



NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

Princeton Forrestal Village, 116-390 Village Boulevard, Princeton, New Jersey 08540-5731

Resources Subcommittee Meeting

Wednesday, October 26, 2005 — 8 a.m.–5 p.m.

Thursday, October 27, 2005 — 8 a.m.–5 p.m.

Friday, October 28, 2005 — 8 a.m.–noon

Haywood Park Hotel
1 Battery Park Avenue
Asheville, NC 28801
Phone: 828-252-2522 ☎ Fax: 828-253-0481

Agenda

Frequency Task Force Conference Call

Balance Resources and Demand Standard Field Test Discussion

Wednesday, October 26, 2005

Conference Call Time: 1–3:30 p.m. EDST (10 a.m.–12:30 p.m. PDST)

Phone Number: (732) 694-2061

Access Code: 1108102605#

1. **Administrative**
 - a. Membership and Guests — Chair
 - b. Introductions — Chair
 - c. Organization, Roster, and Survey Contacts List — Secretary
 - d. Arrangements — Secretary
 - e. Approval of July 27–29, 2005, Meeting Minutes — Chair
 - f. Approval of Agenda — Chair
 - g. Procedures
 - i) Parliamentary Procedures — Chair
 - ii) Antitrust Compliance Guidelines — Chair
 - h. Resources Subcommittee Scope — Chair
 - i. Resources Subcommittee Action Items List — Chair
2. **Task Force Reports**
 - a. Control Criteria Task Force — Alan O Neal
 - b. Frequency Task Force — Raymond Vice
 - c. Inadvertent Interchange Task Force — Don Badley
 - d. Operating Reserves Task Force — Larry Akens

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3. Compliance

- a. Compliance and Certification Managers Committee Liaisons — Bill Herbsleb, Raymond Vice
- b. Update on MISO ACE Diversity Interchange (ADI) Program — Raymond Vice, Terry Bilke

4. NERC Reliability Standards

- a. Standard BAL-001-0, Real Power Balancing Control Performance — Alan Oneal
- b. Standard BAL-002-0, Operating Reserves — Larry Akens
- c. Standard BAL-003-0, Frequency Response and Bias — Terry Bilke
 - i) Frequency Response Standard SAR — Terry Bilke
- d. Standard BAL-004-0, Time Error Correction — Don Badley
- e. Standard BAL-005-0, Automatic Generation Control — Raymond Vice
- f. Standard BAL-006-0, Inadvertent Interchange – Don Badley
- g. Reference Document – Performance Standards Reference Document — Alan Oneal
- h. Training Document – Area Interchange Error Survey Training Document — Don Badley
- i. Training Document – Frequency Response Characteristic Survey — Raymond Vice
- j. Training Document – Inadvertent Interchange Accounting Training Document — Don Badley
- k. Balance Resources and Demand Draft Standard Update — Raymond Vice

5. NERC Active Resources Subcommittee Projects — Status

- a. ACE-Frequency Application Project (Project 2000-03) — Carlos Martinez
- b. AIE Monitoring Application Project (Project 2000-4) — Carlos Martinez
- c. CPS1 & BAAL Monitoring Application Project (Project 2001-38) — Carlos Martinez
- d. Frequency-Phasor Monitoring Application Project (Project 2005-X) — Terry Bilke, Carlos Martinez
- e. DOE Eastern Interconnection Phasor Project (EIPP) — Terry Bilke, Carlos Martinez
- f. Inadvertent Interchange Application Project (SPP inadvertent interchange tool migration) (Project 2001-37) — Carlos Martinez
- g. Data Quality — Carlos Martinez

6. Frequency Performance

- a. Western Interconnection Frequency Trends
- b. Eastern Interconnection Frequency Trends
- c. ERCOT Frequency Trends
- d. CPS1 and CPS2 Data Trends
- e. DCS Data Trends
- f. Inadvertent Interchange Balances — Joe Emde, Don Badley, Terry Bilke
- g. Responsibility for Initiating AIE Surveys — Terry Bilke, Raymond Vice
- h. High Frequency Issue — Terry Bilke, Raymond Vice, Larry Akens
 - i) RS Proposed Frequency Monitoring and Response Process for the Eastern Interconnection — Terry Bilke, Raymond Vice, Larry Akens
 - ii) Decline of the Eastern Interconnection Frequency Response — Raymond Vice
 - iii) Eastern Interconnection Frequency Excursions — Terry Bilke, Raymond Vice, Larry Akens, Carlos Martinez

7. Time Error

- a. Eastern Interconnection — Bill Herbsleb
- b. Western Interconnection — Don Badley
- c. ERCOT Interconnection — Sydney Niemeyer

8. Dynamic Transfer Catalog

9. Future Meetings

- a. February 8–10, 2006 — Scottsdale, AZ
- b. May 3–5, 2006 v Baltimore, MD
- c. September 20–22, 2006 — Québec City, QU
- d. November 15–17, 2006 — Ft. Lauderdale, FL

Item 1. Administrative

Item 1.a Membership and Guests

Chairman Terry Bilke will welcome the Resources Subcommittee members and guests.

Item 1.b Introductions

The chair will ask members and guests to introduce themselves.

Item 1.c Organization, Roster, and Survey Contacts List

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

- a. The subcommittee welcomes new Chairman Terry Bilke who replaces Carl Monroe, and new members Bill Herbsleb replacing Joe Willson, John Tolo replacing Yuri Makarov, and Bart McManus replacing Mirek Horenovsky.
- b. The subcommittee acknowledges and thanks outgoing Chairman Carl Monroe for his leadership through more than six years of service to the NERC Operating Committee's Resources Subcommittee. The subcommittee appreciates all that Carl has done for NERC and specifically for the Resources Subcommittee. The subcommittee also acknowledges Carl's analysis of frequency events and hopes he will continue to participate in diagnosing frequency events as they occur. The subcommittee wishes Carl success in all future endeavors.
- c. The subcommittee will nominate an individual to serve as the vice chairman. If you are interested in the position and your schedule allows you to hold the position, then consider self nomination. Otherwise, please consider the other subcommittee members for the position. The subcommittee's nomination will be forwarded to the OC chairman for his consideration.
- d. The subcommittee shall review the RS Regional Survey Contacts List for accuracy. This list ensures that the proper regional representatives are identified to communicate and process data in a timely manner.

Attachments

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

Item 1.d Arrangements

The secretary will review the meeting arrangements. The Resources Subcommittee task force meetings will be held on Wednesday, October 26, 8 a.m. to 5 p.m. The Resources Subcommittee meeting will begin on Thursday, October 27 at 8 a.m. and adjourn by noon on Friday, October 28. Lunch will be served on Wednesday and Thursday.

***Item 1.e* Approval of July 27–29, 2005 Meeting Minutes**

The chair will ask for approval of the July 27–29, 2005 Resources Subcommittee meeting minutes.

Attachment

July 27–29, 2005 Resources Subcommittee Meeting Minutes

***Item 1.f* Approval of Agenda**

Background

The chair will review the agenda, ask for amendments, and then approval.

Action

Approve the agenda.

***Item 1.g* Procedures**

Item 1.g.i. Parliamentary Procedures

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

Item 1.g.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 draft Antitrust Compliance Guidelines 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 events. 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.h* Resources Subcommittee Scope**

The subcommittee's current and proposed scopes are included in the agenda for reference. Please review the scope before the meeting and e-mail proposed changes for subcommittee consideration.

The secretary recommends removing the list of associated Resources Subcommittee reliability standards from the scope and listing them separately on the subcommittee's "Related Files" Web site. This will eliminate the need to revise the subcommittee scope whenever a standard is revised. The proposed scope replaces the subcommittee's January 2005 document to correspond with the "Subcommittees Scopes, Membership Requirements, Organization, and Procedures" document approved by the Operating Committee at its September 2005 meeting.

Discussion

Discuss, edit, and endorse the proposed Resources Subcommittee draft scope and subcommittee's Web site list of custodian standards that will be forwarded to the OC for approval.

Attachments

1. Current Resources Subcommittee Scope
2. Proposed Resources Subcommittee Scope
3. Proposed Resources Subcommittee NERC Operating Reliability Standards Assignment
4. Subcommittees Scopes, Membership Requirements, Organization, and Procedures

Item 1.i **Resources Subcommittee Action Items List**

The chair will ask the subcommittee to review the action items list. The secretary will update the action items.

The task force chairs need to specify completion dates for their tasks and solicit help from their respective groups to address and resolve the items in a timely manner.

Discussion

Chairman Bilke will discuss the tasks, issues, concerns, projects, etc. that fall within the subcommittee's purview. The goal is to identify, prioritize, and establish completion dates (i.e., near-, mid-, and long-term time frames) for these items. Some issues will need collaboration with other groups such as the Reliability Coordinator Working Group, Interchange Subcommittee, Interconnections, regions, balancing authorities, or the Consortium for Electric Reliability Technology Solutions (CERTS). The subcommittee should start with a review of the subcommittee action items list.

Attachment

Resources Subcommittee Action Items List

NERC Resources Subcommittee Organization and Assignments

Larry Akens Tennessee Valley Authority	Donald E. Badley WECC/Northwest Power Pool	Gerald D. Beckerle Ameren Services Company
Terry Bilke (Chairman) Midwest ISO	Randy M. Jones Calpine Power Service Corporation	Don McInnis Florida Power & Light Company
Carl A. Monroe Southwest Power Pool	Alan R. Oneal MidAmerican Energy Company/MRO	Bart McManus Bonneville Power Administration
William Herbsleb PJM Interconnection, L.L.C.	Sydney L. Niemeyer TxGenco	Michael J. Potishnak ISO-New England
John Swez Cinergy Corp.	John Tolo Tucson Electric Power Company	Raymond L. Vice Southern Company Services, Inc.
Thomas J. Vandervort NERC		
Inadvertent Task Force Don Badley Mike Potishnak Terry Bilke Randy Jones Larry Akens John Swez	Frequency Task Force Raymond Vice Sydney Niemeyer Raymond Vice Mike Potishnak Terry Bilke Gerry Beckerle Don Badley Don McInnis	Reserves Task Force Larry Akens Alan Oneal Don Badley Raymond Vice Mike Potishnak Sydney Niemeyer
Compliance Task Force Raymond Vice Bill Herbsleb	Control Criteria Task Force Alan Oneal Resources Subcommittee	
Survey Assignments		
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	Carl Monroe Raymond Vice Joe Emde Don Badley Bill Herbsleb Don Badley Sydney Niemeyer	

Resources Subcommittee

Chairman

Terry Bilke Technical Manager	Midwest ISO, Inc. 701 City Center Drive Carmel, Indiana 46032	(317) 249-5463 (317) 249-5910 Fx tbilke@ midwestiso.org
Don McInnis Manager, Operations Engineering	Florida Power & Light Co. P.O. Box 029311 Miami, Florida 33102-9311	(305) 442-5272 don_mcinnis@ fpl.com
William Herbsleb Senior Engineer	PJM Interconnection, L.L.C. 955 Jefferson Avenue Valley Forge Corporate Center Norristown, Pennsylvania 19403	(610) 666-8874 (610) 666-2279 Fx herbslhw@pjm.com
Bart McManus Electrical Engineer	Bonneville Power Administration 5411 NE Highway 99 PO Box 491 Vancouver, Washington 98666	(360) 418-2309 bamcmanus@ bpa.gov
John Tolo Control Area Operations	Tucson Electric Power Co. 3950 East Irvington Road Tucson, Arizona 85714	(520) 745-7106 (520) 571-4032 Fx jtolo@tep.com
Larry G. Akens Manager, Operational Analysis	Tennessee Valley Authority 1101 Market Street MRBK Chattanooga, Tennessee 37402	(423) 751-8860 (423) 751-4607 Fx lgakens@tva.gov
Carl A. Monroe Vice President Operations	Southwest Power Pool 415 North McKinley Suite 140 Little Rock, Arkansas 72205	(501) 614-3200 (501) 664-1809 Fx cmonroe@spp.org
Donald E. Badley System Operations Manager	Northwest Power Pool 26 S.W. Salmon Street Suite 400 3WTC0402 Portland, Oregon 97204-2991	(503) 464-2805 (503) 464-2819 Fx don@nwpp.org
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NERC Resources Subcommittee Survey Contacts

Type:	Date:	Time:	Survey Called:	Due By:	
CONTACT	REGION	PHONE	CALL	REC.	
Judi Long-ECAR office	ECAR	(330) 456-2488			
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			
Joe Willson Bob Walsh*	MAAC	(610) 666-8820 (610) 666-8858			
Gary Campbell* Alex Schneider	MAIN	(630) 261-2656 (630) 261-2644			
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			
Carl Monroe Lisa Carter Katy Carter	SPP	(501) 664-3200, Ext. 218 (501) 664-3200, Ext 258 (501) 614-3353			
Esperanza Cabeza de Vaca (CPS)	WSCC	(801) 582-0353			
John Tolo*	WSCC/AZNMSNV	(520) 745-7106			
Dan Tahija* John Chairez Bill Green	WSCC/CAMX	(916) 351-2115 (916) 608-5775 (916) 351-2116			
Don Badley ChaRee Messerli (Inad.)*	WSCC/NWPP	(503) 464-2805 (503) 464-2809			
Robert Johnson	WSCC/RMPP	(303) 273-4893			
Carlos Martinez	CERTS	(626) 685-2105			
TIME CORRECTIONS: System Coordinator-MAPP Art Storey-NYPP		(612) 341-4690 (518) 356-6111			

*Primary Contact

October 2005



NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

Princeton Forrestal Village, 116-390 Village Boulevard, Princeton, New Jersey 08540-5731

Resources Subcommittee Meeting

July 27–29, 2005
Salt Lake City, Utah, Oregon

Minutes

A regular meeting of the North American Electric Reliability Council Resources Subcommittee (RS) was held on July 27–29, 2005 in Salt Lake City, Utah. 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.)

Resources Subcommittee member Raymond Vice presided in the absence of Chairman Carl Monroe. The secretary announced that a quorum was present.

Minutes of the Previous Meeting

The subcommittee approved the May 4–6, 2005 Resources Subcommittee meeting minutes.

Resources Subcommittee Scope and Membership

The Operating Committee is in the process of revising the subcommittee scope and membership criteria and will consider the submitted RS recommendations.

All NERC regions have representation on the Resources Subcommittee at this time.

Resources Subcommittee Action Item List

The subcommittee reviewed and updated the action item list, which is affixed as **Exhibit F**.

Task Force Reports

Frequency Task Force – Chairman Raymond Vice

Balance Resources and Demand Draft Standard Field Test

The Frequency Task Force hosted a WebEx meeting to discuss the Balance Resources and Demand draft standard, proposed Phase II field test. The WebEx participants included the Resources Subcommittee and members of the Operating Reliability Subcommittee, the Reliability Coordinator Working Group (RCWG), the Balance Resources and Demand Standard Drafting Team, and industry participants.

Raymond Vice and Doug Hils summarized the results of the Phase I field test and the expectations of the Phase II field test. The following Phase II field test items were discussed:

- There has not been a negative impact on the Eastern Interconnection frequency due to the Phase II, field test that began on July 6, 2005.
- The Balance Resources and Demand Standard Drafting Team has not received any negative calls or comments from any Eastern Interconnection RC or BA.

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- The RCs on the call endorsed going forward with the next part of the Phase II field test.
- The authority, criteria, and methodology for a RC to suspend the entire Phase II field test or an individual BA’s participation in the field test was reaffirmed.
- The next Phase II field test BA volunteers will be added to the field test on August 1, 2005.

The Balance Resources and Demand Standard Drafting Team will host the next Phase II field test status conference call on August 24, 2005 at 10 a.m., Eastern Daylight Savings Time.

BAL-003, Frequency Response and Bias

Terry Bilke incorporated frequency response language into the BAL-003, Frequency Response and Bias draft standard in preparation for submittal to the SAC. The subcommittee reviewed and enhanced the language and the secretary forwarded the draft to the NERC standards process manager for additional formatting and editing.

Operating Reserves Task Force-Mike Potishnak

BAL-002, Disturbance Control Performance

Larry Akens incorporated contingency reserves language into the current BAL-002 Disturbance Control Performance draft standard. The subcommittee reviewed and enhanced the language. The Operating Reserves task force will continue enhancing the draft standard and intends to present it to the subcommittee in the near future for additional technical analysis.

Inadvertent Interchange Task Force-Don Badley

BAL-004, Time Error Correction

Don Badley incorporated automatic time error correction language into the BAL-004, Time Error Correction draft standard. The subcommittee reviewed and enhanced the language. The final draft includes time error correction requirements that are associated with frequency of the interconnections.

BAL-006, Inadvertent Interchange

Don Badley incorporated inadvertent interchange language into the BAL-006, Inadvertent Interchange draft standard. The subcommittee reviewed and enhanced the language. The final draft includes inadvertent interchange payback requirements that are associated with frequency of the interconnections.

Control Criteria Task Force-Alan Oneal

BAL-001, Real Power Balancing Control Performance

Alan Oneal incorporated language enhancements and clarification to the BAL-001, Real Power Balancing Control Performance draft standard. The subcommittee reviewed and enhanced the language.

NERC Glossary of Terms Used in Reliability Standards

A request was made to the Resources Subcommittee (RS) to evaluate two terms found in the NERC Glossary of Terms: “Spinning Reserve” and “Operating Reserve – Spinning.”

The RS evaluated the two terms and proposes replacing “spinning reserve” wherever the term is used in NERC documents with “operating reserve-spinning.” Before taking action, the subcommittee wants the regions to determine if this action will have a negative effect on the regional standards and procedures. Comments from the regions technical experts are requested by August 26, 2005.

