

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Calvert Cliffs Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 1 8										PAGE (3) 1 OF 0 5																		
TITLE (4) Failure of #21 MSIV to fully close during Surveillance Testing																																						
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	7	2	4	8	5	8	5	0	0	8	0	0	0	8	2	3	8	5											0	5	0	0	0					
OPERATING MODE (9) 3			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																																			
POWER LEVEL (10) 0 0 0			20.402(b)						20.405(c)						80.73(a)(2)(iv)						73.71(b)																	
			20.405(a)(1)(i)						80.38(c)(1)						80.73(a)(2)(v)						73.71(c)																	
			20.405(a)(1)(ii)						80.38(c)(2)						80.73(a)(2)(vii)						OTHER (Specify in Abstract below and in Text, NRC Form 365A)																	
			20.405(a)(1)(iii)						80.73(a)(2)(i)						80.73(a)(2)(viii)(A)																							
			20.405(a)(1)(iv)						80.73(a)(2)(ii)						80.73(a)(2)(viii)(B)																							
			20.405(a)(1)(v)						80.73(a)(2)(iii)						80.73(a)(2)(ix)																							
LICENSEE CONTACT FOR THIS LER (12)																																						
NAME Michael L. Holbrooks, Engineer																				TELEPHONE NUMBER 3 0 1 2 6 0 - 4 8 1 5																		
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																						
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS																													
X	S	B	8 4	Y																																		
SUPPLEMENTAL REPORT EXPECTED (14)																																						
YES (if yes, complete EXPECTED SUBMISSION DATE)																				X NO																		
EXPECTED SUBMISSION DATE (15)																				MONTH DAY YEAR																		

At 0600 on July 24, 1985, during the performance of Surveillance Test Procedure (STP) 0-1-2, #21 MSIV failed to reach the fully closed position. Although an indication problem was initially suspected, hydraulic fluid pressure on both the high pressure (cap) and low pressure (rod) ends of the actuator were abnormal and the valve was observed locally and found to be approximately one-half inch off its seat. At 0700, #21 MSIV was declared inoperable and was shut locally to satisfy the requirements of TS Action Statement 3.7.1.5.

An oil deficiency due to a gas bubble in the hydraulic fluid header was suspected and the ensuing investigation was performed under that premise. High nitrogen gas concentration was found in samples of the hydraulic fluid and the fluid was replaced. However, post maintenance testing indicated that additional component malfunctions/failures contributed to the MSIV failure. Subsequent corrective actions taken were as follows: (1) The bladders of both high pressure hydraulic suppressors were replaced; (2) The check valve which, following a stroke, isolates the cap end of the actuator from the rest of the actuation system was replaced.

After the above corrective actions were completed, #21 MSIV was fast stroked satisfactorily and at 1742 on August 2, 1985 it was returned to service.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

With the plant in MODE 3 at 0600 on July 24, 1985, #21 MSIV (SB-ISV) failed to fully close as required by the MSIV quarterly surveillance test and was declared inoperable. The operator initiated the attempt by taking #21 MSIV's handswitch (SB-HS) to the CLOSE position. This action should have resulted in the following:

1. The opening of one of the two in parallel solenoid operated pilot check valves (2-MSH-4042) (SB-FSV).
2. Discharge of high pressure hydraulic fluid from an accumulator bank (SB-ACC) which is maintained at a pressure of 4700-5000 psig to the high pressure header and the cap end of the actuator.
3. One of the two in series cap end vent solenoids (2-SV-4046) (SB-FSV) energizing to close, to isolate the cap end of the actuator (SB-84) from the hydraulic reservoir (SB-RVR).
4. The restrictor valves (SB-FSV) opening to a preset position, after sensing the increased high pressure header pressure to control the flow of hydraulic fluid from the rod end of the actuator, thereby controlling the MSIV closing speed. At the completion of the valve stroke rod end fluid pressure should be 0 psig.

