

# **ENERGY** **NORTHWEST**

P.O. Box 968 ■ Richland, Washington 99352-0968

April 20, 2004  
GO2-04-075

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. 2004-002-00**

Dear Sir or Madam:

Transmitted herewith is Licensee Event Report No. 2004-002-00 for the Columbia Generating Station. This report is submitted pursuant to 10 CFR 50.73(a)(2)(v)(D). The enclosed report discusses items of reportability and corrective actions taken.

If you have any questions or require additional information, please contact Ms. CL Perino at (509) 377-2075.

Respectfully,



RL Webring  
Vice President, Nuclear Generation  
Mail Drop PE04

Enclosure: Licensee Event Report 2004-002-00

cc: BS Mallett - NRC RIV  
WA Macon - NRC-NRR  
INPO Records Center  
NRC Sr. Resident Inspector - 988C (2)  
RN Sherman - BPA/1399  
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JE22

**LICENSEE EVENT REPORT (LER)**(See reverse for required number of  
digits/characters for each block)

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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington DC 20555-0001, or by internet e-mail to [bis1@nrc.gov](mailto:bis1@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 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.

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Columbia Generating Station

DOCKET NUMBER (2)

05000397

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TITLE (4)

Reactor Core Isolation Cooling Declared Inoperable Due to Relay Failure

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
02	21	2004	2004	02	00	04	20	2004	FACILITY NAME	DOCKET NUMBER	
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)								
POWER LEVEL (10)		100	20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)		50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(i)(A)			50.73(a)(2)(iv)(A)		73.71(a)(4)
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)		73.71(a)(5)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)		Other
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)		X	50.73(a)(2)(v)(D)		
			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)		
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)		
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)		

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Craig D. Sly; Principal Engineer - Licensing

TELEPHONE NUMBER (Include Area Code)

509-377-8616

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	BN	27	ITE	Y					

## SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On February 21, 2004, Columbia Generating Station (Columbia) was in Mode 1 with the reactor operating at approximately 100 percent rated thermal power. At approximately 08:41 the Reactor Core Isolation Cooling (RCIC) system was declared inoperable due to a loss of control power to the RCIC reactor pressure vessel injection valve (RCIC-V-13). The cause was a failure of a normally energized under-voltage relay. The function of the relay is to sense a loss of voltage to the valve motor operator, interrupt valve control power and provide annunciation in the control room. The relay failed due to a failed relay coil that was subjected to long-term heating. Previous reviews to identify relays that should be periodically replaced did not capture this relay because it had no equipment part number and was not included in the master equipment list, the database used to conduct these reviews.

This event posed no threat to the health and safety of the public or plant personnel.

The failed relay was replaced and the RCIC system returned to operable status in 12 hours 48 minutes. Thermography was performed on 43 relays in the DC distribution system and one relay was identified for replacement. Additional actions are planned to identify other relays in the DC distribution and selected portions of the 480 Volt AC systems that need periodic replacement.

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

## Description Of Event

On February 21, 2004, Columbia Generating Station (Columbia) was in Mode 1 with the reactor operating at approximately 100 percent of rated thermal power. At approximately 08:41, the control room received alarms for Reactor Core Isolation Cooling System (RCIC) Division 1 Out Of Service and Motor Operated Valve Network Power Loss. Investigation found that motor operated valve RCIC-V-13 (RCIC reactor pressure vessel injection valve) position indication lights were deenergized, indicating a loss of control power. The RCIC system was declared inoperable and the High Pressure Core Spray system (HPCS) and the HPCS dedicated diesel generator (DG-3) were verified operable and placed in protected status.

An operator was dispatched to investigate the problem and reported that the disconnects to the RCIC-V-13 motor operator were shut and the overloads were reset. RCIC-V-13 still indicated deenergized in the control room. Maintenance was contacted and a work request was initiated to investigate. Maintenance determined that an under-voltage relay (27 relay) in the RCIC-V-13 motor starter (RCIC-42-S21A5B) cubicle had failed.

The function of this under-voltage relay is to sense a loss of voltage (250 Volts DC) to the valve motor operator and to interrupt the 125 V DC control power to the valve motor operator and provide annunciation in the control room. In this case, the relay failure had the same effect as a loss of voltage to the valve motor operator. It was later determined that RCIC-V-13 motor operator power was available. However, the failed relay interrupted control power to the valve motor operator.

