**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

August 5, 2016

Mr. Mark E. Reddemann
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION – NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000397/2016007

Dear Mr. Reddemann:

On June 23, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed the on-site inspection at your Columbia Generating Station. On June 23, 2016, the NRC inspectors discussed the results of this inspection with Mr. R. Schuetz, Plant General Manager, and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

The NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements.

The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of this NCV, you should provide a written response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Columbia Generating Station.

If you disagree with a cross-cutting aspect assignment, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV; and the NRC Resident Inspector at the Columbia Generating Station.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Thomas R. Farnholtz, Branch Chief
Engineering Branch 1
Division of Reactor Safety

Docket No. 50-397
License No. NPF-21

Enclosure:
Inspection Report 05000397/2016007
w/Attachment: Supplemental Information

cc: Electronic Distribution for Columbia Generating Station

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**Distribution**:
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ADAMS ACCESSION NUMBER: ML16218A239

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| DATE | 8/4/16 | 8/2/16 | 8/2/16 | 8/2/16 | 8/3/16 | 8/5/16 | 8/5/16 |
| OFFICE | C:EB1 | | | | | | |
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Letter to Mark E. Reddemann from Thomas R. Farnholtz, dated August 5, 2016

SUBJECT: COLUMBIA GENERATING STATION – NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000397/2016007

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

| | |
|---|---|
| Docket: | 05000397 |
| License: | NPF-21 |
| Report: | 05000397/2016007 |
| Licensee: | Energy Northwest Inc. |
| Facility: | Columbia Generating Station |
| Location: | Richland, WA |
| Dates: | June 6 through June 23, 2016 |
| Team Leader: | R. Kopriva, Senior Reactor Inspector, Engineering Branch 1 |
| Inspectors: | J. Braisted, Ph.D., Reactor Inspector, Engineering Branch 1<br>I. Anchondo, Reactor Inspector, Engineering Branch 2<br>S. Graves, Senior Reactor Inspector, Engineering Branch 2<br>J. McHugh, Operation Engineer, Technical Training Center |
| Accompanying Personnel: | C. Baron, Contractor, Beckman and Associates<br>S. Kobylarz, Contractor, Beckman and Associates |
| Approved By: | Thomas R. Farnholtz<br>Branch Chief, Engineering Branch 1<br>Division of Reactor Safety |

Enclosure

## SUMMARY

IR 05000397/2016007; 06/06/2016 – 06/23/2016; Columbia Generating Station; Baseline Inspection, NRC Inspection Procedure 71111.21M, "Design Basis Inspection (TEAM)."

The inspection activities described in this report were performed between June 6, 2016, and June 23, 2016, by four inspectors from the NRC's Region IV office, one inspector from the NRC's Technical Training Center, and two contractors. One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." The cross-cutting aspect was determined using Inspection Manual Chapter 0310, "Aspects Within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

**Cornerstone: Mitigating Systems**

- Green. The team identified a Green, non-cited violation of Technical Specification 5.4, Procedures, Section 5.4.1, which states, in part, "Written procedures shall be established, implemented, and maintained covering the following activities:
    a. The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978;"

  Regulatory Guide 1.33, Revision 2, Appendix A, Section 1, Administrative Procedures, Subsection d, specifies Procedure Adherence and Temporary Change Method. This requirement includes plant Procedure SWP-PRO-01, "Procedure and Work Instruction Use and Adherence," Revision 27; Procedure SWP-PRO-02, "Preparation, Review, Approval and Distribution of Procedures," Revision 42; and Procedure SWP-PRO-03, "Writers Manual," Revision 21, which identify the requirements governing procedural requirements utilized at Columbia Generating Station. Specifically, from June 6 through June 23, 2016, multiple examples of procedural compliance were identified with the station procedures. These examples include failure to follow procedures, inadequate procedures, not correctly translating design requirements into procedures, validation of procedures, and the distribution of procedures. In response to this issue, the licensee reviewed each individual concern and confirmed that there were no operability concerns. The licensee has also placed each identified concern into their corrective action program and will address each issue. This finding was entered into the licensee's corrective action program as Action Request (AR) 00351364.

  The team determined that the licensee's failure to follow guidance procedures for implementation, adherence, accuracy, verification, and distribution of station procedures, was a performance deficiency. This finding was more than minor because it was associated with the procedures attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failing to have accurate procedures, and to comply with

these procedures, was a significant programmatic deficiency that could adversely affect the reliability and capability of systems used to prevent undesirable consequences. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was a design or qualification deficiency that did not represent a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of non-technical specification equipment; and did not screen as potentially risk-significant due to seismic, flooding, or severe weather. The team determined that this finding had a cross-cutting aspect in the area of human performance, resources, where the licensee will ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Specifically, the licensee had not ensured that site procedures were adequate to support plant activities (H.1). (Section 1R21.4.b.)

## REPORT DETAILS

## 1. REACTOR SAFETY

### Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

This inspection of design bases verifies that plant components are maintained within their design bases. Additionally, this inspection provides monitoring of the capability of the selected components and operator actions to perform their design basis functions. As plants age, modifications may alter or disable important design features making the design bases difficult to determine or obsolete. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems, and Barrier Integrity cornerstones for which there are no indicators to measure performance.

### 1R21M Design Basis Inspection (71111.21M)

.1 Overall Scope

To assess the ability of Columbia Generating Station equipment and operators to perform their required safety functions, the team inspected risk-significant components and the licensee's responses to industry operating experience. The team selected risk-significant components for review using information contained in the Columbia Generating Station probabilistic risk assessments and the NRC standardized plant analysis risk model. In general, the selection process focused on components that had a risk achievement worth factor greater than 1.3 or a risk reduction worth factor greater than 1.005. The items selected included components in both safety-related and non-safety-related systems including pumps, circuit breakers, air handling units, heat exchangers, switchgear, and valves. The team selected the risk-significant operating experience to be inspected based on the team's collective past experience.

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, action requests, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For selected components, the team observed operators during simulator scenarios, as well as during simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions because of modifications, and margin reductions identified as a result of material condition issues. Equipment reliability issues were also

considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded conditions; NRC resident inspector input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in-depth margins.

The inspection procedure requires a review of 10 to 17 total samples that include risk-significant and low design margin components, components that affect the large early release frequency (LERF) and operating experience issues. The sample selection for this inspection was 10 components, 2 components that affect LERF, and 3 operating experience issues. The selected inspection and associated operating experience items supported risk-significant functions including the following:

a. Electrical power to mitigation systems: The team selected several components in the electrical power distribution systems to verify operability to supply alternating current (ac) and direct current (dc) power to risk-significant and safety-related loads in support of safety system operation in response to initiating events such as loss of offsite power, station blackout, and a loss-of-coolant accident with offsite power available. As such, the team selected:

    - Radwaste building mixed air cooling system fan (WMA-FN-53A), including cabling and motor control center components for motor/fan assembly operation
    - Division III 4.16-kV Class 1E switchgear (E-SM-4) including circuit breakers, protective relays, and cabling
    - Division I - 125 VDC battery (E-B1-1)
    - Division I standby service water pump motor (SW-M-P/1A)

b. Components that affect LERF: The team reviewed components required to perform functions that mitigate or prevent an unmonitored release of radiation. The team selected the following components:

    - Containment vacuum breakers (CSP-V-7, -8, -10)
    - Upper containment spray valve RHR-V-16A

c. Mitigating systems needed to attain safe shutdown: The team reviewed components required to perform the safe shutdown of the plant. As such, the team selected:

    - Feedwater pump startup bypass valve (COND-V-149)
    - Main feedwater pumps (RFW-P-1A, -1B)
    - Standby liquid control system (SLC)
    - Standby service water pump (SWP-P-1A)

.2 Results of Detailed Reviews for Components:

.2.1 Radwaste Building Mixed Air Cooling System Fan (WMA-FN-53A) (Feeds Division I Vital Bus SM-7)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance procedures and work orders, test procedures, and condition reports associated with the radwaste building mixed air cooling system fan (WMA-FN-53A). The fan assembly is part of the air handling system for the critical switchgear area HVAC system, and is designed to maintain temperatures in the electrical rooms between 55°F and 104°F during normal operation and to limit the temperatures below equipment operability limits during all emergency modes of operation. Radwaste building mixed air cooling system fan WMA-FN-53A (including motor, fan and belt drive system) provides cooling air to electrical switchgear room #1 (division 1 engineering safety feature (ESF) bus), battery charging room #1, battery room #1, and reaction protection system room #1. The team performed walkdowns and conducted interviews with engineering and operations personnel to ensure capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Component maintenance history and corrective action program reports to verify the monitoring of potential degradation
- Calculations for electrical loading, short-circuit and electrical protection to verify that fan motor operational parameters and equipment capacity remained within minimum acceptable limits
- Protective device settings, cable ampacities, fuse and circuit breaker ratings to ensure adequate selective protection coordination of connected equipment during faulted circuit conditions
- Procedures for preventive maintenance, inspection, and testing to compare maintenance practices against industry and vendor guidance
- Interfaces between air handling unit and cooling water supply systems used as heat transfer medium in internal cooling coils
- Equipment obsolescence issues and licensee strategy for aging management

b. Findings

No findings were identified.

