

Balancing Authority ACE Limit Proof-of-Concept Field Trial

WECC Update Discussion
July 26, 2010

DISCUSSION STARTING AT 3:30 PM EDT

Doug Hils – Duke Energy

Reliability-Based Control Standard Drafting Team

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Western Interconnection Balancing Authority Participants	2010 Frequency Bias	WECC Region	Reliability Coordinator	Start Date
Alberta Electric System Operator (AESO)	-125	NWPP	WECC	March 1, 2010
Arizona Public Service Company (AZPS)	-74.5	AZNMSNV	WECC	March 1, 2010
Bonneville Power Administration (BPAT)	-157.3	NWPP	WECC	March 1, 2010
British Columbia Transmission Corporation (BCTC)	-118	NWPP	WECC	April 1, 2010
California Independent System Operator (CISO)	-485	CAMX	WECC	March 1, 2010
El Paso Electric Company (EPE)	-19	AZNMSNV	WECC	March 1, 2010
NaturEner Power Watch , LLC(GWA)	-2.1	NWPP	WECC	March 1, 2010
Idaho Power Company (IPCO)	-40	NWPP	WECC	March 1, 2010
Los Angeles Department of Water and Power (LDWP)	-62.3	CAMX	WECC	March 1, 2010
Nevada Power Company (NEVP)	-62.29	AZNMSNV	WECC	March 1, 2010
PacifiCorp East (PACE)	-77	NWPP	WECC	March 1, 2010
PacifiCorp West (PACW)	-45	NWPP	WECC	March 1, 2010
Portland General Electric (PGE)	-50	NWPP	WECC	April 1, 2010
Public Service Company of Colorado (PSCO)	-80	RMPA	WECC	March 1, 2010
Public Utility District No.1 of Chelan County(CHPD)	-12	NWPP	WECC	March 1, 2010
Public Utility District No.1 of Douglas County (DOPD)	-7	NWPP	WECC	April 1, 2010
Public Utility District No.2 of Grant County (GCPD)	-25	NWPP	WECC	March 1, 2010
Seattle City Light (SCL)	-40	NWPP	WECC	March 1, 2010
Sacramento Municipal Utility District (SMUD)	-45.18	NWPP	WECC	March 1, 2010
Salt River Project (SRP)	-65.2	AZNMSNV	WECC	May 1, 2010
Sierra Pacific Power Company (SPPC)	-20.04	NWPP	WECC	March 1, 2010
Tucson Electric Power (TEPC)	-30.4	AZNMSNV	WECC	March 1, 2010
Turlock Irrigation District (TIDC)	-6.7	NWPP	WECC	March 1, 2010
Western Area Power Administration – Rocky Mountain Region (WACM)	-55	RMPA	WECC	March 1, 2010
Western Area Power Administration- Desert Southwest Region (WALC)	-54.8	AZNMSNV	WECC	March 1, 2010

Clock-Minute Frequency Below 59.932 Hz FTL_{Low} or Above 60.068 Hz FTL_{High}

DateTime	TimeZone	FreqError	ActualFreq	SchedFreq	Comment
6/5/10 10:18	PDT	-0.1562	59.8438	60.00	1900 MW gen loss in California - Mexico Region
6/5/10 10:19	PDT	-0.1365	59.8635	60.00	
6/5/10 10:20	PDT	-0.1374	59.8626	60.00	
6/5/10 10:21	PDT	-0.1331	59.8669	60.00	
6/5/10 10:22	PDT	-0.1257	59.8743	60.00	
6/5/10 10:23	PDT	-0.1037	59.8963	60.00	
6/5/10 10:24	PDT	-0.0921	59.9079	60.00	
6/5/10 10:25	PDT	-0.0845	59.9155	60.00	
6/18/10 8:08	PDT	-0.0878	59.9122	60.00	1350 MW gen loss in Southwest Region
6/18/10 8:09	PDT	-0.0823	59.9177	60.00	
6/18/10 8:10	PDT	-0.0819	59.9181	60.00	
6/20/10 6:47	PDT	-0.0509	59.9291	59.98	Under generation
6/20/10 6:48	PDT	-0.0508	59.9292	59.98	
6/23/10 12:45	PDT	-0.0990	59.9010	60.00	1400 MW gen loss in Northwest
6/23/10 12:46	PDT	-0.1036	59.8964	60.00	
6/23/10 12:47	PDT	-0.1029	59.8971	60.00	
6/23/10 12:48	PDT	-0.1047	59.8953	60.00	
6/23/10 12:49	PDT	-0.0876	59.9124	60.00	
6/23/10 12:50	PDT	-0.0833	59.9167	60.00	
6/23/10 12:51	PDT	-0.0758	59.9242	60.00	
6/23/10 14:13	PDT	-0.0860	59.9140	60.00	1400 MW gen loss in Northwest
6/23/10 14:14	PDT	-0.0870	59.9130	60.00	
6/23/10 14:15	PDT	-0.0783	59.9217	60.00	
DateTime	TimeZone	FreqError	ActualFreq	SchedFreq	
6/12/10 23:48	PDT	0.0690	60.0690	60.00	

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*

BA	Max_MinCtLow	Max_MinCtHigh	Max_MinCtLow2	Max_MinCtHigh2	Max_LowLimitCt	Max_HighLimitCt
BA01	5	1	2	3	5	3
BA02	5	4	3	4	5	4
BA03	10	10	5	3	10	10
BA04	11	7	11	11	11	11
BA05	9	6	13	13	13	13
BA06	6	3	10	13	10	13
BA07	3	5	8	14	8	14
BA08	7	6	14	14	14	14
BA09	9	7	13	14	13	15
BA10	3	7	3	16	3	16
BA11	17	9	16	16	17	16
BA12	3	9	12	17	12	17
BA13	12	3	25	19	25	19
BA14	6	7	6	21	6	21
BA15	11	16	19	21	19	21
BA16	13	4	22	22	22	22
BA17	6	16	18	24	18	24
BA18	20	16	26	26	27	26
BA19	18	18	27	28	27	28
BA20	27	28	29	29	30	29
BA21	6	16	16	34	16	34
BA22	6	14	35	36	35	36
BA23	10	17	43	37	43	37
BA24	16	12	39	39	39	39
BA25	26	11	28	58	28	58

MinCtLow = Count of consecutive clock-minutes BAAL_{Low} was exceeded
 MinCtHigh = Count of consecutive clock-minutes BAAL_{High} was exceeded
 MinCtLow2 = Count of consecutive clock-minutes ATL_{Low} was exceeded
 MinCtHigh2 = Count of consecutive clock-minutes ATL_{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	FreqError	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	MinCtLow2	MinCtHigh2	LowLimitCt	HighLimitCt	DateTimeMST
06/01/10	23:43	MDT	0.0242	60.0242	60.00	0	22	0	0	0	22	6/1/2010 22:43
06/01/10	23:44	MDT	0.0312	60.0312	60.00	0	23	0	0	0	23	6/1/2010 22:44
06/01/10	23:45	MDT	0.0316	60.0316	60.00	0	24	0	0	0	24	6/1/2010 22:45
06/01/10	23:46	MDT	0.0366	60.0366	60.00	0	25	0	0	0	25	6/1/2010 22:46
06/01/10	23:47	MDT	0.0409	60.0409	60.00	0	26	0	0	0	26	6/1/2010 22:47
06/01/10	23:48	MDT	0.0289	60.0289	60.00	0	27	0	0	0	27	6/1/2010 22:48
06/01/10	23:49	MDT	0.0214	60.0214	60.00	0	28	0	0	0	28	6/1/2010 22:49
06/11/10	10:38	MDT	-0.0279	59.9721	60.00	21	0	13	0	21	0	6/11/2010 9:38
06/11/10	10:39	MDT	-0.0354	59.9646	60.00	22	0	14	0	22	0	6/11/2010 9:39
06/11/10	10:40	MDT	-0.0381	59.9619	60.00	23	0	15	0	23	0	6/11/2010 9:40
06/11/10	10:41	MDT	-0.0236	59.9764	60.00	24	0	16	0	24	0	6/11/2010 9:41
06/11/10	10:42	MDT	-0.0231	59.9769	60.00	25	0	17	0	25	0	6/11/2010 9:42
06/11/10	10:43	MDT	-0.0193	59.9807	60.00	26	0	0	0	26	0	6/11/2010 9:43
06/11/10	10:44	MDT	-0.0178	59.9822	60.00	27	0	0	0	27	0	6/11/2010 9:44
06/08/10	9:00	PDT	-0.0128	59.9872	60.00	0	0	31	0	31	0	6/8/2010 9:00
06/08/10	9:01	PDT	-0.0194	59.9806	60.00	1	0	32	0	32	0	6/8/2010 9:01
06/08/10	9:02	PDT	-0.0161	59.9839	60.00	2	0	33	0	33	0	6/8/2010 9:02
06/08/10	9:03	PDT	-0.0097	59.9903	60.00	0	0	34	0	34	0	6/8/2010 9:03
06/08/10	9:04	PDT	-0.0061	59.9939	60.00	0	0	35	0	35	0	6/8/2010 9:04
06/08/10	9:05	PDT	-0.0056	59.9944	60.00	0	0	36	0	36	0	6/8/2010 9:05
06/08/10	9:06	PDT	-0.0087	59.9913	60.00	0	0	37	0	37	0	6/8/2010 9:06
06/08/10	9:07	PDT	-0.0064	59.9936	60.00	0	0	38	0	38	0	6/8/2010 9:07
06/08/10	9:08	PDT	-0.0053	59.9947	60.00	0	0	39	0	39	0	6/8/2010 9:08
06/08/10	9:09	PDT	-0.0056	59.9944	60.00	0	0	40	0	40	0	6/8/2010 9:09
06/08/10	9:10	PDT	-0.0061	59.9939	60.00	0	0	41	0	41	0	6/8/2010 9:10
06/08/10	9:11	PDT	-0.0036	59.9964	60.00	0	0	42	0	42	0	6/8/2010 9:11
06/08/10	9:12	PDT	-0.0058	59.9942	60.00	0	0	43	0	43	0	6/8/2010 9:12
06/12/10	6:01	PDT	0.0256	60.0256	60.00	0	5	0	31	0	31	6/12/2010 6:01
06/12/10	6:02	PDT	0.0246	60.0246	60.00	0	6	0	32	0	32	6/12/2010 6:02
06/12/10	6:03	PDT	0.0147	60.0147	60.00	0	0	0	33	0	33	6/12/2010 6:03
06/12/10	6:04	PDT	0.0229	60.0229	60.00	0	1	0	34	0	34	6/12/2010 6:04
06/12/10	6:05	PDT	0.0187	60.0187	60.00	0	0	0	35	0	35	6/12/2010 6:05
06/12/10	6:06	PDT	0.0152	60.0152	60.00	0	0	0	36	0	36	6/12/2010 6:06
06/12/10	6:07	PDT	0.0115	60.0115	60.00	0	0	0	37	0	37	6/12/2010 6:07
06/12/10	6:08	PDT	0.0168	60.0168	60.00	0	0	0	38	0	38	6/12/2010 6:08
06/12/10	6:09	PDT	0.0196	60.0196	60.00	0	0	0	39	0	39	6/12/2010 6:09

