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JOHNSON,A.R. Project Directorate I-3

SUBJECT: LER 94-022-01:on 940202,determined that Containment Pressure channels P-947 & P-948 were inoperable.Caused by obstruction of common pressure sensing line.Corrective action:iron oxide scale was removed & channels declared operable.W/940502 ltr.

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

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May 2, 1994

U.S. Nuclear Regulatory Commission
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Attn: Allen R. Johnson
Project Directorate I-3
Washington, DC 20555

Subject: LER 94-022, Revision 1, Containment Pressure Transmitters Inoperable Due to Blockage of Sensing Line by Corrosion Products, Causes a Condition Prohibited by Technical Specifications
RG&E Ginna Nuclear Power Plant
Docket No. 50-244

In accordance with 10 CFR 50.73, Licensee Event Report System, item (a) (2) (i) (B), which requires a report of "Any operation or condition prohibited by the plant's Technical Specifications", the attached Licensee Event Report LER 94-002, Revision 1, is hereby submitted.

This revision is being submitted to report results of inspections performed during the 1994 refueling outage which confirmed that this event was limited to one Containment pressure sensing line. Additional details concerning the plant design basis are also included in this revision.

This event has in no way affected the public's health and safety.

Very truly yours,

Robert C. Mecredy

c: U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Ginna Senior Resident Inspector

Ctrl# Z074512205

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
R.E. Ginna Nuclear Power Plant	05000244	1 OF 3

TITLE (4) Containment Pressure Transmitters Inoperable, Due to Blockage of Sensing Line by Corrosion Products, Causes a Condition Prohibited by Technical Specifications

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	DOCKET NUMBER
02	02	94	94	--002--	01	04	29	94	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	098		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
			20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			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 (Include Area Code)
John T. St. Martin - Director, Operating Experience	(315) 524-4446

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)			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 February 2, 1994, at approximately 1642 EST, with the reactor at approximately 98% steady state power, Control Room operators determined that Containment Pressure channels P-947 and P-948 were inoperable. Based on post-event review of computer data, this condition was in violation of Technical Specification Table 3.5-2 Action Statements.

Immediate corrective action was to defeat the inoperable channels by placing the affected bistables in the tripped condition.

The underlying cause of the event was an obstruction in the common containment pressure sensing line for P-947 and P-948, resulting from water being trapped in a low point of the line. This event is NRC Performance Indicator Program Cause Code 5.8.4.3.

Corrective action was taken to clear the obstruction from the affected tubing, leak test the penetration piping and transmitter tubing, and verify the proper operation of P-947 and P-948.

Corrective action to preclude repetition is outlined in Section V (B).

I. PRE-EVENT PLANT CONDITIONS

The plant was at approximately 98% steady state reactor power with no major activities in progress. Instrument and Control (I&C) Department personnel were investigating Containment Pressure channel P-947. This investigation was initiated by a Maintenance Work Request / Trouble Report (MWR/TR) written January 20, 1994 by Control Room operators because the Main Control Board pressure indication for P-947 (PI-947) was observed to be reading slightly lower than the indication for Containment Pressure channels P-945 and P-949 (PI-945 and PI-949), which are also on the Main Control Board.

II. DESCRIPTION OF EVENT

A. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

- June 24, 1992, 1500 EDST: Containment (CNMT) pressure channel P-947 output indication starts to become inconsistent with channels P-945 and P-949, as monitored on the Plant Process Computer System (PPCS). (This is based on post-event review of archived data on the PPCS.) Event date and time.

- December 24, 1992, 0435 EST: Offsite power 34.5 KV circuit lost during a windstorm, causing loss of 480V safeguards busses 14 and 18 for approximately nine (9) seconds.

- January 20, 1994: Control Room operators submit MWR/TR on PI-947 Main Control Board indication.

- February 2, 1994, 1642 EST: Discovery date and time.

- February 4, 1994, 0007 EST: Containment Pressure channel P-947 is restored to operable status.

- February 4, 1994, 1536 EST: Containment Pressure channel P-948 is restored to operable status.

- March 12 to 16, 1994: Inspections performed of the interior of the carbon steel sensing lines for CNMT pressure channels.

