

**Balancing Authority/Transmission Operator
Reliability Readiness Evaluation Report**

**Southeastern Power Administration
Elberton, Georgia**

February 26–March 1, 2007

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Introduction and Evaluation Process

The North American Electric Reliability Council (NERC) Reliability Readiness Evaluation and Improvement Program is one of the commitments of NERC and the industry following the blackout of August 14, 2003, 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. The document [*NERC Readiness Audit Procedure*](#) describes and defines the process used for reliability readiness evaluations. This document and other documents related to the program are available at <http://www.nerc.com/~rap/>.

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 energy infrastructure will be contained in Appendix 1, a confidential appendix to the report that is sent privately to the organization evaluated and is not included in the public version of the report.

The evaluation team for the Southeastern Power Administration (SEPA) met on-site with SEPA representatives from February 26 to March 1, 2007. This report reflects the views and recommendations of the evaluation team regarding the readiness of the SEPA to meet its responsibilities as a balancing authority and transmission operator.

Evaluation Team

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Organization Profile

SEPA was formed by the United States government under the Department of Energy in 1950 to market power from the hydroelectric projects in the southeastern states. SEPA became a control area in 1995. SEPA markets power from 22 projects with a generating capacity of 3,412 MW. A project consists of a dam, a reservoir, the hydro power plant units generating from the reservoir head, and the switchyard connecting the generators to the electrical grid. All energy produced by SEPA generation, except for a small amount required for its own use, is sold to wholesale customers. SEPA customers include 199 electric cooperatives, 293 public bodies, and three investor-owned utilities. SEPA operates in Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Virginia, North Carolina, South Carolina, and Illinois.

SEPA is a generation-only balancing authority (no load) for three projects with an approximate capacity of 1,400 MW. SEPA balances its generation with schedules to its wholesale electric customers. The SEPA balancing area is interconnected to Southern Company, Duke Power, South Carolina Public Service Authority, South Carolina Electric & Gas Company, and Alabama Electric Cooperative, Inc.

SEPA is a transmission provider but does not own transmission lines. SEPA is a transmission operator for three switchyards in its balancing authority area and seven switchyards in the Southern balancing authority. It is the transmission operator for the switchyards associated with the hydro generators. Since some of the switchyards are connected to more than one neighboring balancing authority, power flows through SEPA between balancing authorities.

SEPA also markets power from 12 other projects for which other organizations provide both the balancing authority and transmission operator services.

Executive Summary

The evaluation team found no significant operational problems and concluded that the SEPA balancing authority and transmission operator 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.

SEPA is committed to reliable operations and supporting the interconnection during abnormal conditions, as indicated by its willingness to supply more reactive power than contractually required for voltage support, to work with the reliability coordinator to develop local procedures to back down generation to resolve congestion, and to develop blackstart plans even when SEPA is not part of the formal SERC restoration process. SEPA is in the middle of a multiyear project to update project equipment that includes improving its control equipment to enhance its ability to meet reliability needs.

SEPA is in the process of developing a comprehensive training program. The present training program plan being implemented is adequate but will improve when the recommendations listed in this report are implemented.

Recommendations 1 (additional alarm functionality) and 2 (increased SEPA switchyard visibility) were included in Recommendation 4 from the previous readiness audit, which occurred in September 2004. This evaluation team considered these two recommendations to be the highest priority recommendations. While SEPA has had plans to implement these recommendations, the budgeting process inhibited their timely implementation. Funding also was indicated by SEPA as an impediment to completing improvements in the training program.

SEPA has organized documentation and an effective process for tracking and distributing changes. SEPA has a shift-change process that includes a daily summary that the operators use and find effective.

The evaluation team identified a number of positive observations. It also offers 16 recommendations that, if implemented, will enhance SEPA's readiness to operate reliably and maintain the reliability of the bulk power system. The findings are listed in order of importance.

Positive Observations

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

1. SEPA shows a commitment to reliability (Sections 12c, 12f, and 13).
2. SEPA supports the interconnection during abnormal conditions (Sections 12c, 12f, and 13).
3. SEPA has a complete shift-change procedure with documentation that includes a daily status report and time scheduled for the operators to effectively pass the system status to the oncoming shift (Section 6).
4. SEPA conducts announced and unannounced evacuation drills to the backup control center (Section 9).
5. Operators prepare a detailed report suggesting potential improvements and listing problems found after the backup control center evacuation drill (Section 9).

