NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Reliability Readiness Evaluation Report

Balancing Authority/Transmission Operator

Entergy Services, Inc.

Pine Bluff, Arkansas

to ensure the reliability of the bulk power system

December 3–6, 2007

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Introduction and Evaluation Process

The North American Electric Reliability Corporation (NERC) Reliability Readiness Evaluation and Improvement Program is one of the commitments of NERC and the industry to strengthen the reliability of the North American bulk power system. The program conducts independent evaluations of balancing authorities, transmission operators, reliability coordinators, and other key entities that support the reliable operation of the bulk power system to assess their preparedness to meet their assigned reliability responsibilities. The evaluations identify strengths and areas for improvement in an effort to promote excellence in operations among these organizations.

Since its inception in 2004, NERC and the industry have been working collaboratively to enhance the program. The evaluation process is based on fundamental aspects of reliability: culture, operations, maintenance, planning, and training. Documents related to the program are available at http://www.nerc.com/.

The reliability readiness evaluation teams, each led by a NERC staff member and a regional co-leader, include industry volunteers with considerable expertise selected to provide representation from other interconnections, other regions, and neighboring operating entities. The teams also typically include representatives from the Federal Energy Regulatory Commission (FERC) staff.

The public version of the reliability readiness evaluation report contains the majority of the evaluation team's findings. Any discussion of findings pertaining to critical infrastructure will be contained in Appendix 1, a confidential appendix to the report that is sent privately to the evaluated entity and is not included in the public version of the report.

An evaluation team met on-site with Entergy Services, Inc. (EES) representatives on December 3–6, 2007. This report reflects the views and recommendations of the evaluation team regarding the readiness of EES to meet its responsibilities as a balancing authority and transmission operator.

Evaluation Team

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Phil D'Antonio	PJM Interconnection, LLC
Larry Goins	Tennessee Valley Authority (TVA)
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Edward Franks	Federal Energy Regulatory Commission (FERC)

*Team co-leader

Organization Profile

Entergy Corporation is an integrated energy company engaged primarily in electric power production and retail distribution operations with annual revenues of over $11 billion and approximately 14,500 employees. Entergy owns and operates power plants with approximately 30,000 MW of electric generating capacity, is the second-largest nuclear generator in the United States, and delivers electricity to 2.7 million utility customers in Arkansas, Louisiana, Mississippi, and Texas. Specific jurisdictional companies own Entergy's generation and transmission assets, including Entergy Arkansas Inc., Entergy Gulf States Inc., Entergy Louisiana Inc., Entergy New Orleans Inc., and Entergy Mississippi Inc. Entergy Services, Inc. (EES) is the electric system operator for Entergy Corporation.

EES is a balancing authority and transmission operator performing all related reliability functions. EES operates a system operations center (SOC) for transmission operations and balancing authority operations, a system planning and operations center (SPO) for balancing authority operations related to ACE, and five transmission operations centers (TOCs) across its system that perform transmission switching functions and some local voltage monitoring. The SPP Independent Coordinator of Transmission (ICT) provides reliability coordinator functions as a contractor. EES is a member of the SERC regional reliability organization.

EES operates a transmission system with 15,500 miles of high-voltage transmission lines and 1,550 transmission substations. The EES transmission system consists of the following voltages (and circuit miles): 115 kV (5,812); 138 kV (2,040); 161 kV (1,478); 230 kV (2,154); 345 kV (97); and 500 kV (2,006). EES is interconnected with the following entities (and number of ties): Associated Electric Cooperative (8), Central Louisiana Electric Cooperative (38), Empire District Electric (1 tie), Oklahoma Gas & Electric (1 tie), the Southern Company (5), Central & Southwest (11), Tennessee Valley Authority (14), Ameren (3), South Mississippi Electric Power Association (4), Louisiana Generating (9), Constellation Energy & subsidiaries (43), Louisiana Energy and Power Authority (6), and Lafayette Utilities System (2).

Executive Summary

The evaluation team found no significant operational problems and concluded that EES has adequate facilities, processes, plans, procedures, tools, and trained personnel to perform the balancing authority and transmission operator functions necessary to maintain the reliable operation of the bulk power system.

EES corporate values are focused on safe and reliable operation of the electric system. Investment in infrastructure and intensified awareness of safety, reliability, and customer satisfaction are recognized as priorities throughout the organization. The corporate managers are committed to maintain these heightened standards.

The evaluation team cites potential examples of excellence for outstanding system restoration and coordination capability with others, and for an internally developed analysis tool enabling the system operator to create a historical record of flowgate loadings and remedial actions taken to resolve these loadings.

Recommendations include enhancement of coordination between the transmission operator and balancing authority functions and integration of the technology in the control room to streamline the equipment and data presentation.

Overall, the evaluation team identified seven positive observations and three potential examples of excellence. In addition, the team offers 13 recommendations that, if implemented, will enhance EES's readiness to operate reliably and maintain the reliability of the bulk power system. The recommendations are listed in order of importance.

Potential Examples of Excellence

The evaluation team identified the following potential examples of excellence in its reliability readiness evaluation:

1. Confidential information on plans for the loss of control facilities redacted from public report. See discussion in Appendix 1.

2. EES has outstanding system restoration and coordination capability with others, as demonstrated following hurricanes Katrina and Rita; EES was recognized with awards from the Edison Electric Institute (Section 2.4).

3. EES developed an analysis tool called the Transmission Reliability Application enabling the system operator to create a historical record of flowgate loadings and remedial actions taken to resolve these loadings. Additionally, this system enforces the EES congestion management policy. The information contained in the application is used by operators and planners to evaluate the system response for similar operating conditions (Section 2.3).

Positive Observations

The evaluation team noted the following positive observations during the reliability readiness evaluation process:

1. EES makes effective use of its dispatcher training simulator, including scenarios for normal and emergency operating conditions (Section 5.1).

2. The EES training staff gave tasks to each system operator to determine a training topic and develop and deliver the training; some of the training qualified for NERC continuing education hours (Section 5.1).

3. EES developed an “alarm health check” application independent from the energy management system (EMS) (Section 2.1).

4. EES developed a process for real-time calculation of generation shift factors to aid in mitigation strategies (Section 2.3).

5. EES management supports adequate operator staffing to accomplish operator training requirements without overtime (Section 5.1).

6. EES uses a document management program for operators to confirm receipt and understanding of new or revised procedures (Section 2.2.3).

