Summary Consideration of Comments:

The Balance Resources and Demand drafting team thanks all balloters who participated in the recent ballot of the set of Balance Resources and Demand Standards:

BAL-007 — Balance of Resources and Demand
BAL-008 — Frequency and Area Control Error
BAL-009 — Actions to Return Frequency to within Frequency Trigger Limits
BAL-010 — Frequency Bias Settings
BAL-011 — Frequency Limits

The drafting team did not make any changes to the standards based on stakeholder comments.

The comments in this report are organized according to the content of the comment, and include all comments submitted with negative and affirmative ballots. Note that where several balloters submitted an identical or nearly identical comment, a summary response has been provided to those comments. All the drafting team responses are in blue text.

There were several reasons cited for voting in the negative, including the following:

1. **Retiring CPS2 will lead to acceptable drag or increased inadvertent interchange; CPS2 is more reliable than BAAL**
   - CPS2 does not prevent Balancing Authorities from "dragging" on the system, as the CPS2 L_{10} can be exceeded for up to ten percent of the ten-minute periods per month (approximately 74 hours in 31-day month). It is very possible for a Balancing Authority to "drag" by hundreds of MW for long periods no matter of its impact to Interconnection frequency and still be compliant under CPS2 at the end of the month. Under the field test, there have been no reports of increased dragging on the system.
   - Compliance to CPS2 requires ACE to move within L_{10} when it is binding (90% of the ten-minute periods per month) without regard as to whether this helps or hurts frequency. Compliance with BAL-007 always drives corrective action in a direction that supports the Interconnection frequency, and the Balancing Authority ACE Limit (BAAL) becomes increasingly more restrictive than the corresponding CPS2 L_{10} as Interconnection frequency deviates further from 60 Hz.
   - The field test results showed that when there is a frequency deviation, Balancing Authority ACE Limits provide tighter control over Interconnection frequency than CPS2 L_{10}.

   Attachment B to this document is a file that includes an actual operating example showing how operation under the Balancing Authority ACE Limit (BAAL) of BAL-007 requires action in support of the Interconnection frequency. The example walks through a scenario that occurred on January 6, 2006, and includes the performance of the Balancing Authorities that were participating in the field test and complying with BAL-007, and a list of other Balancing Authorities at the time (names removed) who would have been required to take corrective action under BAAL to support to the Interconnection frequency. The example helps illustrate how BAAL becomes increasingly more restrictive than the corresponding CPS2 L_{10} as Interconnection frequency deviates further from 60 Hz.

2. **Operating under the proposed standards will lead to an increase in TLRs or IROLs**

   - The factual data posted on the NERC Web Site shows that the gross number of all TLRs decreased during the BRD Field Test and there were no IROLs attributed to operation under the proposed standards.

3. **The standards need more field testing before they are balloted**

   - The field test that was conducted for well over a year, included all 'volunteers' and involved approximately 50% of the load in the Eastern Interconnection and all of ERCOT. Other entities were invited to join the field test but declined and the drafting team cannot force any entity to join a field test. The implementation plan for this set of standards does propose field testing with WECC and Hydro-Quebec before the standards become enforceable in those interconnections.

4. **Requirements should not be assigned to NERC as this would make the associated standard unenforceable**
   - ERO Rules of Procedure 405. Monitoring of Compliance Standards Applicable to NERC clarifies NERC can be assigned responsibility for standards. The ERO Rules of Procedure can be found on the following NERC Web Page: http://www.nerc.com/~filez/rules_of_procedure.html

5. **Time Horizons should not be included in standards until vetted and added to the Reliability Standards Development Procedure Manual**
   - As documented in meeting minutes, the Standards Committee has endorsed having drafting teams add 'Time Horizons' to standards as an interim measure until the manual is updated. This practice supports ensuring that reliability standards that are approved and submitted to regulatory authorities contain all the compliance elements needed to support the ERO Sanctions Guidelines.

6. **The proposed standards impose additional work on the Reliability Coordinators to primarily allow Balancing Areas to relax their control**

   The Reliability Coordinators who participated in the field test did not indicate any concerns to support this concept – on the contrary, the field test participants overwhelmingly support the proposed standards. The results of a survey collected at the completion of the field test are provided at the end of this document as Attachment A. Under BAL-008, the Reliability Coordinators are required to take action based upon the frequency limits of the Interconnection, however not only does the Balancing Authority ACE Limit in BAL-007 provide the Reliability Coordinator with a clear and unquestionable limit to base its decisions on for directing corrective action, but it also requires Balancing Authorities exceeding their BAAL to take corrective action even at times when their Reliability Coordinator is not required to direct corrective action

Index to Comments and Responses:

Comments indicating the CPS2 should be retained until measures are in place to guard against 'drag' on the system or extreme levels of inadvertent energy accumulations.

Summary Response:

The existing CPS2 standard does not prevent "dragging" on the system.

The current CPS2 has merit in that it encourages balanced operations by requiring each Balancing Authority to keep its ACE within its L_{10} bounds for 90% of the ten-minute periods per month; however, there are certain aspects of CPS2 that can be detrimental to Interconnection frequency.

- For example, under the current CPS2, a Balancing Authority's ACE is unbounded for 10% of the ten-minute periods per month, no matter of its impact on the Interconnection frequency.

- It is very possible for a Balancing Authority to "drag" by hundreds of MW for long periods and still be compliant under CPS2 at the end of the month, as roughly 74 hours of a 31-day month (10%) are unbounded.

- Other standards are in place today to address actions to be taken if such operation impacts tie line flows, however there is not a balancing standard today that would immediately require a Balancing Authority to take corrective action based upon its impact on the Interconnection frequency and measure its performance for that event.

The proposed standards require more technically accurate response to each frequency deviation from the BAs responsible for that deviation.

The intent of this set of standards is to support the Interconnection frequency, and to the extent that a Balancing Authority's ACE is negatively impacting the Interconnection frequency beyond its Balancing Authority ACE Limit (BAAL) under BAL-007, the Balancing Authority is required to take corrective action to ensure that its ACE does not exceed the BAAL for more than 30 consecutive clock-minutes. Unlike the CPS2 L_{10} limit, the BAAL becomes more and more restrictive as Interconnection frequency deviates further from 60 Hz.

- For example, for a median-sized Balancing Authority on the Eastern Interconnection, BAAL becomes more restrictive than the lower bound of the CPS2 L_{10} limit as Interconnection frequency drops below 59.98 Hz:

  - BAAL becomes approximately 1/2 of the L_{10} limit at 59.96 Hz.
  - BAAL becomes approximately 1/3 of the L_{10} limit at 59.94 Hz.

BAL-007 discourages coincident "dragging" and associated Inadvertent Interchange by enforcing tighter and tighter limits on Balancing Authorities as the Interconnection frequency deviates further from 60 Hz

As the BAAL is based upon the Interconnection frequency, and Interconnection frequency is impacted by the ACE performance of the Balancing Authorities, BAL-007 discourages coincident behavior of multiple Balancing Authorities "dragging", as any associated drop in Interconnection frequency is also reflected in the BAAL becoming more restrictive as frequency gets worse.

- Coincident behavior or lack of control diversity is occurring today and is clearly observable in the Eastern Interconnection during the time of occurrence of most of the 23 Frequency Trigger Limit (FTL) Low 5-minute alarms in 2006 and the six FTL Low 5-minute alarms during the first quarter of 2007, when Interconnection frequency dropped below 59.95 Hz in the Eastern Interconnection for five minutes or more.
- As the bounds and frequency limits of the proposed standards are symmetric about 60 Hz, the ACE for the individual Balancing Authorities (and associated Inadvertent Interchange) should also be symmetrical and normally distributed about zero such that these standards should not encourage or reward Inadvertent Interchange any more than the current standards.

Proposed standards received the endorsement of the NERC Operating Committee

Recognizing the merits of the proposed Standards, the NERC Operating Committee has endorsed the adoption of BAL-007 through BAL-011.

The Balancing Authority ACE Limit under BAL-007 provides a very clear and unquestionable indication to the Balancing Authority and its Reliability Coordinator, of when the Balancing Authority must take corrective action.

BAL-008 further supports the Interconnection frequency by requiring the Reliability Coordinator to direct its Balancing Authorities to take corrective action when defined frequency limits are exceeded.

Field test performance does not show any increase in Inadvertent Interchange

The field test for this set of standards was conducted for more than a year. The results of the field test have been publicly posted and do not show evidence of any increase in inadvertent energy accumulations. An entity that chooses to 'lean' on the system takes a risk of violating BAL-007 and other standards.

The intent of this set of standards is to support interconnection frequency control, not tie line flows

Through the SAR and Standards development process, the industry did not support this set of standards addressing unscheduled tie line flows. As the Balancing Authority's ACE under CPS2 is unbounded for up to 10% of the ten-minute periods today, there are other standards and business practices in place today that address operating limits and Inadvertent Interchange. To the extent that any party believes the existing standards are not adequate to address the capability that

exists today for a Balancing Authority to create unscheduled flows on neighboring systems, the Standard Drafting Team would encourage that party to draft a SAR to address such concerns and present it to the Industry for its consideration.

Organization:	Massachusetts Department of Telecommunications and Energy
Member:	Donald E. Nelson
Organization:	National Association of Regulatory Utility Commissioners
Member:	Diane J. Barney
Organization:	New York State Public Service Commission
Member:	James T. Gallagher
Comment:	While it appears that the new standard would streamline and simplify control, it should not be instituted until measures are in place to guard against drag on the system.
Organization:	New Brunswick System Operator
Member:	Alden Briggs
Comment:	NBSO is concerned with the potential large tie line flow deviations from schedule when the frequency is at or near 60 Hz. These flows may causue transmission loading issues.
Organization:	Sierra Pacific Power Co.
Member:	Richard Salgo
Comment:	The negative vote on this set of standards stems from the following concerns: We believe that elimnation of the CPS2 threshhold will be detrimental to the reliable operation of the Interconnection by removing ACE limits and allowing extreme levels of inadvertant energy accumulations. The set of standards would create opportunity for entities to become a burden on the Interconnection by leaning on neighbors for resource support. Implementation in the Western Interconnection is proposed to occur first via a trial period; however, the trial period will require substantial investment and commitment by all BA's in order to provide a useful trial. Once this is in place as a trial, it will be essentially impossible to undo the change and revert back to the existing CPS methods because of the extensive labor and expense invested in making the trial change. Existing CPS method has been demonstrated to provide excellent performance, and it is working very well. There isn't a demonstrated industry need to make this monumental shift in interchange control.

Comments indicating the proposed standards would increase IROLs or TLRs on the system:

Summary Response: During the field test, there were no reported IROL violations attributed to operating to the proposed Balance Resources and Demand standards.

The report on actual use of TLRs is posted on the NERC web site and does not support the idea that Reliability Coordinators are implementing TLRs in greater numbers based on participation in the field test. An analysis of the actual reported TLR data shows no dramatic step change in the number, duration or priority level of TLRs under the field test.

Gross number of all TLRs in 21 months prior to the field test:	4,009
Gross number of all TLRs in 21 months under field test:	3,705
Change in number of all TLRs under field test	- 304

The intent of this set of standards is to support interconnection frequency control. There are other standards and business practices that address operating limits and inadvertent interchange. Note, however, that the Reliability Coordinators and the participants in the field test did not report ANY operating issues associated with operating under the proposed standards. Each month on a conference call of the standards drafting team, Resources Subcommittee, Operating Reliability Subcommittee and Reliability Coordinator Working Group, the Reliability Coordinators and participating Balancing Authorities were asked to report on any operational issues associated with the proposed standards, and to date none have been reported. Please review the feedback from the field test participants.

The data collected from the field test shows that BAAL is a better tool for controlling frequency than CPS2.

Organization:	Bonneville Power Administration
Member:	Donald S. Watkins Brenda S. Anderson Rebecca Berdahl
Comment:	While this standard lowers the wear and tear on generating units, it does not appear to improve reliability. In fact, we have identified generation and control scenarios that would result in reliability risk due to IROL violations.
Organization:	Consolidated Edison Co. of New York
Member:	Edwin E. Thompson PE
Comment:	On the initial ballot, there was consensus within NPCC to vote against these standards because of the retirement of the DCS Standard. This second ballot has eliminated the retirement of the DCS standard. However, there is still no consensus among Balancing Authorities within the NPCC region. There has been concern that removal of CPS2

	requirements can result in more frequent IROL/ SOL violations of greater magnitudes and durations. See comments by ISO-NE, NYISO and IESO.
Organization:	New York Independent System Operator
Member:	Gregory Campoli
Comment:	The NYISO does not support the proposal to remove existing CPS 2 requirements from the approved standards. The proposal removes a Balancing Authority's requirement to remain close to schedule on its ties, measured by zero Area Control Error during times when system frequency is near 60 Hz. The proposed standard removes the requirements to maintain schedule resulting in unscheduled flow on the interconnection that are not tagged. The solution to address system over loads for Reliability Coordinators is to implement TLR procedures, cutting scheduled transactions that are not the problem. NYISO continues to recommend the retention of the CPS 2 process to reduce exposure to unscheduled flows due to energy imbalances. The NYISO also supports this and other issues raised by ISO-NE.