Current NERC Glossary of Terms Definitions Used in Reliability Standards	
Spinning Reserve	Unloaded generation that is synchronized and ready to serve additional demand.
Operating Reserve – Spinning	The portion of Operating Reserve consisting of:

	<ul style="list-style-type: none"> • Generation synchronized to the system and fully available to serve load within the Disturbance Recovery Period following the contingency event; or • Load fully removable from the system within the Disturbance Recovery Period following the contingency event.
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If the RS approves this action, “spinning reserve” will replace “operating reserve-spinning” wherever the term is used as a part of a future SAR.

Projects

ACE Project 2000-03

Project Manager Carlos Martinez reported that the Consortium for Electricity Reliability Technology Solutions (CERTS) is projected to distribute the ACE-Frequency software, Release 3 in early August 2005. Release 3 will revise 2005 performance data and incorporate additional geographical jurisdiction adjustments, announce when data is not updated in a two-minute span or a data link fails to transmit data.

AIE Project 2000-04

CERTS sent the AIE software and initial actual WECC sample data to the RS Frequency Task Force evaluation team to review and analyze the software and recommend enhancements. Mr. Martinez is working with the team to enhance the AIE software. Based on RS comments, CERTS will consider incorporating an automatic AIE data form or spread sheet that will populate specific data when trigger limits are reached. Automatic data entry will relieve manual data transmittals and expedite the AIE analysis capabilities.

Inadvertent Checkout Web Site (SPP Inadvertent Tool Migration) Project 2001-37

CERTS is currently in the process of migrating the SPP inadvertent interchange database to NERC and duplicating the user interface. New inadvertent interchange analysis and tool recommendations were submitted from a number of different sources and are being incorporated into the software. CERTS estimates the completion of the SPP Inadvertent Tool migration to be in August 2005. Both the current SPP tool and the new CERTS inadvertent interchange tool will be operated in parallel until the BAs are comfortable using the new CERTS software. At that time, the SPP tool will be retired.

RS Frequency Data Collection and Analysis and the Eastern Interconnection Phasor Project

Terry Bilke and Carlos Martinez reviewed the status of the Eastern Interconnection Phasor Project (EIPP). EIPP will collect and store the frequency, but will not analyze the data. The subcommittee will collect Eastern Interconnection frequency data to use and analyze. EIPP and the RS will eventually share the tools and methodologies developed from their collaboration with the WECC and ERCOT Interconnections and Hydro Québec for their frequency analysis applications.

ACE-Frequency Data Quality Improvements

Carlos Martinez presented the CERTS Data Quality report and the NERC-CERTS-RS strategies to improve the ACE-Frequency data submittal and processing. This includes an alarm function that notifies NERC, CERTS, RCs, and the initiating “signal sender” that transmission has been lost or skewed. NERC and CERTS will hold a joint meeting to discuss data quality performance, new hardware and software, and both near-term and long-term data quality issues.

Frequency Performance

The RS monitors the interconnection frequency and average frequency error trend on an ongoing basis.

Eastern Interconnection Frequency Performance

Bill Herbsleb and Terry Bilke reviewed the Eastern Interconnection frequency performance. The subcommittee discussed recent frequency excursions noting that the Eastern Interconnection had recovered from each excursion in a timely manner. The RCs and BAs have recovered from each frequency excursion in accordance with the standards and excellent operating practices to return frequency to normal bounds. The RS will continue to closely monitor the Eastern Interconnection frequency errors.

ERCOT Interconnection Frequency Performance

Sydney Niemeyer reviewed ERCOT frequency performance. There were no significant events during the recent quarter

Western Interconnection Frequency Performance

Don Badley reviewed the Western Interconnection frequency performance. There were no significant events during the recent quarter.

CPS1 Review

The subcommittee reviewed the monthly and 12-month rolling average CPS1 data for trends and violations. There are no current CPS1 violations. However, there are BAs that have monthly values that are below 100%. See the discussion under CPS2 Violations, below.

CPS2 Violations

The NERC compliance group has identified balancing authorities that have been below 100% of their CPS1 monthly average or have been non-compliant below the required 90% of their monthly CPS2, for April, May, and June 2005. The compliance group suspects the non-compliant CPS2 balancing authorities within the MISO footprint are related to the MISO market start-up, which started on April 1, 2005. MISO informed Dave Hilt, NERC vice president of compliance, that it is making changes to the dispatch algorithm and has a work around for the short term. MISO also reported that they hope to have the issue resolved by the end of July, or in August at the latest. Mr. Hilt requested the RS review the MISO CPS1 and CPS2 issues, evaluate the proposed solution and determine if the solution is workable.

Terry Bilke presented the "MISO CPS Overview." A lengthy discussion followed of both the causes and proposed ACE Diversity Interchange (ADI) corrective action to address the CPS2 non-compliant MISO BAs.

MISO will implement an ADI program within the MISO footprint, on Monday, August 1, 2005. ADI can be thought of as a form of supplemental regulation. The NERC reliability standards, supplemental regulation, and the MISO ADI program are acceptable forms of regulation. There are subcommittee members that have in-depth knowledge of the ADI and the results that it can achieve for MISO. These members agreed that the ADI will allow all MISO BAs to be compliant with CPS2.

In summary, MISO does take its BA's CPS2 non-compliance for April, May, June, and July very seriously. MISO has evaluated the situation, asked the opinion of other technical experts (NPCC, MRO, MAAC) to address the situation, and chose the ADI program to remedy the situation. The RS endorses and believes the ADI program will be an adequate resolution. MISO will implement the ADI program on Monday, August 1, 2005.

Disturbance Control Standard

The subcommittee reviewed the 2005 2nd quarter DCS data. There was one event during the quarter in which the Balancing Authority did not recover within the DCS recovery period. This BA has committed to increase its contingency reserves for the next three months.

RC Frequency Action Initiatives, AIE and Frequency Characteristic Surveys

The RS has developed a “Proposed Frequency Monitoring and Response Process for the Eastern Interconnection.” The Eastern Interconnection reliability coordinators are currently using this process as part of the Balance Resources and Demand draft standard Phase II field test. The subcommittee revised the language, included AIE and frequency characteristic survey trigger points specifying when to call the surveys, and expanded the RC action instructions. The subcommittee is reviewing the document and sharing it with their operations staff. When the subcommittee reaches a consensus, it will be forwarded to the Reliability Coordination Working Group for their review, comment, endorsement, and use.

After the RS and RCWG reach consensus on this document, similar guides will be proposed for the WECC and ERCOT Interconnections, and Hydro Québec. The respective RS members were encouraged to share the document with their regional technical experts to attain their comments.

Time Error

Eastern Interconnection

The Eastern Interconnection called 85 time error corrections during the 2nd quarter 2005: 0 Slow TECs; 85 Fast TECs.

ERCOT Interconnection

The ERCOT Interconnection called 11 time error corrections during the 1st quarter 2005: 1 Slow TECs; 10 Fast TECs.

WECC Interconnection

The Western Interconnection called 23 time error corrections during the 1st quarter 2005: 13 Slow TECs; 10 Fast TECs.

Dates and Locations of Future Meetings

- | | |
|--------------------------|---------------------------|
| 1. October 26–28, 2005 | Asheville, North Carolina |
| 2. February 8–10, 2006 | Scottsdale, AZ |
| 3. May 3–5, 2006 | Washington D.C. |
| 4. September 20–22, 2006 | Quebec City, QU |
| 5. November 15–17, 2006 | Ft. Lauderdale, FL |

Respectfully submitted,

Tom Vandervort

Thomas J. Vandervort
Resources Subcommittee Secretary

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.



NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

Princeton Forrestal Village, 116-390 Village Boulevard, Princeton, New Jersey 08540-5731

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.

Scope Document

Resources Subcommittee

Policy Responsibility

Policy 1, “Generation Control and Performance”

Policy 5, “Emergency Operations” (those sections that deal with generation)

Policy 6, “Operations Planning” (those sections that deal with generation)

Control Area Criteria

Purpose

Establish Policies and Standards for:

- Load-generation balancing
- Interchange deployment
- Inadvertent Interchange accounting and payback
- Control performance
- Automatic Generation Control
- Time Error Correction
- Operating Reserve
- Frequency Response

Under the new Reliability Model:

- Balancing Authority operations
- Generator operations
- Load-Serving Entity operations

Reporting

The Resources Subcommittee reports to the NERC Operating Committee and shall maintain communications with the Market Interface Committee, Planning Committee, and other groups as necessary on relevant issues.

Membership

- Eighteen members plus chairman.
- Membership is divided equally between transmission providers/system operators and transmission customers.

Officers

Chairman and vice-chairman, selected by the Operating Committee chairman and vice-chairman. The chairman does not represent an industry sector. Both officers may vote.

Meeting Procedures

- Quorum: 50% of Subcommittee members eligible to vote
- All other procedures follow those of the “Organization and Procedures Manual for the NERC Standing Committees.”

Subgroups

The Resources Subcommittee may form Working Groups, Task Groups, and Task Forces as needed to assist the Subcommittee in carrying out standing or ad hoc assignments. Task Group chairs (or delegates) are expected to attend the regular Subcommittee meetings to report on assignments.

Resources Subcommittee Scope

Draft

Purpose

The NERC Operating Committee delegates to the reliability subcommittee the responsibility to be the initial interface with the Functional Model balancing authority function, the generator operator function, and the generator owner function, to initiate resolution of balancing authority-related operations issues and the technical interpretation of the balancing authority-related operating reliability standards.

Definition

Balancing authority, generator operator, and generator owner are defined in the Functional Model.

Scope

The reliability subcommittee shall be the specific subcommittee that the Operating Committee relies on to address balancing authority-related operations issues and technical interpretation of the operating reliability standards.

Resources Subcommittee Functional Model Responsible Entities

- a. Balancing Authority
- b. Generator Operator
- c. Generator Owner

Reliability Responsibilities

- a. Support the Operating Committee by addressing technical issues related to the Functional Model balancing authority, generator operator, and generator owner functions.
- b. Assess the effectiveness and impacts of balancing authority-related operations reliability standards.
- c. Identify the need for new balancing authority reliability standards or revisions to standards and initiate standards action by submitting SARs.
- d. Assist the standards process by providing expert resources in support of the development of balancing authority reliability SARs and standards.
- e. Assist the standards process by providing a forum for balancing authority reliability standards discussion, sharing of views, and informed debate.
- f. Review balancing authority standards to facilitate developing reference documents and performing other activities.
- g. Provide input and recommendations to the Personnel Subcommittee on the training issues concerning the balancing authority, generator operator, and generator owner.
- h. Assist in the development of real-time tools for balancing authorities to improve and enhance the reliability of the bulk power system.

Balancing Authority Responsibilities

The resources subcommittee shall provide technical support to NERC and the industry to:

- a. Evaluate proposed and existing reliability standards and any consequences independently for frequency or load-generation balance control performance.

- b. Evaluate proposed and existing NAESB business practices independently for impacts on frequency or load-generation balance control performance.
- c. Propose new reliability standards or NAESB business practices or revisions as needed.
- d. Investigate incidents on the interconnections as requested by the Operating Committee.
- e. Investigate compliance issues as requested by NERC.

To achieve the Balancing Authority Responsibilities the RS may:

- a. Evaluate frequency performance and characteristics independently across and within, in conjunction with, the interconnections of NERC.
- b. Evaluate balancing area control performance and characteristics independently across and within, in conjunction with, the interconnections of NERC.
- c. Define analytical methodologies and data retention to be used by the interconnections for data analyses provided to the RS.

This may include investigations into the following areas:

- a. Load-generation balancing
- b. Interchange deployment
- c. Inadvertent Interchange accounting and payback
- d. Control performance
- e. Automatic generation control
- f. Time error correction
- g. Operating reserve
- h. Frequency response

Under the new Reliability Model the following functions will be investigated:

- a. Balancing Authority
- b. Generator Operator
- c. Load-Serving Entity
- d. Purchasing Selling Entity
- e. Reliability Coordinator
- f. Reliability Authority
- g. Transmission Operator
- h. Interchange Authority

Resources Subcommittee NERC Operating Reliability Standards Assignment

Refer to resources subcommittee balancing authority related standards found on the NERC RS Web site under “related documents.”

Reporting

The resources subcommittee reports to the NERC Operating Committee and shall maintain communications with the Planning Committee, designated North American Energy Standards Board working groups, other operating committee subcommittees, and other groups as necessary to address relevant balancing authority-related operations concerns.

Membership

Voting Members

- a. Each regional reliability organization will provide at least one member. The regions will select those members based on their expertise in balancing authority operations.
- b. Each interconnection as well as Canada must be represented, and the subcommittee chairman, working with the NERC staff, will ask for additional members from the regional reliability councils as necessary to fulfill these requirements.
- c. The subcommittee will tap additional members as needed for their expertise.

Member Expectations

- a. NERC expects resources subcommittee members to participate in all meetings and conference call discussions and be willing to help draft reports, proposals, standards authorization requests, and standards.
- b. The resources subcommittee may request a region, an ISO/RTO, or other industry organization to nominate an individual that meets the above criteria as a replacement for its member that misses three consecutive meetings without sending a proxy.

Observers

Subcommittee meetings are open; however, observers must register to attend.

Officers

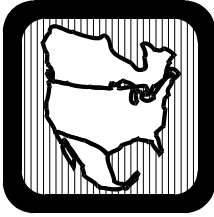
The Operating Committee Chairman selects the chairman and vice chairman. The chairman does not represent a region. Both officers may vote.

Meeting Procedures

- Quorum: 50% of Subcommittee members or proxies eligible to vote
- All other procedures follow the “Organization and Procedures Manual for the NERC Standing Committees.”
- NERC will supply a facilitator for subcommittee activities.
- Liaisons from NAESB, CEA, DOE, and others will be invited as required.

Subgroups

The resources subcommittee may form working groups, task groups, and task forces as needed to assist the subcommittee in carrying out standing or ad hoc assignments. Task group chairs (or delegates) are expected to attend the regular subcommittee meetings to report on assignments.



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Resources Subcommittee NERC Operating Reliability Standards Assignment

The NERC Operating Committee shall delegate to the resources subcommittee the responsibility to be the initial interface with the Functional Model balancing authority function, the generator operator function, and the generator owner function, to initiate resolution of balancing authority-related operations issues and technical interpretation of the balancing authority-related operations reliability standards. For additional information the resources subcommittee's reliability responsibilities refer to the resources subcommittee scope

The balancing authority-related operations reliability standards that the resources subcommittee will have custodianship over are:

- a. Standard BAL-001, Real Power Balancing Control Performance
- b. Standard BAL-002, Disturbance Control Performance
- c. Standard BAL-003, Frequency Response and Bias
- d. Standard BAL-004, Time Error Correction
- e. Standard BAL-005, Automatic Generation Control
- f. Standard BAL-006, Inadvertent Interchange
- g. Standard INT-001, Interchange Transaction Tagging (BA Tech Sections)
- h. Standard INT-003, Interchange Transaction Implementation (BA Tech Sections)
- i. Standard TOP-001, Reliability Responsibilities and Authorities (BA and GOP Tech Sections)
- j. Standard TOP-005, Operational Reliability Information (BA Tech Sections)
- k. Standard TOP-006, Monitoring System Conditions (BA Tech Sections)
- l. Standard EOP-001, Load Shedding Plans (BA Tech Sections)
- m. Standard EOP-002, Capacity and Energy Emergencies (BA Tech Sections)
- n. Standard EOP-008, Plans for Loss of Control Center Functionality (BA Tech Sections)
- o. Standard COM-001, Telecommunications (BA Tech Sections)
- p. Standard PER-001, Operating Personnel Responsibility and Authority (BA Tech Sections)
- q. Standard IRO-005, Reliability Coordination – Current Day Operations (BA Tech Sections)
- r. Reference Document - Performance Standards Reference Document
- s. Training Document – Area Interchange Error Survey Training Document
- t. Training Document – Frequency Response Characteristic Survey
- u. Training Document – Inadvertent Interchange Accounting Training Document

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Operating Committee Subcommittee Organization and Procedures

Introduction

This document includes the following sections:

1. Purpose of the Operating Committee subcommittees
2. Meeting procedures
3. Officers
4. Subgroups
5. Membership
6. Scopes
7. Standards Assignments
8. Approving changes to this document

Purpose of the Operating Committee Subcommittees

The subcommittees' principal role is to provide the Operating Committee with the technical expertise that the committee needs to make informed system operations policy decisions. In addition, the subcommittees:

1. Perform studies for the Operating Committee,
2. Serve as "custodians" for those reliability standards that pertain to system operation,
3. Help the NERC staff respond to government inquiries,
4. Work with NAESB groups,
5. Explain operating concepts, issues, and solutions to the NERC board,
6. Evaluate the performance of the Interconnections against NERC's reliability standards,
7. Recommend changes to those standards to ensure they remain effective, and
8. Work with NAESB as it develops business practices that effectively complement the reliability standards.

Some subcommittees have additional responsibilities, and those are listed in their individual scopes.

Relationship with NAESB

Coordination between NERC and NAESB is essential because of the close tie between reliability standards and complementary business practices. Therefore, NERC and NAESB form joint subgroups when it's necessary to develop standards and business practices that are closely related. In those cases, the joint subgroup will report to both the NERC Operating Committee or one of its designated subcommittees, and the NAESB Executive Committee.

Meeting Procedures

General

Other than the procedures listed below, the subcommittees follow the meeting procedures explained in these two documents:

1. The latest edition of the Organization and Procedures Manual For NERC Standing Committees, and
2. *Robert's Rules of Order, Newly Revised.*

Quorum. A quorum for conducting business is 50% of the members listed on the current Subcommittee roster. If a quorum is not present, then the subcommittee may not take any actions requiring a vote of the subcommittee. However, the chair may, with the consent of the members present, allow discussion of agenda items.

