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VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION
P. O. BOX 402
MINERAL, VIRGINIA 23117

10 CFR 50.73

November 27, 1991

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

Serial No. N-91-030
NAPS:WCH
Docket Nos. 50-339
License Nos. NPF-7

Dear Sirs:

The Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to North Anna Unit 2.

Report No. 50-339/91-011-00

This Report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Corporate Management Safety Review Committee for its review.

Very Truly Yours,

for
G. E. Kane
Station Manager

Enclosure:

cc: U S. Nuclear Regulatory Commission
101 Marietta Street, N.W.
Suite 2900
Atlanta, Georgia 30323

Mr. M. S. Lesser
NRC Senior Resident Inspector
North Anna Power Station

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NRC FORM 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
NORTH ANNA POWER STATION UNIT 2	0 5 0 0 0 3 3 9	1 OF 4

TITLE (4)
PLANT SHUTDOWN REQUIRED BY TECHNICAL SPECIFICATIONS DUE TO RHR VALVE PACKING FAILURE

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
1 1	0 3	9 1	9 1	- 0 1 1	- 0 0	1 1	2 7	9 1		0 5 0 0 0
										DOCKET NUMBER(S) 0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	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 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	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)

NAME	TELEPHONE NUMBER
G. E. Kane, Station Manager	AREA CODE 7 0 3 8 9 4 - 2 1 0 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	B P	I S V	C 6 3 5	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On November 3, 1991, at 0803 hours, with Unit 2 operating at 100 percent power, Operations Department personnel noticed increased makeup flow to the Reactor Coolant System (RCS) and an increased pumping frequency of the Primary Drains Transfer Tank (PDTT). At 0841 hours identified leakage was determined to be greater than the 10 gpm limit of Technical Specification (TS) 3.4.6.2, and the Action Statement was entered. A containment entry team identified the Residual Heat Removal (RHR) System inlet motor operated valve as having an elevated leak-off temperature. At 1456 hours the unit was placed in hot standby (Mode 3) in accordance with the Action Statement. This event is reportable pursuant to 10 CFR 50.73 (a)(2)(i)(A). A one hour notification was made pursuant to 10 CFR 50.72 (B)(1)(i)(A).

The cause of the event was failure of the RHR System inlet isolation valve packing. After repairing the valve packing, the RCS leakage was determined to be within Technical Specification limits and the Action Statement was cleared.

No significant safety consequences resulted from this event because there was no release of radioactive material to the environment. Therefore, the health and safety of the public was not affected at any time during this event.

1.0 Description of the Event

On November 3, 1991, at 0803 hours, with Unit 2 operating at 100 percent power, Operations Department personnel noticed increased makeup flow to the Reactor Coolant System (RCS)(EIIS System Identifier AB) and an increased pumping frequency of the Primary Drains Transfer Tank (PDTT). At 0841 hours on November 3, 1991, identified leakage was determined to be 24.9 gpm. Technical Specification (TS) 3.4.6.2 requires that identified leakage be maintained less than 10 gpm; therefore, the Action Statement was entered. The action requires identification and correction of the leak within 4 hours or the unit must be placed in at least hot standby within the next 6 hours and cold shutdown within the following 30 hours. At 1103 hours a controlled unit shutdown commenced. At 1354 hours a containment entry team identified the Residual Heat Removal (RHR) System (EIIS System Identifier BP) inlet isolation motor operated valve (MOV) (Component Identifier ISV) as having an elevated leak-off line temperature. At 1456 hours the unit was placed in hot standby (Mode 3) in accordance with the Action Statement of TS 3.4.6.2. After reducing the RCS pressure to less than 400 psig, the valve was backseated. After backseating the valve, another leak rate calculation confirmed that the RHR System inlet isolation MOV (2-RH-MOV-2700) packing was the source of the leak. This event is reportable pursuant to 10 CFR 50.73 (a)(2)(i)(A). A one hour notification was made pursuant to 10 CFR 50.72 (B)(1)(i)(A). A Notification of Unusual Event (NOUE) was declared and notifications made to state and local governments at 1116 hours.

The cause of the event was a packing failure of the RHR System inlet isolation valve. At 2218 hours the leaking valve was opened and backseated which stopped the leakage and allowed the packing to be replaced. After replacing the MOV-2700 packing, a satisfactory post maintenance test was performed in accordance with the Inservice Testing Program. In addition, the electrical department measured MOV current traces and determined the valve to be fully operable at 1728 hours on November 4, 1991. At 1713 hours on November 5, 1991, the unit was returned to Mode 1.

