

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

NERC Balancing Authority (BA) Certification Review of the Midwest ISO as part of the MidAmerican Energy, and City of Muscatine, Iowa Integration

Site Visit Conducted
August 17, 2009
Midwest ISO
Carmel, Indiana

to ensure
the reliability of the
bulk power system

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Introduction

This report presents the results of the North American Electric Reliability Corporation's (NERC) Balancing Authority (BA) Certification review of Midwest Independent Transmission System Operator (Midwest ISO) NCR00826, preparation for the addition of MidAmerican Energy (MEC) NCR00824, and Board of Water, Electric and Communications of the City of Muscatine, Iowa (MPW) NCR00967 to the Midwest ISO Balancing Authority Area.

BAs have a primary responsibility for maintaining the reliability of the Bulk Power System. They accomplish this by directly controlling their generation and/or load resources to continuously balance their actual interchange with their scheduled interchange while regulating and stabilizing the alternating-current frequency of the Interconnection. Acceptable reliability levels can be maintained only if the BAs and other entities which make up the interconnection function in accord with good operating practices and reliability criteria, including planning and operating standards as defined by the North American Electric Reliability Corporation (NERC) Reliability Standards. Good operating practices include, but are not limited to, full compliance with the NERC Standards without regard to economic consideration, and burdening neighboring systems.

Certification Team

NERC's decision to complete a certification review began the process that is outlined in the NERC Rules of Procedure (RoP) Section 500 and RoP Appendix 5, and a certification team was formed. The team rosters for members of both the BA Certification Team (CT) and Midwest ISO team are listed in Attachment 1.

Objective and Scope

The objective of this review was to assess the Midwest ISO readiness to integrate MEC and MPW into an expanded Midwest ISO BA Area. The scope of the review included: (1) Communication capabilities between Midwest ISO, MEC, and MPW; (2) Various EMS screen shots regarding the MEC and MPW footprints; (3) Interviewing Midwest ISO system operations personnel; (4) Confirming applicable test data, (5) Reviewing training records, and (6) Reviewing applicable agreements for the Joint Registration Organization (JRO). The review was conducted on August 17, 2009 at the Midwest ISO facility in Carmel, IN.

Overall Conclusion

The certification process was completed in reasonable accordance with the aforementioned Rules of Procedure to determine if the applicants have the necessary tools, processes, and procedures to perform the function as NERC certified BAs. The applicants presented to the certification team the necessary evidence for its review, as it relates to the scope of this review. Because of this review, the certification team has reasonable assurance the applicants do have the tools, processes, and procedures in place to reliably perform the necessary BA services. Therefore, the BA certification team recommends certification of the expanded BA footprint to NERC and that the Midwest ISO modify the current Joint Registration Organization (JRO) registration of the Midwest ISO and the associated ¹LBA's to include MEC, and MPW.

The Midwest ISO expanded BA operation is currently slated to begin on or about September 1, 2009.

Needed for Operation

While the team recommends to NERC that Midwest ISO BA JRO expand certification to include MEC and MPW, the following work-in-process items must be completed prior to Midwest ISO going operational:

- Completion of Open Closed Loop Testing (2 ties)
- Deployment of Physical Scheduling System
- Completion of focused population training (Iowa Integration Training)
 - BAO, IRAC, & UDS (16 operators remain)
- Updating and approval of Operation Guides that are necessary to incorporate MEC and MPW

Positive Observations

- Operator involvement in the change management process
 - Happened with the operators instead of to the operators
- Operator comprehensive knowledge of MEC & MPW footprints
- Operator understanding of the neighboring ties
- Interaction with MEC & MPW
- Operator toolset is intuitive and easy to follow

¹ LBA is a Midwest ISO term “Local Balancing Authority”. These are entities that have entered into a JRO agreement with the Midwest ISO

Midwest ISO Emergency Preparedness

The CT found that the Midwest ISO has implemented steps to expand the adjacent BA agreements to provide their operators with as many options as possible. The current adjacent BA Agreements include but are not limited to the following companies:

- Manitoba Hydro
- Independent Electricity System Operator
- Associated Electric Cooperative, Inc
- Ohio Valley Electric Cooperative
- Kansas City Power and Light
- Dairyland Power Cooperative
- PJM Interconnection, LLC

Company Background

The certification team also gathered some specific details associated with Midwest ISO. Midwest ISO is a non-profit, member-based organization committed to being the leader in electricity markets by providing their customers with valued service, reliable cost effective systems and operations, dependable and transparent prices, open access to markets, and planning for long-term efficiency.

