LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
LaSalle County Station Unit 2	0 5 0 0 0 3 7 4	1 of 0 6

Title (4) Failure of Static-O-Ring Differential Pressure Switch Due to Leakage Across Diaphragm

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 Names	Docket Number(s)
											0 5 0 0 0
1 0	2 1	8 7	8 7	---	0 1 9	0 1	0 8	2 9	8 8		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
	1	___ 20.402(b)	___ 20.405(c)	___ 50.73(a)(2)(iv)	___ 73.71(b)
POWER LEVEL (10)	0 9 9	___ 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)	X Other (Specify in Abstract below and in Text) Voluntary
		___ 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
Richard J. Rohrer, Engineer, extension 251	8 1 5 3 5 7 - 6 7 6 1

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
X	B N	F S	S 3 8 2	Y					

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 fifteen single-space typewritten lines) (16)

At 1400 hours on October 21, 1987, Reactor Core Isolation Cooling (RCIC) Steam Line High Flow Isolation Switch PDS-2E31-N013AA was found to have leakage across the diaphragm. This was discovered during the performance of LaSalle Instrument Surveillance LIS-RI-201, "Unit 2 Steam Line High Flow RCIC Isolation Calibration". At the time, Unit 2 was in Operational Condition 1 (Run) at 99% thermal power.

A new differential pressure switch, identical to the failed one, was certified for service, installed, and calibrated on October 22, 1987.

The condition of flow switch PDS-2E31-N013AA compromised the outboard isolation function of the RCIC steam line in the event of a high flow condition. However, redundant instrumentation was available to provide the inboard isolation of the RCIC steam line had an actual high flow condition existed.

Several perforated diaphragms were examined by a laboratory specializing in polymer chemistry. SOR has changed its manufacturing processes based on the findings of this examination to (1) reduce the presence of foreign particles within the switch body, and (2) maintain smooth contact and distributed forces where the switch body contacts the diaphragm. These actions should be effective in reducing future occurrences of perforated diaphragms.

This equipment failure is reported voluntarily to the Nuclear Regulatory Commission in accordance with the requirements of Inspection Enforcement Bulletin 86-02, "Static-O-Ring Differential Pressure Switches".

IE22 1/1

TEXT

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

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

A. CONDITION PRIOR TO EVENT

Unit(s): 2 Event Date: 10-21-87 Event Time: 1400 hours

Reactor Mode(s): 1 Mode(s) Name: Run Power Level(s): 99%

B. DESCRIPTION OF EVENT

At 1400 hours on October 21, 1987, Reactor Core Isolation Cooling (RCIC, RI) [BN] Steam Line High Flow Isolation Switch PDS-2E31-N013AA was found to have leakage across the diaphragm. This was discovered during the performance of LaSalle Instrument Surveillance LIS-RI-201, "Unit 2 Steam Line High Flow RCIC Isolation Calibration". At the time, Unit 2 was in Operational Condition 1 (Run) at 99% thermal power.

PDS-2E31-N013AA functions to provide an outboard containment isolation of the RCIC Steam Line (closure of valve 2E51-F008) and a RCIC turbine trip upon detection of a high flow condition indicative of a line break in the steam line to the RCIC turbine.

Step F.30 of LIS-RI-201 was in progress at the time of this event. This step determines the "As Found" setpoint of PDS-2E31-N013AA, and verifies the integrity of the diaphragm. The test equipment configuration is shown on Figure 1. A test pressure is applied to the high side water bottle while the low side bottle is vented to determine the differential pressure at which the switch would trip. The diaphragm integrity test is done by holding the setpoint pressure on the high side bottle for approximately two minutes and monitoring the levels in the water bottles. Upon application of the test pressure, water began flowing from the high side bottle to the low side bottle.

Troubleshooting was performed to rule out the equalizing valve as the source of the leak and to qualify the nature of the leak. The water bottles were connected directly to the pressure ports of the flow switch and leakage was still observed, eliminating the equalizing valve as the source of the leak. Water flowed to the low side water bottle only when pressure was applied to the high side water bottle; raising the high side bottle so that the elevation of its water level was higher than the low side bottle was insufficient to cause water to flow through the switch. This indicates that the leak is small and that it was probably discovered at an early point in its development. This flow switch was successfully functionally tested (which includes a diaphragm integrity test) on September 23, 1987, so it is believed that the leak developed subsequent to that date.

TEXT

B. DESCRIPTION OF EVENT (Continued)

No other inoperable plant equipment contributed to this event. No safety system actuations occurred or were required. The plant never became unstable. Personnel performance did not influence the causation or severity of this event. The responses of plant personnel to this event were timely and appropriate.

