ENERGY NORTHWEST

W. Scott Oxenford
Columbia Generating Station
P.O. Box 968, PE08
Richland, WA 99352-0968
Ph. 509.377.4300 | F. 509.377.4150
soxenford@energy-northwest.com

March 16, 2010
GO2-10-043

10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397**
LICENSEE EVENT REPORT NO. 2009-001-01

Dear Sir or Madam:

This submittal provides an update to Licensee Event Report No. 2009-001-00 which reported a reactor scram event at Columbia Generating Station on February 8, 2009. This revision updates the contributing causes for the event based on a recent re-evaluation of the event.

There are no commitments being made to the NRC herein. If you have any questions or require additional information, please contact Mr. M.C. Humphreys at (509) 377-4025.

Respectfully,

W.S. Oxenford
Vice President, Nuclear Generation & Chief Nuclear Officer

Enclosure: Licensee Event Report 2009-001-01

cc: NRC Region IV Administrator
NRC NRR Project Manager
INPO Records Center
NRC Sr. Resident Inspector – 988C (2)
R.N. Sherman – BPA/1399
W.A. Horin – Winston & Strawn
W.C. Walker – NRC RIV/fax

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Columbia Generating Station	05000397	1 OF 4

4. TITLE

Reactor Scram due to Turbine Control System Trip Header Depressurization

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
02	08	2009	2009	– 001	–01	03	16	2010	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE
1

10. POWER LEVEL
075

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203 (a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Donald W. Gregoire, Engineering Specialist	509-377-8616

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	JJ	HCU	I125	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT

On February 8, 2009 at 1125 hours, an automatic reactor scram occurred while Columbia was operating in Mode 1 at 75% power. The Digital Electro-Hydraulic (DEH) Control System emergency trip header momentarily depressurized during testing following on-line quadvoter valve assembly replacement. A Turbine Governor Valve Fast Closure trip signal was generated and a reactor scram occurred.

The direct cause of the event was the introduction of air into the DEH system during quadvoter valve replacement and subsequent compression of the unvented, entrapped air during post maintenance testing. The compression resulted in backflow and excursion of the trip header pressure below the trip setpoint. The root cause is design deficiencies in the on-line serviceable quadvoter assembly which allowed system conditions that resulted in a reactor trip following performance of on-line maintenance activities.

Both quadvoter valve assemblies in the affected channel were replaced. Prior to reactor startup, the DEH system was vented and tested to ensure removal of all air. Corrective actions to address quadvoter design deficiencies and to improve quadvoter performance have been pursued.

This event did not adversely affect the health and safety of the public. Since the installation of a new DEH system at Columbia in 2007, one similar event was reported by Energy Northwest in LER 2008-001-00.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Columbia Generating Station	05000397	2009	– 001	– 01	2 OF 4

NARRATIVE

Plant Condition

The plant was operating in Mode 1 at 75% power at the time of this event.

Event Description

On January 29, 2009, Quadvoter "B" (DEH-SV-TRIP/B) failed during performance of weekly surveillance testing of the solenoid valves in the DEH system [JJ] quadvoter hydraulic trip block [HCU]. The quadvoter valve assemblies are designed for on-line repair and Columbia Licensee Controlled Specifications Surveillance Requirements require a failed channel be returned to operable status within 14 days.

On February 8, 2009, Quadvoter "B" was isolated, replaced, vented, and unisolated in accordance with maintenance work instructions. Weekly surveillance testing was performed as the prescribed post maintenance testing prior to returning the quadvoter channel to operable status. During this testing, the DEH system experienced pressure transients and the trip header of the quadvoter valves momentarily depressurized below the Turbine Governor Valve Fast Closure trip setpoint. Both Reactor Protection System (RPS) [JC] trip systems received reactor trip signals and, at 1125 PST, a full scram of the reactor [RCT] occurred.

All rods fully inserted as expected in response to the RPS actuation and heat removal through the main condenser [SG] was maintained. A reactor water level 3 isolation occurred with the minimum level attained being zero inches. Post trip reactor vessel water level was maintained in the normal band using the feedwater [SJ] and condensate systems [SD] and pressure was controlled in the normal band using the bypass valves and main steam line drains. No other safety systems actuated or were required to actuate. There was no inoperable equipment at the start of the event that contributed to the event. Off-site power was available and three emergency diesel generators [EK] were operable and available. Crew recognition, response, and decision making enabled effective management of the transient.