.2.2 Division III 4.16-kV Class 1E switchgear (E-SM-4)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, electrical coordination calculations, maintenance procedures and work orders, test procedures, and condition reports associated with Division III 4.16-kV Class 1E switchgear (E-SM-4), including circuit breakers, protective relays, and cabling. The team also performed walkdowns and conducted interviews with engineering personnel to ensure capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Component maintenance history and corrective action program reports to verify the monitoring of potential degradation
- Calculations for electrical system coordination, including short circuit analysis, to verify that operational parameters remained within acceptable limits
- Protective device settings, cable ampacities, and circuit breaker ratings to ensure adequate selective protection coordination of connected equipment during faulted circuit conditions
- Procedures for preventive maintenance, inspection, and testing to compare maintenance practices against industry and vendor guidance
- Equipment obsolescence issues and licensee strategy for aging management

b. Findings

No findings were identified.

.2.3 Division I - 125 VDC Battery (E-B1-1)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance procedures, test procedures, and condition reports associated with the Division I - 125 VDC Battery (E-B1-1). The team also performed walkdowns and conducted interviews with engineering personnel to ensure capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Battery sizing analyses to assess battery capability during design basis loss-of-coolant accident (LOCA)/loss of offsite power (LOOP), and station blackout (SBO) load conditions

- Technical Specifications surveillance test results to assess battery capacity and the battery capability for design basis service conditions, and the weekly, monthly, and quarterly surveillance test results to assess the battery condition

- The battery room ventilation system to assess the capability to remove hydrogen gas released during battery equalize charging

b. Findings

No findings were identified.

.2.4 Division I Standby Service Water Pump Motor (SW-M-P/1A)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance procedures, test procedures, and condition reports associated with division I standby service water pump motor (SW-M-P/1A). The team also performed walkdowns and conducted interviews with engineering personnel to ensure capability of these components to perform their desired design basis functions. Specifically, the team reviewed:

- Pump maximum break horsepower requirement to assess the motor capability to supply power during the worst case design conditions

- Results of load flow and voltage regulation analyses to assess the motor starting and running capabilities during degraded offsite voltage conditions coincident with a postulated design bases accident

- Protective overcurrent relaying setting calculation and periodic relay calibration test results to assess motor overcurrent relay settings for the capability of the motor to operate reliably during the most limiting design basis conditions

b. Findings

No findings were identified.

.2.5 Containment Vacuum Breakers (CSP-V-7, -8, -10)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, inservice testing trends, selected drawings, maintenance and test procedures, and condition reports associated with containment vacuum breakers (CSP-V-7, -8, -10.). The team also conducted interviews with system engineering personnel to ensure the capability of these components to perform their desired design basis functions. Specifically, the team reviewed:

- Component maintenance history and corrective action program reports to verify the monitoring of potential degradation

- Analysis on containment negative pressure transient and how it affects vacuum breaker actuation (This analysis was conducted in preparation of increasing containment spray flow.)

b. Findings

No findings were identified.

.2.6 Feedwater Pump Startup Bypass Valve (COND-V-149)

a. Inspection Scope

The team reviewed the updated safety analysis report, design basis documents, the current system health report, selected drawings, maintenance and test procedures, and condition reports associated with the feedwater pump startup bypass valve COND-V-149 to ensure design basis requirements specification were met. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Component maintenance history and corrective action program reports to verify the monitoring of potential degradation

- Work orders for inspection, lubrication, and refurbishment of the valve

- Procedures for preventive maintenance, inspection, and testing to compare maintenance practices against industry and vendor guidance and procedures for operation of the valve during normal and abnormal conditions

b. Findings

No findings were identified.

2.7 Upper Containment Spray Valve (RHR-V-16A)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures, and condition reports associated with upper containment spray valve RHR-V-16A. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Component maintenance history and corrective action program reports to verify the monitoring of potential degradation

- Calculations for torque and limit switch settings, seismic and weak-link analyses, and functional requirements under normal, abnormal, and accident conditions

- Procedures for preventive maintenance, inspection, and testing to compare maintenance practices against industry and vendor guidance

- Modifications to the valve that could affect its capability in the as-modified configuration

b. Findings

No findings were identified.

.2.8 Main Feedwater Pumps (RFW-P-1A, -1B)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures, and condition reports associated with the main feedwater pumps (RFW-P-1A, -1B). The team also performed walkdowns and conducted interviews with engineering personnel to ensure capability of this component to perform its desired design basis function. Specifically the team reviewed:

- Offline-to-running vibration analysis and discussion with system engineer in regards to the modification of RFW-P-1B pump to turbine coupling

- Component maintenance history and corrective action program reports to verify the monitoring of potential degradation

- System maintenance rule applicability to the failure of RFW-V-102A discharge isolation valve

- Calculation for system operation at 68 percent of rated flow with one feedwater pump

b. Findings

No findings were identified.

.2.9 Standby Liquid Control System (SLC)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures, operating procedures, and condition reports associated with the standby liquid control (SLC) system. The team also performed walkdowns and conducted interviews with operations, design engineering, and system engineering personnel to ensure the capability of this system to perform its desired design basis function. Specifically, the team reviewed:

- The capability of the SLC system to provide the required flow to the reactor vessel in response to a postulated anticipated transient without scram (ATWS) event, including the capability of the SLC pumps to provide required flow with their associated diesel generators operating at minimum allowable speed
- The capability of the SLC system to provide alternate injection to the reactor vessel using hoses and tools staged in the station
- The capability of the SLC system to adequately control suppression pool pH in the event of an accident with significant fuel damage
- The seismic design of the SLC tank, the associated monorail, items stored on the tank platform, and the SLC test tank
- SLC pump NPSH analyses
- Recent SLC system surveillance test results and bases for surveillance test acceptance criteria

b. Findings

No findings were identified.

.2.10 Service Water Pump (SWP-P-1A)

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures, operating procedures, and condition reports associated with the service water pump (SWP-P-1A). The team also performed walkdowns and conducted interviews with operations, design engineering, and system engineering personnel to ensure the capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- The capability of the pump to provide the required flow in response to postulated accidents and transients, including the capability of the pump to provide required flow with its associated diesel generator operating at minimum allowable speed

- Recent pump surveillance test results and bases for surveillance test acceptance criteria

- The design and periodic testing of control circuits associated with the standby service water pumps and associated system valves, including verification that the circuits are fully tested to ensure the pumps and valve will operate on demand

- Results of pond and pump pit inspections, including the criteria for the removal of accumulated silt

- Recent standby service water flow balance test results and bases for acceptance criteria

- Standby service water pump submergence requirements

b. Findings

No findings were identified.

.3 Results of Reviews for Operating Experience

.3.1 Inspection of NRC Information Notice 2005-11, "Internal Flooding/Spray-Down of Safety-Related Equipment due to Unsealed Equipment Hatch Floor Plugs and/or Blocked Floor Drains"

a. Inspection Scope

The team reviewed the licensee's evaluation of Information Notice 2005-11, "Internal Flooding/Spray-Down of Safety-Related Equipment due to Unsealed Equipment Hatch Floor Plugs and/or Blocked Floor Drains," to verify that the licensee had adequately addressed the issues in the information notice. Specifically, the information notice discussed the possibility of flooding safety-related equipment as a result of (1) equipment hatch floor plugs that are not water tight and (2) blockage of the equipment flood drain systems that are credited to mitigate the effects of flooding in the final safety analysis report and plant design basis calculations. The team identified that the licensee's review did not specifically address blockage of credited flood drain systems; however, the licensee had previously addressed this particular aspect of the information notice in its review of similar operating experience. As a result, the licensee inspected its credited floor drains and instituted a preventive maintenance task to periodically inspect and clean the drains.

b. Findings

No findings were identified.

