UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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November 28, 2005

J. V. Parrish (Mail Drop 1023)
Chief Executive Officer
Energy Northwest
P.O. Box 968
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SUBJECT: COLUMBIA GENERATING STATION - NRC SUPPLEMENTAL INSPECTION REPORT 05000397/2005010

Dear Mr. Parrish:

On October 21, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure 95001 at your Columbia Generating Station. The enclosed inspection report documents the inspection findings, which were discussed at the exit meeting on October 20, 2005, with you and members of your staff.

The NRC performed this supplemental inspection to assess your evaluation associated with a performance indicator (PI) (Safety System Unavailability, High Pressure Injection System (HPCS)) that crossed the Green-White threshold in the first quarter 2005. Detailed observations, assessments, and conclusions of the inspection are presented in the enclosed inspection report.

The inspection concluded that the root causes of the finding were adequately defined and understood, and the corrective actions resulting from the evaluations appropriately addressed the identified causes.

Based on the results of this inspection, no findings of significance were identified. However, one licensee identified violation determined to be of very low safety significance is listed in Section 4OA7 of this report. If you contest this noncited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Columbia Generating Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document

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Sincerely,

/RA/

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

Docket: 50-397
License: NPF-21

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NRC Inspection Report
05000397/2005010

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	50-397
License:	NPF-21
Report:	05000397/2005010
Licensee:	Energy Northwest
Facility:	Columbia Generating Station
Location:	Richland, Washington
Dates:	October 17-21, 2005
Inspectors:	T. R. Farnholtz, Senior Project Engineer, Project Branch A, Division of Reactor Projects (DRP)
Approved By:	C. E. Johnson, Chief, Project Branch A, DRP
ATTACHMENT:	Supplemental Information

SUMMARY OF FINDINGS

IR05000397/2005010; 10/17/2005 - 10/21/2005; Columbia Generating Station. Inspection Procedure 95001 Supplemental Inspection.

The report covered a one-week period of inspection by a region-based inspector. No violations 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 3, dated July 2000.

A. NRC Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

The U.S. Nuclear Regulatory Commission performed this supplemental inspection to assess the licensee’s evaluation associated with a performance indicator (Safety System Unavailability, High Pressure Injection System) that crossed the Green-White threshold in the first quarter 2005. The primary reason for this performance indicator being characterized as White was a large number of planned unavailable hours that were credited in the first quarter of 2005. These hours were due to a damaged air deflector in the High Pressure Core Spray pump motor that required extensive repair. During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector determined that the licensee identified the issue of the damaged air deflector, adequately determined the root cause and significant contributing causes, and established appropriate corrective actions to prevent recurrence. The licensee’s evaluation identified the primary root cause of the damaged air deflector to be that critical dimensions were not maintained during the motor reassembly process in 1992 which led to clearance deficiencies between the motor rotor/fan assembly and the air deflector.

B. Licensee Identified Violations

One violation of very low safety significance, which was identified by the licensee, have been reviewed by the inspector. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective action tracking number are listed in Section 4OA7 of this report.

Report Details

01 INSPECTION SCOPE

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with a performance indicator (PI) (Safety System Unavailability, High Pressure Injection System (HPCS)) that crossed the Green-White threshold in the first quarter 2005.

The primary cause of the PI crossing the Green-White threshold was repairs associated with damage to the High Pressure Core Spray (HPCS) pump motor upper air deflector. The repair of this motor was performed while the plant was on-line during the Technical Specification allowed outage time of 14 days. The repair time was approximately 11 days (265 hours). A review of the subject PI revealed that this one event, with the large number of unavailable hours associated with the repair, was the cause of the PI being classified as White. No significant adverse trends were noted in the historical PI data as far back as the third quarter of 2003.

The HPCS pump motor upper air deflector damage was identified on March 16, 2005. Similar damage to this same air deflector was identified in May 1992 during a scheduled refueling outage.

This supplemental inspection was focused on the damaged HPCS pump motor upper air deflector and associated issues identified in 1992 and 2005.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determination of who (i.e., licensee, self-revealing, or NRC) identified the issue and under what conditions

Cracks in the upper air deflector of the HPCS pump motor was identified by the licensee during an examination of the upper area inside the motor casing to investigate the source of a motor oil leak. The HPCS motor was declared inoperable on March 16, 2005.

b. Determination of how long the issue existed, and prior opportunities for identification

Similar damage to the HPCS motor upper air deflector was identified in 1992. Repairs were made to the motor involving procuring and installing a new upper air deflector. The licensee determined that the HPCS motor upper air deflector supplied in 1992 was manufactured with only about half the material thickness at the high stress areas as was specified and the component was improperly installed at that time. Consequently, forces from normal operation resulted in extensive fatigue cracking in less than 200 run-time hours. The inspector reviewed the records describing the as-found condition of the air deflector, reviewed the tests and analysis performed on the damaged air deflector, and discussed the issue with the dispositioning manager and the HPCS system

engineer. As a result of these activities, the inspector agreed that the air deflector sustained initial damage during installation in 1992. Subsequent crack propagation during operation resulted in the as-found condition of the air deflector in March 2005.

