

## Resources Subcommittee Meeting

Wednesday, July 18, 2007 — 8 a.m.–5 p.m.

Thursday, July 19, 2007 — 8 a.m.–noon

Hyatt Regency Calgary  
700 Centre St Se  
Calgary, AB, Canada T2G5P6  
Phone: (403) 717-1234

Conference Bridge Participation (Phone Call In)  
Phone Number: (732) 694-2061  
Access Code: 1123071807#

## Agenda

- 1. Administrative**
  - a. Membership and Guests — Chair
  - b. Arrangements — Secretary
  - c. Approval of Meeting Minutes
    - i) April 25, 2007, Meeting Minutes — Chair
    - ii) June 26, 2007, Meeting Minutes — Chair
  - d. Procedures
    - i) Parliamentary Procedures — Chair
    - ii) Antitrust Compliance Guidelines — Chair
  - e. Resources Subcommittee Action Items List (Review prior to the meeting) — Chair
  
- 2. Task Force Reports**

Task Force Meetings, Conference Calls, or Action Since the Last RS Meeting

  - a. Control Criteria Task Force — Alan Oneal
  - b. Frequency Task Force — Raymond Vice
  - c. Inadvertent Interchange Task Force — Don Badley
  - d. Operating Reserves Task Force — Larry Akens
  
- 3. NERC Reliability Standards**
  - a. Frequency Response SAR — Terry Bilke
  - b. Reliability-based Control SAR — Raymond Vice
  - c. BAL-002, 004, 005, 006 Standards Revision SAR — Terry Bilke
  - d. Time and Inadvertent Management SAR – Terry Bilke
  - e. Performance Standards Reference Document — Terry Bilke, Alan Oneal

- f. Training Documents — Task Force Chairs
- g. BAL Standards Related Waivers or Interpretations
  - i) Request for Interpretation of BAL-003-0, R2, 2.2, 5, 5.1— Terry Bilke
  - ii) Reliability-based Control Waiver of CPS2— Terry Bilke
- h. NERC Tool Vision — Tom Vandervort

**4. NERC Active Resources Subcommittee Projects**

- a. Resources Adequacy (ACE-Frequency) Application System — Carlos Martinez, Terry Bilke
- b. Intelligent Alarms — Carlos Martinez, Terry Bilke
- c. AIE Monitoring Application Project (Project 2000-4) — Carlos Martinez, Don Badley
- d. CPS1 & BAAL Monitoring Application Project (Project 2001-38) — Carlos Martinez, Raymond Vice
- e. Frequency Monitoring and Analysis System (Project 2005-6) — Carlos Martinez, Raymond Vice, Terry Bilke
- f. Inadvertent Interchange Application Project (SPP inadvertent interchange tool migration) (Project 2001-37) — Carlos Martinez, Don Badley
- g. DOE Eastern Interconnection Phasor Project (EIPP) — Terry Bilke, Carlos Martinez

**5. Frequency and Control Performance**

- a. Western Interconnection Frequency Trends and Events
- b. Eastern Interconnection Frequency Trends and Events
- c. ERCOT Interconnection Frequency Trends and Events
- d. Hydro Quebec Interconnection Frequency Trends and Events
- e. CPS1, CPS2, BAAL Data Trends
- f. DCS Data Trends
- g. Inadvertent Interchange Balances — Don Badley
- h. Reliability-based Control SAR SDT, Field Trial CPS2 Scores Request– Terry Bilke
- i. Intelligent Alarms— Terry Bilke, Carlos Martinez
- j. Analysis of Eastern Interconnection Intelligent Alarms — M. Potishnak, S. Niemeyer
- k. Evaluating Transaction Schedule Ramps – Raymond Vice

**6. Time Error**

- a. Eastern Interconnection — Bill Herbsleb
- b. Western Interconnection — John Tolo
- c. ERCOT Interconnection — Sydney Niemeyer
- d. Hydro Quebec Interconnection — Mike Potishnak
- e. Time Error Efficiency in the FERC Order 693— Terry Bilke, Gerry Beckerle

**7. Future Meetings**

- a. October 23-24, 2007                      Portland, OR
- b. January 30-31, 2008                      Phoenix. Alternate Location: Miami or Tampa
- c. April 30-May 1, 2008                      Washington D.C., Alt Location: Miami/Ft. Lauderdale
- d. July 30-31, 2008                              To Be Determined

e. October 29-30, 2008

To Be Determined

### ***Item 1.a*      Membership and Guests**

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Chairman Terry Bilke will welcome the Resources Subcommittee members and guests. The chair will ask members and guests to introduce themselves.

Each member is asked to check and review the current organization, roster, and survey contacts list for accuracy.

#### Attachments

1. Resources Subcommittee Organization
2. Resources Subcommittee Roster
3. Resources Subcommittee Survey Contacts List

### ***Item 1.b*      Arrangements**

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The Resources Subcommittee meeting will begin on Wednesday, July 18 at 8 a.m. and adjourn by noon on Thursday, July 19, 2007. Lunch will be served on Wednesday.

### ***Item 1.c*      Approval of Meeting Minutes**

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The chair will ask for approval of the April 25-26, 2007 Resources Subcommittee meeting minutes and the June 26, 2007 Resources Subcommittee meeting minutes.

#### Attachment

- April 25-26, 2007 Resources Subcommittee Meeting Minutes
- June 26, 2007 Resources Subcommittee Meeting Minutes

### ***Item 1.d*      Procedures**

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#### **Item 1.d.i.      Parliamentary Procedures**

A summary of Parliamentary Procedures is attached for reference. The chair will answer questions regarding these procedures.

#### **Item 1.d.ii.      Antitrust Compliance Guidelines**

On June 14, 2002, the NERC Board of Trustees adopted Antitrust Compliance Guidelines for NERC. In adopting the guidelines, the board passed the following resolution:

RESOLVED, that the Board of Trustees (1) adopts the Antitrust Compliance Guidelines draft attached hereto as Exhibit A and (2) instructs that these Antitrust Compliance Guidelines be included in the agenda package for each meeting of every NERC committee, subcommittee, task force, working group, and other NERC-sponsored activity.

The resolution also applies to workshops, training sessions, and any other NERC-sponsored event. A copy of the NERC Antitrust Compliance Guidelines will be included in the agenda package for each meeting of each group or event.

#### Attachments

1. Parliamentary Procedures
2. Antitrust Compliance Guidelines

## ***Item 1.e* Resources Subcommittee Action Items List**

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### **Discussion**

The action items listed are attached for the subcommittee to review prior to the meeting. The action item list will not be reviewed during the meeting. However, the chairman or any member can discuss specific items or request assistance to close them.

### **Action**

Between meetings, the subcommittee is to review the action item list on a periodic basis and perform necessary tasks to close the items. The subcommittee secretary will schedule meetings, conference calls, and webcasts to support efforts to address the action items. It is the responsibility of the action figures to address and close their items.

### **Attachment**

Resources Subcommittee Action Items List

## **Item 2. Task Force Reports**

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Some or all of the subcommittee task forces may have met or conducted conference calls since the last meeting to discuss their respective issues and concerns.

### ***Items 2.a–2.d* Task Force Reports**

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#### Discussion and Action

The RS task forces' chairmen will report to the subcommittee regarding deliverables, significant investigations, action items, and concerns that are new or carry-over from the last meeting.

<b>Task Force</b>	<b>Task Force Chairman</b>
Control Criteria Task Force	Alan Oneal
Frequency Task Force	Raymond Vice
Inadvertent Interchange Task Force	Don Badley
Operating Reserves Task Force	Larry Akens

### **Item 3. NERC Reliability Standards**

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The Resources Subcommittee standards activity listed here may be addressed during the subcommittee meeting or during the RS Task Force meetings.

#### **Item 3.a Frequency Response SAR — Terry Bilke**

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Terry Bilke submitted Frequency Response SAR responses to the industry for comments. Mr. Bilke will report on the status of the Frequency Response SAR.

#### **Item 3.b Reliability-based Control SAR — Raymond Vice**

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The Reliability-based Control SAR drafting team (RBC SDT) is continuing the field trials that were initiated by the Balance Resources and Demand standard drafting team. A number of RS members are on the RBC SDT. Raymond Vice will report on the status of the Reliability-based Control SAR.

#### **Item 3.c BAL-002, 004, 005, 006 Standards Revisions SAR — Terry Bilke**

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The BAL-002, 004, 005, 006 Standards Revisions SAR has been posted for industry comments. Terry Bilke will report on the status of the BAL-002, 004, 005, 006 Standards Revisions SAR.

#### **Item 3.d Time and Inadvertent Management SAR — Terry Bilke**

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Terry Bilke submitted a Time and Inadvertent Management SAR to the NERC Standards Group for processing. Mr. Bilke will report on the status of the Time and Inadvertent Management SAR.

#### **Item 3.e Performance Standard Reference Document — Terry Bilke, Alan Oneal**

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Alan Oneal has spent a significant amount of time revising the Performance Standard Reference Document. This effort is necessary since the Policy 1 reference documents are no longer valid. Terry Bilke requested the Standards Committee determine the fate of this reference document. Mr. Bilke will report on the status of the Performance Standard Reference Document.

#### **Item 3.f Training Documents — Task Force Chairs**

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##### Reference Documents Discussion and Action

Training documents are needed for the industry for performance measures CPS1, CPS2, DCS, time error correction, inadvertent interchange, and especially BAAL (new). The Operating Manual which had associated training documents was superseded by the reliability standards and the old training documents no longer exist. The subcommittee task forces will work with the NERC Personnel Subcommittee to develop training material for the industry. The NERC Personnel Subcommittee needs draft documents for each parameter that the subcommittee wants developed into training documents.

#### **Item 3.g BAL Standards Related Waivers or Interpretations**

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##### **Item 3.g.i Request for Interpretation of BAL-003-0, R2, 2.2, 5, 5.1 — Terry Bilke**

The RS received a request to respond to an interpretation from ERCOT on BAL-003, see attachment. The summary below is Terry Bilke's initial response.

To address the specific request, the two requirements do not conflict.

BAs analyze their response to frequency excursions as a first step in determining bias. The BA may then choose a fixed (constant through the year) or variable (varies with load, specific

generators, etc.) bias. R5 sets a floor, should natural response be less than 1% of peak/0.1Hz change in frequency.

One reason for the 1% floor is so all BAs contribute to stabilizing frequency. Even if a BA had below normal governor response, the 1% Bias setting calls on AGC to help stabilize frequency after a disturbance.

The 1% floor also ensures a consistent measure of control performance. If a BA was allowed to understate their bias, it would inflate their reported CPS1.

The reasoning for the 1% floor is most applicable to multi-BA Interconnections. The Bias term drops out of the CPS calculation in a single BA Interconnection such as ERCOT, so there is no possibility of overstating CPS1.

ERCOT correctly states that the Resources Subcommittee previously voted on a change to R5 that would allow average bias in a given month to be less than 1% of annual peak. The problem is the SAR intended to address such changes has not yet progressed through the standards process.

Another related issue the Resources Subcommittee has been trying to address through the standards process is that a common bias target for all Interconnections may not be appropriate, particularly in single-BA Interconnections. In ERCOT's case, using 1% bias during shoulder periods causes over-utilization of regulation (ACE oscillations) and reduced CPS1.

The Resources Subcommittee believes what ERCOT is doing for its bias calculation is superior to what is required in the standard; however, it does not appear that the interpretation process is the proper mechanism to achieve this goal.

#### Attachment

Request for Interpretation of NERC Standard BAL-003-0, R2, 2.2, 5, 5.1

#### **Item 3.g.ii Reliability-based Control Waiver of CPS2 — Terry Bilke**

In order to continue the Balance Resources and Demand field trials under the new Reliability-based Control SAR, David Hilt, NERC Vice President and Director of Compliance, confirmed the extension of the CPS2 waiver for the entities participating in the field test, see attachment.

#### Attachment

Balance Resources and Demand Draft Standard Continuation Field Test and Waiver of CPS2 Compliance letter from David Hilt, dated June 29, 2007

#### **Item 3.h NERC Tool Vision — Tom Vandervort**

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NERC will only undertake projects and software development that supports reliability concepts or for special negotiated situations. The Resources Subcommittee needs to know and understand the parameters that the projects are governed by. Tom Vandervort will lead the discussion.

## **Item 4. NERC Active Resources Subcommittee Projects**

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### Discussion

Terry Bilke and Carlos Martinez will provide a status report, lead a discussion, and detail action items for the specific Project Review Teams on the following RS projects. Resources Subcommittee teams have been formed that are assigned to address the needs of the respective projects. The team leader is noted with each project.

### Attachment

NERC-CERTS-RS Projects Summary Table – To be sent under separate cover

### ***Item 4.a Resources Adequacy (ACE-Frequency) Application System — Carlos Martinez, Terry Bilke***

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Resources Adequacy (ACE-Frequency) Application Review Team: Leader-Terry Bilke, Raymond Vice, Sydney Niemeyer, Robert Rhodes, Bill Herbsleb, John Tolo, Bart McManus, Tom Vandervort

The Resources Adequacy (ACE-Frequency) Application version 4.0 was released to the industry via NERC subscription and registration. Carlos Martinez will status the project and answer any questions of the subcommittee.

**Important RS Considerations:** 1) NERC IT Registry (currently being revised) is necessary; 2) Subscriber criteria must be established and documented; 3) Establish methodology to address BA name or footprint changes; 4) Other application issues the subcommittee and ACE-Frequency Application Review Team (see RS Action Item List) may have

The subcommittee is urged to contact all Balancing Authorities in their respective regions to subscribe to the Resources Adequacy application and Intelligent Alarms.

### ***Item 4.b Intelligent Alarms — Carlos Martinez, Terry Bilke***

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The NERC Intelligent Alarms are now a two page alarm, distributed to subscribers via the e-mail/internet, that are initiated when specific thresholds are exceeded. Mr. Martinez and Mr. Bilke will report on the new Intelligent Alarms.

### ***Item 4.c AIE Monitoring Applications Project — Carlos Martinez, Don Badley***

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AIE Monitoring Application Review Team: Leader-Don Badley, Raymond Vice, Bart McManus, John Tolo, Terry Bilke, Don McInnis, Mike Potishnak, Tom Vandervort, Brian Nolan

Messrs. Badley and Martinez will discuss AIE Monitoring Application field test, the next steps for full deployment, challenges and problems that have arisen, and the implementation plan.

