

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Reliability Readiness Evaluation Report Balancing Authority/Transmission Operator

Chelan County Public Utility District No. 1
Wenatchee, Washington

to ensure
the reliability of the
bulk power system

June 25–28, 2007

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Table of Contents

Introduction and Evaluation Process	1
Evaluation Team	1
Organization Profile.....	2
Executive Summary	3
Potential Example of Excellence	4
Positive Observations.....	4
Recommendations.....	4
Discussion.....	6
1. Culture.....	6
1.1 General.....	6
1.2 Organizational Effectiveness	6
1.2.1 Foundation for System Reliability	6
1.2.2 Leadership and Management	6
1.2.3 Corporate Oversight and Monitoring.....	7
1.2.4 Human Resources	7
1.2.5 Corporate Communications	8
2. Fundamentals of Operations	8
2.1 General.....	8
2.2 Operational Focus	10
2.2.1 Operational Safety	10
2.2.2 Operational Decision-Making.....	10
2.2.3 Operational Alignment.....	11
2.3 Managing System Configuration	12
2.4 Emergency Preparedness	12
3. Fundamentals of Maintenance	14
3.1 General.....	14
3.2 Equipment Reliability	14
3.2.1 Equipment Performance.....	14
3.2.2 Work Management.....	14
4. Fundamentals of Operational Planning.....	14
5. Fundamentals of Training	16
5.1 General.....	16
5.2 Organizational Effectiveness	17
5.2.1 Human Performance	17
APPENDIX 1: Critical Infrastructure.....	19
APPENDIX 2: Entity Participants.....	20
APPENDIX 3: Documents Reviewed	21

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. 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 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 Chelan County Public Utility No. 1 (CHPD) representatives on June 25–28, 2007. This report reflects the views and recommendations of the evaluation team regarding the readiness of the CHPD to meet its responsibilities as a balancing authority/transmission operator.

Evaluation Team

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Organization Profile

Created in 1936, CHPD is directed by a five-member Board of Commissioners elected by the voters of Chelan County. CHPD is a member of WECC and is registered as a balancing authority, transmission operator, transmission owner, transmission planner, generation owner, generation operator, purchasing-selling entity, resource planner, load-serving entity, and distribution provider. Reliability coordination services are provided to CHPD by the Pacific Northwest Security Coordinator (PNSC). In addition to the electricity, the utility provides local water distribution, wastewater collection and treatment, and wholesale fiber-optic services.

CHPD provides electric power to a service area of about 3,000 square miles in Chelan County, Washington, serving more than 43,000 residential, commercial, and industrial customers. The area's peak demand of 645 MW occurred in December, 1998. The CHPD electric system includes 24 miles of 230 kV transmission lines, 302 miles of 115 kV transmission lines, 35 substations, seven switchyards, and 1,600 miles of distribution lines. CHPD has nine interconnections with neighboring utilities: five with the Bonneville Power Authority (BPA), two with Puget Sound Energy, one with Douglas County Public Utility District, and one with Avista Utilities.

CHPD owns and operates three hydroelectric projects with a combined generating capacity of nearly 2,000 MW. The amount of power that CHPD is entitled to is determined by long-term contracts. The CHPD share of these projects is as follows:

- Rock Island Dam with two power houses for a combined capacity of 624 MW.
- Rocky Reach Dam has a capacity of 1,300 MW.
- Lake Chelan Dam has a capacity of 48 MW and is owned by CHPD.
- Nine Canyon wind project has a capacity of 64 MW, with the CHPD share being eight MW.
- CHPD has 133 kW of photovoltaic generation, which consists of solar panels located at nearly every school in Chelan County and six nonprofit agencies.

Executive Summary

The evaluation team found no significant operational problems and concluded that CHPD 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, with no notable exceptions.

The corporate culture as observed by the evaluation team is one that reflected participative leadership that encourages teamwork, open communications, and continuous improvement. The general manager maintains open lines of communications with CHPD employees and responds to all e-mail in two days or less. There is a focus on developing the human resources of CHPD as well as an emphasis on process improvement.

The evaluation team noted the use of remote monitoring cameras at substation and switchyard facilities for security. Some of these cameras have thermographic capabilities and can sense hot spots on electrical equipment, which may be an indication of a pending failure.

