

# Columbia Generating Station

## 2Q/2008 Plant Inspection Findings

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### Initiating Events

**Significance:**  Mar 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Failure to Control Design of Residual Heat Removal Shutdown Cooling Suction Header Bypass Line**

Green. An NRC identified noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified for Energy Northwest's failure to adequately review a design change to the facility in 1994. The design change installed a bypass line around a residual heat removal pump shutdown cooling suction header isolation valve to bleed pressure from the header. This would be done in the event of leakage past the shutdown cooling suction header reactor coolant system pressure isolation valves. The design change failed to consider the thermal effects of introducing hot reactor coolant system water into the residual heat removal shutdown cooling suction header at a design maximum flowrate of 0.75 gpm. As a result, operation of the bypass line would have resulted in saturation conditions being achieved in the suction header causing flashing across the isolation valves and potentially degrading the valve disk and seating surfaces. This could result in increased reactor coolant system leakage past the isolation valves beyond the capacity of the bypass line. However, in the event of leakage in excess of the ability of the bypass line, Energy Northwest would have received a control room alarm which would have alerted operators to the degraded condition allowing the operators to take prompt action to define the actual leakage and to take actions as needed. Energy Northwest entered the issue into the corrective action program and took immediate action to monitor suction header temperature with the bypass line in service to assure that saturation conditions would not develop.

This finding was more than minor because it was a design control issue which 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, degradation of reactor coolant system pressure isolation valves would occur with the bypass line in service at the maximum allowable design flowrate. This was considered to be a primary system loss of coolant accident initiator contributor (i.e. intersystem loss of coolant accident). The finding was determined to be of very low risk significance (Green) because assuming worst case degradation, the finding would not result in exceeding any Technical Specification limits for reactor coolant system leakage. Additionally, the finding would not have likely affected other mitigation systems resulting in a total loss of their safety function. A crosscutting aspect was not identified due to the performance deficiency occurring in 1994 (Section 1R15).

Inspection Report# : [2008002 \(pdf\)](#)

**Significance:**  Sep 28, 2007

Identified By: Self-Revealing

Item Type: FIN Finding

#### **Failure to Adhere to Operations Standards and Expectations**

Green. A Green self-revealing finding was identified for the failure of operations staff to adhere to an operations instructions which provided operating expectations and standards for dealing with uncertain situations and time critical decisions. This resulted in the inadvertent loss of a condensate booster pump and a resultant reactor trip when operators attempted to shift the pump's lube oil duplex strainer with the pump in operation. This occurred while a second condensate booster pump was already out-of-service and the reactor at 70 percent power. The operating crew conducted the lube oil strainer shift even though the filter swap was not a time critical evolution and the operating condition of the pump had not been investigated. 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 a human performance issue which affected both the initiating events and mitigating systems cornerstone objectives to limit the likelihood of those events that upset plant stability and ensure the availability of systems that respond to initiating events to prevent undesirable consequences. Specifically,

the loss of a condensate booster pump resulted in a loss of reactor feedwater pumps (Mitigating System) which resulted in a reactor scram on low reactor water level (Initiating Event). A Phase 1 Significance Determination Process evaluation determined that a Phase 2 evaluation was required because two cornerstones were affected by the performance deficiency (Initiating Events and Mitigating Systems). The inspectors consulted with a regional senior reactor analyst and determined that a Phase 3 analysis was required because a Phase 2 evaluation using the site specific worksheets did not adequately assess a loss of condensate booster pump event at reduced reactor power. As a result, a Phase 3 analysis was performed by the senior reactor analyst. Key assumptions included the probability of MSIV closure upon a loss of feed, operator recovery of the power conversion system following an MSIV closure, and the effect of containment failure on HPCS functionality. The core damage frequency result was less than 1.0E-6/yr. The initial screening of delta-LERF was slightly greater than 1.0E-7/yr., but a refinement of this result yielded a value less than 1.0E-7/yr. Consequently, the significance of the finding was determined to be of very low risk significance (Green). The cause of the finding is related to the cross-cutting aspect of human performance with a decision making component (H.1.b) because operations staff failed to use conservative assumptions regarding operation of the condensate booster pump lube oil duplex strainer, contrary to relevant operations department standards and expectations. (Section 4OA3.2)

