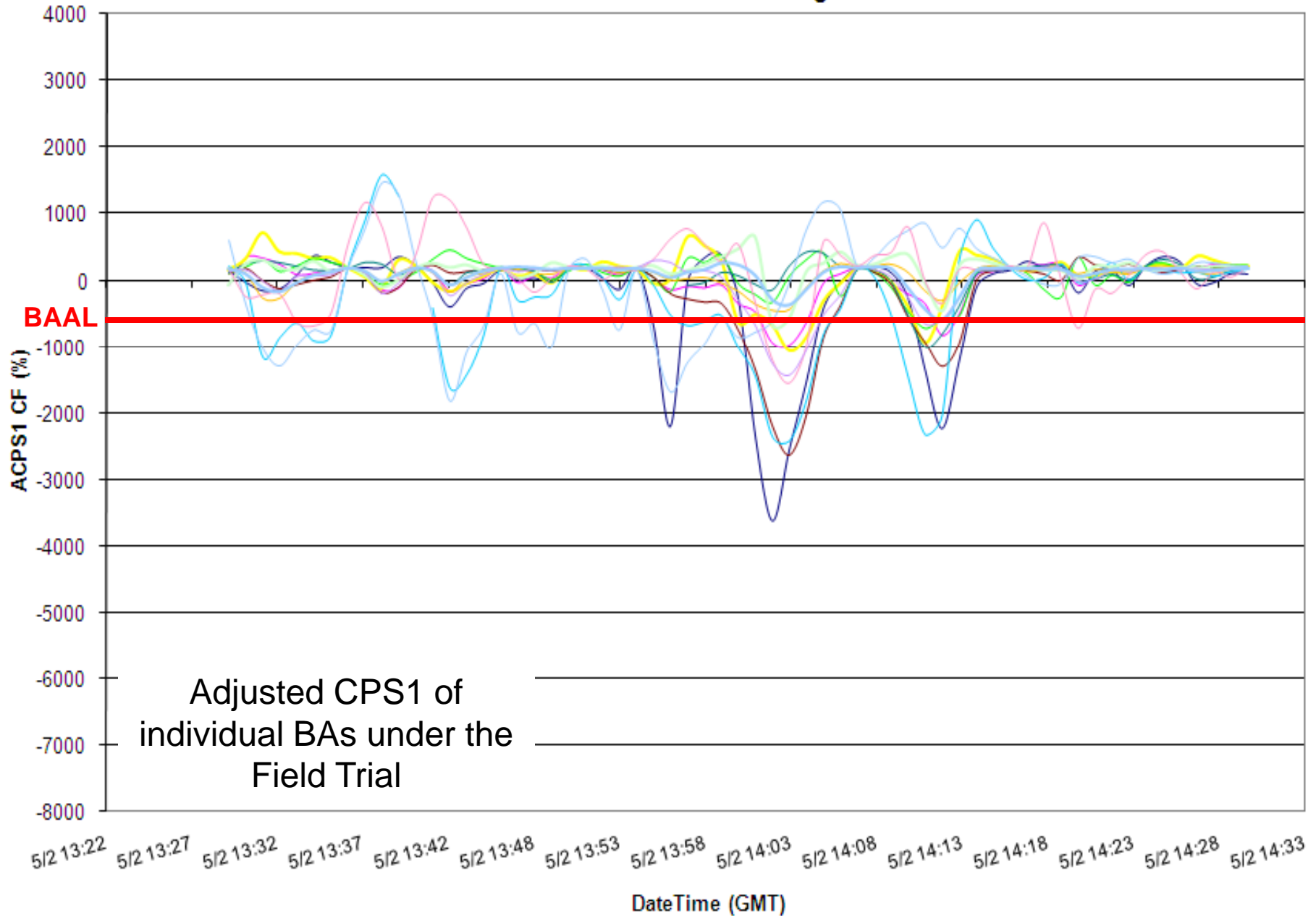


Clock-minute Actual Frequency of Participants

5/02/2010 9:59-10:03 EDT

4 minute duration below FTL_{Low}

ACPS1 Clock-Minute Averages

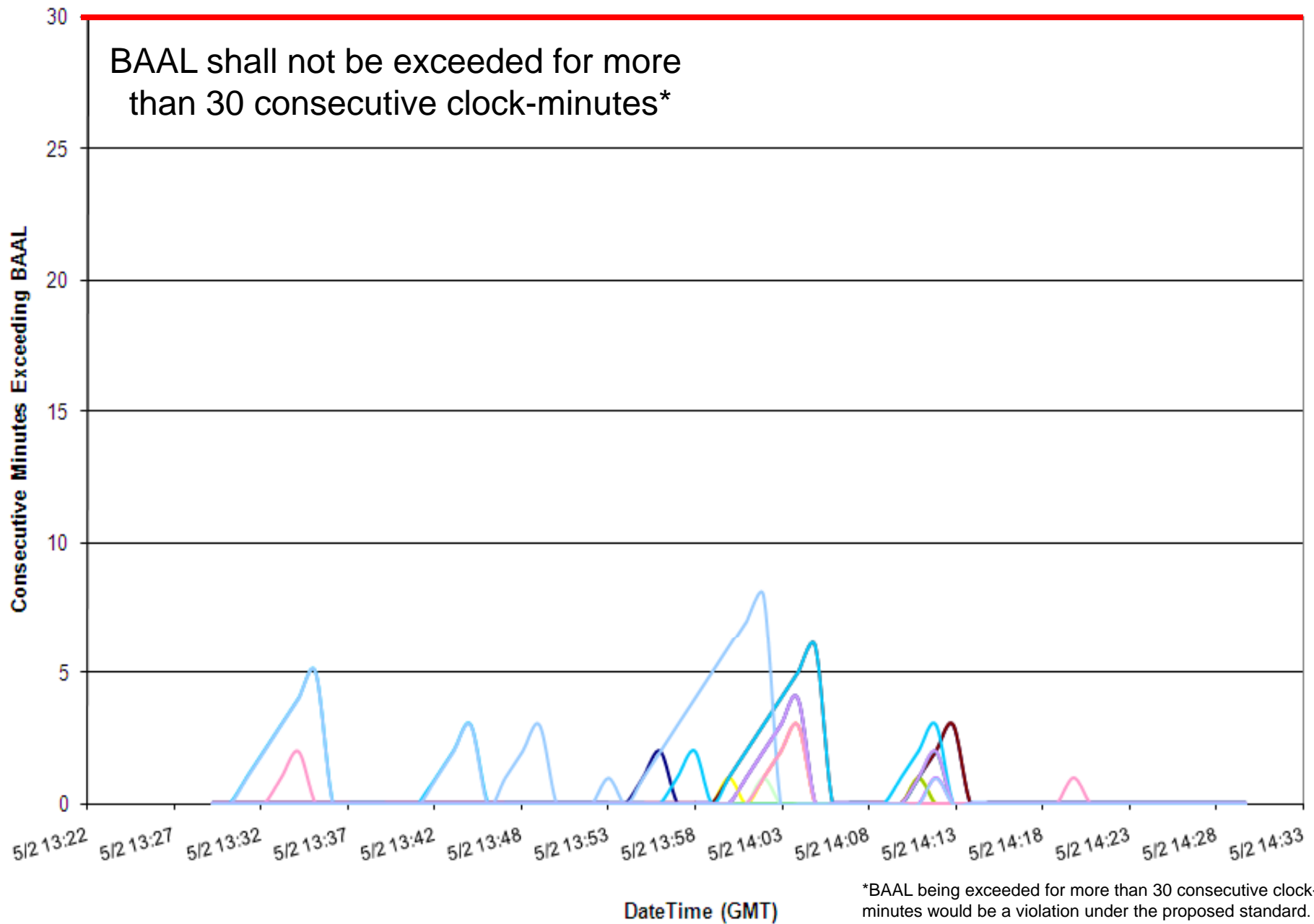


5/02/2010 9:59-10:03 EDT

4 minute duration below FTL_{Low}