Prior opportunities for identification were limited to a preventive maintenance task last performed on November 14, 2000. This task involved performing a visual inspection of the surge ring brackets from outside the motor looking in. Some of these brackets are located in the general vicinity of the upper air deflector, portions of which were visible during these inspections. No visible damage to the air deflector was noted during this activity. The upper portion of the motor had not been disassembled to allow examination of the entire upper air deflector since the motor was assembled in 1992.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issue

The licensee determined that the Incremental Core Damage Probability (ICDP) during the time that the HPCS pump motor was out of service for corrective maintenance to replace the upper air deflector was 2.0E-6 using Sentinel and 1.57E-6 using Revision 5.0 PRA. The inspector requested the Region IV Senior Reactor Analyst to verify that these numbers were in agreement with the model used by the NRC. The SPAR model for this maintenance activity indicated an ICDP of 3.37E-6 which is considered comparable to the licensee's results.

To determine if the HPCS pump motor would have operated for its mission time of 24 hours in the as-found condition, the licensee commissioned a test to be performed by General Electric. The damaged upper air deflector was mounted in a test rig that was designed to simulate operating conditions in the motor including temperature, vibration, and air flow. The test was run for 48 continuous hours without a failure of the air deflector. The inspector reviewed the report associated with this test and determined that it did provide some assurance that the motor would operate for its full mission time had it been called upon to do so. However, the inspector did note that fiberglass and epoxy patches had been applied to the damaged air deflector prior to the test to compensate for several pieces of aluminum that had been removed for metallurgical examination. This had the potential to change the as-found condition of the damaged air deflector. The report stated that the patches did not affect the test results. The inspector did not have any information to the contrary but did note the difference.

The inspector determined that a licensee identified noncited violation of very low safety significance (Green) occurred when the HPCS pump motor upper air deflector was incorrectly installed in 1992. The root cause analysis and the corrective actions specified at that time were ineffective to prevent recurrence. The violation was more than minor because it impacted the Mitigating Systems Cornerstone objective of availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Phase 1 Significance Determination Process Screening Worksheet in Inspection Manual Chapter 0609, Appendix A, the violation was of very low safety significance (Green) because it was confirmed that the damaged upper air deflector did not result in a loss of function of the HPCS pump motor. The violation is discussed in Section 4OA7 of this report.

02.02 Root Cause and Extent of Condition Evaluation

a. Evaluation of methods(s) used to identify root cause(s) and contributing cause(s)

To evaluate this issue, the licensee used a combination of structured root cause analysis techniques including cause and effect analysis, failure analysis, fault tree analysis, and process analysis. The inspector determined that the licensee followed its procedural guidance for performing root cause analysis. The procedural guidance is contained in procedure SWP-CAP-02, "Corrective Action Program, Cause Determination," Revision 3.

b. Level of detail of the root cause evaluation

The licensee's root cause evaluation was thorough and identified the primary root cause of the damaged HPCS motor upper air deflector to be that critical dimensions were not maintained during the motor reassembly process in 1992 which led to clearance deficiencies between the motor rotor/fan assembly and the air deflector. The lack of detailed design drawings that included critical dimensions led to: 1) incorrect planning for reassembly, 2) incorrect upper bearing thrust bearing endplay, and 3) assembly methods that allowed excessive rotor travel that caused an up-thrust impact to the air deflector and caused deformation, dimpling, and displacement.

In addition, significant contributing causes were identified which included: 1) the resolution for the 1992 failure of the upper air deflector did not identify the specific process controls and setup weaknesses in the maintenance procedures used during installation, and 2) less than adequate control of critical dimensions during the manufacturing process which led to parts that did not meet General Electric dimensional specifications.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

The licensee's evaluation included a review to see if similar problems had previously been reported with the high pressure core spray pump motor. The review included both internal (Columbia Generating Station) and external operating experience. Internal operating experience revealed the work done in 1992 on the upper air deflector which was previously determined to be lacking in adequate root cause evaluation and effective corrective actions. The external operating experience search returned records of events similar but not directly applicable to the HPCS pump motor cracked upper air deflector. The inspector did not possess any information to the contrary.

d. Consideration of potential common cause(s) and extent of condition of the problem

The licensee's evaluation considered the potential for common cause and extent of condition associated with the installation errors resulting in damage to the HPCS pump motor upper air deflector. The evaluation states that the identified root causes apply and might result in adverse consequences when the licensee performs major maintenance on any components for which vendor's supplied Columbia with insufficient

information to correctly perform major maintenance activities. The evaluation also stated that Columbia has not performed major maintenance on other emergency core cooling systems (ECCS) pump motors to date. No other vulnerabilities were identified. The inspector considered the extent of condition evaluation to be adequate to address this concern.