.3.2 Inspection of WCAP-17308-NP, Revision 0, "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances"

a. Inspection Scope

The team reviewed the licensee's evaluation of the issues addressed by WCAP-17308-NP, Revision 0, "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances," to verify that performance of safety-related rotating equipment would not be adversely affected by the associated diesel generator operating at its minimum allowable speed under accident conditions. The team verified that the licensee's analyses and test acceptance criteria adequately addressed the issue.

b. Findings

No findings were identified.

.3.3 Inspection of NRC Information Notice (IN) 2013-17, "Significant Plant Transient Induced by Safety-Related DC Bus Maintenance at Power"

a. Inspection Scope

The team reviewed the licensee's evaluation of Information Notice 2013-17, "Significant Plant Transient Induced by Safety-Related DC Bus Maintenance at Power," to assess Columbia Generation Station's review for applicability, to assess the adequacy of actions taken to address similar conditions at the station, and to assess the status of any open corrective actions. The team verified that the licensee's review adequately addressed the issues in the information notice.

b. Findings

No findings were identified.

.4 Results of Reviews for Operator Actions

The team selected operator actions for review using information contained in the licensee's probabilistic risk assessment and design basis documentation.

a. Inspection Scope

The team observed operators during simulator scenarios associated with the selected components, as well as observing simulated actions in the plant.

The selected operator actions were:

- Simulator scenario: The scenario was designed to place the crew in a loss of critical room ventilation, followed by a loss of all alternating current power (station blackout) event. The emergency procedures for this event direct the operators to reduce the direct current bus loads, a one-hour time-critical action, to extend battery life. The scenario was designed to test the following operator responses;

    - Loss of the radwaste building mixed air cooling system fan WMA-53A and associated procedural and Technical Specification actions (The loss of WMA 53A (CDBI Component) was to determine operator actions to support room cooling.)

    - Failure of Level 8 to trip the reactor feed pumps and crew procedural response to prevent steam line flooding (This was listed as a set point issue in the station top ten list and had a high-risk number due to the potential for flooding of the main steam lines.)

    - Loss of offsite power with an immediate failure of the division 2 emergency diesel generator (EDG) and the required time critical action (TCA) (10 minutes) to secure the EDG (CDBI component and operator time critical action)

    - Loss of all alternating current power (station blackout) event (In the emergency operating procedure for this event, the crew directs an operator to shed battery loads within 1 hour (TCA)

- In-plant job performance measure: An in-plant job performance measure was used to evaluate the operator performing the required compensatory actions to control the heatup of the main control room. It is assumed that this task will be completed within 30 minutes of the onset of event.

b. Findings

Programmatic Concern pertaining to Columbia Generating Stations Procedures

Introduction. The team identified a Green, non-cited violation of Technical Specification 5.4, Procedures, for the licensee's failure to follow guidance procedures for initiating, approving, revising, validation, and the distribution of station procedures. The licensee failed to identify and correct numerous problems with station procedures. Specifically, the team identified several instances where the licensee had violated the station's governing procedures for writing, revising, validation, adherence, and distribution of controlled site procedures. The team considered this to be a programmatic concern as the concern for procedural compliance was found in several different disciplines (operations, maintenance, and design engineering).

Description. The licensee had first identified a deficiency with procedure use and adherence in July 2015. This deficiency was noted as part of a snapshot assessment for the time period of January 2014 through June 2015. Continued poor performance in

the area of procedure use and adherence was verified in the licensee's Common Cause Analysis performed under Action Request 338613, and validated by a contracted independent common cause analysis. In a Continuous Monitoring 1st Trimester 2016 report, covering the time period from October 2015 to January 2016, the licensee continued to identify procedure use and adherence concerns. At this time, procedure problems were identified in the areas of fire protection and engineering. In a February 2016 audit, the licensee noted a weakness in a broad implementation of 21 non-compliances with procedures across multiple engineering departments which had not met the stations expectations. In March 2016, the licensee identified that personnel were not using administrative procedures and not ensuring that the procedures had been updated to reflect current business practices. In an April 2016 audit, the licensee noted that 7 of the 20 surveillances and procedures reviewed identified examples of non-compliant use of place-keeping. In the May 2016 audit, the licensee pointed out that procedure concerns still existed, noting that three deficiencies were identified in the areas of procedure review, process, and implementation of procedure revisions.

During the component design bases inspection in June 2016, the team reviewed numerous procedures covered by different work groups throughout the site (engineering, operations, maintenance, administrative, etc.). While performing the inspection, the team started to identify concerns with the station's procedures. The initial concerns were insignificant, administrative errors (typographical errors), but became more significant as the inspection proceeded (outdated controlled procedures in the control room and incorrect control room procedures). The team was aware of the licensee's efforts to improve their procedures and processes. Failure to have accurate procedures, and to comply with these procedures, was a significant programmatic deficiency that could adversely affect the reliability and capability of systems used to prevent undesirable consequences. The team identified multiple examples of procedure violations ranging from adherence to procedures, inadequate procedures, validation of procedures, wrong references identified in documents, and distribution of controlled procedures. Some of the examples identified are listed as follows:

On June 9, 2016, during activities pertaining to a simulator scenario, the team identified that the licensee had not updated the controlled copy of control room Procedure 5.6.2, "Station Blackout (SBO) and Extended Loss of AC Power (ELAP) Attachments." The team found copies of Revision 0 and Revision 3 of the procedure in the control room and did not find the current version of the procedure, Revision 5, in the control room. Procedure SWP-PRO-02, "Preparation, Review, Approval and Distribution of Procedures," Revision 42, identifies the requirements for initial generation, revisions, review and approval, cancellation, and distribution of procedures. Having two different, outdated revisions of Procedure 5.6.2 in the control room, and not having a copy of the current revision of the procedure in the control room, was a violation of Procedure SWP-PRO-02, Step 5.11, for failure to follow procedures. Step 5.11.a.1) states, in part, "File procedure revisions in all Level 1 controlled procedure locations the same date of implementation." This issue has been entered into the licensee's corrective action program as Action Request 00350729.

On June 9, 2016, and June 20, 21016, the team identified that the licensee had not included the Technical Specification diesel frequency variation into the available margin for the service water system and standby liquid control system pump performance. Emergency core cooling systems flow specifications for low pressure core injection and low pressure core spray systems state that flow rates incorporate margin to account for instrument uncertainty and diesel frequency variation. However, the service water system, a support system for these pumps, does not discuss diesel frequency as part of its margin. Also, the standby liquid control system pump, which would be affected by diesel frequency variations, had not included these variations in the standby liquid control system performance requirements. Technical Specification 3.8.1.2 states, in part, "Verify each required diesel generator starts from standby conditions and achieves steady state: a.) Voltage ≥ 3910 V and ≤ 4400 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz for DG-1 and DG-2; and b.) Voltage ≥ 3910 V and ≤ 4400 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz for DG-3." Variations in voltage and frequency will affect the performance of the service water and standby liquid control systems and, therefore, the margin associated with the calculation and performance requirements of these two systems. With the possible reduction in performance, therefore reducing the available calculated design margin, the licensee was required to review the design requirements of the two systems, and to confirm that enough margin still existed. Upon completion of the design reviews, the licensee confirmed that enough margin still exited in the supporting documents for the service water and standby liquid control systems to perform their design functions. A quick extent of condition review by the licensee also revealed that they had also not included the diesel generator frequency variation concern in the high pressure core spay system design requirements. This was a violation of Procedure SWP-PRO-02, Step 5.4.2.g and Step 5.4.7, for failing to validate and incorporate technical requirements into procedures. Step 5.4.2.g, Validation, and Step 5.4.7, Final Approval, both state, in part, "Procedures shall be reviewed for technical accuracy by a minimum of two technical reviewers who are knowledgeable in the affected subject matter." This issue has been entered into the licensee's corrective action program as Action Requests AR 00350779 and AR 00351128.