**Important RS Considerations:** 1) Recap of AIE Monitoring Field Test; 2) AIE Project Review Team (see RS Action Item List) to review field test and determine next step; 3) NERC IT Registry (currently being revised) is necessary; 4) Subscriber criteria must be established and documented; 5) Establish methodology to address BA addition, deletion, or name change; 6) Other application issues the subcommittee and AIE Monitoring Application Review Team may have

***Item 4.d CPS1 & BAAL Monitoring Project — Carlos Martinez, Raymond Vice***

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CPS1 & BAAL Monitoring Application Review Team: Leader-Raymond Vice, Doug Hils, Mark Henry, Sydney Niemeyer, Don Badley, John Tolo, Bart McManus, Tom Vandervort

The Resources Subcommittee is sponsoring the CPS1 & BAAL Monitoring Project, however, the **Reliability-based Control SAR drafting team has the lead**. The application has been used extensively for the Balance Resources and Demand standards field test and will require modification for a real-time production application when the standards are approved and implemented. Messrs. Vice and Martinez will discuss the current status of this project, the transition from the field test tool to a production application, and the expectations for this application.

**Important RS Considerations:** 1) CPS1 & BAAL Monitoring Application Review Team (see RS Action Item List) to work closely with the Reliability-based Control SAR drafting team to set a course of action for this application; 2) NERC IT Registry (currently being revised) is necessary; 3) Subscriber criteria must be established and documented; 4) Establish methodology to address BA addition, deletion, or name change; 5) Other application issues the subcommittee and CPS1 & BAAL Monitoring Application Review Team may have

***Item 4.e Frequency Monitoring and Analysis System Project — Carlos Martinez, Raymond Vice, Terry Bilke***

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Frequency Monitoring and Analysis (FMA) System Project Review Team: Leader-Raymond Vice, Frequency Task Force, Tom Vandervort

Messrs. Vice, Bilke and Martinez will discuss the current status of this project and the actions necessary to move the project forward.

From the Operating Committee (OC) Subcommittee Organization and Procedures, approved by the Operating Committee on December 7-8, 2005:

Operating Committee Directive

Ref: Operating Committee Meeting Minutes, November 10-11, 2004

The following motions were approved by the Operating Committee on November 10-11, 2004:

1. The OC expects the Interconnections (Eastern, Western, ERCOT, and Hydro-Quebec) to analyze their frequency to determine if NERC's balancing standards are "safe and reliable."
2. The OC understands that the Interconnections' frequency profiles may be different.
3. The OC expects that these analyses be conducted according to a consistent set of analytical methodologies that the Resources Subcommittee establishes.
4. The OC expects the Interconnections to maintain this data and cooperate with the Resources Subcommittee's needs to perform its analyses. The RS members will agree upon a data retention requirement.

After further discussion, the Operating Committee approved the following motion:

"The Operating Committee's regional representatives, regional managers, and the Resources Subcommittee are directed to ensure that this resolution is implemented with consideration given to other wide-area data collection initiatives already underway."

**Important RS Considerations:** 1) The Frequency Task Force needs to review the CERTS functional specification and solidify the project scope; 2) Propose solutions to other application issues the subcommittee and the Frequency Task Force may have; 3) The process will have phasor transducers (PMUs) feed data into each interconnection's data concentrators (data warehouses). The RS needs to discuss and determine if the FMA software will reach into the interconnection's data warehouse to extract the necessary frequency data for analysis or if the FMA software will be linked to a dedicated NERC FMA server that will have frequency data extracted from the interconnections' data warehouses.

\*\*\* Is a dedicated NERC server necessary for the FMA software or not? \*\*\*

***Item 4. f      Inadvertent Interchange Applications Projects (SPP inadvertent interchange tool migration) — Carlos Martinez, Don Badley***

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Inadvertent Interchange Application Review Team: Leader-Don Badley, Inadvertent Interchange Task Force, Robert Rhodes is the point of contact for SPP, Tom Vandervort

Messrs. Badley and Martinez will give a summary of the NERC Inadvertent Interchange application deployment, and the implementation progress.

***Item 4.g      DOE Eastern Interconnection Phasor Project — Terry Bilke, Carlos Martinez, Raymond Vice***

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DOE Eastern Interconnection Review Team: Leader-Raymond Vice, Frequency Task Force, Tom Vandervort

Messrs. Bilke (who is also the EIPP Real-time Tools Working Group Chairman), Martinez, and Vice will lead a discussion on the DOE Eastern Interconnection Phasor Project's (EIPP) latest developments, tools, and applications which contains significant grid monitoring and analysis capabilities.

Information on the EIPP can be found at: [http://phasors.pnl.gov/EIPP\\_About.html](http://phasors.pnl.gov/EIPP_About.html)

## **Item 5. Frequency and Control Performance**

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### **Items 5.a–5.g Western, Eastern, ERCOT, and Hydro Quebec Frequency Trends and Events; CPS1, CPS2, Data Trends; DCS Data Trends; and Inadvertent Interchange Balances**

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- 5.a. Western Interconnection Frequency Trends and Events – Bart McManus
- 5.b. Eastern Interconnection Frequency Trends and Events – Raymond Vice
- 5.c. ERCOT Interconnection Frequency Trends and Events – Sydney Niemeyer
- 5.d. Hydro Quebec Interconnection Frequency Trends and Events – Mike Potishnak
- 5.e. CPS1, CPS2, BAAL Data Trends – Terry Bilke
- 5.f. DCS Data Trends – Terry Bilke
- 5.g. Inadvertent Interchange Balances – Don Badley, Bill Herbsleb

#### **Discussion**

The subcommittee will discuss the frequency data, surveys, and trends in the Interconnections.

#### **Attachments**

To be sent under separate cover.

### **Item 5.h Reliability – based Control SAR SDT, Field Trial CPS2 scores Request – Terry Bilke**

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Doug Hils, Chair of the Reliability – based Control SAR drafting team requested the following: In looking at the CPS1 and CPS2 reports posted, I'd like to ask if it would be possible to not highlight BAs below 90% on CPS2 if they are under the BA-007 field test. There's an asterisk next to the number but it's already drawn attention to those BAs when that is not the focus of their operation. Perhaps we can add a sample BAL-007 compliance column for number of BAL-007 violations (0 unless the 30-minute limit is exceeded) - I can talk with the RBC SDT to see if they agree also.

Terry Bilke requested that Mr. Hils discuss the proposal with the RBC SDT and follow-up with a recommendation to the RS.

### **Item 5.i Intelligent Alarms – Terry Bilke, Carlos Martinez**

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The NERC Intelligent Alarms are now a two page alarm, distributed to subscribers via the e-mail/internet, that are initiated when specific thresholds are exceeded. Mr. Martinez and Mr. Bilke will report on the new Intelligent Alarms and how the reliability coordinators are utilizing the modified two page alarm. This item may be covered in the agenda 4 Projects.

### **Item 5.j Analysis of Eastern Interconnection Intelligent Alarms – Mike Potishnak, Sydney Niemeyer**

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Mike Potishnak and Sydney Niemeyer will lead a discussion on their analysis of the Eastern Interconnection Intelligent Alarms.

## Attachments

Possible Coincidence Between PJM's and Intelligent Alarms  
Intelligent Alarms Event Summary – To be sent under separate cover

### ***Item 5.k*      **Evaluating Transaction Schedule Ramps – Raymond Vice****

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Ramping up at the beginning of a schedule and ramping down at the end of a schedule (for example hour- ending 0600 and 2200, for the sixteen hour on-peak period energy products) significantly impacts the Interconnections frequency performance. There are numerous contributing factors to the ramping problem. Raymond Vice has identified many of the factors in his "Frequency Issues 2005" white paper. See attachments. (Load/Generation Mismatch, pages 3-6); and Ramp Resources Sources and Sinks.

Mr. Vice will lead a discussion on evaluating the schedule ramps problem and solutions the RS can propose to the industry, NERC, and NAESB.

Mr. Vice notes the following: Attached is Rev. 1 of the Ramp Resource Table. I have added non-conforming load and unit/load trips as per information supplied by Sydney N. I have also added some additional comments at the end, including a suggestion that an application be developed to provide BA operators (and the Resources Subcommittee) with a projection of his ramp resource balance across the next ramp period so that he may know how he is impacting the interconnection. This may be incorporated using existing standards (INT-007) or added to the consideration of the Reliability Based Control SAR. In either case, it is my opinion that this will go a long way toward solving the 0600/2200 hour frequency excursions.

To address the ramping issue Messrs. Vice and Bilke generated a letter on behalf of the RS to Mr. Richard Schneider, NERC Director of Reliability Readiness, requesting that each NERC Reliability Readiness Evaluation look at the tools and processes each Balancing Authority uses to control, monitor, and execute interchange ramps. Specifically, the RS would like to know what methodology the Balancing Authority uses to determine if ramp resources are sufficient to meet the total demand for ramp capacity across the hour.

## Attachments

Frequency Issues 2005, White Paper by Raymond Vice, May 31, 2005  
Ramp Resources Sources and Sinks  
Ramping Criteria Review for Future Reliability Readiness Evaluations Letter

## **Item 6. Time Error**

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***Item 6.a* Eastern Interconnection — Bill Herbsleb**

***Item 6.b* Western Interconnection — John Tolo**

***Item 6.c* ERCOT Interconnection — Sydney Niemeyer**

***Item 6.d* Hydro Quebec Interconnection — Mike Potishnak**

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### The Discussion

The subcommittee will discuss the time error correction data and trends in the Interconnections.

### Attachments

Time error reports to be sent under separate cover.

***Item 6.e* Time Error Efficiency in the FERC Order 693 – Terry Bilke, Gerry Beckerle**

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Gerry Beckerle and Terry Bilke had a conversation on the intent of FERC Order 693 regarding the reliability requirements for time error correction. Messrs. Bilke and Beckerle will lead a subcommittee discussion on the time error correction efficiency contained in the FERC Order 693.

## Item 7. Future Meetings

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Tuesday, October 23, 2007	8 a.m.–5 p.m.	Portland, OR
Wednesday, October 24, 2007	8 a.m.– noon	
Wednesday, January 30, 2008	8 a.m.–5 p.m.	Phoenix, AZ
Thursday, January 31, 2008	8 a.m.– noon	Alt: Miami or Tampa
Wednesday, April 30, 2008	8 a.m.–5 p.m.	Washington D.C.
Thursday, May 1, 2008	8 a.m.– noon	Alt: Miami/Ft. Lauderdale
Wednesday, July 30, 2008	8 a.m.–5 p.m.	To Be Determined
Thursday, July 31, 2008	8 a.m.– noon	(location and alternate)
Wednesday, October 29, 2008	8 a.m.–5 p.m.	To Be Determined
Thursday, October 30, 2008	8 a.m.– noon	(location and alternate)

### Notes:

1. Schedule meetings before the Operating Committee and Planning Committee meetings, whenever possible.
2. Avoid scheduling meetings 30 days before NERC Board of Trustees meetings.
3. Additional meetings, conference calls, or web casts will be scheduled as deemed necessary to address and accomplish subcommittee or task force business.
4. The subcommittee will conduct future meetings only as necessary: 1) to facilitate necessary face-to-face discussions; 2) to focus on deliverables that cannot be achieved by conference calls or web casts; and 3) to initiate consensus building or decision-making forums.

## NERC Resources Subcommittee Organization and Assignments

<b>Terry Bilke (Chairman)</b> Midwest ISO	Donald E. Badley (Vice Chairman) WECC/Northwest Power Pool	Larry Akens Tennessee Valley Authority
Gerald D. Beckerle Ameren Services Company	William Herbsleb PJM Interconnection, L.L.C.	Don McInnis Florida Power & Light Company
Bart McManus Bonneville Power Administration	Sydney L. Niemeyer NRG Texas, LP	Alan R. Oneal MidAmerican Energy Company/MRO
Michael J. Potishnak ISO-New England	Robert C. Rhodes, Jr. Southwest Power Pool	John Swez Duke Energy
John Tolo Tucson Electric Power Company	Raymond L. Vice Southern Company Services, Inc.	Thomas J. Vandervort NERC
<b>Inadvertent Task Force</b>  <b>Don Badley</b> Mike Potishnak Terry Bilke Larry Akens Bart McManus	<b>Frequency Task Force</b>  <b>Raymond Vice</b> Sydney Niemeyer Mike Potishnak Terry Bilke Gerry Beckerle Don Badley Bart McManus John Swez William Herbsleb	<b>Reserves Task Force</b>  <b>Larry Akens</b> Alan Oneal Don Badley Raymond Vice Mike Potishnak Sydney Niemeyer Robert Rhodes Bart McManus John Tolo John Swez
<b>Compliance Task Force</b>  Bill Herbsleb John Tolo	<b>Control Criteria Task Force</b>  <b>Alan Oneal</b> Resources Subcommittee	
<b>Survey Assignments</b>		
Area Interchange Error Surveys (East) Frequency Response Surveys Inadvertent Interchange Reports (East) Inadvertent Interchange Reports (West) Time Error Reports (East) Time Error Reports (West) ERCOT Reports	Terry Bilke Raymond Vice Joe Emde Don Badley Bill Herbsleb John Tolo Sydney Niemeyer	

## Resources Subcommittee

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<b>SERC</b>	Larry G. Akens Compliance and System Analysis	Tennessee Valley Authority 1101 Market Street MRBK Chattanooga, Tennessee 37402	(423) 751-8860 lgakens@tva.gov
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## NERC Resources Subcommittee Survey Contacts

Type:	Date:	Time:	Survey Called:	Due By:	
CONTACT	REGION	PHONE	CALL	REC.	
Paul Kure Bill Herbsleb*	RFC	(330) 580-8006 (610) 666-8874			
Sydney Niemeyer Lane Robinson*	ERCOT	(713) 795-6108 (512) 225-7211			
Don McInnis* Gary Falasca (Inad.) Donna Howard (CPS & AIE)	FRCC	(305) 442-5272 (305) 529-6115 (813) 289-5644			
Alan Oneal* Peter A. Koegel	MRO	(515) 252-6449 (651) 632-8462			
Mike Potishnak*	NPCC	(413) 535-4308			
Larry Akens Teresa Glaze Catherine Sills	SERC	(423) 751-8860 (205) 257-6361 (423) 843-1562			
Larry Akens	TVA SERC	(423) 751-8860			
Robert Rhodes Lisa Carter Katy Onnen	SPP	(501) 614-3241 (501) 614-3346 (501) 614-3353			
Esperanza Cabeza de Vaca (CPS)	WECC	(801) 582-0353			
John Tolo*	WECC/AZNMSNV	(520) 745-7106			
Dan Tahija* John Chairez Bill Green	WECC/CAMX	(916) 351-2115 (916) 608-5775 (916) 351-2116			
Don Badley ChaRee DiFabio*	WECC/NWPP	(503) 445-1076 (503) 445-1079			
Robert Johnson	WECC/RMPP	(303) 273-4893			
Carlos Martinez	CERTS	(626) 685-2015			
<b>TIME CORRECTIONS:</b> System Coordinator-MAPP Art Storey-NYPP		(612) 341-4690 (518) 356-6111			

\*Primary Contact

January 2007

## **Resources Subcommittee Meeting Resources Subcommittee Standards Meeting**

April 25–27, 2007

### **Meeting Minutes**

A regular meeting of the North American Electric Reliability Corporation's (NERC) Resources Subcommittee (RS) was held on April 25-26, 2007 and a Resources Subcommittee Standards Meeting was held on April 26-27, 2007 in Denver, Colorado. The meeting announcement, agendas, and attendance list are attached as **Exhibits A, B, and C**, respectively. Individual statements and minority opinions are affixed as **Exhibits D and E**. There was one individual statement and were no minority opinions.