At 1808 EST (1508 PST), the NRC was notified of the RPS actuation per 10 CFR 50.72(b)(2)(iv)(B) (reference event notification number 44839). This LER is submitted pursuant to 50.73(a)(2)(iv)(A) as an event or condition that resulted in automatic actuation of the reactor protection system.

Immediate Corrective Action

Following the event, testing was performed to determine the cause of the scram. With the reactor shutdown in Mode 4, Quadvoter "B" was again replaced, vented per instructions provided for on-line replacement, and the weekly surveillance testing re-performed. During the testing, pressure measurements of the trip header were conducted. The weekly surveillance testing independently de-energizes and re-energizes the solenoid valves to demonstrate proper operation. A pressure transient occurred when Quadvoter "B" was re-energized causing the trip header pressure to momentarily drop below trip point limits. The testing illustrated that the DEH system was not completely vented of air.

Cause

The direct cause of the scram was the compression of unvented, entrapped air in the DEH system following maintenance which momentarily depressurized the trip header. Air introduced into the inter-valve cavity line between Quadvoter "A" (DEH-SV-TRIP/A) and Quadvoter "B" serial pair during the replacement was incapable of being vented due to system design. When Quadvoter "B" was re-energized, the air was aligned with the trip header which resulted in backflow and momentary depressurization.

The root cause of the event was design deficiencies in the on-line serviceable quadvoter valve assembly which allowed system conditions that resulted in a reactor trip following performance of on-line maintenance activities. Several contributing causes were identified: 1) Lack of rigor in making risk decisions and risk being managed at inappropriate levels within the organization led to the DEH modification causing two inadvertent reactor scrams. 2) Less than adequate application of methods for the Corrective Action Program problem resolution process following the DEH scram on August 21, 2008, led to overlooking the possibility that a latent design deficiency existed. 3) Less than adequate application of resources, processes, and procedures for completing implementation of the DEH modification error-free in R-18.

Further Corrective Action

Quadvoter "A" was replaced to ensure both valves in at least one DEH trip channel were new. With the reactor shutdown in Mode 4, the system was operated and vented until testing verified no air remained entrapped and no significant pressure transients resulted from solenoid valve operation.

To permit future on-line replacement of quadvoter valve assemblies, design modifications to the DEH system were implemented during the R-19 outage. The modifications allow venting of the DEH system following maintenance, prevent depressurization of the trip header during pressure transients, provide quadvoter solenoids that operate within the normal temperature range of the DEH hydraulic fluid, and provide a pressure monitoring system for the trip header.

In addition, a number of corrective actions have been identified that address Senior Management decision making, communication, and resource management.

Assessment of Safety Consequences

For this event, High-Pressure Core Spray (HPCS) [BG], Reactor Core Isolation Cooling (RCIC) [BN], and both trains of emergency AC power [EA, EB & EK] and Residual Heat Removal (RHR) [BO] systems were capable of performing their intended safety function. This event did not involve an event or condition that could have prevented the fulfillment of any safety function described in 10 CFR 50.73(a)(2)(v). This event posed no threat to the health and safety of the public or plant personnel and was therefore, not safety significant.

Similar Events

Since installation of the new DEH system at Columbia in 2007, one similar event was reported by Energy Northwest in LER 2008-001-00. On August 21, 2008, during performance of post maintenance testing of the DEH system following the planned replacement of the Channel B DEH Solenoid Trip Valve (DEH-SV-TRIP/B), the Digital Electrohydraulic Control (DEH) trip header momentarily depressurized. Coincident with this event was the failure of a DEH compression fitting and the subsequent loss of DEH fluid. The failure of the compression fitting was previously believed to be the cause of the event. However, the re-evaluation of the event occurring on February 8, 2009 determined that both events were caused by the same mechanism (a design deficiency in the on-line serviceable Quadvoter assembly).

Energy Industry Identification System (EIIS) Information codes from IEEE Standards 805-1984 and 803-1983: EIIS information denoted as [XX] or [XXX] throughout the narrative.