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William R. Lagergren, Jr.
Site Vice President, Watts Bar Nuclear Plant

NOV 28 2001

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

10 CFR 50.73

Gentlemen:

**TENNESSEE VALLEY AUTHORITY - WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - DOCKET NO. 50-390 - FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/2001-003**

The enclosed report provides details concerning the number 4 steam generator pressure transmitter loop being inoperable without being placed in the "trip" position within the time required by technical specifications.

This condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

W. R. Lagergren

Enclosure
cc: See page 2

D030
Red FedEx
12/17/01

PLP:JWH
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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)

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| Watts Bar Nuclear Plant (WBN) Unit 1 | 05000390 | 1 OF 8 |

4. TITLE Blocked Sense Line for Loop 4 Steam Header Pressure

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 09 | 29 | 2001 | 2001 | 003 | 00 | 11 | 28 | 2001 | NA | 05000 |
| | | | | – | – | | | | FACILITY NAME | DOCKET NUMBER 05000 |

| 9. OPERATING MODE | 1 |
|---|---|
| 10. POWER LEVEL | 100 |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 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 Specify in Abstract below or in NRC Form 366A |
| | 20.2203(a)(2)(iii) | | 50.46(a)(3)(ii) | | 50.73(a)(2)(v)(C) | | |
| | 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) | | 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) | | |

12. LICENSEE CONTACT FOR THIS LER

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| y Hatcher, Licensing Engineer | (423) 365-1875 |

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

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| 14. SUPPLEMENTAL REPORT EXPECTED | | | | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|---|
| | YES (If yes, complete EXPECTED SUBMISSION DATE) | X | NO | | | | |

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


On September 29, 2001, a blockage in an instrument sense line was discovered. A review of computer trend data for the Watts Bar Unit 1 #4 steam generator pressure transmitter loop, determined the channel may not have performed its design function, and thus had been inoperable without being placed in the "trip" position for about 8 hours and 40 minutes longer than the 6 hour period allowed by the ESFAS technical specifications. Although the channel had been providing the correct pressure value to the ESFAS system and the control room, the blockage had slowed the time response to pressure changes beyond the time assumed in the FSAR.

The other two channels which were part of the two out of three logic circuit were operable during the time period to provide the required signal to the ESFAS system.

The clearing of the blockage corrected the immediate cause, and recurrence control actions included : Back filling of a sampling of the main steam pressure and flow transmitters during the upcoming refueling outage, and providing information to Operations and Engineering on this event and symptoms of a sense line blockage.

## I. PLANT CONDITION(S)

The unit was in Mode 1 at 100 % power. Plant operating temperature at the time was 587.4 degrees F with reactor coolant system pressure at 2233 psig.

## II. DESCRIPTION OF EVENT

### A. Event:

On September 26, 2001, operations personnel noted that Pressure Indicator (PI) 1-PI-1-27A (EIIS code PI) was slowly increasing and swinging about 40 psig. The instrument loop involved in this event (1- LPP-1-27A) is required to perform measurement and processing of the Loop 4 Main Steam header pressure signal. Three operable channels on each steam header are provided to satisfy the protective requirements with a two out of three logic on each line for Safety Injection function "Steam Line Pressure - Low" and Steam Line Isolation functions of "Steam Line Pressure - Low" and "Steam Line Pressure Negative Rate - High."

Operability of the component is required by Technical Specification LCO 3.3.2, Table 3.3.2-1, items 1.e, 4.d.1, and 4.d.2.

Work Orders were generated to troubleshoot the instrumentation. Recalibration of Pressure Transmitter (PT) 1-PT-1-27A as well as replacement of the amplifier board did not correct the problem. Following this, an attempt was made to backfill the sense line. During the backfill operation a blockage in the sense line was identified and cleared. The impact of the blockage was to slow the response time of the transmitter.

After previous maintenance the channel was considered to be operable based on checking the reading with other control room sources and although the time response impact on the channel was identified the channel was within its maximum channel deviation and it was thought the slow response was only in the upward directions. A check had shown the transmitter was responding quickly to a decrease in pressure in the sense line.

A review of the evolution found that the Safety Injection and Steam Line Isolation functions would have functioned as required with the remaining two channels operable.

