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SUBJECT: Forwards response to open items identified in SER re
 NUREG-0737,Item II.D.1, "Performance Testing of...."

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

Gentlemen:


Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
NUREG 0737, Item II D.1.
Performance Testing of Safety and Relief Valves
(NRC TAC Nos. 44626 and 44627)

By letter dated May 16, 1989, the NRC Staff issued a safety evaluation report (SER) prepared by the Staff documenting their review of NUREG 0737, Item II.D.1, Performance Testing of Relief and Safety Valves for the Turkey Point plant.

Attached is Florida Power and Light Company's response to the open items identified in the SER. This should complete our action on this issue.

If you have any further questions, please contact us.

Very truly yours,


C. O. Woody
Acting Senior Vice President - Nuclear

COW/TCG/gp

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

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RESPONSE TO SER
TURKEY POINT UNITS 3 & 4
NUREG 0737 ITEM II.D.1

1. Section 4.3.1 Safety Valves (pages 14 and 15)

CONCERN:

The SER discussed damage experienced by the representative valves (Crosby 6M6) during closing. Turkey Point's submittal does not address this potential concern.

RESPONSE:

The SER is in error in that it refers to two valves as being representative of the Turkey Point Crosby 4K₂6 valve: they are the 3K6 and 6M6 valves. In the EPRI test program, the "representative" valves were chosen based on their orifice designation; i.e. a 6M6 valve was chosen for the M orifices, the 3K6 valve was chosen to represent the K orifices, etc. The submittal made by FPL, as supported by the Westinghouse WCAP 10105, shows that only the 3K6 valve is representative. We have found no references to show that the 6M6 is representative of the 4K₂6 valve.

2. Section 4.3.1 Safety Valves (page 15, paragraph 3)

CONCERN:

The maximum bending moment for the 4K₂6 valve quoted by FPL does not include the effects of the Safe Shutdown Earthquake (SSE).

RESPONSE:

NUREG 0737, Clarification of TMI Action Plan Requirements, Section II.D.1 4.2(2), states that the "...conditions used are equivalent to expected operating and accident conditions as described in the Final Safety Analysis Report (FSAR)". Accordingly, the EPRI recommended load combinations were used that corresponded to the Turkey Point FSAR (i.e. those load combinations for the upset and emergency conditions). The SSE load combination combined with SRV discharge is a faulted load combination and as such was not analyzed for Turkey Point, since faulted analysis is not required by the Turkey Point FSAR. The FSAR piping analysis (non-thermal hydraulic), however does include SSE load for the emergency load case.

The piping stresses are less than the allowable stress (Sy hot). It is therefore expected that the SRVs operate satisfactorily with the actual induced moments.

3. Section 4.3.2 Power Operated Relief Valve (page 15 & 16)

CONCERN:

The SER states "the predicted maximum bending moment on the Turkey Point PORV was not provided, thus it cannot be stated that the moment loading on the PORVs will not affect the operability of the safety valves at Turkey Point 3 and 4."

Several other references are made throughout the SER also stating this as a concern.

RESPONSE:

The moments induced on the PORVs were erroneously omitted from previous submittals.

The maximum stress found per the EPRI criteria for the Turkey Point PORVs is 25,883 psi as a result of normal sustained load (deadweight), OBE, and PORV actuation. The allowable stress for this combination is 36,000 psi. The maximum stress due to an SSE load combination (per the FSAR, without relief or SRV loadings) is 13,700 psi. The allowable stress is 18,500 psi (Sy at design temperature) per the Turkey Point FSAR. As can be seen, the resultant stresses are less than the allowable stresses for all combinations.

The maximum moment induced on the PORVs per the above (25,883 psi) is 6,203 ft.lb.

It should be noted that the induced bending moment for the Turkey Point PORV (Copes Vulcan 17-4 PH plugs and cage) with water seal is not available from EPRI test data (References 1 and 2). Since the adjacent piping stresses are less than the allowable stresses, however, the valves can be expected to operate satisfactorily.

4. Section 4.4.2 Stress Analysis (page 20)

CONCERN:

The criteria of "70 percent of the ultimate moment capacity" as an acceptance criteria for allowable bending moment was arbitrarily established. Secondly, the structural analysis does not include a faulted load combination per recommendations of the EPRI submittal guide, in which safe shutdown earthquake loading is combined with a safety valve actuation.

RESPONSE:

The Turkey Point pressurizer piping system was designed to ANSI B31.1-1955 criteria. ANSI B31.1 does not provide for system operating transients.

The analysis was conducted when valve operability during SRV and PORV events became a concern, before the issuance of the EPRI study. The criteria was to insure structural integrity as well as functionality of both the valve and piping. The "70 percent of ultimate moment" criteria usually assures the structural integrity of piping. It was shown in Reference 3 that the employment of 0.7 Mult/b2 as a moment limit is conservative, thus ensuring structural integrity and functionality of the valve and piping. For these reasons, "70 percent of ultimate moment" was selected as the basis for SRV load case allowables. It should be noted that the EPRI tests performed for the SRV valves with a water seal, (References (1) and (4)) indicated that maximum induced bending moment, which did not impair valve operability, is higher than 70 percent of the ultimate moment used as an acceptance criteria.