6. SEPA tests its backup control center equipment and communications weekly (Section 9).
7. SEPA has a six-shift schedule that provides time for training (Section 5).
8. SEPA has continually improved its training program (Section 5).
9. SEPA has an effective procedure using its *Pass-down Log* for tracking policy and procedure changes (Section 6).
10. SEPA's operating procedures are well organized with a detailed review policy (Section 6).

Recommendations

The evaluation team recommends that SEPA take the following actions to address issues discovered during the evaluation process:

1. Complete the planned additional alarming functions for equipment limits, high and low voltage, and system status changes (Sections 10, 12a, and 12b).
2. Complete the planned addition of the remainder of substation one-line displays for switchyards for which SEPA performs the transmission operator function (Sections 10, 12a, and 12c).
3. Apply a more systematic approach to the in-house training courses (Section 5).
4. Provide operators with more opportunities to plan training and choose training topics (Section 5).
5. Complete planned training courses on electric system basics, reactive power and voltage support, and protection systems (Section 5).
6. Provide additional simulation training for operators (Section 5).
7. Track operator participation in evacuation drills, emergency training, and cyber security using formal training records (Section 5).
8. Include using satellite phones in a drill (Section 9).
9. Include drilling on transferring control between the "A" and "B" computer systems (Section 9).
10. Repair the incorrect frequency data point or remove it from the automatic fail-over sequence for automatic generation control (Section 12c).
11. Add a voice recorder at the backup control center (Section 9).
12. *See discussion in Appendix I.*
13. *See discussion in Appendix I.*
14. Use a redline document or change notes for the *Pass-down Log* to help operators recognize updates (Section 6).
15. Develop operator display to show required and actual reserves (Section 12h).
16. Develop operator display for reactive power availability (Section 12d).

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 and positive observations that the team identified. The report uses the generic term "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 the *balancing* system operator, or *transmission* system operator.

1. Agreements

The balancing authority must have agreements that establish its authority as a balancing authority. The balancing authority/transmission operator must have agreements that establish the reliability coordinator for its footprint.

The evaluation team reviewed the SEPA agreements and found them to be in good order. SEPA is listed as a balancing authority and transmission provider on both the SERC and NERC Web sites. SEPA provided a letter from SERC certifying SEPA as a control area, balancing authority, and transmission provider.

The evaluation team reviewed the SEPA contracts with neighboring balancing authorities and transmission providers and found they included the desired subject matter the evaluation team reviewed as discussed in various sections of this report.

SEPA signed several memorandums of understanding with the United States Army Corp of Engineers (the Corp) giving SEPA the authority to act as the balancing authority and transmission provider for the facilities owned by the Corp. The memorandums of understanding cover interaction between SEPA and the Corp as the operators for both the generation and transmission resources.

The evaluation team reviewed the agreements between SEPA and the VACAR South reliability coordinator and found them to be complete. The *VACAR South Subregion Reliability Plan* establishes VACAR South as the reliability coordinator. The *VACAR South 2005 Reliability Coordination Agreement* lists the roles and responsibilities for SEPA and VACAR South and gives VACAR South the necessary reliability coordinator authority. The *VACAR South Reliability Coordination Agent Agreement* names DukePower as the reliability coordinator agent to perform the reliability coordinator function.

Portions of the SEPA transmission operations are in the Southern subregion of SERC, for which Southern Company is the reliability coordinator. SEPA signed the *Security Coordination Agreement for the Southern Subregion of the Southeastern Electric Reliability Council* establishing Southern Services Company as the reliability coordinator for that area of the interconnection.

2. Operator Authority

The balancing authority/transmission operator is responsible for establishing and authorizing the system operator position that will have the on-shift responsibility for the safe and reliable operation of its portion of the bulk power system in cooperation with neighboring operating entities and the reliability coordinator.

The assistant administrator at SEPA issued a memorandum outlining the authority of the operators. Each of the operators signed the memorandum stating that they understand and accept the responsibility. The evaluation team finds that the authority statement is appropriate for the SEPA operations. It does not include provisions for interrupting firm load since the SEPA balancing authority area does not have any load. The *Conduct of Operations* book located in the

control room and the *Power System Operator Job Description* also outline the operator authority and responsibility.

The evaluation team reviewed the *Memorandum of Understanding between SEPA and the Corp* and found that it gives SEPA the necessary authority to direct the operation of the Corp-owned equipment and reliably operate the system.