The team's recommendations largely focused on tools and documents. The team recommended expanding the use of systems and programs to further enhance the operational processes and enhancing operating policies and procedures and the overall document management process.

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

Potential Example of Excellence

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

1. CHPD has creatively deployed remote monitoring cameras, some of which have thermographic capabilities to perform hot-spot monitoring on substations. See further discussion in Appendix 1.

Positive Observations

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

1. Confidential information on plans for loss of control facilities redacted from public report. See discussion in Appendix 1.
2. CHPD system operators are actively involved in identifying and acquiring NERC-approved training required maintaining NERC-certification (Section 5.1).
3. CHPD has excellent teamwork and communications among operations personnel (Section 5.2.1).
4. Various operations support personnel, including the training coordinator, are NERC-certified (Section 5.1).
5. All CHPD system operators are NERC-certified with the reliability operator credential.
6. CHPD has a positive corporate culture with participative leadership that encourages teamwork, open communications, and continuous improvement (Section 1.2.2).
7. CHPD effectively uses employees that are qualified emergency medical technicians at the CHPD generating plants and operating locations (Section 5.2.1).
8. CHPD computer and communications support group personnel remain in the control room at the primary control center so as to provide an enhanced level of support (Section 3.2.2).

Recommendations

The evaluation team offers the following recommendations:

1. Develop a manual load shedding energy management system (EMS) display to allow system operators to effectively shed pre-determined load blocks to manage the overlap between the manual and automatic underfrequency load shedding programs (Section 2.4).
2. Expedite, to the extent possible, the development and integration of the state estimator and real-time contingency analysis as a system operator tool for short-term and real-time system analysis (Section 2.2.2).
3. Develop and implement an EMS screen that sums and displays the available static and dynamic reactive reserves and the current reactive reserve requirement to provide a situational awareness snapshot for system operators (Section 2.1).

4. Review and revise the shift-change procedure to include the requirements needed to bring a system operator back on-desk after an extended absence (Section 2.2.2).
5. Perform a comprehensive review of the area of operating policies and procedures to include the development and implementation of the following (Section 2.2.3):
 - a. Develop and implement an automated document management tool to accomplish system operator check-off, document review cycle management, and cataloguing for ready reference and retrieval.
 - b. Perform a comprehensive review of all policies and procedures to ensure that all areas system operations are documented.
 - c. Increase the level of system operator training on operating policies and procedures to include content, document location, and access for ready reference.
6. Develop and implement a succession plan to ensure the continuing availability of trained system operators and operating support personnel (Section 1.2.4).
7. Implement a schedule of specific task assignments for system operators to ensure that skill levels are maintained at the highest level possible (Section 5.1).
8. Expedite, to the extent possible, the development integration of the dispatcher training simulator as a training tool for system operators (Section 5.1).
9. Review and revise the reliability coordinator agreement with PNSC to reflect current industry language (Section 2.2.3).

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 example 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 the *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.

CHPD has a corporate mission statement that establishes a goal to safely provide utility services that enhance the economy and quality of life in Chelan County, Washington. In addition to serving as an electric utility, CHPD is the local water utility, the waste-water utility, and a provider of wholesale fiber-optic services. In this multifaceted utility context, CHPD has a vision of being a “premier public utility, highly valued and trusted to focus on the customer, protect and enhance resources, maintain local control, bring innovation to reality, and be a great place for its employees to work.”

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.

The mission of the CHPD System Operations group is to provide for the safe, efficient, secure, and reliable operations of its interconnected electric power system. CHPD provides after-hour call center services for all of the diverse utility services it provides to Chelan County. Based on its commitment to quality utility service, participation in regional and national industry organizations, and an active environmental role in protecting one of its most valuable resources, the Columbia River system, CHPD has established a reputation as a leader in the areas of plant security, dam safety, and fish protection.

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.

CHPD has a positive corporate culture that encourages teamwork, open communications, and continuous improvement. CHPD’s senior leadership is committed to involving all system operations employees in the continuous improvement process, and the team cites this as a

positive observation. This cultural change emphasis coupled with a focus on common goals has resulted in excellent teamwork and communications among operations personnel. The team believes that is also a positive observation and commends CHPD for these initiatives.