Comments indicating standards should not be written to apply to NERC:

Response: From the ERO Rules of Procedure, Paragraph 405:

> **405. Monitoring of Compliance Standards Applicable to NERC**
> The NERC Compliance and Certification Committee shall establish and implement a process to monitor NERC's compliance with the reliability standards that apply to NERC. The process shall use independent monitors with no conflict of interest, real or perceived, in the outcomes of the process. All violations shall be made public according to the reporting and disclosure process in Section 408. The Compliance and Certification Committee will also monitor NERC's compliance with the rules of procedure for the Compliance Enforcement and Organization Registration and Certification Programs.

Organization:	Florida Power Corporation
Member:	Lee Schuster
Comment:	NERC should not write standards that apply to itself. They are not enforceable under the legislation and result in unnecessary added cost for a "third party" compliance monitor. The BAL standards should state that the responsible entities will comply with the values as determined by NERC. Standards BAL-011 should be replaced with a NERC procedure for calculating the necessary values.
Organization:	Progress Energy Carolinas
Member:	Sam Waters Wayne Lewis James Eckelkamp
Comment:	NERC should not write standards that apply to itself. They are not enforceable under the legislation and result in unnecessary added cost for a "third party" compliance monitor. The BAL standards should state that the responsible entities will comply with the values as determined by NERC. Standards BAL-011 should be replaced with a NERC procedure for calculating the necessary values.
Organization:	Progress Energy Carolinas
Member:	Verne B. Ingersoll
Comment:	The vote is against BAL-011. Standards should not be written to apply to NERC which is itself the standards setting organization. Under the ERO legislation, mandatory standards can only apply to owners, users and opertors, not to NERC. These BAL standards should be revised to apply to owners users and opertors. The formulas for frequency limits can be included in the standards and NERC can calculate the values via administrative proceedures. There is no justification for making a standard that applies to NERC and requires a costly third party monitor.

Comments indicating the standards should not be approved until the categories of Mitigation Time Horizons are also approved and incorporated into the Reliability Standards Development Procedure:

Summary Response: Mitigation Time Horizons (now called simply, 'Time Horizons') were identified in the Sanctions Guidelines section of the ERO Rules of Procedure as an element used to determine an appropriate sanction for violation of a specific requirement.

The Standards Committee has formally endorsed having drafting teams add Time Horizons to standards and the Standards Committee also committed to proposing the addition of Time Horizons in the next revision of the Reliability Standards Development Procedure Manual.

Meanwhile, if stakeholders want a voice in determining time horizons, use of the standards development process is a consensus-driven process that involves stakeholders. There is no other stakeholder-driven process in place to add these time horizons. The alternative to using the stakeholder-driven process is to allow regulators to assign compliance elements to the standards.

Organization:	Midwest Reliability Organization
Member:	Larry Brusseau
Comment:	The description of the Mitigation Time Horizons states: The ERO Rules of Procedure include the use of mitigation time horizons as one element used to determine the size of sanctions. Registered Ballot Body needs to know where the ERO definition of Mitigation Time Horizons can be found along with documentation describing how the mitigation time horizons will be used in determining penalties. Mitigation Time Horizons are not listed as a Performance Element of a Reliability Standard in the Reliability Standards Development Procedure Version 6 adopted by the NERC BOT on November 1, 2006. As such, it does not seem appropriate to include them in any Reliability Standards. The comment form description of Mitigation Time Horizons stated the drafting team used the following guidelines in developing mitigation time horizons for each requirement, whereas the final statement in the description of the Violation Risk Factors stated the following categories of violation risk factors were approved with the latest version of the Reliability Standards Development Procedure. Like the Violation Risk Factors, the categories of Mitigation Time Horizons should also be approved and incorporated into the Reliability Standards Development Procedure in order to ensure that the definitions are consistent for all NERC Reliability Standards. The MRO cannot vote to approve a standard that includes Mitigation Time Horizons until the drafting team can produce ERO documented definitions and the documented manner in which the Mitigation Time Horizons will be used to determine penalties.
Organization:	SaskPower
Member:	Wayne Guttormson
Comment:	SaskPower can not vote to approve a standard that includes Mitigation Time Horizons until the drafting team can

	produce ERO documented definitions and the documented manner in which the Mitigation Time Horizons will be used to determine penalties. Also SaskPower questions why BAL-011 could not be delegated to the various RC's (actual operating entities) in the Interconnections rather than NERC (a standards developer).
Organization:	Minnesota Power, Inc.
Member:	Carol Gerou
Comment:	MP agrees with MRO submitted comments.
Organization:	MidAmerican Energy Co.
Member:	Thomas C. Mielnik
Comment:	There needs to be a documented definition for mitigation time horizons and a documented description of how mitigation time horizons will be used in determining penalties.
Organization:	Great River Energy
Member:	Gordon Pietsch
Comment:	Great River Energy would like transparency on how, and to what extent, the ERO plans to use mitigation time horizons in the determination of sanctions. The Violation Risk Factors were fully vetted in the Standards Process as the Mitigation Time Horizons should be also. Unfortunately GRE cannot vote to approve a standard that contains an element that will be used in the determination of sanctions until such time that the ERO; 1) allows the element to be scrutinized by the industry; and 2) provides transparency on the role and to the extent the element will play in the determination of financial sanctions.
Organization:	Lincoln Electric System
Member:	Dennis Florom Bruce Merrill Eric Ruskamp
Comment:	LES agrees with the contents of this set of standards, however LES cannot vote to approve standards that includes Mitigation Time Horizons until the drafting team can produce ERO documented definitions and the documented manner in which the Mitigation Time Horizons will be used to determine penalties. Secondly, LES supports retaining BAL-002 and running it in parallel with the new standards, but as currently proposed a single incident would result in violations of both standards and thus a double penalty. It seems appropriate to address this situation before it occurs.
Response: The field test did not include a waiver from compliance with DCS and during the field test there was no evidence that a single incident would result in violation of both DCS and the new standards.	

Comments indicating the proposed standards haven't been fully field tested:

Response: The standards drafting team cannot change the reliability standards development process and has no authority to require entities to participate in a voluntary field test.

The field test for this set of standards started on July 5, 2005 and was conducted for more than a year. It included fourteen (14) of the ninety-six (96) Balancing Authorities in the Eastern Interconnection (14.6%) with 308,525 MW non-simultaneous peak load, 49.0% of the 629, 288 MW non-simultaneous peak load for the Eastern Interconnection as well as the entire ERCOT Interconnection. While the field test did not include all entities, it did include a large sample with diverse types of Balancing Authorities and Reliability Coordinators, and even included a single Balancing Authority Interconnection.

The field test results are posted for all to review. The field test did show that the new frequency-related limits provide Reliability Coordinators and Balancing Authorities with better information on which to make frequency-related operating decisions.

In addition, the results of the field test show that the new limits and associated standards do a better job of requiring 'appropriate' Balancing Authorities to take appropriate actions to control interconnection frequency.

- Under the proposed standards, only the subset of Balancing Authorities that are 'hurting' frequency are required to move their ACE to within their Balancing Authority ACE Limits.
- Under CPS2, all Balancing Authorities, even those with ACE in a direction that is assisting frequency, are required to move their ACE towards 'zero'.

The field test results showed that when there is a frequency deviation, Balancing Authority ACE Limits provide tighter control over interconnection frequency than L_{10}.

As noted in the proposed implementation plan, to ensure that the limits developed for WECC and Hydro-Quebec interconnections work as intended, the drafting team recommends that members of WECC and Hydro-Québec have a six-month field test to operate under the proposed standards, with any adjustments needed to the interconnection-wide frequency limits made during the field test period.

Note that CPS1 (called CPM1 in the proposed set of standard) and DCS are not proposed for retirement when the new standards are implemented.

The results of the field test have been publicly posted and do not show evidence of any increase in 'leaning on the system'. An entity that chooses to 'lean' on the system takes a risk of violating other standards.

Organization:	Avista Corp.

Member:	Scott Kinney Edward F. Groce Robert Lafferty
Comment:	I am not convinced that the new standards will ensure system reliability and keep utilities from leaning on the system. The West has yet to perform a trial test and the test in the East only included a few utilities. More test data is needed before making this change. The existing CPS 1 & 2 and DCS requirements have been working well. This standard should not be voted upon until other regions can perform trial tests and fully evaluate the changes.
Organization:	California Energy Commission
Member:	William Mitchell Chamberlain
Comment:	While this standard appears to have promise, more time is needed to be sure that it will work in all areas of North America and that appropriate test periods have occurred in the West as well as in the East. I suggest that the standard be modified to require a one year test by all Balancing Authorities (perhaps in 2008 or 2009) after which the standard should only become permanent after the industry has had the opportunity to ballot it again in light of the test results.
Organization:	Public Utility District No. 2 of Grant County
Member:	Greg Lange
Comment:	I do not support this Standard for implementation in the west. We need to do a field trial then decide whether it works in the Western Interconnection. This process is backwards and needs to be fixed.
Organization:	Public Utility District No. 2 of Grant County
Member:	Kevin J. Conway
Comment:	Grant County PUD does not support this standard without conducting field testing. Field testing should be a requirement to prove that this is 1) a good standard, 2) a needed standard, and 3) an enforcable standard.

Other Comments on the Balance Resources and Demand Standards:

Organization:	Northeast Power Coordinating Council, Inc.
Member:	Edward A. Schwerdt
Comment:	NPCC supports the improvements recently made with regard to the retention of the DCS requirement to have sufficient contingency reserve to cover the first contingency loss and also the adjustment of the penalties applied to the RC for frequency limit violations. However, NPCC remains concerned regarding the ability of the new methodology and BAAL limits to assure that unscheduled net flows are bounded sufficiently, and NPCC believes that single Balancing Area Interconnections should have the flexibility to specify their own frequency-related requirements within a reasonable framework.
Response: The drafting team appreciates your affirmative vote in support of the proposed standards. Note that the field test lasted for more than a year, and during that time there were no cases where compliance with the BAAL standards led to exceeding an IROL, nor were there	
Organization:	Duke Energy
Member:	Henry Ernst-Jr
Comment:	With the emergence of large Balancing Authorities, we are experiencing the reality that these large BAs can drive frequency excursions more significantly than in the past. This in combination with the implementation of the BAL may result in system conditions that we have not planned for or prepared for in terms of Operator training.
Response: Agreed. The implementation plan is phased in to allow time for entities to implement new tools to monitor performance and to provide training and practice in complying before the standards become effective.	
Organization:	American Transmission Company, LLC
Member:	Douglas F. Johnson
Comment:	ATC submitted a comment during the drafting of this standard the deals with the ability of a BA to refuse an RC's directive. At issue is Requirement 1.1 in Standard BAL-009-1. The current language: The Balancing Authority shall immediately inform its Reliability Coordinator if complying with the Reliability Coordinator's directive will endanger personnel; damage equipment; violate regulatory or statutory requirements; or if conditions are such that compliance with the directive is not physically possible. ATC pointed out that the additional language "if conditions are such that compliance with the directive is not physically possible" is beyond what other entities are allowed to site as a reason for refusing an order. (Reference IRO-001-1 Requirement 8) In our comments ATC requested that the language in question be removed in order to align this standard with that of IRO-001-1. The Standard Draft Team reviewed our comments but did not remove the objectionable language from the standard, stating the opinion that a number of entities supported the draft language. ATC's concern is that the BA is being given

	wider latitude to refuse an RC directive that may cause our facilities to be placed in a situation of higher risk.

Response: If the drafting team removed the phrase, 'if conditions are such that compliance with the directive is not physically possible' were removed, then the standard would include a requirement that, under some conditions, the Balancing Authority could not meet. For example, if the Reliability Coordinator directed the Balancing Authority to add more generation, and the Balancing Authority did not have any more generation it could put on-line, then the Balancing Authority would not be able to 'physically' meet the directive.

Note that IRO-001-1 is one of the standards subject to revision as part of the Reliability Standards Development Plan 2007-2009 and we encourage you to highlight the need to modify IRO-001-1 Requirement 8 as one of the revisions under Project 2006-06 – Reliability Coordination.

Note that none of the Reliability Coordinators who participated in the field test expressed any concern about the inclusion of this language.

Organization:	Constellation Generation Group
Member:	Michael F. Gildea
Comment:	1. The standard should not have been modified to allow for simultaneous operation of the Disturbance Control Standard (BAL-002) with the new Balance Resource and Demand Standards. There is a concern that an smaller entity could be forced to violate the requirements in one standard, i.e. recover from a disturbance by returning Area Control Error to pre-disturbance levels or to zero, which could be an action that is in opposition to the performance required under the BRD standard. 2. There were no Balancing Authorities with a peak load of less than an 100 MW included in the field test and prior to implementing the new standards their ability to implement these requirements needs to be validated. 3. It is inappropriate to implement different frequency control performance requirements in the Eastern and Western Interconnections, moving away from the uniform measures that are in place today, without field test data from both Interconnections that clearly illustrates the new standards will improve frequency conditions.

