



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

November 7, 2008

Mr. J. V. Parrish  
Chief Executive Officer  
Energy Northwest  
P.O. Box 968, Mail Drop 1023  
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION - NRC INTEGRATED INSPECTION  
REPORT 05000397/2008004

Dear Mr. Parrish:

On September 30, 2008, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Columbia Generating Station. The enclosed inspection report documents the inspection results, which were discussed on October 9, 2008 and October 16, 2008, with Mr. D. Atkinson and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents three NRC-identified findings and one self-revealing finding of very low safety significance (Green). Three of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as noncited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region IV, 612 East Lamar Blvd., Suite 400, Arlington, Texas 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Columbia Generating Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the

NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Claude E. Johnson, Chief  
Project Branch A  
Division of Reactor Projects

Docket: 50-397  
License: NPF-21

Enclosure:  
NRC Inspection Report 05000397/2008004  
w/Attachment: Supplemental Information

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SUNSI Review Completed: CEJ ADAMS: ☒ Yes ☐ No Initials: CEJ  
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| Acting SRI:DRP/A | BC:DRS/EB1  | BC:DRS/PSB1      | BC:DRS/OB        |
| RBCohen          | RLBywater   | MPShannon        | RELantz          |
| /RA – T/         | /RA/        | /RA JLarsen for/ | /RA GWerner for/ |
| 11/07/2008       | 10/30/2008  | 10/30/2008       | 10/30/2008       |
| BC:DRS/EB2       | BC:DRS/PSB2 | BC:DRP/A         |                  |
| NFO'Keefe        | GEWerner    | CEJohnson        |                  |
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| 10/30/2008       | 10/30/2008  | 11/07/2008       |                  |

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 50-397  
License: NPF-21  
Report: 05000397/2008004  
Licensee: Energy Northwest  
Facility: Columbia Generating Station  
Location: Richland, Washington  
Dates: July 1, 2008 through September 30, 2008  
Inspectors: Z. Dunham, Senior Resident Inspector, Project Branch A, DRP  
R. Cohen, Acting Senior Resident Inspector and Resident Inspector,  
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P. Elkmann, Senior Emergency Preparedness Inspector, DRS  
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D. Stearns, Health Physicist, Plant Support Branch 2, DRS  
Approved By: C. E. Johnson, Chief, Project Branch A, Division of Reactor Projects  
ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUMMARY OF FINDINGS

IR 05000397/2008004; 07/01/2008 - 09/30/2008; Columbia Generating Station; Maintenance Effectiveness, Access Control to Radiological Significant Areas, Event Followup and Other Activities.

The report covered a 3-month period of inspection by resident and regional inspectors. Three green noncited violations and one green finding were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified and Self-Revealing Findings

#### Cornerstone: Initiating Events

- Green. The inspector reviewed a self-revealing finding for failure of Energy Northwest to provide an adequate procedure for the installation of a compression fitting in a digital electro-hydraulic system modification. Specifically, failure to provide the methods and details for the preparation, review, approval, and implementation of procedures, contributed to the improper installation of a compression fitting in the digital electro-hydraulic system. This improper installation resulted in a failure of the compression fitting, a leak in the digital electro-hydraulic system, a main turbine trip and a subsequent reactor scram. Energy Northwest entered the issue into the corrective action program and conducted a root cause evaluation.

This finding is greater than minor because it is an equipment performance issue that affected the initiating events cornerstone objectives to limit the likelihood of those events that upset plant stability. Specifically, use of a less than adequate procedure during the installation of a compression fitting in the digital electro-hydraulic system, the rear ferrule was installed backwards, which led to a failure of the compression fitting, a subsequent leak in the digital electro-hydraulic system, a loss of hydraulic pressure, a main turbine trip and a reactor scram (initiating event). The finding was of very low risk significance because the finding did not result in the loss of a safety function of a single train for greater than its technical specification allowed outage time. The cause of the finding is related to the crosscutting aspect of human performance with a resources component, because Energy Northwest failed to provide adequate procedural requirements for compression fitting installation work [H.2.c]. (Section 4OA3.1)

#### Cornerstone: Mitigating Systems

- Green. The inspectors identified a noncited violation of License Condition 2.C.(14) for failure to protect one train of post-fire safe shutdown equipment as required by 10 CFR Part 50, Appendix R, Section III.G. Specifically, the licensee failed to ensure that the Division 2 instrument sensing lines related to residual heat removal flow indication, minimum recirculation valve

control, and reactor pressure vessel level and pressure indication remained free of fire damage. The inspectors determined that a fire in Fire Area R-1 could affect the function of the instrument sensing lines needed to achieve and maintain a safe shutdown condition. The licensee entered this deficiency into the corrective action program as Condition Reports 2-06-02399 and 2-06-04898.

Failure to ensure that the credited instrument sensing lines would remain free of fire damage was a performance deficiency. The inspectors determined this deficiency was more than minor in that it had the potential to affect the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (fire). Because procedures provided adequate guidance to operators in the event of the expected failure modes, the inspectors assigned this post-fire safe shutdown finding a low degradation rating. In accordance with Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," Phase 1, Step 1.3; this finding was determined to have very low safety significance. (Section 4OA5.2)

- Green. The inspectors identified a noncited violation of Technical Specification 5.4.1.a for Energy Northwest's failure to provide adequate procedures during maintenance of emergency core cooling system pumps. Specifically, Energy Northwest failed to specify in procedures a maximum torque limit that is applied to emergency core cooling system motor bearing oil reservoir drain plugs. As a result of improper tightening of these plugs, oil leaks have developed in emergency core cooling system motor oil reservoirs, potentially resulting in O-ring deformation, cracking and eventual failure of the plugs. Energy Northwest has entered this deficiency into their corrective action program.

In accordance with Manual Chapter 0612, Appendix B, this finding was more than minor because it was an equipment performance issue that affected the mitigating systems cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, if left uncorrected, tightening of the emergency core cooling system pump motor bearing oil reservoir drain plugs without specifying maximum torque limits during maintenance could result in o-ring deformation, cracking and eventual failure of the plugs. In addition, under-tightening of drain plugs could cause improper seating of the o-ring seal to the plug bushing. Both conditions as fore mentioned have historically led to oil leaks in emergency core cooling system motor oil reservoirs, increasing the unavailability time to correct the condition. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the inspectors determined that the finding was of very low risk significance because failure to specify maximum torque limits when tightening of emergency core cooling system pump motor oil reservoir drain plugs did not result in the loss of a safety function of a single train for greater than its technical specification allowed outage time. In addition, the finding would not have likely affected other mitigating systems resulting in a total loss of their safety function. A crosscutting aspect in the area of problem identification and resolution with a corrective action component was identified in that Energy Northwest failed to conduct effective corrective action program reviews to ensure maximum torque limits were incorporated into work instructions [P.1.c]. (Section 1R12)

## Cornerstone: Occupational Radiation Safety

- Green. The inspectors identified a noncited violation of Technical Specification 5.7.2.a.1 for failure to maintain administrative control of door and gate keys to high radiation areas with dose rates greater than 1 rem per hour. Specifically, on August 28, 2008, the licensee did not know the location of two of the three master keys to locked high radiation areas. This issue was entered into the licensee's corrective action program as Condition Report 85620.

Failure to maintain administrative control of door and gate keys to high radiation areas with dose rates in excess of 1 rem per hour was a performance deficiency. This finding is greater than minor because the finding could be reasonably viewed as a precursor to a significant event in that an individual could receive unanticipated radiation dose by gaining access to a locked high radiation area without the proper controls and briefing. This finding was evaluated using the occupational radiation safety significance determination process and determined to be of very low safety significance because it did not involve: (1) an as low as is reasonably achievable planning or work control issue, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. Additionally, the violation has a crosscutting aspect in the area of human performance associated with the work practices component because the lack of peer and self-checking resulted in inadequate control of keys to locked high radiation areas [H.4.a] (Section 2OS1).

### B. Licensee-Identified Violations.

None.

## REPORT DETAILS

### Summary of Plant Status

The inspection period began with Columbia Generating Station operating at full power. From July 1-4, 2008, the station reduced power periodically from 100 to 85 percent power to support requests for economic dispatch by Bonneville Power Administration. On July 15, the station reduced power to 81 percent power due to a failed controller on a condensate heat exchanger level control valve. Following repair of the controller, the station returned to 100 percent power on July 16. On August 21, the station reduced power to 60 percent to facilitate maintenance of a reactor feedwater pump. Later on August 21, the reactor was subsequently shutdown following an automatic reactor scram and entered Forced Outage FO-08-01 due to a failed main turbine digital electro-hydraulic system pressure fitting. The station returned to 100 percent power on August 26. The facility operated at 100 percent power, with the exception of scheduled reductions in power to support testing, for the remainder of the inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity and Emergency Preparedness

#### 1R01 Adverse Weather (71111.01)

##### Readiness for Impending Adverse Weather Conditions

##### a. Inspection Scope

The inspectors completed a review of the licensee's readiness for impending adverse weather conditions. The inspectors: (1) reviewed plant procedures, the Final Safety Analysis Report, and Technical Specifications to ensure that operator actions defined in adverse weather procedures maintained the readiness of essential systems; (2) verified that the licensee implemented plant walkdowns as needed to assure continued operability of safety significant systems; (3) reviewed maintenance records to determine that applicable surveillance requirements were current before the anticipated (severe thunderstorms, tornado warning, high winds) developed; and (4) reviewed plant modifications, procedure revisions, and operator work arounds to determine if recent facility changes challenged plant operation. Documents reviewed are listed in the attachment.

- Elevated winds concurrent with high ambient temperatures causing increased main condenser backpressure; August 18, 2008

These activities constitute completion of one readiness for impending adverse weather condition sample as defined in Inspection Procedure 71111.01-05.