Subcommittee Chairman Terry Bilke presided. The secretary announced that a quorum was present.

#### **Antitrust Compliance Guidelines**

Secretary Vandervort acknowledged the NERC Antitrust Compliance Guidelines.

#### **Minutes of the Previous Meeting**

The subcommittee approved the January 31-February 1, 2007 meeting minutes.

#### **Task Force Reports**

##### **Control Criteria Task Force — Chairman Alan Oneal**

###### *Performance Standard Reference Document*

The Control Criteria Task Force (CCTF) Chairman Oneal has incorporated the recommended CPS1, CPS2, and DCS edits recommended by the subcommittee, created individual documents for each performance measure contained within the Performance Standard Reference Document, and is ready to move these documents to a public domain. The subcommittee endorsed posting the CPS1 and CPS2 documents on the standards reference documents web site or on the RS web site. Mr. Oneal will continue enhancing the DCS document which will eventually be posted with the CPS documents. Mr. Bilke will discuss the reference documents with the NERC Standards Committee to determine where the documents will be posted.

##### **Frequency Task Force — Chairman Raymond Vice**

###### *Confirmed Interchange Transaction Regarding Ramping*

Mr. Vice led a discussion on the current requirements for interchange ramping. Two significant NERC Reliability Standards requirements were identified:

##### **BAL-005-0, Automatic Generation Control**

R11. Balancing Authorities shall include the effect of ramp rates, which shall be identical and agreed to between affected Balancing Authorities, in the Scheduled Interchange values to calculate ACE.

##### **INT-006-1, Response to Interchange Authority**

R1. Prior to the expiration of the reliability assessment period defined in the Timing Table, Column B, the Balancing Authority and Transmission Service Provider shall respond to a request from an Interchange Authority to transition an Arranged Interchange to a Confirmed Interchange.

R1.1. Each involved Balancing Authority shall evaluate the Arranged Interchange with respect to:

**R1.1.2. Ramp (ability of generation maneuverability to accommodate).**

The subcommittee believes that balancing authorities have an obligation to ensure and communicate that each confirmed interchange transaction has (1) agreed to source and sink ramping capabilities and (2) that the generating balancing authority must have the generation maneuverability to accommodate the designated ramping capabilities. The subcommittee also believes that if the BAL-005-0, R11 and BAL-006-1, R1.1.2 requirements were enforced, communicated and documented, then ramping problems would be reduced.

Secretary Vandervort will work with Mr. Vice to transmit the Frequency Task Force concerns to the NERC Readiness Audit group and request that the audits review how Balancing Authorities address their interchange transaction regarding the above “ramping” requirements. In addition, the Frequency Task Force will review the BAL-005-0 and INT-006-1 standards to ensure that the requirements, measures and compliance sections are adequate to address “ramping” parameters.

*Turbine/Generator Torsional Resonance (Informational Discussion)*

Mr. Vice has responded on behalf of the Frequency Task Force to recently received inquiries regarding turbine/generator torsional resonance. Most torsional resonance problems are associated with subsynchronous sinusoidal applied torque. Such torque's are caused by transmission series capacitor banks, AC/DC converter control action, and large-scale hot-strip steel mills.

The type of stress that results from relatively slow changes in frequency seems to be a function of the rate of change of frequency, the magnitude of the frequency excursion and the time spent at the reduced frequency. This can be more readily compared with the stress caused by generating unit trips rather than subsynchronous resonance. So far, the frequency excursions associated with system control, primarily at 0600 and 2200 hours, have been relatively mild compared to unit outage contingencies for all three variables. The observed rate of change of frequency has been about 10 mHz. per minute or less compared to 100 mHz. per minute or more during unit trips. The lowest observed frequency has been about 59.910 Hz. This does not mean that these frequency excursions are acceptable, only that they subject the turbine/generator shafts to torsional resonance stresses somewhere between "less than" and "about the same" as the background level of unit trip contingencies. Given that they are about three times more common, Mr. Vice estimates that the total increase in torsional resonance stresses on turbine/generator shafts has roughly doubled since the advent of the 0600/2200 hour frequency swings. This is not good, particularly since damage is cumulative, but not critically urgent either. As long as it doesn't push the shaft damage beyond the linear portion of their design tolerances, and there is little or no indication that it will, this should only result in roughly twice the number of failures due to unit trips, a relatively small subset of overall torsional resonance stress failures which are relatively rare, but extremely catastrophic, themselves. In Mr. Vice's opinion, we, as an industry, definitely need to be aware of this problem caused by frequency transients, particularly since damage is cumulative, but so far, it is not a critically bad problem or urgent. Mr. Vice recommends that IEEE Power Engineering Society should look for any evidence of increased torsional stress failures in the industry.

**Turbine/Generator Torsional Resonance References:**

1. IEEE/PES "Proposed Steady-State Limits for Turbine-Generator Torsional Response" at URL: <http://grouper.ieee.org/groups/harmonic/iharm/docs/ssr.pdf>

2. "TORSIONAL MONITORING OF TURBINE-GENERATORS FOR INCIPIENT FAILURE DETECTION" by Larry S. Dorfman and Miroslav Trubelja at URL:

<http://www.structint.com/tekbrefs/t99016r0.pdf>

*Frequency Response – Obtaining and Measuring*

The subcommittee discussed the probable software requirements implied by the FERC Order 693, Mandatory Reliability Standards for the Bulk-Power System, paragraph 375, item (3), which states:

375. Accordingly, the Commission approves Reliability Standard BAL-003-0 as mandatory and enforceable. In addition, the Commission directs the ERO to develop a modification to BAL-003-0 through the Reliability Standards development process that: (1) includes Levels of Non-Compliance; (2) determines the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other requirements of the Reliability Standard are being met, and to modify Measure M1 based on that determination and (3) **defines the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved.**

The subcommittee agreed that the Order identifies a process that is new and will require software development. BAL-003-0 will also need to be revised to address this directive. Secretary Vandervort stated that a request was submitted for 2008 NERC budget funding for this item, and that NERC needs to determine who has the lead to address this issue: the Standards Group or the Reliability Assessment or Performance Analysis Group (Resources Subcommittee). The subcommittee also agreed that this is very important and needs to be pursued.

**Inadvertent Interchange Task Force — Chairman Don Badley**

*Inadvertent Interchange Monitoring Application*

Mr. Badley reported that the migration of the inadvertent interchange application from SPP to NERC is progressing. Two issues need to be addressed: 1) From the NERC registry subscriptions to the inadvertent interchange application, it appears that the announcement has not been received by appropriate inadvertent interchange data entering staff; and 2) The criteria for the regional administrator and global administrator needs to be defined.

The Inadvertent Interchange Task Force will take action to address and resolve both issues.

**Operating Reserves Task Force — Chairman Larry Akens**

*Operating Reserves White Paper*

The Operating Reserves Task Force (ORTF) Chair Larry Akens reported that the task force's white paper on operating reserves supports all FERC Order 693, Mandatory Reliability Standards for the Bulk-Power System, BAL-002 requirements.

## **NERC Standards Review**

The subcommittee agreed to devote the necessary time between meetings to work on subcommittee-sponsored SARs and to schedule monthly conference calls or face-to-face meetings to status the progress, request assistance, and determine any obstacles or road blocks that are impacting the progress of the SARs.

### *Frequency Response SAR*

The subcommittee reviewed and responded to the Frequency Response SAR comments and recommends to the NERC Standards Committee that the SAR be moved to the standard drafting phase. Linda Clarke, NERC Standards Coordinator assigned to facilitate the RS SARs discussed the proposed SAR and the subcommittee's industry comments responses. With the needed enhancements to the comment responses, Ms. Clarke will forward the SARs and the recommendations to the Standards Group for processing.

Howard Illian made a presentation on the preliminary research, conclusions, and recommendations that he is undertaking to support the proposed frequency response methodology. When Mr. Illian's research is complete, it will be posted on the NERC Standards Frequency Response web site.

### *BAL-004, BAL-005, and BAL-006 Standards Revision Individual SAR*

The subcommittee with Ms. Clarke's guidance, enhanced the BAL-004, BAL-005, BAL-006 Standard Revision SARs and comment responses. The standards process required that these SARs be revised and posted along with the comments responses, even though a new BAL-002, 004, 005, 006 Standards Revision SAR (that includes these four standards revisions into one SAR) has been submitted to revise these standards in accordance with the NERC 3 Year Standards Work Plan.

### *Time and Inadvertent Management SAR*

Terry Bilke submitted a Time and Inadvertent Management SAR to the NERC Standards Process Manager on February 22, 2007, see the RS meeting agenda for a copy of the SAR. It is anticipated that NERC Standards Committee will review and authorize posting of this SAR for industry comment at its next meeting.

### *FERC Order 693, Mandatory Reliability Standards for the Bulk-Power System*

FERC Order 693 recommendations and directives will be reviewed by the subcommittee and the RS task forces and given a high priority for current RS-related SARs in the standards process and for new SARs where deemed necessary. The task forces will focus on three parameters: 1) What is needed for reliability, 2) Who is going to provide it, and 3) How is it measured?

### *Balance Resources and Demand Draft Standards*

The Balance Resources and Demand Draft Standards recirculation ballot ended on Thursday, April 26, 2007. The ballot body did not approve the Balance Resources and Demand standards. The results were announced to the subcommittee on Friday morning. The Balance Resources and Demand field test that is currently in progress will be terminated in accordance with the field test implementation plan. This means that any Balancing Authority ACE Limits (BAAL) algorithms that were incorporated into the participating balancing authorities EMS for the field test, will be removed. This also means that the CPS2 requirements that were waived for the participating field test balancing authorities will be reinstated.

### *Questions on BAL Standards*

The RS has received a number of informal questions for clarification on RS-related standards. With compliance sanctions on the horizon, the subcommittee anticipates receiving additional informal

questions and formal interpretations of standards requirements. The subcommittee will address and respond to these requests as they are received.

## **Projects**

The subcommittee agreed to devote the necessary time between meetings to work on subcommittee-sponsored projects and to schedule monthly conference calls or face-to-face meetings to status the progress, request assistance, and determine any obstacles or road blocks that are impacting the progress of the projects.

### *Real-Time Resource Adequacy (ACE-Frequency) Application, Project 2000-03*

Carlos Martinez, Consortium for Electric Reliability Technology Solutions (CERTS) reported that FRCC is ready to start submitting balancing authorities frequency and ACE data to CERTS for the Resource Adequacy application. However, there are three balancing authorities within FRCC that are not able to submit data at this time. After discussion, the RS authorized CERTS to proceed with incorporating FRCC balancing authorities data (without the three balancing authorities). It is assumed by the RS that FRCC will pursue, in good faith, the establishment of data communication links from the three balancing authorities through the NERC ICCP system to the Resources Adequacy application.

NERC IT Department is in progress to incorporate ERCOT ICCP data into the Resources Adequacy application. Technical difficulties need to be resolved before ERCOT data can be incorporated into the application. NERC IT projects manager, will coordinate the necessary infrastructure, hardware, and software modifications to include ERCOT into the ACE-Frequency Monitoring application.

### **Resource Adequacy (ACE-Frequency) Application, Release 4.0**

The Resources Adequacy (ACE-Frequency) application release 4.0 is scheduled for production during the last week of May 2007. A letter will be sent to each BA that has subscribed to the application with instructions on how to download the web-based application.

### **Subscribing to the Resources Adequacy (ACE-Frequency) Application**

Reliability coordinators, balancing authorities, and transmission operators that are signatories to the NERC confidentiality agreement can subscribe to the Resources Adequacy (ACE-Frequency) application by contacting Tom Vandervort at [tom.vandervort@nerc.net](mailto:tom.vandervort@nerc.net) or Carlos Martinez at [martinez@electricpowergroup.org](mailto:martinez@electricpowergroup.org).

### *Intelligent Alarms*

The Intelligent Alarms (IAs) have received recognition from the Reliability Coordinators, the Balancing Authorities, and the Transmission Operators. The RS intends to enhance the IAs by focusing attention to details on the significant balancing authorities, regions, and interconnections views and perspectives that the reliability coordinators (RCs) consider significant. The subcommittee also intends to eliminate unnecessary insignificant data that will not be beneficial or will not be used by the RCs.

Mike Potishnak put 10 IAs together and analyzed the data. There seemed to be a strong correlation between Balancing Standard field trial participation and being listed as a causal in the field trial, but other explanations are possible. Mr. Potishnak also presented a spreadsheet and an analysis of the impact of BAAL limits vs. CPS2 limits on constrained interfaces.

### **Subscribing to the Intelligent Alarms**

Reliability coordinators, balancing authorities, and transmission operators that are signatories to the NERC confidentiality agreement can subscribe to the Intelligent Alarms by contacting Tom Vandervort at [tom.vandervort@nerc.net](mailto:tom.vandervort@nerc.net) or Carlos Martinez at [martinez@electricpowergroup.org](mailto:martinez@electricpowergroup.org).

### *CPS1 & BAAL Monitoring Application, Project 2001-38*

This application is being used by NERC Balance Resources and Demand (BRD) standard drafting team and the BRD field test participating balancing authorities for BAAL alarming and performance analysis. The BRD standard drafting team has the lead to recommend changes to this application. Since the BRD recirculation ballot body did not approve the draft standards, the BRD standard drafting team will determine the future use of this application.