02.03 Corrective Actions

a. Appropriateness of corrective action(s)

When the damaged HPCS pump motor upper air deflector was identified on March 16, 2005, the licensee declared HPCS inoperable and entered the applicable Technical Specification action statement. Repairs were made to the HPCS pump motor within the allowed outage time and the HPCS system was returned to operable status.

The licensee established corrective actions to prevent recurrence including: 1) Develop and implement procedures to ensure that the station has or obtains all critical information and vendor representation necessary to successfully perform major overhaul or refurbishment work on significant plant equipment; 2) Review and implement appropriate changes to the preventive maintenance tasks performed on motors in the large motor program; 3) Rebuild or replace the HPCS pump motor at the next refueling outage (R18); 4) Perform visual examinations of other large motors for indications of damage to the air deflectors prior to the completion of the refueling outage that concluded on June 11, 2005; and 5) Assess the effectiveness of the corrective actions to prevent recurrence. The inspector determined that the proposed corrective actions were appropriate.

b. Prioritization of corrective actions

The licensee's immediate corrective actions restored the HPCS pump motor to operable status within the Technical Specification Allowed Outage Time. After the HPCS system was returned to operable status, the licensee inspected other potentially affected ECCS pump motors to assess the extent of condition. The inspector verified that these inspections did not reveal similar damage to air deflectors on any other large motors. The inspector considered the prioritization of corrective actions to be appropriate.

c. Establishment of schedule for implementing and completing the corrective actions

The licensee established adequate schedules for completion of the specified corrective actions. The hardware inspections were required to be completed before the end of the refueling outage that represented the earliest opportunity to perform these examinations. The procedure improvements had been completed at the time of the inspection and incorporated into Engineering Procedure EGM-1-8, "Technical Issue Resolution Process" Revision 0.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

Problem Evaluation Request Resolution 205-0175, corrective action number 5 specified an action to assess the effectiveness of the corrective actions to prevent recurrence. This action involves performing a self-assessment to measure the effectiveness of the process changes to ensure the licensee obtains critical information and vendor representation for major overhaul or refurbishment work on important equipment. Success criteria is specified in the corrective action plan. This action has a due date of December 15, 2007. The inspector considered this to be adequate to determine the effectiveness of the corrective actions to prevent recurrence.

03 MANAGEMENT MEETINGS

Exit Meeting Summary

On October 20, 2005, the inspector (T. Farnholtz) presented the inspection results to Mr. V. Parrish, Chief Executive Officer, and members of his staff who acknowledged the findings. The inspector confirmed that proprietary information was provided or examined during the inspection and returned at the conclusion of the inspection.

O4 OTHER ACTIVITIES

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy for being dispositioned as a noncited violation.

10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, requires that in the case of significant conditions adverse to quality, measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, the licensee failed to establish adequate corrective actions in 1992 to prevent the repetitive event in 2005. The issue was entered into the licensee's corrective action program as Condition Report 2-05-01523. The inspector concluded that this violation was identified by the licensee in 2005.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

ATTACHMENTS

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Documents Reviewed

Problem Evaluation Request 205-0175 (2005)

Problem Evaluation Request 292-540 (1992)

Site-Wide Procedure SWP-CAP-02, “Corrective Action Program, Cause Determination,” Revision 3

Condition Reports

2-05-01523	2-05-01680	2-05-01677
2-05-01542	2-05-01722	2-05-02061
2-05-01575	2-05-01727	2-05-02016
2-05-01597	2-05-01733	
2-05-01610	2-05-01735	
2-05-01612	2-05-01745	
2-05-01620	2-05-01770	
2-05-01624	2-05-01771	
2-05-01626	2-05-01773	
2-05-01627	2-05-01866	
2-05-01628	2-05-01902	
2-05-01634	2-05-01902	
2-05-01635	2-05-01930	
2-05-01637	2-05-01949	
2-05-01639	2-05-01952	
2-05-01644	2-05-01969	
2-05-01665	2-05-01970	
2-05-01666	2-05-01971	
2-05-01667	2-05-02013	

ACRONYMS

ECCS	emergency core cooling systems
HPCS	high pressure core spray
ICDP	Incremental Core Damage Probability
NRC	Nuclear Regulatory Commission
PER	problem evaluation request
PI	performance indicator