Consecutive Minutes Exceeding BAAL

BAAL Violation*

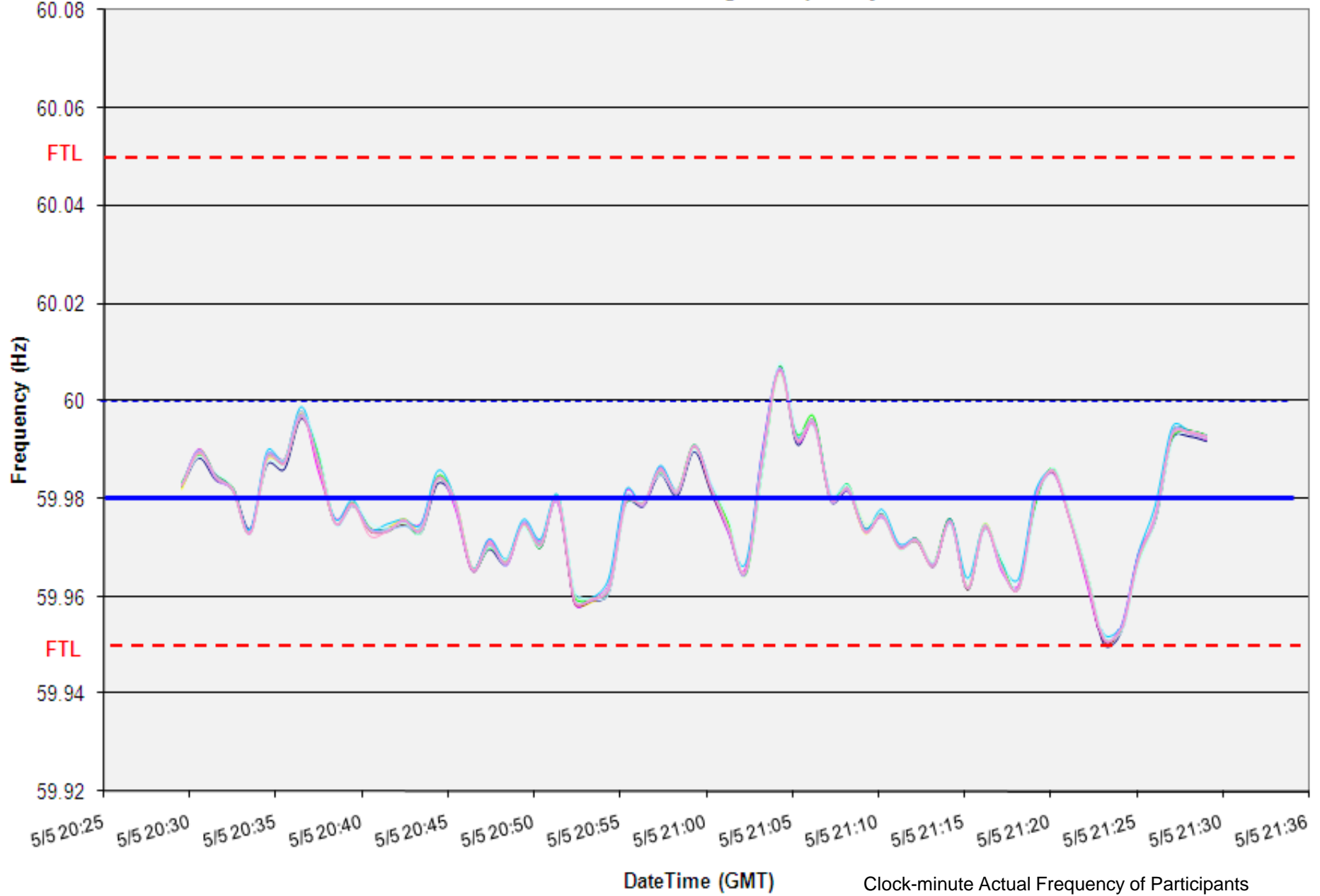


5/5/2010 14:37-14:59 EDT

22-minute duration below BAAL_{Low}

during 59.98 Hz TEC

EI Clock-Minute Average Frequency



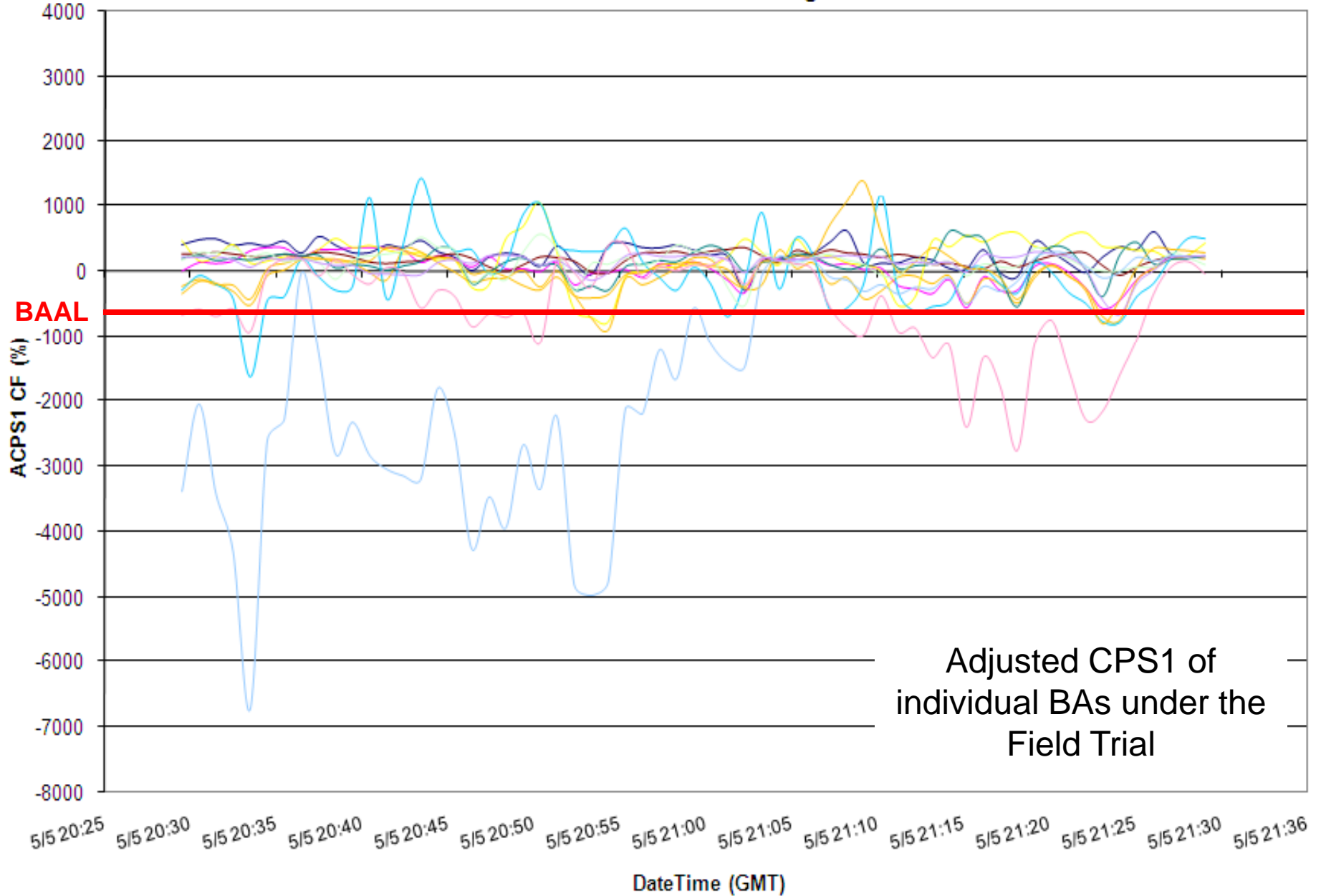
Clock-minute Actual Frequency of Participants