The operator interview confirmed that the operators accept the authority necessary to reliably operate the system and that management expects them to take necessary action without seeking supervisory approval. The operators also stated that the SEPA and Corp operators coordinate operations and that the Corp operators will follow directives when necessary.

3. Delegation of Authority

Any functions that have been delegated must be clearly documented. The documentation must recognize that the balancing authority/transmission operator that is delegating the function continues to be responsible for that function.

SEPA indicated that it has neither delegated any authority to another organization nor accepted any delegation of authority from the reliability coordinator.

The Corp owns the equipment operated under the SEPA balancing authority and transmission operator authority. The Corp maintains, operates, performs the switching for, and administers improvements to the generation and switchyard equipment. SEPA and the Corp have developed memorandums of understanding outlining the authority and responsibilities of both organizations. SEPA and the Corp have regular meetings to coordinate their activities and resolve any issues that develop.

4. Staff Certification

Balancing system operators and transmission system operators must be NERC-certified operators. The balancing authority/transmission operator must have sufficient NERC-certified operator staff for continuous coverage of the system operator positions.

All SEPA operators and lead operators are NERC certified with the Balancing, Interchange, and Transmission Operator credential. The evaluation team found that all functions requiring certification were performed by personnel certified with the appropriate credential. The evaluation team reviewed the SEPA certification records and the signed NERC certificates and found that all certificates were current. The evaluation team reviewed the shift schedule and verified that each shift position requiring NERC certification was staffed by certified operators. Certificates for all operators requiring certification are current until at least 2008.

5. Training

The system operators must be adequately and effectively trained to perform their roles and responsibilities. The balancing authority/transmission operator must have documents that outline the training plans for the system operators. The balancing authority/transmission operator must have training records and individual staff training records available for review.

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The evaluation team reviewed the SEPA training program. The program provides the NERC-required emergency training and the continuing education hours necessary for recertification. One of the two lead power system operators acts as the trainer. The trainer participates in both NERC and SERC training workshops. The SEPA program does not meet the requirements for a NERC-approved provider of continuing education hours. The program is under development and moving in the right direction.

The initial training for new operators includes review of purchased training materials and on-the-job training with experienced operators. SEPA completed a job task analysis according to the Department of Energy requirements and has designed its training program to meet the operator skills and knowledge requirements determined by this analysis. The training requirements are outlined in the *Power System Operator Qualification Standard*. SEPA selected vendor-supplied training courses to cover the necessary topics outlined in its standard. The training is often online or computer-based courses that the operators complete at their own pace. The purchased training material includes training to prepare for the NERC operator certification test. The operators learn the required skills during the on-the-job training. After completing the necessary training material and obtaining NERC certification, the lead operators decide if the candidate is ready to assume independent shift responsibilities.

SEPA selects candidates for training from the federal personnel system. Job announcements list the job qualification and educational requirements. Human resources personnel evaluate the candidate's knowledge, skills, and abilities for the position, and then select three candidates from the screening for a background check. After an acceptable background check is completed, the final candidate is selected and the training begins. The candidate is given about one year to complete certifications and the other requirements for the operator position.

The *Power System Operator Training Program* document includes the objectives for SEPA continuing training. It outlines the SEPA training program and the individual operator training requirements for the current year. SEPA uses a combination of vendor-supplied material, its own training courses, and SERC training. The vendor-supplied courses and the SERC courses are used to meet the continuing education hour requirements. The SEPA-developed courses meet necessary training requirements; but since SEPA does not meet the continuing education provider requirements, the courses are not used for the NERC training requirements.

The SEPA shift schedule has a six-shift rotation with one week in each six weeks designated for training. Individual training is tracked in an automated spreadsheet, which is submitted to human resources for tracking in its database. The spreadsheet includes the operator names, the expiration date of their certifications, the number of continuing education hours that are carried forward from previous years, and the number of training hours operators have scheduled for the current year. It also includes a list of training courses with the expected hours to complete each course; the date completed; and whether the courses meet the requirements for certification, cover NERC policy, or enhance professional development. Due to a variation in shift schedules, some operators received more training than others, but the training records verified that the operators received the training as outlined in the plan. All operators met the NERC required 32 hours of emergency training. The team commends SEPA for building adequate time in the schedule for training.

