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May 18, 1988

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
ASME Section XI Relief Valve Testing Requirements

REFERENCES: (a) Letter from Mr. J. R. Lemons (BG&E) to NRC Document Control Desk, dated April 6, 1988, Request for Relief from ASME Section XI Relief Valve Testing Requirements

(b) Conference between Mr. W. J. Lippold (BG&E) and staff and Mr. R. A. Capra (NRC) and staff, on May 2, 1988, same subject

Gentlemen:

In Reference (a) we requested relief from certain requirements in the ASME Boiler and Pressure Vessel Code Section XI, 1983 Edition with Addendum through Summer 1983. As a result, a meeting (Reference b) was held to address specific concerns regarding our request. This letter is in response to that meeting and supplements Reference (a).

Enclosure (1) provides information you requested in Reference (b) for the Unit 1 and Unit 2 IST relief valves. Information on the code safeties is not included. We will forward by June 13, 1988, additional information on the remaining safety-related relief valves.

Two Unit 1 and three Unit 2 IST Program relief valves had setpoints exceeding their code allowable tolerance. The Unit 1 valves will have their setpoints adjusted to within system design pressure prior to start-up from the current outage. The Unit 2 valves will have their setpoints adjusted during the 1989 spring refueling outage.

Although Unit 2 will be operating with two valves 1.6% above code allowable tolerance and one valve 0.19% above code allowable tolerance, all systems will be within the design requirements.

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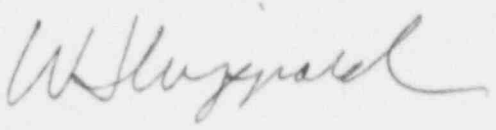
As a follow on effort, we will be reviewing our setpoint program for safety-related relief valves. Our architect/engineer will determine the correct setpoints for the relief valves by November 1988. As this information becomes available, we will schedule setpoint adjustments for the relief valves as required.

Should you have any further questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,



JAT/SRC/SMD/KBC/dlm

Attachment

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ENCLOSURE (1)

ACTIONS TAKEN IN LIEU OF SECTION XI REQUIREMENTS

The following relief valve data matrix (Attachment 1) has been compiled to further evaluate the relief valve setpoint error and its effect on the systems in which they are located.

The data matrix contains information for all the Section XI Class 2 and 3 IST Program relief valves except steam generator safety valves. That is, the data matrix contains information for the valves that are required to perform a specific function in shutting down the reactor to cold shutdown or in mitigating the consequences of an accident as defined in paragraph IWV-1100 of ASME Section XI.

Pertinent Sections of the data matrix are clarified below.

ANSI/ASME Code and Class: The ANSI/ASME original construction Code and Code Class for each system in which the relief valve is located. The original construction Code edition for USAS B31.7 is 1969 and for USAS B31.1 it is 1967.

Design Pressure: The design pressure for each system as listed in the Bechtel design documents.

Back Pressure: The back pressure for each valve as a result of performing field walkdowns of each valve and reviewing the valve design documentation.

Accumulation: Percent accumulation as listed in the valve design documentation.

As-Left Relieving Pressure: Actual relieving pressure of the valve obtained by considering the as-left setpoints listed in Plant Testing Records and back pressure values as listed in the data matrix.

Code Tolerance: The setpoint tolerance allowed by the Code during a test lift of the valve. That is $\pm$ 3 percent for setpoints greater than 70 psi.

It is important to note that the design criteria, design conditions, and the pressure design of components for USAS B31.7 Class II and III systems shall be in accordance with USAS B31.1-1967 as stated in Chapter 2-11 and 3-11 of USAS B31.7. Therefore, the design rules of USAS B31.1-1967 are applicable for all the systems listed in the data matrix with the exception of the Safety Injection Tanks. The design criteria, conditions, and pressure design of Safety Injection Tank components shall be in accordance with ASME Section III Class II.

ENCLOSURE (1)

ACTIONS TAKEN IN LIEU OF SECTION XI REQUIREMENTS

Paragraph 102.2.4 of USAS B31.1-1967 states that:

> "It is recognized that variations in pressure and temperature inevitably occur and, therefore, the piping system shall be considered safe for occasional operation for short periods at higher than the design pressure or temperature.
>
> Either pressure or temperature, or both, may exceed the design values if the stress in the pipe wall calculated . . . does not exceed the S-value allowable . . . by more than the following allowance for the periods of duration indicated:
>
> 1. Up to 15 percent increase above the S-value during 10 percent of the operation period.
>
> 2. Up to 20 percent increase above the S-value during one percent of the operating period."
>
> NOTE:
> A system condition challenging a relief valve would not occur more than one percent of the operating period.

