

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8908010287 DOC.DATE: 89/07/25 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  
 NANDY,F.R. Southern California Edison Co.  
 RECIP.NAME RECIPIENT AFFILIATION  
 Document Control Branch (Document Control Desk)

SUBJECT: Discusses basis for assumption of critical crack in  
 nonseismic portions of CCW sys.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 5  
 TITLE: OR Submittal: General Distribution

### NOTES:

	RECIPIENT ID CODE/NAME	COPIES		RECIPIENT ID CODE/NAME	COPIES	
		LTTR	ENCL		LTTR	ENCL
	PD5 LA	1	1	PD5 PD	1	1
	HICKMAN,D	5	5			
INTERNAL:	ACRS	6	6	NRR/DEST/ADS 7E	1	1
	NRR/DEST/CEB 8H	1	1	NRR/DEST/ESB 8D	1	1
	NRR/DEST/ICSB	1	1	NRR/DEST/MTB 9H	1	1
	NRR/DEST/RSB 8E	1	1	NRR/DOEA/TSB 11	1	1
	NUDOCS-ABSTRACT	1	1	OC/LEMB	1	0
	OGC/HDS2	1	0	<u>REG FILE</u> 01	1	1
	RES/DSIR/EIB	1	1			
EXTERNAL:	LPDR	1	1	NRC PDR	1	1
	NSIC	1	1			

### NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,  
 ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION  
 LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 28 ENCL 26

R  
I  
D  
S  
/  
A  
D  
S  
  
R  
I  
D  
S  
/  
A  
D  
S

mlh 4/21



*Southern California Edison Company*

P. O. BOX 800  
2244 WALNUT GROVE AVENUE  
ROSEMEAD, CALIFORNIA 91770

F. R. NANDY  
MANAGER OF NUCLEAR LICENSING

TELEPHONE  
(818) 302-1896

July 25, 1989

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

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362  
Component Cooling Water System Review  
San Onofre Nuclear Generating Station  
Units 2 and 3

By letter dated December 16, 1988, SCE submitted to the NRC a report documenting the results of our operability assessment of the component cooling water (CCW) system. One area addressed in this report was the ability of the CCW system to withstand a design basis seismic event with a consequential critical crack in the non-Seismic Category I portions of the noncritical loop. In a subsequent telephone conversation, the NRC questioned the basis for assuming a critical crack in lieu of a guillotine break in the noncritical loop.

The purpose of this letter is to discuss the basis for the assumption of a critical crack in the nonseismic portions of the CCW system. As discussed below, this assumption is consistent with the NRC's Standard Review Plan as it existed at the time of plant licensing (NUREG-75/087, November 1975). It is noted that the 1975 Standard Review Plan is also consistent with the current Standard Review Plan (NUREG-0800, Rev. 1 - July 1981) in this area. Furthermore, this is consistent with the licensing basis of San Onofre Units 2 and 3 as documented in the Final Safety Analysis Report and the NRC Safety Evaluation Report (NUREG-0712, February 1981). In addition, SCE conducted a limited survey of other nuclear plants. From this survey, it is apparent that this assumption was not uniformly applied throughout the industry. There are plants that are consistent with San Onofre Units 2 and 3 as well as plants that are not.

NRC Standard Review Plan

The CCW system is addressed in SRP Section 9.2.2, "Reactor Auxiliary Cooling Water Systems." SRP 9.2.2 (NUREG-0800) addresses the issue in several paragraphs; for example:

Paragraph I.2.a

"The effects of non-seismic Category I component failures on the seismic Category I portion of the system."

8908010287 890725  
PDR ADCK 05000361  
P PIC

Acc  
11

## Paragraph I.3.d

"Review of high and moderate energy pipe breaks is performed under SRP Section 3.6.1."

## Paragraph II.3.e

"A moderate-energy leakage crack or an accident that is initiated from a failure in the CWS piping does not result in excessive fuel damage or reactor coolant leakage in excess of normal coolant-makeup capability. A single active failure is considered when evaluating the consequences of this accident. Moderate leakage cracks are determined in accordance with the guidelines of Branch Technical Position ASB 3-1, 'Protection Against Postulated Failures in Fluid Systems Outside Containment.'"

## Paragraph III.5.a

"The failure of portions of the system or of other systems not designed to seismic Category I standards and located close to essential portions of the system, or of non-seismic Category I structures that house, support or are close to essential portions of the CWS, will not preclude essential functions."

These paragraphs make it clear that the effects of moderate energy cracks and of "failure" of nonseismic portions of the CCW system must be evaluated. However, there is not a clear definition of what is meant by "failure" in the context of the nonseismic piping in the CCW system.

To resolve this ambiguity, we go to the only places in the SRP that discuss pipe failure assumptions - SRP Sections 3.6.1, "Plant Design For Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," and 3.6.2, "Determination of Break Locations and Dynamic Effects Associated With The Postulated Rupture of Piping." Branch Technical Position APCSB 3-1, which is attached to SRP 3.6.1 (NUREG-75/087), addresses the issue of piping failures in the following paragraphs, among others:

## Paragraph B.3.a

"To show that the plant arrangement and design features provide the necessary protection of essential systems and components, piping failures should be postulated in accordance with BTP MEB 3-1, attached to SRP Section 3.6.2. In applying the provisions of BTP MEB 3-1, each longitudinal or circumferential break in high-energy fluid system piping or leakage crack in moderate-energy fluid system piping should be considered separately as a single postulated initial event occurring during normal plant conditions."

