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Executive Department



Georgia Power

the southern electric system

SL-4619
0229I
X7GJ17-H310

May 16, 1988

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

PLANT HATCH - UNIT 1
NRC DOCKET 50-321
OPERATING LICENSE DPR-57
LICENSEE EVENT REPORT
DRAIN LINE FAILS DUE TO FATIGUE CAUSING HIGH
TEMPERATURE CONDITION AND VALVE ISOLATION

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(iv), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning an unanticipated actuation of an Engineered Safety Feature. This event occurred at Plant Hatch - Unit 1.

Sincerely,

R. P. McDonald
Executive Vice President,
Nuclear Operations

LGB/lg

Enclosure: LER 50-321/1988-004

c: (see next page)

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U. S. Nuclear Regulatory Commission
May 16, 1988
Page Two

c: Georgia Power Company
Mr. J. T. Beckham, Jr., Vice President - Plant Hatch
Mr. L. T. Gucwa, Manager Nuclear Safety and Licensing
GO-NORMS

U. S. Nuclear Regulatory Commission, Washington, D. C.
Mr. L. P. Crocker, Licensing Project Manager - Hatch

U. S. Nuclear Regulatory Commission, Region II
Dr. J. N. Grace, Regional Administrator
Mr. P. Holmes-Ray, Senior Resident Inspector - Hatch

0229I

LICENSEE EVENT REPORT (LER)

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TITLE (4)
DRAIN LINE FAILS DUE TO FATIGUE CAUSING HIGH TEMPERATURE CONDITION AND VALVE ISOLATION

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LICENSEE CONTACT FOR THIS LER (12)

NAME J. D. Heidt, Nuclear Licensing Manager - Hatch	TELEPHONE NUMBER 4 0 4 5 2 6 - 4 5 3 0
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13):

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS
X	C E		P G O 8 0	N					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On 4/15/88 at approximately 0411 CDT, Unit 1 was in the run mode at an approximate power level of 2436 MWt (approximately 100 percent of rated thermal power). At that time, plant operations personnel noted that one of the Reactor Water Clean Up (RWCU EIIS Code CE) Primary Containment Isolation System (PCIS EIIS Code JM) valves had closed. This was an unanticipated actuation of an Engineered Safety Feature.

The root cause of this event is high cycle fatigue failure of a 3/4 inch drain line. The failure of the drain line allowed steam to be released into the RWCU pump room. This activated a room temperature sensor which, in turn, sent an isolation signal to the outboard PCIS valve.

Corrective actions for this event included: 1) replacing the drain line and verifying the line did not leak, 2) investigating the operation of a transmitter, 3) scheduling replacement of a RWCU pump, and 4) scheduling a detailed engineering evaluation/analysis of the RWCU drain lines and associated small bore piping supports.

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

A. REQUIREMENT FOR REPORT

This report is required per 10 CFR 50.73 (a)(2)(iv), because an unplanned actuation of an Engineered Safety Feature (ESF) occurred. Specifically, one valve of the Primary Containment Isolation System (PCIS EIIS Code JM) valve Group 5 (for the Reactor Water Clean Up [RWCU EIIS Code CE] system) closed. The valve that closed was valve 1G31-F004.

B. UNIT(s) STATUS AT TIME OF EVENT

1. Power Level/Operating Mode

Unit 1 was in steady state operation at an approximate power level of 2436 Mwt (approximately 100 percent of rated thermal power). The reactor mode switch was in the run position.

2. Inoperable Equipment

There was no inoperable equipment that contributed to this event.

C. DESCRIPTION OF EVENT

1. Event

On 4/15/88 at approximately 0411 CDT, plant operations personnel in the main control room noted that two annunciators alarmed. The two annunciators were: "RWCU Demineralizer Failure" and "Pump Low Flow". The licensed operations personnel then noted that the position indication lights for one of the two RWCU PCIS valves (the outboard valve, 1G31-F004) had changed from an open indication to a closed indication.