Response

1. Though there are times today when returning ACE to zero for DCS compliance when frequency is above 60 Hz is not in the best interests of the Interconnection frequency on its own, such operation will not conflict with BAL-007, as bringing ACE to zero would also be bringing ACE into compliance under the BAAL. If the pre-disturbance ACE is negative, DCS compliance is met if ACE is restored to that level within the 15-minute DCS Recovery Period; however, if the Interconnection frequency is below 60 Hz, it is possible the BA could still be operating outside of its BAAL and have to take additional corrective action to ensure that its ACE is not outside of its BAAL for more than 30 consecutive clock-minutes. It is this aspect of BAL-007 that encourages balanced operations, as the measure is always based upon the ACE of the BA and state of the Interconnection frequency. The field test was conducted with DCS in place, and no

adverse effects of retaining DCS while the proposed standards are in effect have been identified. 2. If a Regional Entity determines that a Balancing Authority is too small to require compliance with NERC's reliability standards, then the compliance registration process should be used to exempt that Balancing Authority from compliance registration. **3.** The standards respect the existing differences between the various interconnections by requiring that each interconnection have its own set of interconnection-specific frequency-related limits. Setting the limits based on each interconnection's needs, allows the limits to be set with tighter boundaries where needed, based on the largest size of generating unit and the actual reliability-related setting of frequency relays within each interconnection. If there were a single set of interconnection-wide limits, then the limits would adversely impact the ability to make full use of the transmission system.	
Organization:	Baltimore Gas & Electric Company
Member:	John J. Moraski
Comment:	1. The standard should not have been modified to allow for simultaneous operation of the Disturbance Control Standard (BAL-002) with the new Balance Resource and Demand Standards. There is a concern that a smaller entity could be forced to violate the requirements in one standard, i.e. recover from a disturbance by returning Area Control Error to pre-disturbance levels or to zero, which could be an action that is in opposition to the performance required under the BRD standard. 2. There were no Balancing Authorities with a peak load of less than a 100 MW included in the field test and prior to implementing the new standards their ability to implement these requirements needs to be validated. 3. It is inappropriate to implement different frequency control performance requirements in the Eastern and Western Interconnections, moving away from the uniform measures that are in place today, without field test data from both Interconnections that clearly illustrates the new standards will improve frequency conditions.
Response: **1.** Though there are times today when returning ACE to zero for DCS compliance when frequency is above 60 Hz is not in the best interests of the Interconnection frequency on its own, such operation will not conflict with BAL-007, as bringing ACE to zero would also be bringing ACE into compliance under BAAL. If the pre-disturbance ACE is negative, DCS compliance is met if ACE is restored to that level within the 15-minute DCS Recovery Period; however, if the Interconnection frequency is below 60 Hz, it is possible the BA could still be operating outside of its BAAL and have to take additional corrective action to ensure that its ACE is not outside of its BAAL for more than 30 consecutive clock-minutes. It is this aspect of BAL-007 that encourages balanced operations, as the measure is always based upon the ACE of the BA and state of the Interconnection frequency. Most stakeholders indicated support for retaining DCS. The field test was conducted with DCS in place, and no adverse effects of retaining DCS while the proposed standards are in effect have been identified. 2. If a Regional Entity determines that a Balancing Authority is too small to require compliance with NERC's reliability	

standards, then the compliance registration process should be used to exempt that Balancing Authority from compliance registration. 3. The standards respect the existing differences between the various interconnections by requiring that each interconnection have its own set of interconnection-specific frequency-related limits. Setting the limits based on each interconnection's needs, allows the limits to be set with tighter boundaries where needed, based on the largest size of generating unit and the actual reliability-related setting of frequency relays within each interconnection. If there were a single set of interconnection-wide limits, then the limits would adversely impact the ability to make full use of the transmission system.	
Organization:	Constellation Energy
Member:	Carolyn Ingersoll
Comment:	1. As discussed in previously submitted comments there is a concern that there is the potential for a conflict between the BRD standards and BAL-002, and an entity could be placed in a situation where in order to be in compliance with one set of standards they would be forced to violate another. In addition, the elimination of the retrictions on the maximum assistance a BA provides to the Interconnection, i.e. their bias [See EOP-002-3, R5], while the BA with the contingency recovers, could result in excessive response to low frequency deviations. 2. The standard was not field tested in the Eastern Interconnection by smaller Balancing Authorities (<100 MW) and the BAAL limits under the current calculation place these entities at a higher probability of operating outside of BAAL limits. CECD would recommend the standard include a modification to BAAL limit calaculations that include a minimum BAAL limit of 5-10 MW for frequency deviations of .03 Hz or less from scheduled frequency for entities with a Peak Load of < 300 MW. 3. CECD opperates in both the Eastern and Western Interconnections and, as a result, would be required to operate using two different performance measures simultaneously, resulting in additional cost and creating unecessary complications for operations personnel that can be eliminated with simultaneous implementation of a single performance measure. CECD at minimum request a delay in the implementation untill the field tests in the West are completed. 4. In BAL-007-1 Section 2.2 needs to be modified to include the 90%<12 month rolling average of the one-minute CPM ending in the last month measured < 95% range.

Response:

1. Though there are times today when returning ACE to zero for DCS compliance when frequency is above 60 Hz is not in the best interests of the Interconnection frequency on its own, such operation will not conflict with BAL-007, as bringing ACE to zero would also be bringing ACE into compliance under BAAL. If the pre-disturbance ACE is negative, DCS compliance is met if ACE is restored to that level within the 15-minute DCS Recovery Period; however, if the Interconnection frequency is below 60 Hz, it is possible the BA could still be operating outside of its BAAL and have to take additional corrective action to ensure that its ACE is not outside of its BAAL for more than 30 consecutive clock-minutes. It is this aspect of BAL-007 that encourages balanced operations, as the measure is always based upon the ACE of the BA and state of the Interconnection

frequency. Under the proposed standards, the amount of assistance each Balancing Authority provides in correcting interconnection frequency is based on whether that Balancing Authority is contributing to the error – for most frequency deviations, only those Balancing Authorities who are 'contributing' to the frequency error are required to move their ACE to within their BAALs. This is one of the advantages of the proposed standards. Under the existing standards, EVERY Balancing Authority is required to move its ACE to zero when there is a large enough frequency deviation – but the size of the frequency deviation is not specified, and some Balancing Authorities (those with an ACE in the opposite direction from the frequency error) make the frequency error worse when they move their ACE to zero.

2. If a Regional Entity determines that a Balancing Authority is too small to require compliance with NERC's reliability standards, then the compliance registration process should be used to exempt that Balancing Authority from compliance registration.

3. The standards respect the existing differences between the various interconnections by requiring that each interconnection have its own set of interconnection-specific frequency-related limits. Setting the limits based on each interconnection's needs, allows the limits to be set with tighter boundaries where needed, based on the largest size of generating unit and the actual reliability-related setting of frequency relays within each interconnection. If there were a single set of interconnection-wide limits, then the limits would adversely impact the ability to make full use of the transmission system.

4. The violation severity levels that were posted for ballot do not include any gaps in coverage at the 90% level:

2.2. CPM Requirement:

2.2.1 Lower: 95% < 12 month rolling average of the one-minute CPM ending in the last month measured < 100%

2.2.2 Moderate: 85% < 12 month rolling average of the one-minute CPM ending in the last month measured ≤ 95%

Organization:	Hydro-Quebec TransEnergie
Member:	Julien Gagnon
Comment:	The BAAL calculation (Requirement 1) in BAL-007 is not appropriate in the Quebec Interconnection because there is only one Balancing Authority in this Interconnection. So Hydro-Quebec intends to initiate the process to have a regional difference in that way. The other requirements in BAL-xxx standards are appropriate.

Response: ERCOT is a single Balancing Authority Interconnection, and the standards were successfully field tested with ERCOT. Hydro-Quebec can submit a request for an interconnection-wide regional variance.

Organization:	Dairyland Power Coop.
Member:	Warren Schaefer
Comment:	This negative vote is on the basis of BAL-007-1, not the additional standards on teh same ballot. After reviewing

	the BAAL calculations and standard along with compiling our 2004 data as a participant in NERC's phase 1 analysis, it appears that the Balance Resources Standard will have a detrimental effect on our control area operations and the on all control areas with relatively low system bias. Primarily, we anticipate that we will need to move our units significantly more often than under the current CPS standard in order to be compliant. The problem that we see is the relative impact a small-biased control area is exposed to when compared to the impact on a medium- or large-biased control area. We have compared the impact on our system with the impact on other MRO companies. For example DPC, with its frequency bias of -11, will be more constrained every time frequency is +/- 0.011 away from nominal. A mid-sized MRO system, on the other hand, with a frequency bias of -31 will be constrained whenever frequency is +/- 0.019. This translates into DPC being impacted 40% of the time (based on Jan 04) while the mid-sized system would be impacted 22% of the time. To further highlight this disparity, a third MRO member, with a frequency bias of -50 will be impacted whenever frequency is +/- 0.025 which was 10% of the time in January 2004. Looking at one of the largest systems in the MRO makes the disparity look extremely bad. That system's bias of -171.91 results in their being impacted whenever frequency was +/- 0.046, which was less than 1% of the time in January 2004. At first glance, it appears that the smaller the control area frequency bias, the more restrictive the new standard is going to be. It seems that response to any frequency error is going to be forced first upon the small-biased control areas. While we would not want to argue in favor of a higher burden on large control areas, we would suggest that a more equitable mechanism should be devised. It will be interesting to see the effect of a "super" control area such PJM or that which may be created in the MISO footprint in the future. Will the frequency bias of those "super" control areas be such that they will be effectively insulated from responding to frequency excursions because all of the control areas with lower frequency bias will have been forced to pick up the entire correction ahead of PJM or MISO? There is a point of equity in here somewhere. Shouldn't all systems be responding simultaneously and somewhat proportionally, rather than "smalls first (and always!) and larger only if necessary"?
Response: Unfortunately, the comparison that you made between the new BAAL limits and the old CPS2 limits is not valid. The BAAL has been set at the same proportion for all BAs on an interconnection and can be considered fair as a consequence. The old CPS2 limits are set to favor the smaller BAs because the range between the high and the low CPS2 limit would not provide enough room for reasonable control for smaller BAs. The result is that the old measure(CPS2) is the one that is biased in favor of smaller BAs, not the new BAAL measure. The bias that you are observing is a bias in the old CPS2 measure, not the new BAAL measure. This problem of not having sufficient range for reasonable control has been solved by having only one of the two limits under BAAL apply at a single point in time. If the frequency is low there is no high ACE limit, and if the frequency is high, there is no low ACE limit. Control action should be different under the new standard, but not necessarily bias in a way that is unfair to the smaller BAs.	

Organization:	ISO New England, Inc.
Member:	Kathleen Goodman
Comment:	To: Mr. Gerard Adamski Director of Standards NERC From: Kathleen Goodman Date: March 30, 2007 Subject: ISO New England Voting Position on the Revised Balance Resource & Demand Standard ISO New England strongly supports the initiative to develop and enforce a comprehensive set of mandatory Reliability Standards to prevent

	incidents, acts and events that would interfere with the reliable operation of the Bulk Power System. Unfortunately, we believe adoption of Version 1 of the BAL-007 through BAL-011 Standards would in fact be a step backwards for the industry. Therefore, we cannot support adoption of these revised Standards at this time. Attached to this memo is a detailed technical discussion of the shortcomings we have identified in these revised Standards (see "Comments Related To ISO New England's Balancing Standard Vote v4.doc"). In summary: (1) The improvements that have been made are not sufficient to ensure reliable operations. Although two noteworthy improvements have been made to these Standards since the initial voting ((a) retention of DCS and (b) removal of Reliability Coordinators as the Responsible Entity for certain requirements), these changes are not sufficient to remedy other substantial deficiencies that were noted previously. (2) There appears to be a lack of coordination with other Standards. When the root cause of a transmission problem external to the Balancing Area is caused by its [what does "its" refer to?] energy mismatch [in the neighboring Balancing Area?], the BAAL limits may be very wide and provide the operator with erroneous feedback that their energy balancing function is "OK". Also, operators of affected, external Balancing Areas may be unaware that another Balancing Area's energy mismatch is causing overloads. In such circumstances, the affected Balancing Area may cut schedules under its control to eliminate the overload, but such action will not mitigate the root cause of the problem and the problem may still persist. (3) We are concerned about the impact on transmission flows which have yet to be sufficiently studied. In applying BAAL limits versus CPS 2 limits for New York and New England's Central/East Interface for sample loadings between 50 and 150 MW of transfer margin, the BAAL limits were only 21% effective in flagging a transfer limit violation, while CPS 2 was about 99% effective. ISO New England believes that the industry would not be well-served if the impact of this proposal on transmission flows is not studied sufficiently prior to voting to accept the Balancing Standard. In short, industry acceptance of the Standard without such analyses may jeopardize reliability. (4) We continue to have unanswered concerns with the methodology used for developing these new "limits." In reviewing the BAAL methodology, comments offered over time by others (e.g., Jaleeli, Illian, and Blohm), and the Drafting Team's replies to NPCC and other comments, show that there are several methodological concerns that are unresolved and may adversely affect reliability. For the reasons listed above and expounded upon in the attached, ISO New England cannot support the proposed revisions to these Reliability Standards. In addition, we also support modification to give single Balancing Area Interconnections the flexibility to specify their own frequency-related requirements within a reasonable framework. Cc: Gordon van Welie Peter Brandien Kathleen Carrigan Donald Gates Matt Goldberg Michael Taniwha Stephen Whitley

