Peter E. Katz
Plant General Manager
Calvert Cliffs Nuclear Power Plant

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657
410 495-4101

June 30, 1997

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1; Docket No. 50-317; License No. DPR 53
Licensee Event Report 97-005
Reactor Coolant System Leak Due to Failed Compression Fitting

The attached report is being sent to you as required under 10 CFR 50.73 guidelines. Should you have questions regarding this report, we will be pleased to discuss them with you.

Very truly yours,

John T Carroll
for
Peter E. Katz
Plant General Manager

PEK/CDS/bjd

Attachment

cc: R. S. Fleishman, Esquire
J. E. Silberg, Esquire
A. W. Dromerick, NRC
Director, Project Directorate I-1, NRC
H. J. Miller, NRC
Resident Inspector, NRC
R. I. McLean, DNR
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IE22

NRC FORM 366 (4-95)

U. S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES: 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Calvert Cliffs, Unit 1	05000 317	1 OF 06

TITLE (4)

Reactor Coolant System Leak Due to Failed Compression Fitting

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 NAME	DOCKET NUMBER 05000
05	29	97	97	-- 005	-- 00	06	30	97	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	100		20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (include Area Code)
C. D. Sly, Senior Engineer	410-495-4858

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
B	AB	PSF	P070	N					

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X	YES (If yes, complete EXPECTED SUBMISSION DATE)		NO		08	29	97

ABSTRACT (Limit to 1400 spaces, i.e., approximately15 single-space typewritten lines) (16)

On May 29, 1997 at 1620, Calvert Cliffs Unit 1 experienced a Reactor Coolant System leak of approximately 8-10 gallons per minute while operating at 100 percent power. Operators implemented Abnormal Operating Procedure-2A, declared an Unusual Event, and commenced a rapid unit downpower. The leakage source was a failed 3/4 inch compression fitting in an instrument line from the pressurizer vapor space. The leak was isolated at 1930. By 1935 the plant was in Hot Standby.

The cause of the compression fitting failure was improper assembly. It's ferrule was insufficiently compressed due to insufficient nut advancement.

Inspections of critical compression fittings in both Calvert Cliffs units was expeditiously completed. Other compression fittings will be evaluated and addressed during scheduled system maintenance. Additional corrective actions will be implemented based on the results of an ongoing root cause analysis.

FACILITY NAME (1)	DOCKET	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Calvert Cliffs, Unit 1	05000 317	97	- 005 -	00	02 OF 06

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

I. Description of Event

On May 29, 1997 at approximately 1620, Calvert Cliffs Unit 1 received a thermal power/low pressure Reactor Protective System Channel A trip on Control Room Panel 1C05. At the same time, a Channel ZD Engineered Safety Feature Actuation System alarm was received for a Safety Injection Actuation Signal due to low pressurizer pressure. In addition, Pressurizer Pressure Indicator 1-PI-102A failed low, a Containment Sump Level High alarm was received, and a decreasing pressurizer level trend was noticed. Control Room operators implemented Abnormal Operating Procedure-2A, Excessive Reactor Coolant System Leakage. The plant was operating at 100 percent rated thermal power.

At 1630, operators noticed the Containment Gaseous and Particulate Radiation Monitoring System had risen to approximately 200 counts per minute higher than normal. Based on the above indications, Control Room operators concluded that a Reactor Coolant System (RCS) leak existed that exceeded one gallon per minute and entered Technical Specification Action Statement 3.4.6.2 Action b.

Technical Specification 3.4.6.2 requires RCS Leakage shall be limited to:

A. No pressure boundary leakage;

B. 1 GPM unidentified leakage;

C. 1 GPM total primary-to-secondary leakage through all steam generators and 100 gallons-per-day through any one steam generator; or,

D. 10 GPM identified leakage from the RCS.

The Technical Specification is applicable in Modes 1-4.

The Action Statements for this Technical Specification are as follows:

A. With any pressure boundary leakage, be in at least Hot Standby within 6 hours and Cold Shutdown within the following 30 hours.

B. With any RCS leakage greater than any one of the above limits, excluding pressure boundary leakage, reduce the leakage rate to within limits within 4 hours or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours.

Operators declared an Unusual Event in accordance with Emergency Response Plan Implementation Procedure-3.0, and commenced a rapid downpower of the unit in accordance with Operating Procedures. During the rapid downpower, operators

entered the appropriate Technical Specification Action Statements associated with the loss of Pressure Transmitters 1-PT-102A and 1-PT-105A, which were affected by the leak.

Pressurizer pressure fell to below 2200 psia at 1635 and operators entered the Action Statement for Technical Specification 3.2.5, DNB Parameters. At 1650, pressurizer level fell to below 225 inches and operators entered the Action Statement for Technical Specification 3.4.4(B), Pressurizer. Pressurizer level was restored within 5 minutes. Pressurizer pressure never dropped to below 2150 psia and was restored to greater than 2200 psia by 1719. The turbine was taken off-line at about 1815. By 1823, the plant was in Mode 2 (Startup) and at 1935 the plant was in Mode 3 (Hot Standby). The RCS leak was estimated to be approximately 8-10 gallons per minute.