7. EES management supports active participation in NERC and industry groups (Section 1.2.1).

Recommendations

The evaluation team offers the following recommendations:

1. Investigate and implement opportunities to enhance the inefficient coordination between the SPO and the SOC caused by the application of the FERC Standards of Conduct requirements (Section 2.2.3).

2. Integrate the technology in the control room to streamline the equipment and data presentation (Section 2.3).

3. Implement a checklist designed to track initial training progress (with sign-off) for each control room position at the SOC (Section 5.1).*

4. Enhance the alarm health check application by adding an audible alarm (Section 2.1).

5. Increase communication abilities with the following changes (Section 2.4):
    a. Establish a "blast" message to alert relevant entities of a move from the primary to the backup control center to expedite notifications.
    b. Provide for a transfer of voice communications between the primary and backup control center to provide a seamless transition.
    c. Exchange satellite telephone numbers with neighboring entities.*

6. Confidential information on physical security redacted from public report. See discussion in Appendix 1.

7. Confidential information on physical security redacted from public report. See discussion in Appendix 1.

8. Expand the scope of the document management program to include all SOC processes and procedures, such as EMS operational procedures (Section 2.2.3).

9. Establish metrics to measure and trend system and organizational performance for items such as Robotag errors and remedy tickets (Sections 2.3 and 3.2.2).*

10. Confidential information on plans for loss of control facilities redacted from public report. See discussion in Appendix 1.

11. Improve housekeeping to minimize the presence of combustibles and other items stored in the computer room (Section 3.2.2).

12. Confidential information on physical security redacted from public report. See discussion in Appendix 1.

13. Include human error prevention techniques in the system operator training program (Section 5.2.1).*

*Identified by the company as a key recommendation.

Discussion

The reliability readiness evaluation team examined the following key areas during the evaluation. The detailed discussion that follows provides the foundation for the recommendations, positive observations, and potential examples of excellence that the team identified. The report uses the generic term "system operator" to refer to all on-shift operating personnel responsible for executing the functions necessary to operate reliably and maintain the reliable operation of the bulk power system. This term will be used for the discussions unless additional specificity is required, such as *balancing* system operator or *transmission* system operator.

1. Culture

1.1 General

The corporate organization provides the necessary leadership and management for system operations to sustain high levels of safe, reliable operation.

EES experienced a significant change in corporate priorities in the late 1990s by focusing on safety and reliability as top priorities. Increased investment in infrastructure and intensified awareness of safety, reliability, and customer satisfaction are recognized throughout the organization as key initiatives. The corporate managers are committed to maintain these heightened standards.

Executive management recognizes that system operators need to be NERC certified and adequately trained to operate a reliable system and provides the financial and staff support to make that possible. This is evidenced by the commitment to a systematic approach to training and the commitment of money and staff to support a training simulator. NERC certification, system reliability, and operating procedures are all part of the training program. Executive management requires that training needs are targeted and addressed.

1.2 Organizational Effectiveness

1.2.1 Foundation for System Reliability

The organization's values and behaviors—modeled by its leaders and practiced by its members—serve to make system reliability a top priority.

EES corporate values are focused on safe and reliable operation of the electric system. Entergy's mission is to "Deliver affordable, reliable service to our customers and excel at operating our nuclear fleet." Entergy's vision is "Exceeding customer expectations everywhere we serve." Entergy has a strong internal culture of compliance. Entergy's *Code of Entegrity* reflects Entergy's "uncompromising commitment to do what is legal and ethical in all aspects of our dealings." Entergy's shared values consist of the following:

- Create and sustain a safe work environment
- Possess a winning spirit

- Focus on our customers
- Grow the business profitably
- Be an active team player
- Treat people with respect
- Aggressively look for better ways
- Take action to achieve results
- Above all, act with integrity

Entergy Transmission's mission is "Providing accessible and reliable transmission service profitably while promoting/sustaining a culture of safety, compliance, social responsibility and continuous improvement."

EES staff and managers are actively involved in SERC committees (operating, planning, critical infrastructure protection), subcommittees, and the SERC system operator conference (providing significant support for conference preparation and delivery). EES also participates in all of the NERC personnel and certification-related committees and standards drafting teams. EES staff members routinely volunteer to serve on reliability readiness evaluation teams. The evaluation team cites a positive observation for the EES management support of active participation in NERC and industry groups.

1.2.2 Leadership and Management

Managers, by leadership, commitment, and example, establish and reinforce high standards of performance and align the organization to achieve safe, reliable system operation.

EES has a utility management group with representation from all functional groups at the corporate-officer level. This group is tasked with reviewing and making recommendations for capital, operation, and maintenance requirements using a detailed model to evaluate relative risks and customers-minute outages averted per dollars spent. The objective of the detailed analysis is to obtain the highest possible reliability benefit for the invested capital. There is a strong corporate focus on reliability, and the new NERC compliance initiatives are helping bring reliability-related issues to the forefront of attention.

EES has a continuous improvement initiative in which each employee is empowered to form a team to suggest improvements to management.

EES includes performance objectives in its annual plan.

1.2.3 Corporate Oversight and Monitoring

Line management is used to strengthen reliability and improve performance. System reliability is kept under constant scrutiny through techniques such as self-assessments, performance indicators, and periodic management meetings.

EES corporate management becomes involved in operational decisions only as necessary. The Operation Subcommittee typically addresses issues that require management attention. Executive management does not require operations to request management approval for the implementation of actions needed to maintain system reliability. Executive management also

believes in empowering employees so that issues can be addressed and resolved in a timely manner.

SOC:

EES uses yearly personal performance reviews that provide all employees the opportunity to assess themselves three times during the year; an initial, interim, and final review. During each review, the employee has the opportunity to review and discuss the assessment with his or her supervisor.

EES has an internal quality improvement program, called Entergy Continuous Improvement. There are two branches within the program: one that is focused on large issues involving multiple departments, using Six Sigma methodology, and another that is initiated at the employee or first-line supervisor level. Change initiatives that arise from the Entergy Continuous Improvement program efforts are reviewed by appropriate management to verify that they are not detrimental to the continuing reliable operation of the bulk power system.

EES conducts a benchmark analysis with comparable utilities to evaluate its operational effectiveness on multiple aspects of distribution and transmission, including maintenance, operations, design, and reliability. EES also performs a benchmark analysis with the Edison Electric Institute safety statistics.