Response:

1. The drafting team appreciates your support of these two changes.
2. During the field test, the reliability coordinators have been asked if they can attribute any operational problems to performance associated with compliance to the proposed standards and no reliability coordinator has identified any operating problems associated with the proposed standards. In the example cited, Balancing Authorities are expected

to communicate with one another and with their associated Reliability Coordinators. Note that the BAALs were not intended to flag transfer limit violations – there are other standards that address system operating limits – the BAALs were developed to flag frequency-related violations.
Since the start of the field test in July 2005, no problems related to unscheduled flows have been attributed to operations under the field test. The drafting team was not directed to address unscheduled flows in the proposed standards. Existing standards allow unscheduled flows. The ACE of a Balancing Authority is unbounded for up to 10% of the ten-minute periods per month under the current CPS2 - enabling operation that is at times detrimental to interconnection frequency, and has the potential to significantly impact transmission flows. In addition, a Balancing Authority with a most severe single contingency of 1300 MW is not held to 15-minute DCS recovery for losses less than 1040 MW (80% of 1300 MW), which again can cause large unscheduled flows on neighboring systems. The drafting team suggests reviewing the following NERC standard requirements and their applicability to your transmission concerns: IRO-001-0_R7, IRO-002-0_R5, IRO-003-0_R1, IRO-004-0_R1, IRO-003-0_R1, IRO-004-0_R1, IRO-005-0_R3, IRO-005-0_R13, PER-004-0_R5, VAR-001-0_R1, TOP-002-0_R8, TOP-002-0_R10, TOP-003-0_R12, TOP-004-0_R1, TOP-004-0_R4, TOP-007-0_R1, TOP-007-0_R4, and TOP-008-0_R2. In discussions with the Operating Reliability Subcommittee and the Reliability Coordinator Working Group, members of the drafting team have suggested that if the current standards are not adequate to address unscheduled flows, that a SAR should be developed to address such concerns. The industry did not support having this set of BAL standards address unscheduled flows. Unscheduled flows should be addressed with the development of the IROL standards and any financial considerations should be addressed through NAESB business practices.

3. The field test results show that, under the proposed standards, the data provided to the Reliability Coordinator and Balancing Authority provides the opportunity for improved performance and better control of frequency than provided with CPS2. No reliability concerns associated with the field test have been noted by the Reliability Coordinators, included those within NPCC, since the start of the field test in July 2005. Though the drafting team has not had the opportunity to discuss the results of your study with you, it should be noted that results of studies based upon the CPS2 L10 limits being effective 100% of the month will not reflect the true impact of Balancing Authorities only having to maintain operations within such limits 90% of the ten-minute periods per month, and are otherwise unbounded today.
4. The drafting team has answered every comment posted by ISO-NE and readily admits that additional research should be conducted to continue to refine the frequency-based limits in the proposed standards.

Supplementary Comments submitted for ISO-NE

Comments Related To ISO New England's Voting Position
On The Revised Balance Resource And Demand Standard

Mike Potishnak

October 4, 2006
Revised January 19, 2006
Revised March 19, 2007

Introduction

On behalf of ISO New England and in conjunction with the efforts of the NPCC (CO-1) Control Performance Working Group, the author has been tracking the development of the Balance Resource And Demand Standard from the standard authorization phase, through its theoretical development and comment phase, and through the field trial. After careful review of the proposed Balancing Standard and its implementation plan, ISO New England will be voting against the proposed standard and its implementation plan.

Prior documents have extensive technical detail to support this position. This document will summarize the unresolved concerns with the standard and its implementation plan in the next section. The final section describes possible alternatives that could be taken to change ISO New England's position to be supportive.

Two noteworthy improvements have been made to the Balancing Standard since its initial rejection by the industry. The DCS, and its requirement to carry sufficient contingency reserve to cover the First Contingency Loss, will now be retained. Also, the inappropriate penalties assigned to Reliability Coordinators for some frequency limit violations have been replaced with a more reasonable approach. These necessary changes, however, are not sufficient to remedy other substantial deficiencies that were noted previously, and the highlights of those deficiencies remain in the text to follow.

Problems With The Balancing Standard And Its Proposed Implementation

1. Lack Of Coordination With Other Standards

When a Balancing Area experiences a significant change in the balancing of its load and generation, both the system frequency and its power interchange with its adjacent Balancing Areas are affected. However, this standard, by design is only concerned with frequency. While other standards address transmission issues to some extent, none of them call for a limit on ACE similar to CPS 2, nor do they specifically call for action to adjust an energy imbalance causing transmission problems in other Balancing Areas. NPCC studies using the Balancing Standard demonstrated that significant unscheduled net flows into or out of the Balancing Area will pass under the radar screen of the BAAL limits. A significant energy mismatch in a Balancing Area that causes undesirable net tie line flows that aggravate transmission constraints in other Balancing Areas will go unchecked by the BAAL limits when the frequency is at typical values. When the root cause of a transmission problem external to the Balancing Area is caused by its energy mismatch, the BAAL limits may be very wide and provide the operator with erroneous

feedback that their energy balancing function is "OK". Also, operators of affected external Balancing Areas may be unaware that another Balancing Area's energy mismatch is causing overloads, and may cut schedules under its control which are not the root cause of the problem to try to eliminate the overload, and the problem may still persist.

While the current plan is to retain the DCS, given that most Balancing Areas use the 80% of First Contingency Loss threshold, it will not apply for lesser resource contingencies, nor will it apply for mismatches that arise without the occurrence of a contingency. In summary, the implementation plan does not adequately protect against unscheduled net flows due to energy mismatches in Balancing Areas.

Even if the text of transmission related standards would specifically call for a Balancing Area to adjust its ACE when it causes transmission problems outside its Balancing Area, the permissiveness of the BAAL limits could result in more frequent IROL/ SOL violations, possibly or greater magnitudes and durations than experienced historically, effectively compromising reliability.

Given the concern for the impact that wide BAAL limits may have on transmission interface limits when their loading is near their transfer limit, the author has developed an EXCEL-based model that allows subject matter experts study these concerns. The model estimates whether transfer limits will be violated if the permissiveness of the BAAL limits is utilized, and compares the results with CPS 2 violations that would be received, along with 10 user-specified multiples of the CPS 2 limit. The method seems to be applicable to congested interfaces on any interconnection. For example, in applying BAAL limits versus CPS 2 limits for New York and New England's Central/East Interface for sample loadings between 50 and 150 MW of transfer margin, the BAAL limits were only 21% effective in flagging a transfer limit violation, while CPS 2 was about 99% effective. While the measure for effectiveness needs refinement, this study and its potential relevance to other transmission interfaces is a cause for concern. Details of this study and usage of the new tool are available on request. The author believes that the industry would not be well-served if the impact on transmission is not studied sufficiently prior to voting to accept the Balancing Standard, and acceptance of the standard without such analyses may jeopardize reliability. This tool is available to relevant interested parties immediately and at no cost, along with the free minor training required.

The fledgling Frequency Response Standard (FRS) needs to interact smoothly with the Balancing Standard in areas such as determining how much response will be provided in a timely manner when contingencies occur. Yet this standard is lagging well behind the Balancing Standard in its delivery to the industry, and important parameters have yet to be determined. (Some relevant technical detail is provided in the section addressing the methodology.)

Response:

The drafting team is bound by the scope of the SAR and the Standards development process. Through that process, the industry directed NERC to develop a set of standards to maintain Interconnection frequency within predefined frequency limits under all conditions (i.e., normal and abnormal), to prevent frequency-related instability; unplanned tripping of load or generation; or uncontrolled separation or Cascading outages that adversely impact the reliability of the Interconnection. As you are aware, the industry did not support the standards addressing transmission flow concerns in the development of the scope a few years ago; the drafting team has included that information in its prior responses to ISO New England throughout the standards development process. The drafting team would encourage ISO New England to draft a SAR, specific to the transmission flow concerns raised, and present it through the SAR process to determine if the industry perhaps at this time would support the development of such a standard.

In your comments you note "a significant energy mismatch in a Balancing Area that causes undesirable net tie line flows that aggravate transmission constraints in other Balancing Areas will go unchecked by the BAAL limits when the frequency is at

typical values"; however, the value of this set of standards is that the limits become more restrictive as frequency deviates further from 60 Hz. Any significant energy mismatch by a Balancing Authority will impact the Interconnection frequency resulting in it no longer being at a "typical value" unless countered by other Balancing Authorities operating in the opposite direction.

Though the drafting team has not had the opportunity to discuss the details of your study with you, it should be noted that the results of transmission flow studies based upon the CPS2 L_{10} limits being effective 100% of the month will not reflect the true impact of Balancing Authorities only having to maintain operations within such limits 90% of the ten-minute periods per month, and are otherwise unbounded today under CPS2.

As you note, though the DCS addresses the loss of resource 80% or greater of the most severe single contingency, there are many significant losses that are not captured under DCS. If a Balancing Authority has a most severe single contingency of 1500 MW, DCS will not apply for any loss less than 1200 MWs. As CPS2 allows approximately 74 hours of operation to be unbounded in a 31-day month, there are many hours that losses less than 1200 MW could remain unbalanced for substantial periods of time (unless such losses cause transmission constraints where the IRO and other standards then can be applied to address the problem). Under BAL-007, any loss of generation causing a Balancing Authority's ACE to exceed its BAAL will require corrective action. BAL-007 addresses both the concern of units less than 80% falling under the radar and no action being taken for long periods, or losses that are DCS events being unchecked after the DCS recovery period, where ACE could deteriorate again impacting Interconnection frequency.

The existing CPS2 standard does not guard against "dragging" and its impact on the Interconnection frequency.

The current CPS2 has merit in that it encourages balanced operations by requiring each Balancing Authority to keep its ACE within its L_{10} bounds for 90% of the ten-minute periods per month; however, there are certain aspects of CPS2 that can be detrimental to Interconnection frequency.

- *For example, under the current CPS2, a Balancing Authority's ACE is unbounded for 10% of the ten-minute periods per month, no matter of its impact on the Interconnection frequency.*
- *It is very possible for a Balancing Authority to "drag" by hundreds of MW for long periods and still be compliant under CPS2 at the end of the month, as roughly 74 hours of a 31-day month (10%) are unbounded.*
- *Other standards are in place today to address actions to be taken if such operation impacts tie line flows, however there is not a balancing standard today that would immediately require a Balancing Authority to take corrective action based upon its impact on the Interconnection frequency and measure its performance for that event.*

The proposed standards require more technically accurate response to each frequency deviation from the BAs responsible for that deviation.

The intent of this set of standards is to support the Interconnection frequency, and to the extent that a Balancing Authority's ACE is negatively impacting the Interconnection frequency beyond its Balancing Authority ACE Limit (BAAL) under BAL-007, the Balancing Authority is required to take corrective action to ensure that its ACE does not exceed the BAAL for more than 30 consecutive clock-minutes. Unlike the CPS2 L_{10} limit, the BAAL becomes more and more restrictive as Interconnection frequency deviates further from 60 Hz.

- *For example, for a median-sized Balancing Authority on the Eastern Interconnection, BAAL becomes more restrictive than the lower bound of the CPS2 L_{10} limit as Interconnection frequency drops below 59.98 Hz:*
  - *BAAL becomes approximately 1/2 of the L_{10} limit at 59.96 Hz.*
  - *BAAL becomes approximately 1/3 of the L_{10} limit at 59.94 Hz.*

BAL-007 discourages coincident "dragging" and associated Inadvertent Interchange by enforcing tighter and tighter limits on Balancing Authorities as the Interconnection frequency deviates further from 60 Hz

As the BAAL is based upon the Interconnection frequency, and Interconnection frequency is impacted by the ACE performance of the Balancing Authorities, BAL-007 discourages coincident behavior of multiple Balancing Authorities "dragging", as any associated drop in Interconnection frequency is also reflected in the BAAL becoming more restrictive as frequency gets worse.

- *Coincident behavior or lack of control diversity is occurring today and was clearly observable in the Eastern Interconnection during the time of occurrence of most of the 23 Frequency Trigger Limit (FTL) Low 5-minute alarms in 2006 and the six FTL Low 5-minute alarms during the first quarter of 2007, when Interconnection frequency dropped below 59.95 Hz in the Eastern Interconnection for five minutes or more.*
- *As the bounds and frequency limits of the proposed standards are symmetric about 60 Hz, the ACE for the individual Balancing Authorities (and associated Inadvertent Interchange) should also be symmetrical and normally distributed about zero such that these standards should not encourage or reward Inadvertent Interchange any more than the current standards.*

2. Concerns With The Methodology For Developing BAAL Limits And Durations For Which Their Violation Is Permissible

In reviewing the BAAL methodology, comments offered over time by others (e.g., Jaleeli, Illian, and Blohm), and the Drafting Team's replies to NPCC and other comments, there are several methodological concerns that are unresolved and may affect reliability. They are listed briefly below.

2.1 The method for determining the frequency abnormal low limit and frequency trigger limit uses a once in ten year criterion for placing them above the low frequency relay setting. This is an intermediate variable, and an estimate of what the actual expected failure rate would

be for realistic operating scenarios has not been provided to the industry. The method should allow for that ultimate quantified target of reliability to be known and reviewed, and the method should allow for an entity such as the NERC Operating Committee to review and adjust the target, and subsequent limits over time.