### *AIE Monitoring Application, Project 2000-04*

The Area Interchange Error (AIE) monitoring Application will initially be a balancing authority manual entry collection tool to identify balancing authorities that cause large or long-term frequency deviations, and help reliability coordinators and balancing authorities to assess the situation and recommend alternative actions. The application is intended to allow AIE surveys to be completed upon demand in a timely manner. BAs will submit the specified hourly data into an electronic Web-based data entry form. In the future, the RS hopes to automate the process to receive hourly data automatically to avoid the time delays associated with the manual entries.

The AIE Application will be distributed to the RS members to field test the application during the last week in May, 2007.

### *Inadvertent Interchange Application, Project 2001-37*

The NERC Inadvertent Interchange Application is the replacement for the SPP Inadvertent Interchange tool.

The migration of the inadvertent interchange application from SPP to NERC is in progress. Two issues need to be addressed: 1) From the NERC registry subscriptions to the inadvertent interchange application, it appears that the announcement has not been received by appropriate inadvertent interchange data entering staff; and 2) The criteria for the regional administrator and global administrator needs to be defined. The Inadvertent Interchange Task Force will take action to address and resolve both issues.

### **Subscribing to the Inadvertent Interchange Application**

Balancing authority staff that enter inadvertent interchange data into the SPP inadvertent interchange tool are encouraged to subscribe to the NERC Inadvertent Interchange application by contacting Tom Vandervort at [tom.vandervort@nerc.net](mailto:tom.vandervort@nerc.net) or Carlos Martinez at [martinez@electricpowergroup.org](mailto:martinez@electricpowergroup.org).

### *Frequency Monitoring and Analysis Application (Project 2005-6)*

NERC Projects Group needs clarification on the Frequency Monitoring and Analysis (FMA) application specifications. The critical specification that needs to be clearly defined is where each interconnection's frequency one second data will reside. The specifications call for each interconnection to have three distinctly separate PMU frequency data points and the scheduled frequency to be recorded each second. Currently the project specifications do not specify if the data will reside on the interconnections' specified data warehouses or if the data will reside on a NERC server.

The Frequency Task Force will review and address the FMA application specifications to ensure that the specifications are clear and the location of the data is specified to move the project forward.

### *Study Scope Proposal: Large Generator Loss during Frequency Excursions*

Typically when an interconnection's frequency exceeds the interconnections frequency trigger limit for five minutes or more, the reliability coordinators take action to bring the frequency back to within acceptable levels. If one or more large generator(s) in the interconnection experience a forced outage when the frequency was significantly below the interconnection's FTL, the consequences could be severe.

Bob Cummings made a presentation to the RS on performing a study on the possibilities, risk factors, and consequences of losing a large generator(s) during frequency excursions. NERC as the electric reliability organization and the Resources Subcommittee as the custodian of frequency and generation-load balancing standards needs to consider the possibility of this scenario happening and to study the negative potential capabilities in order to determine how severe the consequences would be. The NERC Reliability Assessment and Performance Analysis group will put together the study parameters and will share the study proposal with the RS for comment and participation.

The RS highly endorses the study and will support the endeavor however it can.

### *WECC Interchange Tool Update*

John Tolo gave the subcommittee an update on the WECC Interchange Tool (WIT). The WIT has been in field test since January 1, 2007 and is scheduled to go into production on May 30, 2007. Due to the complexity of the WIT, it is being phased into operation in three phases with the first phase requiring all interchange transactions required to have WIT electronic tags: no tag means no transaction (no tie line flow).

## **Performance Monitoring**

### *CPS1 Review*

The subcommittee reviewed and discussed the monthly and 12-month rolling average CPS1 reports.

The NERC compliance program determines CPS1 violations, penalties, and monitors corrective actions. The RS reviews the CPS1 report for performance analysis purposes. The subcommittee reviews the data to identify generic problems, inform subcommittee regional representatives when balancing authorities' scores are close to violation, and to assess why balancing authorities have scores below or near the acceptable 100% score.

### *CPS2 Review*

The Resources Subcommittee reviewed and discussed the monthly CPS2 reports.

The NERC compliance program determines CPS2 violations, penalties, and monitors corrective actions. The Resources Subcommittee reviews the CPS2 report for performance analysis purposes. The subcommittee reviews the data to identify generic problems, inform subcommittee regional representatives when balancing authorities' scores are close to violation, and to assess why balancing authorities have scores below or near the acceptable 90% score.

### *Time Error Corrections*

The following interconnection time error corrections from January 1, 2007 were reported:

<b>2007</b>	Fast TEC	Slow TEC	Total TEC
Eastern Interconnection, January–March	51	0	51
Western Interconnection, January–March	6	16	22
ERCOT, January-March	16	0	16
Hydro-Québec, January-March	Unavailable	Unavailable	Unavailable

## Resources Subcommittee Action Item List

Each subcommittee member is to review, take action for their items, and update the action item list, which is affixed as **Exhibit G**.

## Dates and Locations of Future Meetings

- |                        |   |
|------------------------|---|
| 1. April 25–26, 2007   | Denver, CO  |
| 2. July 18–19, 2007    | Calgary, Canada   |
| 3. October 24–25, 2007 | Portland, OR  |
| 4. January 30-31, 2008 | Phoenix, AZ, Alternate Location: Miami or Tampa         |
| 5. April 30-May1, 2008 | Washington, DC Alternate Location: Miami/Ft. Lauderdale |
| 6. July 30-31, 2008    | To Be Determined  |
| 7. October 29-30, 2008 | To Be Determined  |

Respectfully submitted,

*Tom Vandervort*

Thomas J. Vandervort  
Resources Subcommittee Secretary

## Resources Subcommittee Meeting

June 26, 2007

### Meeting Minutes

A meeting of the North American Electric Reliability Corporation's (NERC) Resources Subcommittee (RS) was held on June 26, 2007 in Indianapolis, Indiana. The meeting announcement, agenda, and attendance list are attached as **Exhibits A, B, and C**, respectively. Individual statements and minority opinions are affixed as **Exhibits D and E**. There were none.

The RS acknowledges and thanks Chairman Bilke for making the RS meeting arrangements and hosting the meeting in the Midwest ISO facilities. A tour of the Midwest ISO reliability coordinator facilities was given after the meeting adjourned.

Subcommittee Chairman Terry Bilke presided. The secretary announced that a quorum was present.

#### **Antitrust Compliance Guidelines**

Secretary Vandervort acknowledged the NERC Antitrust Compliance Guidelines.

#### **Projects**

The subcommittee agreed to devote the necessary time between meetings to work on subcommittee- sponsored projects and to schedule monthly conference calls or face-to-face meetings to status the progress, request assistance, and determine any obstacles or road blocks that are impacting the progress of the projects.

The project discussions were led by Consortium for Electric Reliability Technology Solutions projects manager Carlos Martinez. The projects' objectives for the RS and Mr. Martinez are in the agenda.

#### *Intelligent Alarms*

The NERC Intelligent Alarms new 2 page version was put into production along with the Resource Adequacy application, release 4.0. Mr. Martinez reviewed the modifications and gave a demonstration of the new Intelligent Alarms, the Help screens for Reliability Coordinators, and the Intelligent Alarms in-depth data bank and analysis capabilities found in the Resource Adequacy application, release 4.0.

Mike Potishnak critiqued the Intelligent Alarms and made recommendations to the RS. Mr. Martinez complimented Mr. Potishnak on his analysis and five recommendations. Three of the recommendations are being considered and the other two are considered to be related to subject matter and not necessarily to the application.

Action Required: Reliability coordinators, balancing authorities, and transmission operators that are signatories to the NERC confidentiality agreement can subscribe to the Intelligent Alarms by

contacting Tom Vandervort at [tom.vandervort@nerc.net](mailto:tom.vandervort@nerc.net) or Carlos Martinez at [martinez@electricpowergroup.org](mailto:martinez@electricpowergroup.org).

#### *Inadvertent Interchange Application, Project 2001-37*

This Inadvertent Interchange Application is the NERC replacement for the SPP Inadvertent Interchange tool. The tentative date to discontinue using the SPP Inadvertent Interchange tool is July 30, 2007.

Most of the Western Interconnection balancing authorities have subscribed to the NERC Inadvertent Interchange application registry. Approximately 25% of the Eastern Interconnection balancing authorities have subscribed to the application.

Action Required: NERC is the global administrator for the Inadvertent Interchange application and Tom Vandervort will work with Mr. Martinez to register the Eastern Interconnection Balancing Authorities in an expeditious manner. This is a critical component to the success of the NERC Inadvertent Interchange application. In addition, Mr. Vandervort will correspond with the Eastern Interconnection's balancing authorities and the regional managers to solicit additional participation in the new NERC Inadvertent Interchange application.

#### *AIE Monitoring Application, Project 2000-04*

The AIE monitoring application will initially be a balancing authority manual entry collection tool to identify balancing authorities that cause large or long-term frequency deviations, and help reliability coordinators and balancing authorities to assess the situation and recommend alternative actions. The application is ready to be field tested to allow AIE surveys to be electronically completed upon demand in a timely manner. When an AIE survey is requested by the RS Chair, the BAs will submit the specified hourly data into an electronic Web-based data entry form.

Action Required: NERC is the global administrator for the AIE Monitoring application and Tom Vandervort will work with Mr. Martinez to register the Eastern Interconnection Balancing Authorities in an expeditious manner for: 1) temporary AIE Survey registration for the field test; and 2) NERC formal registration for the NERC AIE Monitoring application production version. This is a critical component to the success of the NERC AIE Monitoring application. In addition, Mr. Vandervort will correspond with the Eastern Interconnection's balancing authorities and the regional managers to solicit additional participation in the new NERC AIE Monitoring application.

#### *NERC Frequency Monitoring and Analysis (FMA) Project*

Mr. Martinez reviewed the Frequency Monitoring and Analysis specifications and attained consensus from the RS that the preferred design will call for a server to be placed at NERC for the purpose of storing 10 second frequency data as the back-u frequency data for the primary phasor frequency data. Mr. Vandervort will discuss the proposal with the NERC senior management and Projects Manager to determine funding availability for such a proposal and to discuss the alternatives. The subcommittee expressed a concern to satisfy the OC charge for the RS to monitor each interconnection's frequency it must have the reliability tools in place. The referenced tool for frequency analysis is the NERC Frequency Monitoring and Analysis application, including the proposed NERC 10 second frequency data server.

Action Required: CERTS will continue to develop the NERC Frequency Monitoring and Analysis project including the NERC 10 second frequency data server. Mr. Vandervort will visit with NERC senior management to determine funding and project requirements to proceed with the NERC 10 second frequency data server. A decision needs to be made by NERC to either house the server someplace (within NERC IT or outsource) or drop the server and use only the phasor frequency data (without the NERC 10 second frequency data as a back-up).

### *Real-Time Resource Adequacy (ACE-Frequency) Application, Project 2000-03*

Real-time Resource Adequacy (ACE-Frequency) Application allow NERC Reliability Coordinators to immediately be alerted of electricity reliability threats originated by abnormal resource adequacy giving them time to work with out-of-compliance balancing authorities or other operational organizations to make operational corrections, thereby reducing the chances of unplanned blackouts.

ERCOT has agreed to submit data to be included in the ACE-Frequency application. Brian Nolan, NERC projects manager, will coordinate the necessary infrastructure, hardware, and software modifications to include ERCOT into the ACE-Frequency Monitoring application.

Mr. Martinez reviewed and demonstrated the Resource Adequacy application, release 4.0. The subcommittee was appreciative of all of the analytical and database capabilities that were incorporated into the application's release 4.0.

Action Required: NERC is the global administrator for the NERC Resource Adequacy application and Tom Vandervort will work with Mr. Martinez to register the Eastern Interconnection and Western Interconnection balancing authorities and transmission operators to the Resource Adequacy application. In addition, each RS member needs to familiarize himself/herself with the capabilities of the application. There are a lot of neat statistical analytical features in the new application.

Reliability coordinators, balancing authorities, and transmission operators that are signatories to the NERC confidentiality agreement can subscribe to the Resources Adequacy (ACE-Frequency) application by contacting Tom Vandervort at [tom.vandervort@nerc.net](mailto:tom.vandervort@nerc.net) or Carlos Martinez at [martinez@electricpowergroup.org](mailto:martinez@electricpowergroup.org).

### *Reliability Research Projects Funded by DOE*

This DOE-CERTS supported research is being used by NERC RS to analyze fundamental frequency response issues and basic concerns for a frequency response standard.

Mr. Martinez reported that the research for a frequency response standard has produced the following results:

- Confirmed primary governing Frequency Response has declined on the Eastern Interconnection from 2002 through 2006
- The largest frequency excursions on the Eastern Interconnection are not strongly correlated to disturbances
- Under-frequency load shedding relay limits will be exceeded in about 15 years if current Frequency Response trends continue

- The two adjacent 1-minute average data in the proposed methodology could provide adequate measurement for the calculation of primary governing Frequency Response for the Eastern Interconnection
- The proposed methodology and data for calculating Frequency Response was validated using Eastern Interconnection 2006 generation outage disturbances

### Standard BAL-005 Interpretation

The NERC Standards Director requested an interpretation of the BAL-005, frequency response Bias. Mr. Bilke introduced and led a preliminary discussion on the requirements within the NERC reliability standards regarding a balancing authority's calculation of its Bias obligation. Sydney Niemeyer was asked to continue the review and inform the subcommittee of his results.

### Dates and Locations of Future Meetings

Wednesday, July 18, 2007 Thursday, July 19, 2007	8 a.m.–5 p.m. 8 a.m.– noon	Calgary
Tuesday, October 23, 2007 Wednesday, October 24, 2007	8 a.m.–5 p.m. 8 a.m.– noon	Portland, OR
Wednesday, January 30, 2008 Thursday, January 31, 2008	8 a.m.–5 p.m. 8 a.m.– noon	Phoenix, AZ Alternate: Miami or Tampa
Wednesday, April 30, 2008 Thursday, May 1, 2008	8 a.m.–5 p.m. 8 a.m.– noon	Washington D.C. Alternate: Miami or Ft. Lauderdale
Wednesday, July 30, 2008 Thursday, July 31, 2008	8 a.m.–5 p.m. 8 a.m.– noon	To Be Determined (location and alternate)
Wednesday, October 29, 2008 Thursday, October 30, 2008	8 a.m.–5 p.m. 8 a.m.– noon	To Be Determined (location and alternate)

### Notes:

1. Schedule meetings before the Operating Committee and Planning Committee meetings, whenever possible.
2. Avoid scheduling meetings 30 days before NERC Board of Trustees meetings.
3. Additional meetings, conference calls, or web casts will be scheduled as deemed necessary to address and accomplish subcommittee or task force business.
4. The subcommittee will conduct future meetings only as necessary: 1) to facilitate necessary face-to-face discussions; 2) to focus on deliverables that cannot be achieved by conference calls or web casts; and 3) to initiate consensus building or decision-making forums.

