

LICENSEE EVENT REPORT (LER)

Form Rev. 2 0

Facility Name (1) Quad Cities Unit One	Docket Number (2) 0 5 0 0 0 2 5 4	Page (3) 1 of 0 5
Title (4) Unit One High Reactor Pressure Permissive Switch to the Residual Heat Removal (RHR) Shutdown Cooling System Would Not Close and Would Not Calibrate Due to Switch Aging.		

Event Date (5) Month: 0 9 Day: 1 7 Year: 1998			LER Number (6) Year: 1998 Sequential Number: 0 1 9 Revision Number: 0 0			Report Date (7) Month: 1 0 Day: 1 4 Year: 1998			Other Facilities Involved (8) Docket Number(s) Facility Names: 0 5 0 0 0 0				
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OPERATING MODE: (9) 1

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

POWER LEVEL (10) 1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)	50.36(c)(1)	X 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
	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)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

Name: Charles Peterson, Regulatory Affairs Manager, ext. 3609

TELEPHONE NUMBER: 3 | 0 | 9 | 6 | 5 | 4 | - | 2 | 2 | 4 | 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	B	O	P	S	B	0	7	0	Y

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) X NO

Expected Submission Date (15)

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

ABSTRACT:

At 1915 on 09171998, during the performance of QCIS 0200-23, "Reactor High Pressure Shutdown Cooling Permissive/Isolation Calibration and Functional Test", switch 1-261-23B SW1 failed to close when required. With the failure of this switch, the RHR Shutdown Cooling (SDC) suction valves could not be electrically opened from the control room if required for the SDC function. Technical Specification Table 3.2.A-1 item 7.b requires a minimum of two CHANNEL(s) per TRIP SYSTEM to be operable in modes 1, 2, and 3. The required action is to close the affected system isolation valves within one hour and declare the affected system inoperable. SDC was not required to be operable at the time of the event. The pressure switch was declared inoperable at 1936 on 09171998 and Technical Specification 3.2.A Action 2 was entered. This action statement requires the inoperable TRIP SYSTEM to be placed in the tripped condition within one hour. The pressure switch was electrically disarmed at 2020 on 09171998.

The pressure switch was replaced, tested, and declared operable on 09181998. The cause of the failure of the switch was determined to be due to the age of the switch. A review of other pressure switches of this type has been performed to determine if excessive aging is a factor on other switches in similar applications. It has been determined that there have been no failures of this type since the start of the Problem Identification Form (PIF) program in August of 1993.

The ability to electrically bypass this pressure switch and the ability to manually open the SDC suction valves remained available throughout this event. Therefore, the potential safety consequences to the public and to control room personnel were minimal.

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

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power.

EVENT IDENTIFICATION: Unit One High Reactor Pressure Permissive Switch to the Residual Heat Removal (RHR) Shutdown Cooling System Would Not Close and Would Not Calibrate Due to Switch Aging.

A. CONDITIONS PRIOR TO EVENT:

Unit: 1 Event Date: 09171998 Event Time: 1915
 Reactor Mode: 1 Mode Name: Power Operation Power Level: 100%

This report was initiated by Licensee Event Report 254/98-019

Power Operation (1) - Mode switch in the RUN position with average reactor coolant temperature at any temperature.

B. DESCRIPTION OF EVENT:

At 1915 on 09171998, during the performance of QCIS 0200-23, "Reactor High Pressure Shutdown Cooling Permissive/Isolation Calibration and Functional Test", switch 1-261-23B SW1 failed to close when required. With the failure of this switch, the RHR SDC [BO] suction valves could not be electrically opened from the control room if required for the SDC function. Technical Specification Table 3.2.A-1 item 7.b requires a minimum of two CHANNEL(s) per TRIP SYSTEM to be operable in modes 1, 2, and 3. The required action is to close the affected system isolation valves within one hour and declare the affected system inoperable. SDC was not required to be operable in the current operating mode of the unit. The pressure switch was declared inoperable at 1936 on 09171998 and Technical Specification 3.2.A Action 2 was entered. The required action is to place the inoperable TRIP SYSTEM in the tripped condition within one hour. The pressure switch [PS] was electrically disarmed at 2020 on 09171998.

On each Unit, there are two pressure switches that monitor reactor pressure. When reactor pressure is less than 135 psig, the pressure switch contacts close. When both pressure switches detect a low pressure condition, then the isolation signal to MO-1001-47, SDC suction outboard isolation valve, and MO-1001-50, SDC suction inboard isolation valve, can be reset. This allows the operator to manually open these valves, and then manually start the RHR pumps in the SDC mode. Other normal manual in the field actions required to initiate SDC include filling and venting the SDC suction header, restoration of power to the armature to the motor for valve MO-1001-47, and closure of the electrical circuit breakers to valves MO-1001-47 and MO-1001-50.