Response:
The 'once in ten year' criterion was supported by most stakeholders *as a starting point for the development of the proposed frequency-based limits.*

The NERC Operating Committee has endorsed the proposed standards.

2.2 The method only addresses independent generation losses in the development of BAAL limits. Experience has shown that extreme weather events that happen far more frequently than once in ten years can be a significant source of dependency. Also, Jaleeli notes that most frequency events are the result of coincidental generation control practices that are not the result of a large contingency, which substantially challenges the validity of the assumption of independent generation losses as the basis for BAAL limit development. Resultant limits may be very sensitive to the assumption of independence, and this issue has not been addressed satisfactorily. The ability of BAAL limits to deliver the intended level of reliability is challenged by this shortcoming. With respect to extreme weather events, while a plausible estimate of weather-related risk in determining frequency limit computed for the Balancing Standard is desirable and achievable, the author's informal analysis was inconclusive as to whether this risk would increase or decrease with a transition from current operating practices to operations with the proposed Balancing Standard.

Response: *The drafting team makes the assumption that the most severe single contingency identified by each Balancing Authority is independent as required by other NERC standards. This contingency should be the same contingency used in other operating and planning criteria.*

2.3 The method basically uses the average value of an interconnection's primary frequency response (load response, inertial effects, and generator governor response but not AGC response) in determining frequency limits above the low frequency relay limit. However, this response often does not appear until 10 seconds has elapsed. However, point "C", which is a post-contingency valley frequency, occurs 3 to 6 seconds after the contingency. Also, under-frequency relays operate in less than 1 second. It is not known what fraction of the primary response will be available in a timely manner. This would introduce a bias of setting frequency limits to be too low for the targeted level of reliability, and jeopardize reliable operations. Also relevant is that the frequency response of an Interconnection is known to have a statistical distribution of values. Use of the average value may also jeopardize reliability during periods when a lesser value applies. The ability of BAAL limits to deliver the intended level of reliability is seriously challenged by these shortcomings. First, BAAL limits were computed using an Eastern Interconnection Frequency Response of 3109 MW/ .1 Hz. However, a January 2007 report produced by NERC Resources Subcommittee Chairman Terry Bilke computes an average natural bias of only 2761 MW/ .1 Hz, with a standard deviation of 539 MW/ .1 Hz. An implication of this newly available data is that about 30% of the time, the frequency response of the Eastern Interconnection will be less than 2222 MW/ .1 Hz. Under these circumstances, more contingencies than initially considered could cause the frequency to drop from the low frequency abnormal limit to the underfrequency limit, and also from the low frequency trigger limit to the low frequency abnormal limit. Is is not clear whether this changes the reliability estimates substantially or insignificantly, but clearly an analysis should be performed to determine the sensitivity. An overly simplistic example may help. Assume that a mythical interconnection has an average frequency response of 1000 MW/ .1 Hz. Assume that underfrequency relays operate at 59.9 Hz, and that the frequency is maintained very close to 60

Hz in non-contingent scenarios. Assume that its generators greater than 500 MW in the interconnection are as follows: 1 with 1000 MW capacity, 2 with 900 MW, 3 with 800 MW, 4 with 700 MW, and 5 with 600 MW of capacity. Assume also that each of these generators would trip once a year. If the interconnection frequency response stayed constant at 1000 MW/ .1 Hz, then once a year the 1000 MW unit only would trip, causing once a year undefrequency relay operation. However, if that frequency response is a probability distribution with an average of 1000 MW and a standard devation comparable to that observed for the Eastern Interconnection, then generation trips 800 MW or greater would cause underfrequency relays to operate. This implies that in about 30% of the year, underfrequency relay operation could be expected at a rate of 6 times per year – a much different outcome than projected using a fixed value!

Response: The phenomena described is more in the purview of the proposed Frequency Response Standard *than that of the BRD standards. The "once in ten years" FAL with a single contingency above it would appear to provide sufficient margin above the under frequency relays to prevent this phenomena from occurring.*

2.4 The 30 minute period for compliance with BAAL limits was chosen to be consistent with other standards and is not based on a specific calculation of risk. The ability of BAAL limits to deliver the intended level of reliability is challenged by this shortcoming.

Response:

The 30 minute response time was selected to provide real-time system operators with a fixed, easy to follow response requirement that provides sufficient time to take appropriate action.

- *The initial methodology proposed by the SDT was to use the 50% probability of the next generation contingency as T_v. This turned out to be much greater than 30 minutes. In addition, it was shown that the time based risk of violating FTL was directly proportional to the rate of frequency change and not a fixed value. The SDT decided that a variable time limit would not be acceptable and presented the 30 minute T_v to the industry in the first draft of the standards. The question was asked of industry if they preferred a variable T_v or a fixed T_v and the reply was overwhelmingly for a fixed value.*
- *Actual experience operating under the proposed standards has met with the support of all participating real-time system operators. Please review the actual feedback collected from the real-time system operators who participated in this field test. In the future, if a different method is identified for responding to BAAL violations, then the standard can be revised.*

2.5 Jaleeli notes that BAAL limits are based on the deviation of frequency from 60 Hz, as opposed to the deviation of frequency from the low frequency relay limit, which is to be avoided. The resultant BAAL limits from the two methods are different. The Drafting Team has not provided an explanation for the difference nor the overall impact on reliability (e.g., are the resultant limits more or less conservative) in their reply to this author's inquiry during the comment phase on this topic, making it difficult to evaluate the reliability impact of this choice.

Response*:* ***Mr. Jaleeli is correct in that the BAAL limits are derived from a deviation from 60 Hz.*** *This deviation is calculated such that if all Balancing Authorities within the interconnection are operating exactly at their BAAL limit the*

Interconnection frequency will be exactly at its Frequency Trigger Limit (FTL). The FTL is set one contingency away from the maximum acceptable interconnection frequency risk, the once in ten Years Frequency Abnormal Limit (FAL), and thus links BAAL limits directly back to Interconnection risk.

2.6 The reliance on CPS 1, with its yearly view and its absence of time of day monitoring, is insufficient to assure adequate control performance without CPS 2.

Response**: Please see the response above – **CPS2 is not as effective a requirement as operation within BAALs.

2.7 The application of BAAL limits to single Balancing Area Interconnections has been called into question by HydroQuebec and the NPCC, and a more flexible and reliable alternative has been provided to the Drafting Team. The imposition of BAAL limits as formulated by a design for multi-area Interconnections is inappropriate. (One minute sampling, three tiers of frequency limits, and a thirty minute tolerance to BAAL limit violations might not be the most reliable approach, and the reporting required to support this standard, that does not fit well, could be burdensome, nonproductive, and not address the true reliability needs.)

***Response: The proposed standards were successfully field tested with a single Balancing Authority interconnection – ERCOT.** Maintaining frequency within boundaries is an important reliability objective for every interconnection. The standards only require reporting of violations – if there are no violations, then reporting should not be more burdensome for a single Balancing Authority interconnection than it is for any other interconnection.*

3. Reliability Coordinator Issues

There is a concern for the additional workload imposed on Reliability Coordinators to primarily allow Balancing Areas to relax their control.
***Response: This concern is not supported by the responses of the real-time system operators working for the balancing authorities and reliability coordinators who participated in the field test.** Here are the responses they provided to two of the questions on a survey conducted at the completion of the official portion of the field test:*

Please identify any benefits you see from operating under the BAAL standards.

***Small (BA):** It allows the BA more time to bring his ACE to zero or on the side that benefits frequency. If the BA's ACE is slightly on the wrong side needed for frequency support, he is not in violation unless he allows his ACE to fall further behind. It allows for the BA to over-comply on CPS1 when his system is able without being penalized under the old CPS2. With a large nonconforming load, this is crucial for our overall compliance.*

***Medium (BA):** More immediate incentive to contribute to good frequency control.*

***Large (RC):** The BAAL Standard better defines the limits and actions to return to limits than the CPS2 criteria did.*

***Small (BA):** Less restrictive than CPS2*

Large (BA):

1. *Less stress on equipment due to unnecessary movement of units up and down*
2. *Reduced stress on BA due to not having to move units unnecessarily.*
3. *Better frequency control due to being able to help frequency in most cases instead of worrying about your score for the next 10 minutes.*

Large (BA): *Much less job stress while working on the generation desk. Cycling of hydro, fossil and pump storage generation assets has been greatly reduced. This should be a positive benefit for equipment availability / reliability. BAAL makes it much easier to place in service/remove from service pump storage plant pump/generation units.*

Large (BA and RC): *Reduced minute by minute stress on BA. Reduced swinging (cycling) of quick-start hydro facilities to meet CPS snap. Increased ability to monitor frequency and perform contingency planning. Increased economic operation of system due to reduced reactionary decisions to meet CPS 2 criteria.*

Large (BA): *Less movement of generation for short periods of time (i.e < 10 minutes) just to pass CPS 2 requirements*

Large (BA): *Less counter productive actions trying to pass a CPS 2 period and then counterproductively taking actions to pass the next period. Less Wear and Tear on equipment trying to swing ACE to pass CPS 2 periods. Allows better accommodation of non-conforming loads. Less unnecessary stress on System Operators.*

Large (BA): *Because the BAAL's provide a wider control band, their use allows plant response to be spread out over a longer time, and reduces AGC response cycles while still satisfying control requirements. This also reduces directional changes for the most responsive generating plants, a factor that decreases equipment wear and improves plant reliability.*

Large (BA and RC): *The method removes control function issue found in CPS2 – ten minute interval management which could swing the system both high and low to make an average. Allows for smoother generator response and schedule ramp control.*

Large (BA):

1. *The BA is able to better help maintain interconnection frequency by not having to return the control area ACE to within L sub 10 limits.*
2. *By not controlling to CPS2, the regulating units are less utilized and therefore reducing the likelihood of unplanned unit outages. (BA's only have to have to restore ACE within L sub 10 when "hurting interconnection frequency.*

Do you support the new Balance Resources and Demand standards (BAL-007 through BAL-012)?

Small (BA): *Yes, NIPSCO supports the new Balance Resources and Demand standards (BAL-007 through BAL-012).*

Medium (BA): *Yes*

Large (RC): *Yes. It does seem to provide for more control actions to respond to frequency deviations than the CPS2 standard.*

Small (BA): *Yes*

Large (BA): *Yes*

Large (BA): *YES, very much in support of BAAL.*

Large (BA and RC): *Yes.*

Large (BA): *YES!!!!!!!!!!*

Large (BA): *Absolutely----This is definitely a more common sense approach to operating a system. Consider for a moment if airplanes were flown using a CPS 2 type control method. The airplane would be continuously going up and down and side to side versus a more level flight.*

Large (BA): *Yes.*

Large (BA and RC): *In general new BAL – 007 through BAL – 009 and BAL – 011 and BAL – 012 have our support. BAL – 010 may need further review to ensure a BIAS characteristic for a BA is accurate and not an overbias to the Interconnection.*

Large (BA): *Yes.*

Changes That May Gain ISO New England's Support

Progress would need to be made in each of the following areas.

1. As part of the standard, give single Balancing Area Interconnections the flexibility to specify their own frequency-related requirements within a reasonable framework.
2. Resolve the methodological concerns stated above in the development of BAAL limits, and others noted by Jaleeli that were omitted here for brevity.
3. Take one or more of the following actions to assure that unscheduled net flows are bounded sufficiently, given the limitations noted in the proposed Balancing Standard: keep CPS 2; ratchet CPS 2 up by some value such as 25% per year, and back off the ratcheting process if problems arise; perform a simulation to determine what is the practical limit that should be established for a CPS 2 like criterion; retain the DCS with a 50% reporting threshold.

Response:

1. ***Each Interconnection has the right to request an interconnection-wide regional variance*** *to any standard. Hydro-Quebec was advised of this opportunity but so far has not submitted any documentation requesting such a variance.*
2. *The drafting team believes that* ***the methodology used to develop BAAL limits is working as intended and is as technically justified as practical****. In the future, additional research may result in further refinement of the methodology used to develop these limits.*
3. *The* ***proposed standards, like CPS2, are not designed to address unscheduled flows.***

NOTE: All comments are labeled according the size of the participating utility; the key is noted as follows:
Small = 4000 mw and below
Medium = 4000 mw - 20,000 mw
Large = 20,000 mw and above

Index to Questions

1. Please identify any benefits you see from operating under the BAAL standards.

Small (BA): It allows the BA more time to bring his ACE to zero or on the side that benefits frequency. If the BA's ACE is slightly on the wrong side needed for frequency support, he is not in violation unless he allows his ACE to fall further behind. It allows for the BA to over-comply on CPS1 when his system is able without being penalized under the old CPS2. With a large nonconforming load, this is crucial for our overall compliance.

Medium (BA): More immediate incentive to contribute to good frequency control.

Large (RC): The BAAL Standard better defines the limits and actions to return to limits than the CPS2 criteria did.