Minority Opinions and Personal Comments. The minutes of every subcommittee meeting will include exhibits for minority opinions and personal comments, respectively. The chairman shall communicate both the majority and any minority views in presenting results to the Operating Committee.

Minutes. A guide for subcommittee minutes is found in Appendix A.

Officers

The Operating Committee chairman appoints the subcommittee officers (typically a chairman and vice chairman) for a specific term (generally two years). The subcommittee officers may be reappointed for additional terms.

Subcommittee officers are considered members of the subcommittee and may vote.

Subgroups

The Subcommittee may form task forces and working groups as necessary, and Operating Committee approval is not necessary. The Subcommittee must review the progress of its subgroups at least annually and agree to either continue or disband these groups as needed.

Task forces are usually ad-hoc and are not expected to exist after completing their assignments. Working groups are on-going.

Membership

General Requirements

Membership requirements are focused on *expertise* and allow the subcommittees the flexibility they need to ensure they have this expertise.

Expertise. Each subcommittee must have sufficient expertise within its ranks to fully understand the standards for which the subcommittee is assigned custodianship. This means that NERC expects utilities, Regional Councils, and trade organizations to provide their best experts.

The expertise that subcommittees need will often include people involved in market operations and business practices, as well as those in system operations. Or will involve people from various geographic areas of North America. Subcommittees who find that their ranks do not include sufficient expertise to deal with the subjects at hand should seek additional members with that knowledge and experience.

Commitment and participation. Subcommittee members must be *committed* to their service on the subcommittees. This means preparing for and actively *participating* in all subcommittee meetings in person or on conference calls. It also means writing and reviewing draft reports, serving on SAR and standards drafting teams if selected, and bringing issues to their Regional Councils, trade organizations, and utilities for further discussion and insight.

Required membership. Each subcommittee will include, as a minimum, the following members who may vote:

Voting Members – Required

1. **Regional representatives.** Each regional reliability council will provide one member. The regions will select their representatives based on their expertise in the subcommittee's subject matter.
2. **Interconnections and countries.** If the set of regional representatives does not provide for at least one representative from each Interconnection and two representatives from the U.S. and Canada, the subcommittee chairman, working with the NERC staff, will ask for *additional members* from the regional reliability councils or trade organizations as necessary to fulfill these requirements.

Voting Members – Additional

3. **Additional invited members.** The subcommittee will tap additional members as needed for their expertise. The subcommittee officers will seek recommendations from trade organizations, regional councils, and individual organizations. For example, the Operating Reliability Subcommittee will most likely want several Reliability Coordinators as members. The Resources Subcommittee may need Generator Operators and Market Operators. The Interchange Subcommittee may need Purchasing-Selling Entities

Non-voting members – Guests and observers

Subcommittee meetings are open to others who wish to attend as a guest of the subcommittee. The chairman will provide guests and observers the opportunity to contribute to the subcommittee's discussions, provided the subcommittee's voting members have sufficient time to:

1. Complete the debate of their motions, and
2. Complete the meeting agenda.

Subcommittee Scopes

Resources Subcommittee	
Last Scope Revision Date	9/15/05
Web page	http://www.nerc.com/~oc/rs.html
Scope	<ol style="list-style-type: none"> 1. Load-generation balancing 2. Interchange deployment 3. Inadvertent interchange accounting and payback 4. Control performance 5. Automatic Generation Control 6. Time Error Correction 7. Operating Reserve 8. Frequency Response
Expertise	<ol style="list-style-type: none"> 1. Load-generation balancing 2. Market operations
Functional Model	<ol style="list-style-type: none"> 1. Balancing Authority 2. Generator Operator 3. Load-Serving Entity 4. Purchasing Selling Entity 5. Reliability Coordinator 6. Reliability Authority 7. Transmission Operator 8. Interchange Authority
Surveys and Reports	<ol style="list-style-type: none"> 1. Area Interchange Error 2. Control Performance Standard 3. Disturbance Control Standard 4. Inadvertent Interchange 5. Time Error 6. Frequency Bias Settings 7. Eastern Interconnection Average Frequency Error
Additional Responsibilities	<ol style="list-style-type: none"> 1. Evaluate frequency performance and characteristics independently across and within, in conjunction with, the interconnections of NERC. 2. Evaluate balancing area control performance and characteristics independently across and within, in conjunction with, the interconnections of NERC. 3. Define analytical methodologies and data retention to be used by the Interconnections for data analyses provided to the RS.
Subgroups	<ol style="list-style-type: none"> 1. Frequency Task Force – Deals with Interconnection frequency issues and brings recommendations to the subcommittee 2. Reserves Task Force – Discusses operating reserve issues and brings recommendations to the subcommittee

Interchange Subcommittee	
Last Scope Revision Date	9/15/05
Web page	http://www.nerc.com/~oc/is.html
Scope	<ol style="list-style-type: none">1. Interchange schedule implementation.2. Interchange schedule modifications for reliability or economic reasons.3. Programs and facilities associated with the transfer of energy. This includes development of the business plan, including costs, and schedules for developing system projects and training.
Expertise	<ol style="list-style-type: none">1. Interchange coordination and implementation2. Scheduling (including scheduling agents)3. Market operations4. Purchasing and selling5. Transmission service
Functional Model	<ol style="list-style-type: none">1. Interchange Authority2. Purchasing-Selling Entity3. Balancing Authority
Reports	None
Additional Responsibilities	Maintain Dynamic Transfer Catalog
Subgroups	Joint Interchange Scheduling Working Group (also reports to NAESB) – Develops protocols for OASIS 1a, Etag, and Registry.

Transmission Subcommittee	
Last Scope Revision Date	9/15/05
Web page	http://www.nerc.com/~oc/ts.html
Scope	<ol style="list-style-type: none"> 1. Transmission security limits 2. Operational limits, flow management, and their impact on ATC 3. Voltage and reactive control 4. Coordination with adjacent transmission systems (Including maintenance) 5. Transmission system relief (using local line load relief procedures or seeking help from reliability coordinators) 6. Isolated operations 7. System restoration 8. Automatic load shedding 9. Operational input into transmission system monitoring 10. Operational input into transmission system protection 11. Transmission service provider reliability standards 12. Transmission owner and operator reliability standards <p>And</p> <ol style="list-style-type: none"> 13. Assist in developing programs associated with operating reliability coordination. 14. Develop metrics and compliance templates for performance measurement. 15. Develop a project management plan for reliability standard changes which takes into consideration training requirements
Expertise	<ol style="list-style-type: none"> 1. Transmission operations 2. Transmission service
Functional Model	<ol style="list-style-type: none"> 1. Transmission Operator 2. Distribution Provider
Reports	None
Additional Responsibilities	Maintain Dynamic Transfer Catalog
Subgroups	

Operating Committee Subcommittee Organization and Procedures

Operating Reliability Subcommittee	
Last Scope Revision Date	9/15/05
Web page	http://www.nerc.com/~oc/ors.html
Scope	<p>Reliability coordination functions and responsibilities, including, but not limited to:</p> <ol style="list-style-type: none"> 1. Reliability analyses 2. System Operating Limit and Interconnected Reliability Operating Limit violation mitigating procedures 3. Local and Interconnection line loading relief procedures 4. Energy emergency alert notification and mitigation 5. Reliability Coordinator criteria and certification process <p>And:</p> <ol style="list-style-type: none"> 6. Develops programs and facilities associated with operating reliability coordination. This includes development of the business plan, including costs, and schedules for developing system projects and training. 7. Develops metrics and compliance templates for performance measurement. 8. Assists the Personnel Subcommittee in developing training materials for Reliability Coordinators. 9. Review reliability plans, and 10. Approves minor membership changes 11. Reviews significant organizational changes and provides recommendations to the Operating Committee
Expertise	<ol style="list-style-type: none"> 1. Reliability coordination 2. Transmission operation 3. Load-generation balancing 4. Purchasing and selling
Functional Model	Reliability Authority (Reliability Coordinator)
Reports	None
Additional Responsibilities	<p>Review Regional Reliability Plans and provides recommendations to the Operating Committee</p> <p>Manage the Interchange Distribution Calculator</p>
Subgroups	<ol style="list-style-type: none"> 1. Reliability Coordinator Working Group – Reliability coordination 2. IDC Working Group – Maintains IDC curtailment algorithms and reviews change orders for IDC software changes 3. Distribution Factors Working Group – Maintains base case model for IDC and distribution factor calculation methods 4. Data Exchange Working Group – Establishes telecommunications protocols 5. Telecommunications Working Group – Maintains NERCnet

Personnel Subcommittee	
Last Scope Revision Date	9/15/05
Web page	http://www.nerc.com/~oc/ps.html
Scope	<ol style="list-style-type: none">1. Provides industry input and feedback to the NERC Training Staff in the development of workshops, seminars, training materials, delivery methods, and procedures.2. Promotes the sharing of knowledge and information gained.3. Serves as the technical advisor to the Personnel Certification Governance Body.4. Serves as the governing body of the NERC Continuing Education Program.
Functional Model	<ol style="list-style-type: none">1. Reliability Coordinator2. Transmission Operator3. Balancing Authority
Reports	None
Additional Responsibilities	Maintain Continuing Education Program
Subgroups	Training Resources Working Group – develops training documents Continuing Education Review Panel – reviews Continuing Education programs

Reliability Standards Assignments

This table lists the standards and the subcommittees that have primary custodianship of those standards. These assignments are not exclusive. As the table highlights, many of the reliability standards address more than one responsible entity, so we expect the subcommittees to work with each other, as they have been.

Standard	Title	RS	TS	PS	IS	ORS
BAL-001-0	Real Power Balancing Control Performance	X				
BAL-002-0	Disturbance Control Performance	X				
BAL-003-0	Frequency Response and Bias	X				
BAL-004-0	Time Error Correction	X				
BAL-005-0	Automatic Generation Control	X				
BAL-006-0	Inadvertent Interchange	X				
TOP-001-0	Reliability Responsibilities and Authorities		X			X
TOP-002-0	Normal Operations Planning		X			
TOP-003-0	Planned Outage Coordination					X
TOP-004-0	Transmission Security		X			
TOP-005-0	Operating Reliability Information					X
TOP-006-0	Monitoring System Conditions		X			X
TOP-007-0	Reporting SOL and IROL Violations		X			
TOP-008-0	Response to Transmission Limit Violations		X			
VAR-001-0	Voltage and Reactive Control		X			
INT-001-0	Interchange Transaction Tagging				X	
INT-002-0	IT Tag Communication and Assessment				X	
INT-003-0	Interchange Transaction Implementation				X	
INT-004-0	Interchange Transaction Modification				X	
PRC-001-0	System Protection Coordination		X			
COM-001-0	Telecommunications		X			X
COM-002-0	Communications and Coordination					X

Operating Committee Subcommittee Organization and Procedures

Standard	Title	RS	TS	PS	IS	ORS
EOP-001-0	Emergency Operations Planning		X			
EOP-002-0	Capacity and Energy Emergencies					X
EOP-003-0	Load Shedding Plans		X			
EOP-004-0	Disturbance Reporting					X
EOP-005-0	System Restoration Plans		X			
EOP-006-0	Reliability Coordination – System Restoration					X
EOP-007-0	Standard Does Not Exist					
EOP-008-0	Plans for Loss of Control Center Functionality		X			X
CIP-001-0	Sabotage Reporting					X
PER-001-0	Operating Personnel Responsibility and Authority			X		
PER-002-0	Operating Personnel Training			X		
PER-003-0	Operating Personnel Credentials			X		
PER-004-0	Reliability Coordination – Staffing			X		X
IRO-001-0	Reliability Coordination – Responsibilities and Authorities					X
IRO-002-0	Reliability Coordination – Facilities					X
IRO-003-0	Reliability Coordination – Wide Area View					X
IRO-004-0	Reliability Coordination – Operations Planning					X
IRO-005-0	Reliability Coordination – Current Day Operations					X
IRO-006-0	Reliability Coordination – Transmission Loading Relief					X
	Number of Standards Assigned to Subcommittee	6	13	4	4	18

Approving Changes to this Document

1. The Operating Committee approves all changes to this document.
2. The Operating Committee may change a subcommittee's scope, assignments, and standards custodianship.
3. A subcommittee may ask the OC for permission to change the subcommittee's scope, assignments, and standards custodianship.

Resources Subcommittee

October 27, 2005 Meeting

Open Action Item List

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
Carl Monroe	Complete RS Roster	<p>72805, The OC is in the process of developing new subcommittee structure and membership criteria. The OC should unveil its new criteria at its next meeting in September.</p> <p>102705, All regions are represented on the RS in accordance with the new OC subcommittee policy, but still need two members from Canada. The OC is going to send a letter to Canadian RRCs for nominations for all subcommittees.</p>	010106	102705
Carl Monroe	SPP Inadvertent Tool Use by FRCC	<p>Carl to send a letter to FRCC (Linda Campbell) requesting FRCC to use the SPP Inadvertent tool. Ask for a way to automatically send data to NERC.</p> <p>7/31/03, Carl to call Linda Campbell to discuss SPP Inadvertent Tool or converting FRCC Inadvertent data to a compatible data format for the SPP tool.</p> <p>10/28/04, Carl to visit with Linda to follow-up discussions</p> <p>7/28/05, Carl to visit with Linda Campbell at next OC meeting.</p> <p>102705, The RS's proposed BAL revisions need to include a requirement for all BAs to submit required hourly data to populate hourly AIE surveys. See the proposed BAL standards revisions in this meeting's agenda. Close this item?</p>	102705	
Carl Monroe	SPP AIE Tool	<p>4/28/04, Carl to research the SPP AIE tool. Evaluate the tool to determine if it is practical to use in the Eastern Interconnection.</p> <p>10/28/04, Ongoing activity</p> <p>1/28/05, all 8/14/03 inadvertent interchange accounts have been updated.</p> <p>072805, Carl to update at next meeting.</p> <p>102705, TV not sure what this action item is, suggest surveying the RS for definition and if none is determined, then close this item. Close this item?</p>	102705	
Carl Monroe	FRCC BAs CERTS ACE-Frequency Data	<p>072805, Carl to contact FRCC Regional Manager to request data be submitted as BA data instead of regional data to NERC to populate the CERTS ACE-Frequency displays. TV to draft a letter for Carl. Letter sent to Carl for his review on 080205.</p> <p>102705, The RS's proposed BAL revisions need to include a requirement for all BAs</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		to submit required hourly data to populate hourly AIE surveys. See the proposed BAL standards revisions in this meeting's agenda. Close this item?		
Terry Bilke	When to Call "Surveys"	<p>050505, Terry will evaluate EI historical data and significant events and recommend "survey" initiation criteria (criteria that would require approximately 3 surveys a year). WECC and ERCOT have existing criteria for calling "surveys."</p> <p>As an interim guide for the Eastern Interconnection, the RS recommends AIE surveys be called when the following circumstances occur:</p> <ul style="list-style-type: none"> • Any sudden change of frequency greater than 35 mHz which cannot be explained by a known disturbance or • Any sustained frequency change of greater than 20 mHz-low or 35 mHz-high or daily RMS of 20 mHz or higher. <p>072805, RS Proposed Frequency Monitoring and Response Process for the Eastern Interconnection was reviewed and enhanced, sent to the subcommittee for another round of review, and will be forwarded to the RCWG for their review, endorsement and use during their September meeting.</p> <p>When the RS and RCWG attain consensus on this EI document, the WECC, ERCOT, and HQ RS members are encouraged to share it with their regional technical experts in preparation to initiate similar guides in their footprints.</p> <p>080105, RS furnished the BRD SDT a set of trigger points and actions guide to use during the BRD Proof of Concept Field Test (currently in progress). The RCWG was requested to review and determine what to do with the guide (e.g. incorporate into standard requirements, make into an operating guide, use as a reference guide, etc).</p> <p>102705, Close this item?</p>	102705	
Tom Vandervort	NERC Glossary of Terms: "spinning reserve" and "operating reserve – spinning"	<p>072905, RS evaluated the two terms and proposes deleting "spinning reserve" wherever the term is used and replacing it with "operating reserve—spinning" in its place. Prior to taking this action, the subcommittee wants to know if the regional standards and procedures will be negatively affected by the deletion and substitution. Regional Managers and RS survey contacts were asked to respond by August 26, 2005 with negative impact comments.</p> <p>100105, TV received no response from the survey. TV received guidance from the standards process director that in the future simply incorporate "glossary of term" changes within a SAR and let the industry respond with comments.</p>	100105	100105