##### b. Findings

No findings of significance were identified.



1R04 Equipment Alignments (71111.04)

.1 Partial Walkdown

a. Inspection Scope

The inspectors: (1) walked down portions of the risk important systems listed below and reviewed plant procedures and documents to verify that critical portions of the selected systems were correctly aligned; and (2) compared deficiencies identified during the walkdown to the licensee's corrective action program to ensure problems were being identified and corrected. Documents reviewed are listed in the attachment.

- Emergency Diesel Generator 2 Following Painting Activities; July 7, 2008
- High Pressure Core Spray System while Reactor Core Isolation Cooling System out-of-service; July 29, 2008
- Emergency Diesel Generator 3 while Diesel Generator 2 was out of service for Maintenance; September 18, 2008

These activities constitute completion of three partial system walkdown samples as defined by Inspection Procedure 71111.04-05.

b. Findings

No findings of significance were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors: (1) reviewed plant procedures, drawings, the Final Safety Analysis Report, Technical Specifications, and vendor manuals to determine the correct alignment; (2) reviewed outstanding design issues, operator workarounds, and corrective action program documents to determine if open issues affected the functionality of the system; and (3) verified that the licensee was identifying and resolving equipment alignment problems. Documents reviewed are listed in the attachment.

- Low Pressure Core Spray; July 8, 2008

These activities constitute completion of one complete system walkdown sample as defined by Inspection Procedure 71111.04-05.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

Quarterly Inspection

a. Inspection Scope

The inspectors walked down the plant fire areas listed below to assess the material condition of active and passive fire protection features and their operational lineup and readiness. Where applicable, the inspectors: (1) verified that transient combustibles and hot work activities were controlled in accordance with plant procedures; (2) observed the condition of fire detection devices to verify they remained functional; (3) observed fire suppression systems to verify they remained functional; (4) verified that fire extinguishers and hose stations were provided at their designated locations and that they were in a satisfactory condition; (5) verified that passive fire protection features (electrical raceway barriers, fire doors, fire dampers, steel fire proofing, penetration seals, and oil collection systems) were in a satisfactory material condition; (6) verified that adequate compensatory measures were established for degraded or inoperable fire protection features; and (7) reviewed the corrective action program to determine if the licensee identified and corrected fire protection problems. Documents reviewed are listed in the attachment.

- R-4; Residual Heat Removal Pump B Room; July 7, 2008
- R-3; High Pressure Core Spray; July 8, 2008
- RC-1; General Equipment Area; July 9, 2008
- RC-13; Emergency Chiller Room; July 18, 2008
- M-9; Instrument Rack E-IR-H22/P009 Room; July 18, 2008
- M-21; Instrument Rack E-IR-H22/P021 Room; July 18, 2008

These activities constitute completion of six quarterly fire-protection inspection samples as defined by Inspection Procedure 71111.05-05.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

Semi-annual Internal Flooding

a. Inspection Scope

The inspectors reviewed the Final Safety Analysis Report, flooding analysis, and plant procedures to assess susceptibilities involving internal flooding for the plant areas and/or systems listed below. The inspectors verified: (1) that the licensee appropriately identified and entered internal flooding concerns into the corrective action program; (2) verified that operator actions for coping with flooding can reasonably achieve the desired outcomes; and (3) walked down the areas to verify, as applicable, the adequacy of: (a) equipment seals located below the floodline, (b) floor and wall penetration seals, (c) watertight door seals, (d) common drain lines and sumps, (e) sump pumps, level alarms, and control circuits, and (f) temporary or removable flood barriers. Documents reviewed are listed in the attachment.

- Emergency Core Cooling System Pump Rooms – Reactor Building 422’ Elevation; July 17, 2008

These activities constitute completion of one flood protection measures inspection sample as defined by Inspection Procedure 71111.06-05.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

The inspectors observed performance tests, reviewed test data from performance tests, or verified the licensee's execution and on-line monitoring of bio-fouling controls for the heat exchangers or heat sinks listed below to verify: (1) test acceptance criteria and results considered differences between testing and design conditions; (2) inspection results were appropriately categorized against acceptable pre-established acceptance criteria; (3) the frequency of testing or inspection was sufficient to detect degradation prior to the loss of the heat removal function; (4) the test results considered instrument uncertainties; and (5) the licensee had established adequate bio-fouling controls. Documents reviewed are listed in the attachment.

- Work Order 01151572; DCW-HX-1B1/1B2 Thermal Performance Monitoring; July 24, 2008

These activities constitute completion of one heat sink inspection sample as defined by Inspection Procedure 71111.07-05.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification (71111.11)

a. Inspection Scope

On September 16, 2008, the inspectors observed testing and training of senior reactor operators and reactor operators to identify deficiencies and discrepancies in the training, to assess operator performance, and to assess the evaluator's critique. The training scenario involved a leak in the main turbine digital electro-hydraulic control system, an anticipated transient without scram and a loss of reactor coolant accident. Documents reviewed are listed in the attachment.

These activities constitute completion of one quarterly licensed-operator requalification program sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed the maintenance activities listed below to: (1) verify the appropriate handling of structures, systems, and components performance or condition problems; (2) verify the appropriate handling of degraded structures, systems, and components functional performance; (3) evaluate the role of work control, work practices, and common cause problems; and (4) evaluate the handling of structures, systems, and components issues reviewed under the requirements of the maintenance rule, 10 CFR Part 50, Appendix B, and the Technical Specifications. Documents reviewed are listed in the attachment.

- Residual Heat Removal Pump Motor Lower Oil Reservoir Lower Drain Plug Leaking; July 3, 2008
- Reactor Feedwater Pump 1B Turbine Axial Thrust Vibrations Elevated; August 8, 2008

These activities constitute completion of two quarterly maintenance effectiveness samples as defined in Inspection Procedure 71111.12-05.

b. Findings

Introduction: The inspectors identified a green noncited violation of Technical Specification 5.4.1.a for Energy Northwest's failure to provide adequate procedures during maintenance of emergency core cooling system pumps. Specifically, Energy Northwest failed to specify in procedures a maximum torque limit that is applied to emergency core cooling system motor bearing oil reservoir drain plugs. As a result of improper tightening of these plugs, historically oil leaks have developed in emergency core cooling system motor oil reservoirs, potentially resulting in o-ring deformation, cracking and eventually failure of the plugs. Energy Northwest has entered this deficiency into their corrective action program.

Description: On July 3, 2008, Energy Northwest discovered that the oil level on residual heat removal Pump 2B (RHR-P-2B) motor lower bearing oil reservoir was low (slightly below the motor standstill line). Maintenance personnel identified an oil leak from the lower bearing oil reservoir drain plug measuring approximately one drop every 2-3 minutes as documented per Action Request/Condition Report (AR/CR) 0083345. As directed by minor Work Request 29068546, Energy Northwest electricians tightened the oil reservoir drain plug for RHR-P-2B motor. The work request did not specify a maximum torque limit to prevent damage to the plug. On July 9, 2008, the resident inspectors questioned whether the drain plug could have been over-tightened during this maintenance. The work request did direct maintenance personnel to tighten the plug "snug tight," and provided a caution statement that specified in part that, over-tightening of the drain plug could lead to o-ring deformation and cracking of the plug. Through documentation Energy Northwest staff could not determine whether the drain plug had been over-tightened. This was documented in AR/CR 00183551. In addition, Energy Northwest had historically failed to provide adequate procedures to prevent over-torquing of emergency core cooling system motor bearing oil reservoir drain plugs in the following instances:

- RHR-P-2A
  - Work Order 01130521, Replace Lubricant, October 1, 2007
  - Work Order 01094196, Replace Drain Plugs, December 17, 2005
- RHR-P2B
  - Work Order 01094199, Upper Drain Plug Replacement; October 21, 2006
  - Work Order 01131022, Replacement Lubricant; November 11, 2007
  - Work Order 01138594, Drain Plug Leak; June 15, 2008
- RHR-P-2C
  - Work Order 01123400, Drain Oil for Lower Bearing; January 21, 2007
  - Work Order 01094195, Replace Drain Plugs; December 3, 2007
- LPCS-P-1
  - Work Order 01094198; Replace the Upper and Lower Oil Reservoir drain Plug for Motor; November 29, 2006

Problem Evaluation Report 205-0086, dated September 26, 2005, specified corrective actions to revise emergency core cooling system motor bearing lube oil replacement preventive maintenance procedures to add drain plug tightening limitations. Specifically, emergency core cooling system motor oil reservoir drain plugs were to be tightened snug tight without exceeding 10 ft-lbs. See Inspection Report 05000397/2005002, Section 1R12 for a discussion of a previously documented violation associated with over-tightening of these plugs. The inspectors noted that a limiting torque value of 10 ft-lbs when tightening drain plugs had not been added to the following model work orders as specified by Problem Evaluation Report 205-0086.

|              |              |              |
|--------------|--------------|--------------|
| MWO 01075812 | MWO 01075816 | MWO 01075722 |
| MWO 01075832 | MWO 01075718 | MWO 01075819 |
| MWO 01075720 |              |              |

As a result of the inspectors' observations, Energy Northwest revised the above work orders to include maximum torque limits when tightening the plugs.

In Plant Tracking Log 231227, dated September 2, 2005, the inspectors noted that Energy Northwest staff conducted a hands-on demonstration review to reinforce the construction of the oil drain plugs. This review included steps for removal and installation and the expectations for limiting torque to less than 10 ft-lbs. Labels were to be placed adjacent to all emergency core cooling system pump motor bearing oil reservoir drain plugs cautioning maintenance personnel against over-torquing of the plugs. The inspectors noted that caution labels had not been placed adjacent to the upper motor bearing oil reservoir drain plugs. As a result of the inspectors' questions, Energy Northwest took action to add caution labels to the upper emergency core cooling system motor oil drain plugs. The inspectors concluded that contrary to Problem Evaluation Report 205-0086 corrective actions to limit the maximum torque to be applied to the plugs, these limits were not incorporated into work instructions. In addition, the inspectors noted that under-tightening of plugs resulted in failure of the drain plug o-ring to seat on the plug bushing leading to an emergency core cooling system oil reservoir

leak as documented in AR/CR 0083345. Energy Northwest is evaluating whether to provide specific work instructions to prevent oil leaks as a result of under-tightening of the plugs.

