



CHARLES CENTER • P.O. BOX 1475 • BALTIMORE, MARYLAND 21203-1475

CALVERT CLIFFS NUCLEAR POWER PLANT DEPARTMENT
CALVERT CLIFFS NUCLEAR POWER PLANT
LUSBY, MARYLAND 20657

April 30, 1990

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

Docket No. 50-317
License No. DPR 53

Dear Sirs:

The attached LER 90-11, Revision 0, is being sent to you as required under 10 CFR 50.73.

Should you have any questions regarding this report, we would be pleased to discuss them with you.

Very truly yours,

R. E. Denton
Manager

DWM/lr

cc: Thomas T. Martin
Director, Office of Management Information
and Program Control
Messrs: G. C. Creel
C. H. Cruse
J. R. Lemons
L. B. Russell
R. P. Heibel

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (5150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Calvert Cliffs, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 1 7 1				PAGE (3) 1 OF 06			
TITLE (4) Power Operated Relief Valve Inoperability Due to Open Overload Contact																	
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)				
03	3	09	09	01	1	00	04	3	09	0	5	0	0	0			
OPERATING MODE (9) 5		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)															
POWER LEVEL (10) 01010		20.402(b)				20.408(e)				50.73(a)(2)(iv)				73.71(b)			
		20.406(a)(1)(i)				50.36(e)(1)				50.73(a)(2)(v)				73.71(c)			
		20.406(a)(1)(ii)				50.36(e)(2)				50.73(a)(2)(vi)				OTHER (Specify in Abstract below and in Text, NRC Form 306A)			
		20.406(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)							
		20.406(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)							
		20.406(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)							
LICENSEE CONTACT FOR THIS LER (12)																	
NAME D. W. Muth, Compliance Engineer										TELEPHONE NUMBER AREA CODE 31011 216101-13151912							
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																	
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC							
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)																	
<p>On March 30, 1990, Power Operated Relief Valve ERV-402 was found to have been inoperable for up to 19 months. Surveillance Test Procedure M-572-B-1, "Pressurizer Relief Valve Channel Calibration," is performed every 18 months to verify the operability of the PORVs. While performing this STP, Baltimore Gas and Electric Company personnel found the thermal overload contact for ERV-402 open, indicating that an overcurrent condition had existed for a sufficient amount of time to cause the circuit to open.</p> <p>Insufficient monitoring and followup of physical problems with the PORVs was the root cause of this condition.</p> <p>A procedure will be initiated to require that all PORVs be inspected periodically to prevent problems from developing which will inhibit operability of the valve. This procedure will also require that the current to the solenoid be checked.</p> <p>The procedure for overhauling the PORVs will be revised to require visual verification that the slug is fully extended during adjustment.</p> <p>An evaluation will be performed to determine the need for adding indication of tripped overloads in this and similar systems.</p> <p>The Unit 2 PORVs will be verified operable prior to restart.</p>																	

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FACILITY NAME (1) Calvert Cliffs, Unit 1	DOCKET NUMBER (2) 0500031790	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		0	1	1	0	2 OF 6

TEXT (If more space is required, use additional NRC Form 306A's) (17)

1. DISCUSSION

On March 30, 1990, with Unit 1 in MODE 5 and Unit 2 defueled, Power Operated Relief Valve (PORV) (EIIS AB-RV) ERV-402 was found to have been inoperable for probably as long as 19 months. This is a violation of Technical Specifications 4.4.3.1 and 4.4.9.3 and therefore reportable under 10 CFR 50.73(a)(2)(i)(B).

Surveillance Test Procedure (STP) M-572-B-1, "Pressurizer Relief Valve Channel Calibration," is performed every 18 months to verify the operability of the PORVs. On March 30, 1990, while performing this STP, Baltimore Gas and Electric Company personnel found the thermal overload contact (EIIS AB-76) for ERV-402 open, indicating that an overcurrent condition had existed for a sufficient amount of time to cause the circuit to open. During the performance of the STP, no alarm signal was received in the control room to indicate that the PORV was energized. It was therefore evident that the overload contact had been open prior to the test being run. The PORV had been inoperable for an unknown period of time without Control Room Operators being aware of it. There is no alarm or indication to inform personnel that an overload contact is open.

Upon review it was discovered that the same valve had been found in this condition during the performance of the STP in April of 1988. The overload trip was reset and the STP successfully performed at that time. An inadvertent actuation of ERV-402 occurred on June 26, 1988 and was documented in the 1988 Annual PORV and Safety Valve Failures/Challenges Report. This was the last time the valve is known to have been operable. As discussed below, a review of available records has led to the conclusion that the overload contact opened as a result of this actuation.

Figure 1 is a simplified drawing of the ERV-402 assembly. Upon receipt of an actuation signal, the solenoid (EIIS AB-SOL) forces down the slug which depresses the operating lever. A roller at the end of the slug reduces the frictional forces between the slug and the operating lever, allowing easier movement of the latter. The operating lever forces down the spindle, opening a pilot valve (EIIS AB-LOV) which bleeds off steam from the main valve. The resulting pressure differential causes the main valve to open. An adjusting nut on top of the spindle allows for calibration and adjustment of the assembly.

During performance of STP M-572-B-1, the open overload contact prevented the solenoid from energizing as stated above. The contact was reset and the test performed. A root cause analysis was performed to determine the cause of the overload condition.

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In its as-found condition, ERV-402 drew a current of 2.65 amperes. The manufacturer specifies a maximum current of 1.6 amperes. The overload contact is rated at 1.9 amperes. After 3 minutes of operation at 2.65 amperes, the overload contact opened. During operation, the slug in the solenoid was observed to chatter noticeably. Records indicate that during the actuation of the valve on June 26, 1988, current was supplied to the valve over 3 minutes.