SEPA did not provide the evaluation team with training objectives for its in-house-developed training material. While SEPA asked the operators to complete an evaluation of its training, it did not have them demonstrate that they understood and learned the material covered in the course. The evaluation team recommends that SEPA apply a more systematic approach to the in-house training courses with documentation that includes

- Course objectives
- Course description
- Course outline
- Training material
- Measurement of course effectiveness

SEPA does not have a dispatcher training simulator but does participate in the SERC Southern subregion restoration drill; the drill includes a group exercise on a simulator but not individual simulator exercises. SEPA operators also participate in in-house-developed tabletop exercises. The evaluation team recommends that SEPA provide additional simulation exercises for its operators that include operator responses to emergency situations.

The evaluation team reviewed the training plan and operator knowledge in specific topics. During the operator interviews, the operators provided training subjects that they believe would benefit them. The operators stated that they have been to some worthwhile training courses and some that were not very relevant to their job. The operators interviewed were interested in the training process and had ideas that may improve SEPA training. The evaluation team recommends that SEPA provide the operators with more opportunities to plan training and choose training topics. From its review, the evaluation team supports the need for training in the following courses that are included in the SEPA training for this year:

- Transmission system basics
- Voltage control (reactive power and voltage support)
- System protection

SEPA training includes evacuations drills, emergency training, and cyber security training. In reviewing the annual training program records, the evaluation team did not find these areas recorded. The evaluation team recommends including them in the formal training records so that individual operator operation participation can be verified and tracked.

6. Operating Policies and Operating Procedures

The balancing authority/transmission operator must have an established procedure to ensure that system operators and operations staff are aware of any changes to NERC, regional, and/or local policies or procedures prior to taking over control of a shift position.

The balancing authority/transmission operator must have shift change procedures for updating incoming shift personnel on the current status of the system.

The evaluation team was provided with all of the documentation it requested, and the documents were organized so that it was easily retrievable by the operators. The operators located the

operating policy and procedures quickly. Most procedures are included as *Conduct of Operations* manual and its appendices that include the System Restoration Plan (Appendix F), Shift Change Procedure, and the Capacity and Energy Emergency Plan (Appendix G). The documents follow a specific format that includes sections for the purpose, a listing of who is responsible for following the procedure, specific responsibilities listing what actions are included or required by the procedure, activities showing the steps to be taken in the execution of the procedure, and failure modes and effects analysis. Some of the larger procedures are in separate documents not included in the *Conduct of Operations* appendices. The SEPA documentation covers the scope of the activities for which the operators are responsible.

SEPA had hard copies of all procedures readily accessible in the control room, and the SEPA procedures along with the NERC manuals were available online. The operators could not find the online copy of the SERC manuals.

The *Conduct of Operations* also include a procedure for maintaining and revising procedures, including the method for informing the operator of the changes. The evaluation team commends SEPA for its organized documentation including the documentation control procedure.

Standards changes are included in vendor-based training for the current standards on an ongoing basis, while other changes are communicated on a one-on-one notification by the lead operators, by e-mail notification, and by listing in the *Pass-down Log*. The *Pass-down Log* informs the operators and tracks operator review of changes in SEPA policy and procedures, NERC and SERC policy, PJM procedure, and also temporary changes or summaries of changes in other external guidelines. The changes are put into the *Pass-down Log* with a cover sheet on which each operator must sign off. The notice is removed when all operators have reviewed the material. The evaluation team commends SEPA for tracking and documenting new and revised operator information. The evaluation team did notice that some of the SEPA policies and procedures were lengthy, and the changes, which may be minor updates, were not always easily identified. The evaluation team recommends providing redline copies of the documentation, when available, for the *Pass-down Log* or noting the change on the cover sheet when appropriate.

SEPA has a detailed shift-turnover procedure that is included in the *Operations Standards*. SEPA operators keep a detailed operating log. Each page has a sign-off area that each operator must use to indicate that he or she has reviewed that page. SEPA operators also maintain a daily log that summarizes the system conditions of all projects at the end of each day in a standardized format. The daily log is invaluable for passing on the system conditions to the next operator. The operators indicated that they used this daily log, with one operator stating, "This is my bible" for knowing the status of the system, especially after being off shift for more than a day or two. Between the daily log and the current-day portion of the operations log, SEPA has thorough documents for passing on system status to the next shift. SEPA has 15 minutes built into the schedule for the shift changeover, which is adequate for the SEPA system. The team commends SEPA for its thorough shift-exchange procedure that includes the formalized daily log summarizing the system conditions.