Inspection Report# : [2007004](#) (pdf)

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## Mitigating Systems

**Significance:**  Mar 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Take Adequate Corrective Actions to Address Deficient Emergency Procedure**

Green. An NRC identified noncited violation of Technical Specification 5.4.1.a was identified for an inadequate emergency support Procedure PPM 5.5.26, "Overriding RHR [Residual Heat Removal] Shutdown Cooling Return Valve Isolations," Revision 5. The deficient procedure could have resulted in portions of the RHR Trains A and B injection lines inadvertently draining during emergency response to an anticipated transients without scram event. Although Energy Northwest identified the deficiency with Procedure PPM 5.5.26 in June 2006 and had taken action to implement a procedure change, it was not until the inspectors prompted Energy Northwest regarding status of the procedure change and lack of apparent timeliness in issuing a revision to the procedure that Energy Northwest issued the revision. Procedure PPM 5.5.26, Revision 6, was issued on February 6, 2008. As a result of the value added by the inspectors, this finding is considered to be NRC identified.

The finding was more than minor because it was a procedure quality issue which 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, implementation of Procedure PPM 5.5.26 during an anticipated transients without scram condition could have resulted in an inadvertent draining of RHR and subsequent damage to RHR piping and supports during subsequent initiation of injection. The finding was determined to be of very low risk significance (Green) because the finding did not represent an actual loss of safety function, did not represent a loss of system safety function, was not a design or qualification deficiency that resulted in a loss of operability, and was not risk significant due to external initiating events. The deficiency associated with Procedure PPM 5.5.26 would only occur during an anticipated transients without scram which is a non-design bases accident or event. A crosscutting aspect in problem identification and resolution with a corrective action program component [P.1.d] was identified in that the inadequate procedure, although entered into the corrective action program, was not corrected in a timely manner commensurate with safety. This was attributed to a shortage of qualified operations department procedure writers (Section 1R04.2).

Inspection Report# : [2008002](#) (pdf)

**Significance:**  Dec 31, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Conduct Engineering Evaluation in Accordance with Scaffold Procedure**

Green. An NRC identified violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified for Energy Northwest's failure to follow Procedure PPM 10.2.53, "Seismic Requirements for Scaffolding, Ladders, Man-Lifts, Tool Gang Boxes, Hoists, Metal Storage Cabinets, and Temporary Shielding Racks," Revision 26. Specifically, a protective cover (type of scaffold) was constructed over a safety-related battery with portions of the cover installed within 2 inches of the battery requiring an engineering evaluation to be conducted to assess the seismic qualification of the installation. Contrary to the procedure, no engineering evaluation was conducted until prompted by the inspectors. Although a subsequent evaluation determined that the installed cover was acceptable, Energy Northwest determined that historically battery protective covers had always been installed without a supporting engineering evaluation.

This finding was more than minor because it was a human performance error which affected the Mitigating Systems Cornerstone objective to ensure the availability and reliability of systems that respond to initiating events to prevent undesirable consequences. Although the licensee subsequently assessed the as-found installation of the protective cover as acceptable during mock-up testing, the inspectors concluded that the failure to evaluate past installations in accordance with Procedure PPM 10.2.53, was not commensurate with ensuring the reliability and availability of Battery E-B1-1. This was determined to be consistent with NRC Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix E, Example 4.a. for being more than minor risk significance because Energy Northwest had routinely failed to perform the requisite engineering evaluation during past installations. The finding was determined to be of very low risk significance (Green) because no actual loss of safety function occurred and the finding did not screen as potentially risk significant due to external events. Specifically, the as-found installation of the protective cover was determined to not adversely affect seismic qualification of the battery. A crosscutting aspect in human performance with a work practices component [H.4.b] was identified in that Energy Northwest failed to follow Procedure PPM 10.2.53 on December 3, 2007, resulting in a failure to conduct an engineering analysis associated with a safety-related battery protective cover (Section 1R04).

