



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

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

February 8, 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 90-01, Revision 0, is being sent to you as required under 10 CFR 50.73 guidelines.

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

Very truly yours,

R. E. Denton  
Manager

KWG/lr

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

9002160170 900208  
FDR ADOCK 05000317  
S PIC

1E22  
11

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3100-0101  
EXPIRES 6/30/88

FACILITY NAME (1)  
Calvert Cliffs, Unit 1

DOCKET NUMBER (2)  
0 5 0 0 0 3 1 7

PAGE(S)  
1 OF 0 6

TITLE (4)  
PORV/Safety Valve Acoustic Monitor System Inoperable Due to Inadequate Procedure

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)
01	01	1990	1990	001	0	02	08	1990	Calvert Cliffs, Unit 2	0 5 0 0 0 3 1 8
										0 5 0 0 0 3 1 8

OPERATING MODE (9)

POWER LEVEL (10) 01010

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

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)	<input type="checkbox"/> 60.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 60.73(a)(1)	<input type="checkbox"/> 60.73(a)(2)(v)	<input type="checkbox"/> 73.71(a)
<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 60.73(a)(2)	<input type="checkbox"/> 60.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 60.73(a)(2)(iii)	<input type="checkbox"/> 60.73(a)(2)(viii)(A)	
<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 60.73(a)(2)(ii)	<input type="checkbox"/> 60.73(a)(2)(viii)(B)	
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 60.73(a)(2)(iii)	<input type="checkbox"/> 60.73(a)(2)(v)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: K. W. Gross, Engineer

TELEPHONE NUMBER: 310 112 1610 - 131615 11

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NFRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NFRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15): 0 5 3 1 1 9 0

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

Abstract

On December 21, 1989, it was noted that the indications for one Power Operated Relief Valve (PORV) and one Safety Valve were reversed in Unit 1. An investigation of the cause determined that input leads to the instrument transmitters had been switched for the two channels of instrumentation.

It was determined that the surveillance tests used to perform the channel calibration tests for the acoustic flow monitoring devices were inadequate. This test inadequacy has existed since the original performance of the test and rendered the acoustic monitoring channels administratively inoperable since they were installed.

The swapped leads were restored to their proper configuration. The surveillance tests will be revised and re-performed. The Surveillance Test Program is being upgraded to address the historical weakness identified in this event. One of the responsibilities of the Functional Surveillance Test Coordinators is to ensure all new Surveillance Test Procedures are generated and reviewed to ensure compliance with Technical Specifications. The above corrective actions address the specific event. However, we fully appreciate and are very concerned about the broader implications of this event. Therefore, an in-depth assessment of the generic programmatic concerns relating to this event has been initiated. The results will be provided in a supplement to this LER.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Calvert Cliffs, Unit 1	DOCKET NUMBER (2) 0500031790	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
			001	00	02	OF

TEXT IF MORE SPACE IS REQUIRED. USE ADDITIONAL NRC Form 306A's (17)

Event Description

On December 21, 1989, Unit 1 was in Mode 5 (Cold Shutdown) at 25 psia and 115 degrees F when during a surveillance test (Surveillance Test Procedure (STP) M-539-1) it was discovered that the acoustic indications for one Power Operated Relief Valve (PORV) and one Safety Valve were reversed. An investigation of the cause of the swapped indications determined that input leads to instrument transmitters located in the containment building had been switched for the two channels of indication.

Subsequent investigations into the presence of the swapped leads determined that the surveillance tests used to perform the channel calibration tests for each of the eight acoustic flow monitoring devices (four per unit), were inadequate in that they did not verify indication and alarm for the instrument channels. This test inadequacy has existed since the original performance of the test and rendered the acoustic monitoring channels administratively inoperable since they were installed.

The acoustic monitors are required to be operable in accordance with Calvert Cliffs Technical Specification 3/4.3.3.6, "Post-Accident Instrumentation." This Technical Specification requires one acoustic monitoring channel per safety/relief valve to be operable while the associated unit is operating in Mode 1, 2 or 3 (Power Operation, Startup and Hot Standby respectively). This condition has existed since June of 1982.

The condition was discovered during post-maintenance testing in accordance with the surveillance test procedure (STP) which is designed to provide Channel Calibration of the acoustic monitoring channels. The test was performed following maintenance on the system to install sensors with improved sensitivity. The improved sensor installation led to identification of a wiring discrepancy which did not affect system operability. Following resolution of the discrepancy, the system was tested in accordance with the STP and it was discovered that the signals for one PORV and one Safety Valve were reversed.

Troubleshooting was performed to locate the cause of the reversed indications, and it was determined the input leads from the acoustic sensors (accelerometers) to the associated signal transmitters (charge converters) were reversed. The signal transmitters are located inside of a transient shield enclosure inside the containment building near the pressurizer.

STP M-539-01 and -02 uses an oscilloscope to verify adequacy of the signal coming from the sensor. The performance of the STP uses personnel located at the sensor, which is on piping on top of the pressurizer, and personnel in the Control Room behind the control panel. The personnel behind the control panel operate the oscilloscope and the personnel on top of the pressurizer produce the induced signal by striking the piping with a hammer. During the STP the oscilloscope is located about 10 feet from the nearest system indication of flow, which is the LED display located on the back control panel. Due to the close physical proximity of the PORV/Safety Valve piping and sensors, the oscilloscope could sense a signal coming from one sensor even though the piping being struck was in the vicinity of another sensor. Operating the oscilloscope requires concentration and the signal coming from the pipe is of very short duration. These factors all contributed to the problem not being identified earlier.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Calvert Cliffs, Unit 1	DOCKET NUMBER (2) 0500031790	LER NUMBER (6)			PAGE (3) 03 OF 05
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		00	01	00	

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

The installation of the improved sensors had not required modification work on the swapped leads. An investigation was initiated to determine when the leads had been swapped and the affect on operability. On January 5, 1990 the condition was identified as a potentially reportable event and steps initiated to investigate and report in accordance with plant procedures.