Attachment 2 lists the stress analysis results for each system and the resulting additional stress due to the relieving pressure being higher than system design pressure. The additional pressure stresses due to as-left relieving pressures listed in Attachment 2 were calculated using data from Attachment 1, the valve data matrix. The most limiting valve, that is the valve with the highest relieving pressure compared to system design pressure, was used for each system for each unit to calculate the additional stresses.

Attachment 2, titled Maximum OBE Stress, lists an allowable stress of 1.2S as stated in Paragraph 102.2.4 of USAS B31.1-1967. It is clear that the system stresses remain below the Code allowable stresses.

Therefore, the relief valves continue to meet their design function of providing overpressure protection to the systems. Likewise, the piping systems meet all the requirements of the original Construction Code, USAS B31.1, and remain capable of performing their design function.

Although not required by USAS B31.1-1967, other components were considered during the evaluation process to determine the stress increase due to the relieving pressures listed in the data matrix. The results of our evaluation are summarized below for each component.

ENCLOSURE (1)

ACTIONS TAKEN IN LIEU OF SECTION XI REQUIREMENTS

1. Valves and Fittings

The ANSI design formulas for valve body wall thickness calculations incorporate a 1.5x factor into a modified hoop stress equation. In addition, the S-value for stress used in this equation is 7000 psi instead of the typical allowable stress of about 15,000 for piping. Therefore, the stresses in the piping system would be the bounding condition.

2. Pumps

Pump casing and nozzle wall thicknesses are generally greater than that of the connecting piping. The stresses due to an increase in pressure would be proportionately smaller for the former. Therefore, the piping itself would be the limiting component. In addition, the nozzle allowable loads by design are always much lower than piping system allowable loads.

3. Heat Exchangers

The heat exchanger wall and nozzle thicknesses are generally proportionately thicker than the attached piping. Therefore, the stress increases due to an increase in pressure would be proportionately smaller for the former. Again, the piping itself would be the limiting component. The piping stresses would also bound the additional tubing stresses. This has been confirmed using hoop stress calculations for the component cooling water heat exchanger tubes. A small increase in internal pressure would have a negligible effect on other internal components. The pressure would not affect the loading on the tube sheet or other internal components. Therefore, it is concluded that the piping system is the limiting component. In addition, the nozzle allowable loads are always much lower than the piping system allowable loads.

4. Gasket and other Leakage Boundaries

Gaskets and other leakage restricting devices are not pressure boundary or pressure retaining components and as such are not addressed by the ASME Code design rules. However, it is clear that gaskets and seals can withstand small increases in pressure. These components are typically relied upon to prevent leakage during hydrostatic pressure tests up to pressures of 1.5x design values. Therefore, during slight overpressure conditions, these components will not adversely affect system integrity. In fact B31.1-1967, Paragraph 108.4 does not provide any pressure limit on metal-asbestos or sheet asbestos gaskets provided temperature requirements are met.

In summary, the piping systems meet the design requirements as specified in both USAS B31.1-1967 and the Final Safety Analysis Report.

