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ACCESSION NBR: 9403300088 DOC. DATE: 94/03/24 NOTARIZED: NO DOCKET #
 FACIL: 50-397 WPPSS Nuclear Project, Unit 2, Washington Public Powe 05000397
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 EADES, M.G. Washington Public Power Supply System
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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 94-003-00: on 940222, inadequate motor operator capability
 RCIC Sys steam supply bypass valve failed to automatically
 close following HELB. Caused by inaccurate vendor info. RCIC
 valve deactivated in normal position. W/940324 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352-0968 • (509) 372-5000

March 24, 1994
G02-94-067

Docket No. 50-397

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: **NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21
LICENSEE EVENT REPORT NO. 94-003, REVISION 0**

Licensee Event Report No. 94-03 is attached. This report discusses an event in which it was determined that a motor operated isolation valve could have failed to function during a high energy line break.

If you have any questions or desire additional information regarding this matter, please contact me or H. E. Kook at (509) 377-4278.

Sincerely,

J. V. Parrish (Mail Drop 1023)
Assistant Managing Director, Operations

JVP/MGE/bk
Enclosure

cc: Mr. K. E. Perkins, Jr., NRC - Region V
Mr. R. Barr, NRC Resident Inspector (Mail Drop 927N, 2 Copies)
INPO Records Center - Atlanta, GA
Mr. D. L. Williams, BPA (Mail Drop 399)

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Washington Nuclear Plant - Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 9 7	PAGE (3) 1 OF 5
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TITLE (4) **Undersized Motor Operator Could Prevent Mitigation of a Postulated High Energy Line Break**

EVENT DATE (6)			LER NUMBER (8)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (9)					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES			DOCKET NUMBER(S)		
02	22	94	94	- 0 0 3 -	0 0	03	24	94	N/A			0 5 0 0 0		
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OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)											
POWER LEVEL (10)	1 0 0	— 20.402(b)			— 20.405c			— 50.73(a)(2)(iv)			— 73.71(b)		
		— 20.405(a)(1)(i)			— 50.36(c)(1)			— 50.73(a)(2)(v)			— 73.71(c)		
		— 20.405(a)(1)(ii)			— 50.36(c)(2)			— 50.73(a)(2)(vii)			— OTHER (Specify in Abstract below and in Text, NRC Form 386A)		
		— 20.405(a)(1)(iii)			— 50.73(a)(2)(i)			— 50.73(a)(2)(viii)A					
		— 20.405(a)(1)(iv)			— X 50.73(a)(2)(ii)			— 50.73(a)(2)(viii)B					
				— 20.405(a)(1)(v)			— 50.73(a)(2)(iii)			— 50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)								TELEPHONE NUMBER			
Marsha G. Eades, Licensing Engineer								AREA CODE 509		377-4277	

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	
N/A											

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

ABSTRACT (16)

On February 22, 1994, during a review of motor-operated valve (MOV) thrust and setpoint calculations, the Supply System determined that due to inadequate motor operator capability, the Reactor Core Isolation Cooling (RCIC) System steam supply bypass valve, RCIC-V-76, could fail to automatically close following a High Energy Line Break (HELB). Although a redundant isolation valve was available, this condition resulted in the containment isolation system not meeting single failure design criteria.

The cause of this condition was inaccurate information from the vendor that led to an erroneous conclusion that the motor operator was adequately sized and adjusted to provide the required thrust to isolate an HELB.

Corrective actions taken or planned include deactivating RCIC-V-76 in its normally closed position, reviewing the thrust and setpoint calculations for similar valves, and modification of RCIC-V-76.

The safety significance of this condition was negligible due to the low probability of a HELB occurring while RCIC-V-76 was open with a concurrent failure of the redundant isolation valve. This condition posed no threat to the health and safety of plant personnel or the public.