5/5/2010 14:37-14:59 EDT

22-minute duration below BAAL_{Low}

during 59.98 Hz TEC

ACPS1 Clock-Minute Averages



Adjusted CPS1 of individual BAs under the Field Trial

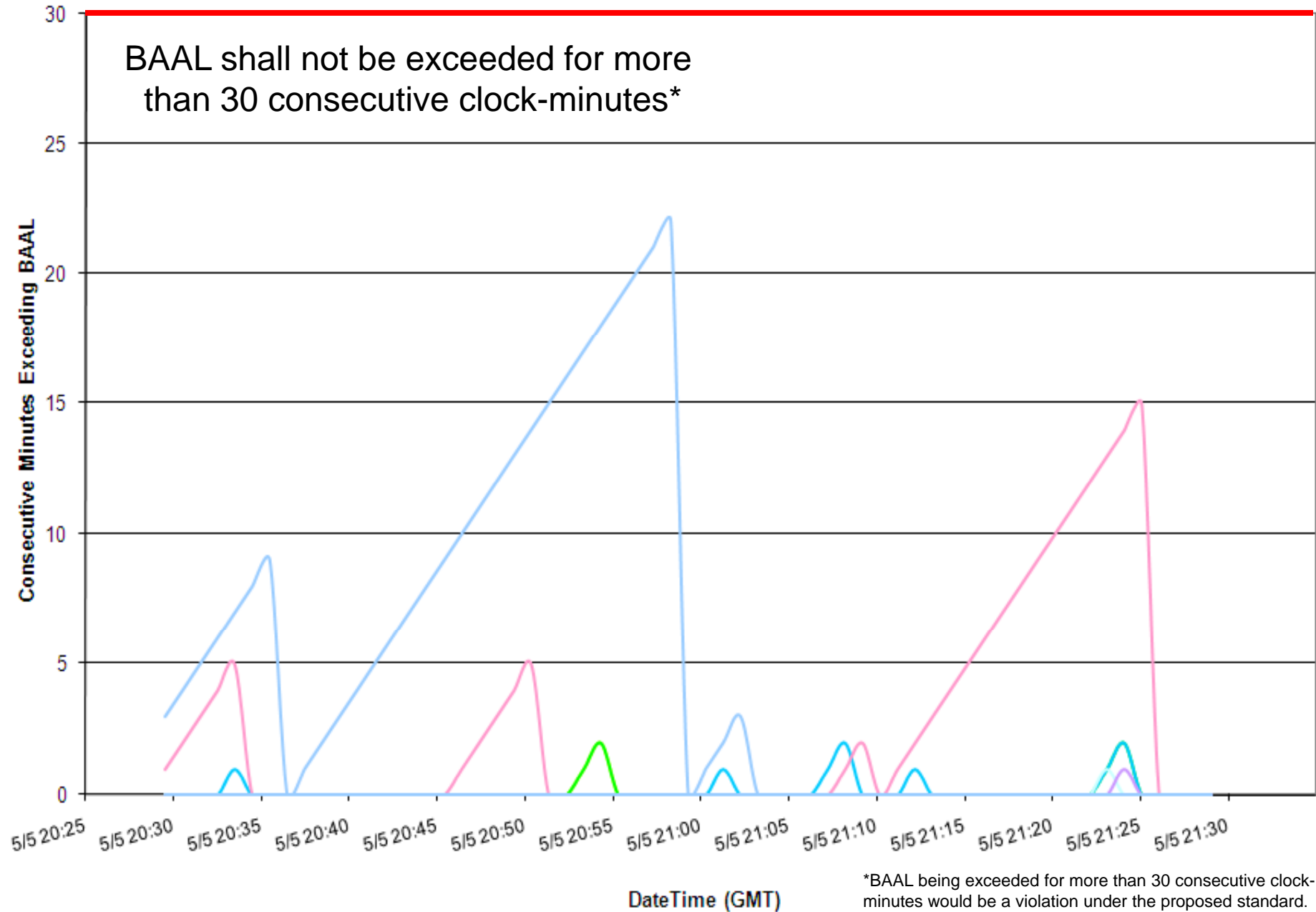
5/5/2010 14:37-14:59 EDT

22-minute duration below BAAL_{Low}

during 59.98 Hz TEC

Consecutive Minutes Exceeding BAAL

BAAL Violation*



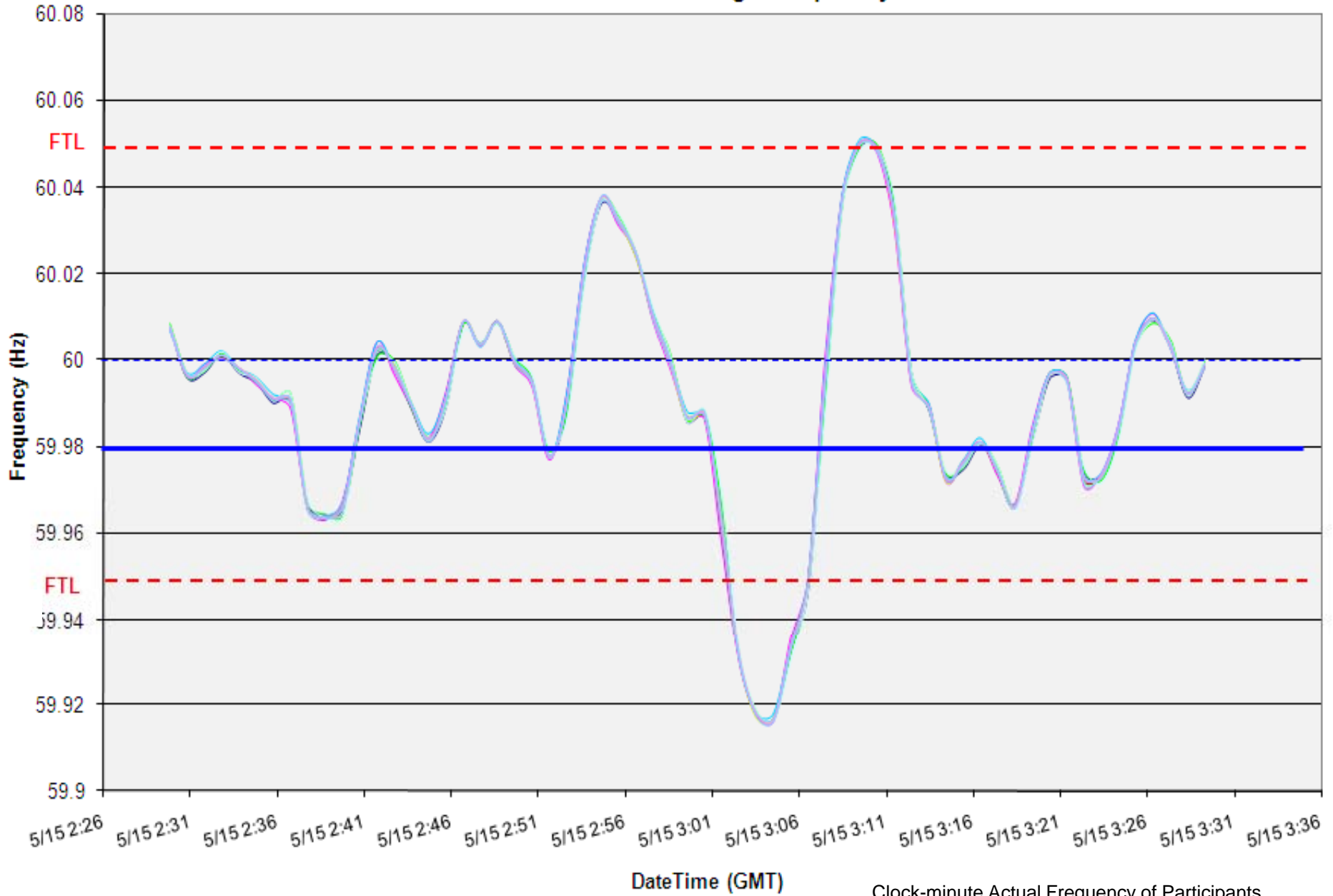
*BAAL being exceeded for more than 30 consecutive clock-minutes would be a violation under the proposed standard.