On June 20, 2016, during a control room simulator activity, one of two crews incorrectly applied the station blackout procedure. Crew 1 followed the dotted line in Procedure PPM 5.6.1, "Station Blackout (SBO) / Extended Loss of A/C Power (ELAP)" flow chart, to Step E-1, which states, in part: "If within 45 minutes it is anticipated that AC power cannot be restored to the battery chargers within 4 hours THEN declare an ELAP." The crew delayed taking action for 45 minutes, and then proceeded to Step E-3 of the procedure to reduce station battery loads per Attachment 8.4 of Procedure PPM 5.6.2, "Station Blackout (SBO) and Extended Loss of AC Power (ELAP) Attachments." The in-field validated time for completing the task of reducing the station battery loads (stripping the batteries of unnecessary loads) takes 35 minutes. Waiting 45 minutes to start the actions required to perform battery load stripping would have exceeded the licensee's one-hour time critical action requirement. This was a violation of Procedure SWP-PRO-02, Step 5.4.2.f.3, for validation of the procedure. Step 5.4.2.f.3 states, in part, "Determine if the procedure revision requires validation based on complexity of performance, particularly operating procedures and special test procedures." Also, in order to implement the procedure correctly as outlined by the station's Operations Superintendent, Crew 2 did not follow the dotted line to Step E-1,

but went directly to Step E-2. This allowed them to reach Step 3 of PPM 5.6.1 and implement Attachment 8.4 in time to meet the task time requirement of 1 hour for reducing station battery loads. This was a violation of Procedure SWP-PRO-01, Step 4.1.1.e, for failure to follow the procedure. Step 4.1.1.e states, in part, "COMPLETE each step before starting the next step." This issue has been entered into the licensee's corrective action program as Action Request 00351178.

On June 21, 2016, during simulator activities, the team identified that one of the two crews incorrectly applied Abnormal Procedure ABN HVAC, "Heating Ventilation and Air Conditioning Trouble," Revision 12, for radwaste building mixed air cooling system fan WMA-53A. The ABN HVAC Procedure, Step 4.5.1, states: "ENTER WMA-FN-53A as inoperable in the Plant Logging System (Refer to Technical Specifications 3.8.4/3.8.5, 3.8.7/3.8.8, and LCS 1.7.1, 1.8.4)." The first crew entered Procedure LCS 1.7.1, "Area Temperature Monitoring," Revision 73, to monitor the area temperatures and take action as required by the procedure action levels. Crew 2 entered Procedure OI-41, "Operations Work Control Expectations," Revision 59, which provided specific guidance on inoperability of components due to a loss of ventilation. Procedure OI-41 is not listed in ABN-HVAC as a procedure the crew should have referred to. Another concern was that the performance differences between the crews could lead to exceeding the technical specification action time requirements for the listed component limiting condition of operations. The Abnormal Procedure ABN HVAC identified that equipment in the room would be declared inoperable on a loss of ventilation fans; however, as the reference Procedure LCS 1.7.1 action levels are reached, no specific actions are provided. This was a violation of Procedure SWP-PRO-02, Step 5.4.2.g and Step 5.4.7, for failing to validate and incorporate technical requirements into procedures. Step 5.4.2.g, Validation, and Step 5.4.7, Final Approval, both state, in part, "Procedures shall be reviewed for technical accuracy by a minimum of two technical reviewers who are knowledgeable in the affected subject matter." This issue has been entered into the licensee's corrective action program as Action Request 00351179.

On June 21, 2016, as part of the job performance measure of the operators, a scenario was selected to observe the performance of procedure PPM 5.6.2, "Station Blackout (SBO) and Extended Loss of AC Power (ELAP) Attachments," Section 8.5, Compensatory Measures to Promote Control Room Cooling. Two differences were noted during the performance of this procedure section. The first difference was that operators opened different panel doors, with one operator having to be prompted to finish opening front panel doors to validate the time requirements. The procedure action, Step 8.5.2, Bullet 3, states, "OPEN all Control Room front panel doors to provide additional panel cooling." The second performance difference was in the opening of control room doors. Operators opened different doors. The team questioned the licensee whether opening different panel doors and different control room doors was sufficient to meet the design requirements for cooling the control room. The licensee had to review the applicable calculation, using the panel doors and control room doors that were actually opened during the control room scenario, to ensure that the calculation still supported the cooling requirements for the control room components. This was a violation of Procedure SWP-PRO-01, Step 4.1.1, for failing to follow the procedure, and Procedure SWP-PRO-02, Step 5.4.7, for review of technical accuracy.

This issue has been entered into the licensee's corrective action program as Action Request 00351361.

On June 21, 2016, during the performance of Procedure PPM 5.6.2, "Station Blackout (SBO) and Extended Loss of AC Power (ELAP) Attachments," Section 8.5, Compensatory Measures to Promote Control Room Cooling, the team discovered that the designation of the control room breaker panels identified in the procedure that needed to be opened did not have the exact same labeling on the control room breaker panels. This was a violation of Procedure SWP-PRO-02, Step 5.4.2.g and Step 5.4.7, for failing to validate and incorporate technical requirements into procedures. Step 5.4.2.g, Validation, and Step 5.4.7, Final Approval, both state, in part, "Procedures shall be reviewed for technical accuracy by a minimum of two technical reviewers who are knowledgeable in the affected subject matter." This issue has been entered into the licensee's corrective action program as Action Request 00351361.

On June 22, 2016, the team identified that the limit on maximum electrolyte temperature assumed in Calculation 2.05.07, "Plant Batteries – Hydrogen Release," was not fully validated and incorporated into plant Procedure PPM 10.25.234, "Equalize Charging 24 VDC, 125 VDC, 250 VDC Station Batteries." The basis for the volume of hydrogen gas that would be generated during equalize charging of the batteries was based on a calculated limiting electrolyte temperature of 104 degrees Fahrenheit. Engineering failed to incorporate the actual temperature increase of 11 degrees Fahrenheit in electrolyte temperature during equalize charging of the batteries into the calculation. The calculated electrolyte temperature limit of 104 degrees Fahrenheit would have been exceeded if the battery room temperature (electrolyte temperature) would have been above 93 degrees Fahrenheit at a time when the batteries would have needed an equalizing charge. This was a violation of Procedure SWP-PRO-02, Step 5.4.2.f.3, for not correctly translating design requirements into procedures (validation of the procedure). This issue has been entered into the licensee's corrective action program as Action Request 00351263

On June 22, 2016, the team reviewed the licensee's list of credited flood drains within the plant, as a follow-up to Information Notice 2005-11, "Internal Flooding/Spray-Down of Safety-Related Equipment due to Unsealed Equipment Hatch Floor Plugs and/or Blocked Floor Drains," under AR Number 00030685. The Final Safety Analysis Review (FSAR), Section 3.9.3 describes the floor drain system, and FSAR Section 3.6 describes the flooding analysis. In 2007, Action Request AR 129227-01 evaluated operating experience associated with flooding and included a list of the flood drains credited for flooding. For the drains that were credited in the flooding calculations; 1) PMRQ 16523-01 performs a three-month preventative maintenance activity to visually inspect floor drains; and 2) PMRQ 16523-02 performs a ten-year inspection where non-destructive examination is performed to closely inspect and verify that the drains do not contain debris or sediment. This had formed the original bases and scope of the licensee's ten-year preventative maintenance activities. In 2012, Action Request AR 212121 identified that the credited floor drains in the flood calculation were to get field labeled. Assignment 02 of AR 212121 was to provide a list of the floor drains credited for flooding. The scope of the current ten-year preventative maintenance program is identified in Work Order WO – 02062360. The team performed a walkdown

of the credited flood drains and identified flood drains in Rooms R214 and D104 that were not on the credited floor drain list, and did not have any preventive maintenance (PM) activities identified to inspect for debris or sediment. Also during the walkdown, two credited floor drain scuppers were found that had not been labeled. These drains are on the W525 foot elevation, one in room C508 and the other one in room C502. This was a violation of Procedure SWP-PRO-02, Step 5.4.2.g and Step 5.4.7, for failing to validate and incorporate technical requirements into procedures. Step 5.4.2.g, Validation, and Step 5.4.7, Final Approval, both state in part, "Procedures shall be reviewed for technical accuracy by a minimum of two technical reviewers who are knowledgeable in the affected subject matter." This issue has been entered into the licensee's corrective action program as AR 00351218 and AR 00351209.