Respectfully submitted,

*Tom Vandervort*

Thomas J. Vandervort  
Resources Subcommittee Secretary

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**From:** Terry Bilke [mailto:TBilke@midwestiso.org]  
**Sent:** Wednesday, June 06, 2007 5:41 PM  
**To:** rs@nerc.com  
**Cc:** carlos martinez; Jennifer Talbott  
**Subject:** RS Applications Issues Meeting

Carlos has asked for a meeting to focus on our tools. Attached is a draft agenda for those that are able to participate on June 26. While just a rough draft, we wanted to get this out early so those that can attend face-to-face can start making plans. If there's interest, we can also look at a webcast option.

I'll provide more information later. In the meantime, there are directions, hotel and amenity information at the following link:

<http://www.midwestmarket.org/page/Contact+Us>

Thanks,

Terry Bilke  
Midwest ISO  
701 City Center Drive  
Carmel, IN 46032  
317/249-5463

## Resources Subcommittee Meeting

Tuesday, June 26, 2007 — 8 a.m.–5 p.m. EDT

Midwest ISO  
Carmel Office  
701 City Center Drive  
Carmel IN 46032  
Phone: (317) 249-5400

Conference Bridge Participation (Phone Call In)  
Phone Number: (732) 694-2061  
Access Code: 1123042507#

WebEx Webcast  
Location: <https://nerc.webex.com/nerc>  
Topic: RS-CERTS  
Access Code: 062607

## Agenda

### 1. Administrative

- a. Membership and Guests — Chair
- b. Arrangements — Chair
  - i) NERC will not coordinate hotel accommodations
  - ii) Hotels near MISO Offices: <http://www.midwestmarket.org/page/Contact+Us>
  - iii) Upon arrival, proceed to the Visitors Entrance
  - iv) If you cannot attend, please plan to participate via conference call/webcast
- c. **Parliamentary Procedures — Chair**
- d. **Antitrust Compliance Guidelines — Chair**

### 2. NERC-RS APPLICATION MEETING

**Meeting Objectives:** Review and agree to solutions and processes for the outstanding issues to complete successful deployment of NERC Inadvertent Interchange and AIE applications. Review and demo 2007 Intelligent Alarms and Resource Adequacy (ACE-Frequency) current and near-term improvements and define implementation priorities. Review NERC Frequency Monitoring and Analysis (FMA) project specification and define if a database server is required, and get Resources Subcommittee feedback for 2007 reliability research funded by DOE.

## **PROPOSED AGENDA TIME LINE**

8:00 a.m. – Introductions

Morning – Intelligent Alarms Issues

Morning – NERC Inadvertent Issues

Morning – NERC AIE Issues

Morning – NERC Frequency Monitoring and Analysis (FMA) Issues

Afternoon – NERC Resource Adequacy (ACE-Frequency) Application Issues

2:00 p.m. – NERC Balance Resources and Demand Field Trials Conference Call

Afternoon – Review of 2007 Research Funded by DOE

Afternoon – Review Action Items and Schedule

5 p.m. – Adjourn

### **3. Balance Resources and Demand Standards Monthly Field Test**

The Resources Subcommittee, Balance Resources and Demand Standard Drafting Team, Operating Reliability Subcommittee, and the Reliability Coordinator Working Group will conduct its June monthly conference call to assess the status of the Balance Resources and Demand field trials, during this meeting. A separate agenda will be distributed and posted for this conference call. However, the conference bridge and webcast communications links will be used for this meeting and the BRD field test call/webcast.

BRD Conference Call/Webcast Details:

Purpose: Monthly Status Balance Resources and Demand, Phase II, Field Test

Date/Time: Tuesday, June 26/1:00 p.m., CDT (2:00 p.m., EDT)

Call Duration: Approximately 1 Hr; (2 Hr Max)

Phone Number: Same as above

Webcast: Same as above

Agenda and attachments: To be posted separately

# NERC APPLICATION ISSUES

## 1. NERC INTELLIGENT ALARMS

- a. Summary and review of 2007 I-Alarms - CERTS
- b. Review the new 2-page summary report and Help for Reliability Coordinators
- c. Review recommendations to improve the alarms intelligence and define near-term improvements – Mike and others proposals
- d. Review and demo I-Alarms data collection and analysis capabilities in NERC Resource adequacy in Release 4.0 – CERTS/EPG

## 2. NERC INADVERTENT

- a. Deployment status – CERTS/EPG
- b. Outstanding Issues to Resolve:
  - i. 2006 data missing
  - ii. 2006 Carry Over solution
  - iii. Discontinue SPP application – July 30
  - iv. Criteria to assign Application Regional and Global administrator responsibilities
  - v. Review new Regional and Global performance reports

## 3. NERC AIE

- a. Report and review Field Trial experience with the 5/12/07 survey-CERTS
- b. Demo for using AIE with the 5/12/07 survey data - CERTS
- c. Outstanding Issues to Resolve
  - i. Review and define AIE utilization procedures
  - ii. Review and define AIE deliver to end users

## 4. NERC FREQUENCY MONITORING AND ANALYSIS (FMA) PROJECT

- a. Review the final version of the functional specification - CERTS
- b. Review need for backup data for phasor measurements, and a server requirement
- c. Review development status
- d. Review and define Field Trial requirements

## 5. RESOURCE ADEQUACY (ACE-Frequency) RELEASE 4.0

- a. Review Release 4.0 changes, enhancements and new functionality - CERTS
- b. Review the new NERC Data Quality report - NERC
- c. Define dissemination and follow-up for the new Data Quality Report to improve application data quality
- d. Review new ACE-Frequency Correlation capabilities and its relationship with intelligent alarms - CERTS

## 6. REVIEW RELIABILITY RESEARCH PROJECTS FUNDED BY DOE

- a. Review new CPS-BAAL requirements
- b. Review Frequency Response project results so far – CERTS
- c. Review Resources Inadequacy (Hours 6 and 22) and need for a performance diversity metric



## Resources Subcommittee Meeting Attendance List

Tuesday, June 26, 2007

Indianapolis, Indiana

### **Attendance:**

Terry Bilke, RS Chair

Raymond Vice

Gerry Beckerle

Tom Vandervort

Carlos Martinez

Qun Gao

Don Badley, RS Vice-Chair via conference bridge

John Swez via conference bridge

Alan Oneal via conference bridge

Bill Herbsleb via conference bridge

John Tolo via conference bridge

Sydney Niemeyer via conference bridge

# Parliamentary Procedures

Based on Robert's Rules of Order, Newly Revised, 10th Edition, plus "Organization and Procedures Manual for the NERC Standing Committees"

## Motions

Unless noted otherwise, all procedures require a "second" to enable discussion.

When you want to...	Procedure	Debatable	Comments
Raise an issue for discussion	Move	Yes	The main action that begins a debate.
Revise a Motion currently under discussion	Amend	Yes	Takes precedence over discussion of main motion. Motions to amend an amendment are allowed, but not any further. The amendment must be germane to the main motion, and can not reverse the intent of the main motion.
Reconsider a Motion already approved	Reconsider	Yes	Allowed only by member who voted on the prevailing side of the original motion.
End debate	Call for the Question or End Debate	Yes	If the Chair senses that the committee is ready to vote, he may say "if there are no objections, we will now vote on the Motion." Otherwise, this motion is debatable and subject to 2/3 majority approval.
Record each member's vote on a Motion	Request a Roll Call Vote	No	Takes precedence over main motion. No debate allowed, but the members must approve by 2/3 majority.
Postpone discussion until later in the meeting	Lay on the Table	Yes	Takes precedence over main motion. Used only to postpone discussion until later in the meeting.
Postpone discussion until a future date	Postpone until	Yes	Takes precedence over main motion. Debatable only regarding the date (and time) at which to bring the Motion back for further discussion.
Remove the motion for any further consideration	Postpone indefinitely	Yes	Takes precedence over main motion. Debate can extend to the discussion of the main motion. If approved, it effectively "kills" the motion. Useful for disposing of a badly chosen motion that can not be adopted or rejected without undesirable consequences.
Request a review of procedure	Point of order	No	Second not required. The Chair or secretary shall review the parliamentary procedure used during the discussion of the Motion.

## Notes on Motions

**Seconds.** A Motion must have a second to ensure that at least two members wish to discuss the issue. The "second" is not recorded in the minutes. Neither are motions that do not receive a second.

**Announcement by the Chair.** The Chair should announce the Motion before debate begins. This ensures that the wording is understood by the membership. Once the Motion is announced and seconded, the Committee "owns" the motion, and must deal with it according to parliamentary procedure.

## Voting

Voting Method	When Used	How Recorded in Minutes
Unanimous Consent	When the Chair senses that the Committee is substantially in agreement, and the Motion needed little or no debate. No actual vote is taken.	The minutes show "by unanimous consent."
Vote by Voice	The standard practice.	The minutes show Approved or Not Approved (or Failed).
Vote by Show of Hands (tally)	To record the number of votes on each side when an issue has engendered substantial debate or appears to be divisive. Also used when a Voice Vote is inconclusive. (The Chair should ask for a Vote by Show of Hands when requested by a member).	The minutes show both vote totals, and then Approved or Not Approved (or Failed).
Vote by Roll Call	To record each member's vote. Each member is called upon by the Secretary,, and the member indicates either "Yes," "No," or "Present" if abstaining.	The minutes will include the list of members, how each voted or abstained, and the vote totals. Those members for which a "Yes," "No," or "Present" is not shown are considered absent for the vote.

### Notes on Voting

(Recommendations from DMB, not necessarily Mr. Robert)

**Abstentions.** When a member abstains, he is not voting on the Motion, and his abstention is not counted in determining the results of the vote. The Chair should not ask for a tally of those who abstained.

**Determining the results.** The results of the vote (other than Unanimous Consent) are determined by dividing the votes in favor by the total votes cast. Abstentions are not counted in the vote and shall not be assumed to be on either side.

**"Unanimous Approval."** Can only be determined by a Roll Call vote because the other methods do not determine whether every member attending the meeting was actually present when the vote was taken, or whether there were abstentions.

**Majorities.** Robert's Rules use a simple majority (one more than half) as the default for most motions. NERC uses 2/3 majority for all motions.

## **NERC ANTITRUST COMPLIANCE GUIDELINES**

### **I. GENERAL**

It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition.

It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

Antitrust laws are complex and subject to court interpretation that can vary over time and from one court to another. The purpose of these guidelines is to alert NERC participants and employees to potential antitrust problems and to set forth policies to be followed with respect to activities that may involve antitrust considerations. In some instances, the NERC policy contained in these guidelines is stricter than the applicable antitrust laws. Any NERC participant or employee who is uncertain about the legal ramifications of a particular course of conduct or who has doubts or concerns about whether NERC's antitrust compliance policy is implicated in any situation should consult NERC's General Counsel immediately.

### **II. PROHIBITED ACTIVITIES**

Participants in NERC activities (including those of its committees and subgroups) should refrain from the following when acting in their capacity as participants in NERC activities (e.g., at NERC meetings, conference calls and in informal discussions):

- Discussions involving pricing information, especially margin (profit) and internal cost information and participants' expectations as to their future prices or internal costs.
- Discussions of a participant's marketing strategies.
- Discussions regarding how customers and geographical areas are to be divided among competitors.
- Discussions concerning the exclusion of competitors from markets.
- Discussions concerning boycotting or group refusals to deal with competitors, vendors or suppliers.

Approved by NERC Board of Trustees, June 14, 2002  
Technical revisions, May 13, 2005

### III. ACTIVITIES THAT ARE PERMITTED

From time to time decisions or actions of NERC (including those of its committees and subgroups) may have a negative impact on particular entities and thus in that sense adversely impact competition. Decisions and actions by NERC (including its committees and subgroups) should only be undertaken for the purpose of promoting and maintaining the reliability and adequacy of the bulk power system. If you do not have a legitimate purpose consistent with this objective for discussing a matter, please refrain from discussing the matter during NERC meetings and in other NERC-related communications.

You should also ensure that NERC procedures, including those set forth in NERC's Certificate of Incorporation and Bylaws are followed in conducting NERC business. Other NERC procedures that may be applicable to a particular NERC activity include the following:

- Reliability Standards Process Manual
- Organization and Procedures Manual for the NERC Standing Committees
- System Operator Certification Program

In addition, all discussions in NERC meetings and other NERC-related communications should be within the scope of the mandate for or assignment to the particular NERC committee or subgroup, as well as within the scope of the published agenda for the meeting.

No decisions should be made nor any actions taken in NERC activities for the purpose of giving an industry participant or group of participants a competitive advantage over other participants. In particular, decisions with respect to setting, revising, or assessing compliance with NERC reliability standards should not be influenced by anti-competitive motivations.

Subject to the foregoing restrictions, participants in NERC activities may discuss:

- Reliability matters relating to the bulk power system, including operation and planning matters such as establishing or revising reliability standards, special operating procedures, operating transfer capabilities, and plans for new facilities.
- Matters relating to the impact of reliability standards for the bulk power system on electricity markets, and the impact of electricity market operations on the reliability of the bulk power system.
- Proposed filings or other communications with state or federal regulatory authorities or other governmental entities.
- Matters relating to the internal governance, management and operation of NERC, such as nominations for vacant committee positions, budgeting and assessments, and employment matters; and procedural matters such as planning and scheduling meetings.

Any other matters that do not clearly fall within these guidelines should be reviewed with NERC's General Counsel before being discussed.

