CALVERT CLIFFS NUCLEAR POWER PLANT

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

BGE

August 28, 1995

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 95-003
Entry into Technical Specification 3.0.3 Due to High Bay Water Temperatures

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,

Charles H. Cruse

CHC/MDM/bjd

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
L. B. Marsh, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
P. R. Wilson, NRC
R. I. McLean, DNR
J. H. Walter, PSC

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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 LICENISNG 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 05

TITLE (4)

Entry into Technical Specification 3.0.3 Due to High Bay Water Temperatures

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 NUMBERS(S)
										05000
07	30	95	95	-- 003 --	00	08	28	95		05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check one or more) (11)					
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
			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 or in NRC Form 366A
			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)
M. D. Milbradt, Compliance Engineer	410-260-4352

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

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 15 single-space typewritten lines) (16)

On July 30, 1995 at 1655 hours, and again on July 31, 1995, at 1428 hours, Calvert Cliffs Unit 1 entered Technical Specification (TS) 3.0.3 due to the inoperability of Service Water (SRW) Subsystems 11 and 12. Both subsystems were declared inoperable after the inlet temperature of the Saltwater (SW) System exceeded maximum administrative limits. Technical Specification 3.0.3 was exited at 1730 hours on July 30, 1995. On July 31, 1995, Unit 1 commenced a power reduction at 1416 hours to meet the requirements of TS 3.0.3. At 1755 hours TS 3.0.3 was exited and power was stabilized at 55 percent.

Entrance into TS 3.0.3 was due to the combination of high bay water temperatures, a slack tide, the removal of intake structure baffle wall sections, a North East wind, and the normal recirculation of circulating water discharge.

Corrective actions included raising the administration limit for bay water temperature and insertion of baffle wall sections. Long-term actions include developing a program to control the configuration of the baffle wall and replacement of the SRW heat exchangers.

I. DESCRIPTION OF EVENT

On July 30, 1995 at 1655 hours, and again on July 31, 1995, at 1428 hours, Calvert Cliffs Unit 1 entered Technical Specification (TS) 3.0.3 due to the inoperability of Service Water (SRW) Subsystems 11 and 12. Both subsystems were declared inoperable after the inlet temperature of the Saltwater (SW) System, the system used to remove heat from the SRW System, exceeded maximum administrative limits. On July 30, 1995, Calvert Cliffs Units 1 and 2 remained at 100 percent power and TS 3.0.3 was exited at 1730 hours after the SW inlet temperature decreased and was observed to be trending below the limit. On July 31, 1995, Unit 1 commenced a power reduction at 1416 hours to meet the requirements of TS 3.0.3. At 1755 hours SW inlet temperature was low enough to exit TS 3.0.3. At this point power was 55 percent.

The SRW System is a closed loop cooling system that supplies cooling water to the Emergency Diesel Generators (EDGs) and the Containment Air Coolers during accident conditions. Each Calvert Cliffs unit has two independent SRW subsystems, subsystems 11 and 12 for Unit 1 and subsystems 21 and 22 for Unit 2. The SRW heat exchangers utilize Chesapeake Bay water via the SW system as their source of heat transfer. The SW pumps take suction from the bay in the Circulating Water System Intake Structure. The Intake Structure receives water from a manmade trench dredged in the floor of the bay called the Intake Channel. The water in the channel passes under a baffle wall which extends the full 560-foot width of the channel. The top of the baffle wall is about 5 feet above the water and the bottom of the wall is approximately 28 feet below the surface. The purpose of the wall is to ensure that essentially all of the water taken into the plant is slowly drawn from the lower strata of the bay. Sections of the wall are removed each year to prevent potential fish kills and to perform necessary maintenance.