Inspection Report# : [2007005](#) (pdf)

**Significance:**  Dec 31, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **Failure to Provide Adequate Procedures for Shutdown of the High Pressure Core Spray Diesel Generator**

Green. A self-revealing Green noncited violation of Technical Specification 5.4.1.a (2 examples) was identified for failure to provide adequate procedures for shutdown of the high pressure core spray diesel generator resulting in inoperability of the diesel generator. Specifically, Procedure OSP-ELEC-C703, "HPCS Diesel Generator AC Source Operability Check," Revision 8, and Procedure TSP-DG-E501, "Simultaneous Start of All Three Diesel Generators," Revision 2, were inadequate in that each procedure directed shutting down the high pressure core spray diesel generator by placing the diesel engine control switch to STOP resulting in an over excited condition of the generator and subsequent clearing of relay and metering circuit fuses and inoperability of the electronic governor. Performance of Procedure OSP-ELEC-C703 on October 19, 2007, resulted in the inoperability of the diesel generator until discovery of the blown fuses on November 8, 2007 and subsequent troubleshooting and repairs were completed on November 10, 2007. Performance of Procedure TSP-DG-E501, on May 3, 2005, also resulted in the inoperability of the high pressure core spray diesel generator through June 5, 2005, when the cleared fuses were identified although the diesel generator was not required to be operable due to the plant being in Modes 4 and 5 at the time.

This self-revealing finding was more than minor because the finding had an attribute of procedure quality which affected the Mitigating Systems Cornerstone objective to ensure the reliability of systems that respond to initiating events to prevent undesirable consequences. The finding was of very low safety significance (Green) because, although the high pressure core spray diesel generator's electronic governor was inoperable, the diesel generator was capable of completing its safety function of supplying rated electrical power to the high pressure core spray pump and associated loads on its backup mechanical governor. Additionally, the finding was not associated with a qualification deficiency and was not risk significance due to external initiating events. A crosscutting aspect in human performance with a resources component [H.2.c] was identified in that Energy Northwest failed to provide adequate test procedures resulting in subsequent inoperability of the high pressure core spray diesel generator (Section 1R15).

Inspection Report# : [2007005](#) (pdf)

**Significance:**  Jul 13, 2006

Identified By: NRC

Item Type: AV Apparent Violation

### **Lack of an Evaluation of the Effect of Fire on the Reactor Protection System / Scram Capability**

The team identified an apparent violation (AV) of License Condition 2.C.(14) concerning failure to evaluate the potential effect of fire damage on the Reactor Protection System circuits relied upon for reactor scram capability in the approved fire protection program. Although the reactor protection and control rod drive systems are identified as part of the minimum safe shutdown systems necessary to accomplish the reactivity control shutdown function, and are credited in the post-fire safe shutdown procedures developed by the licensee, the potential for fire to cause a loss of this required shutdown function had not been evaluated. The licensee's post-fire safe shutdown analysis included the assumption that the operator would initiate and confirm shutdown before control circuits were damaged, therefore, evaluation of the effects of fire damage to the reactor protection (RPS) and control rod drive (CRD) systems was not necessary. Review of the RPS circuits identified the potential for a fire in the control room to prevent the scram of one rod group.

The finding is greater than minor in that it affected the ability to achieve and maintain hot shutdown following a control room fire. This finding is associated with the Mitigating Systems cornerstone and the respective attribute of protection against external factors (e.g., fire). This finding impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (such as fire) to prevent undesirable consequences. It is the NRC's understanding that the licensee does not consider these circuit vulnerabilities to be violations of NRC requirements. The licensee considers multiple hot shorts due to fire in the control room to be outside of the plant licensing basis for the Fire Protection Program. Specifically, in this case, two hot shorts due to fire induced circuit damage would be required to prevent the scram of one rod group. The NRC staff and the industry are currently working on developing a resolution methodology to address these types of potential fire induced circuit failures. The team concluded that this violation meets the criteria of the NRC Enforcement Manual Section 8.1.7.1 for deferring enforcement actions for postulated fire induced circuit failures.