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.

CHPD has launched continuous quality improvement programs utilizing cross-functional teams to review the operational corporate processes. This review includes a thorough analysis and mapping of the process from end to end in an effort to identify both the weak and strong points. Additionally, CHPD conducts after-action reviews of major system events, close-call reporting and tracking, and incident and safety mishap analysis to identify patterns and implement the appropriate corrective actions.

To continue to foster the change in corporate culture, CHPD has created a position of risk manager, for which a search for a qualified candidate is underway. A risk management policy has been integrated into the business practices on the generation side of the business, and now these principals and practices will be incorporated into the system operations aspect of CHPD's transmission business practices. These global risk management concepts will be expanded into work practices, safety, maintenance, and other applicable areas of operations.

1.2.4 Human Resources

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

CHPD has a well-designed organizational structure. All functions report to the general manager who reports to a five-member Board of Commissioners elected by geographical districts in Chelan County. The Office of Safety Policy and Oversight is in the Human Resources department for administrative purposes; however, as previously mentioned, safety is being effectively integrated into the entire CHPD organization and operations.

The evaluation team believes that CHPD is adequately staffed, at present, to accomplish the safe and reliable operations of its electric power system. CHPD has started a succession planning process at the senior level of the organization and has plans to employ this process down through the organization level by level. CHPD reviewed the system operator retirement potential and added two operators-in-training to manage the risk in this skill area. The team recommends that CHPD either expedite the level-by-level review of succession planning or take an in-depth look at not only the operators but also all of the operating personnel to ensure the availability of these key skill sets.

CHPD has assigned senior leaders the responsibility of identifying and developing high-potential employees through a mentoring program. Additionally, this program is effective in identifying potential gaps in skills, training, and critical thinking.

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.

CHPD uses an open-door policy to encourage open, candid, and timely communications at all levels within the utility. The general manager encourages employee feedback and models the culture of open communications as part of the normal business process. The general manager commits to respond to all communication within two business days or less and has lived up to this promise.

Proposed changes are communicated well in advance and feedback is encouraged. Clarification and justification for the changes are communicated as well, thus relieving tension and uncertainty while accelerating acceptance. As a result, an environment of trust is emerging. Training is provided where appropriate to enable employees to accommodate change.

CHPD uses electronic messages, newsletters, and Web links to communicate with employees. Bi-weekly current-event updates are provided to CHPD employees. Emergency events are typically communicated by phone to the supervisor, who disseminates the information to employees. The executive managers have two meetings each week. The Monday morning meeting deals primarily with short-term and tactical issues, while the Thursday meeting deals with policy and longer-term issues.

2. Fundamentals of Operations

2.1 General

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

CHPD has a primary control center with a dual redundant EMS/supervisory control and data acquisition (SCADA) with advanced functionality that provides the system operator with a wide-area view of the interconnected 230 and 115 kV transmission system and the necessary applications for maintaining and operating a safe and reliable transmission system. One half of the fully redundant EMS/SCADA resides at the primary control center, and the other half resides at the alternate control center.

CHPD has good operational communications, including a two-way radio system, an intercontrol center communications protocol (ICCP) node for system data exchange, and WECCNet messaging capability. Redundant fiber optic paths to the remote terminal units (RTUs) ensure that the status of the electrical equipment and operating data are available in a real-time environment. System operators can communicate with internal entities, neighboring interconnected system control centers, and the reliability coordinator using WECCNet, direct phone lines, radio communications, and satellite phones. The team believes that the system operators have a good portfolio of communication options available to sustain the ability to safely and reliably operate the interconnected transmission system.

CHPD is a vertically integrated, non-jurisdictional electric utility that functions as a balancing authority and a transmission owner and operator. The generation dispatch is a unique

arrangement between five public and two federal dams on the Columbia River. The group operates as one owner to optimize the water flow through all seven projects. Avista Energy serves as the real-time marketing entity for CHPD. Other marketing functions such as day-ahead and forward sales are managed by CHPD with internal staff.

