10CFR50.73

**Virginia Electric and Power Company**
**Surry Power Station**
**5570 Hog Island Road**
**Surry, Virginia 23883**

June 12, 2002

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

Serial No.: 02-331
SPS: TJN R1
Docket No.: 50-281
License No.: DPR-37

Dear Sirs:

Pursuant to 10CFR50.73, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to Surry Power Station Unit 2.

Report No. 50-281/2002-001-00

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

Very truly yours,

Richard H. Blount, Site Vice President
Surry Power Station

Enclosure

Commitment contained in this letter:

1. A VT-2 inspection will be completed on the Unit 1 RHR ¾-inch balance lines during the next cold shutdown of Unit 1.

IE22

cc: United States Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23 T85
Atlanta, Georgia 30303-8931

Mr. R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

NRC FORM 366 (7-2001)

U.S. NUCLEAR REGULATORY COMMISSION

**APPROVED BY OMB NO. 3150-0104** **EXPIRES 7-31-2004**

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 bjs1@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.

# LICENSEE EVENT REPORT (LER)

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

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| SURRY POWER STATION , Unit 2 | 05000 - 281 | 1 OF 4 |

TITLE (4)

Residual Heat Removal Piping Corrosion Through-wall Leak

| 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 NAME | DOCUMENT NUMBER |
| 04 | 13 | 2002 | 2002 | -- 001 -- | 00 | 06 | 12 | 2002 | FACILITY NAME | DOCUMENT NUMBER 05000- |

| OPERATING MODE (9) | NA |
|---|---|
| POWER LEVEL (10) | 000 % |

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

| | | | | | |
|---|---|---|---|---|---|
| | 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) | | 50.73(a)(2)(v)(D) | | |
| | 20.2203(a)(2)(v) | X | 50.73(a)(2)(i)(B) | X | 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 | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Richard H. Blount, Site Vice President | (757) 365-2000 |

**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 |
|---|---|---|---|---|---|---|---|---|---|
| X | BP | PSP | | N | | | | | |
| | | | | | | | | | |

| 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 15 single-spaced typewritten lines) (16)

On April 13, 2002 at 05:05 hours during plant heatup with Unit 2 at cold shutdown, a through-wall leak was discovered on the "B" residual heat removal (RHR) pump suction 3/4-inch diameter balance line. This condition did not meet ASME XI code requirements therefore, the line was declared inoperable. Furthermore, the line was not isolable from either RHR train therefore, both trains of RHR were declared inoperable. This condition is reportable pursuant to 10CFR50.73(a)(2)(vii). The line remained structurally adequate therefore, both trains of RHR were capable of performing their intended function and the system remained in service until repairs were implemented. Because no reactor coolant system (RCS) loops were operable at that time, the Technical Specification requirement that a minimum of two non-isolated loops shall be operable was not met. As such, this condition is also reportable pursuant to 10CFR50.73(a)(2)(i)(B). Plant heatup proceeded, keeping the RHR System in service, until two RCS loops were put into operation, restoring Technical Specification compliance. The RHR System was taken out of service, the 3/4-inch line was replaced, and the RHR System declared operable. The cause of this leak was transgranular stress corrosion cracking initiated from the outer surface of the 3/4-inch line.

## 1.0 DESCRIPTION OF THE EVENT

On April 13, 2002 at 03:16 hours, during plant heatup with Unit 2 at cold shutdown and RCS pressure approximately 300 psig, evidence of leakage discovered by Operations personnel during a plant startup walkdown was reported on the "B" residual heat removal (RHR) pump ¾-inch balance line [EIIS-BP, PSP]. At 05:05 hours, an engineering inspection determined that the ¾-inch balance line had a through-wall leak approximately ½" from a sockolet which was attached to the suction piping of the "B" RHR pump.

This through-wall leak was not isolable from the suction of "A" or "B" RHR pumps because it was upstream of "B" RHR pump suction isolation. Thus, both trains of RHR were declared inoperable. However, both trains of RHR continued to operate. Additionally, both trains of RHR remained capable of performing their intended function because the structural integrity of the pipe was maintained. RHR was declared inoperable due to the ASME Code noncompliance, and not due to loss of safety function.