Analysis. The team determined that the licensee's failure to follow guidance procedures for implementation, adherence, accuracy, verification, and distribution of station procedures, was a performance deficiency. This finding was more than minor because it was associated with the procedures attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failing to have accurate procedures, and to comply with these procedures, was a significant programmatic deficiency that could adversely affect the reliability and capability of systems used to prevent undesirable consequences. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was a design or qualification deficiency that did not represent a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of non-technical specification equipment; and did not screen as potentially risk-significant due to seismic, flooding, or severe weather. The team determined that this finding had a cross-cutting aspect in the area of human performance, resources, where the licensee will ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Specifically, the licensee had not ensured that site procedures were adequate to support plant activities (H.1).

Enforcement. The team identified a Green, non-cited violation of Technical Specification, 5.4 Procedures, Section 5.4.1, which states in part, "Written procedures shall be established, implemented, and maintained covering the following activities:

a. The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978;"

Regulatory Guide 1.33, Revision 2, Appendix A, Section 1, Administrative Procedures, Subsection d, specifies Procedure Adherence and Temporary Change Method. This requirement includes plant Procedures SWP-PRO-01, "Procedure and Work Instruction Use and Adherence," Revision 27, Procedure SWP-PRO-02, "Preparation, Review, Approval and Distribution of Procedures," Revision 42, and Procedure SWP-PRO-03, "Writers Manual," Revision 21, which identify the requirements governing procedural requirements utilized at Columbia Generating Station. Contrary to the above, from June 6 through June 23, 2016, the licensee failed to establish, implement, and maintain

written procedures as required by the governing procedural requirements utilized at Columbia Generating Station. Specifically, multiple examples of procedural compliance were identified with the station procedures. These examples include failure to follow procedures, inadequate procedures, not correctly translating design requirements into procedures, validation of procedures, and the distribution of procedures. In response to this issue, the licensee reviewed each individual concern and confirmed that there were no operability concerns. The licensee has also placed each identified concern into their corrective action program and will address each issue. This finding was entered into the licensee's corrective action program as Action Request 00351364. Because this finding was of very low safety significance and has been entered into the licensee's corrective action program, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: (NCV 05000397/2016007-01, "Programmatic Concern Pertaining to Columbia Generating Stations Procedures.")

## 4. OTHER ACTIVITIES

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

### 4OA6 Meetings, Including Exit

Exit Meeting Summary

On June 23, 2016, the inspectors presented the initial inspection results to Mr. R. Schuetz, Plant General Manager, and other members of the licensee's staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

## SUPPLEMENTAL INFORMATION

## KEY POINTS OF CONTACT

Licensee Personnel

P. Allen, Systems Engineering
M. Armenta, Reactor Fuels Manager, Engineering
V. Bhardwaj, Planning, Scheduling and Outage Manager, Planning, Scheduling and Outage
A. Black, Emergency Services General Manager, Emergency Services
D. Brandon, Plant Support Engineering Manager, Engineering
J. Brower, Principal Engineer, Quality
D. Brown, System Engineering Manager, Engineering
J. Carter, Minor Modifications Supervisor, Engineering
D. Cook, Training Specialist, Technical Training
G. Cullen, Technical Services Engineering Manager, Engineering
J. Darling, Nuclear Steam Supply Systems Engineering Supervisor, Engineering
M. Davis, Chemistry & Radiation Safety Manager, Chemistry
J. Dean, Equipment Operator
D. Dearing, Staff Engineer, Engineering
J. Dunn, Senior Engineer, Engineering
K. Eldrige, Senior Engineer, Engineering
K. Elliott, Shift Manager, Operations
E. Gilmour, Computer Engineering Manager, Engineering
D. Gregoire, Regulatory Affairs and Performance Improvement Manager, Regulatory Affairs and Performance Improvement
R. Hammons, Employee Concerns Program Manager, Employee Concerns Program
R. Hermann, Systems Engineering
G. Higgs, Maintenance Manager, Maintenance
M. Holle, Principal Engineer, Engineering
J. Hysjulien, Principal Engineer, Engineering
E. Jakeman, Senior Engineer, Engineering
A. Javorik, Engineering Vice President, Engineering
M. Kellett, Assistant to the Vice President, Operations
D. Kettering, Design Engineering Manager, Engineering
D. Kovacs, Information Services Manager, Information Services
M. Laudisio, Radiation Protection Manager, Radiation Protection
T. McLaen, System Engineering
R. Meyers, Operations Training Manager, Training
C. Moon, Quality Manager, Quality
G. Moore, Contractor, Engineering
S. Nappi, Records and Information Management Manager, Records and Information Management
D. Oaks, Technical Services
S. O'Connor, Procurement Engineering Supervisor, Engineering
T. Parmelee, Principal Engineer, Regulatory Affairs
B. Pease, Emergency Services Support Manager, Emergency Services
J. Pierce, Recovery Manager, Operations

Licensee Personnel (continued)

R. Prewett, Operations Manager, Manager
M. Rice, Design Authority, Engineering
B. Schuetz, Plant General Manager,
R. Slough, Contractor, Regulatory Affairs
C. Smith, Senior Engineer, Engineering
K. Stauffer, Systems Engineering
D. Stephens, Assistant Operations Manager, Operations
M. Stodick, Assistant Operations Manager, Operations
G. Strong, I&C Design Supervisor, Engineering
W. Thomas, Principal Engineer, Engineering
B. Trappett, Program Manager, Engineering
C. Vadoli, Electrical Design Supervisor, Engineering
K. Van Speybroeck, Engineering Fix-It-Now Supervisor, Engineering
D. Wolfgramm, Compliance Supervisor, Regulatory Affairs
D. Wong, Civil/Stress Design Supervisor, Engineering
A. Zbib, Mechanical Design Supervisor, Engineering
J. Zielinski, Staff Engineer, Engineering

NRC Personnel

G. Kolcum, Senior Resident Inspector
D. Bradley, Resident Inspector

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

| | | |
|---|---|---|
| 05000397/2016007-01 | NCV | Programmatic Concern Pertaining to Columbia Generating Stations Procedures (Section 1R21.4.b) |

## LIST OF DOCUMENTS REVIEWED

Calculations

| Number | Title | Revision/Date |
|---|---|---|
| | Off Line to Running Machinery Movement Survey Reactor Feed Water Pump 1B – 2011-2012 | 0 |
| 02-85-19 | Safe Shutdown Temperature Calculation | 10 |
| 02-90-039 | SBO Control Room Heat Load | 2 |
| 02-92-37 | Control room SBO temperatures | 0 |
| 2.05.01 | Battery Sizing, Voltage Drop, and Charger Studies for Div. 1 & 2 Systems | 12 |
| 2.05.07 | Plant Batteries – Hydrogen Release | 0 |
| 2.12.58 | Second Level Undervoltage Relay Settings for Buses SM-4, 7 & 8 | 5 |
| 2-05-01 | SBO battery loading | 12 |
| 213-05, 7 | Vacuum Relief Valve and Auxiliaries | 5 |
| 216-92-058 | Weak Link Analysis for Valve Nos. RHR-V-016A,B,017A,8 Velan 16’ 300# Gate Valve | 0 |
| ABN-TSG-008 | Initiation of Drywell or Wetwell Spray Through the Residual Heat Removal System | 4 |
| C106-92-03.03 | Calculation for RHR Motor Operated Valve Design Basis Review | 5 |
| C106-92-03.04 | SSW System MOV Design Basis Review | 2 |
| CGS-FTS-0168 | Alternative Source Term | 2 |
| CMR 5841 | Design of Monorail SLC-HOI-1 in Reactor Building EL 548’ Overhead | 0 |
| CMR-87-0155 | 2.05.07, Revision 0 | September 24, 1987 |
| CMR-93-625 | 2.05.07, Revision 0 | February 1, 1994 |
| CMR-93-698 | 2.05.07, Revision 0 | March 19, 1994 |
| CRM-93-0645 | Modification to Calculation NE-02-86-03 | 2 |
| CVI-1128-00,2 | Vital Island Analysis of Loss of HVAC | 2 |
| DRF 000-0155-4374 | CGS Containment Negative Pressure Transient Analysis | 1 |