EES is dedicated to understanding what went wrong in an activity or process and to effectively apply "lessons learned" to improve the operation of the company. Entergy's corporate philosophy is to prevent repeating past mistakes by instituting training, improving tools (through upgrades and additions), and modifying procedures to avoid future events. Entergy is also working toward prevention of future errors by building scenarios of major disasters (the worst conceivable events) and running simulations as preparation.

An operating committee composed of key managers in functions that directly affect bulk power reliability meets periodically to review proposed capacity additions and major transmission projects. The committee has set up a subcommittee that meets annually to review processes for the upcoming high-load season and meets via teleconference whenever a reliability threat to significant blocks of firm load becomes significantly elevated. The operating subcommittee reviews decisions to ensure the highest possible system reliability is maintained despite unit trips or transmission contingencies.

Entergy has a storm restoration organization that emphasizes the safe return of customers and generation after extreme weather events.

All of these groups have the support of corporate management.

SPO:

The Entergy Continuous Improvement program is also the framework for improvement initiatives at the SPO (see discussion above). The SPO has no formal documented process for

change initiatives. The initiator of a proposal discusses the proposed activity with a member of system dispatcher management to evaluate the proposed change. Recently, an Entergy Continuous Improvement team developed an automated model for quickly viewing reserves and low-load conditions, providing a diverse set of tools for calculating these operating boundaries. Additionally, heat-rate user interface improvements in the generation management system, unit start-up and shut-down checklists, and shift-turnover checklists were derived from Entergy Continuous Improvement team recommendations.

Self-assessment activities primarily include the determination of specific training needs based on recent events. EES management also reviews daily performance of reliability indicators such as CPS1, CPS2, DCS, BAAL, and reserves.

Reliability issues are discussed at each SPO management meeting.

1.2.4 Human Resources

Personnel resource needs are anticipated and individuals are systematically recruited, developed, and assigned positions in the system operations organization.

EES has a formal employee development and succession plan for the manager level and up. For the supervisor level, EES uses an annual "bench scan" approach to identify candidates prepared for an increased level of responsibility or rotation to a new area. This process looks at future periods of up to 18 months, 18 months to two years, and two to five years. Each manager identifies possible replacements for specific positions, their present readiness, and what grooming is required. EES has limited flexibility to overstaff system operators prior to a vacancy.

EES began a corporate initiative last month for a system-wide structured mentoring program. The Human Resources department has been considering a method in formalizing a mentoring program to improve and maintain employee performance at high levels. In some areas of the company, 360-degree reviews are used to reveal strengths and development areas. Some areas utilize individual personal development plans. EES has a tuition reimbursement plan for employees who chose to pursue a degree related to the industry.

SOC:

EES provides semi-annual performance reviews and career planning at the individual level and a management-level review for key individuals in the organization. Career-broadening recommendations are encouraged as part of the process. Managers are required to identify their best replacement in the event they are no longer able to continue to function in their current role. Additional assignments are made as necessary to further the career development of the individuals involved. Additional reviews occur when someone changes positions.

SPO:

EES evaluates system operations personnel and individuals in key support areas with respect to succession using the "bench scan" process. The director adjusts plans throughout the year to accommodate unplanned changes in staffing or staffing strategies.

1.2.5 Corporate Communications

System operations communications inform and engage both corporate and system operations employees so they can contribute to the strategic priorities of the organization.

EES vice presidents meet regularly with employees to obtain feedback for improving system performance and to foster an environment where individuals speak freely. All employees know they have permission and are expected to speak up about any system issue. Executives take input very seriously and respond to each one to show that they are "listening." EES has structured programs to reward system improvement suggestions that include work-team rewards, gift awards, and recognition though internal communications.

EES has regular meetings called 2 C's (complements and concerns). During these meetings, employees compile complements and concerns, and then upper management joins the employees to discuss these compilations and develop plans to address them.

The Entergy Continuous Improvement program (discussed in detail in Section 1.2.3) encourages the formation of natural work teams to improve any process — safety, customer satisfaction, reliability, risk management, cost performance, or any other corporate objective. EES strongly encourages employees to develop natural work teams and communicate recommendations.

The EES "Open Door Policy" provides assurance for employees to come forward with any information without retribution.

EES issues weekly reports summarizing upcoming activities, weekly events, and major capital projects and associated outage risks.

2. Fundamentals of Operations

2.1 General

Operations personnel monitor and control the system in a manner that ensures safe, reliable operation.

SOC:

SOC operators can view tie-line status and errors on the system tie summary EMS display. There are primary values and secondary values, in the event the primary fails, and the system operator can make manual entries if both sources fail.

EES monitors frequency at each nuclear facility and each blackstart plant, providing sufficient coverage to effectively monitor the grid and determine islanding conditions. EES also has frequency measurement available with the phasor system. The phasor system data goes to a plant information (PI) system that is completely separate from the EMS and can be used in the

event of an EMS failure. Frequency values are displayed in the EMS and on a plasma screen for viewing by all system operators.

EES monitors all voltage levels 115 kV and above through an EMS voltage monitoring display, providing voltage values in a graphical manner with low and high voltage alarms. EES attempts to maintain normal voltage at 1.01 per unit for 230 kV and 1.02 per unit for 345 and 500 kV; with high limits of 1.05 and low limits of 0.95. The engineering staff at the TOCs develops and revises limits. Limit changes are communicated by phone and through the Documentum tool.

EES has two static var compensators that automatically switch capacitor banks into service at pre-determined low-voltage levels. Entergy also has one active undervoltage load shedding scheme in place that will automatically shed load in certain areas if low-voltage conditions are present, in order to prevent voltage collapse.

The system operators have several EMS displays for monitoring the status of static and dynamic reactive resources. All EES fossil-fired plants have automatic voltage regulators (AVRs) in automatic voltage control mode. The plant operator notifies the SOC of any AVR status change and maintains the proper voltage manually, if necessary. Any planned AVR outages must be coordinated with the SOC.

EES has power system stabilizers on two generators. These units were tuned and tested upon commissioning about three years ago. The power system stabilizers are a component of the AVR and treated like AVRs; if there is a change in status, the plant operator must immediately contact the SOC.

Load shedding guidelines are kept in hard copy form at the shift supervisor's desk and are kept electronically in Documentum. All documents appear to be complete and applicable. The SOC notifies the TOCs of load shed amounts. This value is communicated to the distribution operations center dispatcher, who manually sheds load based on system knowledge. The distribution operations center does not use a program for automated load shedding.