Following the fast stroke of the valve, the control room indication showed that the valve had not shut. Initially, operations personnel suspected a position switch (SB-33) malfunction. However, local observation indicated that #21 MSIV remained 1/8" to 1/2" open. Rod end pressure had increased to 2400 psig at the end of the stroke. Cap end pressure was 1900 psig. At 0700 operations personnel shut #21 MSIV by locally running a H.P. pump to increase pressure on the cap end of the actuator.

The MSIV fast stroke quarterly surveillance test was performed to flush a suspected gas bubble from the hydraulic fluid header. It was suspected that a gas bubble was injected during a fast stroke on April 27, 1985 with a ruptured accumulator bladder (SB-ACC) in #13 accumulator. Abnormal partial stroke times had been observed since May 11, 1985 when performing STP-O-47-2 (MSIV partial stroke test) and subsequent investigation indicated that a gas bubble existed in the hydraulic fluid header between the solenoid operated pilot check valve (2-MSH-4042) and the cap end of the actuator. This conclusion was reached by observing the decrease in fluid volume in the hydraulic reservoir immediately after stroking the valve and the increase in reservoir volume that occurred several hours after the partial stroke. Based on these observations the bubble volume was determined to be approximately four (4) gallons. Since this volume is slightly less than half of the accumulator reserve oil inventory, the valve was considered to be operable. Repeated efforts to flush the bubble using the H.P. pumps were unsuccessful. However, calculations showed that the fluid velocity obtained during fast closure should be sufficient to move the gas bubble into the actuator cap end where it could be vented.

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APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

At 1400 on July 24, 1985, a pressurized fluid sample was taken from the cap end of #21 MSIV actuator. The sample was depressurized and 46 cc of N₂ gas was released from a 100 ml fluid sample which confirmed that gas was present. A pressurized sample taken from #22 MSIV contained 11 cc of N₂ gas in a 100 ml sample.

At 1800 on July 24, 1985, a schedule of testing was devised that was intended to purge the hydraulic system of gas and return the valve to service and then demonstrate that fast stroking the MSIV with a failed accumulator bladder could result in gas injection. The gas would then be purged from the hydraulic system and the valve returned to service.

At 2015 on July 24, #21 MSIV was stroked open and the oil and gas mixture from the actuator cap end was dumped. At 2330 on July 24, and again at 1010 on July 25, #21 MSIV was fast stroked successfully and was considered operable.

At 2115 on July 25, the plant was cooled down to MODE 4 and #21 MSIV was declared inoperable to allow performance of the failed bladder test. At 1145 on July 26 a fast stroke was performed with a simulated failed bladder. This was accomplished by using a bladderless accumulator in the #19 accumulator position. The fast stroke test failed. A pressurized fluid sample was obtained from the actuator cap end and gas concentration was observed to be greater than 56 cc in a 100 ml sample.

On July 26, 1985, pressure transducers were installed to monitor pressure at the accumulator header, the actuator rod end and cap end of #21 MSIV in order to investigate the dynamics of system operation during the failed bladder test. A second failed bladder test was performed at 1800 on July 27, 1985. This stroke failed and gas concentration was observed to be 68 cc N₂ per 100 ml fluid sample.

21 MSIV was fast stroked three (3) times late on July 27, 1985, and early on July 28 to remove the remaining N₂ gas from the system. At 1455 on July 28 the plant was heated up to MODE 3 to continue fast stroking. However, while depressurizing the hydraulic header in order to repair an o-ring leak on the restrictor valve (SB-FCV) pilot line, 10 gallons of hydraulic fluid was discharged after the header had been depressurized. This occurrence raised suspicion that gas might still be entrapped in the system. This suspicion was confirmed by a failed fast stroke at 1410 on July 29 and #21 MSIV was declared inoperable.

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

Fast strokes were conducted three times on #21 MSIV late on July 29 to determine if valve stroke time was affected by initial header pressure and to purge gas from the system. It was found that stroke time was not appreciably affected by header pressure but was controlled solely by oil volume delivered. At 2010 on July 29, operations personnel commenced a complete changeout of system oil to remove any remaining gas entrained oil and following the changeout the valve was declared operable.