Inspection Report# : [2006008](#) (pdf)

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## **Barrier Integrity**

**Significance:**  Mar 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure to Preclude a Recurrence and Further Degradation of Secondary Containment**

• Green. A self-revealing noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified for the failure to promptly correct a condition adverse to quality to preclude further degradation of a secondary containment sealing surface. As a result of untimely corrective actions to repair a previously identified breach in secondary containment, further degradation of secondary containment occurred due to high winds. Energy Northwest entered the issue into the corrective action program and took action to implement interim corrective actions so that operability of secondary containment was ensured.

This self-revealing finding was more than minor in accordance with Manual Chapter 0612, Appendix B, because it had an attribute of configuration control and design control that affected the barrier integrity cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Using Manual Chapter 0609, Significance Determination Process," Phase 1 work sheet, the inspectors determined that the finding was of very low risk significance (Green) since the finding only represented a degradation of the radiological barrier function provided for the reactor building. Specifically, the finding resulted in significant erosion of the design margin of allowable secondary containment breach size in the reactor building to support standby gas treatment system and secondary containment operability. However, standby gas treatment and secondary containment remained operable during and following the high wind event. A cross-cutting aspect in human performance with a work control component [H.3.a] was identified in that Energy Northwest did not plan and prioritize work activities associated with final repair of the reactor building siding considering the potential for additional high wind events that could further degrade secondary containment. As a result, in February 2008, a high wind event further damaged the reactor building causing additional erosion of the secondary containment design margin for allowable breach size (Section 40A3.1).

Inspection Report# : [2008002](#) (pdf)

# Emergency Preparedness

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## Occupational Radiation Safety

**Significance:**  Dec 31, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure to survey airborne radioactivity**

Green. The inspector reviewed a self-revealing, noncited violation of 10 CFR 20.1501(a) resulting from the licensee's failure to perform airborne radioactivity surveys during a work activity. The failure was discovered after five contract scaffold workers caused the personnel contamination monitors to alarm as they attempted to exit the radiologically controlled area. The workers had become internally contaminated and radiation protection personnel discovered there had been no air sampling conducted to verify airborne radioactivity concentrations in the work area. The licensee found a similar event had occurred in 2005 and the corrective action was ineffective to prevent recurrence because it lacked specific contamination control rules for areas with high levels of contamination. The licensee was developing more specific contamination controls.

This finding was greater than minor because it was associated with the occupational radiation safety program attribute of exposure control and affected the cornerstone objective in that the lack of knowledge of radiological conditions could increase personnel dose. The inspector determined that the finding was of very low safety significance because it did not involve: (1) an as low as reasonably achievable finding, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. Additionally, this finding had a crosscutting aspect in the problem identification and resolution area, associated with the corrective action program component, because the licensee did not take appropriate corrective actions to address safety issues in a timely manner [P1.d] (Section 2OS1).

Inspection Report# : [2007005](#) (*pdf*)

**Significance:**  Dec 31, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure to use the correct radiation work permit and obtain a briefing of dose rates**

Green. The inspector reviewed a self-revealing, noncited violation of Technical Specification 5.4.1 because a worker failed to use the correct radiation work permit and obtain a briefing of the dose rates in the work area. The worker had been working in the drywell, but entered the steam tunnel without changing radiation work permits or obtaining a briefing on the radiological hazards in the steam tunnel. The licensee was alerted to the situation when the worker's electronic dosimeter alarmed. The licensee counseled the worker on the proper practice.

This finding was greater than minor because it was associated with the occupational radiation safety program attribute of exposure control and affected the cornerstone objective in that the lack of knowledge of radiological conditions could increase personnel dose. The inspector determined that the finding was of very low safety significance because it did not involve: (1) an as low as reasonably achievable finding, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. Additionally, this finding had a crosscutting aspect in the human performance area, associated with the work practices component, because the worker did not use human error prevention techniques such as self-checking (H4.A) (Section 2OS1).