**Resources Subcommittee  
 July 18-19, 2007 Meeting  
 Open Action Item List**

<b>Action Figure</b>	<b>Subject</b>	<b>Action Item/Assignment</b>	<b>Due Date</b>	<b>Completion Date</b>
Terry Bilke and Resources Subcommittee	Frequency Profile Technical Paper	021006, The Resources Subcommittee will document in a technical paper: <ul style="list-style-type: none"> <li>• The recent and historical frequency trends</li> <li>• The root causes behind significant frequency excursions and identifiable frequency fluctuations</li> <li>• The reliability implications behind the frequency events</li> <li>• The state of the interconnection's frequency profiles</li> <li>• Make recommendations to capture, identify, and record the magnitude of frequency excursions for each frequency event</li> </ul> 050406, RS will break up the technical paper into different components. <ul style="list-style-type: none"> <li>• Terry will work on the frequency component of the paper.</li> <li>• Raymond to look at Combustion Turbines and Governor Response</li> <li>• Larry to generate an "Operating Reserves" white paper including definitions</li> </ul> 071807, In progress	071807	
Tom Vandervort	NERC Registry System Applications/Tools Subscription Database	010107, Brian Nolan, NERC Project Manager, is developing a new NERC Registry. The RS System Applications/Tools users need to subscribe to each application/tool through this registry. Tom will coordinate with the RS the following: <ul style="list-style-type: none"> <li>• Review the NERC IT Registry System</li> <li>• Establish and document NERC Registry subscription criteria for System</li> </ul>	071807	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>Applications/Tools Subscription Database (security level, user ID, password, contact information, etc.).</p> <ul style="list-style-type: none"> <li>• Coordinate with CERTS, NERC IT, Training, etc., as needed</li> <li>• Develop maintenance plan to keep System Applications/Tools registry database up to date and accurate.</li> </ul> <p>071807, In progress</p>		
Tom Vandervort	BAL Standards Interpretations	<p>042507, Standards Group, submitted a couple of industry questions for the RS to give answers or interpretations to the questions.</p> <p>071807, In progress, as RS receives formal and informal interpretation requests, the subcommittee discusses, comes to consensus, and responds accordingly.</p>	071807	
Raymond Vice and Tom Vandervort	Ramping Issues	<p>042507, Raymond and Tom will compose and transmit a request from the Frequency Task Force's to the NERC Readiness Audit group requesting that future audits review how Balancing Authorities address their interchange transactions regarding the "BAL-005" and "INT-006" standards ramping requirements:</p> <p>BAL-005-0, R11: Balancing Authorities shall include the effect of ramp rates, which shall be identical and agreed to between affected Balancing Authorities, in the Scheduled Interchange values to calculate ACE.</p> <p>INT-006-1, R1.1: Each involved Balancing Authority shall evaluate the arranged Interchange with respect to: R1.1.2: Ramp (ability of generation maneuverability to accommodate).</p> <p>061407, Letter was sent to Richard Schneider, Director of NERC Reliability Readiness, requesting that reliability readiness audits look at the tools and processes each BA uses to control, monitor, and execute interchange ramps. Specifically, the RS would like to know what methodology the BA uses to determine if ramp resources are sufficient to meet the total demand for ramp capacity across the hour.</p> <p>071807, Close this item or determine next action</p>	071807	
Raymond Vice and Frequency Task Force	Frequency Monitoring and Analysis Specifications	<p>042507, There arose a question on the Frequency Monitoring and Analysis project specifications. The FTF needs to review and scrutinize the FMA specifications to ensure that the specs are what will work and to attain consensus to move the project forward. There is an urgency to proceed with consensus because of NERC 2008 Budget funding for this project.</p> <p>062607, The RS gave CERTS direction to draft the Frequency Monitoring and Analysis specifications.</p> <p>071807, The RS will review the CERTS proposed specs at the July meeting.</p>	071807	
Don Badley and Alan Oneal	IA Contacts	<p>020107, Don and Alan are to collaborate to make recommendations to the RS on who should be contacted for questions regarding technical or program issues and concerns on the ACE-Frequency Intelligent Alarms (IA).</p>	071807	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		042507, In progress		
Don Badley and Inadvertent Interchange Task Force	Inadvertent Interchange Monitoring Application	042507, Two issues need to be addressed: 1) From the NERC registry subscriptions to the inadvertent interchange application, it appears that the announcement has not been received by appropriate inadvertent interchange data entering staff; and 2) The criteria for the regional administrator and global administrator needs to be defined. The Inadvertent Interchange Task Force will take action to address and resolve both issues.  071807, Close this item or identify additional actions	071807	
Don Badley	Review Freq Monitoring Guide (Triggers and Actions Guide)	072905, RS reviewed and revised the RS Frequency Monitoring and Response Process (Triggers and Action Guide) for the Western Interconnection.  092106, Don presented it to WECC and it will be addressed by the WECC Performance Criteria WG.  020107, In progress. – Don Badley, the initial draft is with the WECC CMOPS and WECC RCs for comment. It lies with the WECC OC for direction. In progress.  042507, Waiting to hear how WECC CMOPS received and acted upon the draft.  071807, ?	071807	
Don Badley and Inadvertent Interchange Task Force	II Balances	042507, Don and the Inadvertent Interchange Task Force needs to work with Joe Emde to address and resolve the inadvertent interchange data discrepancies for 2006. Some BAs are stating that their balances do not match the SPP II tool.  071807, ?	071807	
Joe Emde	Inadvertent Interchange Report Accuracy	050406, Joe Emde, Verify if the Inadvertent Interchange Report is accurate? Check on inadvertent interchange report to determine why it is not up-to-date. Don Badley says the WECC is balanced through Feb, 2006. The report shows it is balanced through Nov, 2005.  071807, In Progress. Joe Emde, Inadvertent Interchange accuracy has been a struggle since the inception of RFC. Joe will continue to acquire the correct data and will sort it all out with the help of Don Badley and the IITF.	071807	
Alan Oneal	Rewrite Performance Standards Reference Document	020107, Alan to lead the Control Criteria Task Force to: 1) incorporate the recommended edits into the PSRD; 2) distribute the PSRD to the subcommittee; 3) create individual documents for each performance measure contained within the Performance Standard Reference Document; and 4) develop with Raymond Vice a Balancing Authority ACE Limit (BAAL) reference document.  042507, In Progress, but waiting on BRD Standards, and BAL-002, 004, 005, 006 Standards Revision SAR to determine future direction.	071807	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>052507, Terry sent the rewritten Performance Standards Reference Document to the Standards Committee to determine where the reference document should reside.</p> <p>071807, Close this item or determine next actions</p>		
	<b>NERC-CERTS Project Review</b>			
Terry Bilke	ACE-Frequency Application Review Team	<p>021007, ACE-Frequency Application (NERC Project 2000-03) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend expectations, priorities, uses, methodologies, specifications, timelines, and results. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, NERC IT, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Terry Bilke, Raymond Vice, Sydney Niemeyer, Robert Rhodes, Bill Herbsleb, John Tolo, Bart McManus, Tom Vandervort</p> <p>Group recommendations are to be shared with RS, CERTS and NERC Projects.</p> <p>RS to review the data quality reports – are they appropriate or do they need to be modified.</p> <p>RS recommends setting the frequency response at 3,000 MW/0.1 Hz</p> <p>071807, Team available for consultation or action</p>	071807	
Terry Bilke	Develop ACE-Frequency Application Training Documents	<p>021007, ACE-Frequency Application (NERC Project 2000-03) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend training lessons content, on-line help application, user friendly training tools. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Terry Bilke, Robert Rhodes, Tom Vandervort</p> <p>Group recommendations are to be shared with RS, CERTS, and NERC Projects.</p> <p>Training – 3.5 there are a lot of functions that are not easily to know what to do. RCs want additional face-to-face (on-site) training.</p> <ul style="list-style-type: none"> <li>• Training sites include NE, SE, and one in the west;</li> <li>• another option is to “train the trainer;”</li> <li>• another option is to have a WebEx session.</li> </ul>	071807	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		071807, Team available for consultation or action		
Don Badley	AIE Monitoring Application Review	<p>021007, AIE Monitoring Application (NERC Project 2000-04) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend expectations, priorities, uses, methodologies, specifications, timelines, and results. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, NERC IT, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Don Badley, Raymond Vice, Bart McManus, John Tolo, Terry Bilke, Don McInnis, Mike Potishnak, Tom Vandervort, Brian Nolan</p> <p>Group recommendations are to be shared with RS, CERTS, and NERC Projects.</p> <p>The following individuals signed the WECC confidentiality agreement and were approved to receive WECC data to support the AIE Monitoring Application development:</p> <ul style="list-style-type: none"> <li>Don Badley, Team Leader</li> <li>Raymond Vice</li> <li>Bart McManus</li> <li>John Tolo</li> <li>Terry Bilke</li> <li>Don McInnis</li> <li>Mike Potishnak</li> <li>Tom Vandervort</li> <li>Brian Nolan</li> </ul> <p>071807, Team available for consultation or action</p>	071807	
Don Badley	Inadvertent Interchange Application Review	<p>021007, Inadvertent Interchange Application (NERC Project 2001-37) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend expectations, priorities, uses, methodologies, specifications, timelines, and results. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, NERC IT, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Don Badley, Inadvertent Task Force, someone from Southwest Power Pool (Robert Rhodes will be the point of contact to identify who this person will be), Tom Vandervort</p> <p>Group recommendations are to be shared with RS, CERTS, and NERC Projects.</p> <p>In progress. Don will recommend additional monthly interconnection inadvertent interchange reporting to Carlos</p> <p>TV to work with Joe Emde to generate monthly inadvertent interchange accounting</p>	071807	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>reports.</p> <p>071807, Team available for consultation or action</p>		
Raymond Vice	CPS1 & BAAL Monitoring Application Review	<p>021007, CPS1 &amp; BAAL Monitoring Application (NERC Project 2001-38) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend expectations, priorities, uses, methodologies, specifications, timelines, and results. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, NERC IT, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Raymond Vice, Doug Hils, Mark Henry, Sydney Niemeyer, Don Badley, John Tolo, Bart McManus, Tom Vandervort</p> <p>Group recommendations are to be shared with RS, CERTS, and NERC Projects.</p> <p>071807, Team available for consultation or action</p>	071807	
Raymond Vice	Frequency Monitoring and Analysis (FMA) System Project Review	<p>021007, Frequency Monitoring and Analysis (FMA) System Project (NERC Project 2005-06) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend expectations, priorities, uses, methodologies, specifications, timelines, and results. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, NERC IT, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Raymond Vice, Frequency Task Force, Tom Vandervort</p> <p>Group recommendations are to be shared with RS, CERTS, and NERC Projects.</p> <p>071807, Team available for consultation or action</p>	071807	
Raymond Vice	Eastern Interconnection Phasor Project	<p>021007, ACE-Frequency Application (NERC Project 2000-03) – A small Resources Subcommittee team will review the issues and address the project parameters. The goal is to recommend expectations, priorities, uses, methodologies, specifications, timelines, and results. Collaboration with ORS, RCWG, NERC Projects, NERC Training Dept, NERC IT, etc. to be initiated as necessary.</p> <p>Project Review Team: Leader-Raymond Vice, Frequency Task Force, Tom Vandervort</p> <p>Group recommendations are to be shared with RS, CERTS, and NERC Projects.</p> <p>RS recommends continuing to use the FDCAS specs to acquire the frequency data from the EIPP frequency database.</p> <p>071807, Team available for consultation or action</p>	071807	
Brian Nolan	Incorporate ERCOT	092106, Brian Nolan to incorporate the necessary technology to allow ERCOT to	071807	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
	into ACE-Freq App	send data to the ACE-Frequency monitoring application. Brian will report the progress of this activity to the RS at the January, 2007 meeting. 071807, Brian Nolan – In progress.		



May 31, 2007

Sent Via E-Mail and First-Class U.S. Mail

Ms. Maureen E. Long  
Standards Process Manager  
The North American Electric Reliability Corporation  
Princeton Forrestal Village  
115 Village Boulevard  
Princeton, New Jersey 08540-5731

Subject: Request for Interpretation of NERC Standard BAL-003-0 Requirements R2, R2.2, R5, and R5.1

Dear Ms. Long:

Pursuant to the North American Electric Reliability Corporation (NERC) Reliability Standards Development Procedure (RSDP),<sup>1</sup> the Electric Reliability Council of Texas, Inc. (ERCOT) respectfully requests an interpretation of the above-referenced standard. ERCOT specifically requests clarification that a Balancing Authority (BA) is entitled to use a variable bias value as authorized by Requirement R2.2, even though Requirement R5 seems not to account for the possibility of variable bias settings.

Four specific requirements under NERC Standard BAL-003-0 are relevant to this request:

- NERC Standard BAL-003-0, Requirement R2 states: “Each Balancing Authority shall establish and maintain a Frequency Bias Setting that is as close as practical to, or greater than, the Balancing Authority’s Frequency Response. Frequency Bias may be calculated several ways ....”
- Requirement R2.2 further states: “R2.2: The Balancing Authority may use a variable (linear or non-linear) bias value, which is based on a variable function of Tie Line deviation to Frequency Deviation. The Balancing Authority shall determine the variable frequency bias value by analyzing Frequency Response as it varies with factors such as load, generation, governor characteristics, and frequency.”
- Requirement R5 states: “Balancing Authorities that serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of the Balancing Authority’s estimated yearly peak demand per 0.1 Hz change.”

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<sup>1</sup> Version 6.0, adopted by the NERC Board of Trustees on Nov. 1, 2006, at 26-27.

- Requirement R5.1 further states: “Balancing Authorities that do not serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of its estimated maximum generation level in the coming year per 0.1 Hz change.”

ERCOT submits that, if a BA uses a variable bias in conformance with R2.2, it would violate R5 if the analysis results in any value less than 1% of its yearly peak demand (or maximum generation). R2.2 is a legitimate option sanctioned by NERC and by the Federal Energy Regulatory Commission, and ERCOT sets its bias using this method. We would respectfully further assert that R2.2 is only viable if NERC interprets R5 to only apply to BAs that use a fixed bias setting. The correct corresponding measure for a variable bias setting would be no less than 1% of the BA’s estimated peak (or maximum generation) for the period in which the bias setting is active.

ERCOT’s requested interpretation is consistent with a previous NERC Reliability Subcommittee (RS) interpretation, as noted in the RS’s January 2003 minutes:

Resources Subcommittee Meeting Minutes

January 29-31, 2003

Variable Non-Linear Bias

During the last subcommittee meeting, the following motion was passed: The Resources Subcommittee interprets Standard 1.1.4, “Control Area’s monthly average Frequency Bias Setting must be at least 1% of the Control Area’s estimated yearly peak demand per 0.1 Hz change” requirement to be applicable to all Control Areas that contain load and that use bias settings. The subcommittee discussed and interpreted last meeting’s motion to address only fixed bias, not variable bias. Variable bias needs to be addressed.