2.0 Significant Safety Consequences and Implications

During this event, the increase in charging flow to maintain RCS inventory was well within the capacity of the running charging pump. The RCS leakage was controlled and processed by the plant's liquid and gaseous waste systems (EIIS System Identifier WE). Since there was no release of radioactive materials to the environment, the health and safety of the public was not affected at any time during this event.

3.0 Cause of the Event

The cause of the event was a failure of the packing of the RHR System inlet isolation motor operated valve (2-RH-MOV-2700) which is a fourteen inch Copes-Vulcan gate valve (Vendor Reference C635 - Westinghouse ID 14GM48SER).

3.0 Cause of the Event (Continued)

When the failed packing was removed from the RHR System isolation valve, only small fragments of the packing rings below the lantern ring could be located. The root cause of the packing failure cannot be determined; however, it is suspected that excessive packing rings in the deep packing gland prevented proper compression of the lower rings during installation.

4.0 Immediate Corrective Actions

Operations personnel initially responded by entering abnormal procedure AP-16 "Increasing Primary Plant Leakage," and the Action Statement of TS 3.4.6.2 was entered. Leak rate calculations were performed which determined the identified leak rate as 24.9 gpm, and a controlled unit rampdown was commenced at 1103 hours. At 1354 hours a containment entry team identified the RHR System inlet isolation motor operated valve as having an elevated leak-off temperature of 330°F. After reducing the RCS pressure to less than 400 psig, the valve was backseated. After backseating the valve, another leak rate calculation confirmed that the RHR System inlet isolation MOV (2-RH-MOV-2700) packing was the source of the leak.

5.0 Additional Corrective Actions

The packing was replaced, and the valve was successfully post maintenance tested in accordance with the Inservice Testing Program. The electrical department measured stroke traces and determined the valve to be fully operable.

6.0 Actions to Prevent Recurrence

The subject valve has a deep packing gland requiring eight rings of packing below and four rings above the lantern ring. EPRI Project 2233-3 "Valve stem Packing Improvements," recommends that spacer bushings be utilized to replace excessive packing below the lantern ring in deep packing glands. Excessive rings of packing can cause packing failure due to improper load transfer. The force applied by the gland follower is transmitted only to the upper rings of packing with the lower rings contributing little to sealing.

The lower rings of packing are torqued when installed, and then a final torque is applied after the packing above the lantern ring is installed. The torquing of the lower packing rings will help with sealing; however, due to wear, collapse of voids, loss of packing due to volatilization of fillers and other factors, the load on the packing decreases until the packing radial compressive stress falls below system pressure and stem leakage occurs. Tightening of the gland nuts cannot put additional sealing load on the lower rings of packing. Elimination of the three lowest rings of packing and replacement with a spacer bushing will eliminate this problem plus reduce stem operating forces.

6.0 Actions to Prevent Recurrence (Continued)

Chesterton Packing and Seals (Vendor Reference - C306) was consulted about a permanent "fix" to prevent recurrence. They recommend installing a spacer bushing to replace three rings of packing below the lantern ring and live loading of the packing gland for the subject valve. These are also the EPRI recommendations in the final report on Valve Stem Packing Improvements.

Live loading the valves allows for a continuous force on the packing to compensate for thermal growth, packing wear and differential thermal expansion. A spring loaded gland follower is installed allowing the gland load necessary for sealing to be automatically maintained.

Prior to completion of the next Unit 2 refueling outage, an evaluation will be conducted to determine adaptability for live loading on the RHR inlet isolation MOVs.

During the next refueling outages, bushings will be installed to replace the three lowest rings of packing below the lantern ring on RHR inlet isolation MOVs for both units.

The subject RHR isolation MOV is currently repacked at least every other refueling.

7.0 Similar Events

LER N1-91-011-00 documents a unit shutdown due to exceeding TS Limit for Reactor Coolant System Pressure Boundary Leakage on May 11, 1991.

LER N1-85-015-00 documents a unit shutdown due to failed packing on the RHR inlet isolation MOV which subsequently caused a diaphragm failure on a leak-off header isolation valve on September 30, 1985. Other leakage was attributed to misalignment of a Number 2 seal on a reactor coolant pump. During the event, identified and unidentified leakages were recorded at 16.5 and 1.14 gpm, respectively.

8.0 Additional Information

Unit 1 was operating at 100 percent power throughout the event and was not affected.