

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

**Alcoa Power Generation Incorporated – Yadkin
Alcoa, Tennessee**

January 23–24, 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 Evaluation 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 being evaluated and is not included in the public version of the report.

The evaluation team for the Yadkin Division of Alcoa Power Generating Inc. met on-site with Yadkin representatives on January 23 and 24, 2007. This report reflects the views and recommendations of the evaluation team regarding the readiness of Yadkin to meet its responsibilities as a balancing authority/transmission operator.

Evaluation Team

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Organization Profile

Alcoa Power Generating Inc. (APGI) is a wholly owned subsidiary of Alcoa and has been in existence since the early 1900s. In the late 1990s, two separate system operator centers were responsible for scheduling river flows and the production associated with two separate hydroelectric locations, one in North Carolina and one in Tennessee. These functions were combined in the formation of APGI. APGI consists of two divisions, Yadkin (which operates hydroelectric generation and transmission located along the Yadkin River system in North Carolina) and Tapoca (which operates similar facilities located in the upper East Tennessee region). APGI-Yadkin (hereinafter Yadkin) is registered as a balancing authority/transmission operator in SERC.

The Yadkin system includes four hydroelectric generating plants with a total capacity of 209 MW and approximately 18 miles of 100 kV transmission lines with interconnections to Duke Energy and Progress Energy Carolinas. Yadkin's system load consists of a single customer, an Alcoa production facility located in Badin, North Carolina. The Badin facility load is currently 3 to 5 MW. Historically, the peak load was 220 MW prior to the curtailment of smelter operations in 2002.

Control of the hydroelectric generation and transmission system operations was transferred from Badin, North Carolina, to Alcoa, Tennessee, in 1999, in a consolidation of similar facilities used to operate the Tapoca assets. The Yadkin system operators also operate the Tapoco system, which is a part of the Tennessee Valley Authority (TVA) balancing area.

Executive Summary

The evaluation team found no significant operational problems and concluded that Yadkin has adequate facilities, processes, plans, procedures, tools, and trained personnel to perform the balancing authority/transmission operator functions necessary to maintain the reliable operation of the bulk power system. The evaluation team identified a number of positive observations and commends Yadkin for its progress in the area of system operator training as well as other areas. The team also offers eight recommendations that, if implemented, will enhance Yadkin's readiness to operate reliably and maintain the reliability of the bulk power system. One of the recommendations, dealing with the installation of an automatic failover frequency selector switch, is a repeat of a recommendation from the 2004 reliability readiness audit. (Yadkin has plans for its accomplishment, but it is still in project status.) The findings are listed in order of importance.

Since the 2004 readiness audit, Yadkin has developed a formal training program, including sufficient system operator staff to allow for training activities. System operators train at work, at home, by coming in on off-days, and by attending appropriate courses and seminars. Newly hired system operators receive on-the-job training and utilize outside vendors' training material.

Yadkin's transmission system (18 miles of transmission circuits and four hydroelectric generating plants) has not changed in many years. Yadkin uses an industry-standard planning program for its planning processes, and the study results are tested against NERC planning criteria. Yadkin's load is one customer, an Alcoa manufacturing facility, operating at 3 to 5 MW.

Yadkin has an industry-accepted supervisory control and data acquisition (SCADA) system. Since there are only three interconnections to other control areas and only 18 miles of transmission, Yadkin monitors 100 percent of its system. The Yadkin backup facility in the Badin, North Carolina area is always online, and SCADA information is sent from this location via redundant fiber optic systems to the primary facility. The primary site is essentially a remote terminal off the backup energy management system (EMS). (Normal operations were transferred from what is now the backup location to the current primary facility location.) Yadkin has a workable plan to implement interim operations from the backup facility by contacting the NERC-certified staff member in the backup center's area and moving system operators to that location.

The SERC Compliance Review Steering Committee has granted Yadkin an exemption to NERC reliability standard PRC-007, which requires an underfrequency load-shedding program. The system operators can order manual load shedding.

Yadkin's reactive policy is to control reactive flows to zero (operating at unity power factor) unless called upon for reactive support by its reliability coordinator. There are no flowgates identified in the Yadkin system. Yadkin's system operators comply with any directives issued by the reliability coordinator.