To supplement the quality wide-area view of the CHPD 115 kV and 230 kV interconnected transmission system, system operators have ICCP node neighboring utility system operating data available to ensure that operating decisions reflect the full scope of the transmission system status. CHPD system operators have the ability to access all facility information, dynamic tie-line loading limits, generation status, and the status of breakers. Most of the CHPD distribution system is also visible to the system operator.

The CHPD EMS/SCADA has a full array of alarm capabilities, including prioritization via color and/or audible tones. The health of the alarm processor is monitored by a “heartbeat” program that gives an alarm message in the event of a failure.

CHPD has eight Global Positioning System-synchronized frequency monitoring points from four sources located at key switchyards throughout its footprint. These frequency monitoring points provide good area coverage and are effective in giving the system operator an early indication of a pending islanding condition.

CHPD’s voltage limits are 0.95 to 1.05 per unit. The bus voltage schedule is determined by BPA and programmed into the EMS. CHPD has specific voltage control procedures for Rock Island, Rocky Reach, and Chelan Falls Hydro facilities that provide helpful operating guidance to the system operators. Additionally, CHPD has an operations instruction for controlling Mvar flows using the Rocky Reach Autobank under load tap changer. In general, CHPD does not have a problem maintaining system voltage and controlling the reactive flows on its system. In certain contingency situations with an interconnected neighboring utility, CHPD has experienced difficulties meeting voltage schedules. In this situation, voltage support was provided on two impacted 230 kV lines by changing taps on the BPA system.

All generation on the CHPD system is equipped with automatic voltage regulators. The regulators are required to remain in service at all times; if one is moved to a manual mode, procedures require that the reliability coordinator be notified.

Based on a surplus of reactive capacity in the hydro generation, CHPD does not have an EMS screen that displays the systems reactive load component or reactive reserve requirement. The team recommends that CHPD develop and implement an EMS screen that sums and displays the reactive load, the available reactive reserves, and the current reactive reserve requirement.

CHPD projects all of its real power reserve requirements on an EMS display. The spinning reserve of approximately 25 MW and the contingency reserve of approximately 36 MW, as determined by WECC requirements, are all assigned to the generating units in dispatch at the Rocky Reach generating station instead of being geographically dispersed to other generating stations. CHPD is a member of the Northwest Power Pool Reserve Sharing Group, which may be called if CHPD expects a generating capacity shortfall within the next operating hour. Details of the reserve sharing group operation are discussed in Section 2.4.

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.

CHPD has a safety oversight committee, chaired by the general manager, which uses a behavior-based approach to safety. This committee provides a forum for evaluation of safety programs, consideration of policy changes, incident analysis, and coaching programs involving over 180 employees formally trained as safety observers. Smaller safety committees are in-place throughout the district, with a focus on identifying critical behaviors that are predictors of potential safety problems and changing these behaviors before a problem occurs. This year, all employees have at least one performance goal related to safety in their annual performance plan.

CHPD does not own or maintain a special protection scheme (SPS) or remedial action scheme. It does, however, participate in the BPA generator dropping SPS used for flow mitigation of the PNW to PSW Intertie. The BPA scheme is armed at all times for a specific output that is manually entered by BPA; however, CHPD will arm the system at BPA's direction. BPA notifies Central (located at Grant PUD), which then determines the distribution among the Mid-Columbia SPS participants and notifies CHPD of the MW value for arming the SPS. CHPD also performs maintenance and testing of the equipment when requested by BPA.

2.2.2 Operational Decision-Making

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

The operational decisions for the CHPD electric system are based on transmission-study results, event analysis, and input from the interconnected transmission balancing authorities and the reliability coordinator. Other sources impacting these decisions include NERC and regional operating guidance, equipment outage schedules, operating policies and procedures, and environmental issues. Above all, the pivotal elements of operational decision-making are the reliability and safety of the interconnected transmission system.

CHPD depends on several key elements to ensure the effectiveness of operational decision-making. The first of these is a trained and empowered system operator that knows what to do and when to do it, even if it means shedding firm load to protect the reliability of the interconnected transmission system. The second element is an EMS/SCADA that provides the system operator with a wide-area view of the system with real-time data. The third element is an effective body of policies and procedures to provide operational guidance for the system operator. In keeping with these elements of operational decision-making, the evaluation team recommends that CHPD train system operators on the state estimator as it is integrated into CHPD operations as a real-time contingency and event analysis tool.