This equipment failure is reported voluntarily to the Nuclear Regulatory Commission in accordance with the requirements of Inspection Enforcement Bulletin 86-02, "Static-O-Ring Differential Pressure Switches".

C. APPARENT CAUSE OF EVENT

The reason for the leakage of water from the high side to the low side of PDS-2E31-N013AA was a defect in the diaphragm of the switch.

This defective switch (Model Number 103AS-B203-NX-JJTTX6, Serial Number 85-1-2423) was sent to its manufacturer, Static-O-Ring Inc., for disassembly and inspection.

The inspection confirmed a slow leak across the diaphragm, and a brown foreign substance was noted on the switch diaphragm. The diaphragm was forwarded to Commonwealth Edison's System Materials Analysis Department (SMAD) for detailed inspection and analysis. SMAD found several small surface cracks in the Kapton diaphragm material and one tear approximately 0.25" long at the point where the piston plate attaches to the diaphragm.

Since there have been previous failures of a similar nature, Commonwealth Edison elected to have this diaphragm, along with four others (see LER 374/87-020-00), studied by a laboratory (L. J. Broutman and Associates) that specializes in polymer chemistry. The results of this study indicate two causes for the failures.

1. Debris and microscopic foreign particles have caused some of the cracks by becoming embedded in the Kapton material.

2. The diaphragm is severely deformed at the point where the switch body pinches the material. This has also caused some of the cracks.

D. SAFETY ANALYSIS OF EVENT

The safety consequences of this event were minimal.

The condition of flow switch PDS-2E31-N013AA compromised the outboard isolation function of the RCIC steam line in the event of a high flow condition. However, redundant instrumentation was available to provide the inboard isolation of the RCIC steam line had an actual high flow condition existed. Also, temperature monitoring equipment in the RCIC equipment area was available to detect a steam leak and provide both inboard and outboard isolations of the RCIC System.

TEXT

D. SAFETY ANALYSIS OF EVENT (Continued)

During this event, all Technical Specification requirements were met. In accordance with action statement 22 of Technical Specification 3.3.2, the RCIC Steam Line Outboard Isolation Valve (2E51-F008) was closed within one hour (2E51-F008 was already closed in accordance with the calibration procedure) and the RCIC System was declared inoperable. Action statement "b" of Technical Specification 3.7.3 allowed fourteen (14) days to restore operability to the RCIC System, since the High Pressure Core Spray (HPCS, HP) [BG] System was operable.

E. CORRECTIVE ACTIONS

A new differential pressure switch, identical to the failed one, was certified for service in accordance with procedures LIP-GM-952, "Static-O-Ring Differential Pressure Switch Operability Test", and LIP-GM-956, "Analysis of Static-O-Ring Differential Pressure Switch Test Data". This switch was installed and calibrated under Work Request L72697 on October 22, 1987, and the RCIC System was returned to operability. This action was taken within the 14 days allowed by Technical Specification 3.7.3.

Two actions have been taken to improve the design of SOR differential pressure switches to prevent recurrence of this event.

1. SOR is now electropolishing the internal cavities of the switch body and exercising additional care during manufacturing to avoid contamination of the switch internals. This action should reduce the occurrence of diaphragm cracks caused by foreign material.

2. The electropolishing also produces a smooth surface with rounded corners where the switch body contacts the diaphragm. This should reduce the occurrence of cracks due to stresses applied by the switch body to the diaphragm.

At this time, a program has been established to detect potential diaphragm failures at an early stage and to mitigate the consequences of any failures. The program consists of:

- an increased calibration frequency for Static-O-Ring differential pressure switches, and

- the performance of a leakage integrity test on the diaphragm during each calibration and functional test.

F. PREVIOUS EVENTS

LER Number	Title
374/86-018-01	"Failure of Reactor Core Isolation Cooling Steam Line High Flow Isolation Switch Due to Torn Diaphragm"
374/87-016-01	"Defective Low Pressure Core Spray Minimum Flow Switch"