Analysis: Energy Northwest's failure to provide adequate procedures or documented instructions during maintenance of emergency core cooling system motors is a performance deficiency. Specifically, improper tightening of drain plugs could lead to oil leaks. This finding was more than minor in accordance with Manual Chapter 0612, Appendix B, because it was an equipment performance issue that affected the mitigating systems cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, if left uncorrected, tightening of the emergency core cooling system pump motor bearing oil reservoir drain plugs without specifying maximum torque limits during maintenance could result in o-ring deformation, cracking and eventual failure of the plugs. In addition, under-tightening of drain plugs could cause improper seating of the o-ring seal to the plug bushing. Both conditions as fore mentioned have historically led to oil leaks in the affected emergency core cooling system motors, increasing the unavailability time to correct the condition. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the inspectors determined that the finding was of very low risk significance (Green) because failure to specify maximum torque limits in tightening of emergency core cooling system motor oil reservoir drain plugs did not result in the loss of a safety function of a single train for greater than its technical specification allowed outage time. In addition, the finding would not have likely affected other mitigating systems resulting in a total loss of their safety function. A crosscutting aspect in the area of problem identification and resolution with a corrective action component [P.1.c] was identified in that Energy Northwest failed to conduct an effective corrective actions review to ensure that maximum torque limits are incorporated into work instructions.

Enforcement: Technical Specification 5.4.1.a requires, in part, that the applicable procedures recommended in Regulatory Guide 1.33, "Quality Assurance Program Requirements," Revision 2, be established. Regulatory Guide 1.33, Section 9.a, requires that, "Maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Contrary to this requirement, since December 17, 2005, Energy Northwest failed to provide adequate procedures and documented instructions to prevent over-torquing of emergency core cooling system motor oil drain plugs, which could cause cracks and deformation of o-ring seals, as specified by Problem Evaluation Report 205-0086. In addition, failure to specify a minimum torque value when tightening emergency core cooling system motor oil reservoir drain plugs could cause the plugs to be under-tightened, resulting in an inadequate o-ring seal. Both conditions as fore mentioned have historically led to oil leaks in the affected emergency core cooling system motor oil reservoirs, increasing the unavailability time to correct the condition. Because this finding was of very low safety significance and was entered into the licensee's corrective action program as AR/CR 00183551, this violation is being treated as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000397/2008004-01; Failure to provide an adequate procedure or documented instructions to prevent over-torquing of emergency core cooling system pump motor bearing oil reservoir drain plugs). Energy Northwest implemented corrective actions to specify a maximum torque value in

maintenance procedures to prevent over-tightening emergency core cooling system motor bearing oil reservoir drain plugs.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

Risk Assessment and Management of Risk

a. Inspection Scope

The inspectors reviewed the risk assessment activities listed below to verify: (1) performance of risk assessments when required by 10 CFR 50.65 (a)(4) and licensee procedures prior to changes in plant configuration for maintenance activities and plant operations; (2) the accuracy, adequacy, and completeness of the information considered in the risk assessment; (3) that the licensee recognizes, and/or enters as applicable, the appropriate licensee-established risk category according to the risk assessment results and licensee procedures; (4) the licensee implements adequate risk management actions as applicable; and (5) identified and corrected problems related to maintenance risk assessments. Documents reviewed are listed in the attachment.

- Residual Heat Removal Train A Maintenance Outage and Low Pressure Core Spray Pump – 2 (Keepfill pump) Replacement; August 5, 2008
- Diesel Generator 2 Monthly Operability Testing While Performing Half Scram Surveillances; August 20, 2008
- Steam Generator Train B Maintenance While Performing Mast Climber Installation for Secondary Containment Repair; August 27, 2008

These activities constitute completion of three maintenance risk assessments and emergent work control inspection samples as defined by Inspection Procedure 71111.13-05.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors: (1) reviewed plants status documents such as operator shift logs, emergent work documentation, deferred modifications, and standing orders to determine if an operability evaluation was warranted for degraded components; (2) referred to the Final Safety Analysis Report and design basis documents to review the technical adequacy of licensee operability evaluations; (3) evaluated compensatory measures associated with operability evaluations; (4) determined degraded component impact on any Technical Specifications; (5) used the significance determination process to evaluate the risk significance of degraded or inoperable equipment; and (6) verified that the licensee has identified and implemented appropriate corrective actions associated with degraded components. Documents reviewed are listed in the attachment.

- AR/CR 183345; Lower Oil Reservoir Low Level RHR-P-2C; July 3, 2008
- AR/CR 183386; Containment Purge and Exhaust Valve CEP-V-4B Fail to Open; July 14, 2008
- AR/CR 184382; Reactor Core Isolation Cooling Valve RCIC-V-59 Fail to Automatically Close; July 31, 2008
- AR/CR 185462; Potential Secondary Containment Breach While Installing Mast Climber for Reactor Building Siding Repair; August 26, 2008

These activities constitute completion of four operability evaluations inspection samples as defined in Inspection Procedure 71111.15-05

b. Findings

No findings of significance were identified.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the postmaintenance test activities listed below and applicable licensing and/or design-basis documents to: (1) determine the safety functions that may have been affected by the maintenance activity; and (2) assess the adequacy of the test procedure to ensure it adequately tested the safety function that may have been affected. The inspectors either witnessed or reviewed test data to verify that: (1) acceptance criteria were met; (2) plant impacts were evaluated; (3) test equipment was calibrated; (4) procedures were followed; (5) jumpers were properly controlled; (6) test data results were complete and accurate; (7) test equipment was removed; (8) the system was properly re-aligned; and (9) deficiencies during testing were documented. The inspectors also reviewed the corrective action program to determine if the licensee identified and corrected problems related to postmaintenance testing. Documents reviewed are listed in the attachment.

- Work Order 01151116; Diesel Cooling Water Temperature Switch DCW-TS-4 Replacement; July 16, 2008
- Work Order 01152108; Residual Heat Removal Pump 2A Motor Oil Replacement; August 6, 2008
- Work Order 01137700; Source Range B Spiking on Reactor Shutdown; August 24, 2008
- Work Order 01137927; Reactor Feedwater Pump to Turbine Coupling Replacement; August 25, 2008
- Work Order 01153693; Digital Electro-Hydraulic Leak on Quad Voter Valve High Pressure Fitting; August 25, 2008
- Work Order 01149583; Replace RCIC-LS-10; September 3, 2008



These activities constitute completion of six postmaintenance testing inspection samples as defined in Inspection Procedure 71111.19 05.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

a. Inspection Scope

The inspectors reviewed the following risk significant refueling items or outage activities to verify defense in depth commensurate with the outage risk control plan and compliance with the Technical Specifications: (1) the risk control plan; (2) tagging/clearance activities; (3) reactor coolant system instrumentation; (4) electrical power; (5) decay heat removal; (6) spent fuel pool cooling; (7) inventory control; (8) reactivity control; (9) containment closure; (10) reduced inventory conditions; (11) refueling activities; (12) heatup and cooldown activities; and (13) licensee identification and implementation of appropriate corrective actions associated with refueling and outage activities. Documents reviewed are listed in the attachment.

- Energy Northwest entered Forced Outage FO-08-01 due to a failed main turbine digital electro-hydraulic system pressure fitting; August 21, 2008

These activities constitute completion of one refueling outage and other outage inspection sample as defined in Inspection Procedure 71111.20-05.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the Final Safety Analysis Report, procedure requirements, and Technical Specifications to ensure that the surveillance activities listed below demonstrated that the associated systems tested were capable of performing their intended safety functions. The inspectors either witnessed or reviewed test data to verify that the following significant surveillance test attributes were adequate: (1) preconditioning; (2) evaluation of testing impact on the plant; (3) acceptance criteria; (4) test equipment; (5) procedures; (6) jumper/lifted lead controls; (7) test data; (8) testing frequency and method demonstrated Technical Specification operability; (9) test equipment removal; (10) restoration of plant systems; (11) fulfillment of ASME Code requirements; (12) updating of performance indicator data; (13) engineering evaluations, root causes, and bases for returning systems to an operable status that did not meet the test acceptance criteria were correct; (14) reference setting data; and (15) annunciators and alarms setpoints. The inspectors also verified that the licensee identified and implemented appropriate corrective actions associated with the surveillance testing. Documents reviewed are listed in the attachment.

- Work Order 01152411; ICP-RFW-A301; Reactor Feedwater Flow Div I – CC; Revision 8, July 8, 2008
- Work Order 01150827; OSP-LPCS/IST-Q702; LPCS System Operability Test; Revision 23; July 10, 2008
- Work Order 01150569; OSP-SLC/IST-Q701; Standby Liquid Control Pumps Operability Test, Revision 18; July 25, 2008
- Work Order 01151680; ISP-FDR/EDR-M401; Drywell Sump Flow Monitors – CFT, Revision 5; August 14, 2008
- Work Order 01151912; OSP-RPS-Q402; MSIV Closure Scram Functional; Revision 7; August 20, 2008

These activities constitute completion of five samples including: three routine surveillance tests; one inservice test; and one reactor coolant system leakage surveillance test inspection samples as defined in Inspection Procedure 71111.22-05.

b. Findings

No findings of significance were identified.