Calculations

| Number | Title | Revision/Date |
|---|---|---|
| E/I-02-87-07 | Load Flow and Voltage Analysis for the Plant Main Buses AC Distribution Systems | 8 |
| E/I-02-92-17 | Medium Voltage (4.16 KV & 6.9 KV) Electrical Distribution System Phase Overcurrent Relay Settings | 2 |
| E/I-02-92-17 | Medium Voltage (4.16 kV and 6.9 kV) Electrical Distribution System Phase Overcurrent Relay Settings | 2 |
| E/I-02-95-01 | MC-7F Manual Calculation | 3 |
| ME-02-01-28 | Reactor Building to Wetwell Vacuum Breaker Air Operated Valves Component Level Calculation | 1 |
| ME-02-02-02 | Calculation for Reactor Building Flooding Analysis | 1 |
| ME-02-02-25 | AC Gate Valves - MOV Thrust and Set-point Calculation | 3 |
| ME-02-02-25 | MOV Thrust and Setpoint Calculation | 1 |
| ME-02-02-40 | PFSS Flooding Analysis - Diesel Generator Building | 0 |
| ME-02-83-24 | Spray Pond Leakage Test Evaluation | 0 |
| ME-02-83-26 | RFW System Flow and Pressure at 68% of Rated Flow with One RFW Pump Operating | 0 |
| ME-02-95-35 | Design Basis Thrust Calculation and Evaluation for RHR-V-16A/17A and RHR-V-16B/17B | 0 |
| NE-02-04-05 | Columbia Offsite and Control Room Doses for LOCA using AST and NRC Methods | 0 |
| NE-02-04-05 | Alternate Source Term | 0 |
| NE-02-86-03 | NPSHA Calculation for SLC Pumps | 2 |

Action Requests (ARs)

| | | | | |
|---|---|---|---|---|
| 00030685 | 00285788 | 00296055 | 00314436 | 00332638 |
| 00045732 | 00286642 | 00296600 | 00315307 | 00333017 |
| 00051643 | 00287035 | 00296604 | 00315570 | 00333458 |
| 00054598 | 00288156 | 00297047 | 00315858 | 00338586 |

Action Requests (ARs)

| | | | | |
|---|---|---|---|---|
| 00072935 | 00289689 | 00298030 | 00316338 | 00342162 |
| 00129227 | 00290072 | 00298146 | 00317140 | 00343525 |
| 00253569 | 00290331 | 00299032 | 00319016 | 00344773 |
| 00265152 | 00290429 | 00299389 | 00319175 | 00344954 |
| 00268512 | 00290926 | 00301063 | 00320868 | 00344954 |
| 00268901 | 00292138 | 00301226 | 00321187 | 00346054 |
| 00276553 | 00292521 | 00303553 | 00322159 | 00346219 |
| 00277202 | 00293488 | 00304572 | 00323757 | 00348134 |
| 00278487 | 00294087 | 00306676 | 00325291 | 00348444 |
| 00279047 | 00294249 | 00307234 | 00325901 | 00348565 |
| 00281487 | 00294514 | 00308570 | 00326997 | 00348641 |
| 00281930 | 00295004 | 00309958 | 00330201 | 00349580 |
| 00283440 | 00295177 | 00310390 | 00331738 | 00349813 |
| 00284363 | 00295325 | 00310391 | 00331996 | 00349924 |
| 00284392 | 00295555 | 00310515 | 00331997 | 00350139 |
| 00285106 | 00296000 | 00313179 | 00332338 | 00350661 |

Action Requests (ARs) Generated During the Inspection

| | | | | |
|---|---|---|---|---|
| 00350623 | 00350774 | 00351142 | 00351209 | 00351295 |
| 00350642 | 00350776 | 00351144 | 00351214 | 00351296 |
| 00350660 | 00350779 | 00351176 | 00351216 | 00351355 |
| 00350661 | 00350900 | 00351178 | 00351218 | 00351361 |
| 00350720 | 00350969 | 00351179 | 00351263 | 00351363 |
| 00350729 | 00351128 | 00351199 | 00351269 | 00351364 |
| 00350759 | 00351139 | 00351204 | 00351283 | |

Correspondence

| Number | Title | Date |
|---|---|---|
| G02-04-170 | License Amendment Request Alt. Source Term | September 30,2004 |

Correspondence

| Number | Title | Date |
|---|---|---|
| GI2-06-186 | Issuance of Amendment - RE: Alternative Source Term | November 27, 2006 |
| GI2-07-018 | Clarification of Alternative Source Term Amendment | February 5, 2007 |
| GI2-07-055 | Correction to Safety Evaluation for Amendment No. 199, “Alternative Source Term” | March 27, 2007 |
| GO2-06-043 | Response to Request for Information Related to Alternative Source Term License Amendment Request | March 21, 2006 |

Design Basis Document

| Number | Title | Revision |
|---|---|---|
| | Off Line to Running Machinery Movement Survey Reactor Feed water Pump 1B – 2011-2012 | 0 |
| | Division 300 Section 311 Residual Heat Removal System | 14 |
| | Division 300 Section 312 Reactor Feedwater and Condensate Supply Systems | 6 |
| 213-05, 7 | Vacuum Relief Valve and Auxiliaries | 5 |
| 43-00, 124 | Cast Steel Gate Globe and Check Valves | 10 |
| MOT-PUMP-1-1 | Large Pumps | 9 |
| SD000127 | Primary Containment | 15 |
| SD000151 | Reactor Feed water | 13 |
| SD000172 | Standby Liquid Control | 13 |
| SD000188 | Columbia Generating Station System Description DC Distribution | 10 |
| SD000195 | RW Building HVAC | 9 |
| SD000199 | Plant Service Water | 14 |

Design Basis Document

| Number | Title | Revision |
|---|---|---|
| SD000201 | Columbia Generating Station System Description Control Room, Cable Room and Critical Switchgear Rooms – HVAC (CR-HVAC) | 15 |

Design Change Packages

| Number | Title | Revision/Date |
|---|---|---|
| 0000001891 | Calc 216-92-058 Rev 0 - Evaluate the Impact of PER 202-2399 PERA 202-2399-01 | September 30, 2004 |
| 0000002406 | AST Analysis Documentation / Implementation | February 26, 2007 |
| 0000005841 | Qualification of SLC-HOI-1 Monorail | 000 |
| 0000008370 | 216-92-058 R000, Incorporates the Correct Stem Nut Material and Yield Strength & Evaluates Thread Wear Gate Valve RHR-V-16A, 16B, 17A, 17B | April 29, 2011 |
| 0000011499 | C106-92-03.03 Rev. 4 - Replace RHR-P-2B Pump with a Spare per PDC 11158 | January 17, 2013 |
| 0000011702 | Feed Water Pump Flexible Coupling | 0 |
| 0000014885 | Revise ME-02-02-02 to Implement LPCS EOP Level and Pump Waterleg Height Changes and Include Responses to NRC Questions Regarding the Possibility of Common Cause Flooding on RB 471' El. | February 22, 2016 |
| CMR 10154 | Update Setpoint Calc. 2.12.58 for Div. 2 Second Level Undervolt Time Delay Relays Installed for EC 2201 | May 25, 2011 |
| CMR 11419 | Revise Calculation 2.12.58 to Add Second Level Undervoltage Relay for Bus SM-4 Per PDC 11331 | February 25, 2013 |
| CMR 3551 | 2.12.58, PER 202-2748/PTL 194444 | December 27, 2004 |
| CMR 5696 | 2.12.58, Rev 005 Make PT Errors a "Bias", Not "Random" Ptl # A 245286 | July 16, 2007 |
| EC-6522 | Calc 2.05.07 Rev 0 – Evaluate 24VDC Battery Cell Replacement (E-B0-1A, E-B0-1B, E-B0-2A, and E-B0-2B) | November 12, 2007 |

Drawings

| Number | Title | Revision/Date |
|---|---|---|
| 008763 | Flexxor 400M w/Anderson Clamp Hubs for Tapered Shafts | 3 |
| 02E12-08,14 | Report of Certified Performance Test for RHR Spare Pump | 0 |
| 90167 | YUASA/Exide, Inc. Wiring Diagram , 58 Cell GN-15 Battery For Two Step Racks (End to End) | February 16, 1994 |
| 960690.90 | RHR (LPCI) Pump Characteristics (S/N 0801MP0044399-1) P-2B | 1 |
| E501-1 | Electrical Symbol List One Line and Elementary Diagrams Power, Grounding and Lighting Plans | 28 |
| E501-2 | Electrical Symbol List Communication, Fire Alarm, and Cathodic Protection Systems Plans | 10 |
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Engineering Changes

| Number | Title | Date |
|---|---|---|
| 0000001891 | Calc 216-92-058 Rev 0 - Evaluate the Impact of PER 202-2399 PERA 202-2399-01 | September 30, 2004 |
| 0000002406 | AST Analysis Documentation / Implementation | February 26, 2007 |
| 0000008370 | 216-92-058 R000, Incorporates the Correct Stem Nut Material and Yield Strength & Evaluates Thread Wear Gate Valve RHR-V-16A, 16B, 17A, 17B | April 29, 2011 |
| 0000011499 | C106-92-03.03 Rev. 4 - Replace RHR-P-2B Pump with a Spare per PDC 11158 | January 17, 2013 |
| 0000014885 | Revise ME-02-02-02 to Implement LPCS EOP Level and Pump Waterleg Height Changes and Include Responses to NRC Questions Regarding the Possibility of Common Cause Flooding on RB 471' El. | February 22, 2016 |