5/14/2010 23:01-23:06 EDT

5 minute duration below FTL_{Low}

during 59.98 Hz TEC

EI Clock-Minute Average Frequency



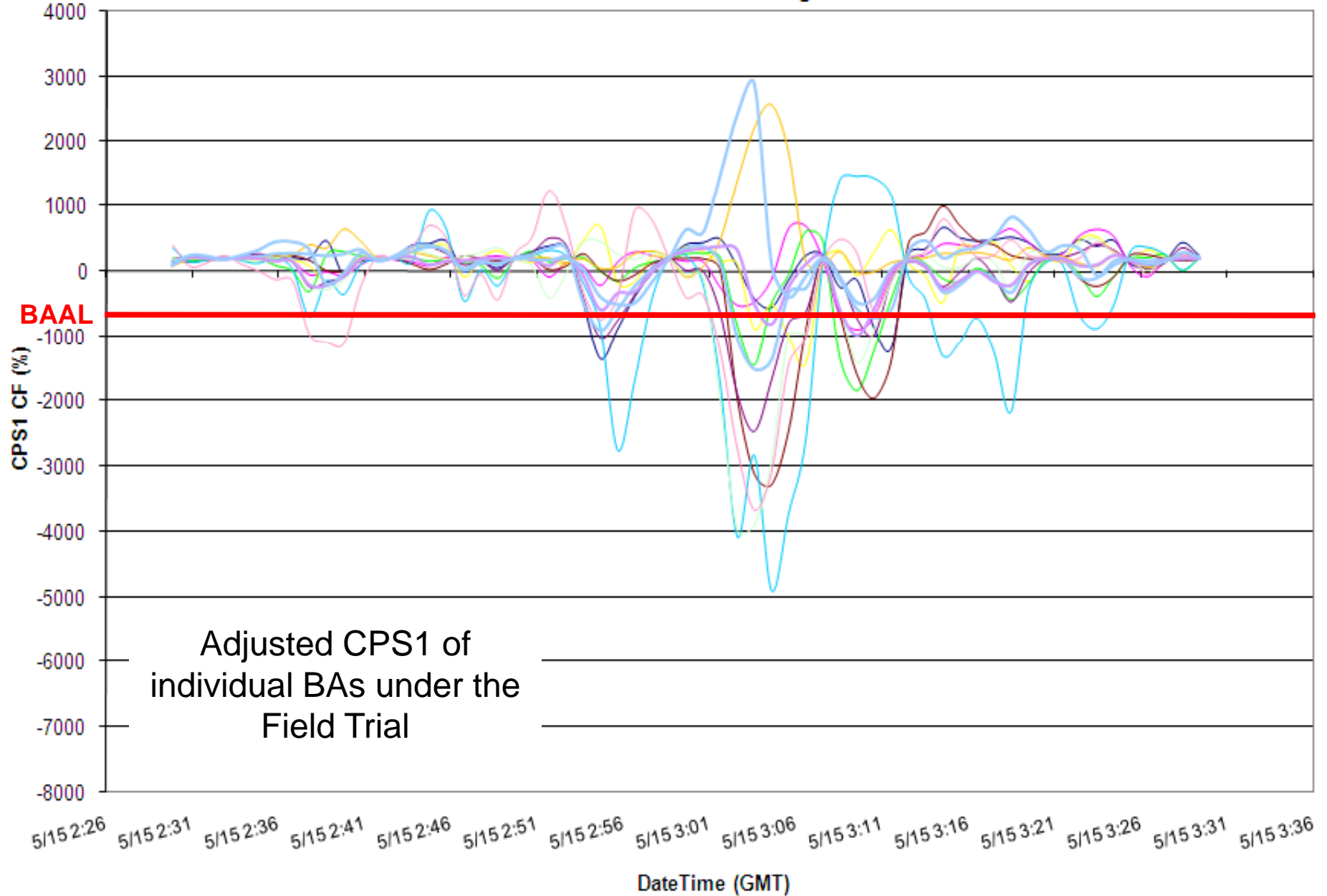
Clock-minute Actual Frequency of Participants