Date	Time	TimeZone	FreqError	ActualFreq	SchedFreq	MinCtLow	MinCtHigh	MinCtLow2	MinCtHigh2	LowLimitCt	HighLimitCt	DateTimeMST
06/13/10	2:07	PDT	-0.0029	59.9971	60.00	0	0	31	0	31	0	6/13/2010 2:07
06/13/10	2:08	PDT	-0.0027	59.9973	60.00	0	0	32	0	32	0	6/13/2010 2:08
06/13/10	2:09	PDT	-0.0046	59.9954	60.00	0	0	33	0	33	0	6/13/2010 2:09
06/13/10	2:10	PDT	-0.0017	59.9984	60.00	0	0	34	0	34	0	6/13/2010 2:10
06/13/10	2:11	PDT	-0.0083	59.9917	60.00	0	0	35	0	35	0	6/13/2010 2:11
06/13/10	2:12	PDT	-0.0021	59.9979	60.00	0	0	36	0	36	0	6/13/2010 2:12
06/13/10	2:13	PDT	-0.0122	59.9878	60.00	0	0	37	0	37	0	6/13/2010 2:13
06/13/10	2:14	PDT	0.0045	60.0045	60.00	0	0	38	0	38	0	6/13/2010 2:14
06/13/10	2:15	PDT	-0.0073	59.9927	60.00	0	0	39	0	39	0	6/13/2010 2:15
06/09/10	5:33	MST	0.0109	60.0109	60.00	0	0	0	31	0	31	6/9/2010 5:33
06/09/10	5:34	MST	0.0065	60.0065	60.00	0	0	0	32	0	32	6/9/2010 5:34
06/09/10	5:35	MST	0.0159	60.0159	60.00	0	1	0	33	0	33	6/9/2010 5:35
06/09/10	5:36	MST	0.0164	60.0164	60.00	0	2	0	34	0	34	6/9/2010 5:36
06/09/10	5:37	MST	0.0102	60.0102	60.00	0	0	0	35	0	35	6/9/2010 5:37
06/09/10	5:38	MST	0.0049	60.0049	60.00	0	0	0	36	0	36	6/9/2010 5:38
06/09/10	5:39	MST	-0.0003	59.9997	60.00	0	0	0	37	0	37	6/9/2010 5:39
06/09/10	5:40	MST	0.0103	60.0103	60.00	0	0	0	38	0	38	6/9/2010 5:40
06/09/10	5:41	MST	0.0124	60.0124	60.00	0	0	0	39	0	39	6/9/2010 5:41
06/09/10	5:42	MST	0.0151	60.0151	60.00	0	1	0	40	0	40	6/9/2010 5:42
06/09/10	5:43	MST	0.0255	60.0255	60.00	0	2	0	41	0	41	6/9/2010 5:43
06/09/10	5:44	MST	0.0284	60.0284	60.00	0	3	0	42	0	42	6/9/2010 5:44
06/09/10	5:45	MST	0.0297	60.0297	60.00	0	4	0	43	0	43	6/9/2010 5:45
06/09/10	5:46	MST	0.0315	60.0315	60.00	0	5	0	44	0	44	6/9/2010 5:46
06/09/10	5:47	MST	0.0198	60.0198	60.00	0	6	0	45	0	45	6/9/2010 5:47
06/09/10	5:48	MST	0.0335	60.0335	60.00	0	7	0	46	0	46	6/9/2010 5:48
06/09/10	5:49	MST	0.0246	60.0246	60.00	0	8	0	47	0	47	6/9/2010 5:49
06/09/10	5:50	MST	0.0199	60.0199	60.00	0	9	0	48	0	48	6/9/2010 5:50
06/09/10	5:51	MST	0.0282	60.0282	60.00	0	10	0	49	0	49	6/9/2010 5:51
06/09/10	5:52	MST	0.0165	60.0165	60.00	0	11	0	50	0	50	6/9/2010 5:52
06/09/10	5:53	MST	0.0105	60.0105	60.00	0	0	0	51	0	51	6/9/2010 5:53
06/09/10	5:54	MST	0.0078	60.0078	60.00	0	0	0	52	0	52	6/9/2010 5:54
06/09/10	5:55	MST	0.0043	60.0043	60.00	0	0	0	53	0	53	6/9/2010 5:55
06/09/10	5:56	MST	0.0070	60.0070	60.00	0	0	0	54	0	54	6/9/2010 5:56
06/09/10	5:57	MST	-0.0020	59.9980	60.00	0	0	0	55	0	55	6/9/2010 5:57
06/09/10	5:58	MST	0.0164	60.0164	60.00	0	0	0	56	0	56	6/9/2010 5:58
06/09/10	5:59	MST	0.0138	60.0138	60.00	0	0	0	57	0	57	6/9/2010 5:59
06/09/10	6:00	MST	0.0138	60.0138	60.00	0	0	0	58	0	58	6/9/2010 6:00

Dates in this presentation:

Clock-minute ACE more positive than the $BAAL_{High}$ on June 1, 2010,
ending 22:49 PDT: 28 consecutive clock-minutes

Clock-minute Frequency less than FTL_{Low} on June 5, 2010,
ending 10:25 PDT: 8 consecutive clock-minutes¹

Clock-minute ACE more negative than the ATL_{Low} on June 8, 2010,
ending 9:12 PDT: 43 consecutive clock-minutes

Clock-minute ACE more positive than the ATL_{High} on June 9, 2010,
ending 6:00 PDT: 58 consecutive clock-minutes

Clock-minute ACE more negative than the $BAAL_{Low}$ on June 11, 2010,
ending 9:44 PDT: 27 consecutive clock-minutes

Clock-minute Frequency less than FTL_{Low} on June 23, 2010,
ending 12:51 PDT: 7 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.