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
Tom Vandervort	Incorporate ERCOT data into the CERTS ACE-Freq Displays	<p>080205, TV contacted Paul Baratelli, NERC IT staff in charge of the data flow to the CERTS ACE-Freq display. Requested Paul to follow-up with whatever is necessary to attain ERCOT data to populate the CERTS ACE-Frequency displays.</p> <p>090105, TV researched and found that for ERCOT to send data to the ACE-Frequency Process, it needs to establish an ICCP node and be coordinated through the Data Exchange Working Group (DEWG).</p> <p>100405, TV requested the DEWG coordinate the necessary steps through the ERCOT DEWG representative to begin the process of ERCOT sending data to the ACE-Frequency application. Sam Jones endorsed this idea.</p>	102705	
Tom Vandervort	Freq Analysis Specs – RS Review	<p>072905, The RS wanted another chance to review the proposed interconnections Frequency Analysis Specifications. TV sent the specs to the RS on 080205, for another review. The frequency analysis specifications will be for the EI, WECC, ERCOT interconnections, and HQ.</p> <p>091505, Carl discussed the RS frequency needs and Bob Cummings discussed the EIIPP capabilities to satisfy those needs at the OC meeting in September, 2005. The OC endorses the frequency-phasor project for all interconnections and looks forward to approving a RS endorsed frequency-phasor project at the December meeting. See frequency-phasor project draft scope in the meeting agenda.</p>	102705	
Tom Vandervort	CERTS Inadvertent Interchange Software	<p>072905, Carlos identified a problem with administration rights of the Inadvertent Interchange software, identified during the WECC II training session. The problem lies with the rights of the administrator for the CERTS software programs. User level / admin level / global level – access to address entries, corrections, adjustments, etc.</p> <p>100405, TV met with NERC and CERTS staff to discuss software applications administrative rights and authority. The next step is for NERC to determine how best to handle, address and structure administration of the software applications.</p> <p>102705, TV recommends closing this item since it falls outside of the RS.</p>	102705	
Tom Vandervort	Review Freq Monitoring Guide	<p>072905, RS reviewed and revised the RS Frequency Monitoring and Response Process for the Eastern Interconnection. TV to sent it to the subcommittee for another review prior to sending it to RCWG for their review during their next meeting.</p> <p>080105, RS furnished the BRD SDT a set of trigger points and actions guide to use during the BRD Proof of Concept Field Test (currently in progress). The RCWG was requested to review and determine what to do with the guide (e.g. incorporate into standard requirements, make into an operating guide, use as a reference guide, etc).</p> <p>102705, Close this item?</p>	102705	
Don Badley	AIE Software – Functionality System Review	<p>10/29/04, Don Badley to process RS Members Confidentiality Forms (work with Carlos as necessary) to allow them to review the CERTS AIE – in order to Test Functionality of the System</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<ul style="list-style-type: none"> • Reconciled Hourly AIE Data • Reconciled Monthly Inadvertent Data <p>Don to attain addresses, phone numbers, e-mail addresses from the agenda item 1:</p> <p>Frequency Task Force Members to evaluate the AIE System:</p> <p>Don Badley</p> <p>Raymond Vice</p> <p>Terry Bilke</p> <p>Mike Potishnak</p> <p>Yuri Makarov</p> <p>Tom Vandervort</p> <p>Brian Nolan</p> <p>12/10/04, Don Badley contacted WECC to identify why the WECC confidentiality agreements have not been sent to the FTF members. WECC replied to Don that the Non-Disclosure Agreements have not been sent yet, but would be sent in the near future.</p> <p>1/28/05, WECC committed to Don to send their confidentiality agreements to the listed RS FTF members this week. We will cover this item during the meeting agenda item 5b.</p> <p>050505, CERTS sent AIE software and WECC data to RS FTF for initial analysis and evaluation. Frequency Task Force will analyze the data / summarize the results / make recommendations. Timetable-by July 30, 2005</p> <p>072805, CERTS – RS Frequency Task Force review team had problems accessing the CERTS AIE software and data. CERTS is addressing the problem. The deadline was pushed back to give the team time to analyze the software and data.</p> <p>102705, ?</p>		
Don Badley	V0 Standards, Ref	012805 Task Forces to review V0 Standards:	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
and IITF	Docs, Training Docs	<ul style="list-style-type: none"> • Review V0 Standards to ensure they are “safe and effectie” • Recommend moving sections within V0 to a Ref Doc • Recommend improvements to the V0 via a SAR • Recommend deletions of sections of V0 • Recommend forwarding sections of V0 to NAESB • Start with V0 Standards, Ref Docs, Training Docs <p>Standard BAL-004-0, Time Error Correction, Version 0</p> <p>Standard BAL-006-0, Inadvertent Interchange, Version 0</p> <p>Training Document – Area Interchange Error Survey Training Document</p> <p>Training Document – Inadvertent Interchange Accounting Training Document</p> <p>050505, On-going activity.</p> <p>072805, Draft BAL-004, TEC and BAL-006, Inadvertent Interchange are to be discussed during this meeting. (agenda item 4). In progress.</p> <p>102705, TF proposes changes to the “BAL” standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>		
Don Badley and IITF	AIE Surveys	<p>012805 Inadvertent Interchange Task Force to incorporate a revision within V0 Standard to specify when to call AIE Surveys – discuss during April, 05 RS meeting and how to call an AIE Survey</p> <p>050505, When to call surveys are to be included in the standards review and recommendations.</p> <p>072805 In progress. When RS and RCWG attain consensus on RS Proposed Frequency Monitoring and Response Process for the Eastern Interconnection, this item will be closed.</p> <p>072805, CERTS – RS Frequency Task Force review team had problems accessing the CERTS AIE software and data. CERTS is addressing the problem. The deadline was pushed back to give the team time to analyze the software and data.</p> <p>102705, ?</p>	102705	
Don Badley and IITF	EI Adoption of WATEC	<p>050505, 1) The Inadvertent Interchange Task Force will review and consider incorporating the WATEC into the NERC Reliability Standards for inadvertent payback. The Task Force will develop a SAR to accomplish this revision following its review. The RS believes this function needs to be returned to the NERC Reliability</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>Standards.</p> <p>2) The Inadvertent Interchange Task force will review and consider the need for incorporating clarifying language into the NERC Reliability Standards for Inadvertent Interchange Payback. Language to be considered is: "The official "ACE Equation" does not include any adjustments unilateral inadvertent interchange payback, Western Interconnection Automatic Time Error Control (WATEC), etc."</p> <p>072805, Automatic Time Error (ATC) is included in the IITF BAL-006 draft. Draft standard will be revised and distributed to the subcommittee for additional comments.</p> <p>102705, TF proposes changes to the "BAL" standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>		
Don Badley	Review Freq Monitoring Guide	<p>072905, RS reviewed and revised the RS Frequency Monitoring and Response Process for the Eastern Interconnection. TV to send it out to the subcommittee for another review prior to sending it to RCWG for their review during their next meeting. Don is to review (and share it with the WECC technical experts) the EI Frequency Monitoring Guide and consider a similar WECC Frequency Monitoring Guide.</p> <p>102705, ?</p>	102705	
Terry Bilke, Raymond Vice, and Freq TF	V0 Standards, Ref Docs, Training Docs	<p>012805 Task Forces to review V0 Standards:</p> <ul style="list-style-type: none"> • Review V0 Standards to ensure they are "safe and effective" • Recommend moving sections within V0 to a Ref Doc • Recommend improvements to the V0 via a SAR • Recommend deletions of sections of V0 • Recommend forwarding sections of V0 to NAESB • Start with V0 Standards, Ref Docs, Training Docs <p>Standard BAL-003-0, Frequency Response and Bias, Version 0</p> <p>Pay close attention to the variable bias calculation</p> <p>Training Document – Frequency Response Characteristic Survey Training Document</p> <p>050505, On-going activity</p> <p>072805, Terry has included initial FRS language into BAL-003. Frequency TF needs to evaluate Version 0 and enhance as necessary. (agenda item 4). Terry has drafted a revision to BAL 003 and the RS sent it to the SAC for discussion along with</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>the comment responses. In progress.</p> <p>102705, TF proposes changes to the “BAL” standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>		
Raymond Vice and Freq TF	ACE Special Cases Pseudo Ties and Dynamic Transfers	<p>050505, The AGC Task Force will review and consider incorporating the ACE Special Cases or the Dynamic Transfer White Paper into BAL-001 or BALI-005. The Task Force will develop a SAR to accomplish this revision following its review. The RS believes this function needs to be returned to the NERC Reliability Standards.</p> <p>072805, Alan and CCTF have incorporated the ACE Special Cases into the draft BAL-001. (agenda item 4)</p> <p>BAL 005 to be revised to include ACE Special cases and pseudo ties. In progress.</p> <p>102705, TF proposes changes to the “BAL” standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>	102705	
Raymond Vice and Freq TF	Generator’s Obligation to Support Interconnection Frequency	<p>050505, The RS agrees that there is no requirement for the generators to support interconnection frequency in existing standards. The RS believes the generators should support interconnection frequency possibly through an ancillary services market.</p> <p>Generator requirements should be included in NERC standards unless there is a robust ancillary service market or other mechanism for providing turbine governor response. As proposed the FRS SAR will not require generators to support interconnection frequency. However, MOD-027-01 that is currently under development, does have such a requirement. If this standard is passed as written, no further action is required. If MOD-027-1 is not authorized, then the Frequency Task Force will review and consider an appropriate generator governor SAR.</p> <p>072805, The Frequency TF will review Raymond Vices’s “Frequency Issues 2005” and determine what actions may be appropriate to address the concerns.</p> <p>102705, ?</p>	102705	
Raymond Vice and Freq TF	Combustion Turbine Governor Response	<p>050505, The Combustion Turbine Governor Response issue only occurs when gas turbines are operating at maximum output limited by blade temperature as indicated by exhaust gas temperature and only limits response to low frequency deviations. It is not clear what percentage of gas turbines operate in this mode at any given time. In addition, the mass flow of air through the compressor of a gas turbine varies geometrically with frequency (speed of the compressor). This may reduce the ability of the turbine to respond to frequency deviation. The Frequency Task Force will continue to investigate these issues and determine if a NERC Reliability Standard requirement(s) is necessary.</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>072805, Raymond contacted local GE governor engineering staff which will possibly put him in contact with the right individuals (possibly John Undrill). Frequency TF will address the issues and concerns. Raymond may possibly invite John Undrill to the next Frequency Task Force meeting to discuss governor response.</p> <p>102705, TF proposes changes to the "BAL" standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>		
Larry Akens and ORTF	"Reserves" Standard	<p>012805 Mike presented the initial Operating Reserves Standard draft to the RS. The RS consensus thought the proposal was a good start, had a lot of merit, but was too prescriptive in its language and proposed methodology. Mike and the ORTF will take the subcommittee comments into consideration in the next draft of the proposal.</p> <p>050505, Larry Akens and Mike Potisnak will work together on this Action Item.</p> <p>072805, Larry drafted, distributed, and led a discussion on "Operating Reserves" proposal included in BAL-002, Disturbance Control Performance, during the ORTF meeting. Larry will enhance the draft using the comments from the task force and distribute to the RS for additional comment. In progress.</p> <p>102705, TF proposes changes to the "BAL" standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>	102705	
Larry Akens and ORTF	V0 Standards, Ref Docs, Training Docs	<p>012805 Task Forces to review V0 Standards:</p> <ul style="list-style-type: none"> • Review V0 Standards to ensure they are "safe and effective" • Recommend moving sections within V0 to a Ref Doc • Recommend improvements to the V0 via a SAR • Recommend deletions of sections of V0 • Recommend forwarding sections of V0 to NAESB • Start with V0 Standards, Ref Docs, Training Docs <p>Standard BAL-002-0, Disturbance Control Performance, Version 0</p> <p>050505, On-going activity</p> <p>072805, ORTF will review BAL-002-0 and enhance as necessary. Mike will draft and distribute recommendations for the RS to consider during this meeting. Larry presented his initial draft to the ORTF and enhanced the draft using the comments from the task force. In progress.</p> <p>102705, TF proposes changes to the "BAL" standards for RS concurrence and then</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>		
<p>Larry Akens and ORTF; and Don Badley</p>	<p>WECC DCS Consideration</p>	<p>050505, The Operating Reserve Task Force will review the WECC DCS grace period of 60 minutes and consider incorporating the language into a SAR during the RS standards review process. Mike Potishnak to attain the details from Don Badley.</p> <p>072805, Don Badley to send the WECC DCS criteria and details to Larry for BAL-002, Disturbance Control Performance, consideration. In progress.</p> <p>102705, TF proposes changes to the "BAL" standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>	<p>102705</p>	
<p>Raymond Vice and AGC TF</p>	<p>V0 Standards, Ref Docs, Training Docs</p>	<p>012805 Task Forces to review V0 Standards:</p> <ul style="list-style-type: none"> • Review V0 Standards to ensure they are "safe and effective" • Recommend moving sections within V0 to a Ref Doc • Recommend improvements to the V0 via a SAR • Recommend deletions of sections of V0 • Recommend forwarding sections of V0 to NAESB • Start with V0 Standards, Ref Docs, Training Docs <p>Standard BAL-005-0, Automatic Generation Control, Version 0</p> <p>050505, On-going activity</p> <p>072805, In progress.</p> <p>102705, TF proposes changes to the "BAL" standards for RS concurrence and then submittal of a SAR(s) to the NERC standards process manager. See meeting agenda.</p>	<p>102705</p>	
<p>Raymond Vice and Freq TF</p>	<p>Frequency Response Characteristics Surveys</p>	<p>012805 Frequency Task Force to incorporate a revision within V0 Standard to specify when to call Frequency Responsive Characteristics Surveys – discuss during April, 05 RS meeting</p> <p>050505, When to call Frequency Response Characteristics surveys are to be included in the standards review.</p> <p>072805, Frequency Response Characteristics survey trigger point (when to call a survey) is included in the RS "Proposed Frequency Monitoring and Response Process for the Eastern Interconnection." When the RS and RCWG attain consensus on this document, this item will be closed.</p>	<p>102705</p>	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		080105, RS furnished the BRD SDT a set of trigger points and actions guide to use during the BRD Proof of Concept Field Test (currently in progress). The RCWG was requested to review and determine what to do with the guide (e.g. incorporate into standard requirements, make into an operating guide, use as a reference guide, etc). 102705, Close this item?		
Raymond Vice and Freq TF	Frequency Issues 2005, White Paper	072905, The RS did not have time to review and discuss Raymond's Frequency Issues 2005, white paper. The Frequency TF will review the concerns identified in the white paper and propose actions or discussion points for the RS to consider. 102705, ?	102705	
Raymond Vice and Freq TF	Dynamic Transfer Catalogue	072905, The IS requests the RS review and enhance the draft of the Dynamic Transfer Catalogue Survey during the July meeting. The RS did not have sufficient time to address this agenda item. Raymond volunteered the Frequency Task Force to address the catalogue and to make suggestions prior to the next IS meeting, August 24 – 26. 080405, Raymond and Terry sent comments to RS and to IS (through Bill Blevins) for inclusion in the DTC. 102705, The IS continues to work on the dynamic transfer catalogue and may request RS assistance. In progress.	102705	
Sydney Niemeyer	Review Freq Monitoring Guide	072905, RS reviewed and revised the RS Frequency Monitoring and Response Process for the Eastern Interconnection. TV to send it out to the subcommittee for another review prior to sending it to RCWG for their review during their next meeting. Sydney is to review (and share with ERCOT technical experts) the EI Frequency Monitoring Guide and consider a similar ERCOT Frequency Monitoring Guide. 102705, ?	102705	
Carlos Martinez	Data Quality	Write an initial definition of "data quality" for the RS to review. (In conjunction with Terry Bilke's "why" data accuracy and quality are necessary.) 071403 – Terry received and commented on Carlos's data quality draft. 080103 – Carlos to send data quality summary to the subcommittee. 102803 – Carlos to send "completed" summary to the subcommittee 013004, One of the common themes from the BIT is data quality concerns, time stamps, and reporting requirements. Possibly report back at the next RS meeting. 040104, Terry submitted Data Quality SAR to Standards Process 042804, Discuss during the meeting, Carlos to distribute Data Quality White Paper 063004, CERTS – Carlos Martinez, Arun Harnoor, and Romulo Barreno are collaborating on the Data Quality issues, concerns, problems, remedies, solutions and possible future project(s). First step will be to complete the white paper.	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>072804, Carlos to present, review, and discuss Data Quality White Paper with RS</p> <p>102804, Carlos to update current status of Data Quality White Paper with RS</p> <p>012805, Carlos to update</p> <p>040105, CERTS completed Data Quality Final Report. Carlos to send to TV.</p> <p>050505, Carlos presented the Data Quality Final Report and the recommendations to improve the transmittal, monitoring, and alarming of data transmittal of ACE-Freq data. NERC-CERTS have the majority of tasks and may request assistance from the RS.</p> <p>072805 NERC and CERTS will hold a joint meeting to discuss data quality concerns and set up a plan to address the issues and concerns.</p> <p>102705, CERTS has developed and implemented alarms that RCs receive when data transmittal fails or data is suspect. NERC IT and Projects departments need to determine how to administer the data quality procedures/policies.</p>		
Carlos Martinez and Joe Emde	ACE and AIE – Data “Unavailability” for CERTS	<p>During the last April RS meeting, Carlos Martinez asked the RS to give CERTS feedback on the frequency desired for data output. The discussion led to an action item for the Frequency Task Force to give CERTS the frequency parameters on “unavailability.” To determine what and when frequency is considered to be “unavailable.”</p> <p>8/1/03 – Both NERC and CERTS to identify why CERTS is not receiving all CA data. Carlos to work with Joe Emde and Paul Baratelli and correct discrepancies.</p> <p>10/28 – CAs not reporting; CAs reporting but not reliable; CAs reporting and reliable; ready to send to subcommittee.</p> <p>1/30/04, Due to time restraints, Carlos has not had time to identify who is not supplying data to CERTS. Carlos to work with Paul Baritelli to resolve the issue.</p> <p>This is important, If Carlos can get the detailed information where the break-downs are, Carl can pass the information and statistics on to the OC at its next meeting.</p> <p>It may be a vicious circle. NERC needs to feed back to the CAs to identify which are not submitting data. (i.e. if the CAs are submitting data and NERC is not receiving the data, a notification needs to be made from NERC to the CAs in order to identify why it is not being received). If there is a break down or miscommunications – they need to be resolved and fixed!</p> <p>Carlos, Tom, Paul, to visit and determine how to establish a receipt process for the data. Possibly include DEWG (data exchange working group) – Enlist Carl’s help if necessary!</p> <p>3/1/04, Joe E started validating data transmittal nodes and contacting control areas</p> <p>4/28/04, Discuss during the meeting, Carlos to distribute Data Quality White Paper to</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>the subcommittee.</p> <p>10/28/04, Joe and Carlos to discuss with the RS the current status of the AIE and ACE data and the amount of data that is "available" and "unavailable," and what additional steps can be taken to remedy the situation.</p> <p>050505, Joe Emde Status Report: The CERTS tool was missing almost 700 MWs of ACE at the time of the last RS meeting. As of today, it's missing a little over 100 MWs. I'm not exactly sure of the numbers but Carlos can probably give you them.</p> <p>There are currently about 8 CAs that are consistently offline.</p> <p>BREC, CWLD, DEVI, LAFA, IP, SC & UPPC work intermittently but are down more often than not. I'm not sure how to fix them.</p> <p>SEPA does not submit its data via ICCP so it's not possible to insert them into the tool.</p> <p>Note: BREC – Big River Elect Corp (ECAR), DEVI (?), LAFA – Lafayette Utility System (SPP), IP – Illinois Power (MAIN), SC (?), UPPC – Upper Peninsula Power Co. (Main)</p> <p>050505, NERC and CERTS are continuing to investigate data quality problems with the ACE – Frequency displays.</p> <p>072805, NERC and CERTS will hold a joint meeting to discuss data quality concerns and set up a plan to address the issues and concerns.</p> <p>102705, CERTS has developed and implemented alarms that RCs receive when data transmittal fails or data is suspect. NERC IT and Projects departments need to determine how to administer the data quality procedures/policies.</p>		
Carlos Martinez	AIE Project (Project 2000-4)	<p>050505, Carlos to send AIE Project specifications, approvals, background information to Brian Nolan, NERC Projects Manager. This information and documentation is necessary for the project paper trail.</p> <p>072805, Carlos to prepare software and a "form" to accept AIE data instead of receiving the data via transmittal to Carl or to the RS.</p> <p>102705, Hourly AIE Application Project Scope is included in the meeting agenda for RS review, consensus and endorsement in order to send it to the OC for endorsement.</p>	102705	
Carlos Martinez	CPS1 & BAAL Displays Application (Project 2001-38)	<p>050505, Carlos to send CPS1 and CPS2 Project specifications, approvals, background information to Brian Nolan, NERC Projects Manager. This information and documentation is necessary for the project paper trail.</p> <p>072805, CERTS is working on revising the project to display CPS1 and BAAL data.</p>	102705	