A fast stroke per STP-O-1-2 was conducted at 0308 on July 30. The test failed and #21 MSIV was declared inoperable. Two fast strokes were then performed in an attempt to purge gas from the header and at 1143 cooldown to MODE 4 was commenced.

At 2230 on July 31, 1985 the high pressure hydraulic suppressors were examined. This examination was called for because comparisons of strip chart recordings of accumulator cap end pressure for #21 MSIV with the recordings for #11 and #22 MSIVs indicated excessive pressure oscillations at the completion of each fast stroke by #21 MSIV. Bladder pressures of 900 psig and 1400 psig were found when the H.P. hydraulic suppressors were examined. Specified pressure for the suppressors is 1200 ± 60 psig. When nitrogen gas was bled from the suppressor bladders, approximately one (1) gallon of hydraulic fluid issued from each bladder indicating ruptured bladders (Greer Hydraulics, Inc. P/N 600201). The suppressors were replaced. An additional two (2) gallons of hydraulic fluid was found in each bladder when the suppressors were disassembled. The H.P. hydraulic suppressors were identified as the probable source of the gas that had returned to the hydraulic system after each effort to flush the system during testing.

At 1618 on August 1, 1985, #21 MSIV was fast stroked per STP-O-1-2 satisfactorily. A second satisfactory fast stroke followed. Excessive pressure oscillations were still being observed and it was suspected that the accumulator cap end check valve (2-MSH-149) (SB-FCV) (Olmsted Products Co., Model # SV-124-2) was not shutting. Comparison of pressure oscillations upstream and downstream of the check valve confirmed that it was not shutting properly and it was replaced.

21 MSIV was fast stroked satisfactorily at 1742 on August 2, 1985 and the valve was declared operable. At 2007 the plant entered MODE 3. The valve was successfully fast stroked four (4) additional times on August 3, 1985.

On August 4, 1985 plant heat up continued. #21 MSIV was fast stroked satisfactorily at 2144 and at 0855 on August 5, 1985 the reactor was returned to power operation.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

The following corrective actions have been taken to prevent recurrence:

1. Establish a PM to perform MSIV accumulator bladder integrity tests weekly vice monthly. This frequency will be evaluated based on initial results of these tests.
2. Establish a PM to implement changeout of MSIV accumulator bladders at end of recommended service life.
3. Revise STP-O-47 to monitor reservoir level during MSIV partial strokes as an indication of system voiding.
4. Revise STP-O-1 to verify accumulator bladder integrity prior to and following each valve fast stroke.
5. Revise operating logs to record MSIV reservoir levels once per shift to detect failed bladders.

The following corrective actions will be taken to prevent recurrence:

1. Change out all MSIV accumulator bladders that have been in service longer than the recommended service life.
2. Establish a PM to implement changeout of high pressure hydraulic suppressor bladders at the end of recommended service life.

When this event occurred #22 MSIV remained operational throughout the event. Therefore, if a steam line break had occurred while #21 MSIV was inoperable, #22 MSIV would have shut and safety analysis assumptions would not have been violated.

A review of reportable events at Calvert Cliffs revealed no other events of gas entrained hydraulic fluid causing MSIV failure.

The contact for further information of this event is M. L. Holbrooks, (301) 260-4815.

BALTIMORE GAS AND ELECTRIC COMPANY

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

August 23, 1985

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

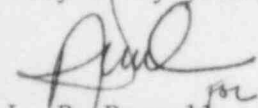
Docket No. 50-318
License No. DPR 69

Dear Sirs:

The attached LER 85-08 is being sent to you as required by
10 CFR 50.73.

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

Very truly yours,



L. B. Russell
Plant Superintendent

MLH
LBR/MLH/pah

cc: Dr. Thomas E. Murley
Director, Office of Management Information
and Program Control
Messrs: A. E. Lundvall, Jr.
J. A. Tiernan

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