6/01/2010 ending 22:49 PDT

28-minute duration above BAAL_{High}

Clock-Minute Average Frequency

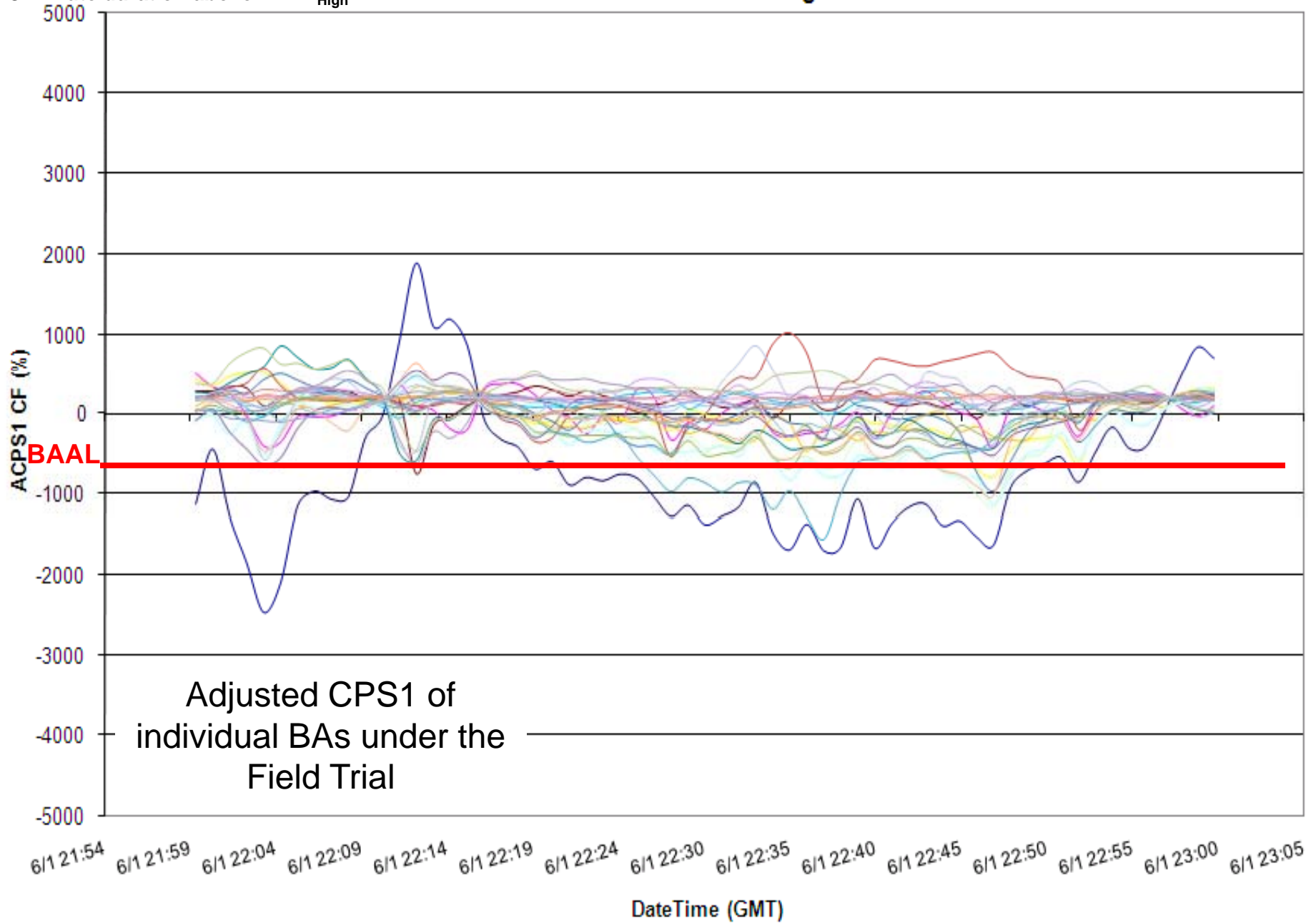


Clock-minute Actual Frequency of Participants

6/01/2010 ending 22:49 PDT

28-minute duration above BAAL_{High}

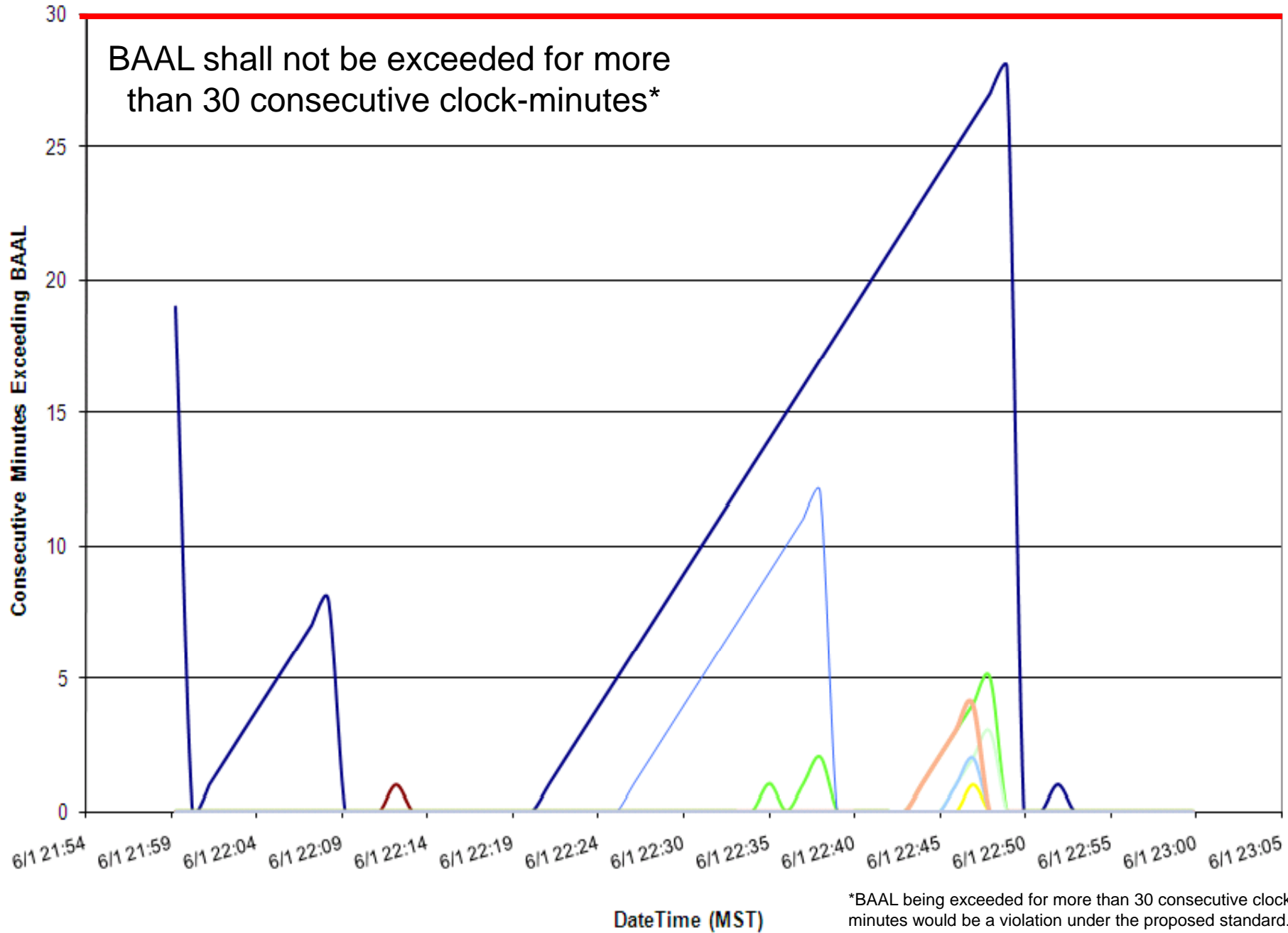
ACPS1 Clock-Minute Averages



6/01/2010 ending 22:49 PDT
28-minute duration above BAAL_{High}

Consecutive Minutes Exceeding BAAL

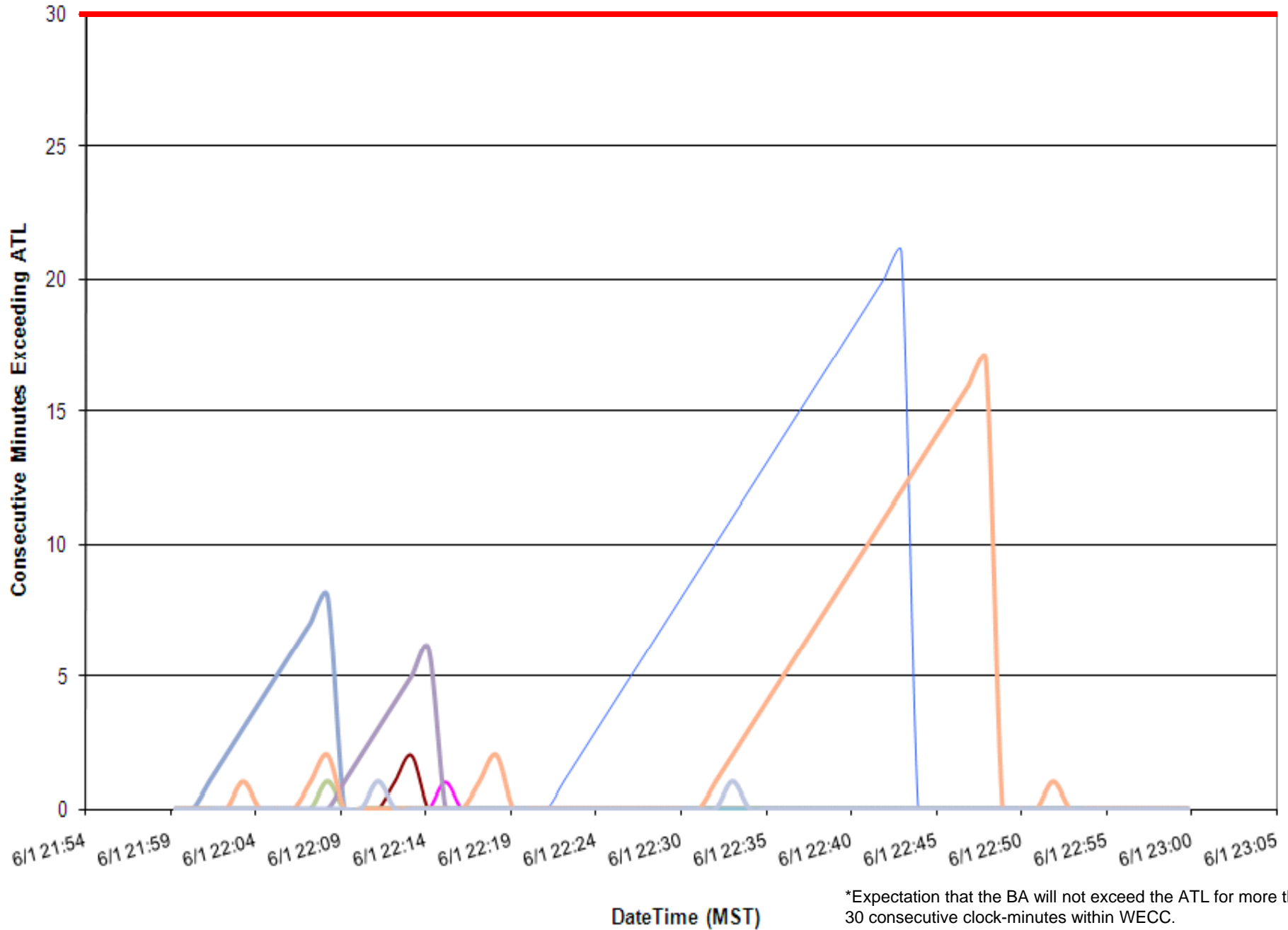
BAAL Violation*



6/01/2010 ending 22:49 PDT
28-minute duration above BAAL_{High}

Consecutive Minutes Exceeding ATL

ATL 30 Min Limit*

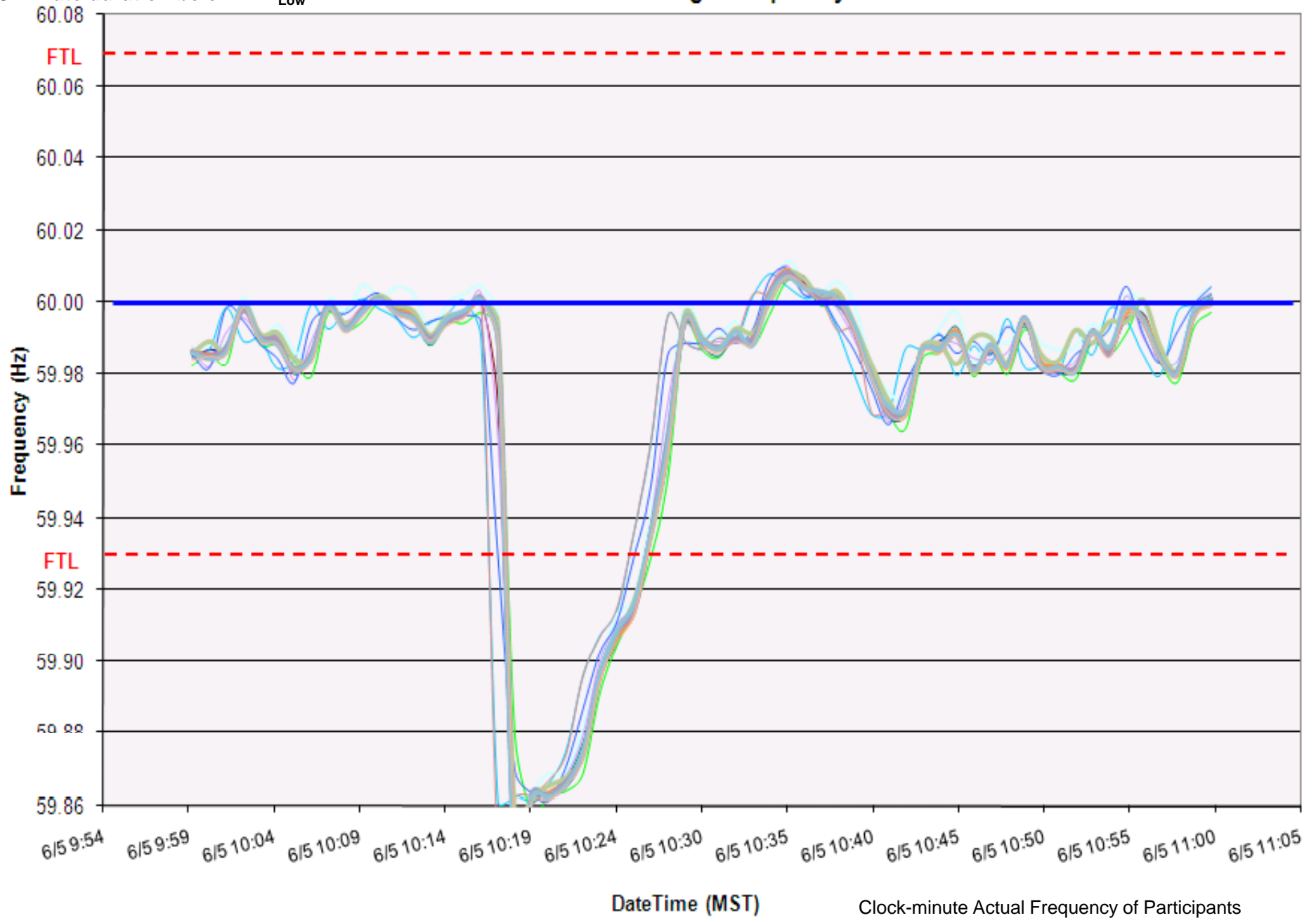


*Expectation that the BA will not exceed the ATL for more than 30 consecutive clock-minutes within WECC.