Another key area in operational decision-making is the continuity of shift change. CHPD has a shift change procedure; however, the team recommends that CHPD review and revise this procedure to strengthen the procedure and address the requirements for bringing a system operator back on-desk after an extended period of absence.

2.2.3 Operational Alignment

Organizational structure supports safe and reliable system operation.

CHPD has interconnection agreements in place for all transmission system interconnections with its neighboring balancing authorities. CHPD also has the facility connection requirements documents and pro-forma agreements for entities that request interconnection to the CHPD system.

The evaluation team reviewed the agreement with PNSC, which is the reliability coordinator for CHPD. The document adequately assigns responsibilities, empowers the balancing authorities, and requires adherence to PNSC directives. The document was written prior to the development of current NERC terminology; therefore, the verbiage is not consistent with the titling and classification of the operating entities of the interconnected bulk power system. The team recommends that CHPD work with the PNSC to review and revise the reliability coordinator agreement with PNSC to reflect current industry language.

CHPD transmission system operator job descriptions clearly provide the system operator with the authority to operate the transmission system in a safe and reliable manner. In addition, each system operator has a copy of an empowerment memorandum from senior management to operate the transmission system in a safe and reliable manner up to and including the dropping of firm load.

The transmission system operator interviews conducted by the readiness evaluation team indicate that the CHPD system operators are both willing and able to operate the transmission system in a reliable manner up to and including the shedding of firm load. The interconnected neighboring transmission system operators are confident of the CHPD system operators' capability and authority to operate the transmission system in a safe and reliable manner.

PNSC has not delegated any reliability coordinator authority or activities to CHPD. CHPD has not delegated any balancing authority, transmission operator, or transmission owner responsibilities to any other operating entity.

CHPD operating policies and procedures are reviewed and revised on an as needed basis, and a system operations engineer ensures that standards documents are current and accurate. CHPD makes an effort to keep its standards compatible with the interconnected neighbors. When revised, operating policies and procedures are sent to the system operators for review. If the document represents a substantive change, training is provided at the next system operators meeting. The policies and procedures exist in electronic as well as hard copy format; FileNet will be used to house the policies and procedures. The team recommends that CHPD perform a comprehensive review of the area of operating policies and procedures to include the development and implementation of the following:

- Develop and implement an automated document management tool to accomplish system operator check-off, document review cycle management, and cataloging for ready reference and retrieval.
- Perform a comprehensive review of all policies and procedures to ensure that all areas system operations are documented.

- Increase the level of system operator training on operating policies and procedures to include content, document location, and access for ready reference.

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.

CHPD's EMS provides a complete wide-area view of the interconnected transmission system. Additional programs used to manage the configuration of the transmission system are outage scheduling, interchange scheduling, and trending applications; weather systems; system data exchange; and voltage stability tools. CHPD installed a state estimator and real-time contingency analysis advanced application in May 2007. Considerable time and effort is being expended on building data sets, training, and operational testing of these applications to fully integrate them into the CHPD operational environment.

When CHPD reduces the rating of piece of transmission equipment, such as a breaker, switch, or transformer, the information is communicated to system operations via radio, phone, and/or e-mail. The system operator records the information in the system operator log and updates the SCADA so as to activate an alarm if the reduced rating limit is exceeded. If the reduced rating has an impact on the bulk power system, the interconnected neighboring system operators and reliability coordinator are notified.

The CHPD transmission system operation not only focuses on serving the Chelan County customers but addresses the delivery of excess generation capacity. CHPD responds to all directives from the reliability coordinator to curtail generation if such reduction is needed to eliminate a limit violation. CHPD has no interconnection reliability operating limits on its transmission system.

The CHPD interconnected transmission system is not part of a WECC-identified transmission path; therefore, there are no procedures that CHPD is required to take to assist a transmission path manager with congestion management. OATI is used for tagging transmission schedules, and CHPD uses an in-house spreadsheet to track interchange schedules.

