REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8609190009 DOC. DATE: 86/09/16 NOTARIZED: NO DOCKET #
FACIL: 50-361 San Onofre Nuclear Station, Unit 2, Southern Californ 05000361
50-362 San Onofre Nuclear Station, Unit 3, Southern Californ 05000362

AUTH. NAME	AUTHOR AFFILIATION
MEDFORD, M.	Southern California Edison Co.
RECIP. NAME	**RECIPIENT AFFILIATION**
KNIGHTON, G. W.	PWR Project Directorate 7

SUBJECT: Forwards response to request for addl info re 860207 proposed Tech Spec Change PCN-207 concerning increase in MSIV response time to 8 s. NSSS response for revised MSIV closure time presented in Cycle 3 reload analysis rept.

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 10
TITLE: OR Submittal: General Distribution

NOTES: ELD Chandler 1cy. 05000361
ELD Chandler 1cy. 05000362

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
	PWR-B EB		1	1	PWR-B PEICSB		2	2
	PWR-B FOB		1	1	PWR-B PD7 LA		1	0
	PWR-B PD7 PD	01	5	5	ROOD, H		1	1
	PWR-B PEICSB		1	1	PWR-B RSB		1	1
INTERNAL:	ACRS	09	6	6	ADM/LFMB		1	0
	~~ELD/HDS2~~		1	0	NRR/ORAS		1	0
	REG FILE	04	1	1	RGN5		1	1
EXTERNAL:	EG&G BRUSKE, S		1	1	LPDR	03	1	1
	NRC PDR	02	1	1	NSIC	05	1	1
NOTES:			1	1				

TOTAL NUMBER OF COPIES REQUIRED: LTTR 29 ENCL 25

Southern California Edison Company
P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

M. O. MEDFORD
MANAGER, NUCLEAR LICENSING

TELEPHONE
(818) 302-1749

September 16, 1986

Director, Office of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing - B
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

Southern California Edison Company's (SCE) letter dated February 7, 1986 submitted Proposed Change PCN-207 to the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 Technical Specifications. PCN-207 would increase the Main Steam Isolation Valve response time to eight seconds. In reviewing the proposed change, the NRC staff has requested additional information in the form of six questions. Our response to these questions are enclosed.

If you require any additional information, please call me.

Very truly yours,

M O Medford

Enclosure

cc: Harry Rood, NRC Project Manager, Units 2 and 3
J. B. Martin, Regional Administrator, NRC Region V
F. R. Huey, Senior Resident Inspector, Units 1, 2 and 3

A001

Request for Additional Information

Regarding Proposed Technical Specification Change
for San Onofre Units 2 and 3

1. The safety analysis submitted indicated that the proposed change would increase the MSIV response time from 5 to 8 seconds. As a result, the analysis appears to have used 8 seconds as a means of supporting this change. It is not clear whether this time accounts for the delay time plus the closure time of the MSIVs (delay time being the time from initiation of an accident plus response time of the instrumentation until valve movement begins). Table 6.2-16 of the FSAR indicates that the delay time is 2.08 seconds, while Table 15.1-13 indicates a delay time of 2.2 seconds. A 2.08 second minimum delay time coupled with an 8 second closure time results in 10.08 seconds until the MSIVs are closed. The proposed technical specification change totals 8.9 seconds, an 0.9 delay plus instrument response time. Therefore the licensee is requested to: a) specify the delay time plus closure time for the MSIVs and how they are verified; b) clarify the discrepancy between the proposed change and those sequences discussed in the FSAR regarding delay time; c) if the time used in the analysis is less than the delay time plus closure time for the MSIVs, the bases for the proposed technical specification, and the applicability of the supporting analysis.

Response:

Three distinct times are involved in the sequence of events for the main steam line break accidents. These are the: 1) time from the break or initiation of the accident to the time when the measured parameter (e.g., low steam generator pressure for MSIS) reaches the setpoint; 2) the instrumentation propagation delay; and 3) the valve closure time. The instrumentation propagation delay time is assumed to be 0.9 seconds and the valve closure time for the containment pressurization analysis is assumed to be 8.0 seconds. These times are validated through the performance of Technical Specification surveillance requirements (4.3.2.3 and 4.7.1.5). The time from the origination of the break to the time the measured parameter meets the setpoint is a contraction of the analysis and depends entirely on the analysis assumptions and analytical methodology employed.

The question compares the sequence of events of FSAR Tables 6.2-16 and 15.1-13. Although both of these tables present results from the analysis of the main steam line break inside containment, these analyses are being performed from different standpoints and thus different analytical methodologies and assumptions are used to ensure that the results of both of these analyses are conservative for the considerations of interest (fuel performance or containment pressurization). The sequence of events contained in Table 6.2-16 applies to the containment pressurization analysis for the main steam line break inside containment. The sequence of events presented in Table 15.1-13 presents the main steam line break inside containment but the analysis is geared toward determination of the effects of this event on reactivity and fuel performance. In the former case, the concern is mass/energy release into containment, the latter is concerned with fuel failures. The differences noted between the two tables result from the use of different analysis codes and other important assumptions regarding loss of offsite power and which reactor trips are credited.