7. Planning

The balancing authority/transmission operator and its supporting planning organizations must have a process for day-ahead planning, and for longer-term planning, such as week-ahead, seasonal, and year-ahead, for the operation and outage scheduling of transmission facilities and generation and reactive resources.

The balancing authority/transmission operator and its supporting planning organizations must have agreements with its reliability coordinator to ensure that day-ahead and longer-term plans for the operation and outage scheduling of transmission facilities, and generation and reactive resources, will not jeopardize the reliability of the bulk power system.

SEPA does not own any transmission lines and does not have any end-use customers. SEPA participates in the SERC planning process under the intraregional short-term power flow study group and the intraregional long-term power flow study group. SEPA has SERC documentation regarding the responsibilities and activities of those groups. SEPA does not maintain a model nor does any studies in house, but participates in the groups and provides information needed for the SERC regional models, such as facility rating and any changes, either planned or completed. SEPA also participates in joint planning between the Corp and SEPA's customers. This joint planning helps determine potential system upgrades and communicates any system limitations and how to operate for them. The evaluation team found the SEPA planning to be appropriate for a system with no transmission lines and no end-use customers.

8. Outage Coordination and Communication

Planned outages of transmission facilities and generating units must be coordinated with the reliability coordinator to ensure that conflicting outages do not jeopardize the reliability of the bulk power system.

Information relative to forced outages of transmission facilities and generating units that may jeopardize the reliability of the bulk power system must be shared with affected balancing authorities, transmission operators, and the reliability coordinator as expeditiously as possible.

The SEPA transmission and generator outage coordination process with both the VACAR South and Southern reliability coordinators are covered in the *SEPA Outage Coordination* document. The lead power system operator is responsible for implementing the procedure. Outages are submitted to VACAR South in an automated spreadsheet. VACAR South has a weekly conference call for outage coordination. The Southern reliability coordinator also uses an automated spreadsheet but does not have a scheduled conference call. SEPA will call either VACAR South or Southern to resolve any outage coordination issues, including adding missed outages. SEPA normally requires that outages be requested three days before the beginning date of the outage.

The Corp issues and executes switching orders as outlined in the station operating manuals. The Corp requests outages through SEPA. SEPA will approve or reject the outage and, if approved, submit it to the appropriate reliability coordinator for final approval. SEPA has a procedure and form to document switching and clearance requests with the Corp. SEPA maintains written

copies of the forms so the operators can review the information at the beginning of the shift, verify that the outage was confirmed, and see when the outage will be occurring. The relationship between SEPA and the Corp is clearly outlined in the memorandum of understandings between the two. The procedure includes specific contact information for each project and the personnel who approve, coordinate, and implement outages.

The neighboring balancing authorities and transmission operators were satisfied with SEPA outage coordination. The evaluation team finds that the outage coordination plan is adequately documented and implemented.

9. Plans for the Loss of Control Facilities

The balancing authority/transmission operator must have a workable plan to continue to perform the balancing authority/transmission operator functions that are required to maintain a reliable bulk power system following the sudden catastrophic loss of its primary control facility, or the partial or full failure of its computer facilities or monitoring tools at the primary control facility.

SEPA has a cold-standby backup energy management system located in an office building about 30 miles from the primary site. Driving time to the backup control center is about 45 minutes. The backup control center control equipment is identical to the primary center and operates in the same manner. SEPA has redundant communications to the backup control center such that if the primary center and communication to it were unavailable, the operators could continue to operate from the backup center. The data from the primary center are replicated to a server at the backup control center, so that in an emergency evacuation, the operators can begin to operate from the backup energy management system as soon as they start it. It takes about two minutes to start the backup control center computer system. When operating from the backup control center, data are not replicated to the servers at the primary control center, but SEPA information technology (IT) staff has a process to update those files as the operators switch back to the primary control center. From the operator point of view, the switch back to the primary control center is seamless.

SEPA conducts announced and unannounced evacuation drills to the backup control center. When the operators transfer control to the backup control center, they operate from there for at least an hour. Evacuation drills are scheduled at least twice a year, but the operators stated that they actually are conducted more often. Both operators interviewed had been there twice in the past year and thought all of the other operators had operated from the backup center during the past year. The operators prepare a trip report listing any problems found during the evacuations and any suggested improvements. In addition to the evacuation drills, the IT staff conducts weekly equipment and communications tests to verify that all of the systems are functioning properly.