Small (BA): Less restrictive than CPS2

Large (BA):

- Less stress on equipment due to unnecessary movement of units up and down
- Reduced stress on BA due to not having to move units unnecessarily.
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- By not controlling to CPS2, the regulating units are less utilized and therefore reducing the likelihood of unplanned unit outages. (BA's only have to have to restore ACE within L sub 10 when "hurting interconnection frequency.

2. Do you have more/less manual operations of units under BAAL as compared to CPS2?

Small (BA): Because of the MISO market and our large percentage of nonconforming load, we must operate our units in AGC to the fullest extent possible. The MISO market sets our units baseline, and we must use our AGC from there for compliance. We have seen very little, if any, change in the manual operations of our units.

Med (BA): About the same in total – More when on "wrong" side of frequency and less when on "right" side of frequency.

Small (BA): Near same

Large (BA): Under BAAL there is much less manual movement of units due to being able to help frequency automatically instead of moving units to pass CPS2.

Large (BA): Considerable reduction in manual operation of generating assets. Again, should help equipment availability.

Large (BA and RC): There is much less manual (using FLM switch) directioning of regulating resources. There is much less movement of hydro resources for CPS purposes.

Large (BA): Less

Large (BA): Less Manual Actions----Before on CPS 2 control we had to continuously swing equipment up and down to pass CPS2 periods which many times hurt frequency. Now we make timely decisions and make generation adjustments and then monitor for the effect on frequency.

Large (BA): There are less manual operations of units necessary under BAAL.

Large (BA and RC): Thus far there appears to be no change in manual operations of units.

Large (BA): Fewer operations due to not having to restore ACE to within L sub 10 limits unless ACE is "hurting frequency.

3. What changes - improvements or degradation – have you seen in generation control (describe briefly)?

Small (BA): We don't have to move our units as hard when frequency is being benefited by over-compliance. We are not moving units to remain within the CPS2 bound when we are supporting the system. In the MISO footprint, we experience more degradation to performance when MISO adjusts our NSI every 5 minutes, 10-minutes late, trying to meet our nonconforming load changes. Under the new standard, we are able to let our system load settle itself as long as we are compliant or over-compliant. Again, we are not moving our units as hard to stay within the CPS2 bounds when we are supporting frequency.

Small (BA): BAAL tends to dampen the amount of control movement on the units.

Large (BA): Generation control has improved dramatically since we have been in the BAAL trail period. We are still having swings in frequency and sometimes it is as great or greater than when we were using the CPS 1 and 2 standards. However, for the most part I have been able to let my units regulate to system conditions and have maintained good system frequency.

Large (BA): Since we have upgraded the TELEGYR operating system to version 8.0, AGC is much slower due to programming issues. BAAL has really been a positive factor in this not becoming a real problem. It allows more time for AGC/ MRU to move units without a CPS violation.

Large (BA and RC): As mentioned above, manually forcing units in a particular direction has decreased significantly. The necessity to force units to pulse up and then turn them around to pulse down has been virtually eliminated due to removing the CPS2 criteria.

Large (BA): No degradation, better frequency control, less volatile swings.

Large (BA): Some degradation in CPM1----There is less CPM1 passing margin but there also seems to be less extreme frequency excursions.

Large (BA): On the average, it seems that generation control has remained about the same.

The overall system control appears more subject to frequency excursions and large ACE values, although it isn't clear that this is related to BAAL or other causes. It seems that even though generation response is still required within a reasonable time frame, the lesser amount of response required to meet the BAAL criteria leads to more voluntary over or under-generation and subsequently abnormal ACE values.

Large (BA and RC): No changes observed

Large (BA): Need the same amount of MW's / minute on AGC due to having to restore ACE when ACE is huting frequency.

4. Can you describe the experience you've had with instances of exceeding BAAL $_{High}$? Do you think there should be more guidance provided in addressing these types of instances?

Small (BA): None

Large (RC): The guidance seems to be adequate.

Small (BA): We have yet to exceed the non-compliance limit.

Large (BA): Nightshift – Load is dropping off fast – All hydro is off line that can be taken off line - Ramping interchange back in after market dried up – Nonconforming load dropped 150 MW – Only regulation is in steam and will not move 450 MW in 10 minutes in either direction – No place to put the MWs. No further guidance needed.

Large (BA): Recently I was on the generation desk during an all shift long pump Storage Plant Pump/Generation test. The flexibility the BAAL allows made this event much easier. Although the swings caused by the test did swing ACE by as much as 700+ MW, the BAAL allows time to move equipment to compensate without violating the BAAL standard. This would have been impossible with CPS2. BAAL also allows more time to compensate for steel mill ACE swings and large utility ramp issue swings. In a turn down situation I would like more guidance on our authority to remove generation from service in order not exceed the 30 min BAAL limit. (For example if all units are on emergency minimum and we are experiencing a BAAL high.)

Large (BA and RC): There has been no policy provided to the BA which provides us with bounds on what to do in the event of a 4 pump trip (pump storage plant) on a light load morning. Other than this, when the BAAL-High has been encountered, it is typically of short duration and reasonably recoverable.

Large (BA): Yes, need to address loss of load and 30 minute requirement. (Loss of pumping at our pump storage plant) -- should we have to take drastic action to get within BAAL at risk of plant equipment damage. (i.e trip a fossil unit to get within BAA)

Large (BA): Need to have less restrictive guidance for loss of load or loss of Pump Storage plants. These events are less critical than loss of generation events. These events also are less likely to happen in multiple areas simultaneously like loss of generation events. These type of events are also harder to respond to than loss of generation especially during turndown periods when we only have steam to move which is very slow.

Large (BA): Instances of exceeding $BAAL_{High}$ primarily involve Pumped Storage plant operations. Actions to restore the system within limits are usually minimal, since the process of placing a unit in service or removing it from service generally removes the source of the deviation. Current guidance appears sufficient.

Large (BA and RC): BAAL $_{High}$ has been observed prior to the field test as well. No additional guidance is deemed necessary – the Reliability Coordinators seem to be discussing these operational conditions.

Large (BA): I feel that I currently have the proper tools and guidance to correct all ACE disturbances. Management expectations were clearly defined.

5. Can you describe the experience you've had with instances of exceeding BAAL $_{Low}$? Do you think there should be more guidance provided in addressing these types of instances?

Small (BA): We have had only one occasion where we were close to noncompliance. The entire MISO footprint, and the Eastern Interconnect, was having frequency issues that day in early December 2005.

Med (BA):

Large (RC): We coordinated mitigation with our affected BA, and they took action to return to within BAAL criteria. The guidance seems to be adequate.

Small (BA): We have yet to exceed the non-compliant limit

Large (BA): Dayshift – Expected morning peak – Scheduled pump storage plant pump testing (-350 MW) – Hydro and steam coming up quick but not as fast as load – Because pump test is near completion and it would have to be started from the beginning I did not take it off line to recover my ACE – After dragging as much as 500 MW for a couple of minutes hydro and steam overcame the load pickup and I pushed for a while. No further guidance needed.

Large (BA): I have been in a BAAL limit low for as long as 12 minutes. As I recall, it was during a morning load pickup and we were attempting to keep pump storage plant units on pump for as long as possible. To meet load demand Steam and Hydro was moved up. The BAAL allows much more time for such a situation without a violation. (nearly impossible with CPS.)

I feel we have been empowered to take necessary action to respond to a BAAL violation. (i.e. starting CT's, moving hydro out of schedule, pump storage plant assets etc.)

Large (BA and RC): Many BAAL-Low excursions have been induced by overall low system frequency. By the time that the alarm is sounded, units are pulsing up and resources are moving to recover frequency. I feel that we are adequately informed as to our options for recovering from BAAL-Low.

Large (BA): No problems

Large (BA): Instances of exceeding BAAL $_{Low}$ primarily involve Pumped Storage plant operations. Actions to restore the system within limits are usually minimal, since the process of placing a unit in service or removing it from service generally removes the source of the deviation. Current guidance appears sufficient.

Large (BA and RC): Same as discussed in item 4. More instances are observed during the period of time error corrections. Consider terminating the time error corrections in these instances.

Large (BA): See above

6. Do the tools provided with these standards make it easier to research the causes of frequency deviations?

Small (BA): Unknown at this time

Large (RC): If they are used as they should be. The one difference from the CPS2 standard is that an RC doesn't know what the BAAL limits are at any given time for BA's outside of their RC area

Small (BA): Have not researched any frequency deviations

Large (BA): Yes, in fact I have found that I watch some parameters (such as frequency) more closely with BAAL than I did under CPS. I have been surprised at how much our ACE swings affect overall system frequency.

Large (BA): NO

Large (BA): There seems to be little difference in our ability to determine frequency deviation causes under BAAL standards as compared with previous policies.

Large (BA and RC): Tools need to focus on more than just the ACE value. The CERTs tool is good display which needs the schedule error as part of the display. BAAL provides a better composite view of frequency and ACE control however separating out bias error vs schedule error would be more telling for the source of a problem.

7. Once you find the cause, do the standards give you clearer guidance for when to direct BAs to take corrective actions? (Compare your experience now under BRD Standards to your experience under CPS2?)?

Small (BA): Once a cause is identified, our dispatchers respond very similar to how they did under the CPS2 standard. The new BAAL allows for a great time for compliance and the opportunity to allow the system to over-comply.

Large (RC): Yes, the BAAL standard does seems to provide better guidance for corrective actions.

Large (BA): Yes. The requirements for directing actions are clear, much more so than before. However, as a BA subject to the direction of the RC in this area, there seems to be little investigation of frequency deviation events by the RC, and subsequently little direction to limit the deviations.

Large (BA and RC): BRD standards put a measured response in place when a trigger limit is reached which is not present in CPS2 standard. Large ACE error due to fixed bias contribution does not become clearer with either method.

8. What is a rough estimate of the amount of time it took you to prepare your control center EMS/SCADA for the field trial?

Small (BA): Our IT staff has estimated that they have 16 hours into the implementation of the standard within our EMS system. Some of that time was spent developing a "warning" signal for when we were out of the BAAL standard to give the dispatcher ample time to respond and get back into compliance.

Medium (BA): 100 man hours.

Large (RC): Approximately 2 days

Small (BA): One person, two weeks

Large (BA): One week.

Large (BA): We had two people spend about 4 days setting up the EMS for BAAL initially. Had one person spend another 2 days setting up a program to make it easier to validate the after-the-fact report against the EMS values.

This does not include time spent training operators or on after-the-fact data collection.

Large (BA and RC): Less than one man-week. Dispatcher visual built outside of the EMS system.

9. Is it easier / harder to operate to BAAL as opposed to CPS2?

Small (BA): We believe it to be easier, particularly with our nonconforming load issues.

Medium (BA): About the same – Since the deviation from scheduled frequency usually cannot be predicted over an extended period such as 30 minutes, the BA still needs to exercise good ACE control at all times (more or less within the old L10 bounds). Also, the lack of penalty for being on the "right" side of frequency is offset by the BAAL limit being much tighter than the old L10 bounds when the deviation from scheduled frequency is large.

Small (BA): Easier

Large (BA): It is easier to operate with the BAAL limits because you do not have to react to every minor excursion of the ACE to try pass every 10 minute period and for the most part it allows you to watch system frequency and try drag when frequency is high and push when frequency is high as long as inadvertent is at a reasonable level.

Large (BA): Much easier to operate to BAAL.

Large (BA and RC): It is both easier and harder. As mentioned above, the minute to minute stress of meeting the CPS2 criteria has been reduced, but the gravity of failing the BAAL is much more severe.

Large (BA): Much easier on BAAL, better resource operations, less tear and wear on plant equipment.

Large (BA): Easier----Reduced System Operator stress and reduced equipment wear and tear by as much as 50% to 75%.

Large (BA): Much easier. Use of CPS2 required tighter system control than BAAL under most circumstances.

Large (BA and RC): The operation is different – not easier or harder for PJM. BAAL removed the 10 minute block that operators currently focus for operation.

Large (BA): Far easier.

10. If DCS were removed, do you believe that it would change your performance?

Small (BA): We do not anticipate any change in our performance.

Medium (BA): Overall no. To DCS possibly.

With 30 minutes to respond we might start fewer fast-start CT's initially. Probably less overshoot.

Small (BA): I think it would tend to lessen performance interconnect wide.

Large (BA): No

Large (BA): I have found that if I operate BAAL with very tight controls I still pass CPS 1 & 2. Likewise, I feel that if DCS were removed I know what I have to do maintain generation vs. load balance. So it shouldn't result in a change of performance.

Large (BA and RC): No.

Large (BA): NO- still need to recover YES- not as concerned with having a 15 minute recovery versus a 20 minute recovery if resources are available.

Large (BA): Yes. I believe performance would decline significantly. DCS appears to have a "keep 'em honest" effect and should not be removed.

Large (BA and RC): At present time we would likely keep DCS response in place modified by BAAL exceedance flag as the trigger to recovery within the present 15 minute window – allowing for a more economic response should the trigger limit not be required.

Large (BA): Not at all. Still have the obligation to do the CA's "fair share in maintaining system frequency.

11. Do you support the new Balance Resources and Demand standards (BAL-007 through BAL-012)?

Small (BA): Yes, NIPSCO supports the new Balance Resources and Demand standards (BAL-007 through BAL-012).

Medium (BA): Yes

Large (RC): Yes. It does seem to provide for more control actions to respond to frequency deviations than the CPS2 standard.