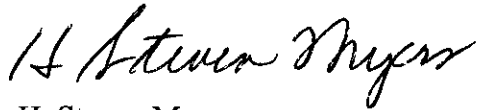
After discussion, Don Badley made a motion as follows: The Resources Subcommittee interprets Standard 1.1.4 for Control Areas utilizing variable bias, the Control Area’s average Bias Setting for a month must be at least 1% of the Control Area’s estimated peak load for that month (or 1% of peak generation for a generation only Control Area forecast for that month). The motion was approved.

An interpretation under NERC’s RSDP is appropriate because the lack of a variable-bias option under Requirement R5 appears to be an oversight, and the RSDP specifically provides that interpretations are appropriate to identify clarifications that correct oversights in the Standards until such time as the standard at issue can be “revised through the normal process ... to incorporate the clarifications provided by the interpretation.” This interpretation is important to ERCOT and should be important to any BA using a variable bias setting, because an incorrect interpretation would force

ERCOT to abandon its longstanding and approved practice of using a variable setting, without any corresponding improvement in reliability.

For the foregoing reasons, ERCOT respectfully requests an interpretation that clarifies the requirements of this Standard.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Steven Myers". The signature is written in a cursive style with a large initial "H" and a long, sweeping tail.

H. Steven Myers  
ERCOT  
Manager, Operating Standards

## Possible Coincidence Between PJM's Operation And Intelligent Alarms

Mike Potishnak

May 14, 2007

The following is a quick visual assessment of the intelligent alarm output graphs for those events available up until this date. The magnitude of the bar graph segment for each Balancing Area shown is the visual indicator.

May 12, 2007 – 0632 PJM much larger than all others individually

May 12, 2007 – 0435 Numerous excursions, PJM was the largest more often than not

May 12, 2007 – 0301 Unusual event, 5 excursions above FTL, PJM was usually much larger than the rest in the 3 longest excursions

May 8, 2007 - PJM much larger than others, but only somewhat larger than TVA

May 7, 2007 \_ PJM largest more often than not for the 3 FTL high violations

May 6, 2007 - PJM much larger than all others individually

April 30, 2007 – PJM ACE much larger than all others individually except TVA; TVA + PJM much much larger than all others individually.

April 22, 2007 – PJM much larger than all others individually

March 30, 2007 - PJM much larger than all others individually

March 29, 2007 – 4 dips in hour, PJM largest in 2 – does not fit the pattern

March 25, 2007 – EES is the largest, does not fit the pattern.

March 12, 2007 – 0718 PJM much larger than all others individually

March 12, 2007 – 0709 PJM much larger than all others individually

March 3, 2007 - PJM much larger than all others individually except only somewhat larger than MISO

February 12, 2007 – I lost the data somehow

January 29, 2007 – 0701 PJM much larger than all others individually

January 29, 2007 – 0644 PJM much larger than all others individually

January 26, 2007 - PJM much larger than all others individually

January 14, 2007 – PJM somewhat larger than most

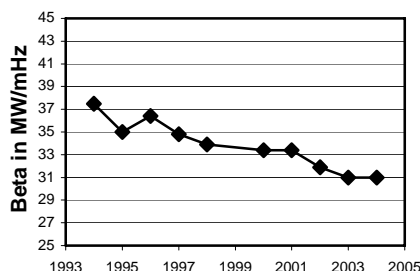
# Frequency Issues 2005

R. L. Vice, PE

Chairman – NERC Frequency Taskforce

## Decline of the Eastern Interconnection Frequency Response

Ingleson and Ellis have documented a decline in the overall frequency response of the Eastern Interconnection from 1994 to 2004 of roughly 6.5 MW/milliHz. (or 6,500 MW/Hz). A linear best fit line for this data indicates that there is an annual decline of roughly 0.59 MW/milliHz. (594 MW/Hz) per year. A number of explanations have been put forth to explain this decline. They include:



- Change in Load Composition – the composition of the load on the Eastern Interconnection has slowly evolved over time. Anecdotal evidence indicates that large industrial loads with high inertia rotating equipment have declined over time as a percentage of EI load and have been replaced with commercial and residential load that is, in general, less inductive in nature and with radically different inertial characteristics. During this same period commercial and residential loads have been evolving toward high efficiency systems that utilize variable speed motors and electronic load control devices that, in general, reduce load frequency response.
- Change in Generation Composition – during the same period, the type of equipment utilized to supply electrical energy on the EI has changed. The majority of the generation equipment built during the last ten years has been gas fired, including both simple cycle gas turbines and combined cycle units. This gas fired has significantly different inertial characteristics from the large steam turbines that provided the majority of EI generation prior to 1994. In addition, the operation of this equipment is often radically different from that of traditional electrical system equipment (as noted below).
- Changes in Generation Operational Practices – the way in which generation is operated also influences the frequency response of the EI. If gas turbines are operated at full load with outlet gas temperature limiting the output of the generator, then the machine will not have capacity available to respond to governor demand if system frequency drops. Steam turbines operated in Valve Wide Open (VWO) mode experience a similar problem in that governor controls can not open further valves that are already wide open. Governor response under these conditions must be mediated through the boiler control, which take minutes, rather than seconds to respond.
- Other Gas Turbine Issues – there is also some indication that gas turbines operated at full load with outlet gas temperature limiting the output of the generator may actually experience a positive frequency response instead of the desired negative response (that is, generator output goes down when frequency declines rather than increasing. Speculation is that the compressors on the gas turbines respond to a decrease in frequency by reducing the air flow to the turbine. This change in air flow is roughly

proportional to the cube of the change in frequency, thus a relatively small change in frequency can cause a relatively large change in air flow. Thus a turbine that can not increase output due to outlet gas temperature limits may actually experience a decrease in generator output due to reduction in air flow to the combustor, increasing the imbalance between the load and generation rather than improving it.

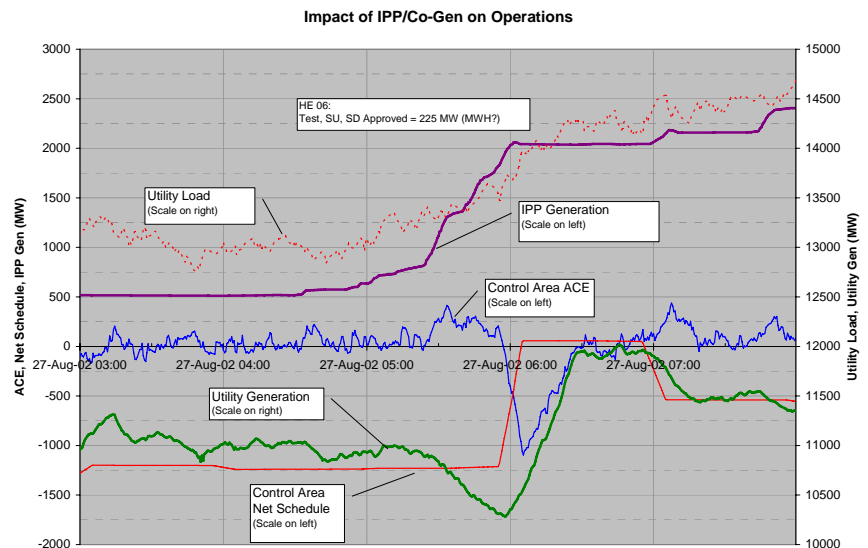
- Governor Limit Issues – a number of generators deliberately limit the response of their turbine governors. Some of these generators, mostly nuclear units, are constrained by fuel cycle and regulatory constraints. Most nuclear units are designed (in particular, the fuel cycle is designed) to operate at the maximum output allowed by their licenses. Thus they can not increase output since they are already operating at the maximum allowed output. Other generators may already be operating at some operational limit that prevents increase in output due to some operational limitation or constraint. Anecdotal evidence indicates that there are also some generators that deliberately limit governor response or increase the governor deadband in order to avoid “noise” or “jitter” from routine system frequency excursions. This violates NERC standard requirements and should not be allowed.
- Governor Rewind and Setpoint Control – in recent years Energy Management System (EMS) vendors and operators have migrated from traditional pulse control, which continues to send increase or decrease signals to a generating unit until the desired output is achieved, to setpoint control, where a megawatt value demand is sent from the EMS to the generating unit (or boiler) controls. Unfortunately, there has been insufficient coordination between system level EMS controls and the local unit controls. This has resulted problems during frequency excursions where the unit controller maintained a fixed MW demand on the generating unit while at the same time the turbine governor opened the turbine valves and increased the output of the generating unit. The unit controller saw this increase in output as a demand error and, within minutes, ramped the unit output back to the setpoint demand in order to clear the “error.” The governor rewind error was first noted in ERCOT, but has also been experienced in the EI. It is, fortunately, relatively easy to fix by modeling the turbine governor response and adding it to the unit demand setpoint.
- Distributed Generation – the trend toward distributed and/or intermittent generation resources may also contribute to frequency response degradation. Distributed generation, which is used to supplement power coming from traditional sources connected to the transmission grid, generally uses inverter-based, inertialess sources that may not provide frequency support. Traditionally, power generation has been from large steam turbines with relatively high mass shafts, where frequency is physically tied to the speed of the generators whose rotating shafts provide with stored kinetic energy via their inertia. Distributed generation that does not provide inertia to the system should address this design issue before their penetration increases to such an extent that it adversely impacts interconnection operations.

## Load/Generation Mismatch

Another issue that noticeably impacts Eastern Interconnection frequency performance is the load/generation mismatch that results from generation output (which is typically ramp rates limited) not matching load changes on the interconnection. This is most evident at either end (but particularly at the 2200 hour end) of the sixteen hour peak period when large blocks of transactions roll into and out of the interconnection generation mix, but can be seen to some extent during the “across the hour” ramp period each hour of the day. Specific issues concerning this mismatch include:

- Sixteen Hour Peak Period Energy Product – the energy market has developed a standard sixteen hour, on peak (hours ending 0700 to 2200 Central Prevailing Time) energy product that is the most common product traded for physical delivery in the forward (day ahead or longer) market. The success of this standard product has resulted in large blocks of energy ramping into the system across the hour (five minutes before to five minutes after) at 0600 CPT and then ramping out at 2200 hours. To the extent that this energy is provided by 1) gas turbines or other peaking resources that come on line to supply the energy strip then go off line after the energy has been delivered or 2) generation that ramps up at 0600 then back down at 2200 hours without following a coordinated ramp under the direction of Balancing Authority operators, the standard Sixteen Hour Peak Period Energy Product is driving diversity out of interconnection operations and causing relatively wide swings in interconnection frequency.

As shown in the attached graph of a actual morning pickup scenario that is typical for BAs with a large proportion of IPP resources, 1) uncoordinated IPP generation (purple line) comes on line and begins loading well before the beginning of their 2) scheduled ramp (red line which starts to ramp upward at 0555 CPT). 3) Balancing Area ACE (blue line) goes positive as IPPs begin to load up, causing 4) BA controlled generation (green line) to ramp down, then goes strongly negative as the IPP scheduled transaction and BA load ramp in, thus causing BA controlled generation to ramp up rapidly to recover ACE.



A similar scenario is common during the evening rolloff as the transactions for the Sixteen Hour Peak Period Energy Product are ramped out and the generation that supported them either comes off line or ramps down without following a coordinated ramp under the direction of Balancing Authority operators. In this case, system load is decreasing and BA controlled generation becomes surplus (with a positive BA ACE) until the Sixteen Hour Peak Period Energy Product ramps out across 2200 hours. BA ACE then becomes strongly negative and BA controlled generation has to ramp up quickly to match replace the IPP scheduled transaction minus the change in BA load.

System operator quickly noticed this pattern of maneuvering BA controlled generation at 0600 and 2200. In general, their reaction was to freeze BA controlled generation output immediately prior to 0600 and 2200 in order to avoid excess maneuvering and turnarounds (which are particularly difficult and inefficient for coal fired steam generation). If any one BA had done this the results would have been undetectable. However, with many BAs doing the same thing at the same time all synchronized by the Sixteen Hour Peak Period Energy Product, it had major impacts on Eastern Interconnection frequency performance.

The pattern that has been observed in interconnection frequency is that :

- Starting at about fifteen minutes before 2200 interconnection frequency begins to trend upward as BA controlled generation is taken off AGC regulation to prevent it from maneuvering
- The upward frequency trend peaks at roughly five minutes before the hour as transactions begin to ramp out
- Interconnection frequency then declines rapidly across the hour as transactions ramp out faster than BA controlled generation can be ramped up
- Frequency bottoms out at roughly five minutes after the hour as regulating units catch up with the ramp. Frequency declines on the order of 0.100 Hz. (100 milliHz.) are routine and higher declines have been observed

Most, but not all, of the extreme frequency excursions observed on the Eastern Interconnection in the last three years have been associated with one end of the Sixteen Hour Peak Period Energy Product or the other.

- Commercial versus Operational Requirements – at least part of the problem associated with the Sixteen Hour Peak Period Energy Product is that the commercial agreements (contracts) between the Balancing Authority (BA) and the independent generator do not include sufficient detail concerning the operational interface between the generating unit and the BA. Thus the BA must have some agreement with the independent generating unit establishing how the unit can come on line and ramp up to service scheduled transactions in coordination and without unduly interfering with BA operations. Most BAs do not have such formal agreements in place.

In fact, most commercial agreements with independent generating units are with the Transmission Service Providers and not with the BA. Almost all of them are based

on hourly energy measurements and very few, if any, have details concerning detailed operational requirements of the BA or the Transmission Operator (TOP), although most do have a catch phrase concerning following NERC Standards. To the best of my knowledge, there is nothing in the NERC Reliability Standards that require individual generators to ramp transactions in or out at any given rate. The standards hold the Balancing Authority responsible for ramping, not the individual generators.

To make things worse, most generating units (with the exception of hydro and simple cycle gas turbines) can not go from zero generation to full load over a period of ten minutes (the standard NERC ramp). Most generation must come on line several hours prior to any scheduled transaction and operate at a reduced output until unit equipment reaches operational temperature. Ramping and other operational requirements can generally not be met by the generating unit during this period of time. Note that even simple cycle gas turbines, which can get on line and load very quickly if need be, generally prefer a longer start up time in order to minimize damage to unit equipment and probability of catastrophic failure. Combined cycle machines typically take two to four hours to come on line; coal fired steam units may take from eight to forty-eight hours, depending upon unit size and design (with supercritical units taking the longest time due to meticulous condensate clean up requirements) while nuclear units may take two days or more to get on line.