1EP1 Exercise Evaluation (71114.01)

a. Inspection Scope

The inspectors reviewed the objectives and scenario for the 2008 biennial emergency plan exercise to determine if the exercise would acceptably test major elements of the emergency plan. The scenario simulated reactor coolant leakage inside containment, a failure of the reactor protection system to shut down the reactor, a failure of the control rod drive system, failure of a non-vital electrical bus, fission product barrier failures, core damage, the inability to isolate steam lines, a radiological release to the environment because of a steam line rupture in the steam tunnel, and a change in wind direction, to demonstrate the licensee's capabilities to implement the emergency plan.

The inspectors evaluated exercise performance by focusing on the risk-significant activities of event classification, offsite notification, recognition of offsite dose consequences, and development of protective action recommendations, in the simulator control room and the following dedicated emergency response facilities:

- Technical Support Center
- Operations Support Center
- Emergency Operations Facility

The inspectors also assessed recognition of and response to abnormal and emergency plant conditions, the transfer of decision making authority and emergency function responsibilities between facilities, onsite and offsite communications, protection of emergency workers, emergency repair evaluation and capability, and the overall implementation of the emergency plan to protect public health and safety and the environment. The inspectors reviewed the current revision of the facility emergency plan, and emergency plan implementing procedures associated with operation of the

above facilities and performance of the associated emergency functions. These procedures are listed in the attachment to this report.

The inspectors compared the observed exercise performance with the requirements in the facility emergency plan, 10 CFR 50.47(b), 10 CFR Part 50, Appendix E, and with the guidance in the emergency plan implementing procedures and other federal guidance.

The inspectors attended the postexercise critiques in each of the above facilities to evaluate the initial licensee self-assessment of exercise performance. The inspector also attended a subsequent formal presentation of critique items to plant management.

These activities constitute completion of one sample as defined in Inspection Procedure 71114.01-05.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

For the drills and simulator-based training evolution listed below, the inspectors: (1) observed the training evolution to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities; (2) compared the identified weaknesses and deficiencies against licensee identified findings to determine whether the licensee is properly identifying failures; and (3) determined whether licensee performance is in accordance with the guidance of the NEI 99-02 document's acceptance criteria.

- Rod drift followed by steam leak in steam tunnel with failure of a main steam isolation valve to close requiring emergency depressurization on maximum safe operating temperatures in two areas being exceeded, July 21, 2008

These activities constitute completion of one sample as defined in Inspection Procedure 71114.06-05.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope

This area was inspected to assess the licensee's performance in implementing physical and administrative controls for airborne radioactivity areas, radiation areas, high radiation areas, and worker adherence to these controls. The inspectors used the

requirements in 10 CFR Part 20, the Technical Specifications, and the licensee's procedures required by Technical Specifications as criteria for determining compliance. During the inspection, the inspectors interviewed the radiation protection manager, radiation protection supervisors, and radiation workers. The inspectors performed independent radiation dose rate measurements and reviewed the following items:

- Performance indicator events and associated documentation packages reported by the licensee in the occupational radiation safety cornerstone;
- Controls (surveys, posting, and barricades) of three radiation, high radiation, or airborne radioactivity areas;
- Conformity of electronic personal dosimeter alarm setpoints with survey indications and plant policy; workers' knowledge of required actions when their electronic personnel dosimeter noticeably malfunctions or alarms;
- Adequacy of the licensee's internal dose assessment for any actual internal exposure greater than 50 millirem committed effective dose equivalent;
- Physical and programmatic controls for highly activated or contaminated materials (non-fuel) stored within spent fuel and other storage pools;
- Self-assessments, audits, licensee event reports, and special reports related to the access control program since the last inspection;
- Corrective action documents related to access controls;
- Licensee actions in cases of repetitive deficiencies or significant individual deficiencies;
- Radiation work permit (or radiation exposure permit) briefings and worker instructions;
- Adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination control during job performance;
- Dosimetry placement in high radiation work areas with significant dose rate gradients;
- Changes in licensee procedural controls of high dose rate - high radiation areas and very high radiation areas;
- Controls for special areas that have the potential to become very high radiation areas during certain plant operations;
- Posting and locking of entrances to all accessible high dose rate - high radiation areas and very high radiation areas; and
- Radiation worker and radiation protection technician performance with respect to radiation protection work requirements.

Either because the conditions did not exist or an event had not occurred, no opportunities were available to review the following items:

- Barrier integrity and performance of engineering controls in airborne radioactivity areas.

Documents reviewed are listed in the attachment.

These activities constitute completion of 20 of the required 21 samples as defined in Inspection Procedure 71121.01-05.

b. Findings

Introduction: The inspectors identified a Green noncited violation of Technical Specification 5.7.2.a.1 for failure to maintain administrative control of door and gate keys to high radiation areas with dose rates greater than 1 rem per hour.

Description: On August 28, 2008, during a review of the licensee's program for administrative control of keys to doors and gates to locked high radiation areas and very high radiation areas, the inspectors determined that a master key assigned to the radiation protection department was not located in the key repository cabinet controlled by radiation protection. The current set of locks and keys was put into use on May 6, 2008. A subsequent investigation by the licensee determined that a total of three master keys were included in the order for new locks. One of those master keys is maintained in the main control room and can be issued by the operations shift manager in the case of an emergency. The location of the remaining two master keys could not be determined. Typically the plant has between 30 and 35 locked high radiation areas posted in the plant depending on plant conditions. Following a review of radiation protection logs, there was no indication that an unauthorized entry into any of the locked high radiation areas had occurred.

The licensee immediately developed a recovery plan which included a plan to change out locks or cores to locked high radiation areas, issuance of a standing order for briefing oncoming shift personnel, and continued search for the missing keys. Cores to all locks were changed out the following day with new master keys controlled by the radiation protection manager.

Analysis: Failure to maintain administrative control of door and gate keys to high radiation areas with dose rates greater than 1 rem per hour was a performance deficiency. This finding is greater than minor because the finding could be reasonably viewed as a precursor to a significant event in that an individual could receive unanticipated radiation dose by gaining access a locked high radiation area without the proper controls and briefing. This finding was evaluated using Manual Chapter 0609, "Significance Determination Process," Appendix C, "Occupational Radiation Safety Significance Determination Process," and was determined to be of very low safety significance because it did not involve: (1) ALARA planning or work control issue, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. Additionally, the violation has a crosscutting aspect in the area of human performance associated with the work practices component [H.4.a] because the lack of peer- and self-checking resulted in inadequate control of keys to locked high radiation areas.

Enforcement: Technical Specification 5.7.2.a.1 requires, in part, that each entryway to a high radiation area with dose rates greater than 1 rem per hour, but less than 500 rads per hour shall be provided with a locked or continuously guarded door or gate that prevents unauthorized entry and all keys shall be maintained under the administrative control of the shift supervisor, radiation protection manager, or his or her designee. Contrary to the above, on August 28, 2008, it was determined that the licensee failed to maintain administrative control of keys to locked high radiation areas with dose rates in excess of 1 rem per hour. Because this violation was of very low safety significance and has been entered into the licensee's corrective action program as CR 85620, it is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000397/2008004-02; Failure to maintain administrative control of keys to high radiation area with dose rates in excess of 1 rem per hour).

## 2OS2 ALARA Planning and Controls (71121.02)

### a. Inspection Scope

The inspectors assessed licensee performance with respect to maintaining individual and collective radiation exposures ALARA. The inspectors used the requirements in 10 CFR Part 20 and the licensee's procedures required by Technical Specifications as criteria for determining compliance. The inspectors interviewed licensee personnel and reviewed:

- Current 3-year rolling average collective exposure;
- Site-specific trends in collective exposures, plant historical data, and source-term measurements;
- Site-specific ALARA procedures;
- ALARA work activity evaluations, exposure estimates, and exposure mitigation requirements;
- Interfaces between operations, radiation protection, maintenance, maintenance planning, scheduling and engineering groups;
- Integration of ALARA requirements into work procedure and radiation work permit (or radiation exposure permit) documents;
- Shielding requests and dose/benefit analyses;
- Dose rate reduction activities in work planning;
- Assumptions and basis for the current annual collective exposure estimate, the methodology for estimating work activity exposures, the intended dose outcome, and the accuracy of dose rate and man-hour estimates;
- Exposure tracking system;
- Use of engineering controls to achieve dose reductions and dose reduction benefits afforded by shielding;

- Workers' use of the low dose waiting areas;
- First-line job supervisors' contribution to ensuring work activities are conducted in a dose efficient manner;
- Source-term control strategy or justifications for not pursuing such exposure reduction initiatives;
- Specific sources identified by the licensee for exposure reduction actions, priorities established for these actions, and results achieved since the last refueling cycle;
- Radiation worker and radiation protection technician performance during work activities in radiation areas, airborne radioactivity areas, or high radiation areas;
- Self-assessments, audits, and special reports related to the ALARA program since the last inspection;
- Resolution through the corrective action process of problems identified through postjob reviews and postoutage ALARA report critiques;
- Corrective action documents related to the ALARA program and follow-up activities, such as initial problem identification, characterization, and tracking; and
- Effectiveness of self-assessment activities with respect to identifying and addressing repetitive deficiencies or significant individual deficiencies.

Documents reviewed are listed in the attachment.

These activities constitute completion of 20 of the required 29 samples as defined in Inspection Procedure 71121.02-05.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index

a. Inspection Scope

The inspectors sampled licensee submittals for the performance indicators listed below for the period from 3<sup>rd</sup> quarter 2007 through the 2<sup>nd</sup> quarter 2008. To verify the accuracy of the data reported during that period, definitions and guidance contained in NEI 99-02, Regulatory Assessment Indicator Guideline, Revision 5, were used to verify the basis in reporting for each data element. The inspectors interviewed the maintenance rule coordinator, reviewed control room log sheets, plant component health reports, the

corrective action database, and submitted unavailability and unreliability data. Documents reviewed are listed in the attachment.