Yadkin has an acceptable system restoration plan and a capacity and energy emergency plan. Yadkin has an adequate transmission line and generator relay maintenance and testing program and vegetation management program. There are no nuclear facilities in the Yadkin footprint.

Positive Observations

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

1. Yadkin system operators conduct annual visits to the remote backup control center (Section 5).
2. Yadkin's four-person system operator rotation, with two additional operators for relief, facilitates both training and the operators' use of vacation time (Section 5).
3. Yadkin has a very engaged system operator group and support staff (Section 6).
4. Yadkin is active in regional and other industry committees, keeping them involved in changes as well as raising the awareness of its operations staff to industry norms (Section 7).

Recommendations

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

1. Change the frequency sources selection switch for area control error calculations from a manual switch to an automatic device. This is a carryover recommendation from the 2004 readiness audit (Section 12c).
2. Make real-time contingency analysis and state estimation available for use by system operators (Section 7).
3. Optimize the alarm identification and processing mechanism (Section 12b).
4. *See discussion in Appendix I.*
5. *See discussion in Appendix I.*
6. Augment the training program to support continuing education training now required to maintain NERC operator certification (Section 5).
7. Obtain NERC certification for additional personnel at the remote backup control center location (Section 4).
8. Develop and provide to system operators a tool that will automatically check an interchange tag for correctness (Section 10).

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 "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 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.

Yadkin is recognized as a transmission operator and balancing authority in the SERC region of NERC. Yadkin is also included in the NERC registry as a balancing authority, planning authority, transmission operator, and transmission planner.

Yadkin is one of the original signatories to the Virginia-Carolinas (VACAR) agreement for coordination of system operations. The VACAR South (Duke) reliability coordinator provides reliability coordinator services for Yadkin. Yadkin supplied a copy of the *VACAR South 2005 Reliability Coordinator Agreement*, which documents the designation of VACAR South as the reliability coordinator for the Yadkin system. Yadkin also supplied a copy of the *Adjacent Reliability Coordinator Coordination Agreement*, documenting the relationship between the TVA reliability coordinator and the member systems of the VACAR South reliability coordination area.

Yadkin supplies its own regulation service for its internal system load. It is not part of a reserve sharing group. The Yadkin system has a single customer, an Alcoa manufacturing facility located in the Badin, North Carolina, area, and supplies 100 percent of the customer load on an ongoing basis, typically 3 to 5 MW.

Yadkin makes excess capacity available for purchase in the electricity market. The Yadkin system is interconnected to Progress Energy Carolinas and Duke Energy, with a total transfer capability of 200 MW on each interface.

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.

Yadkin has a memorandum (dated October 11, 2004 and posted in both the primary and backup control facilities) providing authorization to the system operators to take steps to mitigate problems on the system, including the shedding of firm load, without direction from management or other personnel. This fact is also clearly documented in the power system dispatcher job description. Discussions with system operators indicated they believe they have management support to take any necessary action(s) to protect system security and will take that action if 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.

Yadkin has not delegated any of its balancing authority or transmission operator reliability functions to another entity.

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 seven of Yadkin's system operators are NERC-certified, two with the Balancing and Interchange Operator credential and five with the Reliability Operator credential. One of the NERC-certified staff members is located in the vicinity of the backup control center, which is several hours away from the primary control facility.

The evaluation team discussed with Yadkin its intent of stationing a NERC-certified staff member at the remote location to provide interim system operations while the full-time system operators are transitioning to the backup location. The team discussed a number of scenarios that brought into question whether a single individual at the location would be sufficient, specifically citing the possibilities of illness or vacation. Yadkin stated that it is considering pursuing NERC certification for additional personnel at the backup center location. The team recommends Yadkin require certification for additional personnel at the remote backup control center location.

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.

Since the 2004 reliability readiness audit, Yadkin has instituted a formal training program for its system operators. As part of this program, Yadkin tracks the status of each operator's standing with respect to required NERC training requirements. During discussions, Yadkin presented its training plan for 2007, which includes goals for each system operator. Yadkin provided a tracking spreadsheet that shows the individual's target for each category and breaks out emergency operations planning as a separate total. The team noted that the yearly schedule, if repeated in the future, does not contain sufficient training hours for maintaining NERC certification. The team recommends that Yadkin augment the training program to support continuing education training now required to maintain NERC operator certification.