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Typically, when a PCIS isolation occurs, both of the valves close. Plant operations personnel knew that there are two conditions that can cause only the outboard PCIS valve to close. These two conditions are: 1) a high temperature condition downstream of the RWCU non-regenerative heat exchanger, and 2) the actuation of the Stand By Liquid Control (SBLC EIIS Code BR). Neither of these two conditions were present.

Plant operations personnel requested that plant Instrument and Control (I&C) personnel investigate the event. Additionally, licensed plant operations personnel informed the NRC of the partial isolation at approximately 0632 CDT, per the requirements of 10 CFR 50.72.

At approximately 1245 CDT, plant operations personnel were preparing to pre-warm the "A" RWCU pump per plant procedure 3450-G31-003-1S (Reactor Water Cleanup System). As part of the pre-warming steps, the outboard PCIS valve (1G31-F004) was required to be opened. When this occurred, the operations Plant Equipment Operator (PEO) in the RWCU pump room reported a steam leak. Plant operations personnel in the main control room closed valve 1G31-F004 and initiated an investigation of the steam leak.

At approximately 1335 CDT, plant personnel determined that the "A" RWCU drain piping (connecting the "A" RWCU pump casing and a drain to the clean radioactive waste system - EIIS Code WD) was leaking. The leak was the result of a crack in a 3/4 inch diameter, 3 inch long section of the drain piping. Plant operations personnel generated a Maintenance Work Order (MWO 1-88-1657) to investigate and repair the crack. As part of the work associated with this MWO, plant engineering personnel determined that the crack would allow fluids to be directed upward toward the pump room ceiling.

Plant personnel also noted that there are two temperature sensors in the RWCU pump room (1G31-N062D and 1G31-N062E). When these temperature sensors reach their actuation setpoint, they generate an isolation signal. The isolation signal from the 1G31-N062E sensor will close the inboard RWCU PCIS valve (1G31-F001) while the signal from the 1G31-N062D sensor will close the outboard RWCU PCIS valve (1G31-F004).

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/88

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

Since the operations department PEO had observed steam in the RWCU pump room, plant personnel believed that both the inboard and outboard PCIS valves should have received a closure signal (as a result of a high room temperature condition). On 4/16/88 at approximately 0200 CDT, plant engineering and maintenance (Instrument and Control - I&C) personnel were investigating Resistance Thermal Device (RTD) 1G31-N062E (by performing plant procedure 57SV-CAL-004-1S [ATTS RTD Channel Calibration]) to determine why the inboard PCIS valve (1G31-F001) did not close during the isolation.

As part of the investigation of the system logic and the functional capability of RTD 1G31-N062E, I&C personnel heated the temperature element. This occurred at approximately 0230 CDT. Valve 1G31-F001 closed as designed. This is in accordance with the design of the isolation system.

After the investigation, plant personnel determined that the room air circulating system caused the heat (from the steam and water spraying out of the pipe crack) to progress in the direction of temperature element 1G31-N062D (which actuates the outboard PCIS valve, 1G31-F004). When the isolation logic actuated, the outboard isolation valve closed. The closure of this outboard valve isolated the RWCU system, removed the heat source from the RWCU pump room, and reduced the room temperature below the setpoint of the other pump room temperature element, 1G31-N062E (which actuates the inboard PCIS valve, 1G31-F001).

On 4/17/88 at approximately 0320 CDT, the repairs to the RWCU pump casing drain line were completed. Plant operations personnel pre-warmed the "A" RWCU pump per plant procedure 34S0-G31-003-1S. At the same time, plant operations personnel observed the repaired area to verify there were no leaks. No leaks were observed. The RWCU system was returned to service.