CHPD has a combined generating capacity of nearly 2,000 MW and set a peak system load of 645 MW in 1998. Since this generation is almost all hydroelectric, approximately 75 percent of CHPD capacity is sold via long-term contracts to various entities in the Northwest. The CHPD generation has more than sufficient ramp-rate capability to follow the CHPD system load and off-system schedules on a daily basis. The Mid-Columbia controls the area control error (ACE) for all three member companies; however, CHPD can monitor ACE for its service area. CHPD is a member of the Northwest Power Pool Reserve Sharing Group; therefore, in the event of a short-term capacity shortfall these reserves can be called on as discussed in Section 2.4.

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.

CHPD's automatic underfrequency load shedding (UFLS) procedure, titled *System Operations Instruction No. 10*, must be able to shed 31 percent of CHPD's load to comply with NWPP and WECC criteria. This load is dropped in five high-speed blocks of approximately six percent each. Two blocks can be automatically restored to correct frequency overshoot if required. Automatic load restoration following an underfrequency event is required by the *WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Plan*. CHPD's automatic load restoration plan conforms with WECC requirements. CHPD does not use a voltage reduction scheme for load reduction.

CHPD has a manual load shedding plan that uses the SCADA system to operate distribution breakers and manually rotate the distribution feeders if a rolling blackout is required. The system operator was not sure if there was an overlap between the UFLS program and the manual load shedding program; however, the system operator was very knowledgeable in the operation of both programs. The team recommends that CHPD develop a manual load shedding EMS display to allow system operators to effectively shed pre-determined load blocks and manage the overlap between the manual and automatic UFLS programs.

CHPD has a comprehensive system restoration plan that provides guidance to system operators for system restoration after a complete blackout and/or separation of all interconnections. Blackstart units are identified, and transmission system restoration is given in a detailed and progressive presentation up to and including re-establishing ties with neighboring balancing authorities and re-synchronizing with the bulk power network. CHPD has two mutual assistance agreements in place for system restoration: the Western Interconnected Systems agreement and the Northwest Mutual Assistance agreement.

CHPD has a well-defined capacity energy emergency plan that is comprehensive in scope and content. The plan was last revised on May 22, 2007. CHPD has written its plan to complement the NWPP capacity energy emergency plan, therefore increasing both the overall effectiveness of balancing authorities responding to capacity energy emergencies and NWPP's ability to reduce risks to the interconnected bulk power system. If CHPD needed to implement the plan, it would establish an incident command structure. In this mode of operation, the general manager would be available in the executive support role; however, senior management would maintain its posture and not cross into the incident command structure that is responding to the emergency and implementing the capacity energy emergency plan.

CHPD is a member of the Northwest Power Pool Reserve Sharing Group. For a capacity energy shortfall that is caused by a forced outage of CHPD generation, the group receives a signal for delivery of reserves. Automatic generation control automatically initiates for in-hour and possibly next hour energy. After committing all internal contingency reserves and requesting the 60 minutes of capacity from reserve sharing group, CHPD will attempt to purchase market power for the remaining duration of the energy shortage via Avista Energy. Additional steps identified in the capacity energy emergency plan are taken if the emergency is of a significant duration.

CHPD does not have a nuclear power plant in its service area footprint. Additionally, the CHPD transmission and generation system is not responsible for supporting the critical bus voltage at a nuclear power plant outside the CHPD service area footprint.

3. Fundamentals of Maintenance

3.1 General

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

Four EMS personnel report to the operations reliability manager. These employees maintain the EMS/SCADA. Any problems are entered into the control system engineer's log and tracked until resolved. The information technology help desk is staffed during normal business hours. Emergencies are responded to by personnel on call with a typical response time of approximately 15 minutes. The system operators were complimentary of the services provided by control system maintenance and repair personnel.

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.

The redundancy of the EMS/SCADA equipment at the primary and alternate control centers coupled with the totally redundant communication systems provide for a high level of system performance. The system is monitored by internal systems such as the EMS "heartbeat" application and alarmed if a problem occurs. Servers are equipped with automatic failover, and an alternate path is automatically selected and activated for any communications link failures. This strong level of equipment performance supports the CHPD goal to reliably and safely operate the interconnected electric system.

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.