A new relay was bench tested and installed. Operators verified the indication to RCIC-V-13 was working properly and declared the RCIC system operable on February 21, 2004, at approximately 21:29.

## Cause of Event

The relay that failed was an ITE Model J13P20 relay rated at 250 V DC. This particular relay is normally energized. A failure analysis determined the relay coil had failed due to a shorted coil and that the coil was subjected to long term heating. No evidence has been found to indicate this relay had been replaced prior to this event.

A root cause analysis was performed and identified this relay was not included in the preventative maintenance program. During the 1990s, industry experience and plant operating experience identified that normally energized relay failures were occurring due to thermal aging (reference NRC Information Notice 92-27 and 92-27 Revision 2). Energy Northwest took action during this time period to review relay failure trends and determine what preventative actions were required. The reviews showed that Columbia had experienced failures of normally energized relays involving different manufacturers. As a result, critical relay types were identified and periodic replacement schedules were developed. The

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developed. The relay population reviewed were those that had unique identification numbers and were included in the plant Master Equipment List (MEL). The MEL includes plant components that have Equipment Part Numbers (EPNs). Not all plant sub-components have EPNs. The relay that failed during this event does not have a specific EPN. Therefore this relay was not in the MEL and was not captured during the reviews in the mid-1990s.

**Safety Significance**

The RCIC system is designed to operate either manually or automatically following reactor pressure vessel isolation accompanied by a loss of coolant flow from the feedwater system to provide adequate core cooling and control of reactor pressure vessel water level. Under these conditions, the HPCS and RCIC systems perform similar functions.

After the loss of RCIC, control room operators entered Technical Specification (TS) Action Statement 3.5.3.A, which requires that with the RCIC inoperable, the High Pressure Core Spray must be verified operable immediately and the RCIC system restored to operable status within 14 days. Since the HPCS was operable and protected and the total duration of this event was approximately 12 hours 48 minutes, the TS requirements were satisfied. In addition, the relay failure did not affect the ability of the RCIC-V-13 to be controlled from the remote shutdown panel. Therefore, it is concluded that this event posed no threat to the health and safety of the public or plant personnel.

This event is reported in accordance with 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident."

**Immediate Corrective Actions**

Control room operators entered and complied with TS Action Statement 3.5.3.A, by verifying that HPCS was operable. Operators then proceeded to protect HPCS and its dedicated diesel generator (DG-3). A work request was initiated, and the investigation determined that the reason for the loss of control power and indication to RCIC-V-13 was a failed undervoltage relay. The failed relay was replaced and the valve indication was verified to be working properly. RCIC-V-13 was inoperable for a period of approximately 12 hours and 48 minutes.

**Further Corrective Actions**

1. Thermography was performed on 43 installed normally energized relays in the DC distribution system. One relay was found to be approximately 18 degrees Fahrenheit warmer than the others of the same voltage rating. A work request was written to replace this relay.

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2. Work requests will be generated to replace the currently known normally energized relays in the DC distribution system that do not have EPNs.

3. DC switchgear drawings will be reviewed to identify other normally energized relays and work requests will be created to replace any new relays that are found. Preventative Maintenance procedures (PMs) will be developed or enhanced to replace any additional normally energized relays identified in DC switchgear.

4. A selected population of 480 V AC switchgear drawings will be reviewed to search for normally energized relays that do not have EPNs. Any relays identified will be replaced as necessary and PMs developed as necessary.

5. Other selected DC system equipment, such as battery chargers and inverters, will be reviewed to identify normally energized relays that should be periodically replaced and PMs developed as necessary.

#### Previous Similar Events

This is the second known event involving this relay manufacturer/model or similar model at Columbia Generating Station. Maintenance Work Request (MWR) AS0640 replaced a defective undervoltage relay in the DC switchgear for RCIC-V-19 in June 1989. However, the exact relay failure mechanism was not described in the MWR.

There has been one previous reportable event due to a relay failure at Columbia Generating Station. LER 397/95-006, Revision 1, describes a reactor scram which occurred on April 5, 1996, during performance of a surveillance test of the of the high reactor water level turbine trip channel B logic. This scram occurred because a normally energized Agastat relay in the redundant channel A logic had previously failed in an intermediate position.

Text Reference	System	Component
Reactor Core Isolation Cooling System	BN	
High Pressure Core Spray System	BG	
RCIC-V-13	BN	INV
Diesel Generator-3	BN	DG
RCIC-42-S21A5B	BN	MSTR
Under-voltage relay	BN	27