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

2. Dates/Times

<u>Date</u>	<u>Time (CDT)</u>	<u>Description</u>
4/15/88	0411	Plant operations personnel in the main control room noted that two RWCU annunciators alarmed. They also observed that the position indication lights for the RWCU PCIS outboard isolation valve (1G31-F004) had changed from open to closed. Operations personnel requested that I&C personnel investigate the event.
4/15/88	0632	Licensed plant operations personnel notified the NRC of the partial isolation per the requirements of 10 CFR 50.72.
	1245	Plant operations personnel were preparing to pre-warm the "A" RWCU pump per plant procedure 3450-G31-003-1S and they opened valve 1G31-F004. The operations PEO in the RWCU pump room reported there was a steam leak. Plant operations personnel in the main control room closed valve 1G31-F004 and initiated an investigation of the steam leak.
	1335	Plant personnel determined that the "A" RWCU drain piping was leaking. Plant operations personnel initiated an MWO to investigate and repair the drain line.
4/16/88	0200	Plant engineering and I&C personnel investigated the room temperature RTD that isolates the RWCU PCIS inboard valve 1G31-F001.

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2. Dates/Times

<u>Date</u>	<u>Time (CDT)</u>	<u>Description</u>
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4/16/88	0230	Plant personnel determined that the room temperature RTD was working correctly.
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After the investigation, plant personnel determined that the room air circulating system caused the heat (from the steam and water spraying out of the pipe crack) to progress in the direction of temperature element 1G31-N062D (which actuates the outboard PCIS valve, 1G31-F004). When the isolation logic actuated, the outboard isolation valve closed. The closure of this outboard valve isolated the RWCU system, removed the heat source from the RWCU pump room, and reduced the room temperature below the setpoint of the other pump room temperature element, 1G31-N062E (which actuates the inboard PCIS valve, 1G31-F001).

4/17/88	0320	Plant personnel completed the repairs on the "A" RWCU pump drain line. The line was tested and no leaks were observed. The RWCU system was returned to service.
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3. Other Systems Affected

No safety systems, other than the PCIS valve Group 5, were affected by this event. This system performs no other secondary functions.

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4. Method of Discovery

The event was discovered when plant operations personnel in the main control room noted that annunciators had alarmed and observed that the outboard RWCU PCIS valve's (1G31-F004) position indication lights had changed from open to closed. They visually observed this change in the indication lights on main control room panel 1H11-P601.

5. Operator Actions

Plant operations personnel performed the following actions:

1. Requested that plant engineering and I&C personnel investigate the event.
2. Generated an MWO as required by the plant's administrative control procedures.
3. Notified the NRC of the event per the requirements of 10 CFR 50.72.

6. Auto/Manual Safety System Response

No safety systems, other than the outboard RWCU PCIS Group 5 isolation valve (1G31-F004), actuated in this event.

D. CAUSE OF EVENT

1. Immediate Cause

The immediate cause of this event is due to a crack in the drain line from the RWCU pump case. The crack area allowed the process fluid to flash to steam. This raised the temperature in the pump room to the actuation setpoint for the PCIS outboard isolation valve.

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2. Root/Intermediate Cause

The root cause for the crack of the drain line is due to high cycle fatigue failure of the piping. Over a long period of time, the drain line developed a crack due to high cycle oscillation of the drain pipe relative to the pump casing. The drain piping is supported by a rigid support, and this support is located at the weld where the drain line connects to the pump casing. The location of this support caused a stress concentration and flexure point in the drain piping. This pipe location ultimately failed.

E. ANALYSIS OF EVENT

The objective of the RWCU containment isolation system is to provide protection by preventing releases to the environment of radioactive materials. This is accomplished by the complete isolation of system lines that penetrate the containment. The line contains two isolation valves and only one of these valves is required to ensure the isolation capability.

The high temperature isolation is designed to detect a break in the process piping which would allow radioactive fluid to be released. A process pipe rupture is indicative of a breach of the reactor coolant pressure boundary and a potential accident situation.

In this event, the pump casing drain line broke and allowed some of the process fluid to flash to steam. While the actual process piping did not rupture, the failure of the drain line resulted in a room temperature increase that was similar to that which would have occurred had the process piping ruptured.