Action Figure	Subject	Action Item/Assignment	Due Date	Completion Date
		<p>In progress.</p> <p>102705, CPS1 and BAAL Displays Application Project Scope is included in the meeting agenda for RS review, consensus and endorsement in order to send it to the OC for endorsement.</p>		
Carlos Martinez and Terry Bilke	EIPP Freq Analysis Project Tools	<p>050505, Terry Bilke made a motion for the Resources Subcommittee to develop tools and methodologies for analysis of Eastern Interconnection frequency data supplied from EIPP and based on Phasor measurement technology. These methods and tools will be designed to be compatible with the other Interconnections. The motion passed.</p> <p>072805, Terry and Carlos update the RS each meeting on the progress of the EIPP. The RS proposed interconnection frequency analysis will use the EIPP frequency data as the EI source. When this effort is complete, it may be cloned for the WECC and ERCOT interconnections and HQ.</p> <p>102705, Frequency-Phasor Application Project Scope is included in the meeting agenda for RS review, consensus and endorsement in order to send it to the OC for endorsement.</p>	102705	

Item 2. Task Force Reports

Items 2.a.–2.d. Task Force Reports

Discussion and Action

The task force chairs will provide status reports. Some or all of these task forces will meet to discuss their respective issues and concerns.

The task forces may address their proposed BAL standard revisions during their meetings on Wednesday. Refer to agenda item 4, NERC Reliability Standards. The task forces, chairmen, and respective BAL standards under revision consideration are:

Task Force	Chairman	Proposed BAL Standard
Control Criteria TF	Alan Oneal	BAL-001, Real Power Balancing Control Performance
Operating Reserves TF	Larry Akens	BAL-002, Operating Reserves
Frequency TF	Raymond Vice	BAL-003, Frequency Response and Bias
Inadvertent Interchange TF	Don Badley	BAL-004, Time Error Correction
Frequency TF	Raymond Vice	BAL-005, Automatic Generation Control
Inadvertent Interchange TF	Don Badley	BAL-006, Inadvertent Interchange

The Frequency Task Force will host a Balance Resources and Demand conference call on Wednesday afternoon. The conference call details can be found in agenda item 4.k. Balance Resources and Demand Draft Standard Update.

Item 3. Compliance

Item 3.a Compliance and Certification Managers Committee Liaisons — Bill Herbsleb, Raymond Vice

The Compliance and Certification Managers Committee liaisons will discuss compliance issues relevant to the Resources Subcommittee. These issues may be specific to the subcommittee or general to the power industry.

Item 3.b Update on MISO ACE Diversity Interchange (ADI) Program —Terry Bilke, Raymond Vice

The NERC compliance group has identified MISO balancing authorities that have been below 100% of their CPS1 monthly average or below 90% of their CPS2 monthly averages for the months April through September 2005. The compliance group suspects that the non-compliance is related to the MISO market start-up. MISO informed Dave Hilt, NERC vice president of compliance that a number of actions have been completed or are in progress. Included in MISO's actions was the implementation of an ACE Diversity Interchange (ADI) program. At the July meeting, the Resources Subcommittee endorsed MISO's intent to implement the ADI program.

Discussion

Terry Bilke reviewed the actions taken and those in progress to remedy the conditions that contribute to low monthly CPS values. MISO implemented their ADI program on August 1, 2005. Mr. Bilke will discuss the progress of the ADI program with the subcommittee. The subcommittee should be prepared to make constructive suggestions to Mr. Bilke regarding the MISO balancing authorities' low CPS monthly values.

Item 4. NERC Reliability Standards

Item 4a–4j Enhancements of Reliability Standards

The NERC Operating Committee has assigned the subcommittees as “custodians” of the new reliability standards. It’s important to understand that as custodians, each subcommittee will regularly review the reliability standards to make sure they continue to be “safe and effective,” and will submit requests for revisions or new standards to the Standards Authorization Committee. The Resources Subcommittee task forces began reviewing each of the “BAL” standards, reference documents, and training documents for completeness, accuracy, and that they correctly reflect the Functional Model functions.

Background

The Resources Subcommittee has undertaken a task to revise the current “Balancing” standards, BAL-001 through BAL-006, in accordance with the NERC Reliability Standards Process Manual. To speed up the standards revision process, the RS has drafted proposed revisions to these standards. This brief synopsis gives an insight to the RS initial standard drafting process. Significant changes that will be included in the proposed revisions are as follows:

Proposed Revisions

“Balancing” Standards	Resources Subcommittee Proposed Significant Revision
BAL-001 Real Power Balancing Control Performance	<ol style="list-style-type: none"> 1. Addition of clarification language 2. Addition of equation units and definitions 3. Move CPS2 to BAL-002, Operating Reserves
BAL-002 Operating Reserves	<ol style="list-style-type: none"> 1. Addition of clarification language 2. Addition of Operating Reserves requirements and measures
BAL-003 Frequency Response and Bias	<ol style="list-style-type: none"> 1. Addition of clarification language 2. Addition of Frequency Response calculations, requirements, and measures 3. Addition of turbine generator governor requirements and measures
BAL-004 Time Error Correction	<ol style="list-style-type: none"> 1. Addition of clarification language 2. Addition of NAESB v0 Manual Time Error Correction business practices since they affect frequency and are considered a reliability requirement – the methodology to implement a time error correction is to off-set frequency from the normally schedule 60.00 Hz. Manipulating the interconnection frequency has serious reliability implications. Every NERC calculation that uses “scheduled frequency” is affected by this standard 3. Addition of automatic time error correction to the Eastern Interconnection. WECC automatic time error correction (WATEC) is the model for TEC in the Eastern Interconnection. WECC intends to continue to use its WATEC procedure The automatic time error correction process adjusts the “Control ACE” to payback Inadvertent Interchange thus having reliability implications.
BAL-005 Automatic Generation Control	<ol style="list-style-type: none"> 1. Addition of clarification language 2. Addition of NAESB v0 ACE Equation Special Cases business practices since they affect frequency and are considered

"Balancing" Standards	Resources Subcommittee Proposed Significant Revision
	<p>reliability requirements – these special cases are pseudo ties and dynamic schedules that affect the ACE equation and have reliability implications.</p> <ol style="list-style-type: none"> a. Addition of Supplemental Regulation Service requirements b. Addition of Overlap Regulation Service requirements c. Addition of Pseudo Ties requirements d. Addition of Dynamic Schedule requirements
<p>BAL-006 Inadvertent Interchange</p>	<ol style="list-style-type: none"> 1. Addition of clarification language 2. Addition of NAESB v0 Inadvertent Interchange Payback business practices since they affect frequency and are considered reliability requirements. The unilateral Inadvertent Interchange payback control offset is based on the ACE equation and is limited to the Balancing Authority's L₁₀ limit. As long as unilateral payback is based on the ACE equation (and includes a limiting factor of ACE – L₁₀) it reflects reliability implications. 3. Addition of Inadvertent Interchange calculations, requirements, and measures 4. Addition of Inadvertent Interchange dispute resolution requirements 5. Evaluate and incorporate appropriate operating policy waivers into the proposed standard revision.

Discussion and Action

The subcommittee will evaluate the operating policy waivers that have not been incorporated into the reliability standards and evaluate and dispose of those that relate to the "BAL" standards.

Attachments

1. Waiver — Control Performance
2. Waiver — Enhanced Scheduling Agent
3. Waiver — Financial Inadvertent Scheduling
4. Waiver — Inadvertent Interchange Accounting
5. Waiver — Scheduling Agent

Discussion and Action

The subcommittee believes it is necessary to expeditiously revise these standards in order to incorporate the NAESB business practices (ACE special cases, time error correction, and inadvertent interchange); incorporate the automatic time error correction methodology into the Eastern Interconnection; and to incorporate the frequency response requirements.

The task forces' assignments include:

- Use the standards process to draft appropriate SARs.
- Review reliability standards to ensure they are "safe and effective."
- Ensure reliability standards are in synch with the Functional Model.
- Review reference documents for applicability, accuracy, and relevance.
- Review training documents for applicability, accuracy, and relevance.
- Identify those standards requirements that should become part of reference document(s).

- Recommend moving reference and training document(s) requirements to the reliability standards.
 - Evaluate and recommend revisions or improvements to the reliability standards.
 - Recommend discussions with NAESB on those requirements that might be considered business practices.
- a. Standard BAL-001, Real Power Balancing Control Performance — Alan Oneal
 - b. Standard BAL-002, Operating Reserves — Larry Akens
 - c. Standard BAL-003, Frequency Response and Bias — Raymond Vice
 - i) Frequency Response Standard SAR — Terry Bilke
 - d. Standard BAL-004, Time Error Correction — Don Badley
 - e. Standard BAL-005, Automatic Generation Control — Raymond Vice
 - f. Standard BAL-006, Inadvertent Interchange — Don Badley

Special Note

The Balance Resources and Demand draft standard is independent of these standard revisions. When the Balance Resources and Demand draft standard is approved and implemented, it will impact some of these six standards (by deleting CPS2 and DCS requirements) but not the underlying basis for these proposed “balancing” standard revisions. The SAR(s) that will be submitted to revise BAL-001 through BAL-006 will include an explanation that these revisions will be impacted by the Balance Resources and Demand draft standard.

Attachments

1. Standard BAL-001, Real Power Balancing Control Performance — proposed revision draft
2. Standard BAL-002, Operating Reserves — proposed revision draft
3. Standard BAL-003, Frequency Response and Bias — proposed revision draft
4. Standard BAL-004, Time Error Correction — proposed revision draft
5. Standard BAL-005, Automatic Generation Control — proposed revision draft
6. Standard BAL-006, Inadvertent Interchange — proposed revision draft

Discussion and Action

The subcommittee also needs to review the associated “BAL” reference and training documents for completeness, accuracy, to ensure Functional Model functions are accurately reflected, and that they are still relevant to the reliability standards.

- g. Performance Standards Reference Document — Alan Oneal
- h. Area Interchange Error Survey Training Document — Don Badley
- i. Frequency Response Characteristic Survey — Raymond Vice
- j. Inadvertent Interchange Accounting Training Document — Don Badley

Attachments

1. Performance Standards Reference Document
2. Area Interchange Error Survey Training Document
3. Frequency Response Characteristic Survey
4. Inadvertent Interchange Accounting Training Document

Item 4.k Balance Resources and Demand Standard Update — Raymond Vice

The Balance Resources and Demand (BRD) draft standard Phase II field test began July 6, 2005. The field test is a real-time, proof-of-concept test of the proposed BRD Standard Balancing Authority ACE Limit (BAAL), the Frequency Trigger Limits (FTL), the Frequency Abnormal Limits (FAL), and the Frequency Relay Limits (FRL). Mr. Vice will provide a status report on the field test and time-line schedule for the seven-month test anticipated to be complete on March 31, 2006.

Discussion and Conference Call

Note that the RS Frequency Task Force has a Balance Resources and Demand standard field test conference call planned for Wednesday, October 26, 2005 during the Frequency Task Force meeting. In addition to the subcommittee, the Operating Reliability Subcommittee, the Reliability Coordinating Working Group, and the BRD Standard Drafting Team are invited to participate.

Conference Call Details:

- Hosted by the RS Frequency Task Force
- Purpose: Status the Balance Resources and Demand, Phase II, proof-of-concept field test
- Date and Time: Wednesday, October 26, 2005, 1 p.m.–3:30 p.m. EDT (10 a.m.–12:30 p.m. PDT)
- Phone Number: (732) 694-2061
- Access Code: 1108102605#
- Call Duration: 2½ hour maximum

Attachments

To be sent under separate cover.

Item 5. NERC Active Resources Subcommittee Projects — Status

Discussion

Carlos Martinez, Terry Bilke, and Raymond Vice will provide a status report on the following projects related to the Resources Subcommittee.

Item 5.a ACE-Frequency Application Project (Project 2000-3) — Carlos Martinez

The Consortium for Electricity Reliability Technology Solutions (CERTS) has incorporated geographical jurisdiction adjustments, a new database in the NERC hardware, and corrected numerous software errors into a Version 3 package, which was released in September 2005. Carlos Martinez, CERTS project manager, will report on the status of the project and discuss the release of the next version.

Discussion and Action for Items 5.b, 5.c, and 5.d

The subcommittee needs to reach consensus on the AIE Monitoring Application (Project 2000-4); CPS1 & BAAL Monitoring Application (Project 2001-38); and Frequency-Phasor Monitoring Application (Project 2005-X) scope statements in order to present them to the OC for approval. The OC endorsed the concept of the projects at the September 2005 meeting and is expecting the scope statement at its December 2005 meeting. These are significant tools that the reliability coordinators and the RS will use on a daily basis. CERTS has developed and in-house tested the AIE Monitoring Application and CPS1 & BAAL Monitoring Application projects. However, all three projects have never been officially approved as NERC projects and these scope statements will formally start the project process.

Item 5.b AIE Monitoring Application Project (Project 2000-4) — Carlos Martinez

CERTS has completed factory tests of the AIE software. Some Frequency Task Force members were asked to evaluate the software utilizing actual WECC data. The Frequency Task Force will report their findings. Mr. Martinez will discuss the current status of the project and the next steps for full deployment.

Discussion and Action

The resources subcommittee will discuss, enhance, and endorse the AIE Monitoring Application (Project 2000-4) scope statement. Chairman Bilke will present this project scope to the operating committee at the December, 2005 OC meeting for their discussion and approval.

Attachment

AIE Monitoring Application Project Scope Statement

Item 5.c CPS1 & BAAL Monitoring Application (Project 2001-38) — Carlos Martinez

Mr. Martinez will discuss activities related to creating real-time displays of CPS1 and BAAL for use by balancing authorities, reliability coordinators, and the RS.

Discussion and Action

The resources subcommittee will discuss, enhance, and endorse the CPS1 & BAAL Monitoring Application (Project 2001-38) scope statement. Chairman Bilke will present this project scope to the operating committee at the December 2005 OC meeting for their discussion and approval.

Attachment

CPS1 and BAAL Monitoring Application Project Scope Statement

Item 5.d Frequency-Phasor Monitoring Application Project (Project 2005-X) — Terry Bilke, Carlos Martinez

Mr. Martinez will discuss activities related to developing the Frequency-Phasor Monitoring Application for use by balancing authorities, reliability coordinators, and the RS.

Discussion and Action

The resources subcommittee will discuss, enhance, and endorse the Frequency-Phasor Monitoring Application Project (Project 2005-X) scope statement. Chairman Bilke will present this project scope to the operating committee at the December, 2005 OC meeting for their discussion and approval.

Attachment

Frequency-Phasor Monitoring Application Project Scope Statement

Item 5.e DOE Eastern Interconnection Phasor Project — Terry Bilke, Carlos Martinez

The DOE Eastern Interconnection Phasor Project (EIPP) scope contains significant grid monitoring capabilities. NERC staff, CERTS staff, and subcommittee members discussed the feasibility of using the EIPP project to satisfy the requirements of the Eastern Interconnection frequency analysis. The discussion was very favorable and the consensus is that the comprehensive frequency specifications would fulfill the subcommittee's frequency monitoring and analysis requirements.

Discussion

Messrs. Bilke and Martinez will report on the status of the EIPP, projected deliverables, and future project milestones.

Information on the EIPP can be found at: http://phasors.pnl.gov/EIPP_About.html

Item 5.f Inadvertent Interchange Application Project (SPP Inadvertent Tool Migration) (Project 2001-37) — Carlos Martinez

CERTS is in the process of migrating the SPP Inadvertent Interchange Tool into NERC Inadvertent Interchange Tool software. Mr. Martinez will provide a status report on this project and request assistance from the subcommittee.