6/05/2010 ending 10:25 PDT

8 minute duration below FTL_{Low}

Clock-Minute Average Frequency

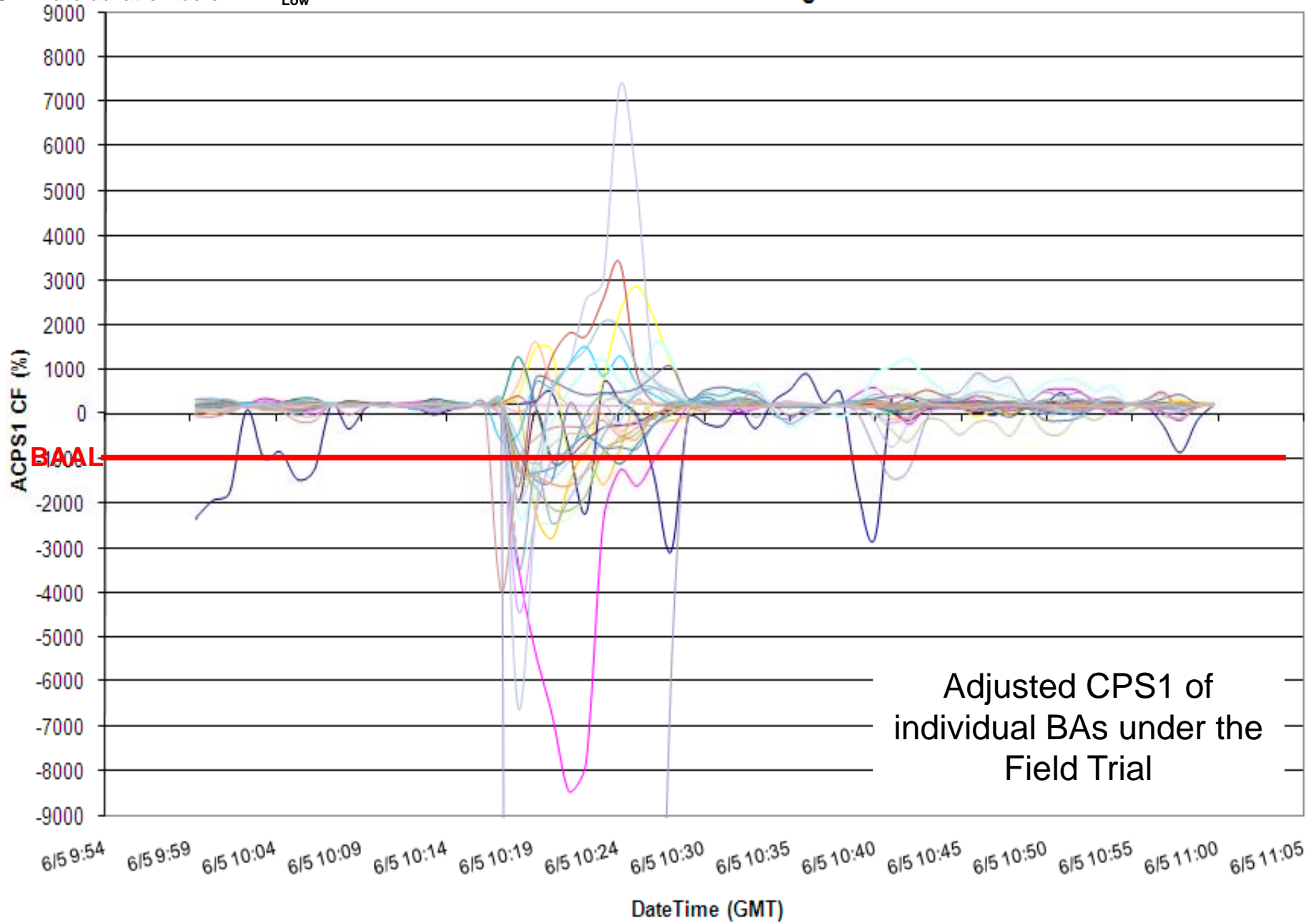


Clock-minute Actual Frequency of Participants

6/05/2010 ending 10:25 PDT

8 minute duration below FTL_{Low}

ACPS1 Clock-Minute Averages



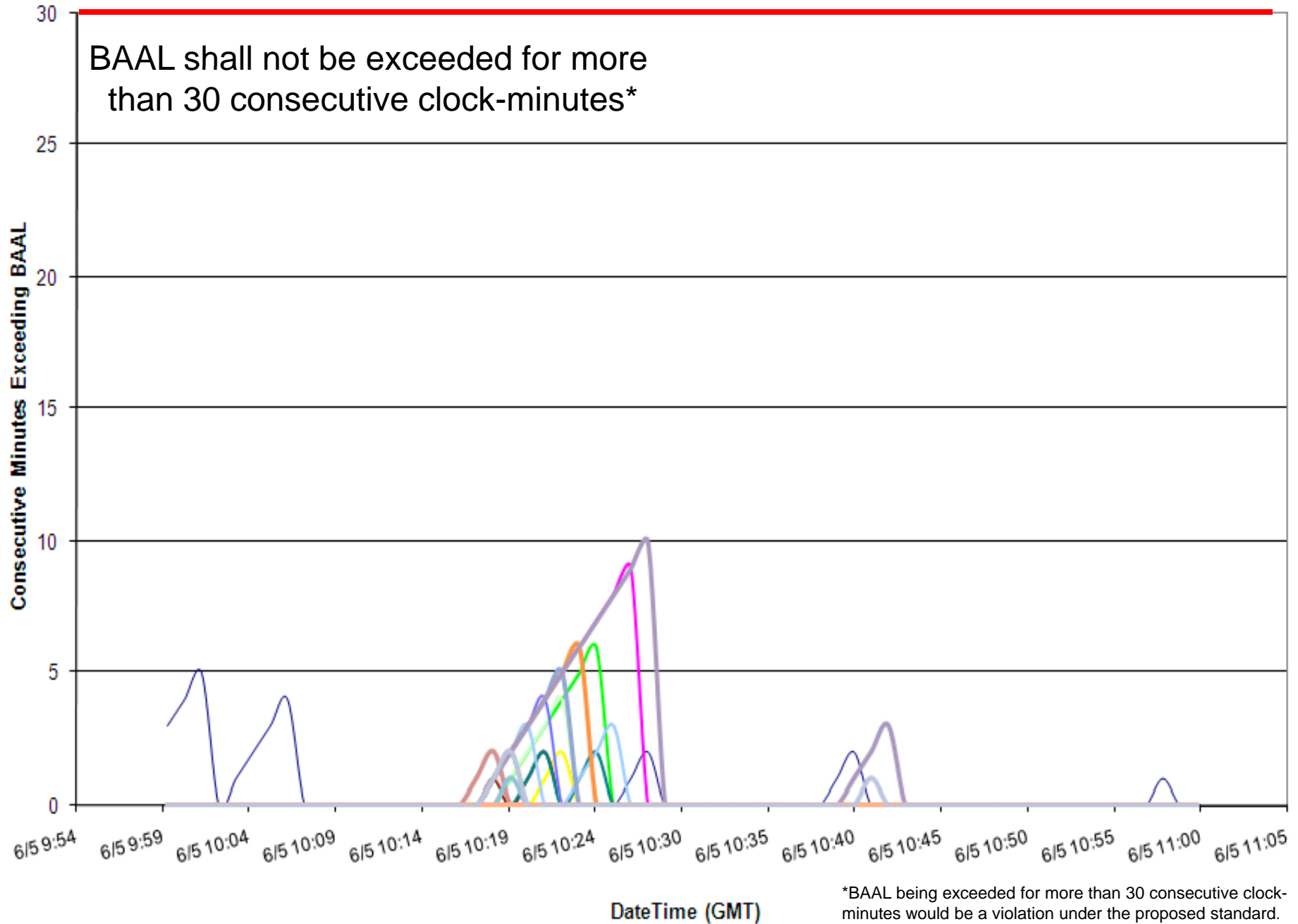
Adjusted CPS1 of
individual BAs under the
Field Trial

6/05/2010 ending 10:25 PDT

8 minute duration below FTL_{Low}

Consecutive Minutes Exceeding BAAL

BAAL Violation*

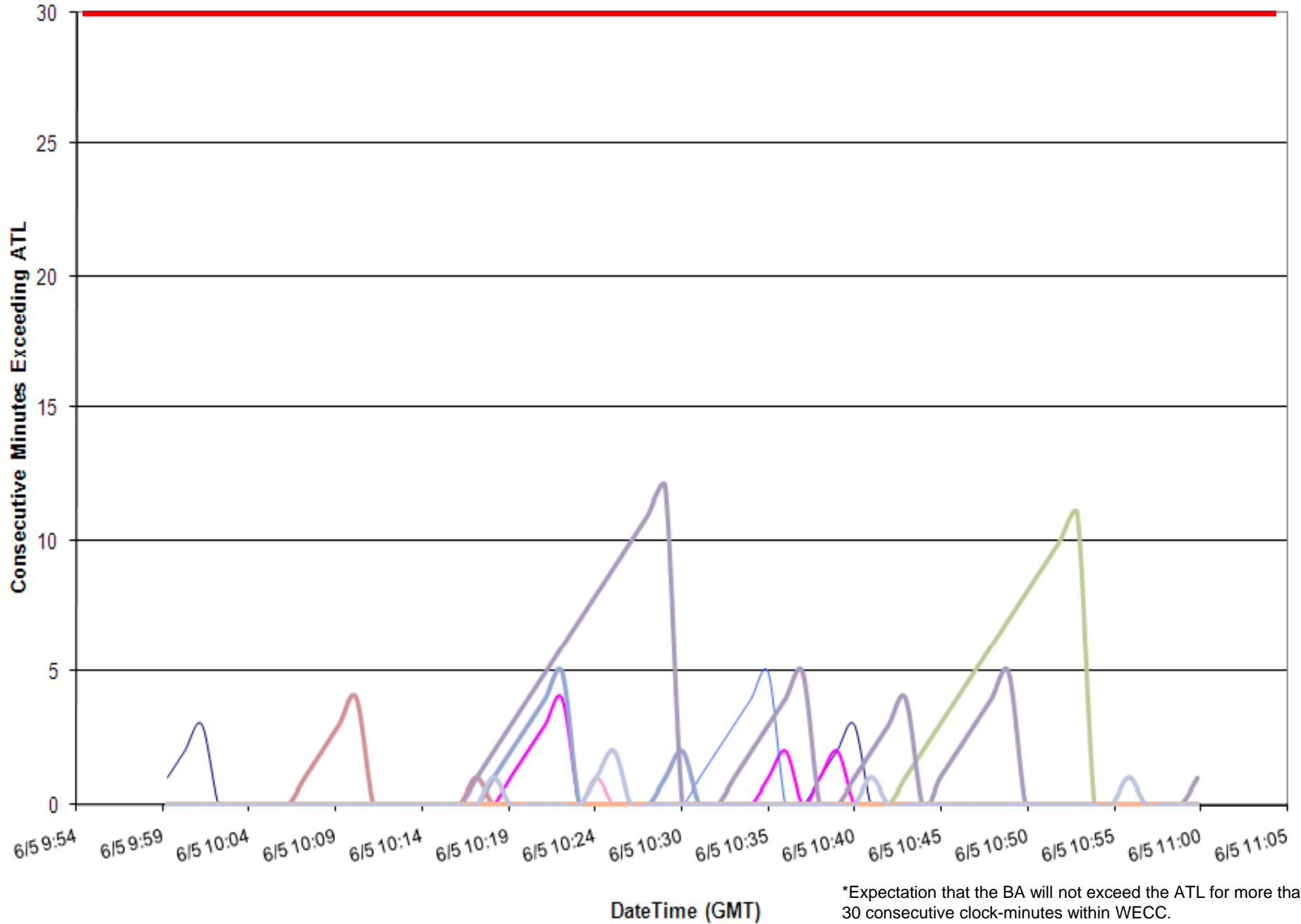


6/05/2010 ending 10:25 PDT

8 minute duration below FTL_{Low}

Consecutive Minutes Exceeding ATL

ATL 30 Min Limit



*Expectation that the BA will not exceed the ATL for more than 30 consecutive clock-minutes within WECC.