It has been determined, after an investigation of all possible isolation conditions, that the room air circulating system caused the heat (from the steam and water spraying out of the pipe crack) to progress in the direction of temperature element 1G31-N062D (which actuates the outboard PCIS valve, 1G31-F004). When the isolation logic actuated, the outboard isolation valve closed. The closure of this outboard valve isolated the RWCU system, removed the heat source from the RWCU pump room, and reduced the room temperature below the setpoint of the other pump room temperature element, 1G31-N062E (which actuates the inboard PCIS valve, 1G31-F001).

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Based on the above information, it is concluded that this event had no adverse impact on nuclear plant safety. Additionally, since the PCIS valves are designed to close under full reactor power conditions (as occurred in this event), it is concluded that the consequences of this event would not have been more severe under other reactor power conditions.

F. CORRECTIVE ACTIONS

Corrective actions for this event included:

1. Replacing the drain line and verifying that the line did not leak.
2. Investigating the logic channel and temperature element transmitter (1G31-NO62E) to ensure correct functioning. This was performed by plant engineering and I&C personnel.
3. Scheduling replacement of one of the two RWCU pumps. The existing pump will be replaced with a seal-less pump. This pump will be able to perform the work of the two existing pumps and will be the primary method of circulating reactor inventory through the RWCU system.

The replacement will occur as part of the modification work associated with Design Change Request (DCR) 85-222. This DCR is scheduled to be worked during the next scheduled Unit 1 outage. This outage is scheduled to begin by approximately November, 1988. The existing pump that is not replaced will be left as a standby unit. This standby unit will be used when the seal-less pump is removed from service. Since this standby pump will be used infrequently, the high cycle fatigue failure is not anticipated to recur.

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4. Scheduling a detailed engineering evaluation/analysis of the RWCU drain lines and associated small bore piping supports. Based on the results of the evaluation, if modifications are required, Design Change Requests (DCRs) will be generated. It is currently anticipated the evaluation will be performed by approximately 7/1/88.

G. ADDITIONAL INFORMATION

1. FAILED COMPONENT(S) IDENTIFICATION

The failed 3/4 inch drain piping does not have a unique plant identification number such as a part number, serial number, etc. The material is pipe code DCB schedule 80 stainless steel, ASTM A-312 or A-376, Type 304. The EIIS Code for the RWCU system is CE.

The failed pipe section was part of the original pump which was supplied by the pump vendor. The failed component identification for the pump is:

MPL (Plant Index Identifier): 1G31-C001A
 Manufacturer: General Electric
 Model Number: 1-ZX11A
 Type: Centrifugal Pump
 EIIS: CE

The failure code blocks on the first page of the LER were completed using the information for the pump.

2. PREVIOUS SIMILAR EVENTS

Previous LERs have described events where the RWCU system isolated on a high ambient air temperature signal. These LERs are: 50-321/1986-022 Rev. 1 (dated 5/14/86), 50-321/1986-028 Rev. 1 (dated 7/2/86), 50-321/1986-040 (dated 10/5/86), 50-366/1987-005 (dated 3/20/87), and 50-366/1987-012 (dated 9/16/87).

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These events occurred for a variety of reasons such as: 1) low temperature setpoints for some isolation instruments, 2) damage to temporary cooling air ducts, 3) leaking equipment (such as valves and heat exchangers), 4) high ambient (summer time) air conditions, 5) loss of electrical power to a room cooling unit, and 6) calcium fouling of a water chiller.

The corrective actions for these events included: 1) supplying cooling air to RWCU rooms, 2) initiating changes to Technical Specifications setpoints, 3) repairing leaking components, 4) resetting tripped cooling equipment, 5) removing calcium deposits, 6) installing a chemical treatment system, and 7) placing increased management attention on the RWCU system. This includes developing integrated efforts to upgrade the system.

These corrective actions would not have prevented the event described in LER 50-321/1988-004 because the cause of the events was different. The event in LER 50-321/1988-004 was the result of fatigue failure of a drain line. None of the other events were the results of a fatigue failure.