Yadkin's training program documentation has been provided by a contract consultant, and was recently revised. The document provided states that the process of power system dispatcher training includes both existing power system dispatchers, who receive ongoing training, and new personnel, who are being trained for the power system dispatcher function. The document is essentially a generalized study guide that lists training resources available to the system operator. The program lists certain items included in each training opportunity, but is not exhaustive.

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The document also lists operating guides that Yadkin employs, which are to be studied in the program.

Yadkin's chief system operator directs the training of new hires by utilizing on-the-job training with an on-shift operator. The chief power system dispatcher and the control center manager, with input from the shift system operators, determine when a new hire is sufficiently trained to take over an independent shift position. NERC certification is also a prerequisite to assuming an independent shift position.

Most training occurs by the on-shift system operators logging onto the corporate local area network, where Yadkin has installed some of its training material, or by system operators participating in training activities on scheduled off days. Outside vendors' training materials are also included as part of the Yadkin training program. Several of Yadkin system operators have attended outside vendor training courses and SERC operator training conferences.

Yadkin stated that it schedules an additional power system dispatcher during training activities to augment the on-shift operations staff. In discussions with system operators, the team found a good culture of support for training activities, and system operators are expected to identify training opportunities and to support one another when needed. The evaluation team commends Yadkin for its dedication to training activities, including providing an atmosphere that promotes training along with sufficient staffing to provide for system operator relief during training activities.

Yadkin typically attempts to fill system operator positions with experienced Alcoa personnel, if the personnel have an electrical background. Training takes approximately six to eight months. The following training is provided to the system operators:

- Initial training for operator candidates
- On-the-job training with NERC-certified system operator
- Outside vendor training (e.g., for computer applications)
- Instruction in NERC policies for NERC certification
- Normal operations
 - On-the-job training
 - Outside vendor training
- Emergency procedures, including operation from the backup control facility
 - Tabletop exercises with neighboring control areas
 - Actual operations from backup facility
- EMS operation
 - EMS training
 - On-the-job training
- Mitigation for partial or full loss of EMS
 - *Emergency Plan Manual* training
- System restoration
 - Tabletop exercises with neighboring systems
 - Discussions by management

Regarding training activities associated with the start-up and operation of the backup control center, Yadkin system operators are expected to visit the backup control center on an annual basis to stay familiar with the location and operational characteristics of the facility. Prior to the visit, the teams undergo a day of training on the operation of the backup control center. During the actual visit, the operators conduct a series of operational tests that validate the functionality of the center. The evaluation team commends Yadkin for this approach to maintaining its system operators' proficiency in the start-up and operation of the backup control center.

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.

Yadkin makes use of a document called the *Shift Operating Procedural Document*, which has a section dealing with shift turnover activities. A number of different steps are discussed, including meter checks and making sure system inputs are correct. Also examined are non-financial indicators, such as unit run times. Other items reviewed at turnover include operational notes, which are kept by the system operators throughout the day, showing the status of all generators and the transmission system, as well as a general overview of the day's activities. Upcoming events, weather, and stream flows (the system operators monitor all stream activities on the Yadkin hydroelectric system) are also examined. Yadkin system operators indicated that this process works well.

Yadkin provides for central server storage of up-to-date standards and procedures. The information stored there is accessible from both the primary and backup facility. Yadkin's internal procedure numbers reference NERC reliability standards by number, making it easy to assess the completeness and accuracy of internally developed procedures.

Changes to reliability standards and internal procedures are provided to individual system operators via e-mail as well as hard copy. Copies of these documents that will reside at the remote backup facility are sent to the NERC-certified staff member located in that area, who in turn updates the appropriate manual. Discussions with both power system operators and supervisors indicate that there is no actual training conducted for changes, and that it is the duty of the individual system operators to read and understand any changes to standards or procedures. The evaluation team believes that Yadkin could develop a more formal tracking mechanism to ensure receipt and understanding of these changes, and discussed this with Yadkin management.