TEXT

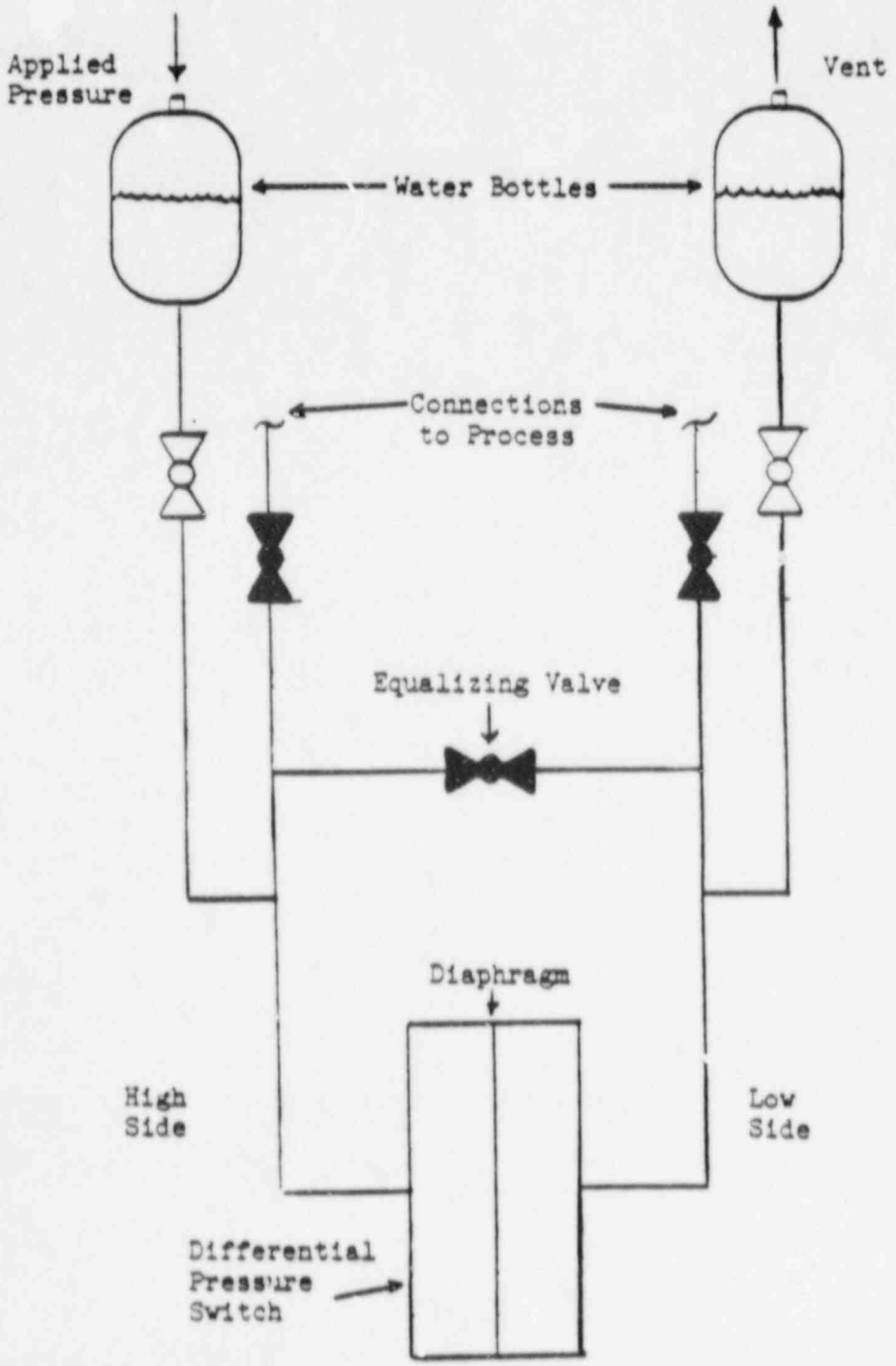
G. COMPONENT FAILURE DATA

Manufacturer	Nomenclature	Model Number	MFG Part Number
SOR, Inc.	Differential Pressure Switch	103AS-B203-NX-JJTTX6	N/A

TEXT

FIGURE 1

CONFIGURATION OF TEST EQUIPMENT FOR LEAKAGE INTEGRITY CHECK



Commonwealth Edison
LaSalle County Nuclear Station
Rural Route #1, Box 220
Marseilles, Illinois 61341
Telephone 815/357-6761

August 29, 1988

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Dear Sir:

Licensee Event Report #87-019-01, Docket #050-374 is being voluntarily submitted to your office in accordance with the requirements of IE Bulletin 86-02, "Static-O-Ring Differential Pressure Switches" to supplement previously submitted report.

W R S for
G. J. Diederich
Station Manager
LaSalle County Station

GJD/RJR/kg

Enclosure

xc: Nuclear Licensing Administrator
NRC Resident Inspector
NRC Region III Administrator
INPO-Records Center

IE22
1/1