Discussion and Action

The subcommittee will discuss the project and develop a plan to attain volunteer to test the application. WECC is encouraged to volunteer since this region/interconnection has had training and CERTS has incorporated application changes in response to WECC comments.

Item 5.g Data Quality — Carlos Martinez

CERTS analyzed the parameters surrounding the data transfer within NERC and developed a data quality white paper. Mr. Martinez will discuss the new developments and potential actions to address data problems.

NERC staff and CERTS staff discussed methods to address the data quality issues and concerns. CERTS has incorporated alarms for failed transmission and corrupt data that will help identify these concerns.

NERC staff will develop administrative procedures and policies to administer data quality corrective actions.

Area Interchange Error Monitoring Application Scope Statement

General

Project Name: Area Interchange Error Monitoring Application

Project Number: 2000-04

Project Manager: Brian Nolan

Date Submitted: October 18, 2005

Requestor Information

Primary Contact: RS Inadvertent Interchange TF Chairman Don Badley, don@nwpp.org ((503) 464-2805

Resources Subcommittee Chairman Terry Bilke, tbilke@midwestiso.org (317) 249-5463

Resources Subcommittee Secretary Tom Vandervort tom.vandervort@nerc.net (609) 452-8060

Project Statement of Need

I. There is a need for operational tools that enhances the reliability coordinators and balancing authorities' ability to quickly assess the adequacy of supply and demand as well as monitor and track the control performance of a balancing authority, within a competitive electricity market. The frequency performance of an interconnection is one of the few fundamental indicators of interconnection reliability that is universally available to all stakeholders. When the frequency performance of an interconnection deteriorates it is imperative that the reliability coordinators be able to quickly and with confidence identify the cause of the deterioration and take swift action to remedy the situation. A process of developing hourly Area Interchange Error (AIE) for each balancing authority will establish an interconnection-wide means for accomplishing this goal.

The AIE survey, as required by NERC Operating Reliability Standard BAL-006-0, Inadvertent Interchange, D.1.4, is a powerful tool for identifying imbalances between generation and load, as corrected for frequency support, among the various balancing authorities of an interconnection. However, the current AIE survey is not automated and takes months to complete.

II. In response to frequency deterioration that occurred in late July 1999, the NERC Operating Committee in its November 22, 1999 meeting passed a resolution:

“NERC shall monitor and collect real time Area Control Error information through the Regional Councils or their Security Coordinators (Reliability Coordinators) for all Control Areas (Balancing Authorities), effective May 1, 2000.”

The specific concern of the Operating Committee was to identify balancing authorities that cause large or long-term frequency deviations. The Resources Subcommittee was asked to enhance the Area Control Error information as necessary to achieve the subcommittee's goal of proper control. Hourly AIE is such a solution.

III. U.S.-Canada Power System Outage Task Force “Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations” contains these recommendations that this project will address:

Recommendation 10: Establish an independent source of reliability performance information.

Area Interchange Error Monitoring Application will supply objective, factual information (hourly AIE surveys) that will allow the reliability coordinators to perform compliance monitoring with current and future NERC reliability standards for each of the balancing authorities under their jurisdiction, identify trends in near-real-time, and take appropriate action.

Recommendation 13: DOE should expand its research programs on reliability-related tools and technologies.

Area Interchange Error Monitoring Application project development has been funded by the Department of Energy (DOE) which endorses the project. To make the Area Interchange Error Monitoring Application tool effective all balancing authorities will be required to submit hourly data.

Recommendation 22: Evaluate and adopt better real-time tools for operators and reliability coordinators.

The Resources Subcommittee recommends the Area Interchange Error Monitoring Application in order to give the reliability coordinators a reliability tool to improve their situational awareness by effectively monitoring and analyzing wide-area performance and compliance with NERC standards; and the Resources Subcommittee a reliability tool to evaluate balancing authorities compliance with AIE standards, and monitor, trend, and analyze system behavior at different levels: NERC, Interconnection, RTO, regional reliability councils, reliability coordinators, and balancing authorities.

Recommendation 35: Implement controls to manage system health, network monitoring, and incident management.

The Area Interchange Error Monitoring Application will support the reliability coordinator and balancing authority to detect EMS, IT, and scheduling errors. Hourly AIE is a series of calculations performed hourly to determine if a balancing authority performs within acceptable boundaries within a given hour and allows reliability coordinators in an interconnection to monitor, measure, track and determine in a timely manner which balancing authority is responsible for deviations away from scheduled frequency.

Project’s Product

Area Interchange Error Monitoring Application Product: Software, hardware and the infrastructure specifications to produce hourly AIE surveys and analytical support data

Hourly AIE data submittal will allow reliability coordinators, the Resources Subcommittee, and other bulk electric system technical monitors to perform near-real-time AIE surveys. These AIE surveys will not be 100% accurate until the data is validated by each balancing authority within the respective interconnection. The AIE survey will be accurate enough to give the reliability coordinators the situational awareness needed for critical operation of the interconnection’s frequency.

Specifically, the Consortium for Electric Reliability Technology Solutions (CERTS) Area Interchange Error Monitoring Application software will include:

- Automatic data input process to allow Control Areas to automatically input the following hourly data:
 - NI_A – Integrated Net Actual Interchange with each adjacent Control Area
 - NIS – Integrated Net Scheduled Interchange with each adjacent Control Area
 - FB – Control Area Frequency Bias
 - FA – Integrated Actual Interconnection Frequency
 - FS – Average Scheduled Interconnection Frequency
 - BIP – Bilateral Inadvertent Payback with each adjacent Control Area (If necessary)
 - UIP – Unilateral Inadvertent Payback (If necessary)
- Database processing infrastructures
- Multi-View, Geo-Graphic visualization monitoring displays, which contain hourly, daily, and monthly data on 3D and 2D maps for each operational jurisdiction
- Tabular displays to allow schedulers to edit the data they have transferred automatically
- Event replay function

Project Deliverables

In Scope

NERC establish standards requirements for all balancing authorities to submit validate, and correct hourly data to satisfy the Area Interchange Error Monitoring Application specifications.

The Area Interchange Error Monitoring Application will provide to the Balancing Authorities a secure web site and data entry form that allows the Balancing Authority to submit, validate, and change the required hourly data.

NERC shall provide to the balancing authorities a secure FTP site that accepts data in a required format.

NERC shall provide to the balancing authorities, in accordance with reliability standard's dispute resolution compliance requirements, a view of the disputed data to assist in the dispute resolution.

The Area Interchange Error Monitoring Application will provide the Resources Subcommittee weekly reports including disputed data.

NERC shall support the Area Interchange Error Monitoring Application data flow through the necessary hardware: Ethernet connection, an ICCP node, a FTP server, a SQL server, an Application server, and a Web server.

Area Interchange Error Monitoring Application shall provide to the reliability coordinators, Resources Subcommittee, and other bulk electric system technical monitors; the actual submitted data, geographic and graphic views to facilitate the analysis of the data, analysis reports, frequency error reports, and data validation reports.

Access to the Area Interchange Error Monitoring Application shall be password protected based on registered user IDs and passwords. Area Interchange Error Monitoring Application shall be accessible to all reliability coordinators, balancing authorities, Resources Subcommittee members, and other bulk electric system technical monitors.

Out of Scope

NERC Resources Subcommittee shall review current reliability standards and submit SAR(s) as necessary that specify standards requirements for all balancing authorities to submit, validate, and correct hourly data to satisfy the hourly AIE survey requirements.

NERC Resources Subcommittee shall review current reliability standards and submit SAR(s) as necessary that specify balancing authority's standard dispute resolution requirements to address and resolve balancing authorities disputed data; non-reporting by balancing authorities; error reports by balancing authorities.

Each balancing authority will determine its methodology to submit the hourly data to NERC. This may range from manual data entry to an automated process utilizing software that links EMS to the Area Interchange Error Monitoring Application.

The AIE processes and sub processes related to resolve data problems, often referred to as data quality problems, are NERC's responsibilities and those processes are not part of the Area Interchange Error Monitoring Application process.

Assumptions

NERC will specify and require confidentiality agreements and non-disclosure agreements to individuals and companies involved in the Area Interchange Error Monitoring Application project, reliability coordinators, balancing authorities, resources subcommittee members, and other bulk electric system technical monitors.

Project Objectives

- I. Reliability Objective: Satisfy the need for operational tools that enhances the reliability coordinators and balancing authorities' ability to quickly assess the adequacy of supply and demand as well as monitor and track the control performance of a balancing authority within a competitive electrical market. The Area Interchange Error Monitoring Application supports NERC's Operating Committee and Resources Subcommittee's needs for identifying balancing authorities that cause large or long-term frequency deviations in each NERC interconnection.

Core Objective: Identify balancing authorities that cause large or long-term deviation in each NERC interconnection.

- II. Reliability Objective: Satisfy the NERC Operating Committee's intent to establish a reliability tool that evaluates balancing authorities' performance and compliance with AIE standards, monitors, trends, and analyzes system behavior at different levels: NERC, Interconnection, RTO, regional reliability councils, reliability coordinators, and balancing authorities. Compliance with AIE reliability standards requirements must be mandatory throughout each interconnection.

Core Objective: Identify balancing authorities that are non-compliant with proposed reliability standard's hourly AIE survey requirements.

- III. Reliability Objective: Satisfy the U.S.-Canada Power System Outage Task Force (that investigated the causes of the August 14, 2003 blackout) recommended actions to minimize the likelihood and scope of similar events in the future.

Core Objective: Implement Area Interchange Error Monitoring Application project to partially satisfy U.S.-Canada Power System Outage Task Force recommendations.

Cost Objectives

Area Interchange Error Monitoring Application development: Department of Energy has funded CERTS to develop the application through the implementation and validation phases.

NERC Area Interchange Error Monitoring Application hardware and support server systems: Much of the required hardware and support server systems are in place without additional expense. Additional hardware and server systems that will be procured should be less than \$100,000.

Balancing Authority hourly data input: Each balancing authority will determine the methodology it will use to submit the hourly data to satisfy the Area Interchange Error Monitoring Application specifications. As an example of strictly manpower expense, manual data entry will require manpower to gather, input, validate, resolve disputes, and change data for each hour of each day. As an example of automated data entry expense, the initial expense will be to procure software that populates the AIE form with data from an EMS system, with manpower to validate, resolve disputes, and change data for each hour of each day. Hourly data entry in either example has a cost that is not determined in this scope.

NERC On-going expense for CERTS Support, Maintenance and Field Trial Participation: estimated to be \$10,000 per year, starting in 2006.

Schedule Objectives

Start: Four Regions represented in the NERC Resources Subcommittee are in the process of field testing the Area Interchange Error Monitoring Application using actual sample data supplied by the WECC interconnection.

Area Interchange Error Monitoring Application Milestone Objectives:

Operating Committee endorsement

SAR submittals to incorporate AIE hourly data submittal into reliability standard

Approval and implementation of AIE hourly data submittal reliability standard

Implementation of Area Interchange Error Monitoring Application in each interconnection

Satisfactory CERTS final factory test

Each interconnection's balancing authorities hourly data input grace period

Identification and resolution of identified project problems

Actual implementation within NERC standards compliance program

Project Completion: Project completion will be six months after the actual implementation of the Area Interchange Error Monitoring Application within NERC standards compliance program.

Quality Measures

- Satisfactory testing of the integrated systems including both NERC servers and reliability coordinator clients.
- Satisfactory testing of system performance and stability, verifying the web-visualization response for clients located in different geographical locations.

- Survey five to six reliability coordinators for feedback about control monitoring system functionality, visualization and performance. NERC/CERTS will define what changes will be considered for implementation before final system delivery.

Other Objectives

None identified

Methodology

The Resources Subcommittee will work with CERTS to implement, test, incorporate constructive changes, and validate incremental results through the entire project. This working relationship has proved successful in the development and implementation of past projects: ACE-Frequency Monitoring; and the SPP Inadvertent Interchange Tool migration to NERC Inadvertent Interchange Tool.

The Operating Committee in conjunction with the Resources Subcommittee will work with the regions to gain support for the Area Interchange Error Monitoring Application project. This will include the incorporation of AIE hourly data submittal requirements into the NERC reliability standards.

Impacts/Risks

Existing Systems or Other Projects

This project has received attention from NERC operations staff, reliability assessment staff, projects staff, compliance staff and the information technology staff. NERC internal resources to support the Area Interchange Error Monitoring Application project need to be committed by each department.

Standards

BAL-006-0, Inadvertent Interchange,

D.1.4. Each Balancing Authority shall perform an Area Interchange Error (AIE) Survey as requested by the NERC Operating Committee to determine the Balancing Authority's Interchange error(s) due to equipment failures or improper scheduling operations, or improper AGC performance.

This standard will be drafted to specify each balancing authority shall submit hourly data to produce near-real-time AIE surveys, including requirements, measures, and compliance monitoring, and levels of non-compliance. The SAR will be submitted in accordance with the NERC Standards Process Manual.

CPS1 – BAAL Wide-Area Alarming, Monitoring and Tracking Application Scope Statement

General

Project Name: CPS1 - BAAL Monitoring Application

Project Number: 2001-38

Project Manager: Brian Nolan

Date Submitted: October 18, 2005

Requestor Information

Primary Contact: RS Frequency TF Chairman Raymond Vice, rvice@southernco.com (205) 257-6209

Resources Subcommittee Chairman Terry Bilke, tbilke@midwestiso.org (317)2495463

Resources Subcommittee Secretary Tom Vandervort tom.vandervort@nerc.net (609)4528060

Project Statement of Need

I. There is a need for operational tools that enhance the reliability coordinators and balancing authorities' ability to quickly assess the adequacy of supply and demand as well as monitor and track the control performance of a balancing authority according to new standards. The existing control performance CPS1 provides a statistically-bound one-minute ACE performance characteristic. The existing CPS2 performance metric will be replaced by a frequency sensitive balancing authority ACE limits (BAAL) which is under field trial test. CPS1 and BAAL together will make a compact and powerful long and short term pair of balancing standards.

This operation tool will: alarm when the balancing authority's ACE performance exceeds or violates CPS1 or BAAL pre-define thresholds, track and monitor in real time the balancing authority's behavior from a wide-area perspective, facilitate reliability coordinators to define and implement remedial actions to mitigate abnormal system conditions.

Alarming, monitoring and tracking features of CPS1 and BAAL will complement the utilization of the ACE-Frequency tool for the reliability coordinators. By making the new short and long term performance metrics easily available to the reliability coordinators, it will help them to have a wide-area, more realistic view of their jurisdictions load-generation balance and control performance.

II. U.S.-Canada Power System Outage Task Force "Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations" contains these recommendations that this project will address:

Recommendation 10: Establish an independent source of reliability performance information.

Real Time alarming, monitoring and tracking of CPS1 and BAAL will supply objective, wide-area information that will allow the reliability coordinators to perform compliance monitoring with current and future NERC reliability standards for each of the balancing authorities under their jurisdiction, identify trends in near-real-time, and take appropriate action.

Recommendation 13: DOE should expand its research programs on reliability-related tools and technologies.

The CPS1 and BAAL real time monitoring project development has been funded by the Department of Energy (DOE) which endorses the project. The same data used by the ACE-Frequency monitoring application will be required in 1-minute increments.

Recommendation 22: Evaluate and adopt better real-time tools for operators and reliability coordinators.

The Resources Subcommittee recommends real time alarming, monitoring and tracking of CPS1 and BAAL Application in order to give the reliability coordinators a reliability tool to improve their situational awareness by effectively monitoring and analyzing wide-area performance and compliance with NERC standards; and the Resources Subcommittee a reliability tool to evaluate balancing authorities compliance with current and future reliability performance standards, and monitor, trend, and analyze system behavior at different operational levels: NERC, Interconnection, RTO, regional reliability councils, reliability coordinators, and balancing authorities.

Project's Product

CPS1 - BAAL Alarming, Monitoring and Tracking Application Product: Software, hardware and the infrastructure specifications to produce real-time CPS1 - BAAL multi-view, geo-Graphic, Wide-Area Visualization and data collection for analytical support purposes.

CPS1 - BAAL data allow reliability coordinators, the Resources Subcommittee, and other bulk electric system technical monitors to monitor and track in real-time the CPS1 and BAAL reliability performance metrics. The CPS1 - BAAL monitor will be accurate enough to give the reliability coordinators the situational awareness needed for taking corrective actions if the interconnections frequency and the BA's ACE exceed its ACE safe limits. The requirement for alarming when the BA's ACE exceeds or violates their BAAL for specific periods of time will allow balancing authority's to control their ACE in a way that limits adverse impact on the interconnection's frequency.

Specifically, the Consortium for Electric Reliability Technology Solutions (CERTS) CPS1/BAAL Monitoring Application software will include:

- Database processing infrastructures
- Multi-View, Geo-Graphic Wide-Area visualization displays, which contain 1-minute, hourly, daily, and monthly data on 3D and 2D maps
- Visuals showing CPS1 and BAAL performance at different jurisdictional levels from balancing authorities to interconnection
- Event replay function
- User interactive data collection capabilities to recall archived CPS1 and BAAL data

Project Deliverables

In Scope

NERC already has established standards requirements for all balancing authorities to submit 1-minute ACE and frequency data that the ACE-Frequency application currently uses. CPS1 – BAAL Monitoring Application require the same input data.

NERC shall support CPS1 - BAAL Monitoring Application data flow through the necessary hardware: Ethernet connection, an ICCP node, a FTP server, a SQL server, an Application server, and a Web server.