- High Pressure Coolant Injection (High Pressure Core Spray); July 31, 2008
- Heat Removal (Reactor Core Isolation Cooling); July 31, 2008
- Emergency AC Power; July 31, 2008
- Residual Heat Removal; July 31, 2008
- Support Cooling Water (Standby Service Water); July 31, 2008

These activities constitute completion of five mitigating systems performance index samples as defined by Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.2 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors reviewed licensee documents from January 1, 2008 through June 30, 2008. The review included corrective action documentation that identified occurrences in locked high radiation areas (as defined in the licensee's Technical Specifications), very high radiation areas (as defined in 10 CFR 20.1003), and unplanned personnel exposures (as defined in NEI 99-02, "Regulatory Assessment Indicator Guideline," Revision 5). Additional records reviewed included ALARA records and whole body counts of selected individual exposures. The inspectors interviewed licensee personnel that were accountable for collecting and evaluating the performance indicator data. In addition, the inspectors toured plant areas to verify that high radiation, locked high radiation, and very high radiation areas were properly controlled. Performance indicator definitions and guidance contained in NEI 99-02, Revision 5, were used to verify the basis in reporting for each data element.

These activities constitute completion of one occupational exposure control effectiveness sample as defined by Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.3 Radiological Effluent Technical Specification/Offsite Dose Calculation Manual  
Radiological Effluent Occurrences

a. Inspection Scope

The inspectors reviewed licensee documents from January 1, 2008 through June 30, 2008. Licensee records reviewed included corrective action documentation that identified occurrences for liquid or gaseous effluent releases that exceeded performance indicator thresholds and those reported to the NRC. The inspectors interviewed licensee personnel that were accountable for collecting and evaluating the performance indicator data. Performance indicator definitions and guidance contained in NEI 99-02, Revision 5, were used to verify the basis in reporting for each data element.



These activities constitute completion of one radiological effluent Technical Specifications/offsite does calculation manual radiological effluent occurrences sample as defined by Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.4 Drill/Exercise Performance, Emergency Response Organization Drill Participation, and Alert and Notification System

a. Inspection Scope

The inspectors reviewed licensee evaluations for the three emergency preparedness cornerstone performance indicators of Drill and Exercise Performance, Emergency Response Organization Participation, and Alert and Notification System Reliability, for the period July 2007 through June 2008. The definitions and guidance of NEI Report 99-02, "Regulatory Assessment Indicator Guideline," Revisions 4 and 5, and the licensee's Performance Indicator Procedure EPI-18, "Emergency Preparedness NRC Performance Indicators," Revisions 11 and 12, were used to verify the accuracy of the licensee's evaluations for each performance indicator reported during the assessment period. The inspectors also performed Temporary Instruction 2515\175, "Emergency Response Organization, Drill/Exercise Performance Indicator, Program Review."

The inspectors reviewed a sample of drill and exercise scenarios and licensed operator simulator training sessions, notification forms, and attendance and critique records associated with training sessions, drills, and exercises conducted during the verification period. The inspectors reviewed 19 selected emergency responder qualification, training, and drill participation records. The inspectors reviewed alert and notification system testing procedures, maintenance records, and a one hundred percent sample of siren test records. The inspectors also reviewed other documents listed in the attachment to this report.

These activities constitute completion of one drill/exercise performance sample, one emergency response organization drill participation sample and one alert and notification system sample as defined by Inspection Procedure 71151-05..

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program

a. Inspection Scope

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed screening of all items entered into the licensee's corrective action program. This was accomplished by reviewing the

description of each new corrective action document and periodically attending daily management meetings. Documents reviewed are listed in the attachment.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

The inspectors evaluated the effectiveness of the licensee's problem identification and resolution process with respect to the following inspection areas:

- Access Control to Radiologically Significant Areas (Section 2OS1)
- ALARA Planning and Controls (Section 2OS2)

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings of significance were identified.

.3 Annual Sample - Operator Work Around Review

a. Inspection Scope

On September 8, 2008, the inspectors reviewed the operations department burden list, control room deficiencies, and operator work around list to determine if any operator work arounds, either individually or collectively, could unnecessarily challenge mitigating system performance or operators during event response. The inspectors verified that Energy Northwest was identifying and documenting operator work around problems at an appropriate threshold. Documents reviewed are listed in the attachment.

These activities constitute completion of one sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings of significance were identified.

.4 Annual Sample Review

a. Inspection Scope

The inspectors reviewed a summary of CRs, and evaluation reports for thirteen drills and exercises conducted October 2006 through August 2008. The CRs and evaluation reports were reviewed to identify significant emergency response organization performance issues and emergency response facility problems. The inspectors observed the September 9, 2008, biennial emergency preparedness exercise to verify that previously-identified performance deficiencies and facility readiness issues had been corrected. In addition, the inspectors reviewed two CRs initiated following the biennial emergency preparedness exercise to ensure the full extent of issues was identified. The inspectors evaluated the CRs against the requirements of Procedure SWP-CAP-1, "Corrective Action Program," Revision 12.

b. Findings

No findings of significance were identified.

4OA3 Event Followup (71153)

.1 August 21, 2008 Automatic Reactor Scram

a. Inspection Scope

On August 21, 2008, the inspectors observed and evaluated Energy Northwest's response to a scram while the reactor was operating at 65 percent power. Failure of a digital electro-hydraulic compression fitting occurred resulting in a leak in the digital electro-hydraulic system, a main turbine trip and a subsequent reactor scram. The inspectors responded to the control room and verified the status of plant conditions by observing key plant parameters, annunciator status, and observing the current status of safety related mitigating equipment to ensure that the reactor plant was stable. The inspectors also observed reactor operator actions in response to the reactor scram and senior reactor operator's evaluation of plant conditions and oversight of the reactor operators to ensure that operators were adhering to plant procedures. The inspectors also reviewed Energy Northwest's evaluation of the apparent cause of the scram.

b. Findings

Introduction: A self-revealing Green finding was reviewed for the failure of Energy Northwest to provide an adequate procedure for the installation of a compression fitting in a digital electro-hydraulic modification. Specifically, failure to provide the methods and details for the preparation, review, approval, and implementation of procedure, contributed to the improper installation of a compression fitting in the digital electro-hydraulic system. This improper installation resulted in a failure of the compression fitting, a leak in the digital electro-hydraulic system, a main turbine trip and a subsequent reactor scram. The cause of the finding is related to the crosscutting aspect of human performance with a resources component [H.2.c], because Energy Northwest failed to provide adequate procedural requirements for compression fitting installation work.

Description: On August 21, 2008, with the facility operating at 65 percent power, a reactor scram occurred. Low digital electro-hydraulic trip header pressure caused a fast

closure of the turbine governor valves as a result of a digital electro-hydraulic leak and subsequent reactor scram. This leak was the result of a failed compression fitting. This condition was documented in AR/CR 00185299. Energy Northwest had recently performed maintenance to replace a digital electro-hydraulic system solenoid operated isolation valve per Work Order 01157289. This solenoid isolation valve is one of four valves in the digital electro-hydraulic system that protects the main turbine from an overspeed condition. Procedure PPM OSP-MT-W701, Quad Voter Solenoid Valve Test was in progress as a postmaintenance test for the replaced solenoid valve when the reactor scrammed. Energy Northwest conducted a root cause evaluation as documented in Problem Evaluation Report 207-0261. This evaluation concluded that this maintenance was performed in an appropriate manner and failure of the fitting was inevitable based on visual inspection of the failed assembly.

Energy Northwest also concluded in their root cause evaluation that the direct cause of the fitting failure was a result of an incorrect assembly of the fitting. Specifically, the rear ferrule in the compression fitting was installed backwards on the tubing. The function of the rear ferrule is to prevent tube ejection under pressure. This incorrect installation was made evident by vendor and Energy Northwest inspections of the area where the tubing pulled out of the fitting. In a normal compression fitting, when the fit-up is made, marks on the tubing occur where the back ferrule grips the tube to prevent pullout. These marks on the tubing were not apparent. The failed compression fitting was initially assembled during a digital electro-hydraulic modification during the spring 2007 Refueling Outage R-18.

Energy Northwest determined that the root cause was less than adequate procedural requirements for compression fitting installation work. The tubing associated with the digital electro-hydraulic header was identified by Energy Northwest engineering staff as a single point vulnerability during the design phase, but this recognition did not result in additional inspection requirements for proper assembly. Quality control hold points were established for welded connections associated with the digital electro-hydraulic modification to ensure proper fit-up, but were not established for compression fittings. Energy Northwest found that the use of vendor recommended installation instructions resulted in inconsistent and sometimes inadequate quality of the fitting, even when parts are oriented properly. The compression fitting consisted of one-inch tubing with a wall thickness of 0.120 inches. Energy Northwest investigations revealed that this wall thickness is difficult to swage using the vendor recommended installation instructions at the digital electro-hydraulic system operating pressure. Energy Northwest Procedure DES 2-1, Plant Design Changes, Attachment 8.2, states in part to review detailed installation instructions covered by Design Specifications, Engineering Criteria Documents, and procedures to ascertain if they are adequate. If the procedures are adequate, no other detailed instructions should be provided. If the procedures are not adequate, include additional installation instructions. Contrary to this, Energy Northwest did not provide the work instructions necessary to ensure a proper compression fitting assembly. The inspectors reviewed the root cause evaluation and could not provide any information to the contrary.