ATTACHMENT 1
INSERVICE TEST PROGRAM
RELIEF VALVE DATA MATRIX SHEET

RUN DATE 05/16/88

UNIT	VALVE NUMBER	P&ID	LINE SIZE IN INCHES AND LINE NUMBER	ANSI/ASME CODE & CLASS	VALVE SIZE INLET INCHES	VALVE SIZE OUTLET INCHES	ACC %	SET PRESS PSIG	LAST TEST	AS LEFT SETTING PSIG	BACK PRESS PSI	AS LEFT RELEV PRESS PSIG	SYS DESIGN PRESS PSIG	CODE TOLERANCE PSI	MODE TO RESET	RESET DATE SEE NOTES
1	AFW-4501	M800	1.5-HB19-1004	B31.1	1.5	3.	10.	85.	11/04/86	65.	30.	115.	285.	+/-8.5	OUTAGE	1
	AFW-4502	M800	1.5-HB19-1007	B31.1	1.5	3.	10.	85.	11/04/86	85.	30.	115.	285.	+/-8.5	OUTAGE	1
	CVC-311	M73	4-HC16-1001	B31.7 CL III	0.75	1.	10.	140.	05/13/85	142.	0.	142.	150.	+/-4.5	OUTAGE	1
	CVC-315	M73	4-HC16-1015	B31.7 CL III	0.75	1.	10.	150.	05/10/88	150.	7.	157.	150.	+/-4.5	OUTAGE	3
	CVC-318	M73	4-HC16-1016	B31.7 CL III	0.75	1.	10.	150.	05/12/88	150.6	2.	152.6	150.	+/-4.5	OUTAGE	2
	CVC-321	M73	4-HC16-1017	B31.7 CL III	0.75	1.	10.	150.	11/07/83	156.	4.	160.	150.	+/-4.5	OUTAGE	3
	CVC-324	M73	2-CC7-1003	B31.7 CL II	0.75	1.	10.	2800.	11/08/83	2713.	73.	2786.	2800.	+/-84	NONOUTAGE	1
	CVC-325	M73	2-CC7-1002	B31.7 CL II	0.75	1.	10.	2800.	04/29/85	2720.	73.	2793.	2800.	+/-84	NONOUTAGE	1
	CVC-326	M73	2-CC7-1001	B31.7 CL II	0.75	1.	10.	2800.	11/08/83	2710.	73.	2783.	2800.	+/-84	NONOUTAGE	1
	SI-211	M74	TANK	SEC.III CL II	1.	1.5	1.	250.	04/30/88	253.	0.	253.	250.	+/-7.5	OUTAGE	2
	SI-221	M74	TANK	SEC.III CL II	1.	1.5	1.	250.	04/11/85	252.	0.	252.	250.	+/-7.5	OUTAGE	2
	SI-231	M74	TANK	SEC.III CL II	1.	1.5	1.	250.	04/30/88	253.	0.	253.	250.	+/-7.5	OUTAGE	2
	SI-241	M74	TANK	SEC.III CL II	1.	1.5	1.	250.	11/10/86	250.	0.	250.	250.	+/-7.5	OUTAGE	1
	SI-409	M74	6-DC1-1004	B31.7 CL II	0.75	1.	10.	1485.	05/05/85	1481.	0.	1481.	1600.	+/-40	OUTAGE	1
	SI-417	M74	6-CC6-1001	B31.7 CL II	1.	1.5	10.	2505.	05/24/85	2500.	0.	2590.	2485.	+/-74.5	OUTAGE	2
	SI-468	M74	14-6C5-1003	B31.7 CL II	1.5	2.5	10.	315.	11/21/86	317.	0.	317.	335.	+/-10	NONOUTAGE	1
	SI-469	M74	14-CC14-1004	B31.7 CL II	0.75	1.	10.	2485.	11/17/86	2490.	4.	2494.	2485.	+/-74.5	OUTAGE	2

NOTES

1. NO ACTION REQUIRED. AS LEFT RELIEVING PRESSURE AT OR BELOW SYSTEM DESIGN PRESSURE.
2. VALVE TO BE RESET AT NEXT SCHEDULED SURVEILLANCE TEST. AS LEFT RELIEVING PRESSURE WITHIN CODE TOLERANCE.
3. UNIT 1 VALVES TO BE RESET DURING CURRENT OUTAGE. UNIT 2 VALVES TO BE RESET DURING THE 1989 SPRING REFUELING OUTAGE. AS LEFT RELIEVING PRESSURE EXCEEDS CODE TOLERANCE.