A more recent analysis has been done. The results of this later analysis were compared to the EPRI load combinations which use ASME Service Level "B" (upset condition) for PORV (Table 1) and "C" (emergency condition) for SRV (Table 2) actuations respectively. These comparisons demonstrated that the maximum stress for the SRV emergency load case does not exceed the allowable in Table 2 with a maximum ratio of 0.936. This more stringent EPRI criteria can therefore replace the previously used "70 percent of the ultimate moment " criteria.

As far as Service Level "D" (faulted) is concerned, level "D" load combinations are not a design basis load combination for Turkey Point as discussed above and were therefore not analyzed.

5. Section 4.4.2 Stress Analysis (page 21)

CONCERN:

Discussion is made regarding the transient loads on certain of the supports exceeding the listed design load or support capacity.

RESPONSE:

A revised submittal was made to the NRC on October 29, 1986 (L-86-420). This submittal was made to address this specific item.

REFERENCES

1. EPRI PWR Safety and Relief Valve Test Program Guide for Application of Valve Test Program results to Plant Specific Evaluations, EPRI Safety and Relief Test Program, February 1982.
2. EPRI PWR Safety and Relief Valve Test Program, Safety and Relief Valve Test Report, EPRI NP-2628-SR Special Report, December 1982, Prepared by Electric Power Research Institute, Palo Alto, California.
3. S. H. Shaaban, A. A. Shaaban, R. C. Iotti, "Functional Capability of Piping Elbows", SMIRT Proceedings, F17/8, August 1985.
4. Review of Pressurizer Safety Valve Performance as Observed in the EPRI Safety and Relief Valve Test Program by E. M. Burns et al; WCAP-10105, June 1982.



Table 1

"PIPESTRESS 2010" PORV DATA PT REF. (1)	"SUPER- PIPE GRAVITY DATA PT REF. (4)	ASME CLASS	TYPE OF STRESS, PSI				EPRI COMBINED STRESS REF. (2) PSI	ALLOW- * ABLE STRESS PSI	STRESS RATIO
			Pressure	Weight	OBE (EDS) REF. (2)	PORV			
1330	133	1	8,930	3087	5184	8600	25,801	36,000	0.717
1350	135	1	8,930	1713	4583	8208	23,434	36,000	0.651
1382	138A	1	11,481	2234	3796	8002	25,513	36,000	0.709
1384	138B	1	11,481	3732	3908	9851	28,972	36,000	0.805
712	71A	1	11,481	744	1506	4194	17,925	36,000	0.498
714	71B	1	11,481	361	1902	4955	18,699	36,000	0.519
722	72A	1	11,481	1238	2094	5313	20,126	36,000	0.559
724	72B	1	11,481	2156	2028	5430	21,095	36,000	0.586
1710	171A	1	11,481	5016	7666	2261	26,424	36,000	0.734
1714	171B	1	11,481	4642	5164	5304	26,591	36,000	0.739
1724	172B	1	11,481	1375	6582	5371	24,809	36,000	0.689
1734	173B	1	11,481	1218	6890	6019	25,608	36,000	0.711
1422	142A	1	8,930	3950	9216	7670	29,766	36,000	0.827
1460	146	1	8,930	2024	7888	7041	25,883	36,000	0.719
1202	120A	2	16	902	4906	9035	14,859	27,000	0.550
1260	126A	2	16	2360	6338	7319	16,033	27,000	0.594
372	37A	1	11,481	821	2702	1576	16,580	36,000	0.468
1050	105	1	11,481	1022	4732	3176	20,411	36,000	0.567

Stresses in Turkey Point pressurizer relief piping resulting from normal sustained load, OBE and PORV actuation.

*Service stress limit B (Upset)
for CL.1 = 1.8Sm, for CL.2 = 1.8 Sh

Table 2

"PLAST" SRV Actuation Data Pt.	"SUPER- PIPE" Gravity Case Data Pt.	ASME Class	SRV Actuation Bend Moment In-LB	STRESS TYPE			EPRI combined Stress PSI	***) Allowable Stress PSI	Stress Ratio
				*) SRV (MarvI) Zelast. PSI	**) Weight PSI	***) Pressure PSI			
40 (4 in. Sch 120)	38B	1	1.26X10 ⁵	29,466	1,192	11,481	42,139	45,000	0.936
39 (4 in. Sch 120)	38A	1	7.96X10 ⁴	18,617	1,112	11,481	31,210	45,000	0.694
31 (4 in. Sch 120)	32	1	1.14X10 ⁵	22,020	753	11,481	34,254	45,000	0.761
29 (6 in. Sch 40)	28B	2	1.04X10 ⁵	27,712	1,364	1,219	30,295	33,750	0.898

*) Stress conservatively estimated dividing total moment by Zelastc, stress intensification factors correspond to ones used in "SUPERPIPE" gravity analysis.

**) Weight analysis

****) Service Stress Limit C (Emergency)
for CL1 = 2.25Sm
for CL2 = 2.25 Sh

***) P^T/t = conservative stress in the direction perpendicular to the bending moment.
(See also Table 1)

Stresses in Turkey Point pressurizer relief piping resulting from normal sustained loads and SRV actuation.



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