B. EVENT:

On January 20, 1994, Control Room operators observed that one Main Control Board indication for CNMT pressure, PI-947, was reading slightly lower than the other two indicators, PI-945 and PI-949. They initiated a MWR/TR, for I&C personnel to investigate the difference in readings. On January 21, I&C performed the annual calibration of the channel. The channel (P-947) responded properly to both the electronic checks and to actual pressure signals inserted into the transmitter (PT-947). After reviewing post-calibration trending data and archived PPCS computer traces of CNMT pressure, I&C noticed that channel P-947 was still not tracking consistent with channels P-945 and P-949. Further investigation was conducted on February 2, 1994, to identify if there could be any possible mechanical and/or electrical problems with P-947.

On February 2, 1994, at approximately 1612 EST, with the reactor at approximately 98% steady state reactor power, Control Room operators declared channel P-947 inoperable. The affected bistables were placed in the tripped condition. To verify the operability of the redundant CNMT pressure channels, the operators then caused a small change in CNMT pressure by depressurizing CNMT per operating procedure O-11, "Control of Mini Purge Exhaust Valves While Depressurizing Containment". I&C personnel monitored test points for CNMT pressure channels P-945, P-947, P-948, and P-949 with a digital multimeter. During this depressurization, at approximately 1642 EST, two channels (P-947 and P-948) did not show any response to the small change in CNMT pressure.

The Control Room operators formally declared P-948 inoperable at approximately 1658 EST. The affected bistables were placed in the tripped condition per emergency restoration procedure ER-INST.1, "Reactor Protection Bistable Defeat After Instrumentation Loop Failure". P-947 and P-948 sense CNMT pressure via a common line (CNMT Penetration 203A). A CNMT entry was made to verify that this sensing line for PT-947 and PT-948, (Pen. 203A) was not mechanically blocked. Pen. 203A was visually verified not to be externally obstructed. The valve lineups for the pressure transmitters (PT-947 and PT-948) were verified to be correct.

On February 3, 1994, a work package for troubleshooting and repair of the CNMT penetration line was prepared. A CNMT entry was made and Pen. 203A was pressurized to thirty (30) pounds per square inches above atmospheric pressure (PSIG), using surveillance test procedure PTT-23.17B, "Containment Isolation Valve Leak Rate Testing Containment Pressure Transmitters PT-947 and PT-948 Pen 203A". PT-947 and PT-948 did not respond to this pressure, which indicated a blockage in the piping for Pen. 203A or in the common instrument tubing line. Backflushing with one-hundred-twenty (120) PSIG air supply to clear the blockage was unsuccessful.

Pen. 203A was isolated inside CNMT to provide double barrier isolation for CNMT integrity. The instrument tubing was disconnected outside CNMT. The instrument tubing was found to contain water, but this water was not the source of the blockage. The 1/2 inch carbon steel tubing for Pen. 203A was found to be mechanically blocked with a thick sludge. The blockage was removed. The tubing was reassembled and preparations were made to test the tubing.

On February 3, 1994, at approximately 2207 EST, Pen. 203A was declared inoperable to perform required Appendix J testing. The Limiting Condition for Operation (LCO) for Technical Specification (TS) 3.6.3.1. was entered. Pen. 203A was tested in accordance with surveillance test procedure PTT-23.17B, "Containment Isolation Valve Leak Rate Testing Containment Pressure Transmitters PT-947 and PT-948 Pen 203A". It was documented in PTT-23.17B that PT-947 and PT-948 now accurately responded when the penetration was pressurized to 60 PSIG. PTT-23.17B was successfully completed at approximately 2336 EST and Pen. 203A was declared operable at approximately 2340 EST.

On February 4, 1994, at approximately 0007 EST, P-947 was declared operable.

The transmitter and rack calibration procedure for channel P-948 was performed later in the day on February 4, and P-948 was declared operable at approximately 1536 EST on February 4, 1994.

All CNMT pressure channels functioned properly for the remainder of the operating cycle. The plant began the 1994 refueling outage on March 4, 1994. Cold Shutdown was achieved on March 5, 1994, at approximately 0759 EST.

With the plant in the Cold Shutdown condition, additional inspections were conducted to determine the extent of corrosion in the carbon steel sensing lines. As previously stated, the common sensing line for CNMT pressure channels P-947 and P-948 is Pen. 203A. The remaining Engineered Safety Feature CNMT pressure channels also utilize common sensing lines. The common sensing line for CNMT pressure channels P-945 and P-946 is CNMT Pen. 121C. The common sensing line for CNMT pressure channels P-949 and P-950 is CNMT Pen. 332C. The interior of the sensing lines for the two unaffected penetrations (Pen. 121C and Pen. 332C) were inspected in mid-March, 1994. The inspection found the interior of each penetration clean, dry, and free from obstructions, with no evidence of any degradation of the carbon steel piping.