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Plant Conditions

Power Level - 100%
Plant Mode - 1 (Power)

Event Description:

On February 22, 1994, the Supply System determined that the motor [MO] operator for the Reactor Core Isolation Cooling (RCIC) System [BN] steam supply bypass valve [V], RCIC-V-76, could fail to close the valve following a postulated High Energy Line Break (HELB) downstream of the outboard isolation valve [ISV]. Identification of this condition occurred during a review of thrust and setpoint calculations for motor-operated valves (MOVs) as part of the Generic Letter (GL) 89-10 Program at WNP-2.

The RCIC System provides cooling water to the Reactor Pressure Vessel [AD, RPV] for abnormally low RPV water level conditions via a steam turbine [TRB] driven pump [P]. The steam supply line to the RCIC turbine branches off Main Steam [SB] Line "B", upstream of the Main Steam Isolation Valves. Three MOVs, RCIC-V-63, RCIC-V-76 and RCIC-V-8, provide inboard and outboard isolation of the RCIC turbine steam supply line from the reactor at the Primary Containment [NH].

The normally closed valve, RCIC-V-76, is installed in a one inch bypass line around the inboard isolation valve, RCIC-V-63, and is used for warming and pressurizing the steam supply line. RCIC-V-8 is the outboard isolation valve. A postulated HELB downstream of RCIC-V-8 requires either RCIC-V-8 or both RCIC-V-76 and RCIC-V-63 to automatically close to isolate the leak.

During review of the setpoint calculation for RCIC-MO-76, the actual valve seat diameter used to calculate the required thrust was found to be approximately three times the diameter originally provided by the valve vendor and used as the basis for the current setpoint and operability evaluations. Further analysis revealed the motor operator torque switch was not set high enough to fully close the valve under the differential pressure conditions that would develop across the valve following the postulated HELB with the RPV pressure at the design basis value of 1162 psig.

The containment isolation system was therefore susceptible to a single failure (RCIC-V-8 failing to close automatically) whenever RCIC-V-76 was open. This was a condition outside of the design basis of the plant since the containment isolation system is designed to meet a single failure criterion.



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Immediate Corrective Action:

RCIC-V-76 was declared inoperable and deactivated per the requirements of Technical Specification Section 3.6.3. The valve was already in its normally closed position.

Further Evaluation:

This event is reportable per 10CFR50.73(a)(2)(ii)(B) as a condition that was outside the design basis of the plant.

This event was also reported per 10CFR50.72(b)(2) using the Emergency Notification System on February 22, 1994, at 1911 PDT.

RCIC-V-76 is a one inch Borg-Warner globe valve with a Limitorque motor operator, Model SMB-000. The procurement specifications for the valve required the motor operator to operate from the fully open position to the fully closed position against a maximum differential pressure equal to the design pressure of the piping system in which the valve is installed. The vendor, Borg-Warner, had sized the motor operator for a maximum differential pressure of 1250 psi. The valve seat diameter used by the vendor to size the motor operator is unknown.

In September, 1993, a change in the thrust and setpoint calculation methodology required that the disc guide diameter be used instead of seat diameter for Y-pattern globe valves such as RCIC-V-76. This information was not provided on the Borg-Warner valve drawings for RCIC-V-76; therefore, the Supply System requested information from BWIP (formerly Borg-Warner). BWIP provided the RCIC-V-76 disc guide outside diameter of 2.340 inches on January 14, 1994. In addition, BWIP indicated that the seat diameter for this valve was 1.784 inches.

The Supply System had reviewed the thrust requirements for RCIC-V-76 in response to an Inspection and Enforcement Bulletin (IEB) 85-03 and GL 89-10; however, the seat diameter used for these reviews was obtained from the Borg-Warner Class 1 Design Report for RCIC-V-76 and information obtained from the vendor during telephone conversations. These sources indicated the seat diameter was 0.8 inches, less than the actual value of 1.784 inches. Since a larger seat diameter requires a larger thrust to close the valve against a given differential pressure, use of the incorrect seat diameter resulted in underestimating the minimum thrust requirements for the valve.