Even when on line and operating at steady state conditions, few generating units can ramp from minimum load to full load in ten minutes (assuming minimum load is 50% or less of maximum output). Most coal fired generating units ramp at about two or three percent of rated output per minute, and thus would take between 17 and 25 minutes to ramp from 50% to 100% output. Some coal fired units may ramp much slower than this due to design and operational considerations. Combined cycle machines may achieve quick initial changes in output due to their gas cycle units, but typically take much longer to reach steady state conditions due to the inherent thermal lag of their steam cycle. Elaborate controls are required for combined cycle units to ramp in a smooth and coordinated manner.

As can be seen, it is not reasonable to expect single generating units to meet the NERC standard ramp or even an extended ramp. This must be accomplished through the coordinated maneuvering of a fleet of generating units. The contractual and operational infrastructure to support such coordinated movement is not in place today.

- Lack of Balancing Authority Ramp Capability – generation must be maneuvered to match load in order to avoid frequency excursions. Transactions are used to move the obligation to serve load from one Balancing Authority to another. The implementation of these transactions can only be done in a smooth, coordinated manner if both the supplying BA and the receiving BA ramp at the same rate. Observation of Eastern Interconnection frequency during across the hour ramp periods indicates that this is not being accomplished to any noticeable degree. The problem appears to be that some BAs are allowing more transactions than can be supported by available ramping capability. Given that most generating units ramp

down much faster than they ramp up and that most frequency excursions occur in the low frequency direction rather than the high frequency direction, it would appear that the BAs supplying generation are not providing sufficient ramping capability to support the transactions they are scheduling. This violates NERC Standards and should not be allowed.

- **Over Commitment of Generation** – even the most casual observation of Eastern Interconnection frequency during the last three or more years is sufficient to show that the average frequency has been higher than scheduled. This is obviously due to over commitment of generation, mostly during the shoulder and minimum load periods. Industry speculation is that generation owners want to keep their generation on line in order to be able to sell its output in the market during the next peak period while at the same time avoiding the cost of unit shut down and start up (cycling). All things considered, this is not a rational strategy for market competition. However, not all things are considered. We live today in a mixed open market and regulated utility environment. Hard to quantify operational costs, such as those associated with over commitment, are inadvertently socialized by the simplistic rules put in place by FERC and the independent system operators. This allows significant amounts of “slop” or unaccountable uplift costs to be produced by some incompetent or unscrupulous industry participants, and paid for by all customers on the Eastern Interconnection. The high average frequency in the Eastern Interconnection is only a symptom of this underlying inefficiency.

## **Fear and Loathing in Princeton** (editorial comments)

Last, but certainly not least, there are the human factors associated with system operations on the Eastern Interconnection. The electrical industry is run by people at all levels, from the board room to the control room. These people have a “comfort” zone in which they operate most effectively and efficiently. Changes in the industry in the past three years or more have shifted people away from their comfort zones en masse and this has led to a number of human factors problems :

- **Uncertainty and Decision Making** – there is very little that will disrupt efficient decision making more than uncertainty about whether you have the authority to make the decision or not. Yet there has been a constant stream of organizational and policy changes over the past years that has significantly blurred the lines of responsibility and authority for almost everyone associated with the industry. This can be quite easily seen not only in the report on the August 14, 2003 Blackout, but in the lack of investment in infrastructure throughout the industry. Is it any wonder that we have high frequency due to over commitment of generation when no one is sure that they have the authority to order generation off line to correct this problem?
- **Training, Tools and Temper Tantrums** – It is amazingly difficult to train someone when you don’t know what the rules are. This is seen quite clearly in the NERC Operator Certification program where the test taken for operator certification is based on an obsolete set of standards. Operators must essentially waste their time studying

obsolete standards in order to pass a test rather than doing something that would actually improve their operational skills. They must do this because the standards are changing faster than the test can be administered. This obviously causes confusion among operators and frustrates those that recognize the artificiality of the certification process.

There is a similar problem with tools currently being introduced onto the control room floor. While new tools are needed to help identify areas of generation /load imbalance and give the operators a better wide area view of system interactions, these tools have been often rushed into service too soon (before they are ready for production grade service) and have caused more trouble than they have resolved. What generally happens to such tools is that they lose credibility with system operators and are often ignored even after they become production grade products. Thus the tools needed are often actually on the control room floor, but are not properly utilized due to either lack of training or lack of operator confidence. The CERTS ACE/Frequency Monitor is one tool that has suffered such a fate and is only now becoming accepted by the system operator community as a useful tool for tracking the cause of frequency excursions.

All this, of course, leads to a high level of frustration among some system operators. This, in turn, leads to often contradictory requests (or demands) for more and better training and more and better tools. More is not always what's needed. In fact, we must be very careful not to substitute quantity for quality. System operators obviously need on going training to meet on going demands on their expertise. They also need quality tools to help them determine the best course of action to take under conditions that, in many cases, is radically different than any seen just a few years ago. But tools and training must be carefully coordinated with needs and requirements of the individual situation and operator. The operator is the final line of defense in our "in depth" defense strategy and his or her tools and training must be the best available and tailored to meet the individual needs of the individual operator.

R. L. Vice  
May 31, 2005  
Birmingham, Alabama

Ramp Resources :					
<u>Source</u>	<u>Inc.</u>	<u>Rate</u>	<u>Dec.</u>	<u>Rate</u>	<u>Notes</u>
Generators	Increase Generator Output (MW)	≈ 2% generator nameplate per minute*	Decrease Generator Output (MW)	≈ 4% generator nameplate per minute*	Most common source for ramp resources
Demand Side Resources	Decrease Controllable Load (MW)	Process Dependent	Increase Controllable Load (MW)	Process Dependent	Control procedures not well established

\* Based on coal fired steam generators, those most commonly used to provide ramp resources. Oil and gas fired steam generators tend to ramp incrementally at higher rates (≈ 5% per minute) as do combined cycle units (≈ 7% per minute), simple cycle combustion (gas) turbines (≈ 10% per minute) and hydro units (> 10% per minute). Almost all generators ramp decrementally faster (typically by a factor of 2 or so) than they ramp incrementally. Nuclear units are not typically used to provide ramp resources. Economics generally dictate that ramp resources should be supplied from the most expensive generation on line and available for loading. All numbers are my estimates based on my own personal experience, although some work has been done by Eric Hirst and Brendon Kirby of the Oak Ridge National Lab, if I recall correctly.

Ramp Sinks :					
<u>Sink</u>	<u>Inc.</u>	<u>Rate</u>	<u>Dec.</u>	<u>Rate</u>	<u>Notes</u>
Territorial Load	Tends to use incremental ramp resources in AM	Varies widely by time of year	Tends to use decremental ramp resources in PM	Varies widely by time of year	Complex forecasting problem. Not deterministic.
Transaction Schedule	Ramps up in source BA and down in sink BA at start of schedule	Typically 10% per minute in EI, 5% per minute in WECC	Ramps down in source BA and up in sink BA at end of schedule	Typically 10% per minute in EI, 5% per minute in WECC	Procedure established by NERC INT standards
Pumped Storage Hydro	Typically starts generating in AM	Relatively high (can be > 10% per minute)	Typically starts pumping in PM	Very high (similar to starting 100+ HP motor)	Transition from generating to pumping and vice versa roughly doubles impact
Conventional Hydro	Typically loads up prior to peak hour	Relatively high (can be > 10% per minute)	Typically comes off line after peak hour	Relatively high (can be > 10% per minute)	Generally spread out due to differences in pond capacities or run of river limits
On Peak vs. Off Peak Rate Changes	Generally increases load at beginning of Off Peak period	Unknown overall, but estimated to be relatively high for some customers**	Generally decreases load at beginning of On Peak period	Unknown overall, but estimated to be relatively high for some customers**	Some large customers are known to reconfigure their load based on these changes in price. Not as much a factor in LMP markets.

Independent Power Producers	Come on line prior to On Peak period in order to meet schedules during On Peak hours	Relatively low early on with increasing rate as system nears On Peak period	Come off line at or before Off Peak period (as MWH contracts finish)	Relatively high close to or at end of On Peak period	Closely related to 5 X 16 Standard Energy Product
5 X 16 Standard Energy Product	Ramps up in source BA and down in sink BA across start of On Peak period	Typically 10% per minute in EI, 5% per minute in WECC	Ramps down in source BA and up in sink BA across start of Off Peak period	Typically 10% per minute in EI, 5% per minute in WECC	Tends to synchronize operations of all BAs in interconnection and reduce diversity of operations
Non-conforming Load***	Step change up in seconds. May appear at random. Near impossible to regulate.	Near instantaneous	Step change down in seconds. May appear at random. Near impossible to regulate	Near instantaneous	Some BAs have agreements with non-conforming load to provide notice. Danger of generator damage if not filtered.
Generator Trip(s)	Typically ramps down rapidly with little or no warning	Seconds for generator trips under load. Minutes for boiler trips or runbacks.	n/a	n/a	Heavily dependent upon size, design type and age of generating fleet servicing BA.
Load Trip(s)	n/a	n/a	Typically step change in load. Relatively small compared to generator trips.	Seconds typically	Not traditionally considered in BA operations except for non-conforming load

\*\* Based on observation of industrial pipeline customer who completely reconfigured multi-MW pumping load across entire southeastern region at transition from On Peak to Off Peak pricing rates.

\*\*\* Steel mills are classical examples of non-conforming load. Typically 50 MW to 100 MW in size with little or no notice before switching occurs. Ramp rate is near instantaneous, with full load change occurring in seconds.

#### Other Considerations

- Ramp Resources can only be supplied from Spinning Reserves. Traditionally Frequency Responsive Reserves, Ramp Resources (Regulating Reserves), and Contingency Reserves have all been “lumped” together without regard to what resource was serving what functions and used on a “first come, first served” basis. This will probably not suffice in an open market environment where customers will want to know the cost of resources reserved to serve each of these functions and

additional metering and software will be required to determine what resource is serving which function.

- The relationship between Primary Frequency Response and Unit/Load Trips significantly complicates the calculation of how these sinks and sources behave during contingency conditions. Primary Frequency Response, which consists of Turbine Governor Response and Load Frequency Response, provides a quick response to disturbances in a direction which tends to stabilize interconnection frequency (opposite that of the initial contingency). This response, however, does not tend to be sustained and is primarily provided by turbine governors from spinning reserves (roughly 60% to 70% is typically estimated to be provided from governors with the remainder being provided from Load Frequency Response). Spinning Reserves thus provide the initial Turbine Governor Response while Contingency Reserves, both spinning and supplemental, replace the initial response and complete the recovery of the BA (and interconnection frequency) from the contingency condition.
- Most, if not all, of the information required to allow BA operators to monitor ramp resource utilization is available from existing applications. It does not, at first glance, appear to be overly complicated to accumulate the required data to provide BA operators a “near real time” estimate of ramp resources and sinks. This can then be projected on a short term basis to determine if the ramp sink/resource balance will be adequately maintained across the ramp for each hour (or shorter period).

June 14, 2007

Richard Schneider  
Director of Reliability Readiness  
NERC  
116-390 Village Boulevard  
Princeton, New Jersey 08540

Dear Richard:

**Ramping Criteria Review for Future Reliability Readiness Evaluations**

The Resources Subcommittee (RS) has developed tools for the Reliability Coordinators to monitor the four NERC interconnections' frequency on a continuous basis. The hour ending frequency excursions, especially at the beginning and end of the 16 hour "On-Peak" period, HE 0600 and HE 2200 respectively, are of ongoing concern. The RS believes that interchange ramping control by Balancing Authorities is a significant contributor to these frequency excursions.

The RS requests that each NERC Reliability Readiness Evaluation look at the tools and processes each Balancing Authority uses to control, monitor, and execute interchange ramps. Specifically, we would like to know what methodology the Balancing Authority uses to determine if ramp resources are sufficient to meet the total demand for ramp capacity across the hour. There may also be an excellent opportunity for an "Example of Excellence" in this area. Refer to the attached *NERC Standards "Ramping" Requirements*.

Sincerely,

*Terry Bilke*

Terry Bilke  
Resources Subcommittee Chair

*Raymond Vice*

Raymond Vice  
RS Frequency Task Force Chair

cc: Resources Subcommittee  
Interchange Subcommittee  
Operating Reliability Subcommittee  
Reliability Coordinator Working Group  
NERC-NAESB Joint Interchange Scheduling Working Group  
David Hilt  
David Nevius  
David Whiteley

## NERC Standards “Ramping” Requirements

Applicable NERC Standards that address schedule ramp rates or ramping are:

- BAL-005-1, Automatic Generation Control, R11: Balancing Authorities shall include the effect of ramp rates, which shall be identical and agreed to between affected Balancing Authorities, in the Scheduled Interchange values to calculate ACE.
- INT-005-1, Interchange Authority Distributes Arranged Interchange, R1: Prior to the expiration of the time period defined in the Timing Table, Column A, the Interchange Authority shall distribute the Arranged Interchange information for reliability assessment to all reliability entities involved in the interchange. Reference: Int-005-1 Timing Table
- INT-006-2, Response to Interchange Authority, R1.1. and R.1.1.2., Reference INT-006-2 Timing Table:
  - R1.1. Each involved Balancing Authority shall evaluate the Arranged Interchange with respect to:
    - R1.1.2. Ramp (ability of generation maneuverability to accommodate)
- INT-007-1, Interchange Confirmation, R1., R1.3. and R1.3.3.:
  - R1. The Interchange Authority shall verify that Arranged Interchange is balanced and valid prior to transitioning Arranged Interchange to Confirmed Interchange by verifying the following:
    - R1.3. The following are defined:
      - R1.3.3. Ramp start and stop times
- INT-008-2, Interchange Authority Distributes Status, R1.1. and R1.1.1., and Reference INT-008-2 Timing Table:
  - R1.1. For Confirmed Interchange, the Interchange Authority shall also communicate:
    - R1.1.1. Start and stop times, ramps, and megawatt profile to Balancing Authorities.
- TOP-002-2, Normal Operations Planning, R9: Each Balancing Authority shall plan to meet Interchange Schedules and ramps.