While the backup control center has most of the equipment contained at the primary center, it does not have voice recording on the communications system. The evaluation team recommends that SEPA add voice recording to the backup control center.

SEPA recently purchased a satellite phone and plans to use it while transferring to the backup control center, in addition to having it available for emergency backup communications. The operators were not sure how to operate the phone when asked to demonstrate it. The evaluation team recommends that SEPA add use of the satellite phone to the evacuation drill.

The evaluation team finds the backup control system meets the needs of the SEPA operations. The team commends SEPA for conducting announced and unannounced evacuation drills to the backup control center, preparing a trip report reviewing the drill, and conducting weekly equipment tests.

SEPA has “A” and “B” redundant energy management systems at the primary site that require a manual switchover from the currently operating system to the standby system. The IT staff normally makes the switch from the operating to the standby system, and the operators do not drill on making the switch. While the operators were familiar with the switching procedure, the evaluation team recommends that SEPA add planned drills so that all operators periodically switch from the operating to standby system.

10. Tools

The balancing authority/transmission operator must have adequate analysis tools to perform the balancing authority/transmission operator functions. Such tools include state estimation, precontingency and postcontingency analyses capabilities (thermal, stability, and voltage), mapboard (static, dynamic, hardwired, or projected), e-tagging program, weather service, interchange scheduling system, outage scheduling system, trending tools, and a voice recording system.

SEPA has a distributed energy management system (EMS) with each project monitoring and controlling the equipment at the project. The control center collects the information from the control system at each project. The control center EMS monitors system frequency and calculates and displays the balancing authority area control error (ACE). The generation loading is determined from the control center, and generator set points are sent to the control systems at each of the projects. The control center does not have direct control over the switchyard equipment.

SEPA does have a detailed online display with real-time loading and breaker positions for the generation and switchyards in its balancing area. Each of the project switchyards is on an individual display. SEPA does not have a system overview or wide-area display. SEPA does not have EMS displays for the switchyards in the Southern balancing authority area for which SEPA is a transmission operator. At times, SEPA operators are questioned by operators from neighboring systems about events at these substations, but SEPA operators do not have switchyard details and the events are not alarmed; therefore, they are unaware of any activity. SEPA plans to add these substations to its control center displays. The evaluation team recommends that SEPA complete the planned addition of switchyard displays to the control center EMS for all switchyards for which SEPA is the transmission operator and include alarming as described in report Section 12b below.

Since SEPA does not have any transmission lines under its control, it does not need nor have advanced applications such as a state estimator, real-time contingency analysis, or load flow program.

Other systems in the control center include

- Voice recording the primary control center (but not at the backup control center)
- Interchange scheduling system
- Two tagging systems, each for a different time zone and as backup for the other
- Internet weather forecast

11. Load Shedding Plans

The balancing authority/transmission operator must establish plans for automatic load shedding for underfrequency or undervoltage conditions, coordinate load shedding plans with other interconnected entities, implement load shedding in steps to minimize further uncontrolled events, and have plans for operator-controlled manual load shedding to mitigate violations of system operating limits (SOL) or interconnection reliability operating limits (IROL).

SEPA does not have any load and, therefore, does not have nor need load shedding plans.

12. Real-Time Monitoring

a. System Visibility

The balancing authority/transmission operator must monitor operating data and status in real time for its area and adjacent areas as necessary to maintain situational awareness of its system.

SEPA does not have a wide-area view of system conditions outside of its balancing authority and transmission operator areas. SEPA is working with VACAR South and Southern reliability coordinators to obtain data to develop a wide-area view. SEPA has a large monitor in the future budget for the wide-area display. With the new EMS and its enhancements, SEPA has additional data available and is working with the VACAR South and Southern reliability coordinators to provide requested portions of this additional data.

SEPA does not display the switchyards outside of its balancing area for which it is a transmission operator. The evaluation team recommends completion of the planned addition of one-line displays of these switchyards with real-time display of generation, loading, and breaker status.

b. Alarms

The balancing authority/transmission operator must have effective and reliable alarming capability. This should be supported in the energy management system (EMS) and/or supervisory control and data acquisition (SCADA) system by alarm priority.