6/08/2010 ending 9:12 PDT

43-minute duration below ATL_{Low}

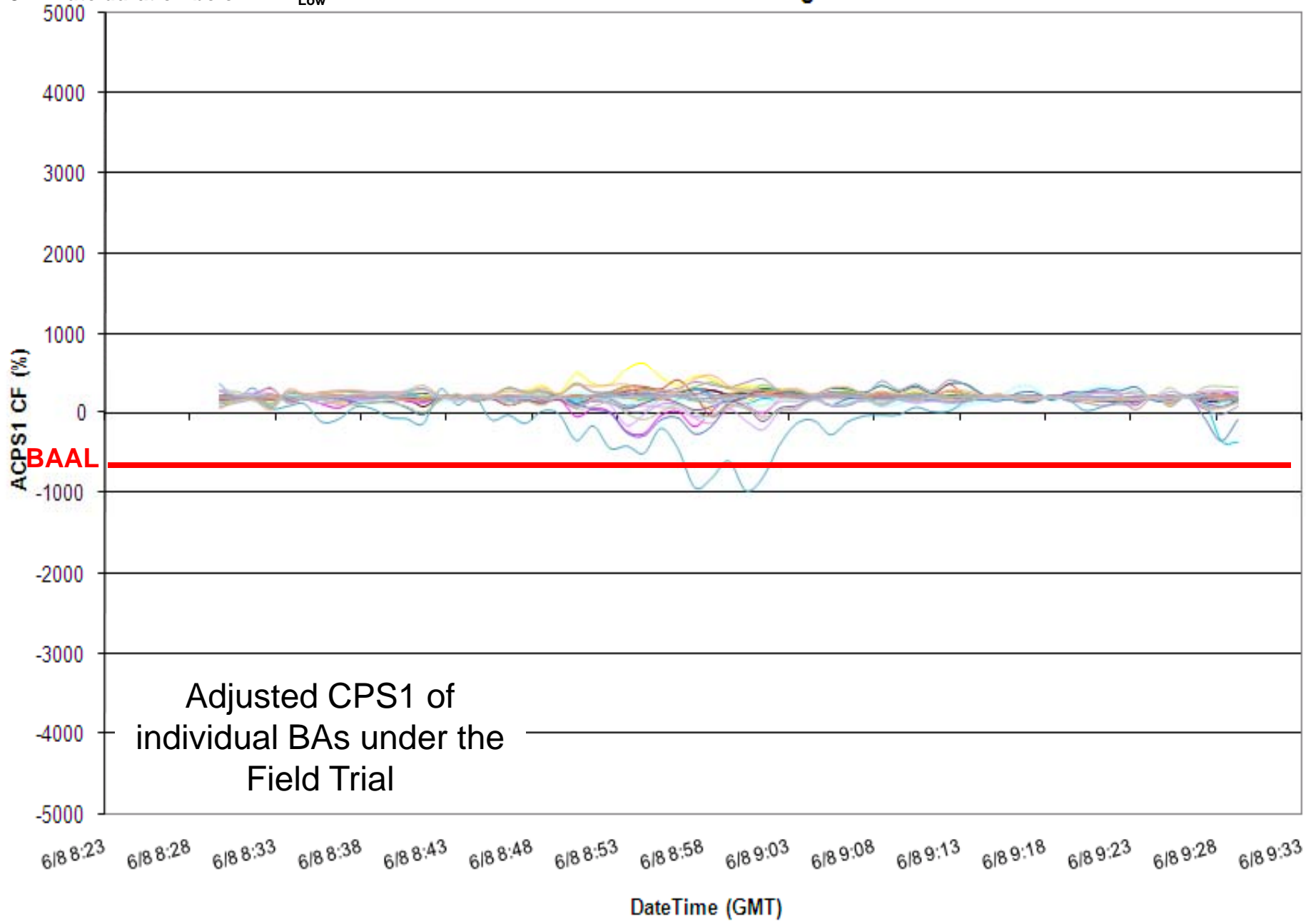
Clock-Minute Average Frequency



6/08/2010 ending 9:12 PDT

43-minute duration below ATL_{Low}

ACPS1 Clock-Minute Averages



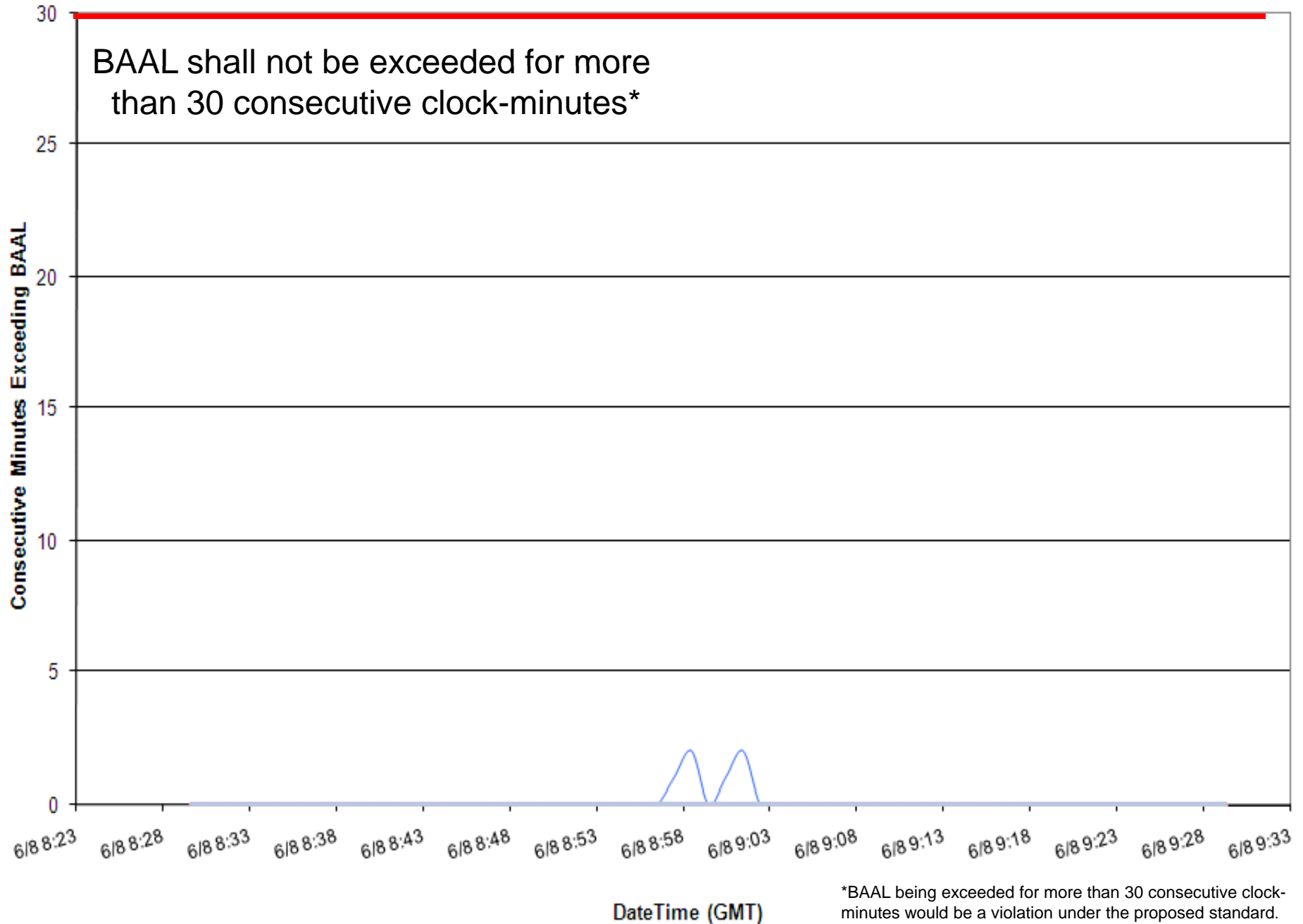
Adjusted CPS1 of
individual BAs under the
Field Trial

6/08/2010 ending 9:12 PDT

43-minute duration below ATL_{Low}

Consecutive Minutes Exceeding BAAL

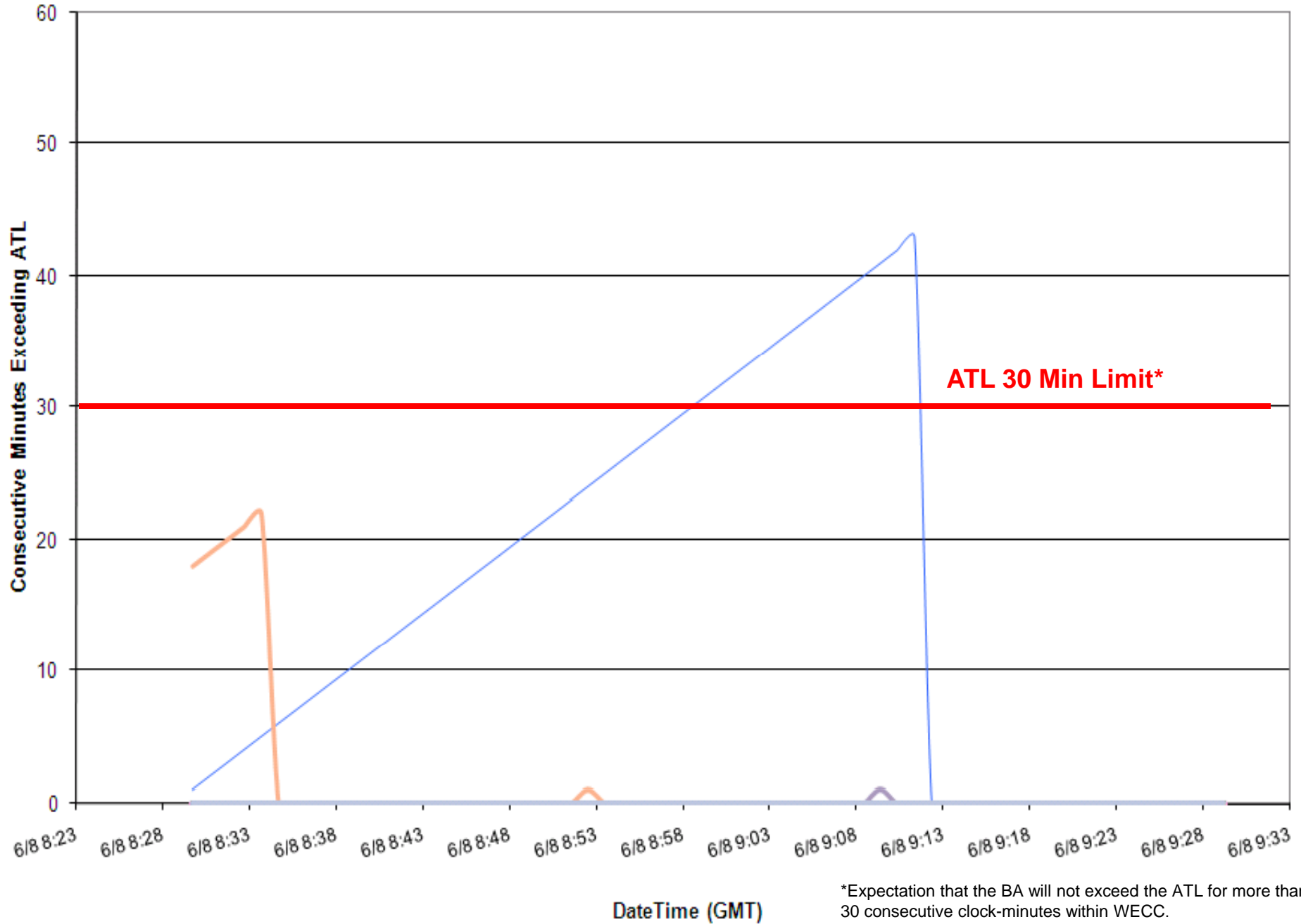
BAAL Violation*



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

6/08/2010 ending 9:12 PDT
43-minute duration below ATL_{Low}

Consecutive Minutes Exceeding ATL



*Expectation that the BA will not exceed the ATL for more than 30 consecutive clock-minutes within WECC.