Yadkin's system operators are actively involved in making changes to processes and procedures that will improve system reliability. Corporate management challenges the system operators to improve their processes, indicative of a culture of engagement at all levels. The evaluation team applauds Yadkin for keeping system reliability as the top concern for its system operators.

Yadkin's policy of having an adequately staffed system operator rotation along with additional individuals equally qualified allows flexibility in the training program as well as the use of vacation time by system operators. The evaluation team recognizes the fact that an experienced system operator crew will generally accrue more vacation time than a less experienced one and that, for some utilities, vacation use presents a difficult challenge. The team commends Yadkin for its policy of adequate staffing to alleviate the impacts of this challenge.

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.

Operational planning activities are primarily conducted by the chief system dispatcher, but include operator input if needed. In addition, Yadkin has an individual charged with ensuring Yadkin's adherence to all applicable planning requirements. Because of the static nature of the Yadkin system, operational planning is currently done on an exception basis, and the evaluation team finds this acceptable. Yadkin stated that there have not been any major changes to the Yadkin system in recent years, but there are impacts from projects in neighboring systems.

The Yadkin transmission system does not change from day-to-day, only the amount of water available for the hydroelectric generating units changes. Long-term planning studies are performed using the SERC region-wide study groups. These groups consist of representatives from VACAR, American Electric Power, Southern Company, TVA, and Entergy. Operations Planning conducts weekly planning activities to project energy availability and annual maintenance outage requirements. There is no contingency within the Yadkin transmission system that causes voltage, stability, or loading problems. All potential transmission problems in the Yadkin system are caused by contingencies external to the Yadkin system.

Plans are under way to provide for state estimation and real-time contingency analysis for system operators. The evaluation team supports this effort and recommends Yadkin complete its plans to make real-time contingency analysis and state estimation available for use by its system operators.

Discussions with Yadkin personnel revealed an active participation in industry working groups and committees, both regionally and nationally. This provides Yadkin with a valuable conduit to monitor industry trends and to discover additional avenues for system reliability improvement. The evaluation team applauds this commitment to system reliability, especially considering the relative size of the Yadkin staffing, and appreciates the perspective that Yadkin brings to the industry groups.

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.

Outages are coordinated by exchanging outage information through the NERC System Data eXchange tool and through direct coordination with neighboring systems. Interviews with system operators indicated that required information is available via teleconferencing and may include changes to generation patterns outside the Yadkin footprint. Outage scheduling for the Yadkin system is conducted by the planning group one year in advance. Additionally, Yadkin relies on oversight provided by the reliability coordinator.

Yadkin's long-term transmission and generation outage plans for the system are sent to the VACAR Operating Task Force for annual and seasonal studies. Near-term transmission and generation outage plans are appropriately posted, and notification is sent to the reliability coordinator. Yadkin notifies its reliability coordinator of forced transmission outages. Generator outages are not communicated due to the small size of the units.

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.

All system operators are annually trained on procedures for the loss of the primary control facility, as discussed above. Along with system operations from the remote backup control center, Yadkin has the ability to manually operate the system by dispatching appropriate personnel to the generation and transmission substation locations, should that ever become necessary. Yadkin operators stated that they are able to operate all aspects of their EMS from the remote backup control center.

Yadkin presented documentation of its plans for loss of the primary control facility as well as the backup control center activation information.

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.

Yadkin has the necessary tools to operate reliably, including well-designed EMS displays for many functions. Discussions with system operators indicate that the reliability of the present EMS is acceptable. Yadkin noted that the EMS is scheduled for replacement late in 2008.

Yadkin does not currently have or employ a state estimator, but it is expected that one will be included with the EMS replacement. In addition, Yadkin does not currently conduct real-time contingency analysis studies. It is anticipated that the new EMS will include this tool for system operators.

Yadkin currently has a static mapboard, and a similar installation will be included in the new operating center. This system visibility mechanism meets the needs of the system operators. Yadkin system operators have many displays that include system single line information. They utilize voice communications recording capability at both the primary control center. Yadkin has access to the Reliability Coordinator Information System in the control center.

Yadkin uses the Open Access Same-time Information System for posting available transfer capability and accepting transmission reservations, and discussions with system operators indicated that a high degree of manual intervention is required for processing interchange transactions. The evaluation team recommends Yadkin develop and provide to system operators a tool that will automatically check the applicable fields entered on an interchange tag for correctness.