The SEPA control system only alarms when ACE is out of its acceptable range. SEPA plans to add more alarms to its alarm package. The evaluations team recommends that SEPA complete the planned additional alarming and include the following events:

- Breaker and generator status change
- High and low voltage
- Limit violations
- High and low frequency

The evaluation team also recommends that the additional alarming include an alarm log accessible to the operators.

c. Frequency

The balancing authority/transmission operator must monitor frequency, direct actions to resolve significant frequency errors, and correct real-time trends that indicate potentially developing problems. Frequency monitoring points should be of sufficient number and from several locations with sufficient area coverage to allow the balancing authority/transmission operator to effectively monitor the balancing authority/transmission operator footprint to determine possible islands.

Since SEPA is a generation-only balancing authority and schedules generation from no generation to full load, it uses a variable frequency bias proportional of one percent of generation. SEPA has one local frequency source from the control room for local indication and three remote frequency sources, one for each of the projects, it can use for automatic generation control. The control system has automatic failover from the primary frequency point to the second and then to the third point. The evaluation team noticed that the third point is out of calibration and recommends that it either be repaired or removed from service as a potential control point for automatic generation control.

d. Voltage/Reactive Reserve

The balancing authority/transmission operator must monitor voltage levels and take appropriate actions to support the bulk power system voltage if real-time trends indicate potentially developing problems. Voltage measuring points must be of sufficient number and from several locations and voltage levels to allow the balancing authority/transmission operator to effectively monitor the voltage profile of its footprint.

The balancing authority/transmission operator must ensure that reactive reserves are available and properly located to satisfy the most severe single contingency.

SEPA operates generators to maintain voltages within a specified range of 5 percent of nominal voltage. The operators will order an adjustment to the automatic voltage regulators to assist in meeting interconnection reactive power requirements as requested by the reliability coordinator or neighboring system. The interconnection contracts with neighboring systems specify power factor requirements, but the operators stated that they would supply reactive power up to the capacity of the generators if requested. The evaluation team commends SEPA for its commitment to reliability and its commitments

to support the interconnection during abnormal conditions as demonstrated by its voltage control policy.

The generators within SEPA always operate with the automatic voltage control enabled. If a unit's automatic voltage control is not available, the unit will be taken or kept off-line. SEPA monitors the voltage within its balancing area but does not monitor the voltage on the switchyards where SEPA is the transmission operator outside its balancing authority. SEPA does not alarm on high or low voltage. The voltage is primarily controlled at the individual project in accordance with the *Standard Operating Procedure Hydro Plant Operations*.

Power system stabilizers have been recently installed on all SEPA generators and are in service any time the generators are on-line.

While SEPA has more reactive power than its no-load system requires, it does not have a display that shows the amount of reactive power available. Since the amount of generation SEPA has on-line and the reactive power availability varies, a display would keep the operators aware of the amount of reactive power available for interconnection needs. The evaluation team recommends that SEPA develop an EMS display of available reactive power.

e. Critical Facilities

Monitoring of facilities that are critical to the reliability of the bulk power system is a joint responsibility of the balancing authority, transmission operator, and the reliability coordinator.

An established process must determine which facilities are critical to the reliability of the bulk power system. Real-time operating information (data and status) and operating limits for these critical facilities must be provided to the balancing authority, transmission operator, and the reliability coordinator.

Neither the VACAR South nor Southern reliability coordinators have designated any SEPA facilities to be included in a critical facilities list.

f. Transmission System Congestion

The transmission operator must monitor transmission flowgates and be prepared to take actions to alleviate congestion in conjunction with, and as directed by, its reliability coordinator.

SEPA does not have any flowgates registered in the NERC Interchange Distribution Calculator. SEPA and both of its reliability coordinators normally use local procedures to relieve congestion. SEPA has never requested loading relief but will respond to interchange schedule curtailments or re-dispatch for problems on other systems. As part of a local procedure, SEPA will back down generation on one of its plants to relieve a known potential contingency. The evaluation team commends SEPA for its commitment

to reliability and supporting the interconnection during abnormal conditions, which includes controlling congestion by using predetermined local procedures.

SEPA does not have automated transfer of tagging information or tag changes to its EMS. Changing the EMS schedules requires manual intervention that is difficult to complete during the time allowed for schedule changes associated with congestion relief. The operators stated that this is becoming more difficult because the number of schedules is increasing.

g. Load Generation Balance

The balancing authority must monitor the balance of load, generation, and net scheduled interchange in its balancing area. The balancing authority must take actions to mitigate unacceptable load, generation, and net scheduled interchange imbalance.