5/14/2010 23:01-23:06 EDT

5 minute duration below FTL_{Low}

during 59.98 Hz TEC

ACPS1 One-Minute Averages

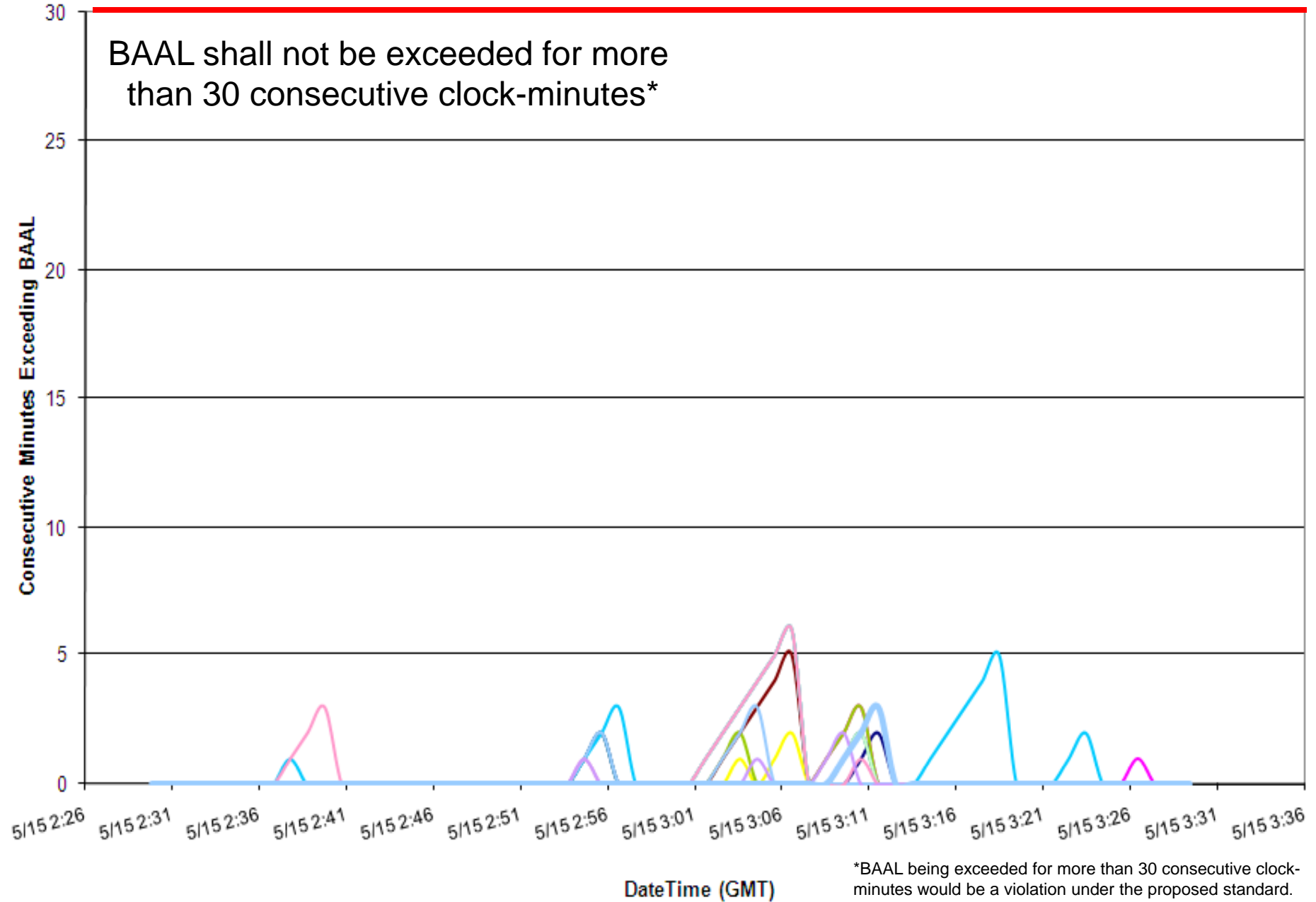


5/14/2010 23:01-23:06 EDT

5 minute duration below FTL_{Low}
during 59.98 Hz TEC

Consecutive Minutes Exceeding BAAL

BAAL Violation*

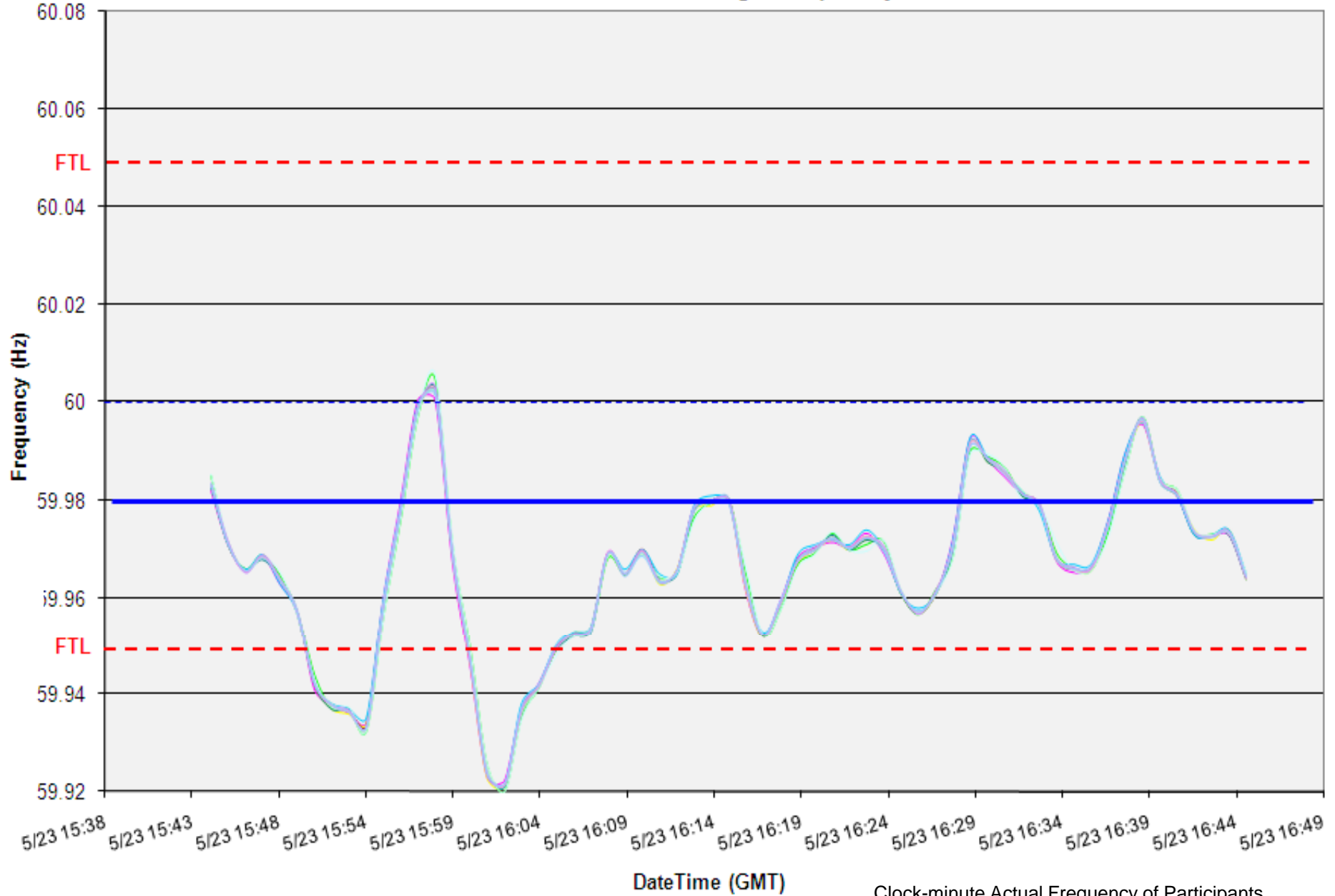


5/23/2010 9:58-10:27 EDT