Small (BA): Yes

Large (BA): Yes

Large (BA): YES, very much in support of BAAL.

Large (BA and RC): Yes.

Large (BA): YES!!!!!!!!!!

Large (BA): Absolutely----This is definitely a more common sense approach to operating a system. Consider for a moment if airplanes were flown using a CPS 2 type control method. The airplane would be continuously going up and down and side to side versus a more level flight.

Large (BA): Yes.

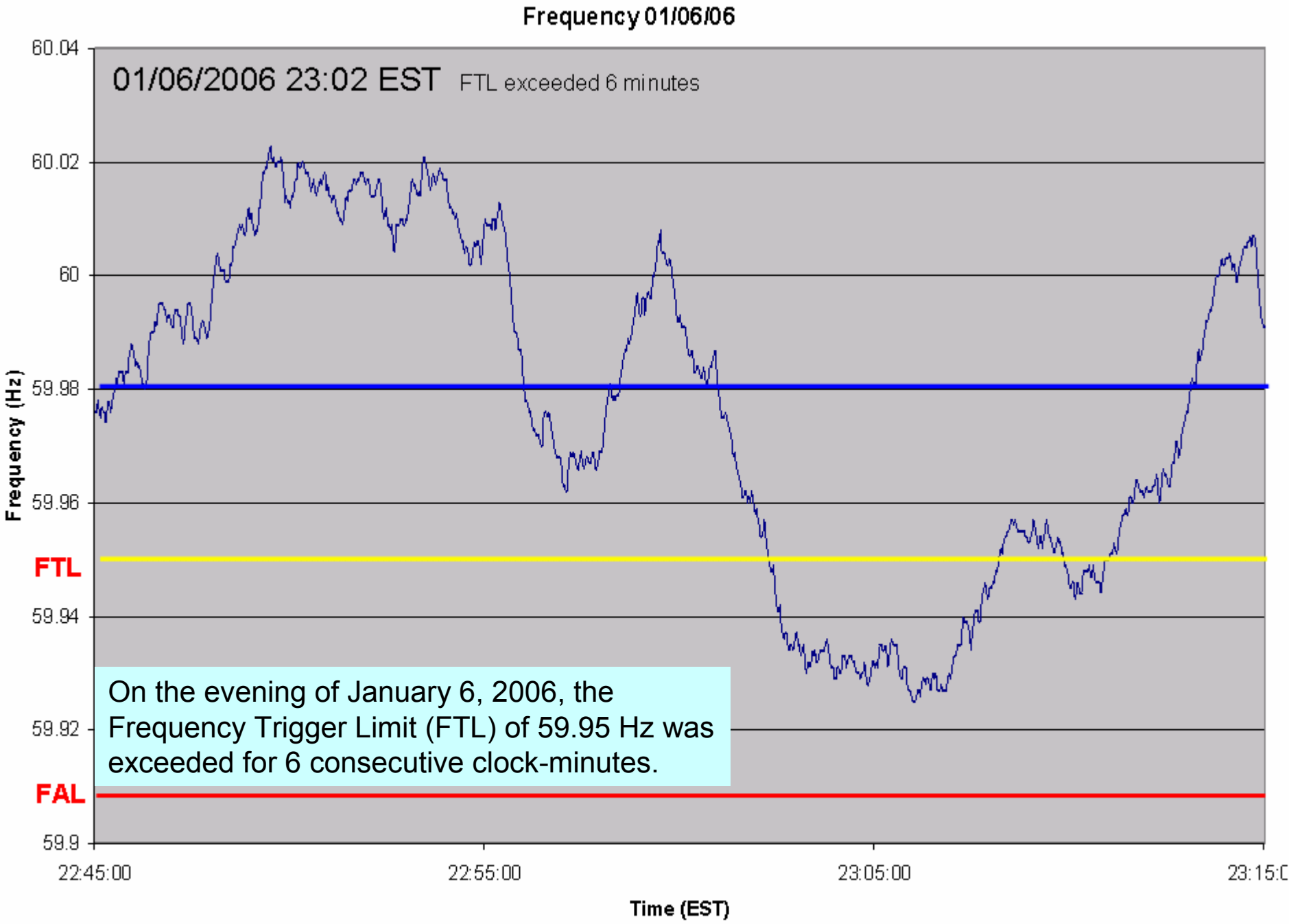
Large (BA and RC): In general new BAL – 007 through BAL – 009 and BAL – 011 and BAL – 012 have our support. BAL – 010 may need further review to ensure a BIAS characteristic for a BA is accurate and not an overbias to the Interconnection.

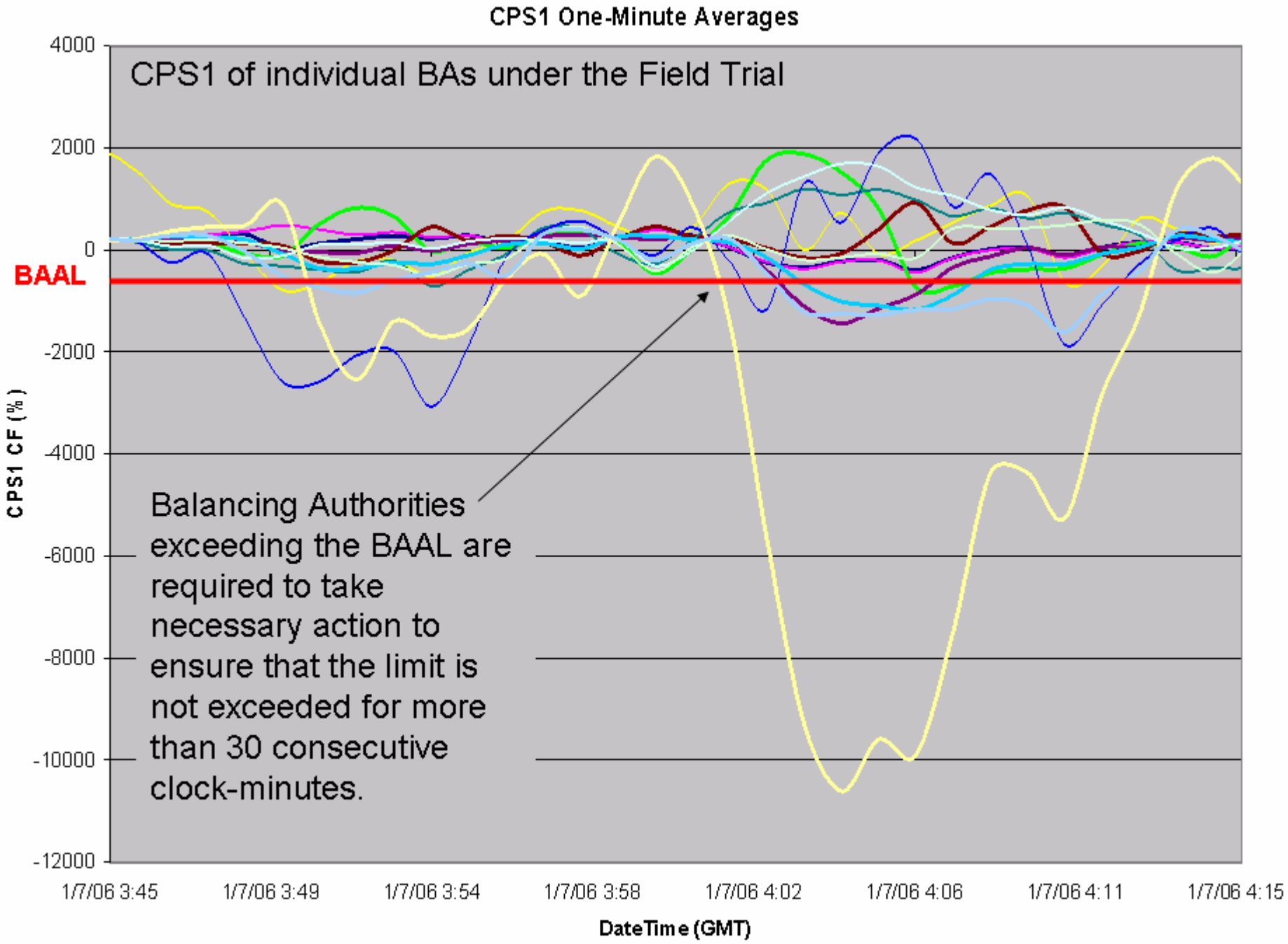
Large (BA): Y

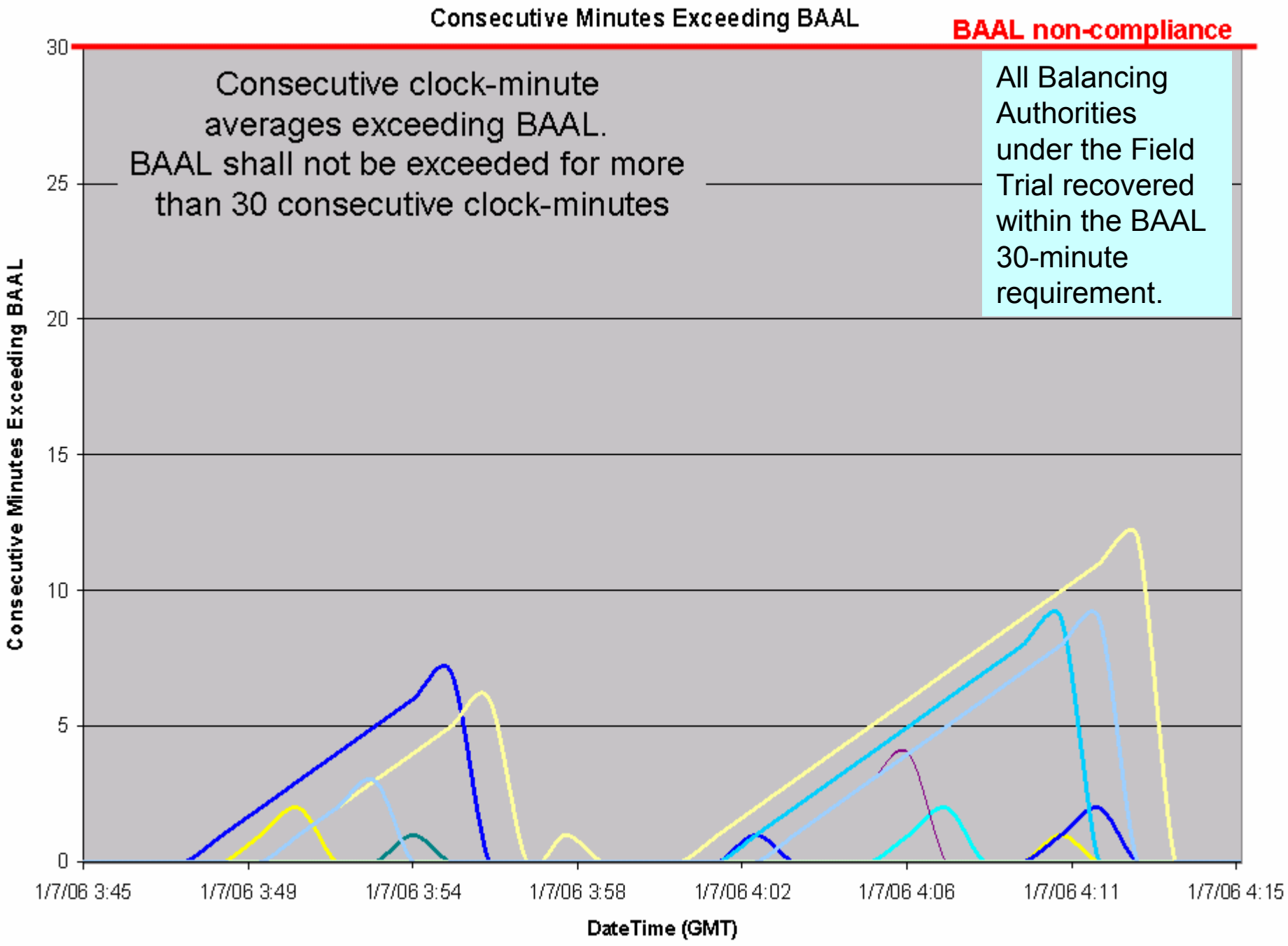
Balance Resources and Demand Proof-of-Concept Field Trial