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C. CAUSE OF THE EVENT:

The following information was gathered during the investigation into this event:

- The Work History of this pressure switch and the redundant pressure switches in this application on Unit 1 and Unit 2 revealed that PS 1-261-23B (the failed switch) had never been replaced since original construction. PS 1-261-23A was replaced on 08081989 and again on 02061997. The two Unit 2 pressure switches, PS 2-261-23A and 2-261-23B, were replaced on 04161990.
- From 10211993 through 08011996 there were 17 occurrences in which the Unit 1 or Unit 2 pressure switches were found to be out of tolerance. No Technical Specification limits were exceeded and the pressure switches were recalibrated to within tolerance. Corrective actions were taken to calibrate the switches on a monthly frequency and the pressure switches have not been found to be out tolerance since 08011996. The Technical Specifications require that these switches be calibrated and functionally tested on a quarterly time frame.
- The pressure switch manufacturer was contacted to determine if an age related issue exists with this particular pressure switch model. The vendor stated that their predicted lifetime is based upon one million cycles for this type of pressure switch. The actual number of cycles will be less than several thousand for the entire plant life. The vendor does not predict a failure based on years only. The vendor stated that pressure switches of this type are in operation, which are fifty years old.
- Two different pressure switch models are used at the station. The B2T-A12SS model is rated for alternating current (AC) in the micro switch circuitry, while the B2T-M12SS model is rated for either direct current (DC) or for AC in the micro switch circuitry. This particular application is AC; therefore, either model would be acceptable. There is no reason, per the switch manufacturer, that one model would be more likely to fail than the other would. After the replacement of the failed switch, both Unit 1 pressure switches are now Barksdale model number B2T-A12SS. The Unit 2 pressure switches (as was the pressure switch that failed on Unit 1) are model number B2T-M12SS. The manufacturer states that both switch types are very similar and are still available for procurement.

These facts lead to the conclusion that the root cause of this failure is age related. The fact that the failed Unit 1 switch was approximately 28 years old and the other switches had all been replaced within the last 8 years indicates that the switch failure is age related. All four switches have performed acceptably for the last two years since monthly calibration and functional testing has been instituted.

This root cause determination was discussed with the Station instrumentation component expert and with a Barksdale engineer. Both agreed this is the most probable failure mode. The Barksdale engineer stated that even though no age limit is provided other than the one million cycles, the actual lifetime could be affected by environmental factors, the application, setpoint, frequency of exercising, and normal operating pressure of the bourdon tube.

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D. SAFETY ANALYSIS:

The consequences of this event were minimal.

The performance of QCIS 0200-23, "Reactor High Pressure Shutdown Cooling Permissive/Isolation Calibration and Functional Test", on a monthly frequency, indicates that this pressure switch failed recently. If SDC were required it would have been possible to electrically bypass the failed pressure switch by jumpering the interlock logic. This would have allowed the initiation of SDC after the performance of the other normal manual in the field actions, as discussed in the Description of Events section. It would have also been possible to manually open valves MO-1001-47 and MO-1001-50 to initiate SDC. This would have required the verification that reactor pressure was below the setpoint and the de-inertion of the drywell atmosphere to allow personnel entry into the drywell. De-inertion of the drywell is usually accomplished prior to initiating SDC during the cooldown process using the main condenser. These contingency actions would have required the entry into Technical Specification 3.2.A Action 2 that contains a footnote that, "An inoperable CHANNEL need not be placed in the tripped condition where this would cause the trip function to occur. In these cases, the inoperable CHANNEL shall be restored to OPERABLE status within 2 hours or the ACTION required by Table 3.2.A-1 for that trip function shall be taken." The ACTION in the table is to "close the affected system isolation valves within one hour and declare the affected system inoperable." If the switch was found to be failed and it was desired to initiate SDC, the isolation valves could have been opened by bypassing the isolation signal. Within the required one hour ACTION requirement, the Unit would be in mode four (COLD SHUTDOWN) where the isolation requirement is no longer required.

E. CORRECTIVE ACTIONS:

Corrective Actions Completed:

1. The failed pressure switch was electrically disarmed per Technical Specification 3.2.A Action 2. This was completed at 2020 on 09171998.
2. Action Request 980058445 was written to replace pressure switch 1-261-23B. The pressure switch was replaced and successfully tested on 09181998 under Nuclear Work Request 980096799-01.
3. The Work History was reviewed for all the pressure switches in this application.
4. The Problem Indication Form (PIF) program history was reviewed for these pressure switches.
5. The pressure switch manufacturer was contacted concerning this switch and the similar switches.
6. Nuclear Operations Notification (NON) QC-98-106 was initiated to notify the other ComEd plants concerning this event and pressure switch failure.
7. The pressure switch manufacturer was contacted to determine if an age related issue exists and if an abnormal failure rate has been observed with this particular pressure switch model.
8. A review of other Barksdale pressure switches models used at Quad Cities Station, as listed in Vendor Manual C0007, was completed. A search of the PIF database for these pressure switch equipment piece numbers (EPN) showed no failures of the switch to close or to actuate, since the initiation of the PIF system in August of 1993.

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Since these pressure switches are tested monthly and the switch age limit cannot be readily predicted and since switch failure is a very rare occurrence, no other actions are planned at this time.

F. PREVIOUS OCCURRENCES:

A search was performed of the PIF database and LERS over the past two years for problems of these pressure switches on SDC pressure permissive. No similar failures have been noted.

G. COMPONENT FAILURE DATA:

Component Description: Pressure Switch

Manufacturer: Barksdale

Model Number: B2T-M12SS