

Columbia Generating Station

1Q/2009 Plant Inspection Findings

Initiating Events

Significance:  Feb 08, 2009

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Perform an Adequate Site Acceptance Test

Green. The inspectors reviewed a self-revealing finding for the failure of Energy Northwest to perform an adequate site acceptance test of the digital electro-hydraulic system. Specifically, Energy Northwest failed to verify that the quad voter solenoid valves in the digital electro-hydraulic system could be replaced with the main turbine on-line. Consequently, when an on-line valve replacement was performed, the system experienced a pressure transient which resulted in a fast closure of the main turbine governor valves 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 was a human performance error 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. 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. This finding was determined to have the crosscutting aspect of human performance with a decision making component, because Energy Northwest failed to perform an adequate effectiveness review to identify the possible unintended consequences of on-line replacement of quad voter solenoid valves in the digital electro-hydraulic system [H.1.b]. (Section 4OA3.1)

Inspection Report# : [2009002](#) (*pdf*)

Significance:  Sep 30, 2008

Identified By: Self-Revealing

Item Type: FIN Finding

DEH Leak Results in Reactor Scram

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)

Inspection Report# : [2008004](#) (*pdf*)

Mitigating Systems

Significance:  Mar 28, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to perform engineering evaluation to determine seismic qualification of safety-related equipment

Green. The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," 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, the position of equipment is required to meet specific criteria to prevent damage to safety related equipment during a seismic event. Contrary to this procedure, the inspectors identified that equipment was routinely positioned next to safety-related equipment without a supporting engineering evaluation.

This finding is greater 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. 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. 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 position of the equipment was determined to not adversely affect seismic qualification of the affected safety-related components. A crosscutting aspect in human performance with a work control component was identified in that Energy Northwest failed to appropriately plan work on multiple occasions, resulting in job site conditions which may have impacted plant components [H.3.a]. (Section 1R04).

Inspection Report# : [2009002](#) (*pdf*)

Significance:  Dec 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Follow Procedures during an Overhaul of Emergency Diesel Engine 1A1

Green. The inspectors identified a noncited violation (NCV) of Technical Specification 5.4.1.a (Procedures) for Energy Northwest's failure to follow site procedures during an overhaul of the Division 1 emergency diesel engine in 2003. Specifically, care was not exercised to protect diesel fuel oil injector line seating surfaces from mechanical damage during maintenance. In addition, the procedure was inadequate, in that it required an inspection but contained no acceptance criteria. As a result, seating surfaces of diesel fuel oil injector lines were damaged during maintenance and fuel oil leaked into the lubricating oil system during emergency diesel generator operation. The leakage was not immediately noticed during postmaintenance testing (2003), but was identified substantially later during lubricating oil viscosity testing (2008). Fuel leakage into the lubricating oil system has rendered emergency diesel generators inoperable at other sites and the vendor stipulated that this condition can result in crankcase explosions and severe damage. The licensee's initial review of the issue failed to identify the inadequate inspection requirements. Further, the licensee did not follow the vendor manual recommendation of replacing the lubricating oil filter until identified by the inspectors. Energy Northwest entered the issues into the corrective action program as Condition Report 187580.

The finding was more than minor because, if left uncorrected, it could result in a more significant safety concern. Specifically, postmaintenance testing may not immediately identify fuel injector damage following maintenance and the damage could render the emergency diesel generator inoperable during event response. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 screening worksheet, the finding was of very low risk significance (Green) because it was a qualification deficiency confirmed not to result in a loss of emergency diesel generator operability. While the procedural deficiencies were aged, the licensee missed a recent opportunity in 2008 to identify the problems because they repaired the diesel but did not evaluate the adverse condition. This issue had a crosscutting aspect associated with Problem Identification and Resolution (corrective action program component), in

that the licensee failed to thoroughly evaluate the problem such that the resolution addressed the cause [P.1(c)] (Section 1R12).

Inspection Report# : [2008005](#) (pdf)

Significance:  Dec 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Translate Design Basis into Procedures for Residual Heat Removal Operating Modes

Green. The inspectors identified a noncited violation of 10 CFR 50, Appendix B, Criterion III (Design Control) for the failure to properly translate the design basis of the facility into procedures. Specifically, when the residual heat removal system, Trains A, B or C, were used in the suppression pool cooling or mixing modes of operation, the trains were vulnerable to water hammer events that could challenge train operability during a loss of coolant accident coincident with a loss of offsite power. The licensee entered the condition into their corrective action program as Condition Report 182958.

The finding was more than minor because, if left uncorrected, it would lead to a more significant safety concern. Specifically, the licensee could use multiple trains of residual heat removal in the suppression pool cooling and mixing modes of operations, which could make them incapable of performing their safety functions during a loss of coolant accident coincident with a loss of offsite power. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 screening worksheet, the issue screened as having very low safety significance (Green) because the finding: 1) was a design or qualification deficiency that could result in loss of operability or functionality; 2) did not involve an actual loss of system safety function; 3) did not result in a loss of a single train for greater than the technical specification allowed outage time; 4) did not result in a loss of safety function of one or risk significant trains of equipment for more than 24 hours; and 5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding did not have a crosscutting aspect because the concern involved an older design issue (Section 4OA5).