SEPA only balances generation to transaction schedules since it has no load. With controlled schedule changes and hydro power capable of quick response, SEPA has very good NERC control performance standard (CPS) scores with CPS1 sometimes over 200 percent and CPS2 consistently over 99 percent.

h. Contingency Reserves

The balancing authority must monitor the required reserves and the actual operating reserves in real time, and take action to restore acceptable reserve levels when reserve shortages are identified.

SEPA has agreements that cover the loss of generation supplying power to each of its neighboring balancing authorities. In some cases, SEPA has access to neighboring system reserves, and in others, it has the authority to curtail schedules. At times, SEPA also maintains reserves on its own system.

SEPA does not have a display showing the required or available reserves for its balancing area. The evaluation team recommends that SEPA add a reserve display to its EMS showing required and actual reserves.

i. Special Protection Systems

The balancing authority/transmission operator and the reliability coordinator must be aware of the operational condition of special protection systems that may have an effect on the operation of the bulk power system.

SEPA does not have any special protection systems.

13. System Restoration

The transmission operator must have a documented system-restoration plan that is consistent with NERC Reliability Standard EOP-005-0 — System Restoration Plans. This restoration plan must be provided to its reliability coordinator.

The transmission operator must be prepared to restore its transmission area following a partial or total collapse of the system and coordinate system restoration with its neighboring transmission operators and with the reliability coordinators.

SEPA does not have any load to restore other than station power usage. It does have a system restoration plan that includes connecting to energized neighbors or blackstarting its units if necessary. While all units in the SEPA balancing authority have blackstart capability, they are not designated as blackstart units in the SERC blackstart plan; therefore, SEPA does not keep records of testing of its blackstart units. The evaluation team finds that SEPA has an appropriate restoration plan for its system.

While the SEPA generation is not included in the SERC system restoration plan, both the operators and management stated that they would use SEPA's blackstart capability if doing so would help restore the interconnection, and the operator sited an event after one of the hurricanes where SEPA generators were used for system restoration. The team commends SEPA for its commitment to reliability as indicated by this "do what is necessary" attitude and for supporting the interconnection during abnormal conditions.

The operators participate in the Southern subregion system restoration workshops. SEPA is planning to add tabletop restoration drills to its in-house training program.

14. Capacity and Energy Emergency Plan

Each balancing authority must have a capacity and energy emergency plan that address the applicable requirements of NERC Reliability Standards EOP-001-0 — Emergency Operations Planning and EOP-002-0 — Capacity and Energy Emergencies.

SEPA has developed a *Capacity and Energy Emergency Plan*. While the plan covers all the NERC-suggested topics, some topics are not relevant since SEPA does not have load. The plan includes information on water-supply issues and ways to manage water (fuel) limitations. The operators were experienced in evaluating and operating to water-flow limitations. The emergency provisions were included in the memorandum of understanding with the Corp. The evaluation team finds that SEPA's *Capacity and Energy Emergency Plan* is appropriate for its system.

SEPA drills on its *Capacity and Energy Emergency Plan* during a regional energy alert exercise and develops a tabletop exercise for the operators that cannot participate at the time of the regional exercise. SEPA operators often use part of the plan as they go through the scheduled allocation when water resources are limited.

15. Equipment Maintenance and Testing

Transmission and generator owners must ensure that maintenance of transmission lines, substation equipment, transmission protective systems, and generator relays is carried out according to company, regional, and/or NERC requirements.

The Corp is responsible for equipment maintenance and testing, and this responsibility is covered in a memorandum of understanding between SEPA and the Corp. SEPA coordinates and arranges for necessary outages to complete maintenance or improvement. The Corp generally notifies SEPA prior to completing relay maintenance, as required in the memorandum, but sometimes fails to notify the operators.

16. Vegetation Management

The transmission operator must have a documented vegetation-management program.

Since SEPA does not have any transmission lines, a vegetation-management program is not necessary.

17. Nuclear Power Plant Requirements

Transmission operators must support nuclear power plants in meeting regulatory requirements that allow the plant operators to maintain voltages within design limits and adequate off-site power sources in both normal and abnormal operating conditions (n-1 and system restoration).

SEPA does not have a nuclear plant in its balancing area and does not have any obligations to supply off-site power.

APPENDIX 1: Critical Energy Infrastructure

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

APPENDIX 2: Evaluation Participants

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

APPENDIX 3: Documents Reviewed

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