Event Illustrating the Value of BAAL During Frequency Excursions

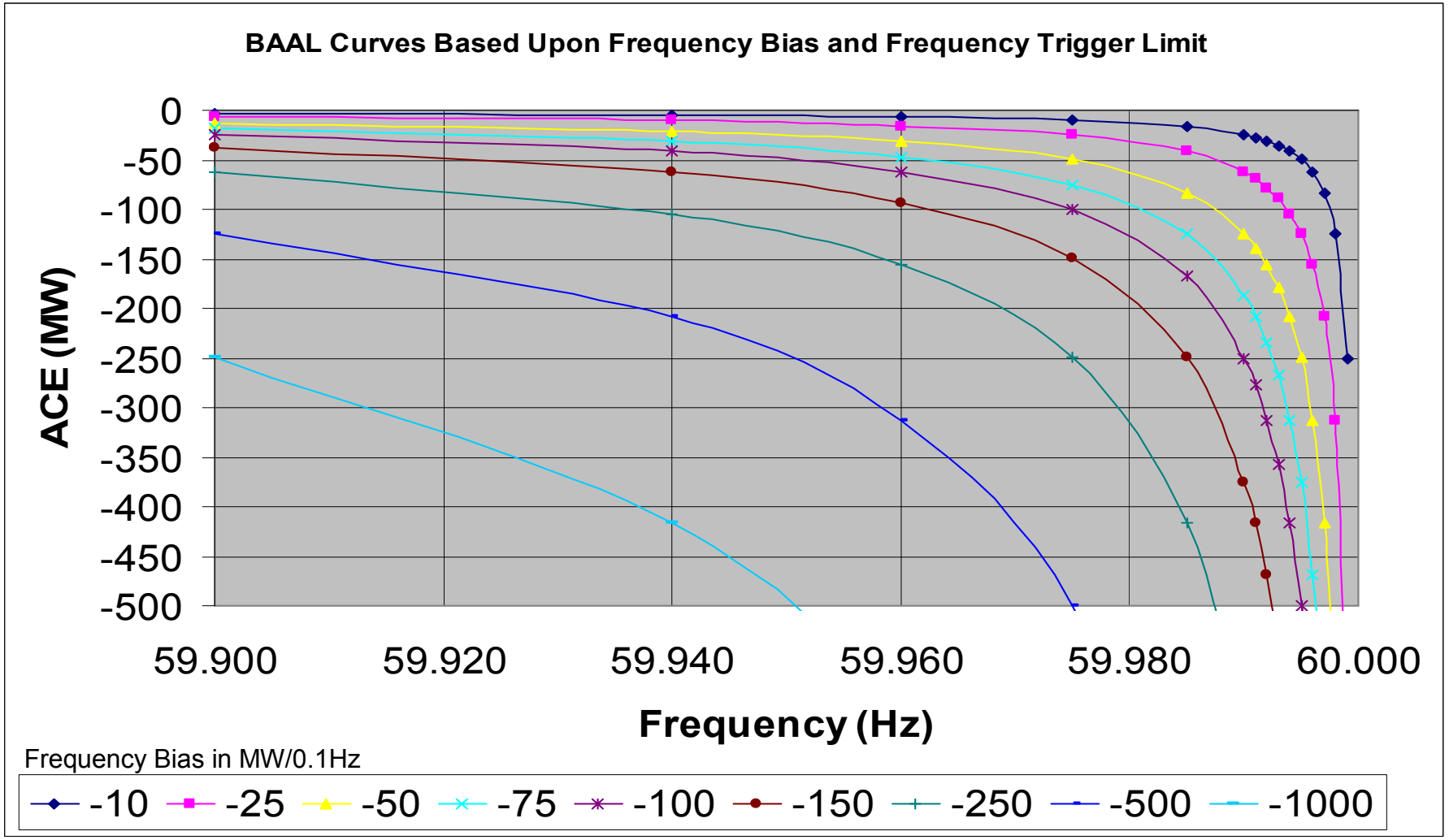
January 6, 2006


Frequency 01/06/06
01/06/2006 23:02 EST
FTL exceeded 6 minutes
60.04
60.02
60
59.98
59.96
FTL
59.94
59.92
FAL
59.9
Frequency (Hz)
22:45:00
22:55:00
23:05:00
23:15:0
Time (EST)
On the evening of January 6, 2006, the Frequency Trigger Limit (FTL) of 59.95 Hz was exceeded for 6 consecutive clock-minutes.

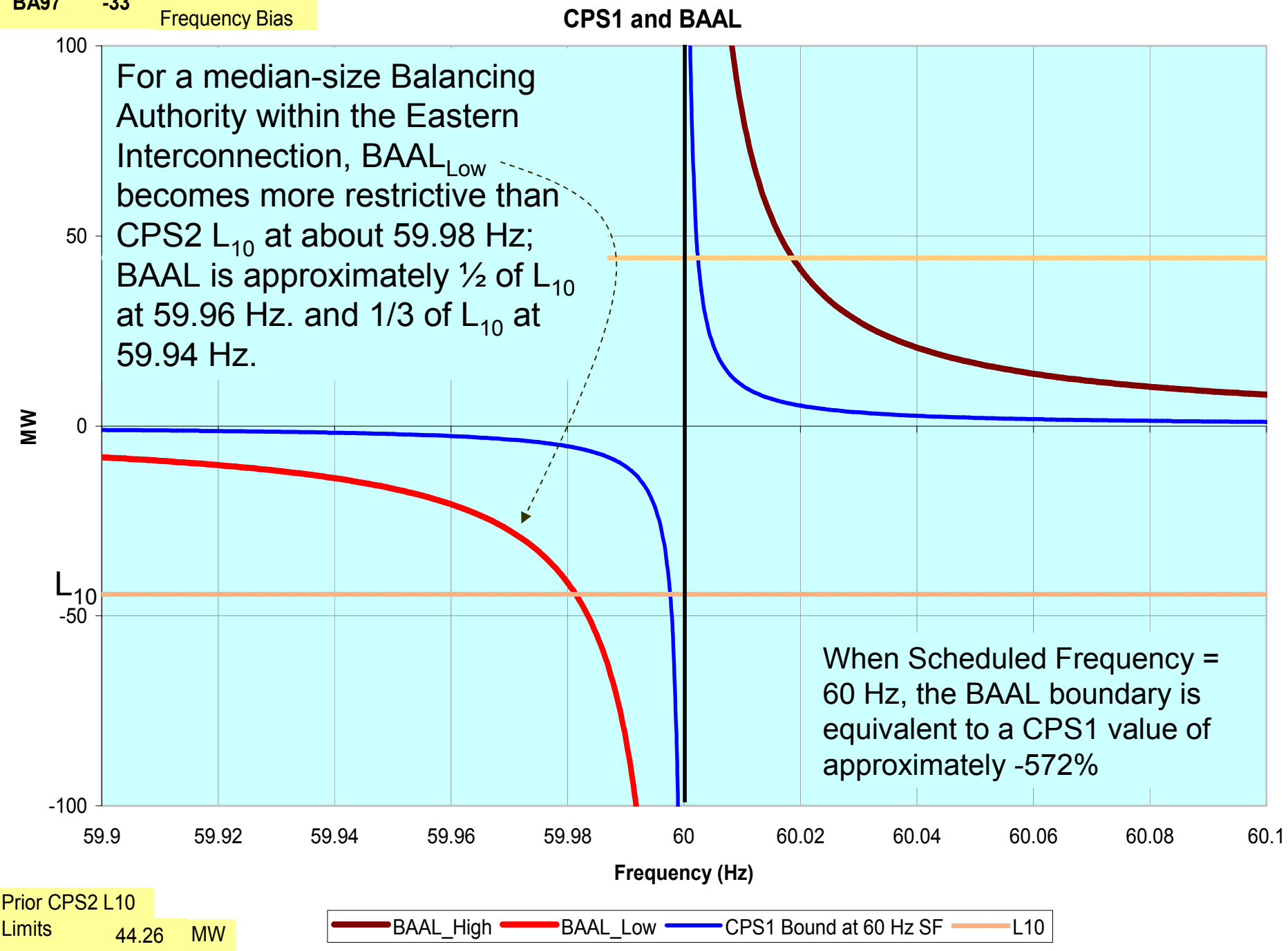

CPS1 One-Minute Averages
CPS1 of individual BAs under the Field Trial
BAAL
Balancing Authorities exceeding the BAAL are required to take necessary action to ensure that the limit is not exceeded for more than 30 consecutive clock-minutes.
CPS1 CF (%)
4000
2000
0
-2000
-4000
-6000
-8000
-10000
-12000
1/7/06 3:45
1/7/06 3:49
1/7/06 3:54
1/7/06 3:58
1/7/06 4:02
1/7/06 4:06
1/7/06 4:11
1/7/06 4:15
DateTime (GMT)


Consecutive Minutes Exceeding BAAL
BAAL non-compliance
Consecutive clock-minute averages exceeding BAAL. BAAL shall not be exceeded for more than 30 consecutive clock-minutes
All Balancing Authorities under the Field Trial recovered within the BAAL 30-minute requirement.
Consecutive Minutes Exceeding BAAL
30
25
20
15
10
5
0
1/7/06 3:45
1/7/06 3:49
1/7/06 3:54
1/7/06 3:58
1/7/06 4:02
1/7/06 4:06
1/7/06 4:11
1/7/06 4:15
DateTime (GMT)

By design, the Balancing Authority ACE Limit (BAAL) for any given frequency is directly proportional to the frequency bias or, for the most part, relative size of the Balancing Authority. As such, at a given frequency a Balancing Authority ten times smaller than another Balancing Authority will have a BAAL ten times smaller than the other. Equal treatment across all Balancing Authorities is already evident in the CPS1 calculation. The BAAL is equivalent to CPS1 of approximately -572% for all Balancing Authorities in the Eastern Interconnection when Scheduled Frequency is 60 Hz, as seen below for various-size Balancing Authorities.



BA97	-33	MW/0.1 Hz Frequency Bias



Prior CPS2 L10 Limits	44.26	MW

One-minute "snap-shot" of ACE at worst frequency of 59.931 Hz

Date/Time	Area	CPS1	MW below BAAL	MW below L10	BAAL 'tighter' than L10
1/6/2006 23:06	BA1	**-9771.420**	**-200.70**	**-173.5**	**-27.2**
1/6/2006 23:06	BA2	**-7615.976**	**-23.25**	**-8.7**	**-14.6**
1/6/2006 23:06	BA3	**-4719.276**	**-41.03**	**-19.0**	**-22.0**
1/6/2006 23:06	BA4	**-3737.199**	**-5.47**	5.6	**-11.0**
1/6/2006 23:06	BA5	**-3126.743**	**-6.77**	6.5	**-13.3**
1/6/2006 23:06	BA6	**-3076.774**	**-107.26**	**-78.8**	**-28.5**
1/6/2006 23:06	BA7	**-3065.907**	**-82.21**	**-53.6**	**-28.6**
1/6/2006 23:06	BA8	**-3051.594**	**-32.65**	**-8.7**	**-24.0**
1/6/2006 23:06	BA9	**-2296.161**	**-26.13**	**-1.2**	**-24.9**
1/6/2006 23:06	BA10	**-2196.121**	**-11.50**	8.1	**-19.6**
1/6/2006 23:06	BA11	**-1856.724**	**-12.25**	9.4	**-21.7**
1/6/2006 23:06	BA12	**-1638.797**	**-13.32**	10.3	**-23.6**
1/6/2006 23:06	BA13	**-1408.966**	**-40.30**	**-12.1**	**-28.2**
1/6/2006 23:06	BA14	**-1378.896**	**-2.70**	11.9	**-14.6**
1/6/2006 23:06	BA15	**-1353.393**	**-16.98**	10.1	**-27.1**
1/6/2006 23:06	BA16	**-1194.084**	**-12.26**	14.3	**-26.5**
1/6/2006 23:06	BA17	**-1187.731**	**-38.16**	**-11.9**	**-26.3**
1/6/2006 23:06	BA19	**-1052.844**	**-2.49**	14.9	**-17.4**
1/6/2006 23:06	BA20	**-1039.276**	**-0.95**	10.8	**-11.7**
1/6/2006 23:06	BA21	**-874.909**	**-43.94**	**-42.5**	**-1.4**
1/6/2006 23:06	BA22	**-764.076**	**-22.18**	**-10.1**	**-12.1**
1/6/2006 23:06	BA23	**-690.860**	**-7.64**	18.3	**-25.9**
1/6/2006 23:06	BA24	**-654.958**	**-1.60**	24.9	**-26.5**
1/6/2006 23:06	BA25	**-615.345**	**-4.96**	7.8	**-12.8**
1/6/2006 23:06	BA26	-447.282	35.18	**-25.0**	60.2
1/6/2006 23:06	BA27	-435.705	3.30	31.0	**-27.7**
1/6/2006 23:06	BA28	-428.315	29.86	5.0	24.9
1/6/2006 23:06	BA29	-426.819	4.75	33.4	**-28.6**
1/6/2006 23:06	BA30	-418.153	12.96	34.3	**-21.3**
1/6/2006 23:06	BA31	-363.069	1.13	18.6	**-17.5**
1/6/2006 23:06	BA32	-362.283	7.88	36.6	**-28.7**
1/6/2006 23:06	BA33	-273.448	9.80	38.4	**-28.6**
1/6/2006 23:06	BA34	-260.334	6.51	33.4	**-26.8**
1/6/2006 23:06	BA35	-250.001	9.56	37.9	**-28.4**

Balancing Authorities exceeding BAAL

25 Balancing Authorities would have been required to take action under the proposed BAL-007 by exceeding their Balancing Authority ACE Limit (BAAL) - only 3 of the 25 were under the field test.

13 of the 25 Balancing Authorities who would have been required to take action under BAAL were operating within their CPS2 L_{10} limit, illustrating BAAL getting "tighter" than CPS2 L_{10} as frequency deviates further from 60 Hz.

A negative value reflects the amount of MWs BAAL was "tighter" than the CPS2 L_{10} at the given frequency

At Scheduled Frequency of 60 Hz, BAAL is equivalent to a one-minute CPS1 of approximately -572%