Inspection Report# : [2008005](#) (pdf)

Significance:  Sep 30, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to assure that Division 2 instrument sensing lines remained free of fire damage

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)

Inspection Report# : [2008004](#) (pdf)

Significance:  Sep 30, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to provide adequate procedures during maintenance of ECCS Pumps

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)

Inspection Report# : [2008004](#) (*pdf*)

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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.

Barrier Integrity

Emergency Preparedness

Occupational Radiation Safety

Significance:  Sep 30, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Maintain Administrative Control of Keys to High Radiation Area with Dose Rates in Excess of 1 Rem per Hour

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).

Inspection Report# : [2008004](#) (pdf)

Significance:  Jun 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Control Access to an Area with Radiation Levels in excess of 1.0 Rem/hr

Green. The inspectors reviewed a self-revealing noncited violation of Technical Specification 5.7.2 for failure to control a high radiation area with dose rates in excess of 1.0 rem per hour. Specifically, on January 30, 2008, a worker, within the 512' reactor traversing incore probe mezzanine room, received an electronic dosimeter alarm and the investigation survey found that Valve RFW-V-70 had a dose rate of 4.2 rem per hour on contact and 1.2 rem per hour at 30 centimeters. The area was immediately controlled as required per Technical Specifications. Review of this occurrence revealed surveys indicating an upward trend of radiation levels on the valve in the May and June 2007 time frame. The review also revealed that several crud burst causing evolutions occurred around the June to July 2007 time frame and there was no process in place for radiation protection to be informed so that they could adequately monitor for changing radiological conditions throughout the plant. The issue was entered into the licensee's corrective action program as Action Report/Condition Report Numbers 00176887 and 00178189. Initial corrective actions included controlling the area as required by Technical Specifications and procedure changes to ensure radiation

protection is notified of such evolutions and enhancement of radiation protection procedures to include additional areas of the plant to be monitored upon notification of crud burst causing evolutions.

The failure to control a high radiation area with dose rates in excess of 1.0 rem per hour was a performance deficiency. This finding is greater than minor because it is associated with the occupational radiation safety program and process attribute and affected the cornerstone objective, in that the failure to properly control a high radiation area with dose rates in excess of 1.0 rem per hour had the potential to increase personnel dose. 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 control component because of a lack of interdepartmental communication and the failure to keep radiation protection informed of evolutions that may cause a change in radiological conditions [H.3(b)] (Section 2OS1).

Inspection Report# : [2008003](#) (*pdf*)

Significance:  Jun 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Barricade and Conspicuously Post a High Radiation Area

Green. The inspectors reviewed a self-revealing noncited violation of Technical Specification 5.7.1 for failure to barricade and conspicuously post a high radiation area. Specifically, a worker received a dose rate alarm of 216 millirem per hour while working in a HI-TRAC cask work area of the spent fuel pool floor on March 5, 2008. The worker was working on a radiation work permit that had a dose rate alarm setpoint of 80 millirem per hour. Radiation protection personnel performed radiation surveys following notification of the alarm and identified the area had radiation levels up to 230 millirem per hour on contact and 120 millirem per hour at 30 centimeters constituting a high radiation area. The issue was entered into the licensee's corrective action program as Action Report/Condition Report Number 00178381.

The failure to barricade and conspicuously post a high radiation area was a performance deficiency. This finding is greater than minor because it is associated with the occupational radiation safety program and process attribute and affected the cornerstone objective, in that the failure to barricade and conspicuously post a high radiation area had the potential to increase personnel dose. 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 control component because the work planning did not appropriately plan work activities by incorporating job site conditions and appropriate equipment to use [H.3(a)] (Section 2OS1).

Inspection Report# : [2008003](#) (*pdf*)

Significance:  Jun 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Perform Radiological Survey

Green. The inspectors reviewed a self-revealing noncited violation of 10 CFR 20.1501(a) for failure to perform a survey of a potentially contaminated barrel, resulting in the contamination of a worker. Specifically, on October 5, 2007, a worker alarmed a personnel monitor with radioactive contamination on the back of the worker's T-shirt. The worker showed radiation protection personnel the work area; a barrel of scrap metal with a label indicating contamination levels <1000 decays per minute per 100 centimeters squared. Smears of the inside of the drum and closure ring revealed contamination levels up to 4000 decays per minute per 100 centimeters squared. The ring was decontaminated, the barrel was sealed and labeled as radioactive material, and was placed in an appropriate storage area. No other contamination was found in the area and a random survey of other non radioactive barrels revealed no contamination. The issue was entered into the licensee's corrective action program as Action Report Number

00056086.

The failure to perform surveys of potentially contaminated items is a performance deficiency. This finding is greater than minor because it is associated with the occupational radiation safety program and process attribute and affected the cornerstone objective, in that not completely evaluating the radiological conditions had the potential to increase personnel dose. 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. This finding has a crosscutting aspect in the area of human performance associated with work practices because the individual that performed the survey failed to use proper human error prevention techniques to ensure an adequate survey of the barrel [H.4(a)] (Section 2OS1).

Inspection Report# : [2008003](#) (pdf)

Public Radiation Safety

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.

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)