Table 1 presents a revised accident chronology corresponding to FSAR Table 6.2-16 for the revised analysis. As can be seen from this table, the reactor trip, on high containment pressure, and main steam isolation signal (MSIS), on low steam generator pressure, occur earlier (1.02 seconds versus 1.18 seconds) than in the FSAR analysis. This difference is due to more detailed modeling used in the revised analysis as discussed in the response to Question 2 below. The time which is referred to here is the time following the main steam line break where the measured parameters, containment pressure and steam generator pressure reach the setpoints. In both cases, the main steam isolation valves are assumed to begin to close after a 0.9 second instrumentation propagation delay from the time of the MSIS as described above. The eight-second closure time referred to in the proposed change means that the valves are assumed to be closed eight seconds after they begin closing. In the new analysis, the MSIVs are closed 9.92 seconds (1.02 + 0.9 + 8.0) after the occurence of the main steam line break.

Table 15.1-13 of the FSAR indicates an interval of 2.2 seconds between the occurence of the main steam line break and the time when the MSIVs begin to close. This interval is longer than the corresponding 2.08 seconds given in Table 6.2-16 of the FSAR (1.92 seconds for the revised analysis presented in the Cycle 3 Reload Analysis Report) because of the differences in the models and analytical methodologies. For example, the values given in Tables 6.2-16 were derived from the results of the RCS and containment analysis code SGNII/CONTRANS, while those in Table 15.1-13 were derived from the results of the system analysis code CESEC. Also, the event described in Table 15.1-13 assumes a CPC trip at 0.6 seconds (low RCP speed resulting from the assumed loss of AC power at time zero is detected by CPCs which generate a low DNBR trip), while that in Table 6.2-16 has a trip generated at 1.18 seconds (containment pressure-high). Ignoring the earlier CPC trip is conservative for the peak pressure calculation, but would not have been conservative for the calculation of the reactivity inserted during the cooldown.

Table 1

Accident Chronology of the Worst

Case Main Steam Line Break

Time Seconds	Event
0.00	Break Occurs
1.02	Reactor Trip
1.02	Main Steam Isolation Signal
1.92	Main Steam Isolation Valves Start to Close
1.92	Main Feedwater Isolation Valves Start to Close
4.10	Containment Spray Actuation Signal
9.92	Main Steam Isolation Valves Closed
11.92	Main Feedwater Isolation Valves Closed
48.90	Peak Containment Temperature
58.40	Peak Containment Pressure
70.00	End of Blowdown

2. Provide a brief discussion of the assumption and boundary conditions, margins that exist, conservative and non-conservative areas and acceptance criteria utilized in the safety analysis.

Response

The analysis was performed using the same general methodology as was used in the original FSAR analysis. The changes in methodology mainly involved more realistic and detailed (but still conservative) modeling than did the FSAR analysis. The basic assumptions are discussed below.

1) The analysis setpoint for the high containment pressure trip system, which initiates the reactor trip in this analysis, is assumed to be 4 psig, while the instrumentation setpoint is 2.95 psig.

2) For the revised analysis, the MSIV flow area is conservatively assumed not to change during the first second of the closure duration. The flow area is then linearly decreased to zero over the remainder of the closure duration. This closure profile realistically models the MSIV's behavior, but the initial delay in valve motion conservatively increases the mass/energy release to the containment building.

3) The Main Feedwater Isolation Valve (MFWIV) closure profile is assumed to be a step function in both the original and revised analyses, which maximizes the mass/energy release to the containment building.

4) The turbine admission valves are assumed, in both the original and revised analyses, to close instantaneously upon trip. This assumption minimizes the steam flow to the turbine and maximizes the flow to the containment building.

5) The rapid depressurization of the ruptured steam generator causes more than 50% of the total feed flow to be diverted to this unit. The original analysis for the FSAR assumed that 100% of the total feedwater flow is diverted to this unit. However, subsequent analysis (which is also documented in the FSAR reference section) indicated that at full power only 65% of the total feedwater flow would be diverted to this unit. The revised analysis conservatively assumes that 87.5% of the total feedwater flow is diverted to the ruptured unit. This assumption maximizes the mass/energy release to the containment building.

6) The steam line and feedwater line inventories are considered to contribute to the mass/energy release to the containment building.

7) The steam blowdown back pressure is decreased, thereby increasing the blowdown, by using a multiplier of 1.2 on the Uchida condensing heat transfer coefficient (which increases the condensation). However, in calculating the containment peak pressure, a conservative value of 1.0 is used for the multiplier.