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).

Yadkin does not have automatic load shedding. Due to the size and nature of its internal load, SERC has granted Yadkin a waiver of its requirements for having underfrequency load shedding relays installed and operational. Yadkin has manual control of all load breakers within the Yadkin balancing area and can shed 100 percent of its load manually if directed to do so by the reliability coordinator or other system conditions make it necessary.

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.

Yadkin utilizes many display features of its EMS to monitor and control its power system. System operators are able to observe the entire Yadkin system and can interpret the data through a variety of displays. An automatic failover to a second computer system occurs if the primary system ceases to operate.

The reliability coordinator provides the wide-area view for Yadkin. The new EMS will enable system operators to view a larger footprint than the existing system allows.

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.

Automated alarm processing by the EMS provides for some level of alarm prioritization. System operators expressed a desire for a single, easily accessed display that would show the pertinent alarms and other needed information. The evaluation team recommends Yadkin optimize the alarm identification and processing mechanism.

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.

Yadkin continues to use a manual switch to select the frequency source for its area control error calculation. The team reiterates the previous audit team recommendation (#17) that this change be made as soon as possible.

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.

Voltages throughout the power system are available to system operators via EMS display. System operators indicated that they typically use voltage control to operate the power system at a unity power factor and that automatic voltage regulators are normally in service throughout the system. The system operator indicated concern with the need to supply reactive support to a neighboring system on a routine basis, even though the

neighboring system has static resources available for voltage support. Yadkin does not monitor its reactive reserve but, because of its relatively small internal Yadkin load in relation to its installed generation capacity, frees up a large amount of reactive reserves for system use. Yadkin has adequate reactive reserves.

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.

Yadkin stated there are no contingencies on the Yadkin system that can result in adverse impacts to neighboring systems. There are no critical facilities identified in the Yadkin system. However, the team noted that Yadkin monitors 100 percent of the Yadkin system.

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.

Yadkin indicated that no NERC transmission flowgates are located in the Yadkin system. The Yadkin system operators stated that they comply with all transmission loading relief requests from the reliability coordinator, and the reliability coordinator responses verify this fact. The Yadkin power system operators follow the directives of the reliability coordinator to relieve congestion, acknowledging any transmission loading relief and adjusting schedules as required. Net scheduled interchange is settled with neighboring systems any time schedules change before implementation. Yadkin coordinates loading problems on its system with its reliability coordinator. The reliability coordinator uses local operating procedures for the relief of congestion on the Yadkin system.

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.

Yadkin has a total system load of 3 to 5 MW and, with an installed generation capacity of over 200 MW, has adequate capacity to balance load and capacity. Yadkin's control performance standard data supports this assertion.

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.

Yadkin is not a member of a reserve sharing group and manages its contingency reserves through internal company policy. Yadkin maintains 8 to 15 MW of spinning reserve. Yadkin also holds the equivalent power output of the largest generator in reserve, or sells its output as nonfirm recoverable power to meet its reserve requirements.

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.

There are no special protection systems or remedial action schemes in the Yadkin system.

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.

Yadkin has a system restoration plan and adequate blackstart capacity. If islanding occurs, reconnection of the systems is directed by the reliability coordinator.

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.

Yadkin has a plan referred to internally as the *Insufficient Generating Capacity* document, which is a chapter in the emergency operations procedure. The evaluation team finds the plan sufficient for the Yadkin system.

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.

Yadkin has a transmission line and generator relay maintenance and testing program, which is on schedule. Yadkin contracts with a vendor to conduct its relay testing. Yadkin is not required, under NERC or SERC standards, to install automatic oscillography or fault recorders with pre-fault capability since all of Yadkin's transmission lines (at 100 kV) are under the 161 kV threshold for these requirements.

The Yadkin system operators have the authority to declare a moratorium on work around any transmission or generation facilities when necessary due to system conditions.

16. Vegetation Management

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

Yadkin has a vegetation-management plan, and patrols its transmission lines at least twice a year. Yadkin has not experienced any outages due to vegetation issues on its transmission system.

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).

There are no nuclear facilities within the Yadkin footprint.

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.

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