The EES underfrequency load shed plan will reduce the system load by a minimum of 30% (in addition to manual load shedding) in three steps of 10 percent each, at 59.3, 59.0, and 58.7 Hz. The EES plan assumes that the manual and automatic plans are executed consecutively, and allows only 9 percent overlap of the manual and automated load shed programs. The SPO determines peak MW loads and underfrequency allocations by area annually in December. Distribution planners then select circuits to meet the load-shed allocations by May of each year. Selection of circuits is based upon criticality and type of load served.

The system operators receive alarms on alarm summary displays in the EMS and also on the alarm health-check application. The system operators can filter the alarm summaries by fields such as voltage level, equipment type, limit violation, allowing operators to easily search for a particular event. The most critical alarms always filter to the top of the summary, and alarms are color coded. Alarms must be acknowledged by the operators. There are no audible alarms.

The evaluation team cites a positive observation that EES developed an alarm health-check application independent from the EMS. This application monitors the functionality of the alarm processor and alerts the system operator in the event of a stalled condition or failure. As noted above, the alarm health check feature also has no audible alarm. Due to the importance of this application, the evaluation team recommends that EES enhance the alarm health-check application by adding an audible alarm.

SPO:

The SPO generation management system (GMS) has a primary and a backup frequency source, both from within the western division of the EES system. Additionally, frequency information is available from the SOC and can be viewed on a supervisory control and data acquisition (SCADA) point within GMS if needed. The system operator console normally displays frequency from the western division, unless it is of bad quality, then it will automatically display the SOC value. The SPO does not monitor for islanding conditions.

EES is in the process of validating the reactive capabilities of fossil generating units in accordance with NERC reliability standard MOD-025-1. The process required a demonstration of the ability of the unit to produce the declared Mvar capability. The schedule included in MOD-025-1 requires 20 percent of units be validated by January 1, 2008, and EES is on schedule to meet that target.

EES attempts to keep dynamic reserves in the generators. EES also has two static var compensators and capacitor banks. A typical generator power factor is in the .98 to .99 range, leaving as much reactive reserve capability as possible with the generators.

The SPO system operators have the authority to initiate the capacity and emergency plan. Flow-charted criteria are available for reference.

2.2 Operational Focus

2.2.1 Operational Safety

System operation activities are conducted in a manner that maintains high levels of safety and reliability for all system conditions.

EES is confident that its corporate safety program has become a core value for each employee, ingrained through years of emphasis. Entergy's corporate safety program is dedicated to ensuring employee safety and health. Employee input for improving safety is solicited during confidential employee surveys. As a result, EES believes that this emphasis has positioned EES as an industry leader in industrial safety practices.

At the TOC's, a system operator independently develops each set of switching orders with a second-party review and check. EES does not allow canned switching orders. In addition to standard notations for line clearances, EES also has a "man in the station" symbol included in the EMS operating software.

EES promotes a professional atmosphere in the control rooms using dress codes, business communication standards, and vested authority in the shift managers to monitor and control the control room activities.

The SOC has an EMS display that shows the status of each special protection scheme (SPS). The EES system operators communicate SPS status changes to the reliability coordinator. EES performs SPS maintenance and testing consistent with its overall bulk transmission protection and control maintenance program. Maintenance templates automatically generate work requests, and completion of the work is documented within the EES substation work management system.

2.2.2 Operational Decision-Making

Operational decisions are reached using a systematic and thorough approach that supports safe, reliable, and efficient system operations.

SOC:

The system operators follow directives to operate the system safely and reliably, and have full authority to make critical decisions independently. If time allows, the system operators discuss all available options with the supervisor, duty chief, engineering support and planning group, to collectively determine the best option. EES has many study applications available for use in the decision process. Each operating position has a defined list of responsibilities available at all times.

EES operates to a minimum n-1 reliability criteria standard and, in some critical load pockets, plans for the loss of the largest transmission line and the loss of the largest generator. EES uses a load risk alert protocol that establishes the risk analysis process. The transmission operations planning group and security superintendents evaluate proposed transmission and generation outages to ensure continued reliability of the bulk power system.

EES provides advance preparation and training for infrequent events, including re-orientations or reminders of past events and lessons learned. EES provides decision making and risk analysis training in coordination with the SERC region and outside vendors.

SPO:

SPO system operators recognize their responsibility to follow approved procedures. For situations occurring outside the scope of developed procedures, the system operators consult with the current-day operations team, the operations superintendent, and operations management. System operators are empowered to make decisions with the information available at the time for situations requiring an immediate response. The SPO system operator responsibilities are available and defined in the *SPO System Dispatcher Responsibility & Authority* document.

EES convenes the Operating Subcommittee to develop strategies for a projected resource shortfall.

2.2.3 Operational Alignment

Organizational structure supports safe and reliable system operation.

The EES system operations center (SOC) and system planning and operations (SPO) organizations execute the EES balancing authority functions. The SOC is responsible for verifying and approving all interchange schedules; monitoring actual and scheduled interchange; responding to reserve sharing events by creating offset schedules; calculating an ACE signal and sending it to the SPO; and monitoring ACE, automatic generation control (AGC), frequency, and voltage and line flows. SOC personnel confirm and ensure that the outage coordination and generation mix is adequate for the entire EES system, giving special attention to the load pockets. Also on a daily basis, the SPO system operators plan and verify that total of the EES generation and other resources will meet the projected load. The SPO is responsible for ramping EES generating units to meet scheduled interchange (using AGC), resource planning, monitoring schedules in which an EES generating facility is listed on the physical path, participating as the generating entity of the reserve sharing system, creating tags for interchange transactions sinking to EES, planning and maintaining adequate operating reserves, and deploying reserves when needed. EES does not perform any functions for others at either facility. The SOC also performs all EES transmission operator functions. However, there are no transmission operator functions performed at the SPO location. These functions are completely separate.

EES operates the separate facilities for the SOC and the SPO as a result of its interpretation of the requirements of FERC orders 888, 889, 890, 890A. Due to this separation, the SOC cannot disclose any transmission-related information to the SPO. In daily operations, the marketing and generation dispatch plan is communicated to the SOC for the next day and various periods beyond. If the dispatch plan is such that it may cause reliability risks, the SOC will deny that plan and request that the SPO revise the plan; however, the SOC cannot recommend specific alternatives as this could reveal sensitive transmission-related information. The SOC will indicate if the deficiency is a need for more resources in a load pocket, or if there is a need to obtain output from a specific resource. Once SPO arranges for additional resources to meet the deficiency, the revised plan is sent by SPO to the SOC and the process is repeated until a dispatch plan is acceptable with the SOC. Although no observed impact on system reliability was noted, the evaluation team is concerned that this approach is inefficient and may cause delays in implementing an acceptable generation dispatch plan and may potentially jeopardize system reliability. The evaluation team recommends that EES investigate and implement opportunities to enhance the inefficient coordination between the SPO and the SOC caused by the application of the FERC Standards of Conduct requirements.