Upon further investigation, the roller at the end of the slug was found to be frozen in place. With the roller removed, the slug was found to travel an extra 1/4 inch. The current was measured at 1.4 amperes. The roller was replaced with one that moved freely and the pilot valve was slightly readjusted. The current remained at 1.4 amperes, within design, and the valve functioned properly. No chatter was observed in the solenoid.

II. CAUSE OF CONDITION

The immediate cause of this condition was the inability of the slug to extend its full length which prevented it from reaching magnetic center. This caused the chatter in the solenoid and required excess current to be drawn to operate the valve. Movement of the slug was inhibited by the stuck roller which applied additional friction force increasing the current necessary to open the valve and may have caused a moment between the slug and the lever arm preventing free movement of the slug. The slug had been positioned high during its last readjustment but was within the tolerance specified by the manufacturer. The combination of the high positioning of the slug and the stuck roller prevented the slug from reaching magnetic center.

The available evidence indicates that the roller had been stuck since the initial installation of the valve. The bearing on which the roller was mounted was too short to prevent the roller from being clamped in place when the bolt running through the bearing was tightened. The vendor information provided did not include any guidance on the significance of a freely moving roller. No examination of the roller or solenoid was performed to verify that full travel of the slug was not interfered with. There was no procedural requirement to examine the solenoid or roller and repair identified problems. This insufficient monitoring and followup of physical problems with the PORVs was the root cause of this condition.

Maintenance procedure RCS-25, "Electromatic Relief Valve Removal, Repair and Reinstallation" governs the maintenance and adjustment of PORVs. This procedure did not include steps to ensure that personnel performing the procedure visually verified that the slug was extended its full length during adjustment of the spindle. It was therefore possible to adjust the valve and leave it in a condition in which it would draw too much current as was the case with this event. The valve had been adjusted in accordance with RCS-25 and was

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within the tolerances allowed by the procedure. This procedural inadequacy contributed to this condition. An additional contributory procedural problem lay in the lack of a Post Maintenance Test to require that the current to the solenoid be checked against the design rating.

Contributing to this event was insufficient depth of assessment and root cause analysis when a similar condition was found in April of 1988. The investigation performed at that time did not identify that excessive current was being drawn and did not identify the stuck roller as a possible contributor to the condition.

An additional contributing cause of this event was the lack of indication that an overload contact had been tripped.

III. ANALYSIS

The PORVs were originally installed to protect the Pressurizer Safety Valves from lifting and possibly not reseating during plant operation. In 1978 the PORVs were modified for use in mitigating overpressurization events at low temperature. No credit is taken for the operability of the PORVs in any Updated Final Safety Analysis Report (UFSAR) accident analysis.

In Emergency Operating Procedure EOP-3, the PORVs are relied on for emergency once-through core cooling in the event of a Total Loss of All Feedwater. In the event that the steam generators become ineffective for heat removal, the RCS is vented to containment atmosphere via the PORVs. The loss of a single PORV would limit flow to the point that once-through core cooling could probably not be maintained. Total loss of all feedwater is not a design basis event. The FSAR assumes that emergency feedwater is available in the event of a feedline break.

As stated in the Low Temperature Overpressure Protection (LTOP) System Description dated July 21, 1977 and updated on March 2, 1990, the LTOP analyses for Calvert Cliffs assume only one PORV is available to mitigate an overpressurization event. As stated above, PORV ERV-402 was unavailable for a period of up to 19 months. However, a redundant PORV, ERV-404, was generally operable during this time, as demonstrated by successful performance of STP-M-572-B-1 on ERV-404 both in April, 1988 and March, 1990. ERV-404 was taken out of service seven times for surveillance testing during these 19 months. The approximate total time the valve was unavailable was seven hours. This condition was therefore within the design assumptions for the LTOP system with the exception of the relatively small amount of time ERV-404 was out of service.

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Since November 24, 1989, the LTOP controls have been sufficient to prevent overpressurization of the Reactor Coolant System. Therefore, since this time, the unavailable PORV has had no adverse effect on the health and safety of the public. Prior to this time, LTOP controls were not sufficient. An analysis of this condition during the earlier timeframe will be provided as discussed below.

Previous problems with the LTOP design are documented in LER 89-19 and Inspection Report 50-317/89-31, 50-317/89-32. A supplement to LER 89-19 will address the safety significance of the LTOP design problems. This supplement will include a discussion of the effects on these problems of the unavailability of ERV-402 for the past year and a half.

IV. CORRECTIVE ACTIONS

1. A procedure will be initiated to require that all PORVs are inspected periodically to prevent problems from developing which may inhibit operability of the valve. This procedure will also require that the current to the solenoid be checked.
2. The procedure for overhauling the PORVs, RCS-25, will be revised to require that, while the pilot valve setting is being adjusted, full extension of the slug is visually verified.
3. We have previously identified the problems of insufficient depth of assessment and root cause analysis. Section 4.6 of our Performance Improvement Plan states that root cause analysis training will be provided to System Engineers to improve problem solving capability and reduce events and repetitive failures. This training has been provided and was put to use by the System Engineer in discovering and analyzing the condition described above.
4. An evaluation will be performed to determine the need for adding indication of tripped overloads in this and similar systems.
5. The Unit 2 PORVs will be verified operable prior to restart.
6. Operating procedures will be revised to require verification that the overload contacts are not tripped following PORV actuation.

V. ADDITIONAL INFORMATION

As discussed above, a condition regarding inadequate LTOP controls was reported as LER 89-19.

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Figure 1