The interior of the piping for Pen. 203A had been initially cleaned out on February 3, 1994. A fibrescope examination of Pen. 203A was conducted on March 14, 1994. This examination confirmed that there had been standing water in the tubing in the past, since there was a buildup of corrosion on the bottom of the carbon steel tubing. On March 16, 1994, this piping was brushed, rodded, and flushed with water. A small amount of sludge and scale was removed. This penetration was then tested per surveillance test procedure PTT-23.17B, "Containment Isolation Valve Leak Rate Testing Containment Pressure Transmitters PT-947 and PT-948 Pen. 203A". Pen. 203A was pressurized to approximately 63 psig and the integrity of the tubing for Pen. 203A was confirmed.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

None

D. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

Engineered Safety Features that rely on CNMT pressure inputs are Safety Injection Actuation (SI), Steam Line Isolation, and Containment Spray Actuation (CNMT Spray). None of these features was affected by the inoperability of P-947 and P-948, because at no time, from June 24, 1992, to February 4, 1994, was CNMT pressure at or near the actuation setpoints (4 PSIG for SI, 18 PSIG for Steam Line Isolation, and 28 PSIG for CNMT Spray). During this period, the redundant channels (for P-947 the channels are P-945 and P-949; for P-948 the channels are P-946 and P-950) were in service and were not taken out of service unless the affected bistables were placed in the tripped condition, except for approximately nine (9) seconds on December 24, 1992.

E. METHOD OF DISCOVERY:

This event was first identified due to the astute observation of a Control Room operator on January 20, 1994, who questioned a slight difference in indications for CNMT pressure. The small deviation between redundant channels was within the tolerance of Main Control Board instrumentation channel checks.

The monthly Channel Functional Tests and annual Channel Calibrations associated with these channels (as required by TS Table 4.1-1 for units #17 and #25) did not detect the obstructed tubing line due to the location of the obstruction. The sludge was located between CNMT and the root isolation valves for PT-947 and PT-948. These root isolation valves are closed during performance of the necessary tests and calibrations, in order to pressurize the volume between the valve and the pressure transmitter. This method of testing is consistent with the definition of Channel Functional Testing, as defined in TS 1.7.3.a.

The fact that this event affected both channels P-947 and P-948 was identified as a result of the investigations performed by I&C personnel on February 2, 1994.

A more detailed review of the archived PPCS records of CNMT pressure concluded that channel P-947 had not responded to changes in CNMT pressure since June 24, 1992, beginning at approximately 1500 EDST.

Note that while CNMT pressure channel P-947 is monitored by the PPCS, channel P-948 is not. In addition, PI-948 (and also PI-946 and PI-950) have a scale of 10 to 200 PSIA (absolute pressure). By comparison, PI-947 (and also PI-945 and PI-949) have a scale of 0 to 60 PSIG.

It is assumed that P-948 had not responded to changes in CNMT pressure for the same amount of time as P-947.

F. OPERATOR ACTION:

The Control Room operators observed that the PI-947 reading was inconsistent on January 20, 1994, and initiated a MWR/TR. After both channels P-947 and P-948 were discovered to be inoperable, the Control Room operators performed emergency restoration procedure ER-INST.1 and placed the affected bistables in the tripped condition.

Subsequently, the Control Room operators ensured that higher supervision and the NRC Resident Inspector had been notified of this event.

G. SAFETY SYSTEM RESPONSES:

None

III. CAUSE OF EVENT

A. IMMEDIATE CAUSE:

The immediate cause of the event was the failure of P-947 and P-948 to respond to changes in CNMT pressure due to obstruction of the common pressure sensing line.

B. INTERMEDIATE CAUSE:

The intermediate cause of the obstruction of the common pressure sensing line at Pen. 203A was a buildup of corrosion products in this line, which is 1/2 inch OD, 0.065 inch wall thickness, carbon steel tubing. These corrosion products were visually examined and found to be reddish brown/black in color, visually resembling iron oxide scale. This buildup of corrosion products (iron oxide scale) was due to water being collected at the low point in the sensing line after completion of calibration.