Congestion management is a collaborative effort between the SOC and ICT. If a parameter is observed as being close to a limit, the SOC and ICT communicate over the phone to validate the findings and determine corrective actions. These actions may include transmission loading relief (TLR) orders, generation re-dispatch, transmission reconfiguration, and load shed. The SOC is responsible for communicating information and corrective actions to the SPO and TOCs. The SOC also coordinates restoration activities with the ICT, neighboring balancing authorities and transmission operators, and the TOCs. Information provided to the SPO is limited due to Standard of Conduct restrictions.

For major system emergencies, EES operates a command center with a corporate communications group. The vice president, transmission is designated as the "storm boss" to eliminate bureaucracy and enhance communications with the public and coordination of field crews.

EES communicates process changes to the system operators primarily using online applications known as uses e-Room and Documentum. For policy changes that occur during real-time operations, EES supervisors or managers discuss the issue with the system operators on the control room floor. E-Room allows for voting on procedures with acknowledgements. EES also has a continuous six-week training cycle, and process and procedure changes are reviewed using face-to-face training. The SOC management has an open-door policy, and the system operators are always able to formally or informally comment on changes that affect operations. The system operators access operating policies, procedures, and standards using the Documentum program; there are no hard copies at the workstations. The evaluation team was impressed with the efficiency of the Documentum program, allowing system operators to confirm receipt and understanding of new or revised procedures, and cites it as a positive observation. The evaluation team recommends that EES expand the scope of the Documentum program to include all SOC processes and procedures, such as EMS operational procedures.

EES has an annual review process for all policies and procedures, and revisions must be reviewed by management-level subject matter experts. Electronic signatures in the Documentum program verify that the operators have reviewed new and revised procedures. Operations management can review a page in Documentum that shows which individuals have read the new and revised procedures as well as those who have not. The supervisor keeps updated hard copies of the NERC reliability standards and a "flashcard' reference to the standards.

The SOC 24-hour coverage has a day shift, 6 a.m. to 6 p.m., and a night shift, 6 p.m. to 6 a.m. There are six operating shifts with five NERC certified system operators on each shift, totaling 30 system operators. Each shift has a shift supervisor, who is the senior person on the shift and responsible for the shift activities.

The system operator shift-change procedure includes a review by the incoming operator of shift notes maintained in an Excel spreadsheet titled Floor Applications. Each workstation has an individual shift-notes display, including information such as contingency management details (generation shifts, TLRs, switching), equipment de-rates, abnormal equipment status, and policy or procedure changes.

A letter of operator authority is posted on a bulletin board in the control room clearly stating the system operator authority for the safe and reliable operation of the EES system in cooperation with neighboring operating entities and the reliability coordinator.

2.3 Managing System Configuration

Power system configuration is carefully designed, analyzed, maintained, and controlled throughout the life of the infrastructure, ensuring that system and equipment margins are understood, considered in decision-making, and managed consistent with design and system requirements.

The SOC control room has a static wall mapboard displaying the entire system in single-line form. EES expects to complete a project to replace the existing mapboard with a video mapboard in 2008. EES uses the PowerWorld application for voltage contouring displayed on a large plasma screen visible to all control room operators. Plasma screens also display actual voltages with minimum and maximum values. Violations flash using color coding, red for high voltage and blue for low voltage. The EMS has overview displays that represent the EES system by voltage level.

The SOC EMS has state estimator and real-time contingency analysis (RTCA) applications. The applications have capabilities to solve models with up to 15,000 buses; the EES network model presently uses approximately 3,400 buses. EES also maintains an external model in the state estimator using intercontrol center communications protocol (ICCP) data two buses into neighboring systems. The state estimator runs every 90 seconds and typically takes 10 to 15 seconds to solve. The real-time contingency analysis runs every 10 minutes and solves in approximately 30 seconds. EES updates the state estimator and RTCA models weekly. The state estimator availability has been 99.99 percent year to date. The system operators have various one-line displays to view the results of state estimator and RTCA analyses.

EES has a PowerWorld Retriever-based wide-area-view display with the capability to trend voltages and indicate overloads graphically.

Entergy is involved in the North America SynchroPhasor Initiative (NASPI) project, which involves time-synchronized phasor technology and sharing data with other participants. Entergy has 21 phasor measurement units (PMUs) online and is receiving measurements from approximately 25 other PMUs from the TVA phasor data concentrator. The NASPI program information is displayed on another plasma screen using a PowerWorld platform for geographic referencing of frequency points from the PMU processors.

EES uses an in-house developed application called the Transmission Automated Outage Request System that provides the platform for outage routing and approvals. The system interfaces with the available flowgate capacity (AFC) calculation process, System Data eXchange postings, OASIS postings, and multiple internal outage coordination processes.

The system operators use another in-house developed application (called Robotag) and OATI e-tagging to manage interchange transaction scheduling. Though they have no statistics to support their opinion, the system operators stated that they do not have a high rate of tagging errors and credit that to the automation provided by Robotag. The evaluation team recommends that EES establish metrics to measure and trend system and organizational performance (e.g. Robotag errors, remedy tickets). The operators stated that they have sufficient staffing to handle the interchange transaction duties. The operators could not think of any tool upgrades or additions they needed to better perform their job duties as they relate to interchange management. They also stated that they are comfortable letting management know what they need, and management is very responsive to requests and suggestions.

EES developed an analysis tool called Transmission Reliability Application to monitor and log the results of system operator reliability actions on flowgates in the EES system. This valuable

tool allows system operators and planners to analyze system conditions that may have existed in the past and to review the actual results of remedial actions taken on flowgates. Clients connect to an application server within the EMS network. The application server records all actions to a centralized database and provides updates back to all clients connected to the system. EES system operators continuously update the database with new information regarding flowgate control action, improving the existing database. The evaluation team believes this is a unique application for archiving "lessons learned" for immediate recall and review, and cites the Transmission Reliability Application as a potential example of excellence.