29-minute duration below BAAL_{Low}

during 59.98 Hz TEC

EI Clock-Minute Average Frequency



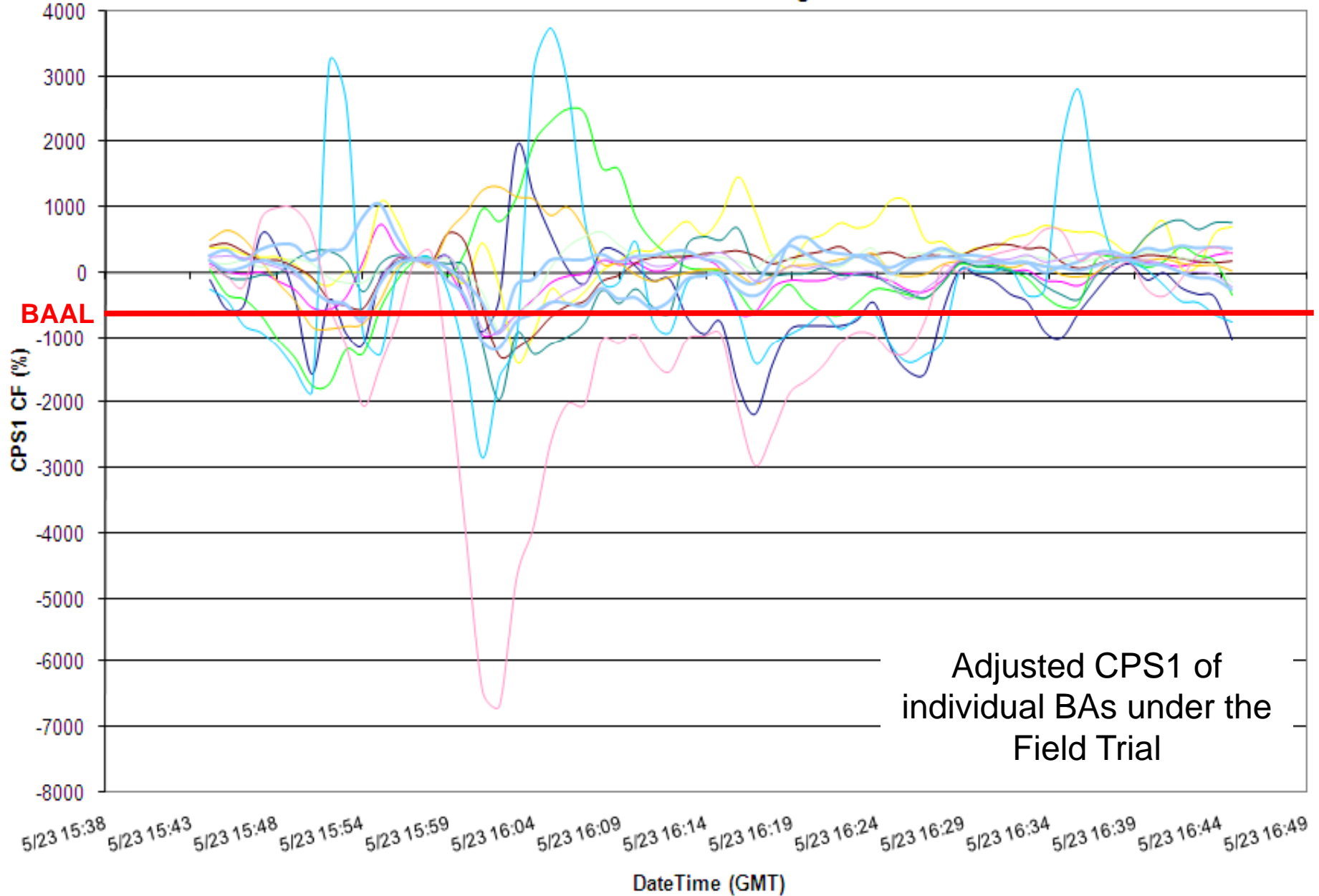
Clock-minute Actual Frequency of Participants

5/23/2010 9:58-10:27 EDT

29-minute duration below BAAL_{Low}

during 59.98 Hz TEC

ACPS1 One-Minute Averages



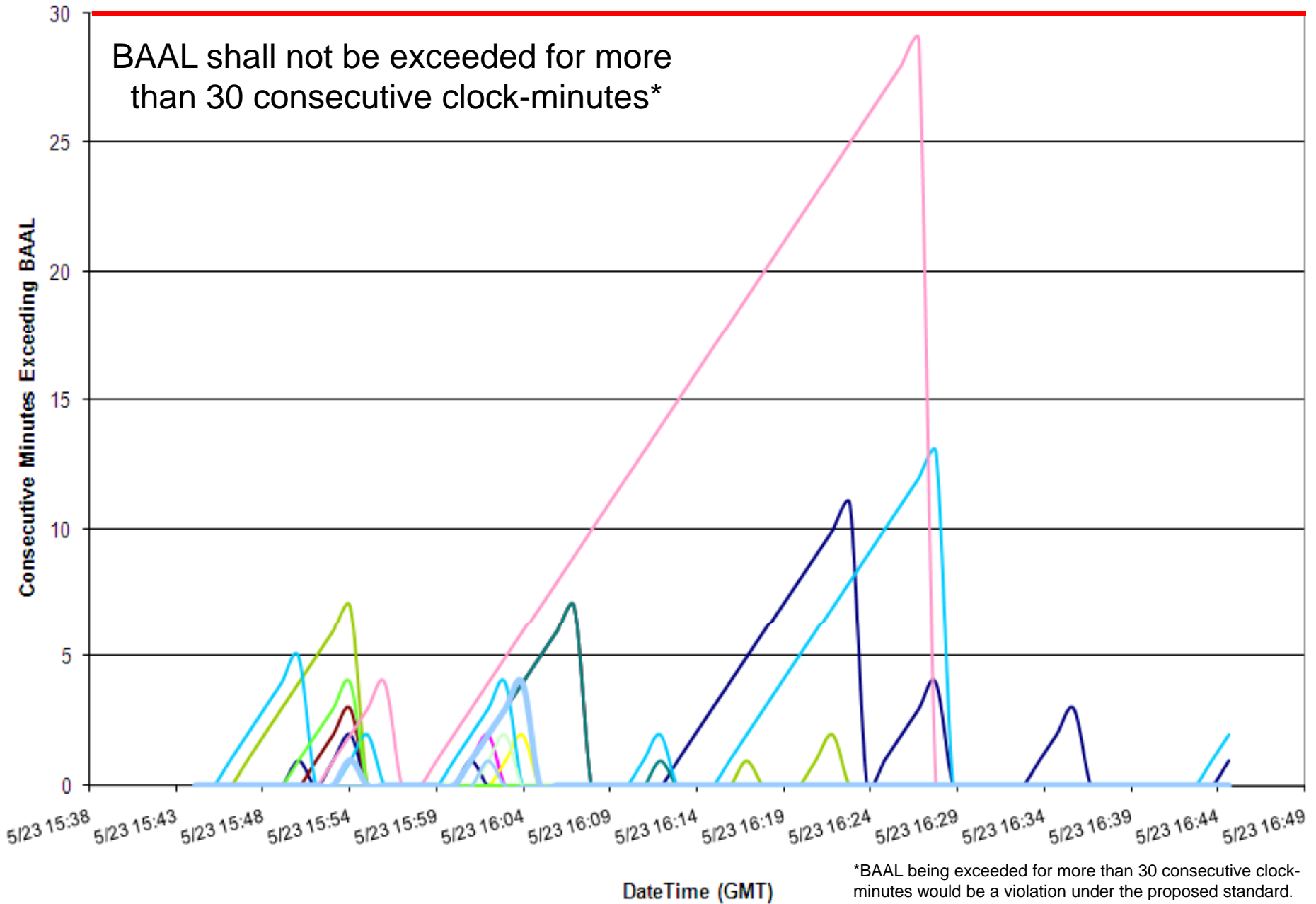
Adjusted CPS1 of
individual BAs under the
Field Trial