Midwest ISO has a peak load (set July 31, 2006) of 109,157 MW within their market area and an overall peak load of 129,647 MW across the entire Midwest ISO Reliability area. The MISO has approximately 93,600 miles of transmission facilities at voltage levels of 500kV, 345kV, 230kV, 161kV, 138kV, 120kV, 115kV and 69kV. Geographically, the Midwest ISO regional area covers an area of 13 states and one Canadian province, which in all covers about 920,000 square miles.

Since January 6, 2009 the Midwest ISO has been operating as a BA and calculating ACE for a footprint with a 2009 forecasted peak of 110,600 MW. With the addition of MEC and MPW the Midwest ISO forecasted peak increases to 115, 580 MW. This is an incremental increase of approximately 4.5%. The Midwest ISO is responsible for monitoring over 700 BA Area tie lines. The number of tielines will increase to 741 once MEC and MPW are within the Midwest ISO BA Area.

Generation capacity of the Midwest ISO exceeds 127,000 MW within their market area and 156,000 MW within the entire Midwest ISO reliability area. With the additions of MEC and MPW the generation capacity in the market area will increase to approximately 136,800 MW. In addition, the MEC BA Area wind resources that will be transferring into Midwest ISO BA Area are approximately 1385 MW. After the integration, the Midwest ISO will have approximately 6,185 MW of renewable wind generation in the Midwest ISO BA footprint.

Once MEC and MPW are Midwest ISO LBAs, the contingency reserve sharing responsibility will transfer to the Midwest ISO. The Midwest ISO will increase its obligations with the Contingency Reserve Sharing Group (CRSG) to reflect the transfer of MEC and MPW obligations into the Midwest ISO BA Area.

DCS compliance will no longer be a MEC and MPW responsibility, as the Midwest ISO will assume the responsibility for DCS compliance for their respective LBA areas.

Operating Facility Details

The Midwest ISO built and continuously refines its extensive network computer model of the Midwest ISO interconnected reliability region and surrounding systems. Their Network Model has 36,730 network buses, 286,000 SCADA data points, 5,464 generating units, and 29,627 loads. Included in their toolset for operation are a State Estimator that utilizes over 233,600 real-time measurements and Real Time Contingency Analysis that solves over 8,300 “what-if” contingencies on average in less than five minutes.

The Midwest ISO will calculate the Area Control Error (ACE) for the expanded BA Area, including MEC and MPW. This will increase the number of tielines for the Midwest ISO to monitor from 705 to 741. Some of these interconnections are with companies of the Independent Electricity System Operator of Ontario, the Mid-Continent Area Power Pool, PJM, Southwest Power Pool and the Tennessee Valley Authority. The Midwest ISO has seams agreements or memorandums of understanding with each of these organizations to facilitate operations.

The Midwest ISO has two primary control centers which are located in Carmel, Indiana and St. Paul, Minnesota. All required support staff (administrative and IT) are located within the same buildings at each location. The Midwest ISO control system consists of an AREVA (formerly Alstom/ESCA) standard control system. The operation center contains numerous AREVA work stations with multiple head monitor screens (three workstations with seven monitors per operator) at each operator’s workstation. Midwest ISO also has a video wall that can be accessed from any of the AREVA work stations to display control information. The video wall in the primary control room is 150 feet wide by 10 feet tall. The board is used to display a large dynamic transmission overview showing all 230 kV transmission facilities and above, plus critical underlying 100 kV facilities and above in Midwest ISO and surrounding areas. It includes the line MW and MVAR flows, lines out of service indication, high voltage and low voltage alerts. Also displayed on the video wall are a delta flow and delta generation displays, a flowgate monitoring tool, a frequency and frequency trends display, the ACE, ACE trends display, the ACE vs. BAAL, load, load trends, load forecast, net scheduled interchange, actual interchange, reserves, weather, and news.