EES is a member of the SPP Reserve Sharing Group and responds to operating reserve delivery requests upon activation. SPP calculates the minimum daily reserve requirement for the group and assigns reserves allocations to each member daily. The SPO is responsible for maintaining the EES operating reserve obligation. For the loss of an EES generator, the SPO submits the reserve-sharing request and the recovery MW amount. The SOC is responsible for submitting emergency assistance schedules and creates schedules for emergency assistance wheeling through EES.

EES has ring-down communications circuits to the SPO, TOCs, EES generating plants, independent power producers and cogenerators, ICT, interconnected system control centers, NERC, SERC, and MISO (Midwest Independent Transmission System Operator). EES records all SOC control room voice communications.

EES considers all remote terminal units (RTUs) communicating to the SOC as critical facilities, and the system operators monitor and assess the EMS displays continuously.

EES gives special attention to all nuclear facilities and has made specific modifications to the state estimator and contingency analysis programs to provide system operators with enhanced capability to monitor the reliability of nuclear off-site power. Other important facilities receiving special attention include transmission lines with temporary stability limits. These stability ratings are in place of the normal thermal limit and monitored by the system operators as if they were the actual rating of the line.

EES is in the process of developing a "real-time" voltage stability analysis tool to facilitate the evaluation of stability limits and transfer limits around defined load pockets.

EES developed a process for real-time calculation of generation shift factors to aid in congestion mitigation strategies. The evaluation team cites this as a positive observation.

The numerous advancements in technology and tools developed by EES are presented to the system operators in several fashions within the control room environment, creating a non-uniform system of tools and displays. The evaluation team recommends that EES integrate the technology in the control room to streamline the equipment and data presentation.

EES has many other operating tools, including the following:

- trending application (virtual charts)

- weather forecasting services
- lightning tracking system
- electronic tagging system (OATI)
- scheduling coordination service
- reserve sharing system
- Reliability Coordinator Information System (RCIS)
- System Data eXchange
- system monitoring and trending
- regional communications terminal (SERC Hotline)

2.4 Emergency Preparedness

The organization is prepared to manage and mitigate the impact of system emergencies in order to preserve the reliability of the system and to protect the interests of the public.

The SOC has emergency procedures documents titled *Backup Control Plan, Operating During a Loss of Voice Communications,* and *Entergy System Restoration and Blackstart Plan.* EES has a "storm team" comprised of key management outage response personnel, a command center used during an emergency event, and a designated corporate communications group. EES also has an operating subcommittee that meets any time short-term or dynamic events occur or if load is at risk. Designated operating subcommittee personnel distribute information resulting from these meetings to "the rest of the world."

A detailed discussion on the backup control plan and related topics is in Appendix 1. EES system operators carry a card identifying them as critical to the electric infrastructure, allowing them to pass through road blocks and local curfews during emergency situations. The evaluation team recommends that EES provide these additional communication features: 1) establish a "blast" message to alert relevant entities of a move from the primary to the backup control center to expedite notifications and 2) provide for a transfer of voice communications between the primary and backup control center to allow a seamless transition.

The EES system restoration and blackstart plan describes the overall system restoration effort for the EES balancing authority area to ensure that system restoration and blackstart activities are performed in a stable and orderly manner, with a priority given to restoring the integrity of the interconnection. This plan is supplemented by individual TOC plans. The SOC and the ICT coordinate restoration activities among the TOCs and with neighboring systems.

The SPO will implement the capacity and energy emergency plan during a system-projected or dynamic shortfall of adequate generation resources. The SPO system operator has the responsibility and authority to take any action necessary to ensure stable and reliable system operation. The SPO *System Dispatcher Responsibility & Authority* document explicitly states this responsibility and authority. Additionally, the senior vice president, system planning and the

vice president, energy management issued a memorandum explicitly stating the system operator authority to take any action necessary to keep the interconnected bulk power system reliable. Several current-day procedures reference the load curtailment process as a last resort.

SOC system operators have an EMS display that shows the critical line configurations for each nuclear power plant. EES maintains a Web site to post any element outage within a two-bus radius of each nuclear plant, and plant operators routinely review the Web site. EES monitors real-time and post-contingency voltages at its nuclear power plants using the contingency analysis program under a nuclear voltage tab. EES procedures require notification to the plant control room for potential voltage violations, and a plant operator will then organize a conference call to discuss the issue. The nuclear plant operator taking the lead to set up the conference call allows the SOC to address voltage issues within the requirements of the FERC Standards of Conduct.

EES uses satellite phone systems for emergency communications with the SOC, TOCs, ICT, and neighboring systems. EES has all internal satellite phone numbers documented but does not have the neighbor's satellite phone numbers. The evaluation team recommends that EES exchange satellite telephone numbers with neighboring systems.

EES has demonstrated its outstanding ability to manage and restore the electric system as evidenced by its monumental efforts during the events of hurricanes Katrina and Rita. The EES storm team, emergency command center, and corporate communications group are key components in effective and efficient management of emergency activities. The evaluation team cites a potential example of excellence for the outstanding system restoration and coordination with others following hurricanes Katrina and Rita; these efforts were recognized by awards from the Edison Electric Institute.

3. Fundamentals of Maintenance

3.1 General

Maintenance is conducted by skilled personnel to achieve safe, reliable control center equipment and system performance.

EES provides a qualified support staff of 37 employees for all EMS (database and applications) and communications systems on an around-the-clock basis. A large portion of the technology delivery staff is dedicated to supporting the SOC; supported technology includes the EMS, servers, internal and external communications networks, hardware for phones, UPS, RTU (communications and trouble shooting), OASIS, OASIS Automation, Robotag, and (development of) in-house applications. EES documents problems using an electronic reporting system that tracks problem assignment and remedies from initiation to resolution.

EES uses a development system to verify EMS software changes are working properly before installing on the real-time EMS. The system operators must approve any software or hardware changes before they are initiated.

EES has an automated process that monitors the EMS network at the primary and backup facilities and notifies maintenance personnel of any failures by text message. EES performs weekly tests of the SCADA at the backup facility, satellite phones tests at backup facility during routine drills several times annually, ICCP data set-up tests at the backup facility annually, and ICCP server tests at the primary facility weekly.

EES has digital fault recorders at key locations on the transmission system. The units have sequence-of-events functionality to monitor breaker operations and meet NERC and SERC technical requirements. The units are capable of being upgraded to meet NERC and SERC dynamic disturbance recorder functional requirements; one is installed in Texas. The disturbance monitoring equipment is time synchronized to coordinated universal time.

