

January 2, 2007  
GO2-07-001

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. 2006-001-00**

Dear Sir or Madam:

Transmitted herewith is Licensee Event Report No. 2006-001-00 for Columbia Generating Station. This report is submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A). The enclosed report discusses items of reportability and corrective actions taken.

There are no new commitments being made. If you have any questions or require additional information, please contact Mr. GV Cullen at (509) 377-6105.

Respectfully,



WS Oxenford  
Vice President, Technical Services  
Mail Drop PE04

Enclosure: Licensee Event Report 2006-001-00

cc: BS Mallett – NRC RIV  
RF Kuntz – NRC NRR  
INPO Records Center  
NRC Sr. Resident Inspector – 988C (2)  
RN Sherman – BPA/1399  
WA Horin – Winston & Strawn  
CE Johnson – NRC RIV/fax

IE22

<b>NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION</b> (6-2004)	<b>APPROVED BY OMB NO. 3150-0104</b> <span style="float: right;"><b>EXPIRES 6/30/2007</b></span> Estimated burden per response to comply with this mandatory information collection request: 50 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 <a href="mailto:infocollects@nrc.gov">infocollects@nrc.gov</a> , 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.
<b>LICENSEE EVENT REPORT (LER)</b> (See reverse for required number of digits/characters for each block)	

<b>1. FACILITY NAME</b> Columbia Generating Station	<b>2. DOCKET NUMBER</b> 05000397	<b>3. PAGE</b> 1 OF 3
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**4. TITLE**  
Reactor Trip due to Digital Electro-Hydraulic Control System Card Failure

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
10	31	2006	2006 - 001 - 00			01	02	2007	FACILITY NAME	DOCKET NUMBER
										0500
										0500

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> <i>(Check all that apply)</i>									
<b>10. POWER LEVEL</b> 100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)							
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Donald W. Gregoire - Engineering Specialist, Licensing	TELEPHONE NUMBER <i>(Include Area Code)</i> 509-377-8616
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	JJ	ECBD	AVX	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		
<input type="checkbox"/> YES <i>(If yes, complete 15. EXPECTED SUBMISSION DATE)</i>				<input checked="" type="checkbox"/> NO		
				MONTH	DAY	YEAR

**ABSTRACT** *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On October 31, 2006 at 0445 hours, the reactor tripped from 100% power. The trip resulted from a Reactor Protection System (RPS) actuation due to a failure in the Digital Electro-Hydraulic (DEH) system used to position Main Turbine valves. This failure caused four turbine throttle valves (TVs) and four turbine governor valves (GVs) to spuriously stroke to the full close position. When the TVs were closing and reached a position less than 95% open, RPS logic was met and a Reactor Scram occurred.

The cause for the valve closure was a failure of an output peripheral driver chip on a DEH Digital Input Card. When the chip failed, the output went to high voltage which is equivalent to a turbine unlatched condition. This false turbine unlatched condition is the initiator for the subsequent turbine valve motion.

The card was replaced and the circuit successfully tested. The DEH system has been previously determined to have multiple single point vulnerabilities. Long-term corrective actions have been pursued in which a new DEH system is scheduled to be installed in refueling outage R18 (May/June 2007).

This event did not adversely affect the health and safety of the public. Two similar events were reported by Energy Northwest as LERs 2004-004-00 and 2005-003-00.

**LICENSEE EVENT REPORT (LER)**

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		2006-001-00			

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

Plant Condition

The plant was operating in Mode 1 at 100 percent power at the time of this event.

Event Description

On October 31, 2006 at 0445 hours, the reactor [RCT] tripped from 100% power. The trip resulted from a Reactor Protection System (RPS) [JC] actuation due to a failure in the Digital Electro-Hydraulic (DEH) system used to position Main Turbine [TA] valves. The failure caused four turbine throttle valves (TVs) [FCV] and four turbine governor valves (GVs) [FCV] to spuriously stroke to the full close position. When the TVs were closing and reached a position less than 95% open, RPS logic was met and a Reactor Scram occurred. The RPS actuates to generate a scram when three or more TVs are less than or equal to 95% open with reactor power greater than or equal to 30%.

All rods fully inserted as expected in response to the RPS actuation. No safety or relief valves lifted during the transient. Reactor water level 3 isolation occurred with the minimum level attained being minus 6 inches as indicated on control room recorders. Post trip reactor vessel water level was maintained by normal feedwater. There was no inoperable equipment at the start of the event that contributed to the event.

At 0704 hours, the NRC was notified of the RPS actuation per 10 CFR 50.72(b)(2)(iv)(B) (reference event notification number 42950). This LER is submitted pursuant to 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of the reactor protection system.

Immediate Corrective Action

Following the event, a Technical Issues Resolution (TIR) team was formed to investigate the inadvertent valve closure. Plant staff performed numerous troubleshooting activities. This work determined the cause of the failure was a fault in the output driver circuit of a NUCANA Digital Input (NDI) card [ECBD] associated with the Autostop Oil Pressure Trip Switch circuit. The card was replaced and the circuit successfully tested. Remaining NDI cards were tested to determine if additional problems exist and no defects were noted. This is the first occurrence of an NDI card failure at Columbia Generating Station.

Cause

The root cause of this event is the DEH Control System design has single point vulnerabilities with logic cards that do not exhibit a predictable failure mechanism which would allow replacement prior to failure.

The logic card failure was due to a failure of an output peripheral driver chip on a DEH Digital Input Card associated with the Autostop Oil Pressure Trip Switch circuit. When the chip failed, the output went to high voltage which is equivalent to a turbine unlatched condition. This false turbine unlatched condition is the initiator for the subsequent turbine valve motion.

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Normally, output signals from DEH are used to position Main Turbine Governor Valves, Throttle Valves, and Main Steam Bypass valves. During 100% power operation, DEH is operating to control reactor pressure by monitoring steam header pressure and modulating the position of the turbine governor valves. Under this condition the turbine throttle valves are in a full open position and the steam bypass valves are shut.

DEH receives an input when the turbine is latched to change control modes and control sources. The source of this input is Turbine Oil (TO) [TD] Auto Stop Header pressure. The Auto Stop Header is pressurized by turbine oil to apply pressure to the Interface Diaphragm valve which results in its closure. Closure of this valve allows porting of high pressure hydraulic oil to the turbine valves when the turbine is latched. The Auto Stop Header is depressurized as a result of various turbine trip signals. Low pressure in the Auto Stop Header is used as an indication of a Turbine Trip signal by DEH.

Further Corrective Action

The DEH system has been previously determined to have multiple single point vulnerabilities. Long-term corrective actions have been pursued such that a new DEH system is scheduled to be installed in refueling outage R18 (May/June 2007).

Assessment of Safety Consequences

For this event, both trains of emergency AC power [EA, EB & EK], High-Pressure Core Spray (HPCS) [BG], Reactor Core Isolation Cooling (RCIC) [BN], and Residual Heat Removal (RHR) [BO] were capable of performing their intended safety function. This event did not involve an event or condition that alone 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

The relevant recent LERs and Problem Evaluation Reports (PERs) for DEH Control System circuit card failures include: LERs 2004-004 (PER 204-0972) and 2005-003 (PER 205-0424).

This is the third reactor scram with DEH card failure as the cause since 2004. Each of these failures is associated with a different type of DEH card. The specific failure for each card is varied and there is no discernible trend in individual component failures. Internal experience shows these failures are random and the elimination of these failures would require DEH system replacement.

EIIS information denoted as [XX]