Analysis: Energy Northwest's failure to provide an adequate procedure for the installation of a compression fitting in a digital electro-hydraulic system modification is a performance deficiency. Specifically, failure to provide the methods and details for the preparation, review, approval, and implementation of work, contributed to the improper installation of a compression fitting in the digital electro-hydraulic system. The cause of

the finding is related to the crosscutting aspect of human performance with a resources component [H.2.c], because Energy Northwest failed to provide adequate procedural requirements of compression fitting installation work.

The inspectors utilized NRC Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," to determine that the finding was more than minor because it was an equipment performance issue that affected the initiating events cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, failure to provide the methods and details for the preparation, review, approval, and implementation of work, contributed to the improper installation of a compression fitting in the digital electro-hydraulic system, a failed compression fitting, a leak in the digital electro-hydraulic system, loss of digital electro-hydraulic hydraulic pressure, a main turbine trip and a subsequent reactor scram (initiating event). The inspectors evaluated the finding in accordance with Manual Chapter 0609, Appendix A, "Significance Determination Process," Phase 1 Worksheet. The finding was determined to be of very low safety significance (Green) because the finding did not result in the loss of a safety function of a single train for greater than its Technical Specification allowed outage time.

Enforcement: No violations of NRC requirements were identified since the affected component, digital electro-hydraulic system, is non-safety related (FIN 05000397/2008004-03; Digital electro-hydraulic leak results in reactor scram).

#### 4OA5 Other Activities

##### .1 Quarterly Resident Inspector Observations of Security Personnel and Activities

###### a. Inspection Scope

During the inspection period, the inspectors performed observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

These quarterly resident inspector observations of security personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspector's normal plant status review and inspection activities.

###### b. Findings

No findings of significance were identified.

##### .2 (Closed) Unresolved Item 05000397/2006008-03: Inadequate Evaluation of the Effects of Fire on Instrument Sensing Lines

Introduction: The inspectors identified a Green noncited violation of License Condition 2.C.(14) for failure to protect one train of post-fire safe shutdown equipment as required by 10 CFR Part 50, Appendix R, Section III.G. Specifically, the licensee failed to assure that the Division 2 instrument sensing lines related to residual heat removal flow indication, minimum recirculation valve control, and reactor pressure

vessel level and pressure indication remained free of fire damage in Fire Area R-1. The licensee entered this deficiency into the corrective action program as CRs 2-06-02399 and 2-06-04898.

Description: The team evaluated whether the licensee had assured that the Division 2 instrument sensing lines remained free of fire damage during the 2006 triennial fire protection inspection. For instrument sensing lines related to reactor pressure and water level indication and for instrument sensing lines related to the residual heat removal pump minimum recirculation valve flow control and residual heat removal flow indication, the licensee had not performed an analysis to demonstrate that a fire would not impact the post-fire safe shutdown capability. Calculation NE-02-895-19, "Post-Fire Safe Shutdown (PFSS) Analysis," Section 1k1, "Instrument Tubing Analysis," stated, "The purpose of this evaluation is to determine the protection necessary to prevent PFSS instrument-sensing lines from providing erroneous readings resulting from elevated, fire induced, temperatures." The team determined the evaluation had an unverified assumption that stated, "Since most of the lines are routed together, any increase in temperature will affect both lines the same, thus minimizing the transducer errors." The team did not agree with this conclusion since heat from a fire could cause the water in the instrument lines to flash to steam and have a more significant impact on the instrument reading. The licensee entered this deficiency into their corrective action program as CRs 2-06-02399 and 2-06-04898.

During in-office inspection to review this deficiency, the inspectors: (1) interviewed fire protection and design engineers; (2) reviewed the documents listed in the attachment related to routing of the instrument sensing lines, electrical schematics, and plant procedures; (3) reviewed the CRs and evaluation of the instrument sensing lines; and (4) confirmed that the affected instrument sensing lines were routed in Fire Area R-1.

The inspectors determined that, for any loss of reactor water level indication, Procedure ABN-FIRE, "Fire," Revision 13, Step 6.5, required operators to transition to Procedure PPM 5.1.1, "RPV Control," that subsequently transitioned the operators to Procedure PPM 5.1.4, "RPV Flooding." From review of electrical schematics and plant procedures, the inspectors verified that operators have instructions to verify correct operation of the residual heat removal minimum flow control valve upon any manual start of the residual heat removal pump. If a fire affected the residual heat removal minimum flow valve, the inspectors determined that: (1) the normally closed minimum flow control valve would prevent a system drain down and possible water hammer upon pump start, (2) the maximum flow diversion would not decrease the system flow rate enough to impact the required cooling, and (3) operators have the capability to override the minimum flow control valve control circuit if it failed to open on a pump start. The residual heat removal pump has diverse indication (an ammeter) to indicate flow.

From a review of drawings, the inspectors verified that the Division 2 instrument sensing lines would be susceptible to a fixed heat source in only two locations. Both locations were near cable trays wrapped in thermolag material. Although thermolag can be a heat source, the material requires heat input to continue sublimating and giving off heat. Because the approved fire protection program did not prohibit the storage of transient combustible materials, this was also considered as a potential fire source.

The inspectors requested documentation showing the location of the redundant Division 1 instrument sensing lines. The licensee walked down the redundant Division 1 instrument sensing lines and the post-fire safe shutdown circuits for instruments connected to the sensing lines. Since the licensee had elected to use only Division 2 as their post-fire safe shutdown train for a fire in Fire Area R-1, the licensee had not previously identified the exact location of Division 1 instrument sensing lines. The licensee determined that a minimum horizontal distance of 30 feet separated the redundant post-fire safe shutdown components of concern. From review of photographs and a building floor plan, the inspectors reviewed the routing of the Division 1 instrument sensing lines and discussed the routing with fire protection and design engineers who performed the evaluation. Based upon the review, the inspectors determined that a single credible fire would not prevent operators from implementing their emergency procedures.

Analysis: Failure to assure that the credited instrument sensing lines would remain free of fire damage was a performance deficiency. The inspectors determined this deficiency was more than minor in that it had the potential to affect the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (fire). Consequently, the inspectors evaluated these deficiencies using Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process."

During the Phase 1 evaluation, the inspectors determined that this deficiency affected the ability to implement post-fire safe shutdown. The inspectors assigned this finding a low degradation rating because existing procedures provided guidance to operators to mitigate each expected instrument impacted by this finding. Although the approved fire protection program would allow storage of transient combustible materials, the inspectors determined that the license did not routinely place transient combustibles in this fire area. Because the finding had a low degradation rating, the inspectors determined in Appendix F, Step 1.3, this finding had very low safety significance (Green).

Enforcement: License Condition 2.C.(14) states, "The licensee shall implement and maintain in effect all provisions of the approved fire protection program, as described in Section 9.5.1 and Appendix F of the Final Safety Analysis Report for the facility thru Amendment No. 39; and as described in subsequent letters to the staff through November 30, 1988, referenced in the May 22, 1989 safety evaluation and in other pertinent sections of the Final Safety Analysis Report referenced in either Section 9.5.1 or Appendix F and as approved in the Safety Evaluation Report issued in March 1982 (NUREG 0892) and in Supplements 3, issued in May 1983, and 4, issued in December 1983, and in safety evaluations issued with letters dated November 11, 1987 and May 22, 1989. The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire."

Final Safety Analysis Report, Appendix F, Section F.4.2, states that the licensee complies with the safe shutdown requirements of 10 CFR Part 50, Appendix R. Appendix R, Section III.G, requires that, "Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that one train of systems necessary to achieve and

maintain hot shutdown conditions from either the control room or emergency control stations is free of fire damage."

Contrary to the above, the licensee failed to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to provide fire protection features so that one train of systems necessary to achieve and maintain hot shutdown conditions from the control room would remain free of fire damage. The licensee failed to assure that the residual heat removal flow indication, residual heat removal minimum recirculation valve flow control, the reactor pressure indication and reactor water level indication in Fire Area R-1 would not affect post-fire safe shutdown. Because this finding is of very low safety significance and has been entered into the corrective action program (CRs 2-06-02399 and 2-06-04898), this issue is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000397/2008004-04, Failure to ensure that Division 2 instrument sensing lines remained free of fire damage).

#### 4OA6 Meetings, Including Exit

##### Exit Meeting Summary

On July 24, 2008, the inspectors presented the results of the in-office inspection to Mr. G. Cullen, Regulatory Programs Manager, and other members of the licensee staff who acknowledged the findings. The inspectors did not review any proprietary or confidential information during the inspection.

On August 28, 2008, the health physics inspector presented the occupational radiation safety inspection results to Mr. V. Parrish, Chief Executive Officer, and other members of his staff who acknowledged the findings. The inspector confirmed that proprietary information was not provided or examined during the inspection.

On September 12, 2008, the inspectors presented the results of the onsite inspection of the biennial emergency preparedness exercise to Mr. D. Atkinson, Vice President, Nuclear Generation, and other members of his staff, who acknowledged the findings. The inspectors confirmed that proprietary, sensitive, or personal information examined during the inspection had been returned to the identified custodians.