5/23/2010 9:58-10:27 EDT

29-minute duration below BAAL_{Low}
during 59.98 Hz TEC

Consecutive Minutes Exceeding BAAL

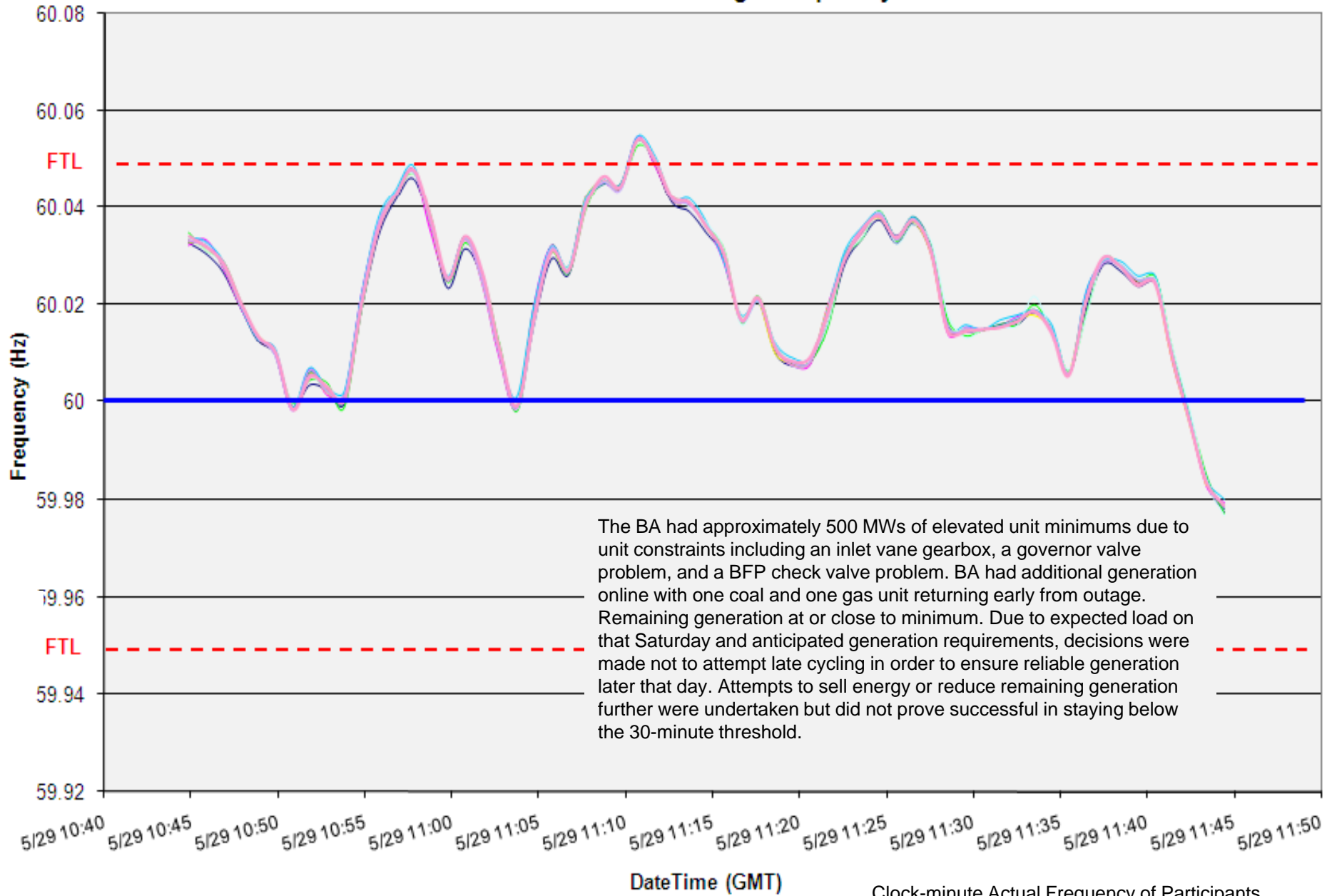
BAAL Violation*



5/29/2010 5:04-5:35 EDT

31-minute duration above BAAL_{High}

EI Clock-Minute Average Frequency

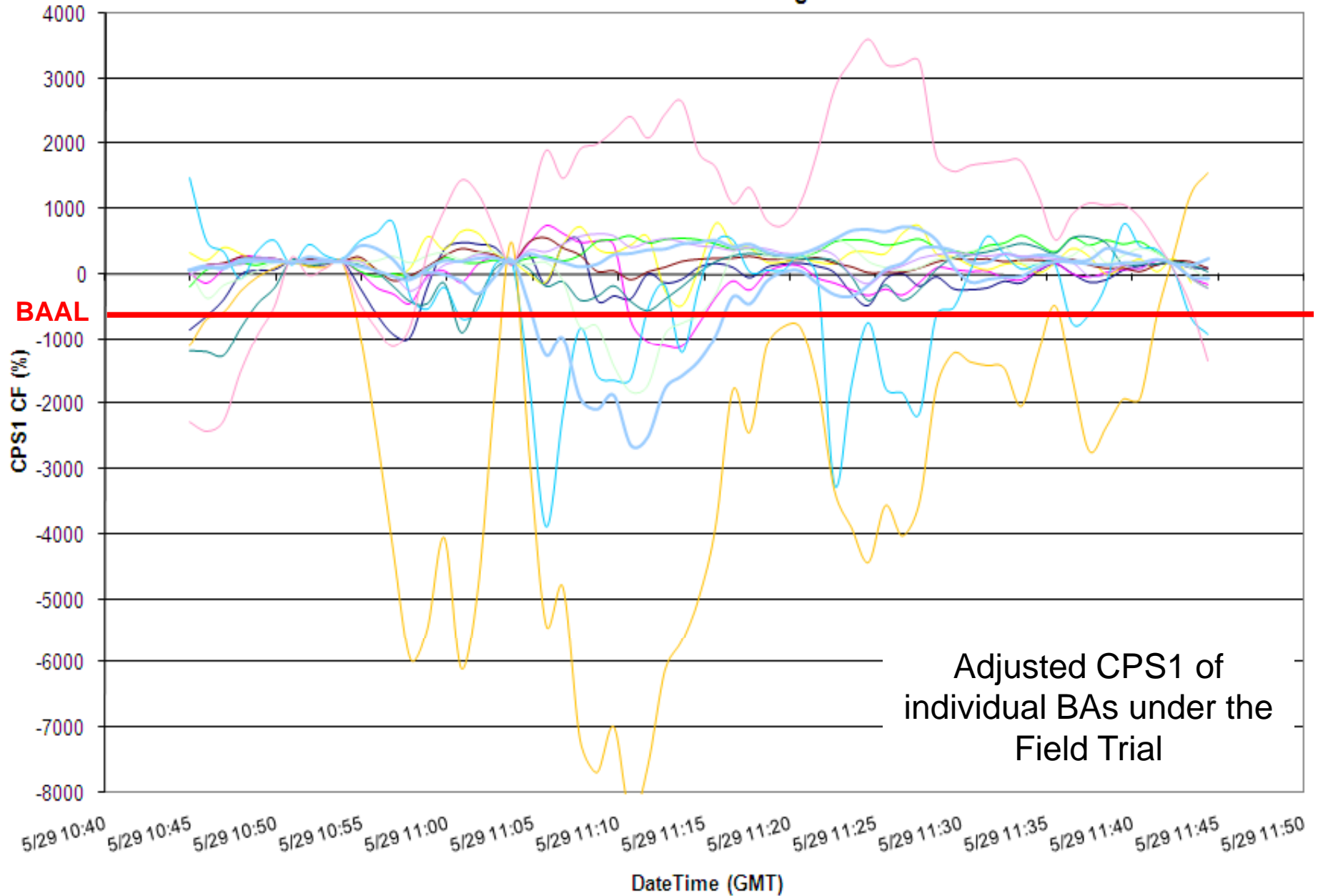


Clock-minute Actual Frequency of Participants

5/29/2010 5:04-5:35 EDT

31-minute duration above BAAL_{High}

ACPS1 One-Minute Averages



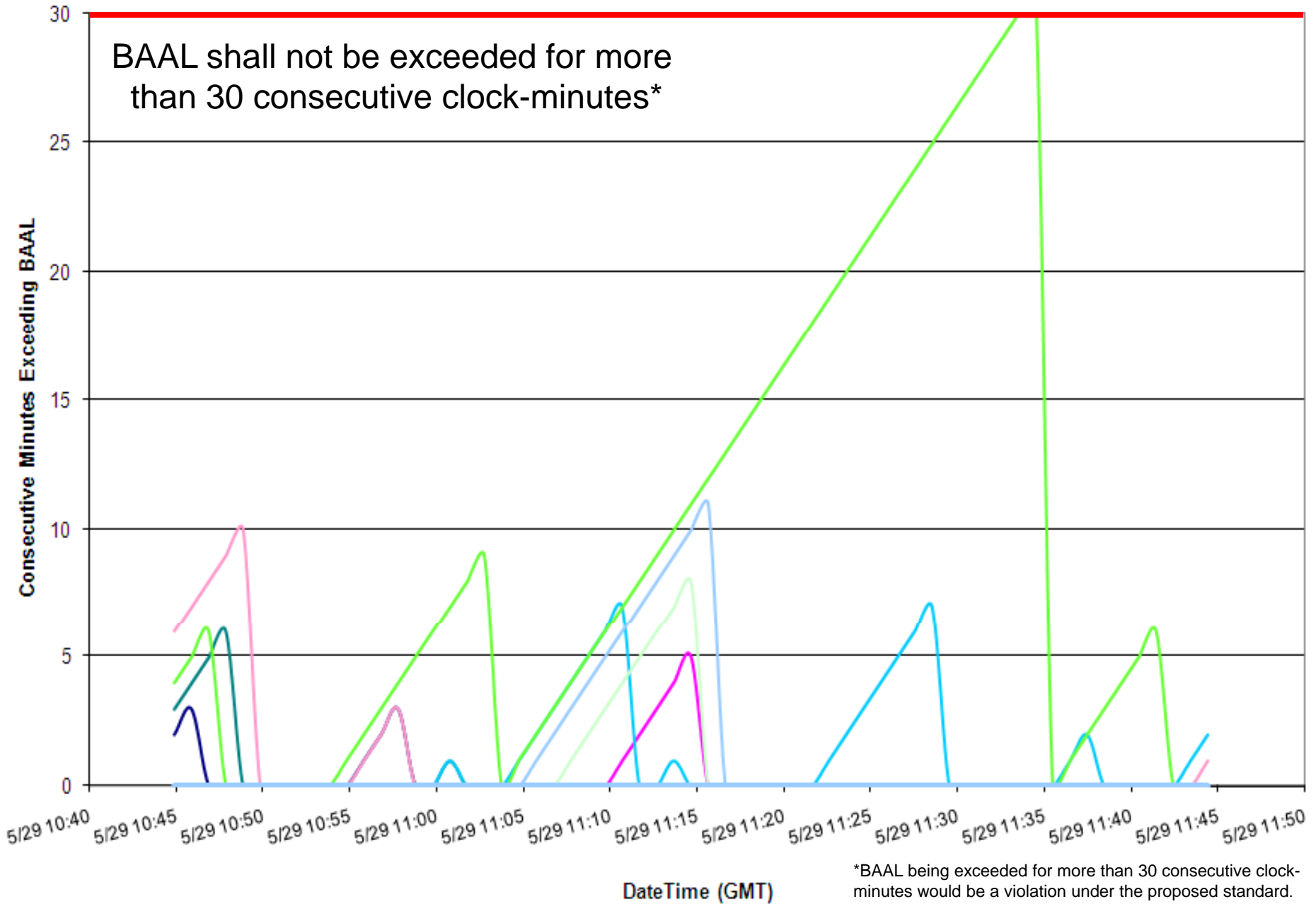
Adjusted CPS1 of individual BAs under the Field Trial

5/29/2010 5:04-5:35 EDT

31-minute duration above BAAL_{High}

Consecutive Minutes Exceeding BAAL

○ BAAL Violation*



Project 2007-18 Reliability-Based Control - examples of ACE exceeding the BAAL

Project 2007-18 Reliability-Based Control Proof-of-Concept Field Trial

Monthly Review of ACE Exceeding the Balancing Authority ACE Limit

On a monthly basis, each Balancing Authority will review its performance for the prior month and identify any periods where the ACE exceeded the low BAAL ("BAAL_{Low}") or the high BAAL ("BAAL_{High}") for more than ten consecutive clock-minutes. To help the RBCSDT gain a better understanding of the circumstances that all Balancing Authorities may be faced while operating under BAL-007, each Balancing Authority will provide a brief explanation of the circumstances related to any periods where the duration of consecutive clock-minutes exceeded twenty minutes. In the event that no period exceeded twenty minutes in the prior month, but the longest duration exceeded ten minutes, the Balancing Authority will provide a brief explanation of the circumstances related to that longest-duration event.

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
5/2/10 21:22	5/2/10 21:35	EST	0:13	0	0	Electric ARC furnace shutdown (125 MW's), falling load curve, de-commitment of Combustion Turbines in progress