EES has a resource team to analyze all generation and transmission system protection trip misoperations, establish what happened, and recommended corrections. The power plant operators are responsible to report and document misoperations of generator relays. The plant operators can draw from inside or outside resources to determine cause and corrective action.

3.2 Equipment Reliability

3.2.1 Equipment Performance

The organization achieves high levels of equipment reliability. Equipment problems that impact reliability are resolved in a thorough and timely manner.

SOC:

The system operators are notified by audio and visual alarms of all telemetry failures. Additionally, each hour they review metered MWh comparisons to tie-line integrated MW averages and opposite end-of-line integrated averages to verify correct values. The system operator can replace erroneous meter values with secondary backup values, opposite end–of-line values, or calculated “net around the bus” calculations to use in the area control area (ACE) calculation until the primary meter value is corrected.

EES uses TrueTime frequency and time-error devices in the primary control center that do not require calibration. EES verifies time error weekly with MISO to ensure valid data.

All EMS applications are continuously monitored for network connectivity, disk utilization, and CPU usage; all EMS network devices are monitored via a server that employs Simple Network Management Protocol and various health checks. The back-end telecommunications equipment is wired to provide alarm output to a local RTU.

The market systems support group monitors a small subset of specific application errors for the Robotag, energy accounting, and generator imbalance agreement applications via an e-mail notification program. The market systems support group relies upon reports from the system operators to the on-call technician for other real-time monitoring checks.

The system operators receive alarms for network connectivity and disk utilization from the systems, and all alarms are monitored by an external system. The external monitoring system sends alarms to system management personnel through a combination of e-mails and pager alerts. The EMS network monitoring server sends alarms to the EMS network team through a combination of e-mails and pager alerts.

SPO:

SPO uses vendor-provided software to monitor the EMS network for bandwidth, network performance, and server/network node availability. The HP System Insight Manager provides proactive notification of actual or impending component server hardware failures (disc drive, memory, etc).

SPO monitors the UPS and backup generator systems using a facility surveillance system. The surveillance system sends alerts whenever someone enters the room (motion detection), if the generator runs, if the generator or UPS is in alarm, and for high temperature.

3.2.2 Work Management

Work activities, including corrective, elective, and preventive maintenance, surveillance testing, and modifications, are managed effectively to support safe, reliable operation during both outage and routine periods.

SOC:

The EES system operators report computer problems with an automated tracking program called REMEDY that sends e-mails to a pre-determined call list. There is also an "on-call" telephone list available to the system operator. The evaluation team observed that there is a backlog of REMEDY tickets, including some that have been referred to the software vendor. The evaluation team recommends that EES establish metrics to monitor and trend REMEDY tickets to determine if staffing is adequate to keep up with the system needs, and to maintain an awareness of the potential cumulative burden of the ticket backlog.

EMS software development is performed by a software development team and tested in the Control Library. The REMEDY system tracks changes, and data owners provide approvals. The group that develops the code cannot move it to production. After quality assurance testing, the EMS staff notifies the operators of the update availability. The operation crew on duty has the option to refuse the change. If it affects the ICT, the ICT must approve also.

On the facilities tour, the evaluation team noticed several maintenance manuals, instruction sheets, packaging materials, and spare parts randomly around the computer room. The evaluation team recommends that EES improve housekeeping to minimize the presence of combustibles and other items stored in the computer room.

The SOC support staff is available as follows:

- Market system support: not on-site full time; employees participate in a one week on-call rotation every six weeks. The on-call technician for that week serves as the primary respondent for all reported problems, though issues may be handed off to other group members if needed.

- EMS: Someone is located on-site for normal duty and on-call for after hour support with an on-call rotation within the staff.

- EMS network: An EMS Network Team member is located on-site at the SOC during normal business hours and on-call for after-hour support with an on-call rotation within the team.

- Telecommunications: Telecom typically has someone on duty at the SOC during normal business hours and available for call out support around-the-clock.

SPO:

The generation management system equipment is maintained by the GMS support team of four technicians who rotate on call 24 hours a day, 7 days a week. The support team limits risk by applying unproven changes to a developmental computer system before implementing changes on the production system.

4. Fundamentals of Operational Planning

Operational planning provides the technical information and support necessary for safe, reliable system operation.

The SOC transmission operational planning group supports the system operations group with day-ahead contingency analysis studies and mitigation plans for identified issues, including transmission and generation outages and updated load forecasts. The study results and mitigation plans are discussed daily with the system operators. EES also provides the system operators a summary of the next week's planned transmission outages and detailed information concerning any limitations and associated mitigation plans.

The next-day studies are performed each evening using two load forecasts, expected system temperatures, updated system models that represent the scheduled outages, and the scheduled generation mix. Study results are reviewed with the shift supervisor and passed on to the next shift at shift change.

EES runs a daily nuclear contingency analysis using the latest daily peak case to ensure adequate off-site voltage with the loss of the nuclear unit and a transmission element.

EES has a five-year nuclear power plant outage plan, three-year plan for fossil units, and 18-month plan for transmission outages. The transmission operational planning group supports the planning schedule through 18 months forward.

EES operations management ensures that all system problems are addressed through the operations planning process.

The transmission operational planning group implements facility rating changes in impacted daily power flow models and through next-day analysis and other planning studies; the group communicates changes to affected work groups and operations staff. Once the operations staff is notified, the limit is changed in the EMS, which populates into each system operator tool.

EES uses vendor software (PSS/E, PowerWorld, and MUST) for day-ahead operational planning analysis. The daily base case models are derived from regional working group model development activities, including the Eastern Interconnection Reliability Assessment Group, Multiregional Modeling Working Group, SERC Long-Term Study Group, and SERC Near-Term Study Group. Entergy also coordinates through a "SEAMS" process with Southern Company and TVA for monthly model development and then develops detailed monthly models for internal use and daily models for use in all operational planning analysis. In daily operational planning power flow models, representation of external systems is based on the base case models developed by the study groups mentioned above.

Generator dispatch scenarios in daily operational planning power flow models are based on the unit commitment provided by the SPO and historic run levels for EES network resources. The output of merchant facilities in power flow models used for operational day-ahead analyses is based on both historical output and confirmed transactions.