On October 9, 2008, the resident inspectors presented the inspection results to Mr. D. Atkinson, Vice President, Nuclear Generation and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

On October 16, 2008, the resident inspectors re-exited to present the inspection results to Mr. D. Atkinson, Vice President, Nuclear Generation and other members of his staff, who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION



## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Energy Northwest Personnel

D. Atkinson, Vice President, Nuclear Generation  
D. Bent, System Engineer  
D. Brown, Manager, Operations  
R. Burk, Fire Protection Supervisor  
G. Cullen, Manager, Regulatory Programs  
M. Davis, Supervisor, Radiological Support  
J. Frisco, General Manager, Engineering  
S. Gambhir, Vice President, Technical Services  
W. Harper, Fire Protection Engineer  
M. Huiatt, Licensing Engineer  
M. Humphries, Supervisor, Licensing  
W. LaFramboise, System Engineering Manager  
M. Laudisio, Supervisor, Radiological Operations  
R. Lightfoot, Radiological Planning  
T. Lynch, Plant General Manager  
A. Mouncer, Vice President  
J. Parrish, Chief Executive Officer  
M. Reis, Supervisor, Emergency Planning  
F. Schill, Licensing  
M. Shymanski, Manager, Radiation Protection  
W. Smoot, Craft Supervisor, Radiological Services  
C. Tiemens, Craft Supervisor, Radiological Operations  
C. Whitcomb, Vice President, Organizational Performance and Staffing

### **ITEMS OPENED AND CLOSED**

#### Opened and Closed

|                     |     |  |
|---------------------|-----|--|
| 05000397/2008004-01 | NCV | Failure to provide adequate procedures during maintenance of emergency core cooling system Pumps (Section 1R12)                      |
| 05000397/2008004-02 | NCV | Failure to maintain administrative control of keys to high radiation area with dose rates in excess of 1 rem per hour (Section 2OS1) |
| 05000397/2008004-03 | FIN | Digital electro-hydraulic leak results in reactor scram (Section 4OA3)   |
| 05000397/2008004-04 | NCV | Failure to ensure that Division 2 instrument sensing lines remained free of fire damage (Section 4OA5.2)                             |

Closed

05000397/2006008-03    URI    Inadequate Evaluation of the Effects of Fire on Instrument Sensing Lines (Section 4OA5)

## **PARTIAL LIST OF DOCUMENTS REVIEWED**

### **Section 1R01: Adverse Weather Protection**

#### Procedures

ABN-Backpressure; Loss of Main Condenser Backpressure; Revision 0  
ABN-Wind; Tornado/High Winds; Revision 10  
SOP-Hotweather-Ops; Hot Weather Operations; Revision 2  
SOP-Warmweather-Ops; Warm Weather Operations; Revision 3

### **Section 1R04: Equipment Alignment**

#### Procedures

OSP-HPCS-M102; HPCS Valve Lineup; Revision 1  
SOP-DG2-STBY, Emergency Diesel Generator (DIV 2) Standby Lineup, Revision 9  
SOP-DG3-STBY; High Pressure Core Spray Diesel Generator Standby Lineup; Revision 7

#### Diagrams

M520; Flow Diagram – HPCS and LPCS Systems Reactor Building; Revision 95  
M512-1, Flow Diagram Diesel Oil and Misc. Systems Diesel Generator Building, Revision 41  
M520; Flow Diagram HPCS and LPCS Systems Reactor Building; Revision 95

#### Work Orders

WO 01075448      WO 01151886      WO 01154022

### **Section 1R05: Fire Protection**

#### Procedures

FPP-1.6; Combustible Loading Calculation Control; July 22, 2004  
Final Safety Analysis Report; Appendix F  
National Fire Protection Association NFPA-10, 1984 Revision

#### Miscellaneous

Columbia Generating Station Final Safety Analysis Report; Appendix F; Amendment 57  
Columbia Generating Station Pre-Fire Plans; Revision 3

## **Section 1R06: Flood Protection**

### **Procedures**

PPM 5.3.1; Secondary Containment Control; Revision 15  
PPM 1.5.13; Preventive Maintenance Optimization Living Program; Revision 14  
ABN-Flooding; Flooding; Revision 7

### **Work Orders**

WO 01105603

### **Corrective Action Documents**

AR/CR 183963      AR/CR 183354      PER 298-1243      PER 298-1133      PER 203-2902  
AR/CR 183656

### **Miscellaneous**

NE-02-84-33; Emergency Procedure Guidelines Secondary Containment Control; Revision 3  
Design Specification 208; Internal/External Flooding Design Requirements;

## **Section 1R07: Heat Sink Performance**

### **Procedures**

PPM 8.4.62; Thermal Performance Monitoring of DCW-HX-1B1/1B2  
PPM 1.5.9; Plant Performance Monitoring Program; Revision 8

### **Diagrams**

M512-2; Flow Diagram Standby Service Water System Reactor, Radwaste, Diesel Generator Buildings and Yard; Revision 33

M512-3; Flow Diagram Diesel Oil and Miscellaneous Systems Diesel Generator Building; Revision 35

### **Work Orders**

WO 01151572

### **Miscellaneous**

Engineering Calculation ME-02-92-231; Revision 1

## **Section 1R11: Licensed Operator Requalification**

### **Miscellaneous**

Columbia Generating Station Simulator Examination; Cycle 08-05 Evaluation; Dated September 8, 2008

Crew Evaluation Summary; Scenario LR001893; Dated September 18, 2008

### **Section 1R12: Maintenance Effectiveness**

#### **Procedures**

PPM 4.840.A1; Alarm Response Procedure; Revision 9

#### **Work Orders**

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| WR 29068546  | WO 01123400  | WR 29067210  | WO 01130521  | WO 01094196  |
| WO 01094199  | WO 01131022  | WO 01138594  | WO 01123400  | WO 01094195  |
| WO 01094198  | MWO 01075812 | MWO 01075816 | MWO 01075722 | MWO 01075832 |
| MWO 01075718 | MWO 01075819 | MWO 01075720 |              |              |

#### **Corrective Action Documents**

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| AR/CR 183345 | AR/CR 183551 | AR/CR 184106 | AR/CR 183785 | AR/CR 183268 |
| PER 205-0086 | WR 29068546  | AR/CR 183556 | AR/CR 009441 | AR/CR 183747 |

#### **Miscellaneous**

Energy Northwest Decision Resolution; RFW-DT-1B; July 31, 2008  
PTL 231227

### **Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

#### **Procedures**

OSP-SGT-M702; SGT B Operability; Revision 9; August 27, 2008

#### **Work Orders**

|             |             |             |             |              |
|-------------|-------------|-------------|-------------|--------------|
| WO 01147080 | WO 01097916 | WO 01152108 | WO 01152620 | WO 011553030 |
|-------------|-------------|-------------|-------------|--------------|

#### **Corrective Action Documents**

AR/CR 185462

### **Section 1R15: Operability Evaluations**

#### **Work Requests**

WR 29045279

#### **Corrective Action Documents**

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| PER 205-0128 | PER 205-0175 | PER 205-0127 | AR/CR 183345 | AR/CR 184382 |
| AR/CR 185462 | AR/CR 185462 | AR/CR 183386 |              |              |

## Miscellaneous

Reference Number; Title; Revision or Date of Document  
PTL 231227  
PTL 225296  
Operations' Night Order 938; July 29, 2008

## **Section 1R19: Post Maintenance Testing**

### Procedures

ISP-SRM-W402; SRM Channel B Functional Test; Revision 8  
OSP-MS-Q701; Turbine Valve Surveillance; Revision 11  
OSP-RFW/IST-Q701; RFW Valve Operability – Shutdown; Revision 7

### Work Orders

WO 01137700      WO 01137927      WO 01153693      WO 01151116      WO 01152108  
WO 01149583

### Corrective Action Documents

AR/CR 185295

## **Section 1R20: Refueling and Other Outage Activities**

### Procedures

OSP-MT-W701; Quad Voter Solenoid Valve Test; Revision 2

### Work Orders

WO 01157298

### Corrective Action Documents

AR/CR 185299      AR/CR 185296      AR/CR 185295      AR/CR 185294      AR/CR 185231  
AR/CR 185331      AR/CR 185508      AR/CR 185297

## Miscellaneous

FO-08-01; Outage Shutdown Safety Plan; Revision 0  
Forced Outage Work Plan; Dated August 22, 2008

## **Section 1R22: Surveillance Testing**

### Procedures

Severe Accident Guidelines  
OSP-LPCS/IST-Q702; LPCS System Operability Test; Revision 23  
ICP-RFW-A301; Reactor Feedwater Flow Div I – CC; Revision 8  
PPM 4.603.A8; Alarm Response Procedure; Revision 24

### Work Orders

WO 01150827      WO 01152411      WO 01151912      WO 01151680      WO 01150569

### Corrective Action Documents

AR/CR 184398

### Miscellaneous

Technical Memorandum 2118; Technical Support Guidelines – TSC Operations Manager; Revision 4

Technical Memorandum 2115; Technical Support Guidelines – Mechanical Engineer; Revision 4

Technical Memorandum 2120; Columbia EOP/SAG; Revision 1

GI2-05-017; Request for Additional Information from Energy Northwest License Amendment for Alternative Radiological Source Term Columbia Generating Station Docket Number 50-397; February 1, 2005

G02-05-054; Columbia Generating Station, Docket No. 50-397 Response to Request for Additional Information Addressing Chemistry Issues Associated with the Alternative Source Term License Amendment Request; March 16, 2005

## **Section 1EP1: Exercise Evaluation**

### Procedures

EPIP 13.1.1, Classifying the Emergency, Revision 36  
EPIP 13.1.1A, Classifying the Emergency – Technical Basis, Revision 19  
EPIP 13.2.1, Protective Actions and Emergency Exposure, Revision 17  
EPIP 13.2.2, Determining Protective Action Recommendations, Revision 16  
EPIP 13.4.1, Emergency Notifications, Revision 35  
EPIP 13.5.7, Industrial Development Authority Duties, Revisions 3 and 4  
EPIP 13.10.1, Control Room Operations and Shift Manager Duties, Revision 31  
EPIP 13.10.2, TSC Manager Duties, Revision 30  
EPIP 13.10.9, OSC Manager and Staff Duties, Revision 43  
EPIP 13.11.1, EOF Manager Duties, Revision 41  
EPIP 13.12.21, JIC Activities, Revision 8  
EPIP 13.13.3, Intermediate Phase MUDAC Operations, Revision 16  
EPIP 13.14.8, Drill and Exercise Program, Revision 16  
EPI-21, Drill and Exercise Performance, Revision 1