While performing a change to the RCIC-V-76 thrust and setpoint calculation with the new input data, the Supply System noted the new calculated required torque switch setpoint of 10,000 lbf was significantly greater than the current setpoint of 3,460 lbf. Based

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on the disc part number, the vendor confirmed that RCIC-V-76 had the larger seat diameter. Upon further review of the valve diagnostic test data, the Supply System determined the torque switch could trip the motor operator before the valve is fully closed in response to a postulated HELB. The Supply System also determined the motor operator is not adequately sized (due to additional considerations not included in the procurement specification of load sensitive behavior and stem factor degradation) to provide an adequate thrust setup window when the actual seat diameter of 1.784 inches is used.

There were no other structures, systems or components inoperable prior to the event which contributed to the event.

Root Cause:

The root cause of this condition was inaccurate valve seat diameter information from the vendor in 1979 that led to an erroneous conclusion by the Supply System that the motor operator was adequately sized and adjusted to the correct torque/thrust setting. Because additional requirements for load sensitive behavior, stem factor degradation and the effect of the guide ring on this particular type of valve have been added since the original sizing, the capability of the selected Limitorque actuator has been exceeded.

Further Corrective Actions:

The plant RCIC system operating procedure, PPM 2.4.6, was changed to require RCIC-V-76 be closed and deactivated during Modes 1, 2 and 3 except during RCIC steam supply line warmup and pressurization. The outboard isolation valve RCIC-V-8 remains closed while RCIC-V-76 is open during the warmup and pressurization evolution.

Thrust and setpoint calculations for Borg-Warner globe valves within the GL 89-10 Program have been reviewed and no similar discrepancies have been identified.

A Plant Modification Request (PMR) was initiated on March 14, 1994 to determine the appropriate changes required to make RCIC-V-76 operable. The PMR will be implemented prior to restart from the next refueling outage to make RCIC-V-76 operable in the required modes.

An evaluation in accordance with 10CFR Part 21 will be completed by May 1, 1994.

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TEXT (17)

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~~An evaluation will be performed by May 1, 1994 to determine if the disc seat diameter discrepancy in the Borg-Warner Class 1 Design Report for RCIC-V-76 requires correction.~~

LICENSED EVENT REPORT (LER) TEXT CONTINUATION

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A review will be performed by July 1, 1994 of all Borg-Warner Class 1 Design Reports for globe valves for disc seat diameter discrepancies. Identified discrepancies will receive further evaluation for possible correction.

Safety Significance:

The safety significance of this condition was negligible. Based on Probabilistic Risk Assessment (PRA) assumptions, the probability of a line break in the piping downstream of RCIC-V-8 is 0.003 per year. Also, RCIC-V-76 is opened infrequently: during reactor startup to pressurize and warm the RCIC turbine steam supply line, for a short period following an automatic actuation of the steam supply isolation valves, and for quarterly testing. RCIC-V-76 is estimated to be open less than 6 hours during each operating cycle, equal to 0.001. Finally, the PRA assumed probability of failure of the redundant isolation valve RCIC-V-8 is 0.00011. The combined probability of an unmitigated HELB is therefore less than $0.003 \times 0.001 \times 0.00011$ or $3.0 \text{ E-}10$ per year. Based on the low probability of occurrence, this condition posed no threat to the health and safety of plant personnel or the public.

Previous Similar Events:

Three similar events were identified related to inadequate motor operator thrust required for the associated valve to perform its safety function. LER 88-017-01 describes a condition on the outboard isolation Main Steam (MS) line drain valve MS-V-67B where the torque switch cam block could bind on its steel shaft causing premature torque switch actuation. LER 89-041 describes a condition in which the motor operator to Residual Heat Removal (RHR) System valve RHR-V-40, a discharge valve to Radwaste, would not develop sufficient thrust under 80 percent degraded voltage conditions to close the valve at the design differential pressure. LER 92-026 describes a condition with the motor operator to Drywell spray valve RHR-V-17A in which a gap was found in the spring pack which could result in torque switch actuation at a lower thrust than required to close against the design differential pressure. Resolution of the generic implications to the low thrust problems described above would not be expected to have precluded or provided earlier detection of the deficiency found in RCIC-V-76. The earlier problems were not attributable to erroneous information from the valve manufacturer.