EES uses the AFC approach for calculating available transmission capability and evaluating requests for transmission service under the EES open access transmission tariff. The AFC software package recalculates new AFC values every hour (called a resynchronization) for the operating horizon (defined as all hours of the present day; and after noon, the horizon expands to include all hours of the next day), four times a day for the planning horizon (end of the operating horizon through day 31), and once a week for the study horizon (end of planning horizon through month 18). Between resynchronizations, the software algebraically adjusts the AFC values as new requests are submitted and approved or as previously accepted requests are retracted or withdrawn.

5. Fundamentals of Training

5.1 General

Training in both specific job-related skills and broader technical fundamentals is used to provide highly skilled, knowledgeable personnel for safe, reliable operations, and to achieve performance improvement.

Candidate Selection:

System operator trainee candidates have various backgrounds and levels of experience. Historically, the TOCs have been a primary source; recently, engineering graduates have also been a source. EES prefers a diversity of sources to create a balance of experience in the SOC control room. The number of new trainees per year normally varies significantly. EES expects

two to three per year going forward due to anticipated retirements. EES does not have an exam or other testing program but does require a drug test and a background check for all new hires.

Initial Training:

The initial training program is designed to provide an acceptable minimum understanding of NERC standards and EES policies and procedures. Training coordinators hold introductory training sessions to introduce new operators to the NERC standards. In-house training includes on-the-job training working with experienced, NERC-certified operators and structured classroom training provided by the training department. EES combines vendor and in-house training to prepare trainees for the NERC certification exam. The typical training period for new operators is 6 to 12 months, depending on experience. Experienced operators from the TOCs typically require the least initial training time.

The determination for when a trainee is sufficiently trained to operate independently in a shift position requires the recommendations of the trainers, four to five system operators the trainee has worked with, and the shift supervisor. The manager, transmission system security has the final call to add a new system operator in the shift rotation schedule.

The evaluation team recommends that EES develop and implement a checklist designed to track initial training progress (with sign-off) for each control room position at the SOC.

Continuing Training:

One week of the six-week system operator shift schedule is a dedicated training week (Monday through Friday). The training shift provides ample time off shift to complete all required training. EES uses no routine overtime for training. The evaluation team cites a positive observation for the EES management support for adequate operator staffing to accomplish operator training requirements without overtime. Each system operator develops a personal training program based on assigned topics and is responsible for completing the training sessions for the training shift.

The SOC conducts in-house classroom training on various topics listed in Appendix A of the NERC certification program manual, computer-based training modules, and vendor-provided products. EES is a NERC-approved continuing education provider, and all in-house developed training is certified for continuing education credit. EES uses subject matter experts, such as relay engineers, for approximately 60 to 70 percent of the specialized classroom training.

EES uses the Systematic Approach to Training and ADDIE, which are holistic training and training management methods, to analyze job descriptions for all levels and has started a job task analysis in anticipation of NERC standard PER-005. EES has designed its training program to address known weaknesses and continuously evaluates the program. For example, system operators complete feedback forms after each training session to asses the effectiveness of the presentation.

Administration:
The SOC employs two full-time trainers reporting to the manager, transmission system security, who approves all training materials and plans. EES requires trainers to be NERC certified with 10 years of system operating experience. The trainers have no other responsibilities. The SOC has received management approval for a third trainer, mostly to develop on-the-job training. EES has no formal training committee overseeing the system operator training program.

The EES dedicated trainers have attended NERC- and SERC-sponsored "train the trainer" sessions, and upper management supports continuing such training.

EES has been a NERC-approved continuing education provider since the program began. EES has approximately 110 certified hours of approved lessons.

EES training plans are task oriented, developed using operator feedback, and are within the NERC-recommended training categories. Some operators may request a specific topic, and EES uses specific computer lessons on an as needed basis. The trainers determine operator training requirements with input from operations supervisors and operator feedback forms. The trainers review the training programs twice per year, or more often as needed.

In 2007, the EES training staff tasked each system operator to choose a training topic and develop and deliver the training; some training was accredited for NERC continuing education. The evaluation team cites this as a positive observation.

The evaluation team reviewed the SOC training plans for 2007 and 2008, individual training records, training attendance records, and the list of NERC certified operators; all documents and records were adequate and accurate.

Specialized Training:

Every SOC system operator attends the SERC operator conference each year, covering topics such as standards, situational awareness, blackout simulation, and relaying zones. The SOC system operators attend SPP regional or subregional blackstart drills, SERC operators' conference, and the American Power Dispatchers Association operators' conference. EES sends 10 to 12 operators annually to SPP for regional blackstart simulator training.

EES administers simulated exercises for blackstart and system restoration twice per year. It is mandatory for each operator to attend at least one session per year.

EES conducts backup control center training at least once per year (usually twice).

EES operates an in-house training simulator that emulates the actual EES operating environment. Training scenarios include light-load, undervoltage, and line-outage simulations. The training department also uses lessons learned to develop scenarios. Feedback received from the system operators is very positive. EES is making ongoing simulator enhancements to include blackstart training. The evaluation team cites a positive observation for the effective use of the dispatcher training simulator, including scenarios for normal and emergency operating conditions.

The SOC EMS group provides associated training (that may take place on the control room floor) for EMS changes. Time is available within each training week for last-minute topics.

SPO Specific:

5.2.1 Human Performance
Personnel select and apply appropriate human error prevention techniques commensurate with the importance of assigned tasks to minimize the frequency and consequences of events.

The TOC system operators independently develop each set of switching orders with a second-party review and check.

Communication is 80% of the activity at the SPO, and management stresses three-part communication techniques. Training includes techniques to avoid "traps" in communication.

The SPO conducts annual performance evaluations linking pay to performance. Operations management meets with the duty chiefs to emphasize accuracy and error prevention. Performance improvement plans are tied into training.

EES requires requalification training of its system operators after an extended leave using on-the-job training. The returning operator temporarily functions as an extra person on the shift.

EES administers disciplinary and corrective action procedures in coordination with the Human Resources department, using a standard progressive disciplinary process.

Some communication skills are practiced during operator training to instill situational awareness; however, there is no specific focus on human performance. The evaluation team recommends that EES include human error prevention techniques in the system operator training program.

APPENDIX 1: Critical Infrastructure

The following discussion will be presented under private letter to the evaluated entity only and will not be included within the public version of the report.

APPENDIX 2: Entity Participants

The following will be presented under private letter to the evaluated entity only and will not be included within the public version of the report.

APPENDIX 3: Documents Reviewed

The following will be presented under private letter to the evaluated entity only and will not be included within the public version of the report.