6/09/2010 ending 6:00 PDT

58-minute duration above ATL_{High}

Clock-Minute Average Frequency

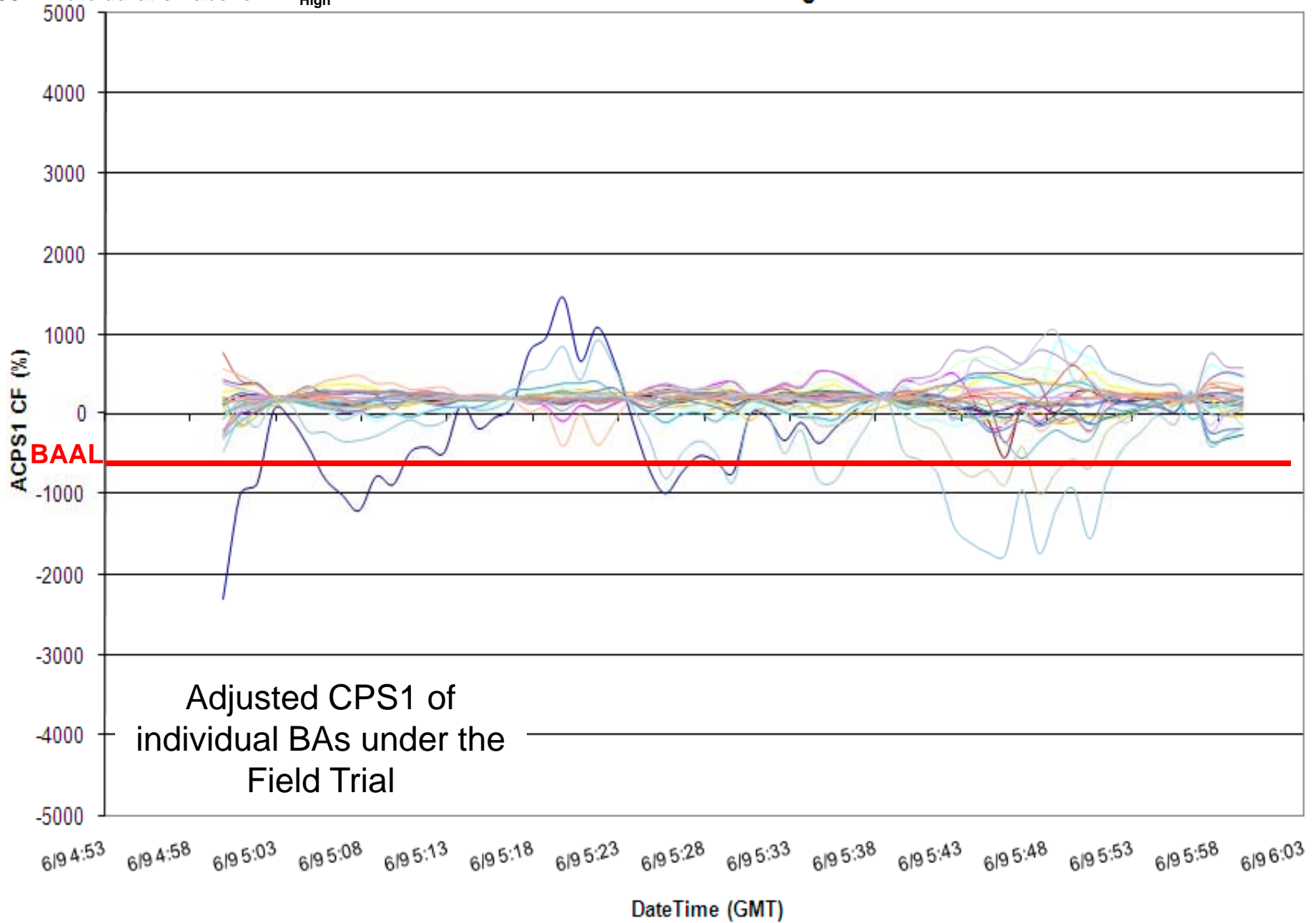


Clock-minute Actual Frequency of Participants

6/09/2010 ending 6:00 PDT

58-minute duration above ATL_{High}

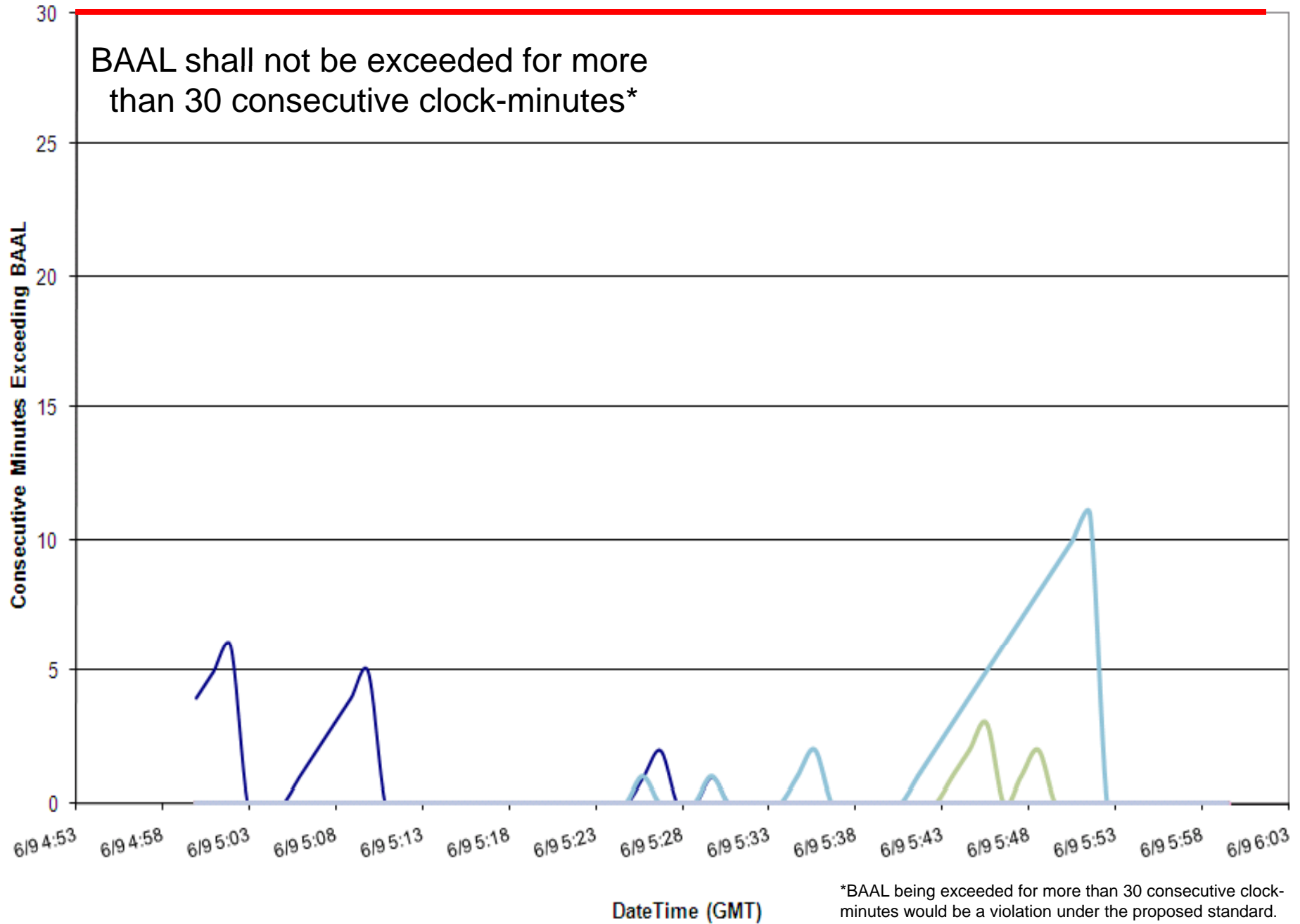
ACPS1 Clock-Minute Averages



6/09/2010 ending 6:00 PDT
58-minute duration above ATL_{High}

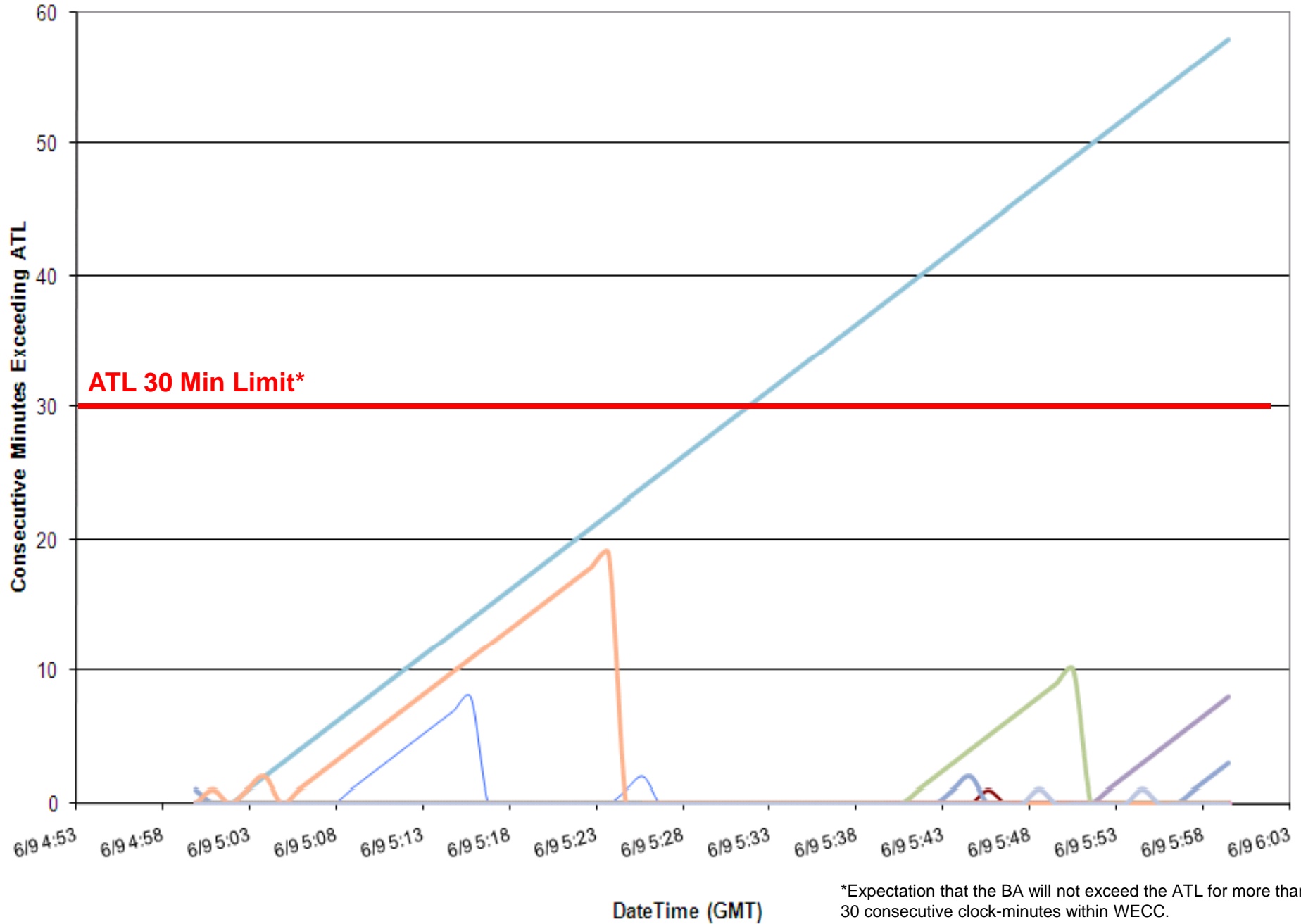
Consecutive Minutes Exceeding BAAL

BAAL Violation*



6/09/2010 ending 6:00 PDT
58-minute duration above ATL_{High}

Consecutive Minutes Exceeding ATL



*Expectation that the BA will not exceed the ATL for more than 30 consecutive clock-minutes within WECC.

