TENNESSEE VALLEY AUTHORITY

Browns Ferry Nuclear Plant
Post Office Box 2000
Decatur, Alabama 35609-2000

JAN 05 1990

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

Dear Sir:

TVA - BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 2 - DOCKET NO. 50-260 - FACILITY OPERATING LICENSE DPR-52 - REPORTABLE OCCURRENCE REPORT BFRO-50-260/89028

The enclosed report provides details concerning a failed solder connection on the scram pilot air header during an instrument calibration resulting in a reactor protection system actuation. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv).

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. R. Bynum
Vice President
Nuclear Power Production

Enclosure
cc (Enclosure):

Regional Administration
U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region II
101 Marietta Street, Suite 2900
Atlanta, Georgia 30323

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

NRC Resident Inspector, BFN

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PDR ADOCK 05000260
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NRC Form 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

Approved OMB No. 3150-0104
Expires 4/30/92

**LICENSEE EVENT REPORT (LER)**

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| BROWNS FERRY UNIT 2 | 0 5 0 0 0 2 6 0 | 1 OF 0 4 |

TITLE (4) FAILED SOLDER CONNECTION ON SCRAM PILOT AIR HEADER DURING INSTRUMENT CALIBRATION RESULTS IN REACTOR PROTECTION SYSTEM ACTUATION

| EVENT DAY (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 2 | 0 6 | 8 9 | 8 9 | 0 2 8 | 0 0 | 0 1 | 0 5 | 9 0 | | 0 5 0 0 0 |

OPERATING MODE (9): N

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)(11)

| | | | |
|---|---|---|---|
| 20.402(b) | 20.405(c) | X 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) | 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 (AREA CODE) |
|---|---|
| DENZEL A. HOUSLEY, ENGINEER, COMPLIANCE LICENSING | 2 0 5 7 2 9 - 2 8 7 4 |

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 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

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 fifteen single-space typewritten lines) (16)


On December 6, 1989 at 2111, a reactor protection system (RPS) actuation occurred due to a RPS trip signal generated by low scram pilot air header pressure. During the calibration of a pressure indicator, the instrument tap piping disconnected from the air header piping at a soldered reducing connection. This resulted in an air leak on the scram pilot air header which reduced the pressure to the RPS actuation setpoint. No control rod movement occurred since all rods were already fully inserted.

The cause of this event was the unexpected failure of a soldered connection during reinstallation of the pressure indicator. This soldered connection had been in service for 14 years and the pressure indicator had been removed several times for calibration prior to this event. Although the exact cause of the soldered connection failure could not be determined, stresses added during the removal and reinstallation of the pressure indicator while performing the calibrations may have contributed to the failure.

As a result of this event, the solder connection has been repaired. Leak testing of the soldered connections in the scram pilot air header has been performed to ensure the integrity of the air piping system. Three air leaks at soldered connections have been identified. These air leaks will be repaired. Additionally, an evaluation of the present scram pilot air header piping system will be performed to determine if additional actions should be taken to increase the reliability of the air header piping.

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | PAGE (3) |
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

DESCRIPTION OF EVENT

On December 6, 1989 at 2111, a reactor protection system (RPS) [JC] actuation occurred due to a RPS trip signal generated by low scram pilot air header pressure. At the time of this event, instrument mechanics were performing a routine calibration of the control air filter inlet pressure indicator (2-PI-85-67A) for the control rod drive (CRD) system [AA] scram pilot air header. The scram pilot air header is constructed of soldered copper piping and is supplied air from the control air system.

In order to perform the calibration, pressure indicator 2-PI-85-67A was removed from the air supply header piping by disconnecting the threaded connection. The associated instrument valve on the instrument tap piping was closed prior to removing 2-PI-85-67A to maintain the air header pressure. While reinstalling 2-PI-85-67A after the calibration was performed, the instrument tap piping (containing the instrument valve and pressure indicator) disconnected from the air header piping at a soldered reducing connection. This resulted in an air leak on the scram pilot air header which reduced the pressure to the RPS actuation setpoint.