UNIT	VALVE NUMBER	P&ID	LINE SIZE IN INCHES AND LINE NUMBER	ANSI/ASME CODE & CLASS	VALVE SIZE INLET INCHES	VALVE SIZE OUTLET INCHES	ACC %	SET PRESS PSIG	LAST TEST	AS LEFT SETTING PSIG	BACK PRESS PSI	AS LEFT RELEV PRESS PSIG	SYS DESIGN PRESS PSIG	CODE TOLERANCE PSI	MODE TO RESET	RESET DATE SEE NOTES
2	AFW-4501	M801	1.5-HB19-2004	B31.1	1.5	3.	10.	85.	11/12/85	85.	30.	115.	285.	+/-8.5	OUTAGE	1
	AFW-4502	M801	1.5-HB19-2007	B31.1	1.5	3.	10.	85.	04/02/88	85.3	30.	115.3	285.	+/-6.5	OUTAGE	1
	CVC-311	M461	4-HC16-2001	B31.7 CL III	0.75	1.	10.	140.	03/31/87	140.	0.	140.	150.	+/-4.5	OUTAGE	1
	CVC-315	M461	4-HC16-2015	B31.7 CL III	0.75	1.	10.	150.	11/12/85	150.	7.	157.	150.	+/-4.5	OUTAGE	3
	CVC-318	M461	4-HC16-2016	B31.7 CL III	0.75	1.	10.	150.	03/30/87	147.	2.	149.	150.	+/-4.5	OUTAGE	1
	CVC-321	M461	4-HC16-2017	B31.7 CL III	0.75	1.	10.	150.	11/11/85	153.	4.	157.	150.	+/-4.5	OUTAGE	3
	CVC-324	M461	2-CC7-2003	B31.7 CL II	0.75	1.	10.	2800.	03/31/87	2720.	73.	2793.	2800.	+/-84	NONOUTAGE	1
	CVC-325	M461	2-CC7-2002	B31.7 CL II	0.75	1.	10.	2800.	11/05/85	2713.	73.	2786.	2800.	+/-84	NONOUTAGE	1
	CVC-326	M461	2-CC7-2001	B31.7 CL II	0.75	1.	10.	2800.	03/27/87	2727.	73.	2800.	2800.	+/-84	NONOUTAGE	1
	SI-211	M462	TANK	SEC.III CL II	1.	1.5	1.	250.	10/23/85	258.	0.	258.	250.	+/-7.5	OUTAGE	3
	SI-221	M462	TANK	SEC.III CL II	1.	1.5	1.	250.	03/23/87	253.	0.	253.	250.	+/-7.5	OUTAGE	2
	SI-231	M462	TANK	SEC.III CL II	1.	1.5	1.	250.	10/23/85	253.	0.	253.	250.	+/-7.5	OUTAGE	2
	SI-241	M462	TANK	SEC.III CL II	1.	1.5	1.	250.	03/24/87	253.	0.	253.	250.	+/-7.5	OUTAGE	2
	SI-409	M462	6-DC1-2004	B31.7 CL II	0.75	1.	10.	1485.	03/23/87	1485.	0.	1485.	1600.	+/-48	OUTAGE	1
	SI-417	M462	6-CC6-2001	B31.7 CL II	1.	1.5	10.	2505.	03/23/87	2512.	0.	2512.	2485.	+/-74.5	OUTAGE	2
	SI-468	M462	14-GC5-2003	B31.7 CL II	1.5	2.5	10.	315.	04/02/87	316.	0.	316.	335.	+/-10	NONOUTAGE	1
	SI-469	M462	14-CC14-2004	B31.7 CL II	0.75	1.	10.	2485.	04/01/87	2481.	4.	2485.	2485.	+/-74.5	OUTAGE	1

NOTES

1. NO ACTION REQUIRED. AS LEFT RELIEVING PRESSURE AT OR BELOW SYSTEM DESIGN PRESSURE.
2. VALVE TO BE RESET AT NEXT SCHEDULED SURVEILLANCE TEST. AS LEFT RELIEVING PRESSURE WITHIN CODE TOLERANCE.
3. UNIT 1 VALVES TO BE RESET DURING CURRENT OUTAGE. UNIT 2 VALVES TO BE RESET DURING THE 1989 SPRING REFUELING OUTAGE. AS LEFT RELIEVING PRESSURE EXCEEDS CODE TOLERANCE.

ATTACHMENT (2)

MAXIMUM OBE STRESS TABLE

System	Calc. No.	Line Size O.D., Thickness (in.)	Highest Upset Stress (psi) *	Add'l Stress Due to As-Left Relieving Pressure (psi)	Allowable Stress (psi) **
AFW U-1	80A	4.50, 0.337	10,904	0	18,000
AFW U-2	746	6.625, 0.432	11,242	0	18,000
CVC U-1	89A-1	3.5, 0.120	17,701	65.5	22,560
CVC U-2	293-A	3.5, 0.120	11,757	46	20,022
SI U-1	40AB	8.625, 0.148	18,093	207.4	21,696
SI U-2	213	6.625, 0.280	13,086	140	19,680

* Upset Stress = Pressure Stress + Weight Stress + Seismic OBE Stress

** Allowable Stress = 1.2S (from paragraph 102.2.4 of USAS B31.1 - 1967)