Paragraph B.3.d<sup>1</sup>

"A postulated failure of piping not designed to seismic Category I standards should not result in any loss of capability of essential systems and components to withstand the further effects of any single active component failure and still perform all functions required to shut down the reactor and mitigate the consequences of the postulated piping failure."

## Appendix A, Definitions

"Postulated Piping Failures. Longitudinal and circumferential breaks in high-energy fluid system piping and through-wall leakage cracks in moderate-energy fluid system piping postulated according to the provisions of BTP MEB 3-1, attached to SRP 3.6.2."

Branch Technical Position MEB 3-1, which is attached to SRP 3.6.2 (NUREG-75/087), addresses the issue of piping failures in nonseismic systems in the following paragraph, among others:

## Paragraph B.2.c.(ii)

"Through-wall leakage cracks should be postulated in fluid system piping designed to non-seismic standards as necessary to satisfy B.3.d of BTP APCS 3-1."

In general, SRP 3.6.1 and 3.6.2 and the corresponding Branch Technical Positions do not differentiate between seismic and nonseismic systems; for moderate energy fluid systems, a piping failure corresponds to a through-wall leakage crack. However, even in the specific case in BTP APCS 3-1 where "failure" of nonseismic piping is addressed (paragraph B.3.d), BTP MEB 3-1 makes it very clear that through-wall leakage cracks should be postulated and not guillotine breaks (paragraph B.2.c.(ii)).

San Onofre Units 2 and 3 Licensing Basis

Moderate energy pipe breaks were not part of the original design basis of San Onofre Units 2 and 3. (Reference: SCE's response to NRC question 010.4 on the FSAR.) However, during the review of the operating license application, SCE did agree to evaluate leakage cracks in major safety-related, moderate energy piping in selected areas outside the containment. This is documented in Appendix 3.6B of the FSAR. Appendix 3.6B addresses spray effects and refers to Section 3.4 for flooding effects and for a definition of moderate-energy leakage cracks.

---

<sup>1</sup> This paragraph is reworded in NUREG-0800. However, the meaning is unchanged. NUREG-0800 states: "The functional capability of essential systems and components should be maintained after a failure of piping not designed to seismic Category I standards, assuming a concurrent single active failure."

Section 3.4 addresses flooding effects of piping failures. For high energy piping, a double ended guillotine break was postulated. For moderate energy piping, it states:

3.4.2.2.1.B

"Critical cracks are postulated in fluid system piping which is not considered high-energy. Fluid flow from a crack is based on an area equal to that of a rectangle one-half pipe diameter in length and one-half pipe wall thickness in width."

Consistent with this criterion, a critical crack is shown as the type of break in Table 3.4-2 of the FSAR for component cooling water piping.

The NRC Safety Evaluation Report for San Onofre Units 2 and 3 discusses pipe break in Section 3.6. This section addresses "postulated pipe breaks or cracks in high energy piping systems and postulated pipe cracks in moderate energy piping systems." The NRC Staff concluded that the plant design was acceptable.

During the review of the operating license application, there were several NRC questions which related to the non-Seismic Category I portion of the component cooling water system. (Reference Questions 010.13, 010.29 and 010.48.) Specifically, the NRC concern related to the non-Seismic Category I component cooling water lines to the reactor coolant pumps. This concern is documented in Section 9.2.2 of the NRC Safety Evaluation Report. The Safety Evaluation Report states:

"During the course of our review, we notified the applicant that the component cooling water system design is to meet the following criteria:

- "(1) A single failure in the CCWS shall not result in fuel damage or damage to the reactor coolant system pressure boundary caused by an extended loss of cooling to the RCPs. A single failure includes operator error, spurious actuation of motor-operated valves, and loss of CCW pumps.
- "(2) A moderate energy leakage crack or an accident that is initiated from a failure in the CCWS piping shall not result in excessive fuel damage or a breach of the reactor coolant system pressure boundary when an extended loss of cooling to the reactor coolant pump occurs. A single active failure shall be considered when evaluating the consequences of this accident. Moderate leakage cracks should be determined in accordance with the guidelines of Branch Technical Position APCS 3-1, 'Protection Against Postulated Failure in a Fluid System Outside Containment.'

July 25, 1989

"To meet the two criteria above, that portion of the CCWS which supplies cooling water to the reactor coolant pump can be designed to non-Seismic Category I requirements and Quality Group D if it can be demonstrated that the RCPs are capable of operating with loss of cooling for longer than 30 minutes without loss of function and without the need for operator protective action."

The Safety Evaluation Report goes on to conclude that tests performed by SCE "demonstrate that the RCPs are capable of operating with loss of cooling for a period of time compatible with corrective operator action." This interaction clearly demonstrates the NRC expectation that a critical crack be postulated in the non-Seismic Category I moderate energy component cooling water piping.

In summary, SCE's evaluation of the CCW system at San Onofre Units 2 and 3 postulated a critical crack in the non-Seismic Category I portions of the noncritical loop independent of the initiating event. A critical crack is appropriate since the CCW system is a moderate energy fluid system. This is consistent with Branch Technical Positions APCS 3-1 and MEB 3-1 which clearly indicate that through-wall leakage cracks are the appropriate piping failure in moderate energy fluid systems. Furthermore, this is consistent with the San Onofre Units 2 and 3 licensing basis as documented in the FSAR and the NRC Safety Evaluation Report.

If you wish to discuss this matter, please let us know.

Very truly yours,



cc: J. B. Martin, Regional Administrator, NRC Region V  
F. R. Huey, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3