Actions were immediately taken and the air leak was isolated from the air header approximately 15 minutes following the actuation. Maintenance to repair the failed solder connection was initiated and an investigation of the event was conducted to determine the cause of the failed connection.

At the time of this event, unit 2 was in a cold shutdown condition with irradiated fuel in the reactor vessel. No control rod movement occurred since all rods were already fully inserted. The unplanned automatic actuation of the RPS is reportable in accordance with 10 CFR 50.73(a)(2)(iv).

ANALYSIS OF EVENT

Following this event, the failed soldered connection was examined in an attempt to determine its failure mechanism. The soldered connection had been installed in 1975 as part of a modification that added the pressure indicator to the scram pilot air header. The examined soldered joint had smeared metal on the outside diameter surfaces and the solder appeared to be spotty around the circumference. However, there was sufficient solder near the top edge of the joint. There was some bending identified on the end of the instrument tap nipple and the mating fitting. This bending could have occurred after the connection failure. Examination of the mated surfaces did not reveal any corrosion or corrosion related features. This examination concluded that sufficient evidence did not exist to determine the cause of the failed soldered connection.

A review of the work techniques used by the instrument mechanic while reinstalling the pressure indicator was also conducted. This review determined that the mechanic utilized correct methods while tightening the pressure indicator and that excessive force had not been used. This was the fifth time since 1984 that the pressure indicator had been removed for calibration.

The portion of the CRD air system is not safety related and is not designed to seismic Class I. Copper tubing and fittings are a commonly used material for this type system. The design of the scram pilot air header piping requires that the CRD system fail safe (RPS actuation) on a loss of control air. During this event, the CRD system performed its function following the loss of air pressure.

The low scram pilot air header pressure RPS actuation is redundant to the scram discharge instrument volume high level RPS actuation for certain fast fill events. Low air pressure in the scram pilot air header can allow the control rod scram valves to unseat, resulting in a flow of water into the scram discharge volume. The setpoint for the RPS actuation will result in a scram prior to air header pressure decreasing to the point that would allow unseating of the valves to occur. In this event, the RPS actuation occurred as required and all systems functioned as expected. Therefore, this event had no safety significance.

CAUSE OF EVENT

The cause of this event was the unexpected failure of a soldered connection during reinstallation of 2-PI-85-67A. This soldered connection had been in service for 14 years and 2-PI-85-67A had been removed several times for calibration prior to this event. An evaluation of this event was conducted which included an examination of the failed solder connection, a review of the work techniques employed during the reinstallation of the pressure indicator, and a review of the design of the air system piping. Although the exact cause of the connection failure could not be determined, stresses added during the removal and reinstallation of the pressure indicator while performing the calibrations may have contributed to the failure.

PREVIOUS SIMILAR EVENTS

On November 3, 1988, a RPS actuation occurred when the control air supply valve to the scram pilot air header was closed as a result of an inadequate review of a tagout request (LER 50-260/88014). The low scram pilot air header pressure resulted in a RPS actuation on high scram discharge instrument volume level. No other previous RPS actuations involving the scram pilot air header pressure were identified.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

CORRECTIVE ACTIONS

As a result of this event, the solder connection for 2-PI-85-67A has been repaired and 2-PI-85-67A has been replaced due to damage substained after the soldered connection failed. Leak testing of the soldered connections in the scram pilot air header has been performed to ensure the integrity of the air piping system. Three air leaks at soldered connections have been identified. These air leaks will be repaired.

Additionally, an evaluation of the present scram pilot air header piping system will be performed to determine if additional actions should be taken to increase the reliability of the air header piping. Such actions would be implemented to reduce the probability of future piping failures. The current system configuration meets the design requirements for this system and is acceptable for operation of unit 2. Therefore, this action is considered a long-term project designed to improve the reliability of the piping system and is not considered to be a requirements for restart of unit 2.

COMMITMENTS

1. Air leaks in the scram pilot air header identified during the leak testing will be repaired by February 28, 1990.

2. An evaluation of the present scram pilot air header piping system will be performed to determine if additional actions should be taken to increase the reliability of the air header piping. These actions will be implemented to reduce the probability of future piping failures.

Energy Industry Identification System (EIIS) Codes are identified in the text as [XX].