Midwest ISO is staffed with NERC certified operators. Normal staffing consists of 16 operators per shift (12 hour shifts) and one shift manager. Staffing is adjusted as required during weather events and peak seasons.

Dual redundancy is provided in data communications, which uses frame relay connections provided by two separate nationwide communication providers. There are primary and secondary data communication paths from each LBA to the Midwest ISO for BA data. The data is also mirrored to their back-up site which is located in Indianapolis, IN remote from their primary site.

Midwest ISO's primary operator communication system is the AT&T and or Time Warner Telecom system. Telephone circuits can be "hard line" redirected or forwarded. Operators also have the option of accessing an ICP IQMX Turret Phones, replicating all of the stored numbers and features of their office phones in a disaster recovery environment. Cell phones are kept charged at all times, with all pertinent phone numbers loaded. Additional communications capability includes ICP IQMX Turret Phones at each operator position in the primary and backup operation center sites, and also in the St. Paul control room. In addition, Nortel phones, cell phones, voice over IP phones, and analog phones are available as backups. There is also a satellite phone at each site along with fax machines and e-mail communications.

Documentation List

Electronic copies of all of the supporting Midwest ISO, MEC and MPW documents were collected as evidence of Midwest ISO's preparedness to integrate MEC and MPW into the Midwest ISO BA Area. Electronic documents will be kept as a record of evidence to support the certification team's recommendation. These documents will be retained at the NERC office in Princeton, NJ for a period of no less than 5 years.

None of the documents listed below are included with the distribution of this final report. Per the NERC Rules of Procedure and due to the confidential nature of this material, these documents are available for review at the NERC offices after proper authorization is obtained through NERC.

- NERC, and Midwest ISO, MEC, and MPW's various BA evidence, correspondence, and presentation files
- Documentation resulting from the "Needed for Operation" items

CIP Requirements

CIP standards are not in scope for this certification review.

Attachment 1

The BA Certification Team

- Jim Hughes North American Electric Reliability Corporation
- Don Urban ReliabilityFirst Corporation
- Riaz Islam Midwest Reliability Organization

The Midwest ISO Personnel that Participated in the On-site Visit

- Roger Harszy Vice President, Real Time Operations
- Joe Gardner Executive Director System Wide Operations
- Michael Walsh Senior Director, UDS, EMS, Compliance & Trng
- Michael McMullen Director, Regional Operations
- Greg Troxell Assistant General Counsel
- Steve Swan Senior Manager IRAC & CRS
- David Espling Manager, Technical Training
- Marc Keyser Technical Lead Market & AGC Engineering
- Barry McMahan Senior Reliability Analyst
- Todd Seanor Senior Balancing Authority Operator
- Dan Munson Senior Intra Day RAC Operator
- Gareth Lim Lead Generation Modeling and Data Services
- Keith Mitchell Technical Manager, Real Time Operations
- Kim Van Brimer Senior Operations Specialist
- Ben Deutsch Technical Manager, Real Time Operations
- Dan Myers Lead Forward Mkts & Scheduling Apps

Attachment 2

Documentation Review

The certification team also reviewed the appropriate documentation that provided reasonable assurance that the Midwest ISO has the tools, processes, procedures, and training to operate an expanded BA Area that includes MEC and MPW.

Applications Review

The site visit focused on documentation review, interview of certified BA operators, and evaluation of the BA applications, and operator toolset that Midwest ISO has available for their operators. The certification team reviewed Midwest ISO's online applications that will be used to perform the BA requirements for the MEC and MPW footprints. Midwest ISO developed a series of EMS demonstrations using their testing environment that were led by Midwest ISO's Senior Manager of IRAC & CRS, Technical Lead Market & AGC Engineering, and Lead Forward Markets & Scheduling Applications. These demonstrations provided the certification team with an understanding of Midwest ISO's proposed applications for the balancing of MEC and MPW, as well as demonstrate the readiness of the Midwest ISO to assume the duties of the BA Operator for these footprints.

Operational Testing

Midwest ISO, MEC, and MPW have conducted a series of operational tests. Operational testing was primarily focused on the BA Area operations as well as tools necessary to support reliability. Specific testing included tie line checkouts.