CPS1 - BAAL Alarming, Monitoring and Tracking Application shall be password protected based on registered user IDs and passwords. CPS1 - BAAL Monitoring Application shall be accessible to all reliability coordinators, balancing authorities, Resources Subcommittee members, and other bulk electric system technical monitors.

Out of Scope

None identified

Assumptions

NERC will specify and require confidentiality agreements and non-disclosure agreements to individuals and companies involved in the CPS1 - BAAL Alarming, Monitoring and Tracking Application project, reliability coordinators, balancing authorities, resources subcommittee members, and other bulk electric system technical monitors.

Project Objectives

Reliability Objective: Satisfy the need for operational tools that enhances the reliability coordinators and balancing authorities' ability to quickly assess the adequacy of supply and demand as well as monitor and track the control performance of a balancing authority within a competitive electrical market. The CPS1 - BAAL Alarming, Monitoring and Tracking Application supports NERC's operating committee and resources subcommittee's need for balancing authorities to control their ACE in a way that limits adverse impact on the interconnection's frequency.

Core Objective: The ultimate goal is to perform real-time alarming, monitoring, and tracking of each balancing authority's ACE with respect to BAAL to maintain situational awareness and status, and identify the root causes for the abnormalities of the NERC reliability standards.

Cost Objectives

CPS1 - BAAL Alarming, Monitoring and Tracking Application development: Department of Energy has funded CERTS to develop the application through the implementation and validation phases.

NERC CPS1 - BAAL Monitoring Application hardware and support server systems: Much of the required data communications, hardware and support server systems are in place without additional expense. Additional hardware and server systems that will be procured should be less than \$100,000.

NERC On-going expense for CERTS Support, Maintenance and Field Trial Participation: estimated to be \$10,000 per year, starting in 2006.

Schedule Objectives

Start: CERTS is in the process of testing the CPS1 - BAAL Alarming, Monitoring and Tracking Application using actual sample data.

CPS1 - BAAL Monitoring Application Milestone Objectives:

Operating Committee endorsement

Implementation of CPS1- BAAL Alarming, Monitoring and Tracking Application

Satisfactory CERTS final factory test

Identification and resolution of identified project problems

Actual implementation within NERC standards compliance program

Project Completion: Project completion will be six months after the actual implementation of the CPS1/BAAL Monitoring Application within NERC standards compliance program.

Quality Measures

- Satisfactory testing of the integrated systems including both NERC servers and reliability coordinator clients.
- Satisfactory testing of system performance and stability, verifying the web-visualization response for clients located in different geographical locations.
- Survey five to six reliability coordinators for feedback about control monitoring system functionality, visualization and performance. NERC/CERTS will define what changes will be considered for implementation before final system delivery.

Other Objectives

None identified

Methodology

The Resources Subcommittee will work with CERTS to implement, test, incorporate constructive changes, and validate incremental results through the entire project. This working relationship has proved successful in the development and implementation of past projects: ACE-Frequency Monitoring; and the SPP Inadvertent Interchange Tool migration to NERC Inadvertent Interchange Tool.

The Operating Committee in conjunction with the Resources Subcommittee will work with the regions to gain support for the CPS1 - BAAL Alarming, Monitoring and Tracking Application project.

Impacts/Risks

Existing Systems or Other Projects

This project has received attention from NERC operations staff, reliability assessment staff, projects staff, compliance staff and the information technology staff. NERC internal resources to support the CPS1 - BAAL Alarming, Monitoring and Tracking Application project need to be committed by each department.

NERC Frequency Monitoring and Analysis Application Using Phasor Measurements Scope Statement

General

Project Name: NERC Frequency Monitoring and Analysis Application

Project Number: to be assigned

Project Manager: Brian Nolan

Date Submitted: October 7, 2005

Requestor Information

Primary Contact: RS Frequency TF Chairman Raymond Vice, rvice@southernco.com (205) 257-6209

Resources Subcommittee Chairman Terry Bilke, tbilke@midwestiso.org (317)249-5463

Resources Subcommittee Secretary Tom Vandervort tom.vandervort@nerc.net (609)452-8060

Project Statement of Need

I. There is a need for monitoring and tracking tools that enhance the resources subcommittee, reliability coordinators and balancing authorities' ability to quickly assess the adequacy of supply and demand as well as recommend preventive actions to maintain reliability within a competitive electricity market. The frequency performance of an interconnection is one of the few fundamental indicators of interconnection reliability that is universally available to all stakeholders. When the frequency performance of an interconnection deteriorates it is imperative that NERC subcommittees be able to quickly and with confidence identify the cause of the deterioration and take preventive actions to remedy the situation. An application using multiple-sources of time-synchronized accurate frequency data, with interactive data collection, analysis, and report capabilities will facilitate NERC subcommittees to accomplish timely frequency abnormalities analysis, assessments and recommendations.

II. The U.S.-Canada Power System Outage Task Force "Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations" contains these recommendations that this project will address:

Recommendation 10: Establish an independent source of reliability performance information.

Frequency Monitoring and Analysis Application will supply objective, factual information that will allow the resources subcommittee to monitor and track the Eastern Interconnection frequency.

Recommendation 22: Evaluate and adopt better real-time tools for operators and reliability coordinators.

The resources subcommittee recommends the Frequency Monitoring and Analysis Application in order to obtain a reliability tool to evaluate balancing authorities' compliance with AIE standards, and monitor, trend, and analyze system behavior at different levels: NERC, interconnection, RTO, regional reliability councils, reliability coordinators, and balancing authorities.

Recommendation 28: Require use of time-synchronized data recorders

In its requirements of February 10, 2004, NERC directed the regional councils to define within one year regional criteria for the application of synchronized recording devices in key power plants and substations.

A valuable lesson from the August 14, 2003 blackout is the importance of having time-synchronized system data recorders. The task force's investigators labored over thousands of data items to determine the sequence of events, much like putting together small pieces of a very large puzzle. That process would have been significantly faster and easier if there had been wider use of synchronized data recording devices.

NERC Planning Standard I.F., Disturbance Monitoring, requires the use of recording devices for disturbance analysis. On August 14, 2003 time recorders were frequently used but not synchronized to a time standard.

Project's Product

The Consortium for Electric Reliability Technology Solutions (CERTS) Frequency Monitoring and Analysis application will include:

- Automatic transmission of phasor frequency data from a minimum of three different locations in the Eastern Interconnection using the EIPP phasor data.
- Synchronization of the frequency sampling intervals, time stamp information and any other time information required (calibrated to sources traceable to the National Institute of Standards and Technology (NIST) time standards).
- Collection and archive frequency data to a resolution of at least +/-0.001 Hertz (one milliHertz).
- Store archived frequency data at a minimum rate of one sample per second, with a resolution no less than the specified accuracy of the associated frequency transducer.
- Maintain on-line archived frequency data for a minimum of five (5) years.
- Support report production and database query capabilities that offer standard periodic reports and event driven reports using archived data.
- Support database query and report writing tools to generate both graphic and tabular format reports.
- Wide-Area graphical visuals to quickly correlate frequency abnormalities with specific operational jurisdictions.
- Allow only authorized users to view and query the frequency database content

Project Deliverables

In Scope

This application will use the Eastern Interconnection Phasor Project (EIPP) phasor infrastructure with TVA serving as the host for Eastern Interconnection frequency data source, both for real time and for archived phasor frequency data. NERC shall support the application data flow through the necessary hardware: Ethernet connection, an ICCP node, a FTP server, a SQL server, an Application server, and a Web server.

The Application shall be password protected based on registered user IDs and passwords. Frequency Monitoring and Analysis Application shall be accessible to the resources subcommittee members.

Out of Scope

None identified

Assumptions

NERC will specify and require confidentiality agreements and non-disclosure agreements to individuals and companies involved in the Frequency Monitoring and Analysis.

Project Objectives

Primary Objective: A reliability tool to evaluate balancing authorities' compliance with control performance and AIE standards, and monitor, trend, and analyze system behavior at different levels: NERC, interconnection, RTO, regional reliability councils, reliability coordinators, and balancing authorities.

For this project the fundamental metrics utilize the Eastern Interconnection frequency in order to support the NERC's resource subcommittee's need to identify the root cause for the abnormalities of reliability performance standards. The time error correction (TEC) data will be required.

Cost Objectives

Frequency Monitoring and Analysis Application development: Department of Energy has funded CERTS to develop the functional specification and initial software development, and CERTS is requesting additional funding to complete the application software component of the project.

NERC Frequency Monitoring and Analysis application hardware and support server systems: Much of the required data communications, hardware and support server systems are in place without additional expense. Additional hardware and server systems that will be procured should be less than \$100,000.

NERC On-going expense for CERTS Support, Maintenance and Field Trial Participation: estimated to be \$30,000 per year, starting in 2006.

Schedule Objectives

Start: August 2005 – Functional Specifications

October 2005 – Start software development

Frequency Monitoring and Analysis Application Milestone Objectives:

- Functional Specification
- Resources Subcommittee approval
- Operating Committee endorsement
- Implementation of Frequency Monitoring and Analysis Application
- Satisfactory CERTS factory test
- Satisfactory NERC-CERTS field test
- Actual implementation within NERC standards compliance program

Project Completion: Second Quarter 2006

Quality Measures

- Satisfactory testing of the integrated systems including both NERC servers and reliability coordinator client.
- Satisfactory testing of system performance and stability, verifying the web-visualization response for client.

Other Objectives

None identified

Methodology

The resources subcommittee will work with CERTS to implement, test, incorporate constructive changes, and validate incremental results through the entire project. This working relationship has proved successful in the development and implementation of past projects: ACE-Frequency Monitoring; and the SPP Inadvertent Interchange Tool migration to NERC Inadvertent Interchange Tool.

Impacts/Risks

Existing Systems or Other Projects

This project has received attention from NERC operations staff, reliability assessment staff, projects staff, compliance staff and the information technology staff. NERC internal resources to support the Frequency Monitoring and Analysis Application project need to be committed by each department.

Source of phasor input data for the project will be coming from TVA master phasor database. TVA resources commitment to work with CERTS and NERC with the input phasor data is required.

Item 6. Frequency Performance

Items 6a–6e Western, Eastern, and ERCOT Frequency, CPS1 and CPS2 Data Trends, and DCS Data Trends

Discussion

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

Attachments

To be sent under separate cover.

Item 6f. Inadvertent Interchange Balances — Joe Emde, Don Badley, Terry Bilke

Discussion

The subcommittee will discuss the inadvertent interchange balances. The regional reliability organization subcommittee representatives are requested show the data to the regions and stress the importance of balancing inadvertent interchange in a timely manner (as soon as reasonably possible).

Attachments

To be sent under separate cover.

Item 6g. Responsibility for Initiating AIE Surveys — Terry Bilke, Raymond Vice

At its June 2005 meeting, the Operating Committee discussed reliability standard BAL-006-0, “Inadvertent Interchange,” Compliance section D.1.4:

“Each Balancing Authority shall perform an Area Interchange Error (AIE) Survey as requested by the NERC Operating Committee to determine the Balancing Authority’s Interchange error(s) due to equipment failures or improper scheduling operations, or improper AGC performance.”

OC Chairman Sam Jones assigned this task to the Resources Subcommittee to facilitate initiating these surveys. In turn, the subcommittee drafted the “Resources Subcommittee Proposed Frequency Monitoring and Response Process for the Eastern Interconnection” guide. The guide is being used by the Eastern Interconnection reliability coordinators during the balance resources and demand proof of concept field test. The subcommittee requested that the Reliability Coordinator Working Group recommend what to do with the guide (e.g., incorporate into reliability standard requirements, create operating guides, roll into reference documents, etc.).

Discussion

The subcommittee in conjunction with the reliability coordinator working group will determine what to do with the guide.

Attachment

Proposed Frequency Monitoring and Response Process for the Eastern Interconnection

Item 6h. High Frequency Issue – Terry Bilke, Raymond Vice, Larry Akens

The subcommittee discusses the Interconnections' frequency trends during all of its meetings and considers the Interconnection frequency significant and vital to the reliability of the bulk transmission system. The subcommittee is heavily involved in developing frequency analysis tools for use by the reliability coordinators and the Resources Subcommittee to monitor and analyze the frequency data and trends both real-time and on a historical basis. The subcommittee will discuss the three agenda items that are described below.

Item 6.h.i RS Proposed Frequency Monitoring and Response Process for the Eastern Interconnection — Terry Bilke, Raymond Vice, Larry Akens

The Reliability Coordinator Working Group sought a reliability coordinator in the eastern interconnection to be the Eastern Interconnection monitor. Tennessee Valley Authority (TVA) volunteered to be the Interconnection monitor. The responsibilities and tasks are to be defined by the RCWG. TVA, as the Eastern Interconnection monitor, is expected to improve the communications throughout the Interconnection whenever a frequency event occurs.

Discussion

As the Eastern Interconnection monitor role and responsibilities are defined, the Resources Subcommittee will be able to respond to monitor's and reliability coordinator's frequency monitoring and analysis requests. Messrs. Bilke, Vice, and Akens will lead a discussion and share background information on the Eastern Interconnection monitor.

Item 6.h.ii Decline of the Eastern Interconnection Frequency Response — Raymond Vice

Raymond Vice wrote a white paper that includes possible causes of the frequency excursions that the Interconnections have experienced over the last few years.

Mr. Vice will present the white paper for subcommittee comment.

Discussion

The subcommittee will discuss corrective actions that may address, prevent, or mitigate future frequency excursions. Reliability standard SARs, reference documents, operator guides, collaborative NERC-NAESB actions, and further investigations are possible next steps. The Frequency Task Force or a special subcommittee working group may be formed to address the causes and potential solutions identified in the white paper.

Attachment

Frequency Issues 2005

Item 6.h.iii Eastern Interconnection Frequency Excursions — Terry Bilke, Raymond Vice, Larry Akens, Carlos Martinez

At the June 2005 OC meeting, Carl Monroe explained that frequency excursions occur for different reasons, including:

- a. Delinquent control performance standard data reporting
- b. Delinquent inadvertent interchange balancing
- c. Frequency response today versus the past (MW/Hz), and the need for operator data and "tools" to understand where balancing problems may be occurring.
- d. The need for operating data that is not specifically required in the reliability standards.

Discussion

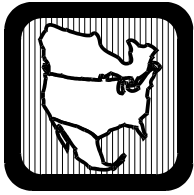
The subcommittee needs to be diligent in monitoring all Interconnections' frequency and performing diagnosis analysis of significant events. The ACE-frequency monitoring application is supplying data that subcommittee members are using to create their own databases to analyze the events. The

subcommittee needs to discuss what analytical tools are needed to identify which BA is hurting frequency during each event in an effective and efficient methodology.

The Operating Committee discussed frequency excursions and the need for reliability coordinators to know which BAs are contributing to the excursions in order to bring frequency back within bounds. The OC agenda item is attached for the subcommittee to review and to realize the significance and attention these frequency excursions are attracting. A sample list of frequency deviations that occurred in the Eastern Interconnection between September 1 and October 18, 2005 is also attached.

Attachments

1. Operating Committee Discussion of Eastern Interconnection Frequency Excursions
2. Short-term Eastern Interconnection Frequency Deviations



NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

Princeton Forrestal Village, 116-390 Village Boulevard, Princeton, New Jersey 08540-5731

Proposed Frequency Monitoring and Response Process for the Eastern Interconnection

Introduction

This document outlines a proposed frequency monitoring and response process for the Eastern Interconnection.

Short-Term Triggers (Reliability Coordinators (RC))

NOTE: If the frequency exceeds the FRL (Frequency Reliability Limit) or FAL (Frequency Abnormal Limit) High or Low then immediate action is required. The Frequency Trigger Limit (FTL) represents the initial frequency where the Reliability Coordinators should be directing corrective action if necessary.

Frequency	What	Actions
60.5	FRL High	1,4
60.2	FAL High	1,3
60.05 (if >10 minutes)	FTL High	1,2
60.05 (if >5 minutes)	FTL High	1,
59.95 (if >5 minutes)	FTL Low	1,
59.95 (if >10 minutes)	FTL Low	1,2
59.91	FAL Low	1,3
59.82	FRL Low	1,4

Actions

1. Look for BAs (Balancing Authorities) within your area beyond BAAL (Balancing Authority Abnormal Limit). Direct correction and log in RCIS (Reliability Coordinator Information System) under Frequency section.
2. Direct BAs beyond BAAL to correct ACE (Area Control Error). Call Other RCs, communicate problem if known. Ask for cause if none reported. Log in RCIS under Frequency section. Notify Time Monitor of event and problem (if known). Time Monitor logs event and problem.
3. Direct all BAs with ACE hurting frequency to correct. Call other RCs, communicate problem if known. Ask for cause if none is reported. Log in RCIS under Frequency section. Notify Time Monitor of event and problem (if known). Time monitor logs event and problem.
4. Evaluate whether still interconnected. Direct emergency action. Call other RCs, communicate problem if known. Ask for cause if none is reported. Log in RCIS under Frequency section. Notify Time Monitor of event and problem (if known). Time monitor logs event and problem.

RCs should also log any other unusual frequency events and report to the Time Monitor.

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Proposed Frequency Monitoring and Response Process for the Eastern Interconnection

The Time Monitor will notify the Resources Subcommittee for all events logged by Time Monitor.

Metric	What	Actions
+/- 0.031Hz	Hourly Average	Call Other RCs, communicate problem if known. Ask for cause if none reported. Log in RCIS under Frequency section. Notify Time Monitor of event and problem (if known). Time Monitor logs event and problem.
28 mHz	Changes in one-minute average frequency deviation	Call Other RCs, communicate problem if known. Ask for cause if none reported. Log in RCIS under Frequency section. Notify Time Monitor of event and problem (if known). Time Monitor logs event and problem.
28 mHz	Change over 10 seconds (future-in CERTS)	Scan for corresponding ACE changes to capture unit trips for frequency response benchmarking. Call Other RCs, communicate problem if known. Ask for cause if none reported. Log in RCIS under Frequency section. Notify Time Monitor of event and problem (if known). Time Monitor logs event and problem.