### Evaluation Reports for Drills Conducted

2006 – October 24, November 13, and December 7

2007 – January 9, March 6, August 11, August 28, October 23, and December 5

2008 – January 15, March 11, May 6, and July 8

## **Section 2OS1: Access Controls to Radiologically Significant Areas (71121.01)**

### **Condition Reports**

|              |              |              |              |
|--------------|--------------|--------------|--------------|
| AR/CR 180258 | AR/CR182635  | AR/CR183101  | AR/CR 183306 |
| AR/CR 184482 | AR/CR 184588 | AR/CR 184635 | AR/CR 184947 |
| AR/CR 185112 | AR/CR 185158 |              |              |

### **Audits and Self-Assessments**

AU-RP/RW-07 Radiation Protection/Process Control Program Audit

### **Procedures**

SWP-RPP-01, Radiation Protection Program, Revision 7

PPM 11.2.6.7, Special Dosimetry, Revision 12

PPM 11.2.7.1, Area Posting, Revision 26

PPM 11.2.7.3, High Radiation Area, Locked High Radiation Area, and Very High Radiation Area Controls, Revision 28

PPM 11.2.13.1, Radiation and Contamination Surveys, Revision 21

GEN-RPP-04, Entry Into, Conduct In, and Exit from Radiologically Controlled Areas, Revision 15

## **Section 2OS2: ALARA Planning and Controls (71121.02)**

### **Corrective Action Documents**

|              |              |              |              |
|--------------|--------------|--------------|--------------|
| AR/CR 181212 | AR/CR 182933 | AR/CR 183235 | AR/CR 183296 |
| AR/CR 183317 | AR/CR 183822 | AR/CR 184481 | AR/CR 184482 |
| AR/CR 184588 |              |              |              |

### **Procedures**

HPI-0.13, Radiation Protection Standards and Expectations, Revision 1

GEN-RPP-02, ALARA Planning and Radiation Work Permits, Revision 17

GEN-RPP-13, ALARA Committee, Revision 5

GEN-RPP-13, Control of Temporary Shielding, Revision 5

PPM 11.2.2.11, Exposure Evaluations for Maintaining TEDE ALARA, Revision 4

PPM 11.2.13.1, Radiation and Contamination Surveys, Revision 20

PPM 11.2.13.8, Airborne Radioactivity Surveys, Revision 9

### **Shielding Packages**

|        |        |       |       |       |       |
|--------|--------|-------|-------|-------|-------|
| 05-007 | 06-011 | 07-40 | 07-45 | 08-01 | 08-04 |
|--------|--------|-------|-------|-------|-------|

### **Miscellaneous Documents**

Columbia Generating Station Source Term Reduction Strategy 5-Year Plan, dated July 28, 2008

ALARA Challenge Meeting – WO 01123364 – WEA Duct Cleaning  
Senior Site ALARA Committee 08-06 Meeting Minutes  
Senior Site ALARA Committee 08-04 Meeting Minutes  
Senior Site ALARA Committee 08-03 Meeting Minutes  
Senior Site ALARA Committee 08-02 Meeting Minutes  
Senior Site ALARA Committee 07-16 Meeting Minutes

### **Section 40A1: Performance Indicator Verification**

#### **Procedures**

HPI-0.14, Accessing and Reporting NRC Occupational Exposure Control Effectiveness  
Performance Indicator Data, Revision 4

EPIP 13.1.1, Classifying the Emergency, Revision 36

EPIP 13.1.1A, Classifying the Emergency – Technical Basis, Revision 19

EPIP 13.2.2, Determining Protective Action Recommendations, Revision 16

EPIP 13.4.1, Emergency Notifications, Revision 35

EPIP 13.14.4, Emergency Equipment Maintenance and Testing, Revisions 42 and 43

EPI-26, Tone Alert Radio Test and Survey, Revision 0

Telecommunications Services Instruction 6.2.22, Annual ER Siren System Activation Test,  
Revision 10

Telecommunications Services Instruction 6.2.32, Bi-Weekly Emergency Response River Siren  
Polling Test, Revision 9

Washing Nuclear Project No. 2 Site-Specific Offsite Radiological Emergency Preparedness  
Alert and Notification System Quality Assurance Verification, May 1994

#### **Miscellaneous**

MSPI-01-BD-0001; CGS MSPI Basis Document; Revision 7  
Columbia Generating Station Emergency Plan, Revision 49

### **Section 40A2: Identification and Resolution of Problems**

#### **Procedures**

OI-14; Columbia Generating Station Operational Challenges Program; Revision 2

#### **Corrective Action Documents**

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| CR/AR 186272 | CR/AR 185462 | CR/AR 186531 | CR/AR 186544 | CR/AR 186545 |
| CR/AR 186571 | CR/AR 186573 | CR/AR 186578 | CR/AR 186640 | CR/AR 185852 |
| CR/AR 186242 | CR/AR 186251 | CR/AR 186262 | CR/AR 186278 | CR/AR 185768 |
| CR/AR 186205 | CR/AR 186219 | CR/AR 186226 | CR/AR 186226 | CR/AR 186230 |
| CR/AR 185560 | CR/AR 186138 | CR/AR 185753 | CR/AR 185766 | CR/AR 185555 |



|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| CR/AR 185621 | CR/AR 185620 | CR/AR 185600 | CR/AR 185600 | CR/AR 185571 |
| CR/AR 185450 | CR/AR 185293 | CR/AR 185291 | CR/AR 185302 | CR/AR 185303 |
| CR/AR 185304 | CR/AR 185305 | CR/AR 185309 | CR/AR 185417 | CR/AR 185418 |
| CR/AR 185419 | CR/AR 185427 | CR/AR 185195 | CR/AR 185207 | CR/AR 183686 |
| CR/AR 183709 | CR/AR 183735 | CR/AR 183515 | CR/AR 183520 | CR/AR 183526 |
| CR/AR 183469 | CR/AR 183477 | CR/AR 183386 | CR/AR 183351 | CR/AR 183353 |
| CR/AR 186973 | CR/AR 186978 | CR/AR 186860 | CR/AR 186861 | CR/AR 186863 |
| CR/AR 186867 | CR/AR 186881 | CR/AR 186910 | CR/AR 186914 | CR/AR 186925 |
| CR/AR 186928 | CR/AR 186929 | CR/AR 186930 | CR/AR 186931 | CR/AR 186737 |
| CR/AR 186700 | CR/AR 186703 | CR/AR 186708 | CR/AR 186715 | CR/AR 186722 |
| CR/AR 186731 | CR/AR 186666 | CR/AR 186676 |              |              |

#### Miscellaneous

Operations Aggregate Impact Index; Dated September 15, 2008

Operations Aggregate Index Component Status; Dated September 15, 2008

#### **Section 4OA3: Event Followup**

##### Procedures

OSP-MT-W701; Quad Voter Solenoid Valve Test; Revision 2  
DES-2-1; Plant Design Changes; Revision 23

##### Work Orders

WO 01157298

##### Corrective Action Documents

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| AR/CR 185299 | AR/CR 185296 | AR/CR 185295 | AR/CR 185294 | AR/CR 185231 |
| AR/CR 185331 | AR/CR 185508 | AR/CR 185297 |              |              |

#### **Section 4OA5: Other Activities**

##### Procedures

ABN-INSTRUMENTATION, Loss of RPV Level/Pressure Instrumentation, Revision 7  
ABN-FIRE, Fire, Revision 13  
1.3.10C, Control of Transient Combustibles, Revision 13  
5.1.1, RPV Control, Revision 16  
5.1.4, RPV Flooding, Revision 7  
SPIP-SEC-54; Post 1-8 Checkpoint Procedures; Revision 0

##### Drawings and Diagrams

E678, Reactor Building El. 471' and El. 501' Cable Tray Plans, Revision 30

E679, Reactor Building El. 522' and MISC Details Cable Tray Plans, Revision 24

E689, Reactor Building El. 548' and El. 572' Cable Tray Plans, Revision 20

E948-1, Appendix R Post-Fire Safe Shutdown (PFSS) Protected Raceways General Notes, Legend and Drawing Index, Revision 11

E948-2, Appendix R Post-Fire Safe Shutdown (PFSS) Protected Raceways Reactor Building & DG/RW Corridor Elevations 441' and 471', Revision 14

E948-2A, Appendix R Post-Fire Safe Shutdown (PFSS) Protected Raceways Reactor Building Elevations 501' and 522', Revision 4

E948-2B, Appendix R Post-Fire Safe Shutdown (PFSS) Protected Raceways Reactor Building Elevations 548' and 572', Revision 7

FM892-6, Zones of Limited Combustibles Reactor Building Plan Misc Elevations, Revision 6

M568, General Arrangement Plan El. 471' and 501' Reactor Building, Revision 48

M569, General Arrangement Plan El. 522' and 548' Reactor Building, Revision 48

EWD-9E-004A, RHR System Pump RHR-P-2B, Revision 1

EWD-9E-004B, RHR Pump RHR-P-2B Breaker RHR-CB-P2B, Revision 3

EWD-9E-057, RHR MOV RHR-FCV-64B(E12-F064B), RHR-P-2B Mini Flow Valve, Revision 18

#### Corrective Action Documents

CR 2-06-02399      CR 2-06-04898      AR 42547

#### Miscellaneous

Sketch of Post-Fire Safe Shutdown Division 2 Instrument Tube Routing

Sketch of Fire Area R-1 Division 1 Instrument Tube Routing with Selected Photographs

Columbia PFSS Instrument Sensing Line Position Paper, dated July 11, 2006.

NFPA 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials,"2006 Edition

Analysis of Impact on PFSS due to Loss of Instruments

Calculation NE 02-85-19, "Instrument Tubing Analysis," Revision 4

Evaluation 7.10.12, "Fire Protection of Instrument Tubing," Revision 0