6/11/2010 ending 9:44 PDT

27-minute duration below BAAL_{Low}

Clock-Minute Average Frequency

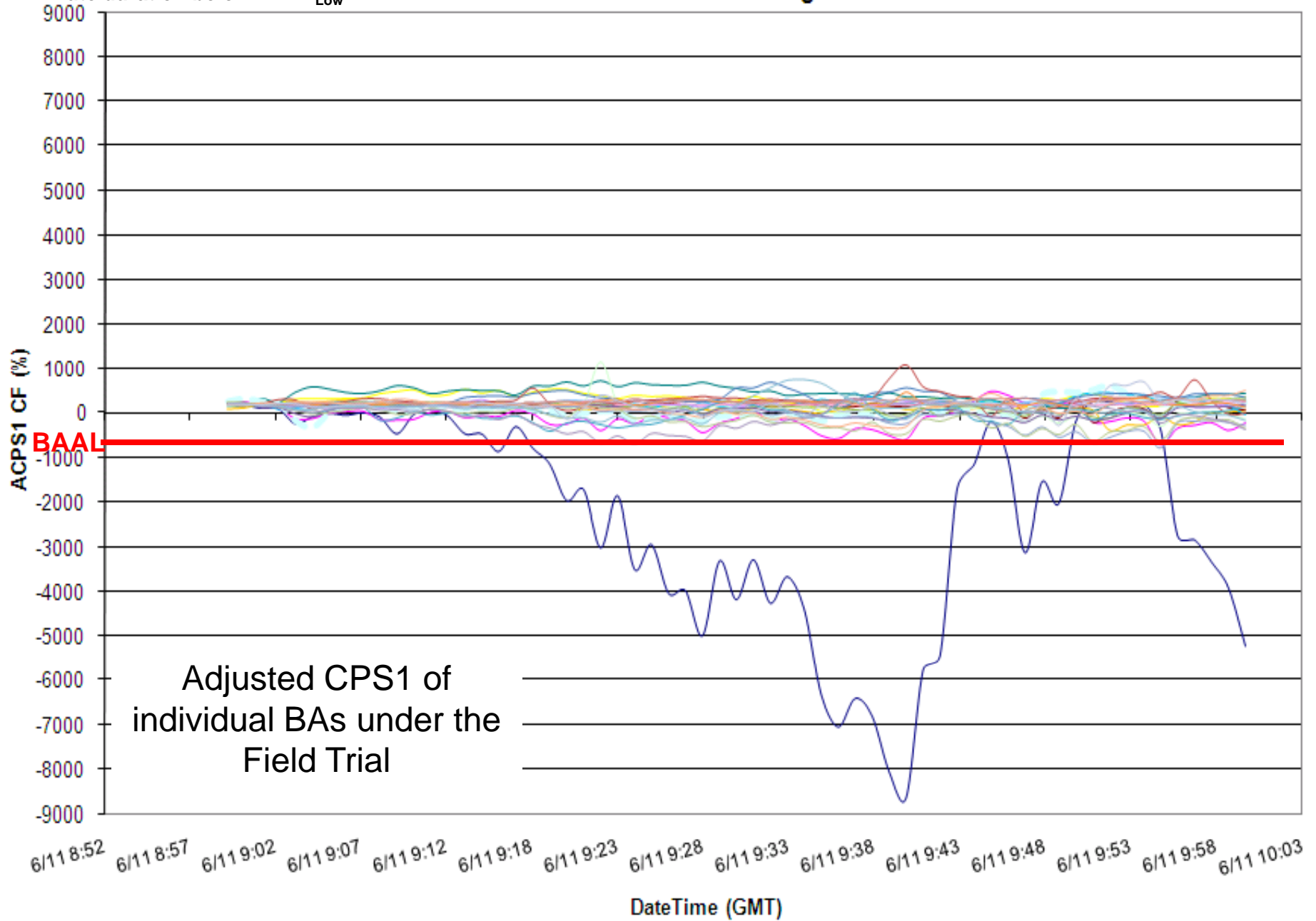


Clock-minute Actual Frequency of Participants

6/11/2010 ending 9:44 PDT

27-minute duration below BAAL_{Low}

ACPS1 Clock-Minute Averages



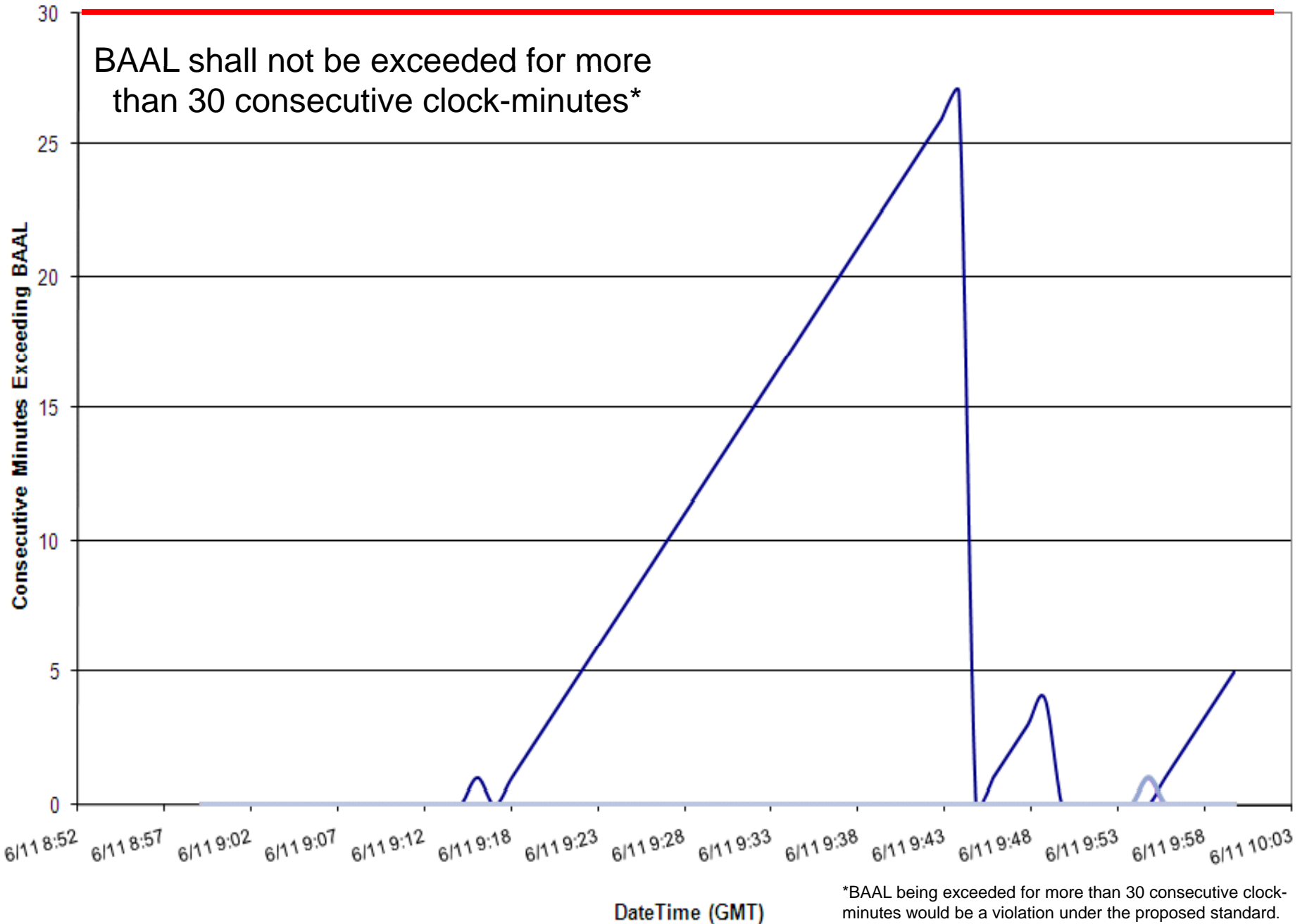
Adjusted CPS1 of individual BAs under the Field Trial

6/11/2010 ending 9:44 PDT

27-minute duration below BAAL_{Low}

Consecutive Minutes Exceeding BAAL

BAAL Violation*

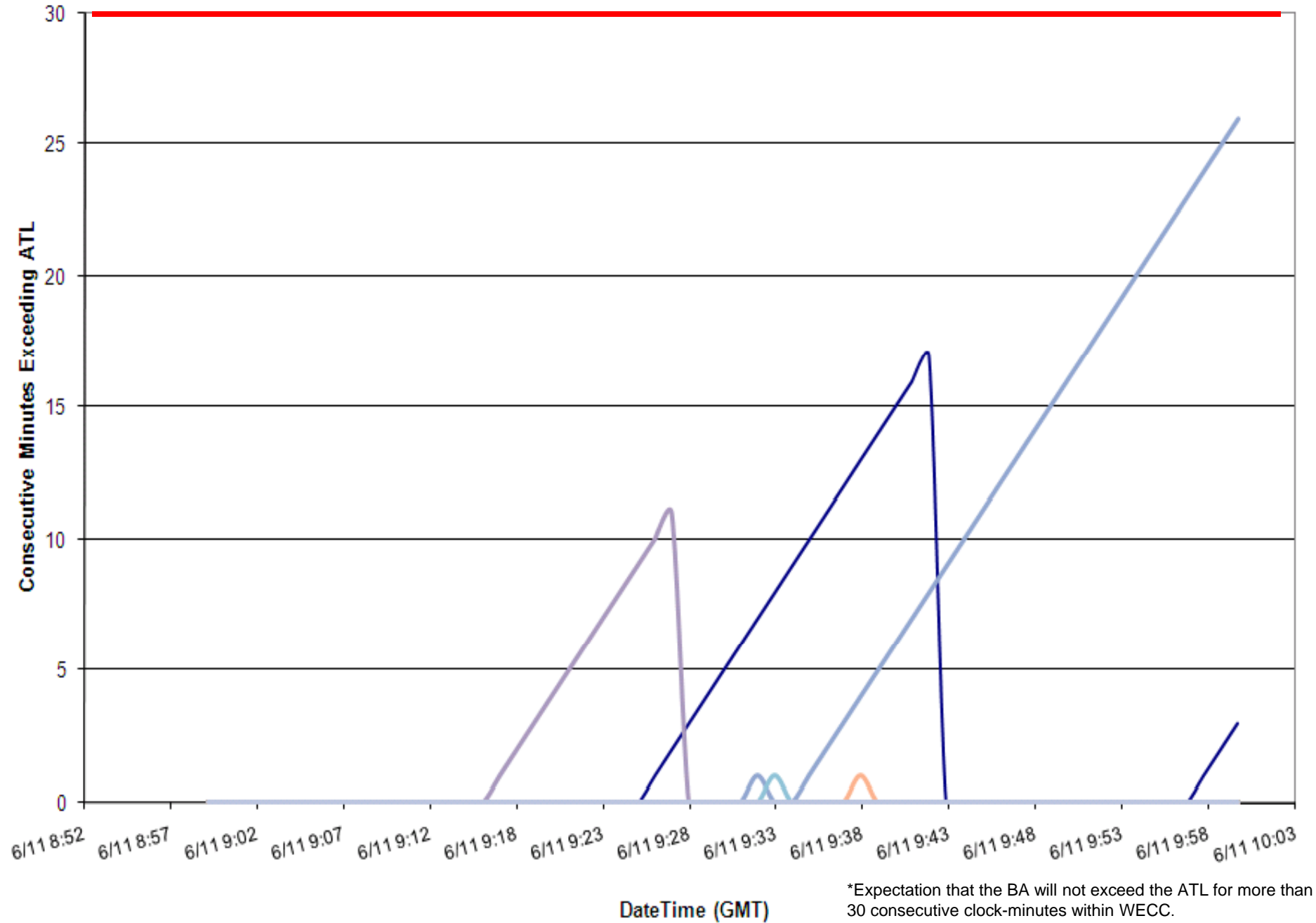


6/11/2010 ending 9:44 PDT

27-minute duration below BAAL_{Low}

Consecutive Minutes Exceeding ATL

ATL 30 Min Limit*

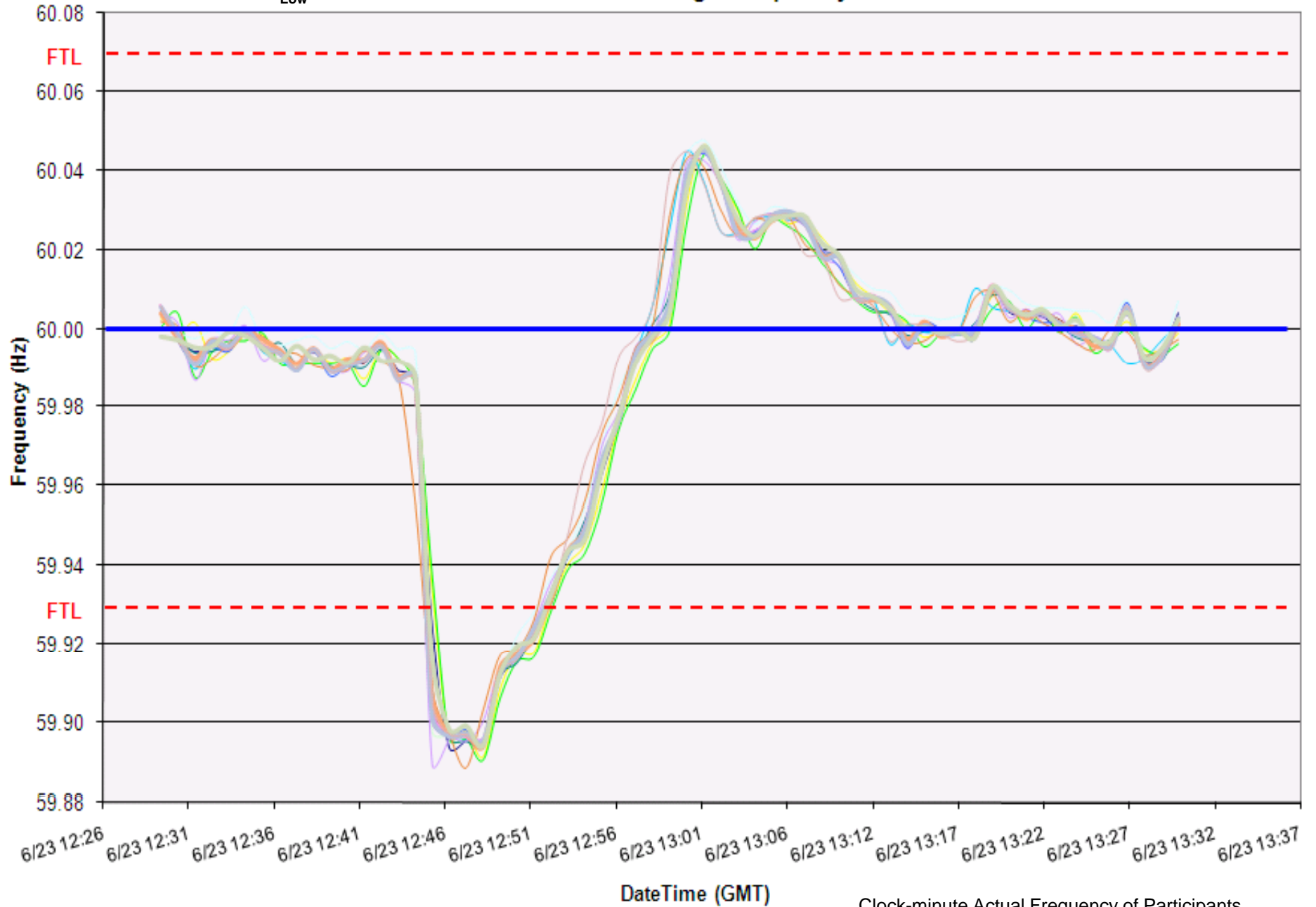


*Expectation that the BA will not exceed the ATL for more than 30 consecutive clock-minutes within WECC.