C. ROOT CAUSE:

The underlying cause of the ~~buildup of corrosion products (iron oxide scale)~~ water being trapped was the method of transmitter calibration ~~coupled with~~ for the specific sensing line configuration. I&C personnel have calibrated these transmitters with a water-filled deadweight tester for many years. The configuration of the transmitter and sensing line for Pen. 203A prevented the drainage of all the water after calibration. After the transmitter was unisolated as part of the calibration process, the trapped water traveled down to the low portion of the sensing line, where it stayed until evaporating, permitting the corrosion to initiate. This specified method of transmitter calibration is not the desired method for the configuration and material.

The sensing lines for Pen. 121C and Pen. 332C are configured such that all the water would drain out at the time the deadweight tester is disconnected. This was verified by visual inspection of these penetrations, which was performed during the 1994 refueling outage. No evidence of water or corrosion was found.

This event is NRC Performance Indicator Program Cause Code 5.8.4.3, "Maintenance Equipment Failure".

Stagnant water ~~has~~ remained in the carbon steel sensing ~~lines~~ line for Pen. 203A for a substantial period of time after each calibration. Under ~~such~~ these conditions, significant corrosion of the carbon steel material ~~can occur~~ occurred. The corrosion product, hydrated iron oxide (common rust) is voluminous, occupying many times the volume of the material lost to the corrosion process. Sufficient corrosion product accumulated to block the sensing line tubing, resulting in the inoperability of P-947 and P-948.

IV. ANALYSIS OF EVENT

This event is reportable in accordance with 10 CFR 50.73, Licensee Event Report System, item (a) (2) (i) (B), which requires a report of, "Any operation or condition prohibited by the plant's Technical Specifications". CNMT pressure channels P-947 and P-948 were inoperable for a considerable length of time, ~~in violation~~ contrary to the requirements of TS Table 3.5-2, units # 1.b., 2.b., and 5.c. Operation in this condition since June 24, 1992 is a condition prohibited by TS.

An assessment was performed considering both the safety consequences and implications of this event. The results of this assessment are that there were no operational or safety consequences or implications attributed to the inoperability of P-947 and P-948 because:

- A review of plant history and preventive maintenance history files has shown that the redundant CNMT pressure channels (P-945, P-946, P-949, and P-950) have been either operable or placed in the conservative tripped state from the Event date to the Discovery date, except for approximately nine (9) seconds on December 24, 1992.

- A review of PPCS data has shown that the redundant pressure channels have responded to pressurization of the sensing lines and pressure changes in CNMT. Visual inspections performed during the 1994 refueling outage showed no evidence of any degradation in the condition of the sensing lines. Thus, these redundant channels ~~did not exhibit~~ were not susceptible to the same failure mode as P-947 and P-948.

- The 2 out of 3 logic (2/3) required for actuation of SI was reduced to a 2/2 logic with the inoperability of P-947. Thus SI actuation from ~~high~~ CNMT pressure (4 PSIG) would have occurred as assumed in the design basis.

- The diverse actuation circuitry for SI has three additional means of actuation (steam generator low steam pressure, pressurizer low pressure, and Manual). None of these diverse means was affected by the inoperability of P-947.

- The 2/3 logic required for Steam Line Isolation actuation was reduced to a 2/2 logic with the inoperability of P-948. Thus, Steam Line Isolation actuation from ~~high-high~~ CNMT pressure (18 PSIG) would have occurred as assumed in the design basis.

- The diverse actuation circuitry for Steam Line Isolation has three additional means of actuation (hi-hi steam flow with safety injection, hi steam flow and 2/4 low Tavg with safety injection, and Manual). None of these diverse means was affected by the inoperability of P-948.

- The 2/3 plus 2/3 logic required for CNMT Spray actuation was reduced to a 2/2 plus 2/2 logic with the inoperability of P-947 and P-948, except for approximately nine (9) seconds on December 24, 1992. Thus, CNMT Spray actuation from ~~high-high~~ CNMT pressure (28 PSIG) would have occurred as assumed in the design basis.

- The alternate actuation circuitry for CNMT Spray (Manual) was not affected by the inoperability of P-947 and P-948.

On December 24, 1992, at approximately 0435 EST, a loss of offsite power 34.5 KV Circuit 751 occurred. The "A" Emergency Diesel Generator ("A" D/G) started and re-energized 480V safeguards busses 14 and 18. Instrument Bus B, which supplies instrument power to Reactor Protection bistables for pressure channels P-946 and P-949, was de-energized for approximately nine (9) seconds while the "A" D/G was starting and loading onto the safeguards busses.