Technical Specification 3.1.A.1.d.1 requires a minimum of two non-isolated loops, consisting of any combination of RCS loops or RHR loops, to be operable. Because both trains of RHR were inoperable and no reactor coolant system (RCS) loops were operable at that time due to plant conditions, the Technical Specification 3.1.A.1.d.1 requirements were not met. This condition is therefore reportable pursuant to 10CFR50.73(a)(2)(i)(B).

The piping leak was not isolable from the RHR suction header, therefore the two independent trains of the RHR System were declared inoperable. This condition is therefore also reportable pursuant to 10CFR50.73(a)(2)(vii).

On April 13, 2002, ultrasonic thickness (UT) measurements were performed for a length of approximately 16-inches on the "B" RHR pump ¾-inch balance line with the lowest reading measuring 0.109-inches, which is above the manufacturer's tolerance of 0.099-inches minimum. UT measurements were also taken on the "A" RHR pump ¾-inch balance line and were satisfactory. Based on these UT measurements it was determined that the leak was localized, and there were no indications that the piping was degrading at other locations. Periodic monitoring of the leakage was initiated.

Plant heatup proceeded, keeping the RHR System in service, until the second RCS loop was put into operation at 23:56 hours on April 13, 2002, which restored compliance with the Technical Specifications.

On April 14, 2002, Engineering performed a visual inspection of the leak. Two circumferential, linear indications were found in the ¾-inch diameter, schedule 40 pipe downstream from the sockolet that is welded to the 14-inch line. Some surface pitting was apparent around the leak location. The leak was very slow (approximately 2-3 drops per minute) and continued to be visually monitored periodically to verify the piping was not

degrading.

On April 15, 2002, Engineering performed another visual inspection of the leak. The indications were re-measured and no changes were found in the linear lengths. Boric acid was found solidifying at the leak location. With the system in service, the linear indications were not expected to propagate. The ¾-inch balance line on the "A" RHR pump was visually inspected with no indications of any through-wall leaks.

On April 16, 2002, with RCS loops in operation and the RCS temperature above 200 degrees F, the RHR System was taken out of service and the ¾-inch diameter line was replaced. Post maintenance testing was completed, and the RHR System was declared operable at 16:29 hours on April 16, 2002.

## 2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

Even with this through-wall leak in the balance line associated with the "B" pump, both RHR pumps were still able to perform their intended function because the structural integrity of the pipe was maintained. RHR was declared inoperable due to ASME Code, Section XI, Class II noncompliance, and not due to loss of safety function.

## 3.0 CAUSE

Following removal of the leaking line, the failed segment was sectioned to allow detailed examination with the scanning electron microscope. The ¾-inch section of RHR pipe failed as a result of transgranular stress corrosion cracking (TGSCC) initiated from the outside surface from an external foreign contaminant which caused surface pitting. It was from these pits that the two cracks appear to have initiated. One of these cracks propagated through the pipe until a through-wall leak developed. Based on the width of the crack and the amount of oxide on the fracture, the crack growth rate appears to have been very slow. The pitting that was present on the outer surface of the pipe adjacent to the cracks was suggestive of chloride-induced corrosion pitting. The source of the chloride contamination is unknown.

## 4.0 IMMEDIATE CORRECTIVE ACTION(S)

Plant heatup proceeded, keeping the RHR System in service, until the second RCS loop was put into operation at 23:56 hours on April 13, 2002, which restored Technical Specification compliance. On April 16, 2002, with RCS loops in operation and the RCS temperature above 200 degrees F, the RHR System was taken out of service and the ¾-inch diameter line was replaced.

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| SURRY POWER STATION | 05000 - 281 | 2002 | 001 | 00 | 4 OF 4 |

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

## 5.0 ADDITIONAL CORRECTIVE ACTIONS

Post maintenance testing was completed, and the RHR System was declared operable at 16:29 hours on April 16, 2002.

## 6.0 ACTIONS TO PREVENT RECURRENCE

A VT-2 inspection will be completed on the Unit 1 RHR ¾-inch balance lines during the next cold shutdown of Unit 1 to detect flaws such as TGSCC, or pitting which could lead to TGSCC.

## 7.0 SIMILAR EVENTS

None.

## 8.0 MANUFACTURER/MODEL NUMBER

The ¾-inch line was schedule 40, 304 stainless steel.

## 9.0 ADDITIONAL INFORMATION

None.