At 1911, a containment personnel entry was performed to identify the source of the leakage. The leakage source was identified as coming from a failed 3/4 inch compression fitting at an elbow near isolation valve 1-RC-1164. Valve 1-RC-1164 is a 3/4 inch isolation valve for Pressure Transmitter 1-PT-102A. Both 1-PT-102A and 1-PT-105A are supplied by the same pressurizer pressure instrument line. Therefore, both pressure transmitters were affected by the leak. This instrument line connects to the pressurizer vapor space at the top of the pressurizer. The leak was isolated at approximately 1930 by shutting two upstream root valves 1-RC-267 and 1-RC-266 on the common instrument line. By 2005, the plant was secured from the Unusual Event. At 2015 the reactor shutdown was completed.

II. Cause Of Event

A 3/4 inch compression fitting failed at an elbow fitting near isolation valve 1-RC-1164. The elbow fitting was located in the instrument line to RCS Pressure Transmitters 1-PT-102A and 1-PT-105A. This instrument line originates near the top of the pressurizer in the vapor space.

The post-shutdown investigation found the cause of the compression fitting failure was due to improper assembly. The compression fitting's ferrule was insufficiently compressed due to insufficient nut advancement. The tubing had pulled completely from the elbow while the ferrule and nut remained in the fitting. Neither the ferrule nor the tubing showed any evidence of deformation that would normally occur in a properly installed compression fitting. Markings on the tubing indicated the tubing had been fully inserted into the compression fitting. The compression fitting that failed was installed during the Unit 1 1996 refueling outage.

The post-shutdown investigation also determined that the compression fitting failure had potential generic implications. Apparent inadequate maintenance practices indicated a concern that other fittings might also be improperly assembled. These practices included apparent failures to perform a Go/No-Go gauge check (used to determine the adequacy of fitting compression) of compression fittings and failure to perform an adequate post-swaging inspection of compression fittings. The causal factors surrounding these inadequate maintenance practices are currently being investigated under Baltimore Gas and Electric Company Program Deficiency Report 97-010.

III. Analysis of Event

This event did not have significant safety consequences. This event resulted in a 3/4 inch compression fitting failure, opening a 0.44 square inch RCS loss-of-coolant path from the vapor space of the pressurizer into the Containment. However, this size of RCS break is fully bounded by the Calvert Cliffs Updated Final Safety Analysis Report, Section 14.17, Small Break Loss-of-Coolant Accident Analysis. For the current Unit 1 fuel cycle, the Updated Final Safety Analysis Report small break loss-of-coolant accident analysis assumes a worst case 0.1 square foot (14.4 square inches) RCS cold leg break at a Reactor Coolant Pump discharge. The analysis demonstrates appreciable margins relative to meeting the applicable acceptance criteria of 10 CFR 50.46. The resulting break in this case was significantly smaller than 0.1 square feet.

The venting steam caused no collateral damage and deposited essentially no boric acid on adjacent plant equipment.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(A), The completion of any nuclear plant shutdown required by the plants Technical Specifications.

IV. Corrective Actions

A. A review was conducted of compression fitting maintenance performed on high pressure systems that could have a significant impact on the plant if they failed. Plant systems included in the review were the RCS, Reactor Protective System, Engineered Safety Feature Actuation System, auxiliary feedwater system, main feed water system, main steam system, steam generating system, and the high pressure safety injection system. The review identified about 300 critical compression fittings on each unit requiring inspection.

B. The inspections of the all the critical compression fittings was expeditiously completed. The Unit 1 compression fitting inspections were completed prior to restart of the Unit on June 1, 1997. The Unit 2 critical compression fitting inspections were completed on June 6, 1997. There were approximately 275 fittings requiring some adjustment.

C. Plant systems not included in the original compression fitting review scope will be evaluated on a case by case basis to determine which additional plant compression fittings should be inspected. These additional compression fittings will be inspected during future scheduled maintenance windows for the plant systems they are associated with.

D. The Maintenance Superintendent issued a memorandum to all Maintenance Supervisors concerning process tubing and compression fitting work. This memorandum limits the amount of tubing/fitting work to only essential repairs. All tubing/fitting work must be specifically approved by the responsible Maintenance General Supervisor and the maintenance order directing the work must have specific sign-offs to document that the completed work meets the standards of the current Maintenance Guidelines. These interim requirements will remain in place until the root cause analysis provides more definitive conclusions as to why the connection failed and corrective actions to prevent recurrence of similar failures.

E. Additional corrective actions will be implemented based on the results of the root cause analysis for Baltimore Gas and Electric Company Program Deficiency Report 97-010. A supplement to this Licensee Event Report will be issued after the results of the root cause analysis are finalized.

V. Additional Information

A. Affected Component Identification:

Component or System	IEEE 803 EIIS Funct	IEEE 805 System ID
Compression Fitting	PSF	AB
Pressure Transmitter	PT	AB
Isolation Valve	ISV	AB
Root Valve	RTV	AB
Reactor Coolant Pump	P	AB
Pressurizer	PZR	AB
Auxiliary Feedwater System	N/A	BA
Main Feedwater System	N/A	ST
Main Steam System	N/A	SB
Steam Generating System	N/A	TB
High Pressure Safety Injection System	N/A	BQ
Engineered Safety Feature Actuation System	N/A	JE

B. Previous Similar Events:

Calvert Cliffs Unit 2 experienced a failure of a 3/4 inch compression fitting in the flexible metal hose installed on the 21A Reactor Coolant Pump middle seal pressure sensing tubing between the pump and the pressure transmitter on July 25, 1986. This event was reported in Licensee Event Report 318/86-005. The corrective actions for the 1986 event were not adequate to prevent the recurrence of this event. An issue report was written to document this concern.