Longer-Term Triggers and Benchmarks (Resources Subcommittee)

Metric	What	Actions
+/- 0.031Hz	Hourly Average	AIE Survey if no problem known. If problem known, survey entities involved to determine any lessons. Maintain record
20 mHz	Daily RMS1	Evaluate Day and determine need for survey. Maintain Record
16.8 mHz	Weekly RMS1	Evaluate Week and determine underlying cause. Maintain Record
28 mHz	Changes in one-minute average frequency deviation	If problem is known, maintain for excursion benchmarking. If problem is not known, ACE survey to determine problem.
28 mHz	Change over 10 seconds (future-in CERTS)	Scan for corresponding ACE changes to capture unit trips for frequency response benchmarking. If problem is not known, ACE survey to determine problem.

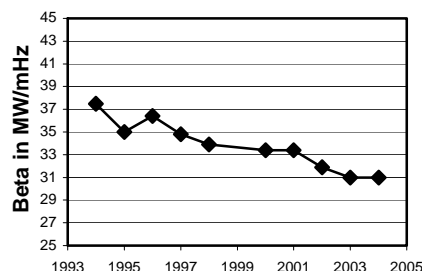
Frequency Issues 2005

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.

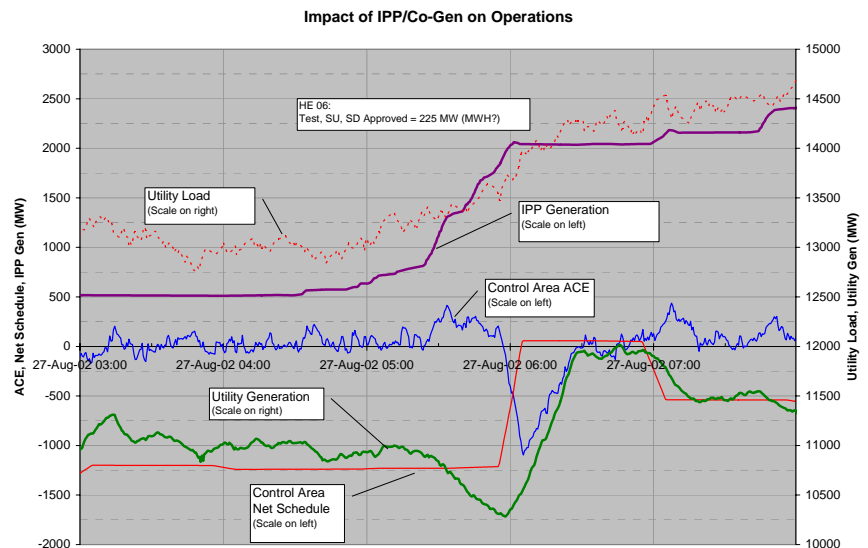
- Governor Limit Issues – a number of generators deliberately limit the response of their turbine governors. Some of these generators, mostly nuclear units, are constrained by fuel cycle and regulatory constraints. Most nuclear units are designed (in particular, the fuel cycle is designed) to operate 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

Item 1. Operating Events

Action

Discussion

Item 1.a Frequency Excursion – Eastern Interconnection – August 14, 2005

Action

Discussion

Background

A representative from the Midwest Independent System Operator will discuss the August 14, 2005 frequency excursion shown in the chart on the right. MISO was experiencing dispatch problems that contributed to this excursion.

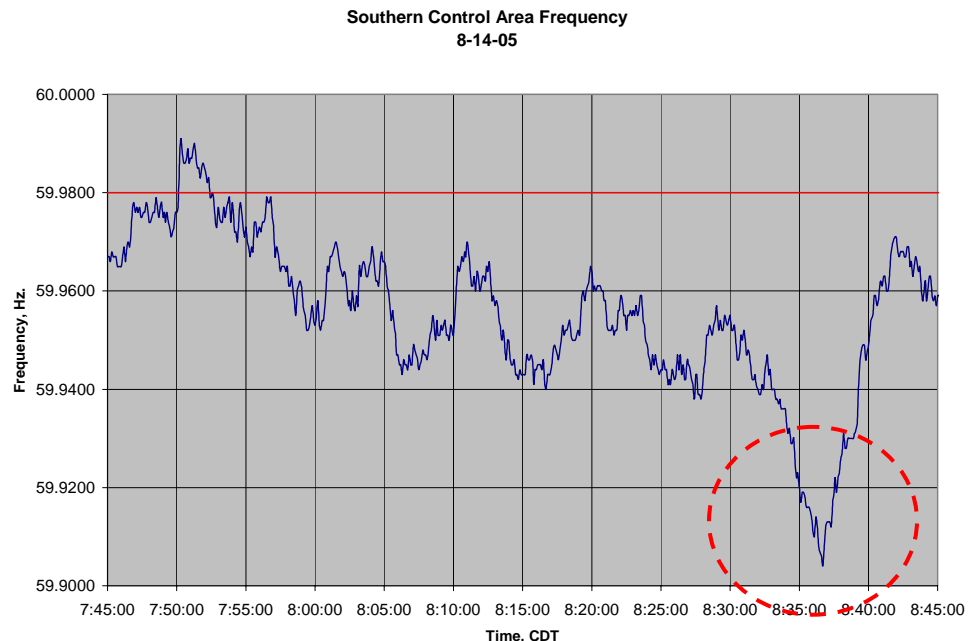
Secretary's note

When interconnection frequency decays for no apparent reason, reliability coordinators and balancing authorities become understandably worried. Events surrounding many frequency excursions are never solved for any number of reasons, such as:

- Reliability coordinators aren't checking their balancing authorities' ACE values or schedules, or
- They know what happened but don't report the event on the RCIS, or
- The excursion doesn't hit a "trigger point," or
- Balancing authorities don't freely offer this information, or
- The excursion is caused by a number of balancing authorities leaning a little bit at the same time, or
- "Other" reasons

This particular event did not hit NERC's "trigger points" that would initiate an AIE survey. Nevertheless, it resulted in a number of e-mail comments and speculations at the time, as well as calls to the NERC staff seeking information on the cause of the frequency excursion.

After NERC staff queried the reliability coordinators later that week, MISO provided a detailed explanation of the dispatch problems they had that morning. MISO also agreed to discuss the



problem with the Operating Committee with the understanding that the Operating Committee needs to learn about these events for its own education.

MISO's willingness to discuss its operating problems on August 14 should prompt the Operating Committee to consider a number of actions that will result in a better understanding of what causes frequency excursions and how they are being mitigated:

- 1. Help the Resources Subcommittee make progress in developing an automated Area Interchange Error survey "tool" and procedure.** The subcommittee is working on this now, but is encountering reluctance from some balancing authorities who believe the hourly actual and scheduled net interchange information is market sensitive. (Note: Net interchange is between the balancing authority and the Interconnection, and does not include any purchasing-selling entity details.)
- 2. Expect that all reliability coordinators will investigate and report the reasons for frequency excursions on the reliability coordinator Information System.** This would include those events that do not hit NERC "trigger points," but still result in RC unease and speculation as to the cause of the event.
- 3. Expect that reliability coordinators, balancing authorities, and transmission operators will explain operating events to the Operating Committee** as MISO is doing at this meeting for "lessons learned." This helps the Operating Committee 1.) understand the nature of operating problems, and 2.) make informed decisions about the efficacy of NERC reliability standards and regional reliability plans.
- 4. Similarly, investigate why balancing authorities do not freely explain to their reliability coordinators operating problems** that contribute to Interconnection frequency excursions.
- 5. Discuss the merits of providing better real-time tools to the reliability coordinators** so that they all have real-time knowledge of who is "dragging" on the system. This should be established to provide oversight, coordination, and direction as necessary to maintain the health and security of the full network.

Note: This is a sample list of frequency deviations that occurred in the eastern interconnection between September 1, and October 8, 2005. Some of the frequency deviations appear to be more significant than others.

Short-term Eastern Interconnection Frequency Deviations

SHORT-TERM: -EAST 10/18/2005 7:01:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.968-60.018)=\mathbf{0.050Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/17/2005 8:33:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.026-59.990)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/17/2005 6:16:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.948-59.993)=\mathbf{0.045Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/16/2005 9:01:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.951-59.998)=\mathbf{0.047Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/16/2005 3:51:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.029-59.991)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/16/2005 7:58:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.970-60.029)=\mathbf{0.059Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/16/2005 5:44:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.962-60.000)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/15/2005 6:43:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.964-60.003)=\mathbf{0.039Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/15/2005 1:26:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.974-60.011)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/15/2005 11:59:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.035-59.988)=\mathbf{0.047Hz} \geq 0.035Hz$.

SHORT-TERM: FAST TEC ACTIVE, START=10/14/2005 7:01:00 PM(EDT), SCHED FREQ=59.98 - EAST 10/14/2005 11:05:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.956-60.010)=\mathbf{0.054Hz} \geq 0.035Hz$.

SHORT-TERM: FAST TEC ACTIVE, START=10/14/2005 7:01:00 PM(EDT), SCHED FREQ=59.98 - EAST 10/14/2005 8:40:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.961-60.000)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/14/2005 6:02:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.035-59.988)=\mathbf{0.047Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/14/2005 6:17:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.044-60.004)=\mathbf{0.040Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/14/2005 6:01:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.952-59.997)=\mathbf{0.045Hz} \geq 0.035Hz$.

SHORT-TERM: FAST TEC ACTIVE, START=10/13/2005 1:01:00 PM(EDT), SCHED FREQ=59.98 - EAST 10/13/2005 8:56:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.948-59.990)=\mathbf{0.042Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/13/2005 12:18:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.027-59.990)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/12/2005 10:24:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.968-60.023)=\mathbf{0.055Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/12/2005 10:49:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.963-59.999)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/12/2005 9:05:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.026-59.978)=\mathbf{0.048Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/12/2005 8:27:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.025-59.979)=\mathbf{0.046Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/12/2005 7:01:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.958-60.007)=\mathbf{0.049Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/11/2005 9:59:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.038-59.999)=\mathbf{0.039Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/10/2005 7:59:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.958-60.002)=\mathbf{0.044Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/10/2005 7:01:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.957-59.997)=\mathbf{0.040Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/10/2005 12:21:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.971-60.009)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/9/2005 12:38:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.048-60.012)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/9/2005 11:49:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.039-59.996)=\mathbf{0.043Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/8/2005 10:40:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.031-59.995)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/8/2005 6:46:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.029-59.992)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/8/2005 7:50:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.042-60.004)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 10/8/2005 7:19:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(60.037-59.999)=**0.038Hz**>=0.035Hz.

SHORT-TERM: FAST TEC ACTIVE, START=10/7/2005 8:01:00 PM(EDT), SCHED FREQ=59.98 -
EAST 10/7/2005 10:01:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.958-60.001)=**0.043Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/7/2005 7:13:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.976-60.017)=**0.041Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/7/2005 9:49:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(60.034-59.980)=**0.054Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/7/2005 7:50:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.976-60.024)=**0.048Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/7/2005 12:31:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.973-60.009)=**0.036Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/5/2005 11:47:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(60.043-60.004)=**0.039Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/5/2005 2:44:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.973-60.018)=**0.045Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/4/2005 10:47:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(60.024-59.983)=**0.041Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/4/2005 10:49:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.948-59.990)=**0.042Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/4/2005 12:01:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.960-60.003)=**0.043Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/2/2005 9:24:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.944-60.011)=**0.066Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/2/2005 7:04:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.970-60.007)=**0.037Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/2/2005 4:29:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.961-60.003)=**0.042Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/2/2005 2:06:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.965-60.010)=**0.045Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/2/2005 6:00:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.976-60.012)=**0.036Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/1/2005 11:07:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: ABS(59.971-60.009)=**0.038Hz**>=0.035Hz.

SHORT-TERM: -EAST 10/1/2005 9:15:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.959-60.000)=\mathbf{0.041Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/30/2005 6:19:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.963-60.000)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/30/2005 1:02:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.968-60.004)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/29/2005 12:37:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.037-59.996)=\mathbf{0.041Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/29/2005 12:42:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.961-60.002)=\mathbf{0.041Hz} \geq 0.035Hz$.

SHORT-TERM: FAST TEC ACTIVE, START=9/29/2005 1:02:00 AM(EDT), SCHED FREQ=59.98 -
EAST 9/29/2005 1:32:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.964-60.000)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/28/2005 11:42:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.037-60.001)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/28/2005 10:07:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.962-60.001)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/28/2005 3:20:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.962-60.000)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/27/2005 12:22:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.034-59.997)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/26/2005 4:36:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.023-59.983)=\mathbf{0.040Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/24/2005 7:48:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.025-59.986)=\mathbf{0.039Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/24/2005 6:16:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.025-59.983)=\mathbf{0.042Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/23/2005 9:32:00 PM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.973-60.019)=\mathbf{0.046Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/23/2005 7:05:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.965-60.005)=\mathbf{0.040Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/23/2005 2:02:00 AM (EDT)
- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.974-60.011)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/22/2005 9:59:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.969-60.007)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/22/2005 9:00:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.026-59.970)=\mathbf{0.056Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/22/2005 8:57:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.958-59.995)=\mathbf{0.037Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/20/2005 6:08:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.972-60.012)=\mathbf{0.040Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/19/2005 1:23:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.953-59.994)=\mathbf{0.041Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/18/2005 11:41:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.977-60.017)=\mathbf{0.040Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/9/2005 11:57:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.959-60.014)=\mathbf{0.055Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/9/2005 7:39:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.047-60.009)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/9/2005 6:01:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.963-59.999)=\mathbf{0.036Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/7/2005 10:22:00 PM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(59.957-60.000)=\mathbf{0.043Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/2/2005 11:56:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.027-59.989)=\mathbf{0.038Hz} \geq 0.035Hz$.

SHORT-TERM: -EAST 9/1/2005 6:17:00 AM (EDT)

- Frequency Absolute value of two most recent 1-Minutes: $ABS(60.029-59.993)=\mathbf{0.036Hz} \geq 0.035Hz$.

Item 7. Time Error

Discussion

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

Attachments

Time error reports to be sent under separate cover.

Item 8. Dynamic Transfer Catalog

Discussion

The Interchange Subcommittee (IS) will soon ask the regional reliability organizations for help in administering their balancing authorities' completion of the dynamic transfer catalog. The Interchange Subcommittee will use the information in this catalog to review system modeling and granularity in the Interchange Distribution Calculator.

The Interchange Subcommittee will analyze the information to confirm that dynamic transfers are correctly modeled. Once completed, the IS will share this information with the regional compliance managers, Resources Subcommittee, and the Operating Reliability Subcommittee.

Background

At the Operating Committee's March 2004 meeting, Doug Hils, the Interchange Subcommittee chairman, provided a presentation to the OC (see excerpt at right) regarding the compilation of a dynamic transfers catalog. The Interchange Subcommittee is developing this catalog in response to findings from the August 14, 2003 Blackout Section V Final NERC Report Conclusions and Recommendations. Item 23 of this report noted:

“Numerous control areas in the Eastern Interconnection, including FirstEnergy, were not correctly tagging dynamic schedules, resulting in large mismatches between actual, scheduled, and tagged interchange on August 14. This prevented reliability coordinators in the Eastern Interconnection from predicting and modeling the effects of these transactions on the grid.”

The dynamic transfer catalog was then assigned to the IS at the March OC meeting. The OC also requested that the IS coordinate developing a questionnaire for building this catalog with the resources subcommittee to help the RS collect AIE survey information. The questionnaire has been jointly developed with the RS and is ready to be sent to the industry for data collection.

The Interchange Subcommittee estimates the number of dynamic transfers to be between 100 and 500.

Attachments

1. Dynamic Transfer Catalog, Dynamic Schedules Form
2. Dynamic Transfer Catalog, Pseudo Ties

Dynamic Transfer Catalog

The Interchange Subcommittee intends to conduct an industry survey to identify the current Control Area configurations for Dynamic Transfers implemented to accommodate jointly owned units, remote loads, remote generation, supplemental regulation service, and AGC interchange, among other uses.

The Control Areas will be required to provide detailed operating and accounting methods for each Dynamic Transfer along with the 'associated' Control Area(s) involved in the Dynamic Transfer.

The Interchange Subcommittee will review the data to ensure among other items that:

- Entities are accounting for transfers in the same way
- Transfers are handled correctly in the ACE equations
- Transfers that should be tagged are tagged.

Item 9. Future Meetings

Wednesday, February 8, 2006 Thursday, February 9, 2006 Friday, February 10, 2006	8 a.m.–5 p.m. 8 a.m.–5 p.m. 8 a.m.–noon	Scottsdale, AZ
Wednesday, May 3, 2006 Thursday, May 4, 2006 Friday, May 5, 2006	8 a.m.–5 p.m. 8 a.m.–5 p.m. 8 a.m.–noon	Baltimore, MD
Wednesday, September 20, 2006 Thursday, September 21, 2006 Friday, September 22, 2006	8 a.m.–5 p.m. 8 a.m.–5 p.m. 8 a.m.–noon	Québec City, QU
Wednesday, November 15, 2006 Thursday, November 16, 2006 Friday, November 17, 2006	8 a.m.–5 p.m. 8 a.m.–5 p.m. 8 a.m.–noon	Fort Lauderdale, FL

Notes:

1. Schedule meetings before the OC/PC meetings, whenever possible.
2. Avoid scheduling meetings 30 days before NERC Board of Trustees meetings.
3. 2006 RS meetings are scheduled to coincide with the Interchange Subcommittee, Operating Reliability Subcommittee, and the Reliability Coordinator Working Group. Joint meetings to discuss mutual issues may be arranged.