B. **Inoperable Structures, Components, or Systems that Contributed to the Event:**

There were no other channels besides # 4 Steam Generator Pressure that were inoperable that impacted the event.

C. **Dates and Approximate Times of Major Occurrences:**

| Date/Time (EDT) | Activity |
|---|---|
| 9/26/01/(1405) | Noted that 1-PI-1-27A was slowly increasing and monitoring activities started. |
| 9/28/01/(1425) | Troubleshooting conducted on 1-PT-1-27A, entered LCO 3.3.2. |
| 1502 | Subsequent records review showed the transmitter was not reacting properly to system pressure. |
| 1739 | Operations exited LCO 3.3.2, 1-LPP-1-27A removed from bypass believing that the transmitter was still operable, even though further troubleshooting was required. |
| 9/29/01/(0159) | TS LCO 3.3.2 Condition D entered, to backfill sense line. |
| 9/29/01/(0313) | 1-PT-1-27A sense line was unblocked, thus determined inoperable prior to this time. |
| 9/29/01/(0542) | As required by TS, the steam channel was placed in "TRIP." |

D. **Other Systems or Secondary Functions Affected:**

None.

E. **Method of Discovery:**

During a computer channel trend review following maintenance activities which cleared a blocked sense line on September 29, 2001, engineers identified an abnormal channel response following the installation of a

pressure gauge connected to the instrument test tee. When the gauge was valved in it read approximately 880 psig which was about 80 psig below actual system pressure. The gauge pressure gradually rose to system pressure over a period of 45 to 60 minutes.

Review of Operations logs indicated that LCO 3.3.2 was entered and troubleshooting was conducted between 1425 and 1739 hours on September 28, 2001. The LCO was exited at 1739 hours believing that the pressure transmitter was operational. At this point the channel in question had normalized with other instruments. Although the slow upwards time response had been identified a separate check had shown a prompt response to decreasing pressure which was the safety function of the channel. It was subsequently learned the blockage made this check invalid.

LCO 3.3.2 was entered again on September 29, 2001, at 0159 hours with an entry that the line was unblocked at 0313. From a computer point review TVA has concluded that transmitter operation was degraded from September 12, 2001, until 1502 hours on September 28, 2001 (the approximate time the Heise pressure gauge was installed). As the Maximum Channel Deviation (MCD) requirements were continuously met during this interval and no discrete event occurred that caused the condition that obstructed the sense line prior to September 28, 2001, the channel is considered functional but degraded until 1502 hours on September 28, 2001. However, when the Heise pressure gauge and 1-PT-1-27A response was observed to be much slower than the design sense line delay allowance when the instrument was returned to service. In hindsight this was objective evidence the impulse pressure input to the transmitter was not properly transmitting system pressure in the required response time.

Based on a review of the computer trend data for the other steam generator pressure channels the event was isolated to the single channel discussed above.

F. **Operator Actions:**

Operators initiated a work order to investigate the problem with pressure swings. Based on evaluation of the subject condition, the steam pressure sense line for 1-PT-1-27A was confirmed to be effectively blocked and thus incapable of

performing its required protection function at approximately 0313 hours on September 29, 2001. At that time, appropriate Technical Specifications (TS) LCO Conditions (LCO 3.3.2 Condition D) had already been entered at 0159 hours on September 29, 2001, in order to backfill the instrument sense line and replace the pressure transmitter which was initially suspected as the problem. As required by TS, the steam channel was placed in "TRIP" at 0542 hours on September 29, 2001.

The channel output had been undergoing monitoring and troubleshooting since September 26, 2001, due to Operations observations of unusual channel behavior (rising pressure on 1-PI-1-27A). Troubleshooting activities since September 26, 2001, included transmitter calibration, replacement of amplifier card, and temperature measurements. At 17:39 on September 28, 2001, Operations exited LCO 3.3.2 believing that the pressure channel was operational as discussed above.

The required TS Actions for an inoperable Steam Pressure Channel (3.3.2, Condition D) require that the channel be placed in TRIP within 6 hours or enter Mode 3 within 12 hours. A subsequent review determined the channel was inoperable without being placed in TRIP for a period of approximately 14 hours 40 minutes commencing at 1502 on September 28, 2001, and ending at 0542 on September 29, 2001.