On Sunday July 30, 1995, there were sections of the baffle wall removed. The removal of north-end baffle wall sections allowed warm water, close to the surface, to enter and mix in the intake structure, eventually entering the suction of the SW pumps. The bay temperature was elevated due to a heat wave during the month of July in which the air temperature was consistently over 90 degrees Fahrenheit. The wind direction during the event was from the North East and there was very little current during the tide change. These factors, combined with the normal recirculation of a small amount of the Unit 1 and Unit 2's discharge back into the intake structure, resulted in elevated bay and SW inlet temperatures. As the temperature approached 87 degrees, subsystem 11 was declared inoperable when administrative limits based on a combination of heat exchanger differential pressure, SW flow, and temperature were exceeded. There limits are described in Figure 4 of Operating Instruction (OI)-29, "Saltwater System." At approximately 1655 hours, as SW inlet temperature rose to 87.03 degrees Fahrenheit, subsystem 12 was declared inoperable, and TS 3 0.3 was entered. By around 1705 hours, temperature decreased to below 87 degrees and at 1730 hours TS 3.0.3 was exited. An engineering analysis performed Sunday evening showed the SW intake temperature

limit could be raised to 87.4 degrees Fahrenheit based on current plant conditions.

On Monday July 31, 1995, environmental conditions similar to those experienced on Sunday afternoon existed, and at 1416 hours a power reduction was commenced on Unit 1. The power reduction was performed in anticipation of entering TS 3.0.3 as the bay temperature continued to climb during the day. Subsystem 11 had already been declared inoperable at 1335 hours after exceeding the limits stated in OI-29 and at 1428 hours TS 3.0.3 was entered when subsystem 12 failed to meet the limits as well. By 1755 hours subsystem 12 was able to meet the limits of OI-29 and declared operable. Unit 1 power was then held at the existing level of 55 percent. Unit 2's SRW system remained operable throughout the period with power remaining at 100 percent.

II. CAUSE OF EVENT

The cause of the entrance into TS 3.0.3 on July 30 and 31, 1995, was due to the declared inoperability of Unit 1's SRW subsystems. As described above, the combination of persistent hot weather, resulting in high bay water temperatures, a slack tide, the removal of certain baffle wall sections, a North East wind, and the normal recirculation of a small amount of both unit's circulating water discharge back into the intake structure, resulted in conditions that exceeded the administrative limits for SRW heat exchanger stated in OI-29. As changes to the above environmental factors took place, the administrative limits were satisfied and TS 3.0.3 was exited.

III. ANALYSIS OF EVENT

The most limiting design basis accident involving an elevated bay water temperature is a loss-of-offsite power concurrent with a loss-of-coolant accident (LOCA) followed by the most limiting single failure of an EDG. Failure of the EDG causes the loss of one train of Emergency Core Cooling System equipment, including one of two trains of Containment Spray, two of four Containment Air Coolers, and one train each of SRW, SW, and Component Cooling water. At the time of the event the temperature of the Chesapeake Bay is assumed to be equal to or less than the design basis limit of 87 degrees Fahrenheit. Although the primary consideration for the SRW System heat duty during the postulated scenario is containment response, the most sensitive and limiting safety-related components are the EDGs. The design basis maximum SRW inlet temperature to the EDG air coolers is a transient, up to 115 degrees Fahrenheit, returning to less than 105 degrees within 25 minutes of the start of the event. The temperature limits are derived from a maximum allowable EDG combustion air temperature of 145 degrees Fahrenheit.

The SW inlet (bay water) design basis temperature limit, being used at the time of the event, was based on a calculation that assumed each operable SRW heat exchanger contained 130 plugged tubes. In reality, at the time of the event, the maximum number of tubes plugged in either a Unit 1 or Unit 2 SRW heat exchanger was 37 (Unit 1, subsystem 11). As stated above, a new

calculation was performed Sunday evening using a maximum of 40 tubes as an input. The new calculation showed that with fewer tubes plugged (40 versus 130) the SW inlet temperature limit could be raised from 87.0 to 87.4 degrees Fahrenheit. The maximum bay temperature recorded on July 30, 1995 was only 87.03 degrees Fahrenheit, thus there were no safety consequences associated with the event.