Inspection Report# : [2007005](#) (*pdf*)

**Significance:**  Dec 31, 2007

Identified By: Self-Revealing

Item Type: FIN Finding

### **ALARA Finding**

Green. The inspector reviewed a self-revealing ALARA finding because performance deficiencies resulted in the collective dose of a work activity exceeding five person-rem and the legitimate dose estimate by more than 50

percent. The licensee estimated Radiation Work Permit 30001874, "R18 RX RRC/RWCU Chemical Decontamination," would accrue 5.783 person-rem; however, the actual dose was 9.143 person-rem. The primary reason for exceeding the estimated dose was the need to perform work activities more than once. Lack of adequate planning and errors by craft workers resulted in the need to repeat activities, thereby increasing collective dose. Corrective action is being evaluated.

This finding is greater than minor because it is associated with the occupational radiation safety program attribute of exposure control and affected the cornerstone objective in that it caused increased collective radiation dose. The inspector determined this finding had very low safety significance. Although the finding involved ALARA planning and work controls, the licensee's latest, official 3-year rolling average collective dose was less than 240 person-rem. Additionally, this finding had a crosscutting aspect in the human performance area, associated with the work control component, because work activities were not planned taking into account job site conditions [H3.a] (Section 2OS2).

Inspection Report# : [2007005](#) (pdf)

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## Public Radiation Safety

**Significance:**  Sep 06, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### Failure to Provide Recurring Training to Hazmat Employees

Green. The team identified a noncited violation of 10 CFR 71.5 because the licensee failed to provide required recurring training to hazmat employees involved in the shipment of radioactive material. Specifically, the licensee did not provide recurring, function-specific training of applicable sections of the shipping regulations to health physics technicians performing surveys of the shipment. As immediate corrective action, the licensee suspended shipments and documented the finding in the corrective action program. Additional corrective action is still being evaluated.

The finding is greater than minor because it is associated with the Public Radiation Safety Cornerstone attribute of program and process and affects the cornerstone objective in that improper performance of radiation and contamination surveys has a direct impact on public dose and has the potential to impact the licensee's ability to safely package and transport radioactive material on public roadways. The violation involved an occurrence in the licensee's radioactive material transportation program that is contrary to NRC or Department of Transportation regulations. When processed through the Public Radiation Safety Significance Determination Process, the finding was determined to be of very low safety significance because it: (1) was associated with radioactive material control, (2) involved the licensee's program for radioactive material packaging and transportation, (3) did not cause radiation limits to be exceeded, (4) did not result in a breach of package during transit, (5) did not involve a certificate of compliance issue, (6) did not involve a non-compliance with low level burial ground, and (7) did not involve a failure to make notifications or to provide emergency information. In addition, this finding had cross-cutting aspects in the area of human performance and the component of resources because the licensee did not ensure recurring training of individuals involved in the shipment of radioactive material was available and adequate. (H.2.b) (Section 2PS2)

Inspection Report# : [2007008](#) (pdf)

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## Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

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# Miscellaneous

**Significance:** SL-IV May 13, 2008

Identified By: NRC

Item Type: VIO Violation

## **Willful Violation by a project manager who instructed plant workers to reach across a contamination boundary without radiation protection approval**

During an NRC investigation and subsequent in-office inspection completed on May 13, 2008, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Technical Specification 5.4.1.a states, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Appendix A, Section 7.e (1), specifies procedures for “Access Control to Radiation Areas Including a Radiation Work Permit System.”

Columbia Generating Station Procedure GEN-RPP-04, “Entry into, Conduct in, and Exit from Radiologically Controlled Areas,” Revision 14, states, in part, “Do not reach over, or cross contaminated area boundaries without RP approval.”

Contrary to the above, during repair of the HPCS-P-1 flange on June 16, 2007, a project manager instructed plant workers to reach across a contamination boundary without radiation protection approval.

This is a Severity Level IV violation. (Supplement IV)

Inspection Report# : [2008008](#) (*pdf*)

Last modified : August 29, 2008