G. **Safety System Responses:**

None

## III. CAUSE OF THE EVENT

A. **Immediate Cause:**

Transmitter was not reacting properly to system pressure.

B. **Root Cause:**

The sense line for the transmitter was apparently blocked. The source of the blockage is unknown at this time.

C. **Contributing Factor:**

None.

## IV & V. ANALYSIS OF THE EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

Each Main Steam header contains three pressure transmitters each of which provide input to the Engineered Safety Features Actuation System (ESFAS) as part of a two out of three logic for a Safety Injection or a Steam Line Isolation signal. The instrument loop involved in this event (1-LPP-1-27A) is required to perform measurement and processing of the Loop 4 Main Steam header pressure signal. The instrument provides a comparator function for the Low Steam Line Pressure Safety Injection and Steam Line Isolation and for the High Negative Rate Steam Line Isolation. This loop also provides input to the Plant Computer, Main Control Room (MCR) Annunciators, local and MCR indicators (PAM Category 1), a MCR recorder, and pressure compensation to the Loop 4 Steam Line flow loop (1-FT-1-28A).

Operability of the component is required by Technical Specification LCO 3.3.2, Table 3.3.2-1, items 1.e, 4.d.1, and 4.d.2.

Based on the problems encountered when attempting to backfill the transmitter sense line, the most probable cause for the erratic action of the pressure transmitter was a blockage of the sense line. Technical Specification Surveillance Requirement (SR) 3.3.2.10 and SR 3.3.2.1 ensure that the response times of ESF functions are less than or equal to the maximum values assumed in the accident analyses. Individual component response times are not modeled. The required response time for the Low Steamline Pressure SI and Steamline Isolation and High Negative Rate Steamline Isolation actuation signal is specified in the FSAR section 15.4.2.1.1 as less than or equal to 2 seconds. A partially blocked sense line could increase the delay associated with detection of steam pressure changes, and therefore could prevent the channel from performing required protective functions within the time allotted in the accident analyses.

Two operable channels on each steam header are sufficient to satisfy the protective requirements with a two out of three logic on each line for Safety Injection function "Steam Line Pressure - Low" and Steam Line Isolation functions of "Steam Line Pressure - Low" and "Steam Line Pressure Negative Rate - High." Trend graphs were generated for the remaining pressure transmitters of the loop 4 main steam header. The remaining two channels were functioning correctly and were not out of service during the time period that 1-LPP-1-27A was not functioning

correctly. Therefore, these safety functions could be performed by the two remaining channels.

## VI. CORRECTIVE ACTIONS

### A. Immediate Corrective Actions:

1. Work Orders 01-014747-000 and 01-014747-001 were initiated to investigate problem with pressure swings.
2. Pressure Transmitter (PT) 1-PT-1-27A was calibrated.
3. The amplifier card for 1-PT-1-27A was replaced.
4. The common sensing line for 1-PT-1-27A and 1-PT-1-26C was backfilled. During the backfill an apparent obstruction in sensing line was removed by the backfill process.
5. 1-PT-1-27A was replaced.

### B. Corrective Actions to Prevent Recurrence:

The following actions are tracked under TVA's corrective action program and therefore, are not considered to be regulatory commitments.

1. Issue training memorandum to Operations, System Engineering and Maintenance Engineering describing this event and the symptoms of a sense line blockage.

2. Perform a review of industry information for similar types of events and based on this review, determine if additional corrective actions are warranted. (Completed)

3. Test the PT that was removed (refer to Immediate Corrective Action 5 above) to determine the effect the blockage of the sense line had on the component.

4. Backfill a sampling of the main steam pressure and flow transmitters during the upcoming refueling outage and including venting the subject transmitter through the condensing pot to observe any debris.

## VII. ADDITIONAL INFORMATION

### A. Failed Components:

None. The apparent cause was a blockage in the sense line. However, additional testing of the affected component 1-PT-1-27A will be performed (see corrective action 4 above).

### B. Previous LERs on Similar Events:

A review of previous reportable events for the past six years was performed.

No similar events of sense line blocking were identified.

### C. Additional Information:

None

### D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with NEI 99-02, Section 2.2.

### E. Normal Heat Removal

This event did not result in the loss of normal heat removal in accordance with NEI 99-02, Section 2.1.

## VIII. COMMITMENTS

None.