At the start of a LOCA, containment temperature rises and peaks before trending down. As the accident proceeds and the Refueling Water Tank empties, a Recirculation Actuation Signal (RAS) is generated, and suction for the High Pressure Safety Injection (HPSI) pumps shifts to the containment sump. Following the RAS shift, a secondary temperature peak is experienced and becomes the most limiting factor for SRW heat exchanger performance. As the bay temperature began to rise on Monday, July 31, 1995, a Unit 1 shutdown was commenced. Operation at lower power results in a reduced containment temperature profile following a LOCA. Using the reduced temperature profile, assuming an 80 percent power history, engineers were able to show the post-RAS performance for Unit 1 would not be limiting on the SRW heat exchanger. Therefore, the SRW heat exchanger performance limits calculated for the initial containment temperature peak following a LOCA could be used. The analysis determined power operations could go as high as 80 percent with a bay temperature of as high as 89 degrees Fahrenheit. But in the week following the event bay temperature decreased and power was returned to 100 percent. Although Unit 1's SRW system was unable to perform its design function while the Unit was in TS 3.0.3 on Monday July 31, 1995 a loss of offsite power event concurrent with a LOCA did not occur, therefore the health and safety of the public was not affected.

IV. CORRECTIVE ACTIONS

In response to the elevated bay temperatures experienced on July 30-31, 1995, the following short term corrections were initiated:

A. On both days TS 3.0.3 was entered as the administrative limits for OI-29 were exceeded for the heat exchangers in SRW subsystems 11 and 12. A power reduction was commenced on July 31, 1995, in anticipation of needing to meet the requirements of TS 3.0.3 and was terminated at 55 percent. TS 3.0.3 was exited on both days after plant and environmental conditions changed and the limits of OI-29 were satisfied.

B. Permanent changes were made to OI-29 to reflect the results from the engineering analysis performed following the event. The changes reflected the new bay water administrative limit of 87.4 degrees Fahrenheit. If the administrative limit is reached the procedures states the TS should be referred to for making OPERABILITY determinations. The results from the analysis that determined the 89 degree Fahrenheit limit were available if necessary as power was escalated on Unit 1 during the week, following the event, but the bay water temperature never rose above 87.4 degree procedure limit.

C. To promote the flow of cooler water into the intake structure, two northern sections of the baffle wall were reinstalled on August 1, 1995.

Long term corrective actions include:

A. The baffle wall configuration was a factor in this event. To mitigate the impact of the baffle wall when bay temperatures are high, a program is being developed that will look at the impact removal of wall sections has on maintaining acceptable intake structure temperatures. The number of sections, their locations, and the scheduling of wall maintenance will be considered. The program will also determine how the baffle wall configuration should be managed with respect to ensuring large fish kills are avoided.

B. To improve the thermal performance of the SRW system and allow for higher bay temperatures, the current Unit 1 and Unit 2 SRW tube type heat exchangers will be replaced with high efficiency plate and frame units.

V. ADDITIONAL INFORMATION

A. Failed Component Identification

	IEEE 803 EIIS Funct	IEEE 805 System ID
Service Water Heat Exchanger	HX	BI
Containment Air Cooler	CLR	BK
Emergency Diesel Generator	DG	EK
Saltwater System	N/A	KE
Service Water Pump	P	KE
Containment Spray System	N/A	BE
Component Cooling Water	N/A	CC

B. Previous Similar Events

Although there have been no previous similar events at Calvert Cliffs in which TS 3.0.3 was entered due to high bay temperatures, a voluntary LER (50-317/93-007) was submitted describing our initial concerns related to bay temperatures and SRW performance. The LER described the results of thermal performance testing we completed on the SRW heat exchangers which indicated they may not have been capable of meeting their intended safety function during certain past periods of high bay temperatures. Based on the testing results the administrative limits for bay temperature were lowered appropriately.