LICENSEE EVENT REPORT (LER) Form Rev. 2.0

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Title (4)

Condenser Vacuum Scram Switches Found Out Of Technical Specification Limits Due To Apparent Setpoint Drift.

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)
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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)		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)		
	0	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	Other (Specify		
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	in Abstract		
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	below and in		
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	Text)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Nick Chrissotimos, Regulatory Assurance, Ext. 3100	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 NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X										

SUPPLEMENTAL REPORT EXPECTED (14)		Expected Submission Date (15)	Month	Day	Year
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		1 1	3 0	9 5

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

ABSTRACT

On July 26, 1995, at 1500 hours, Unit Two was in the Shutdown mode. During a quarterly calibration and functional test per QCIS 500-1, "Quarterly Low Condenser Vacuum [SH] Scram Calibration and Functional Test", all four (4) low condenser vacuum scram switches [PS] 2-503-A/B/C/D setpoints were found to be out of their Technical Specifications (TS) limit of 21" Hg. (decreasing). A Problem Identification Form (PIF) was written and the switches were calibrated to within the allowable tolerance. The safety consequences of this event are minimal. The unit was in the Shutdown mode and per TS, the operation of the low condenser vacuum scram switches is not required. The switches were replaced with like-for-like switches on July 27, 1995. The new switches were placed in an accelerated weekly calibration frequency for the first month and monthly for the next five months. Any further corrective actions will be determined based on the results of the accelerated calibration and also on the results of the failure analysis of the old, replaced switches.

PLANT AND SYSTEM IDENTIFICATION:
General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power.

EVENT IDENTIFICATION: Condenser Vacuum Scram Switches found out of Technical Specification Limits due to apparent Setpoint Drift.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: July 26, 1995 Event Time: 1500
Reactor Mode: 1 Mode Name: Shutdown Power Level: 0

This report was initiated by Licensee Event Report LER265\95\004.

SHUTDOWN (1) - In this position, a reactor scram is initiated, power to the control rod drives is removed, and the reactor protection trip systems have been deenergized for 10 seconds prior to permissive for manual reset.

B. EVENT DESCRIPTION

On July 26, 1995, at 1500 hours, Unit Two was in the Shutdown mode. During a quarterly calibration and functional test per QCIS 500-1, "Quarterly Low Condenser Vacuum Scram Calibration and Functional Test", all four (4) low condenser vacuum scram switches 2-503-A/B/C/D setpoints were found to be out of their TS limit of 21" Hg. (decreasing). The "As Found" setpoints of the four vacuum switches ranged from 20.55" Hg. to 20.90" Hg. (decreasing). A PIF was written and the switches were calibrated to within the tolerance. It was determined to replace these switches with like-for-like switches on July 27, 1995. There were no Engineered Safety Feature (ESF) actuations resulting from this event.

The reactor is protected from the effects of a complete loss of vacuum in the turbine-generator condenser by closing the turbine stop valves and the turbine bypass valves. The scram on condenser low vacuum is designed to reduce the severity by anticipating the transient and scramming the reactor at a slightly higher vacuum than the setpoints that close the turbine stop valves and bypass valves.

C. APPARENT CAUSE OF EVENT

This Licensee Event Report (LER) is being submitted due to the requirements of 10CFR50.73(a)(2)(v)(A).

The apparent cause of this event was setpoint drift which caused all four switches to be out of TS setpoint limits. This type of switch has been known to have setpoint drift. There were 18 occurrences at Quad Cities in the last five (5) years in which a condenser low vacuum switch setpoint was out of the allowable tolerance. None of these occurrences resulted in a TS limit violation due to a built-in margin of safety between the instrument setpoint and the TS setpoint.

The root cause of the setpoint drift is still being investigated. Two of the four replaced switches were sent to Material Engineering Group (MEG) for failure analysis. The two remaining switches are being investigated on-site by System Engineering and Instrument Maintenance Department. Also, Barksdale application Engineering was requested to assist with the root cause analysis. The results of the investigation will be reported in a supplementary report expected to be issued by November 30, 1995.

One possible cause considered was improper calibration methodology. The calibration procedure was reviewed. The calibration of the vacuum switches was overviewed by Engineering and Quality Control Department. No deficiencies in the procedure or the calibration performance were found.

Another possible cause considered was condenser vacuum sensing line slope problem found in August 1995. The sensing line slope problem was corrected. Due to the calibration performance method of the low condenser vacuum switches, it was determined that the sensing line slope is irrelevant to the switch setpoint drift problem.