5/4/10 16:28	5/4/10 16:48	CDT	0:20	0	0	Time error correction in effect. 600 MW Coal Unit began dropping load due to high condensate level from 575 to 350 MW. Unit began swinging. System Operator prepared to call for reserves in the event the unit tripped. System Operator also verified availability of quick start peaker. 100 MW sale ramped out at 16:45. Coal Unit recovered at and began picking up enough load to recover within BAAL.
5/5/10 15:37	5/5/10 15:59	CDT	0:22	0	0	Time error correction in effect. 200 MW purchase was cut due to TLR. Raised 600 MW coal unit to top to gain 20 MW, 145 MW ramping in due to normal schedule changes. Began cutting 75 MW sale when BAAL returned.
5/23/10 10:59	5/23/10 11:28	EST	0:29	0	0	A BAAL low event occurred during a time error correction. An industrial customer was swinging and the units were at the top. The frequency was low.
5/25/10 14:41	5/25/10 15:02	CDT	0:21	0	0	Time error correction in effect. A 280 MW Coal Unit fuel tripped at 14:41 and dropped 230 MW. System load was increasing steadily. A 110 MW quick-start peaker was fired at 14:51 and synchronized at 14:58. A second 110 MW quick-start peaker was fired at 15:00. Recovered within BAAL before second peaker synchronized.
5/26/10 19:20	5/26/10 19:30	EDT	0:10	0	0	High ACE caused by demand being lighter than expected. No notable actions taken to recover.
5/27/10 14:12	5/27/10 14:29	EST	0:17	0	0	Coal unit dropped to 232 net MW in a runback event. The operator quickstarted 2 combustion turbine units and requested 70MW from dam.
5/29/10 7:04	5/29/10 7:35	EPT	0:31	0	0	Minimum Generation problems
5/30/10 4:22	5/30/10 4:33	EDT	0:11	0	0	High ACE caused by surplus conditions resulting from lighter than expected loads. Imports curtailed mid-hour to reduce the over generation condition

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Discussion

Doug Hils

Reliability-Based Control Standard Drafting Team

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