CHPD has strict work management protocols for EMS-related work. EMS/SCADA testing and development is performed and validated on the maintenance console prior to implementing the repair or change on the real-time operating system. The CHPD EMS personnel are on call 24 hours a day, 7 days a week with at least one person required to stay in town and be available for response within a half hour of notification. As noted above, the typical response time is much less than the half-hour limit. The team noted that the computer and communications support group personnel remain in the control room at the primary control center so as to provide an enhanced level of support. The team commends CHPD for the positive display of customer service.

4. Fundamentals of Operational Planning

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

CHPD transmission planning is accomplished using a power system load flow tool. CHPD customizes WECC's annual base case to reflect CHPD's expected operating conditions. The electric system element ratings are consistent with the WECC-published rating methodology. CHPD uses dynamic equipment ratings on certain system elements; however, this practice is limited to just a few elements.

CHPD's transmission and distribution study group performs the long-range planning with an annual assessment of three to five years that includes both summer and winter weather conditions. CHPD participates with six other entities to do area analysis of the transmission system with a long-range focus. The resource planning process was not discussed as part of this evaluation due to the fact that CHPD has excess generation.

Seasonal studies are prepared by the CHPD transmission and distribution study group using data from WECC base cases. Studies are performed on a yearly cycle.

Voltage and reactive stability studies are being performed by an outside contractor. BPA has initiated a flat voltage schedule, which, when coupled with excess dynamic vars from the CHPD generation, has resulted in stable voltage and reactive conditions on the CHPD system; therefore, additional studies in this area have not been performed. CHPD does not calculate available transmission capability and total transfer capability limits for its transmission system, as it is not a path operator. For this information, CHPD refers to the WECC Path Rating Catalog.

The CHPD outage coordination process is facilitated through the NWPP Online Coordinated Outage System and evaluated by the daytime outage coordinator. Scheduled transmission and generation outages require a minimum of a 45-day notice prior to the month of the outage. Outages of a line and a generator at the same time are not normally allowed. The outage coordination process is documented for both transmission and generation outages. Any outage that appears to significantly impact the system is sent to the transmission planning engineer for in-house study and analysis. Alternatively, CHPD can use the PNSC day-ahead study capabilities on an as needed basis to evaluate the impact of a proposed outage. Outages on the CHPD system are approved by the chief operator; however, the outage can be cancelled by the system operator if the reliability or safety of the system is at risk.

When the system operator receives a request for the Rocky Reach-Columbia No. 2 230 kV line to be removed from service, notification of BPA, Mid-Columbia coordinator, the path operators, the reliability coordinator, and Alcoa is required via telephone. The system operator will also send a message via WECCNet to confirm the requested outage and associated outage schedule. The minimum notification requirements are 72 hours for any affected WECC member and 48 hours for the reliability coordinator. These instructions are documented in *System Operations Guideline No. 8*.

CHPD only performs daily studies if there is a change in the system that would require a study. For real-time contingency analysis, next contingency analysis, and post-event analysis on the 230 kV and 115 kV portions of the transmission system, CHPD will use the state estimator when it is integrated as a tool to support system operating requirements. Predefined contingencies are being identified and prepared for placement in the database for state estimator utilization. Operating cases for an event can be saved and run on the state estimator for post-event analysis.

Additionally, the state estimator will be used as a “what if” tool to enhance the system operators situational awareness.

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.

CHPD has a written plan for the initial training of the system operator trainees. Prior to hiring, system operator candidates are given a psychological evaluation to determine work behavior, communication skills, critical/logical thinking skills, analytical skills, and math skills. Initial training covers a three-year period, broken up into six-month increments with defined expectations in each increment. During the initial training period, the trainee must become NERC-certified and complete a commercial block of training modules on transmission and distribution operations as well as system protection. Additional topics include power plant operations, regional reliability, organizational policies, and restoration drills. Much of this training time is spent with a senior system operator in on-the-job training. CHPD currently has two employees in the system operator trainee program, and both have passed the NERC-certification examination for the reliability operator credential.