The acceptance criterion for this analysis is the containment peak pressure, which is determined by the mass and energy releases. The peak pressure reported in the FSAR is calculated by the code COPATTA, and is based on mass and energy releases supplied by the code SGNIII/CONTRANS. In this revised analysis, the mass and energy releases were lower than those reported in the FSAR. Hence, it is concluded that the containment peak pressure claculated by the code COPATTA would not be higher than that reported in the FSAR.

3. Provide a brief discussion as to why changes were made to the FSAR safety analysis methodology.

Response

Changes were made to the original FSAR methodology to accommodate longer MSIV response times and achieve acceptable results in the Safety Analysis. The requirement to increase the response time became apparent after licensing of SONGS 2 and 3 when there appeared to be little margin between the five second Technical Specification response times and actual measured response times in the field. Initially SCE proposed an increase in MSIV response time from five to six seconds (Reference PCN-96). This response time increase was approved May 16, 1986 by Amendment Nos. 46 and 35. This increase in response time was justified using the original FSAR analysis methodology with actual valve flow characteristics instead of those assumed in the original analysis.

During the first refueling outage of each unit, modifications were made to the hydraulic skids for the MSIV's to improve their reliability and maintainability. In the process of these modifications, new problems relating to the Marotta dump valves, which were relocated were identified. These problems manifested themselves as cracked seats allowing hydraulic fluid to bleed off resulting in the MSIV drifting closed. Because the supplier, Marotta had difficulty in supplying parts, it was decided to replace the Marotta valves with valves manufactured by Paul Munroe Hydraulics. This change was instituted during the second refueling outage. It was anticipated that the MSIV response time would increase with these modifications. CE was requested to reanalyze the main steam line break events to support longer valve closure times. This action was carried out in parallel with the detailed design of the modifications. As it turned out, when modified, the MSIVs close in less than six seconds, the PCN-96 approved response time. However, additional margin is desired to avoid future TS problems. To obtain acceptable analysis results with a longer MSIV response time, revised analysis assumptions and refined methodology were employed. These analysis changes are described in the response to Question 2 above.
In summary, the changes in FSAR methodology were required to support the longer response times desired to increase operating margin.

4. Provide a statement verifying that the analysis supporting the proposed technical specifications are based on maximum delay plus closure time for the MSIVs when addressing RCS cooldown, thermal transients, equipment response, etc.

Response

As discussed in the response to Question 1 above, the analysis supporting the proposed Technical Specification changes are based on the maximum delay time; i.e., instrumentation propagation delay plus valve closure time. These assumed response times are validated through the performance of the Technical Specification surveillances. The NSSS response for the revised MSIV closure time, is presented in the Cycle 3 Reload Analysis Report. Because the NSSS response is less limiting than the containment analysis, a 10-second valve closure time was assumed in the RAR which has been reviewed by the NRC staff (refer to Amendments 47 and 36).

5. Provide a brief discussion regarding the qualification and ability of the equipment, located in the containment, to perform their function due to the changing containment environment as a result of the increased closure time of the MSIVs.

Response:

As stated in the response to Question 2, the revised analysis demonstrates that mass and energy releases to containment, with an eight-second MSIV closure time, are predicted to be less than those reported in the original FSAR analysis. As a result, the containment environment predicted by the revised analysis is bounded by that presented in the FSAR. The basis for environmental qualification of equipment inside containment is discussed in FSAR Section 3.11. The qualification profiles for equipment are presented in Figures 3.11-1 and 3.11-2. Because the containment environment predicted by the revised analysis is bounded by the FSAR analysis and environmental qualification profiles, the proposed change does not affect the qualification or ability of the equipment to function inside containment.

6. For those valves that communicate with the containment environment, provide a brief discussion regarding operability qualification and demonstration as a result of the changing containment environment (e.g., opening and closing capability, technical specification requirements, back-pressure acting on pneumatic operator vent port, survivability, etc.).

Response:

The only valves that communicate with the containment atmosphere during power operation that are automatically actuated to close in the event of an accident, are the containment mini-purge isolation valves HV-9821, 23, 24 and 25. These valves are qualified to close in a post-accident environment and satisfy Branch Technical Position CSB 6-4. In response to TMI Action Item II.E.4.2 Containment Isolation Dependability, SCE provided a certification of conformance from the valve manufacturer (Fisher Controls) certifying that the valves are capable of closing in a post-accident environment. The Staff's evaluation of this response is included in SER Supplement 2. The revised analysis of containment pressurization for the limiting main steam line break supporting the increased MSIV response time demonstrates that the predicted containment environment is bounded by that presented in the original FSAR analysis; therefore, the containment purge isolation valves will continue to meet the requirements of CSB 6-4 even with the revised MSIV response time. It should be noted that the purge valves are qualified to close against a 60 psig containment pressure and that the FSAR reported P_a (peak accident pressure) is 55.7 psig and that bounds the revised analysis since mass and energy releases to containment are lower.

PWS0022H