Another possible cause considered was human error on the part of the Instrument Maintenance (IM) technician who performed the calibration on these switches in April 1995 during the initial installation. The calibration performed in April 1995 was witnessed by a Quality Control inspector and the switch setpoints were found to be within their tolerance. Also, the same technician reperformed the calibration check of these switches on July 27, 1995, as part of the accelerated calibration frequency program. The switch setpoints were again checked on July 28, 1995, by a different IM technician, and found to be within their tolerance. Based on this analysis, it was determined that there was no human error associated with this event.

The last possible cause considered was that this batch of switches was defective. These four switches were procured in February 1995 and installed in April 1995 during a unit shutdown. This was the first and only time these switches have been calibrated since installation. MEG is investigating this issue and the results will be reported in a supplementary report.

D. SAFETY ANALYSIS OF EVENT

The safety consequences of this event are minimal. The unit was in the Shutdown mode and per TS, the operation of the low condenser vacuum scram switches is not required nor had been required since their installation in April 1995. The automatic scram initiation from these switches is bypassed when the reactor mode switch is not in Run.

Had the reactor been in the RUN mode and a low condenser vacuum event occurred, the reactor would have scrammed at 20.6" Hg. from low condenser vacuum scram switches 2-503C and 2-503D. The scram would have occurred prior to the automatic closure of the

main turbine stop valves and the main turbine bypass valves which would actuate at 20.4" Hg. and 7.5" Hg., respectively. This was based on the last calibration surveillance of the main turbine stop valves and the main turbine bypass valves vacuum switches performed in March 1995. Had the main turbine stop valve switch setpoints also drifted in the conservative direction, the turbine stop valves would close prior to the scram initiation from the low condenser vacuum scram switches.

The condenser low vacuum scram is a backup to the turbine stop valve closure scram and causes a scram before the turbine stop valves close on condenser low vacuum, thus reducing the transient on the reactor. However, the turbine stop valve closure scram function alone is adequate to prevent the cladding safety limit from being exceeded in the event of a turbine trip transient with bypass valve closure.

E. CORRECTIVE ACTIONS

Corrective Actions Completed:
The immediate corrective action was to recalibrate the pressure switches to their allowable setpoint tolerance by performance of procedure QCIS 500-1, "Quarterly Low Condenser Vacuum Scram Calibration and Functional Test". On July 27, 1995, it was decided to replace all four switches and their setpoints were changed to a higher value for added margin of safety. The replaced switches were quarantined for further investigation.

Two switches were set up in the Instrument Maintenance Department (IMD) shop for on-site failure analysis performed by System Engineering and IMD. Two calibration tests, each with three setpoint calibration readings, were performed. There was no evidence of setpoint drift found. All the readings were within the instrument tolerance. The switches were internally inspected. No evidence of physical damage or loose components were found.

Corrective Actions to Be Completed:
The switches were placed in an accelerated calibration frequency. For the next six (6) months, the calibration frequency was accelerated to weekly for the first month and to monthly for the remaining five (5) months. Based on the results of the calibration surveillances, further corrective actions will be determined. This will be completed by November 1, 1995. To date, three weekly calibrations have been performed on the new switches with the switches setpoints changed to a higher value for added margin of safety. The switches continue to be calibrated per the accelerated frequency. (INSTRUMENT MAINTENANCE; NTS#2651809500401)

The manufacturer's assistance was requested to determine the root cause(s)of the switches' failure. A copy of the calibration procedure will be sent to the manufacturer for review. This will be completed by September 1, 1995. (SYSTEM ENGINEERING; NTS#2651809500402)

Two of the replaced switches were sent to MEG for failure analysis. MEG is testing the switches for temperature, humidity, and cycling effects associated with the setpoint drift. A 10CFR part 21 notification may be warranted based on the failure analysis. The manufacture has suggested that the root cause of the setpoint drifts might be due to differential temperature effects and/or lack of switches' setpoint cycling prior to installation. These potential root causes are being investigated by MEG. Corrective actions based on this analysis will be identified by November 1, 1995. (SYSTEM ENGINEERING; NTS#2651809500403)

The results of the follow-up corrective actions will be reported in a supplementary report expected to be issued by November 30, 1995.
(SYSTEM ENGINEERING; NTS32651809500404)

F. PREVIOUS EVENTS

A Nuclear Plant Reliability Data System (NPRDS) search has been conducted for the last ten years for events involving these low condenser vacuum scram switches which resulted in TS Limit violation. There were 17 occurrences in which a Barksdale Condenser Low Vacuum Switch was found to be out of TS limit due to setpoint drift. Among these, 10 out of 17 setpoint drift occurrences were caused by changes in the ambient temperature. The root cause(s) of the rest of the setpoint drift occurrences were undetermined.

G. COMPONENT FAILURE DATA

Equipment Piece Number	2-503A/B/C/D
Manufacturer	Barksdale
Model Number	D1T-H18SS
Description	Vacuum Pressure Switches