Miscellaneous

| Number | Title | Revision/Date |
|---|---|---|
| | System Health Report – CRHVAC | First Quarter - 2016 |
| | System Health Report – 4160V | First Quarter - 2016 |
| | Degraded Voltage (Secondary Level) Undervoltage Protection Ladder Logic Setpoint Diagram | |

Miscellaneous

| Number | Title | Revision/Date |
|---|---|---|
| | Maintenance Rule Criteria – WMA System | |
| | COND System Health Report | 1st Qtr 2016 |
| | Performance Criteria Form for COND System | 0 |
| | Performance Criteria Form for RHR System | 0 |
| | RHR System Health Report | 4th Qtr 2015 |
| 23-00 | Service Water Pump Performance Curve and Test Data | 0 |
| 93-044 | SAR Change Notice Forms | 1993 |
| AR 346054 | Apparent Cause Evaluation - Ash Fall Event | 1 |
| E/I-02-92-17, Appendix D | Time-Current Characteristic Curves for HPCS 4160V | June 23, 2015 |
| EES-4, Section 2 | Reference listing from EES-4, Setpoint Methodology | 007 |
| EI-02-95-01 APP. B1 | Time-Overcurrent Characteristic Curve for PP-7FA | February 17, 2016 |
| FPF 1.1, Item 40 | Re-analysis of NRC Information Notice 88-60 | 0 |
| GEWP-2-81-189 | Letter from GE Service Company to WNP-2 Project Manager, HPCS Protective Relay Settings | August 17, 1981 |
| LDCN-13-026 | Lowering TS LPCS & LPCI Flow Rates | 0 |
| MOT-FAN-1-1 | Maintenance Optimization Template – Fans | 8 |
| MOT-MO-1-1 | Motor Operated Valves | 20 |
| MOT-MOTOR-2-3 | Maintenance Optimization Template – 480V Motors | 7 |
| N/A | Inservice Testing Program Plan - Fourth Ten-Year Inspection Interval | 0.001 |
| PSA-2-SN-RHR | RHR System Notebook | 6 |
| PSAT CI 10.03 | Topical Report on Alternative Source Term Application | 0 |
| SC000134 | Condensate | 16 |
| SD000157 | Feedwater Level Control | 16 |

Miscellaneous

| Number | Title | Revision/Date |
|---|---|---|
| Test T-41533-1A | Pump Serial No. 94W-S-0035 Standby Service Water Pump | June 20, 1995 |
| TM-2117 | Technical Support Guidelines - Core/Thermal Engineer | 7 |
| Updated Safety Analysis Report, Chapter 8.3.1, Amendment 59 | Alternating Current Power Systems | December, 2007 |
| Updated Safety Analysis Report, Chapter 9.4.1, Amendment 54 | Main Control Room/Cable Spreading Room/Critical Switchgear Area | April, 2000 |
| WO 4000-13 | B&R Memorandum – Standby Service Water System Hydraulic Review | September 1, 1981 |

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| Number | Title | Revision/Date |
|---|---|---|
| | Inservice Testing Program Plan – Fourth Ten-Year Inspection Interval | December 17, 2014 |
| 10.25.168 | Maintenance and Repair of Limitorque Valve Operators - Model SMB and SB 0 Through 4 | 12 |
| 10.25.234 | Equalize Charging 24 VDC, 125 VDC, 250 VDC Station Batteries | 1 |
| 10.25.4 | Lubrication and Inspection of MOVs | |
| 10.25.74 | Testing Motor Operated Valve Motors and Controls | 27 |
| 11A-00, 70 | Instruction Manual for Centrifugal Pumps Reactor Feed Pumps | 4 |
| 18.1.32 | RHR-P-2B Pre-Service Test | 2 |
| 5.2.1 | Primary Containment Control | 23 |
| 5.6.2 | Station Blackout (SBO) and Extended Loss of AC Power ELAP Attachments | 4 |
| ABN-ASH | Ash Fall | 023 |

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| ABN-Core | Unplanned Core Operating Conditions | 16 |
| ABN-CR-Evac | Control Room Evacuation and Remote Cooldown | 34 |
| ABN-Fire | Fire | 36 |
| ABN-HVAC | HVAC Trouble | 12 |
| ABN-LEVEL | Unplanned RPV Water Level Change | 6 |
| ABN-SW | Service Water Trouble | 015, Minor 002 |
| ABN-SW | Service Water Trouble | 15 |
| ABN-WIND | Tornado/High Winds | 028 |
| CGS-FTS-0168 | Columbia Generating Station Alternative Source Term | 2 |
| DDSI-DOC-01 | Document and Data Services Instruction | 14 |
| DES -2-1 | Design Engineering Instructions | 55 |
| DES-2-1 | Design Engineering Instructions | 55 |
| DES-4-1 | Preparation, Verification, and Approval of Calculations | 21 |
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| ESP-B11-A101 | 12 Month Battery Inspection of 125 VDC E-B1-1 | 9 |
| ESP-B11-B101 | 24 Month Battery Testing of 125 VDC E-B1-1 | 16 |
| ESP-B11-F101 | 60 Month Battery Testing of 125 VDC E-B1-1 | 13 |
| ESP-B11-M101 | Monthly Battery Testing 125 VDC E-B1-1 | 6 |
| ESP-B11-Q101 | Quarterly Battery Testing 125 VDC E-B1-1 | 11 |
| ESP-BAT-W101 | Weekly Battery Testing | 16 |
| ESP-R2762414243-X301 | 4.16 KV Emergency Bus Undervoltage Relays (E-RLY-2762/4/1, E-RLY-2762/4/2 and E-RLY-2762/4/3) - CC | 0 |
| ESP-RLY274S1S2-X301 | 4.16 KV Emergency Bus Primary Undervoltage Relays (E-RLY-27/4/S1 and ERLY-27/4/52) - CC | 5 |
| ESP-RLY624S1S2-B301 | DIV 3 Loss of Voltage Time Delay Relays, E-RLY-62/4/S1 and E-RLY-62/4/S2 - CC | 5 |

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| Number | Title | Revision/Date |
|---|---|---|
| ESP-RLY624S3S4-B301 | DIV 3 Loss of Voltage Time Delay Relays, E-RLY-62/4/S3 and E-RLY-62/4/S4 - CC | 4 |
| ESP-SM4-B501 | SM 4 Loss of Voltage Relays | 12 |
| ISP-CSP/IST-B101 | RB-WW Vacuum Breaker Setpoint Verification, Visual Inspection, Actuation, and VPI-CC | 3 |
| MES-10 | Motor Operated Valve Sizing and Switch Setting | 7 |
| MOVPP-01 | MOV Periodic Verification Program Plan | 7 |
| OPEX-01 | Operating Experience Program Implementation Manual | 7 |
| OSP-CONT-/IST-Q701 | CSP and CEP Containment Isolation Valve Operability | 13 |
| OSP-ELEC-M703 | HPCS Diesel Generator Monthly Operability Test | 61 |
| OSP-ELEC-S703 | HPCS Diesel Generator DG3 Loss of Power Test | 17 |
| OSP-ELEC-S703 | HPCS Diesel Generator Semi-Annual Operability Test | 57 |
| OSP-ELEC-W101 | Offsite Station Power Alignment Check | 28 |
| OSP-ELEC-W102 | Electrical Distribution Subsystem Breaker Alignment and Power Availability Verification | 29 |
| OSP-HPCS/IST-Q701 | HPCS System Operability Test | 48 |
| OSP-INST-B702 | Alternate Remote Shutdown Panel Operability | 9 |
| OSP-RHR/IST-Q703 | RHR Loop B Operability Test | 49 |
| OSP-RHR-M104 | Residual Heat Removal System A Valve Position Verification | 4 |
| OSP-SLC/IST-Q701 | Standby Liquid Control Pumps Operability Test | 026, Minor 002 |
| OSP-SLC-B701 | Standby Liquid Control Loop A Injection Functional Test | 009, Minor 003 |
| OSP-SW/IST-Q701 | Standby Service Water Pump Operability | 27 |
| OSP-SW-M101 | Standby Service Water Loop A Valve Position Verification | 037 |
| OSP-SW-Q101 | SW Spray Pond Average Sediment Depth Measurement | 010, Minor 001 |