At the end of the first 18 months, the trainee takes a battery of tests to determine the focus of the next six month period of training. After these six months, another battery of tests will be given to identify the training needs for the next six months. At the end of the three-year training period, and after NERC-certification has been obtained, the system operator trainee must take a final written examination to qualify as a candidate to go before a review board of NERC-certified system operators and management for a final oral examination. The final oral examination is a pass/fail examination and successful completion of this examination certifies the trainee to become a CHPD system operator.

The CHPD ongoing training program is documented in a written plan and consists of 32 hours of annual emergency operations training for each system operator and 10 continuing education hours (CEHs) of WECC-specific training every other year. This training may be provided by the CHPD training coordinator or a NERC-approved training vendor. Each year, the system operators acquire one-third of the NERC CEH requirement to maintain NERC-certification with the reliability operator credential. The courses are scheduled in the work schedule book as far in advance as possible to ensure attendance as well as adequate system operator coverage of the CHPD primary control center. The evaluation team noted as a positive observation that each system operator is actively involved in identifying and obtaining the NERC-approved CEHs to maintain reliability operator certification.

CHPD collects formal feedback on all aspects of training, ranging from the presentation to the quality of the material presented. This feedback is evaluated and the necessary changes are reflected in the next offering of that particular training module. Other feedback data are maintained and used for scheduling as well as curriculum development.

CHPD recently purchased a dispatcher training simulator (DTS) that is not fully implemented into the training program. CHPD has a list of real-world training scenarios that it plans to install on the DTS to increase training opportunities and training quality for the CHPD system operators. The evaluation team recommends that CHPD develop an expedited schedule to develop training scenarios and fully integrate the DTS into the training program.

The evaluation team noted that all CHPD system operators and senior system operators are NERC-certified with the reliability operator credential. The senior management of CHPD is committed to providing the resources necessary for the system operations staff to acquire the additional training necessary to maintain NERC-certification of this credential. The team commends CHPD for this initiative. Other system operations personnel, such as the system operations training coordinator, system operations engineer, and the system operations supervisor are also NERC-certified with the reliability operator credential, and the team cites this as a positive observation also.

The addition of the system operations training supervisor in early 2006 has enabled CHPD to evaluate its overall training program and create a roadmap for enhancement and improvement. The DTS is a good example of a strategic element of improvement in the training program. Other improvements planned include developing additional training and improving the training library to support an expanded program.

During the evaluation interviews, the team observed that the senior system operators select the operating desk of their choice (two operating positions for system operations) when coming on-shift. If a system operator always selects the same operating desk, the team believes that over a period of time there could be a deterioration of the skill sets associated with the other operating desk. The team recommends that CHPD review this practice and implement a schedule of specific task assignments for system operators to ensure that skill levels are maintained at the highest level possible.

5.2 Organizational Effectiveness

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.

CHPD is considering the use of performance appraisals in the development of the training plan. CHPD's Human Resources department is beginning to implement this program with the goal of increasing the system operator's skills and performance. For example, CHPD uses an "above and beyond" program (spot award program) to recognize exceptional performance in which the employee being recognized can order an item from a catalog.

CHPD system operators have worked outside the operations environment on occasion with the wildfire and mutual aid liaisons. The team noted that a number of CHPD employees are certified emergency medical technicians. CHPD effectively uses these employees at the CHPD generating plants and operating locations. The team commends CHPD for this initiative.

CHPD requires that all switching orders be reviewed by two system operators or appropriate operations personnel, reflecting the company's high priority on safety and reliability. Communications are emphasized in the areas of switching and tagging, and CHPD is planning additional training in this area. If a switching and/or tagging incident occurs, CHPD does not hesitate to perform a root-cause analysis, develop and implement the recommendations of the analysis, and record the lessons learned.

CHPD uses a philosophy of communicating, coaching, and encouraging each employee to practice a zero-defects work ethic. If an error is made or instructions are not followed, CHPD is committed to coaching, counseling, training if the need is identified, and then discipline if deemed appropriate. CHPD desires a culture of coaching and counseling versus discipline so as to promote growth and give personnel the freedom of opportunity to operate the CHPD system in a safe and reliable manner while growing professionally, technically, and personally.

During the evaluation the team noted that an environment of good communications and teamwork existed among all the operations personnel. The team commends CHPD for this exceptional element that contributes greatly to reliability and safety.

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.