During this nine (9) second loss of Instrument Bus B on December 24, 1992, the logic required for CNMT Spray actuation, which had been reduced to 2/2 plus 2/2, was inoperable. This time of nine (9) seconds is less than the design basis assumption of ten (10) seconds for emergency D/G startup and loading of the safeguards busses.

The SI actuation bistable for channel P-949, changes to the tripped condition on a loss of instrument power. During this nine (9) second loss of Instrument Bus B, this bistable was already tripped, and the logic required for actuation of SI was a 1/1 logic, given the inoperability of P-947 and the de-energization of P-949.

The Steam Line Isolation bistable for channel P-946 changes to the tripped condition on a loss of instrument power. During this nine (9) second loss of Instrument Bus B, this bistable was already tripped, and the logic required for Steam Line Isolation actuation was a 1/1 logic, given the inoperability of P-948 and the de-energization of P-946.

The CNMT Spray logic is an energize-to-actuate circuitry. During this nine (9) second loss of Instrument Bus B, the actuation logic for channels P-946 and P-949 from CNMT pressure (28 PSIG) for CNMT Spray would not have functioned until power was restored.

While safeguard busses 14 and 18 were de-energized during the nine (9) second undervoltage condition, safeguard busses 16 and 17 were available to supply power to the CNMT Spray components. The CNMT Spray logic to start these components was inoperable during this nine (9) second undervoltage condition.

This inoperability of the CNMT Spray System is bounded by the design basis accident analysis for a Loss of Coolant Accident (LOCA) or a Steam Break Accident because these accidents assume a loss of offsite power coincident with the accident initiation.

On loss of power, CNMT Spray components do not respond to an actuation signal for the ten (10) second delay time assumed for the emergency D/G startup and loading because the safeguards busses are de-energized. Instrument Bus B was de-energized for approximately nine (9) seconds, which is less than the ten (10) seconds assumed in the UFSAR. Thus, the margin of safety as assumed in the UFSAR was not reduced during the loss of Instrument Bus B concurrent with the inoperability of P-947 and P-948.

Based on the above, it can be concluded that the public's health and safety was assured at all times.

V. CORRECTIVE ACTION

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

- The iron oxide scale was removed from the obstructed penetration sensing line and P-947 and P-948 were restored to operable status.
- The other channels that monitor CNMT pressure were verified to respond to small changes in CNMT pressure.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

- PPCS computer points for CNMT pressure will be archived daily until the 1994 refueling outage to verify channel operability. PPCS computer points for CNMT pressure were archived daily from February 4, 1994 to March 5, 1994 to verify that all three CNMT pressure channels monitored by the PPCS (P-945, P-947, and P-949) remained operable during this period.

- The sensing lines for all CNMT pressure channels will be inspected and cleaned out during the 1994 refueling outage. The three sensing lines for all six CNMT pressure channels were inspected during the 1994 refueling outage. Pen. 121C and Pen. 332C showed no evidence of any degradation and did not require any corrective actions. The sensing line for Pen. 203A showed a buildup of corrosion on the bottom of the tubing. This sensing line was brushed and rodded, and pressurized to 63 psig, to verify its integrity.

- The method of calibration of the CNMT pressure transmitters has been changed to use gas (instead of water) as the test medium. These revised procedures were used to perform calibrations of the CNMT pressure channels during the 1994 refueling outage. Continued use of gas as test medium will prevent future rusting of the pressure sensing tubing, thus preventing recurrence.

- Testing these containment penetrations has been enhanced to include formal documentation of pressure channel response. This enhanced testing will detect any obstructed tubing, and will verify communication through the sensing line, from its end point inside the Containment to the transmitter.

VI. ADDITIONAL INFORMATION

A. FAILED COMPONENTS:

There were no failed components. The obstructed sensing line is 1/2 inch OD, 0.065 inch wall thickness, carbon steel tubing. Information about the vendor and manufacturer is not relevant to this event.

B. PREVIOUS LERs ON SIMILAR EVENTS:

A similar LER event historical search was conducted with the following results: LER 92-003 was also an event caused by an obstructed pressure sensing line. However, the obstruction was caused by buildup of sludge from normal impurities in the process fluid (feedwater). The obstruction referred to in LER 94-002 was caused by corrosion from the interaction of the test medium and the sensing line materials.

C. SPECIAL COMMENTS:

None