6/23/2010 ending 12:51 PDT

7-minute duration below FTL_{Low}

Clock-Minute Average Frequency

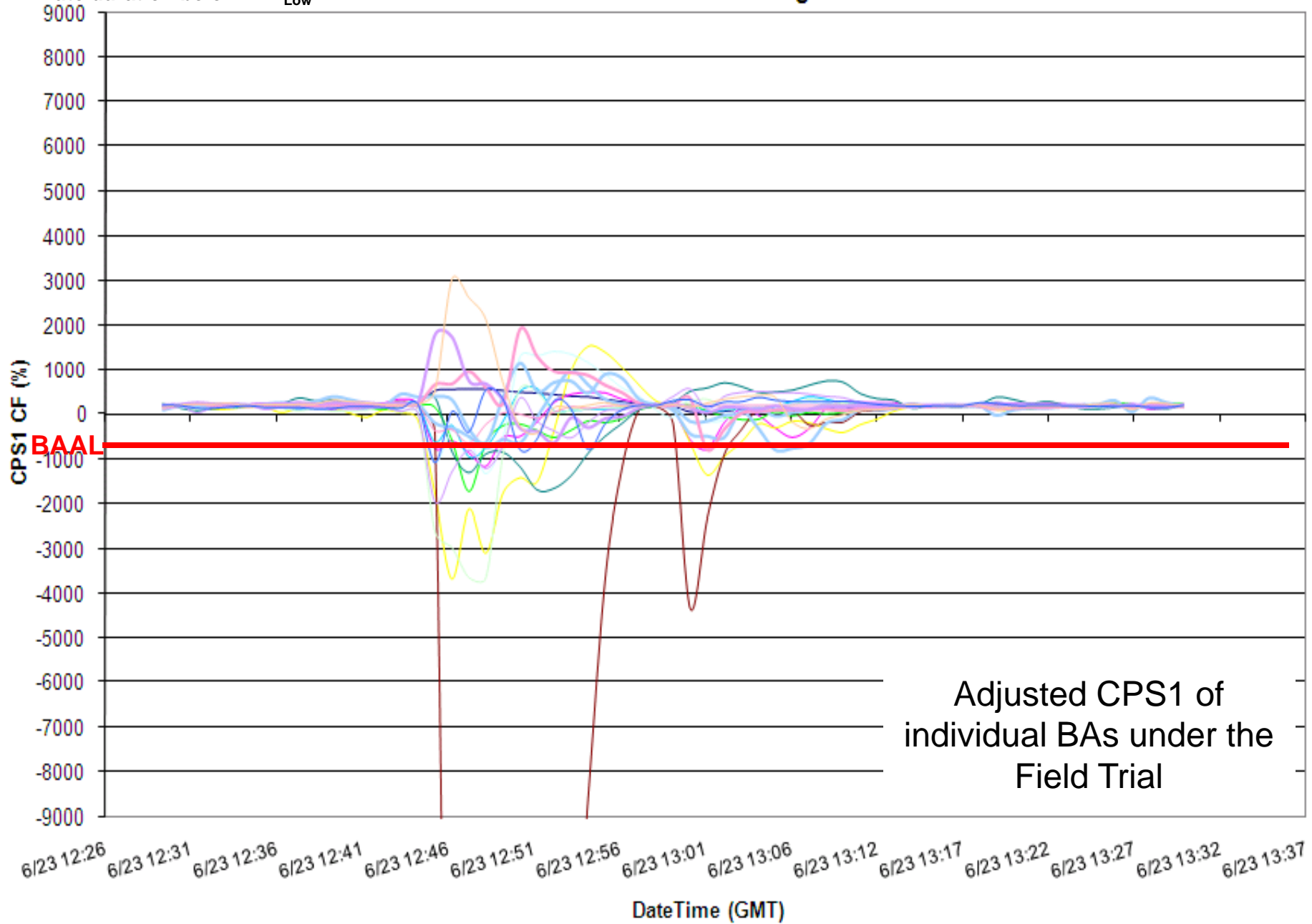


Clock-minute Actual Frequency of Participants

6/23/2010 ending 12:51 PDT

7-minute duration below FTL_{Low}

ACPS1 One-Minute Averages

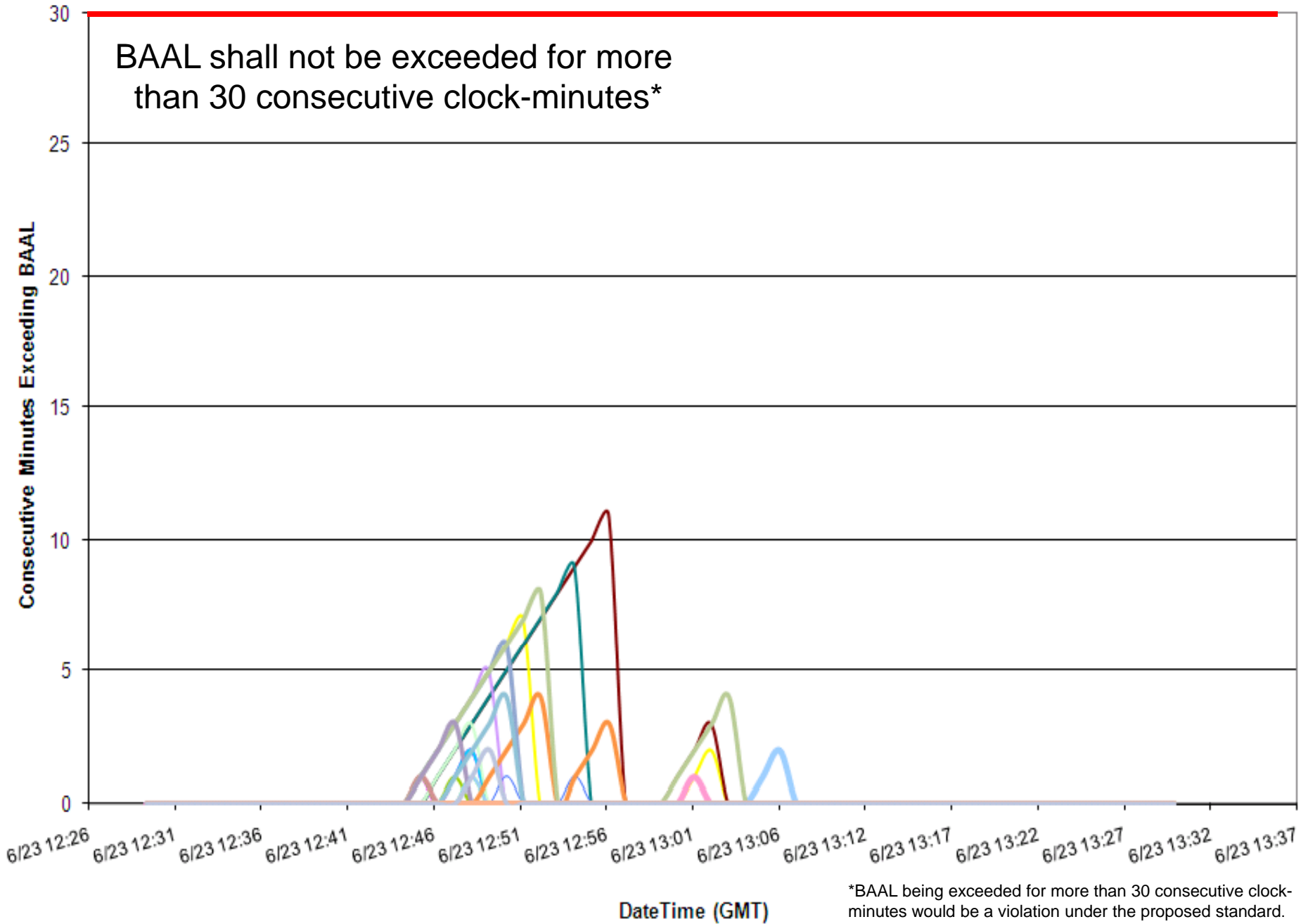


6/23/2010 ending 12:51 PDT

7-minute duration below FTL_{Low}

Consecutive Minutes Exceeding BAAL

BAAL Violation*



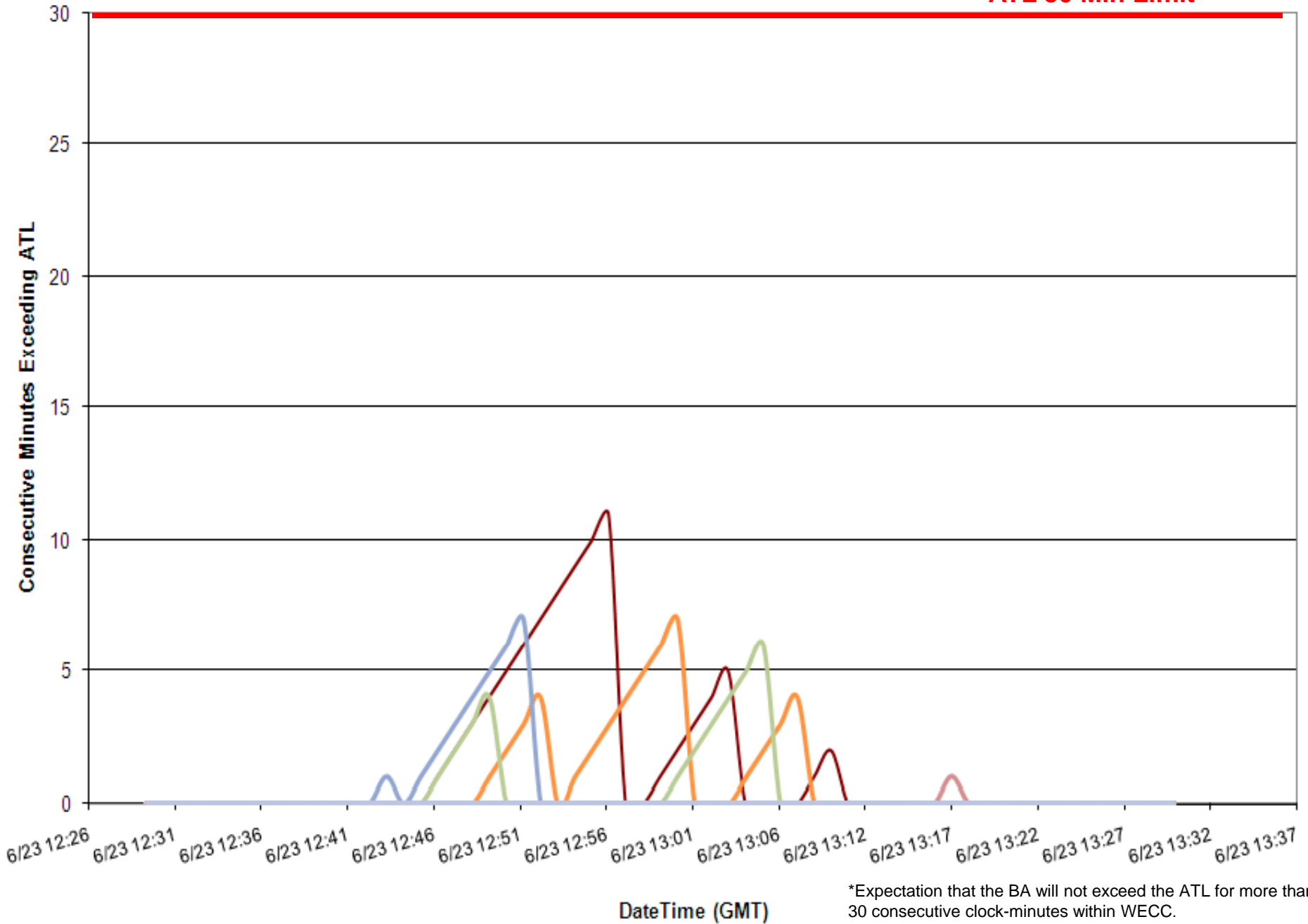
*BAAL being exceeded for more than 30 consecutive clock-minutes would be a violation under the proposed standard.

6/23/2010 ending 12:51 PDT

7-minute duration below FTL_{Low}

Consecutive Minutes Exceeding ATL

ATL 30 Min Limit*



*Expectation that the BA will not exceed the ATL for more than 30 consecutive clock-minutes within WECC.

Balancing Authority ACE Limit Proof-of-Concept Field Trial

Discussion

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