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| OSP-UV/DV-B503 | 4.16 KV Emergency Bus Undervoltage and Degraded Voltage LSFT (DIV 3) | 11 |
| Plant Procedures Manual 10.25.16 | General Electric 4160V Circuit Breaker | 22 |
| PPM 1.3.1 | Operating Policies, Programs and Practices | 120 |
| PPM 10.2.53 | Scaffolding | 43 |
| PPM 13.10.2 | TSC Managers Duties | 35 |
| PPM 13.10.5 | Operations managers Duties | 12 |
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| PPM 5.1.4 | RPV Flooding | 11 |
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| PPM 5.7.1 | RPV AND Primary Containment Flooding SAG | 6 |
| SAG-2 | Containment and Radioactivity Release Control | 8 |
| SOP-ELEC-125V-OPS | 125 VDC System Operation | 3 |
| SOP-RCIC-INJECTION | RCIC RPV INJECTION | 10 |
| SOP-RFT-OPS | Reactor Feed water Turbine Operations | 20 |
| SOP-RFT-START | Reactor Feedwater Turbine System Start | 21 |
| SOP-RFW-FCV-QC | Transfer RPV Level Control to RFW-FCV-10A/10B - Quick Card | 11 |
| SOP-SW-DRAIN | Standby Service Water Drain | 008 |
| SOP-SW-FILL | Standby Service Water System Fill | 007, Minor 002 |
| SOP-SW-OPS | Standby Service Water Operations | 007 |

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| Number | Title | Revision/Date |
|---|---|---|
| SOP-SW-SHUTDOWN | Standby Service Water System Shutdown | 002 |
| SOP-SW-SPRAY | Standby Service Water Spray Header Operations | 000, Minor 003 |
| SOP-SW-START | Standby Service Water System Start | 006 |
| SOP-SW-STBY | Placing Standby Service Water in Standby Status | 003, Minor 001 |
| SWI-LIC-03 | Licensing Document Change Process | 17 |
| SWP-CAP-03 | Operating Experience Program | 3 |
| SWP-OPX-01 | Operating Experience Program | 0 |
| SYS-4-22 | Maintenance Rule Program | 10 |
| TDI-02 | Systematic Approach to Training | 25 |
| TDI-04 | Processing of Training Requests | 17 |
| TM-2117 | TSC Core Thermal Engineer | 7 |
| TM-2118 | TSC Operations Manager | 8 |
| TM-2120 | EOP/SAG Technical Document | 9 |
| TM-2138 | CGS Position on the use of SLC for pH control | 9 |
| TSP-DG1/LOCA-B501 | Standby Diesel Generator DG1 LOCA Test | 24 |
| TSP-DG1/LOP-B501 | Standby Diesel Generator DG1 Loss of Power Test | 018, Minor 002 |
| TSP-DG3/LOCA-B501 | HPCS Diesel Generator DG3 LOCA Test | 25 |
| TSP-DG3/LOP-B501 | HPCS Diesel Generator DG3 Loss of Power Test | 17 |
| TSP-DG3-B502 | HPCS Diesel Generator DG3 Load Testing | 20 |
| TSP-DWSPRAY-E701 | Residual Heat Removal System Drywell Spray Nozzle Flow Test | 4 |

Self-Assessments

| Number | Title | Revision/Date |
|---|---|---|
| AR 00337996 | Focused Self-Assessment for the 2016 NRC Component Design Bases Inspection | October 13, 2015 |
| AR 00341239 | CDBI SA 2015 RRC-PS-18A and 18B head correction | December 9, 2015 |
| AR 00341251 | Close stroking of RHR-V-8 and RHR-V-9 in the event of a “Reactor Pressure Vessel High” isolation signal. | December 9, 2015 |
| AR 00341385 | CDBI Self-Assessment 2015 CR 325206 closed with no action | December 10, 2015 |
| AR 00341388 | CDBI SA 2015 Editorial errors in Calculation ME-02-02-25 | December 10, 2015 |
| AR 00346094 | CDBI Self-Assessment P2 – Outstanding Engineering Changes against Calculation ME-02-02-25, “Calculation For AC Gate Valves - MOV Thrust And Torque.” | March 19, 2016 |
| AR-SA: 337996 | Focused Self-Assessment Report NRC Component Design Bases Pre-Inspection Readiness | February 23, 2016 |
| AU-EN-14 | Quality Services Audit Report, “Engineering Programs.” | February 20, 2014 |
| AU-EN-16 | Quality Services Audit Report, “Engineering Programs.” | February 18, 2016 |
| AU-OP/TS-15 | Quality Services Audit Report, “Operations, Technical Specifications and Conditions Programs Applicable License”. | August 20, 2015 |
| Calculation 10.7.74 | Calculation: Standby Service Water; Siphon between Spray Ponds | 0 |
| Calculation 10.7.74 | Calculation: Standby Service Water; Siphon between Spray Ponds | 1 |
| LDCN—13—036 | Energy Northwest Licensing Document Change Notice (LDCN) Main Transformer Bank, Action Request 290955 | January 22, 2014 |

Training Documentation

| Number | Title | Revision |
|---|---|---|
| SD000172 | System Description – Standby Liquid Control | 013 |

Training Documentation

| Number | Title | Revision |
|---|---|---|
| SD000204 | System Description – Standby Service Water | 019, Minor 001 |

Vendor Technical Manual

| Number | Title | Revision |
|---|---|---|
| 02E22-14,10 | Instruction Manual For GE Switchgear | 004 |
| 28-00,103 | Operating and Maintenance Manual Type L & 2RE Cent. Fans | 001 |
| 43-00,124 | Walworth Company Cast Steel Gate Globe and Check Valves | 10 |
| 48-00,13 | Westinghouse - Indoor Low Voltage Metal-Enclosed Switchgear | 005 |
| 999-00,12,1 | Limitorque Valve Control and Hazardous Brake | 4 |
| CVI 235-00,25,1 | General Electric Relay A Through H Instruction Manual | 003 |
| CVI 235-00,25,2 | General Electric Relay Manual Volume II | 002 |
| CVI 235-00,25,3 | General Electric Relay Manual Volume III | 002 |
| CVI 235-00,25,9 | ABB-BBC-ITE Instruction Manual for Relays (Confidential) | 003 |
| CVI 67-00,423 | HK Porter - WMA Fan Coil Cooling Units | 002 |
| CVI 999-00,214 | 5600 Series Motor Control Center Cubicles Instruction Manual (Confidential) | 001 |

Work Orders (WOs)

| | | | | |
|---|---|---|---|---|
| 01037787 | 02028128 | 02046510 | 02062050 | 02081571 |
| 01041180 | 02030138 | 02046898 | 02063947-01 | 02082771 |
| 01071941 | 02031316 | 02047395 | 02067246 | 02082999 01 |
| 01107388-01 | 02032251 | 02050919 | 02068071-01 | 02083022-01 |
| 01111247 | 02037500 01 | 02051677 | 02068350 | 02083046 |
| 01176270 | 02037570 01 | 02052454 | 02069996-01 | 02083467 |

Work Orders (WOs)

| | | | | |
|---|---|---|---|---|
| 02003766 | 02040482-01 | 02052455 | 02070930 | 02083497 |
| 02006294 | 02042234 | 02054477 | 02071120 | 02084014 |
| 02008126-01 | 02042235 | 02056010 | 02074560-01 | 02086758 01 |
| 02008126-02 | 02043692 | 02057214 01 | 02078228 01 | 11539863 |
| 02015532 | 02043788-01 | 02061640 | 02078931 | 29126080 |
| 02019495-01 | 02043795 | 02061774 | 02079353-01 | 29129120 |
| 02020298 | 02043802-01 | 02061933 | 02081296 01 | |