The investigation of when the leads were swapped was conducted through an examination of the STP used to calibrate the system. The STP is required to be performed on a refueling frequency, and has typically been used following system maintenance to assure the system has been returned to operability. Historical performances of the procedure were obtained and reviewed to attempt to determine when the leads had been swapped, however it was noted that the STP did not include alarm or indication verification for the instrument channels. Rather the procedure called for the use of an oscilloscope to verify the size and duration of the output from each channel, without any recorded observation of system alarm or installed indication. Previous performances of the test did not readily identify any particular point at which the channels appeared to have been swapped. In addition, the less sensitive sensors used prior to a recent upgrade, and a wiring discrepancy which did not directly affect system operability, may have contributed to channel cross-talk between channels and a lower signal to noise ratio, limiting the ability to identify the swapped leads.

Cause of Event

The cause of the swapped input leads was personnel error either during initial installation or in subsequent system maintenance. The inadequate surveillance test prevents determination of the exact date of the erroneous installation. The less sensitive sensors and wiring discrepancy may have contributed to the failure to identify the swapped leads.

The cause of inadequate procedures has previously been identified as part of the historical root causes associated with the Performance Improvement Plan (PIP), Action Plan No. 5.2, Procedure Upgrade Project. Specifically, the PIP cites, 1) inadequate detail was provided in the procedures to ensure that they were technically correct and unambiguous, 2) inadequate control for capturing the bases for procedure changes as they are made, 3) over reliance upon worker knowledge and experience.

Analysis of Event

The acoustic monitors are required to be operable in accordance with Calvert Cliffs Technical Specification 3/4.3.3.6, "Post-Accident Instrumentation." This Technical Specification requires one acoustic monitoring channel per safety/relief valve to be operable while the associated unit is operating in Mode 1, 2 or 3 (Power Operation, Startup and Hot Standby respectively). This condition has potentially existed since June of 1982, a period of approximately 100 months. This is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as operation in a condition prohibited by Technical Specifications.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Calvert Cliffs, Unit 1	DOCKET NUMBER (2) 0500031790	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		00	01	00	04	OF 05

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

The acoustic monitors for one PORV and safety valve were found swapped and had there been a transient which required their use in determining which valve was discharging, plant operators could have been misled. A review of the system configuration prior to installation of the improved sensitivity sensors and resolution of the wiring discrepancy indicates that the system was functional in that flow in the discharge piping would have caused the system to alarm and indicate that flow. The swapped input leads would have caused erroneous indication of the source of the flow noise, however flow would have been indicated.

The acoustic monitors were provided to address concerns raised following the incident at Three Mile Island. They are used in conjunction with the plant parameters to identify and take action to address loss of coolant inventory via the PORVs.

Plant operator training emphasizes the use of diverse indications to analyze plant conditions. For PORV/Safety valve leakage the primary indications emphasized are high quench tank temperatures, high discharge piping temperatures, PORV solenoid power applied indication lamps and abnormal acoustic monitor indications. Procedures include these as indication of flow. Based on this, it is likely that the swapped input leads would not have prevented identification and proper response to leakage.

Based on this information, this condition did not threaten the health or safety of the public.

Corrective Actions

1. The swapped leads were restored to their proper configuration.
2. Surveillance Tests M-539-1 and -2 will be revised to fully address the Technical Specification requirements imposed on Channel Calibration tests. The procedures will be revised and re-performed prior to entering a mode which requires their operability in accordance with plant Technical Specifications. If wiring discrepancies are identified in Unit 2 during performance of the revised STP, they will be reported in a supplement to this LER.
3. The Surveillance Test Program has and is being upgraded to address the historical weaknesses identified in this event. The STP program improvement is a continuing effort and includes additional reviews of procedures and programs as needed. The effort is extensive and current plans include revising the PIP to address the actions required for additional detailed reviews of surveillance procedures. The effort will continue until all identified concerns have been addressed.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Calvert Cliffs, Unit 1	DOCKET NUMBER (2) 0500031790	LER NUMBER (6)			PAGE (3) 05 OF 05
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		00	01	00	

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

4. The revised Calvert Cliffs Instruction 104 assigns Functional Surveillance Test Coordinators (FSTC) responsibility for overseeing and maintaining the STPs assigned to them. The FSTC will ensure that Technical Specification surveillance requirements are addressed by those procedures. All new STPs will be generated and reviewed using strict guidelines designed to ensure surveillance compliance. New procedure reviews and biennial reviews of each STP will consist of two parts. The first part will be a technical review by the System/Component Engineer. The second part will be a functional review by the department responsible for performing the procedure.
5. The above corrective actions address the specific event. However, we fully appreciate and are very concerned about the broader implications of this event. Therefore, an in-depth assessment of the generic programmatic concerns relating to this event has been initiated. The results will be provided in a supplement to this LER.

Additional Information

A. Affected Component Identification

<u>Component</u>	<u>EIIS Function Code</u>	<u>EIIS System Code</u>
Power Operated Relief Valves	PSV	AB
Safety Valves	RV	AB
Acoustic Monitors	VE	IP
Signal Transmitter	VT	IP

B. Previous Similar Event

Somewhat similar events caused, or contributed to, by historical weaknesses in the STP program where described in LERs Nos. 317/89-013, 317/89-017, 318/89-022, and 317/89-24.