UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 26 1979

Docket No. 50-~~29~~ 206

MEMORANDUM FOR: Dennis Crutchfield, Chief
Systematic Evaluation Program Branch, DOR

FROM: Kahtan Jabbour
Systematic Evaluation Program Branch, DOR

SUBJECT: SUMMARY OF MEETING WITH SOUTHERN CALIFORNIA EDISON ON HIGH ENERGY LINE BREAK INSIDE CONTAINMENT FOR SAN ONOFRE (SEP TOPIC III-5.A)

Representatives of the Nuclear Regulatory Commission (NRC) and Southern California Edison (SCE) met in Bethesda to discuss the Systematic Evaluation Program (SEP) Topic III-5.A, "Effects of Pipe Break on Structures, Systems and Components Inside Containment", on September 19, 1979. A list of attendees is provided in Attachment 1.

Following brief introductory discussions of the criteria for postulating break locations and break scenarios, SCE representatives made a presentation on the San Onofre plant layout and identified the high energy lines and safety-related equipment inside containment. Their presentation is contained in a preliminary report (Attachment 2) to be utilized primarily to illustrate the philosophy and methodology of the approach to be used by SCE in evaluating the effects of pipe breaks on structures, systems and components inside containment. SCE representatives also stated that they will use either the mechanistic or effect oriented approach for each separate pipe run.

To date SCE has utilized the effect oriented approach (for evaluating the high energy line break effects) described in the attachment to the NRC letter to KMC dated July 20, 1978. This approach postulates a high energy pipe break inside containment near safety equipment and analyzes the capability of the remaining systems to safely shutdown the reactor. Licensee representatives discussed the interaction of the breaks (pipe whip and jet impingement) with the safety systems required to shutdown the plant.

The NRC representatives requested the licensee to study the pipe whip and jet impingement effects of the breaks postulated under NRC TASK ACTION PLAN (TAP) A-2 and to consider these effects for postulated breaks in the primary coolant loop at locations other than those required in TAP A-2 using either the mechanistic or effect oriented approach. The NRC representatives agreed to further review the interface between A-2 and SEP Topic III-5.A to assure that there is no unnecessary duplication of effort.

The licensee stated that the consideration of a whipping pipe as having sufficient energy to postentially rupture an impacted pipe of equal or greater nominal pipe size and equal or greater wall thickness is an escalation of current criteria. The NRC representatives agreed to attempt to resolve this concern in the near future. However, the licensee agreed to consider the effects of jet impingement loads from a ruptured pipe on a pipe of equal or greater nominal size.

The NRC representatives made the following statements concerning the effect oriented approach:

1. The safety objectives are:

   A. To maintain a coolable core geometry following any postulated break.

   B. To maintain the capability of safe plant shutdown (definition of safe shutdown consistent with that of safe shutdown reviews).

   C. To maintain containment integrity.

2. It is of utmost importance that the consequences of each pipe break scenario be fully recognized and understood before a decision would be made on any proposed resolution. The staff further stated that pipe breaks should be considered at locations close to safety-related equipment (as stated in the enclosure to the NRC letter to KMC dated July 20, 1978). Consideration must be given to the effects of larger pipe damaging smaller pipes and causing multiple failures of piping, jet impingement and single failure. The methods of calculating the effects of jet impingement are discussed in the NRC Standard Review Plan (SRP), Section 3.6.2 or in the proposed ANS-58.2 (ANSI-N176) dated January 1979. Other types of enveloping solutions may be generated by the licensee and will be reviewed by the NRC staff. The single failure criteria to be used by the NRC staff in their review will be that of ANS-51.7, Draft 4; Rev. 1, November 1975, which states that the most limiting single failure will be taken in addition to the initiating break and its effects. The most limiting single failure can be taken either as a single active failure in the short-term <u>or</u> a single active <u>or</u> passive failure in the long-term. Short-term, long-term and the nature of the passive failure are defined in the standard.

3. General Design Criterion No. 17 and SRP Section 3.6.1 (BTP APCSB 3-1) will be employed relating to loss of offsite power; however, on a plant-by-plant basis, operational experience will be considered.

4. Credit for operator action will be considered on a case-by-case basis once the scenarios have been developed.

The licensee requested that augmented in-service inspection (ISI) be considered as a means to mitigate the consequences of the postulated pipe breaks where retrofitting or adding restraints is impractical.

At the conclusion of the meeting, the licensee approach and schedule for resolving this topic were discussed. The NRC representatives expressed concern about the schedule delay in developing postulated break scenarios. However, they agreed to discuss the revised schedule at a later date.

Ted Quay for
Kahtan Jabbour
Systematic Evaluation Program Branch
Division of Operating Reactors

Attachment:
As stated

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W. Moody, SCE
H. Smith, SCE
J. Rainsberry, SCE
K. Jabbour, NRC
P. DiBenedetto, NRC
R. Kiessel, NRC
C. Hofmayer, NRC
J. Shapaker, NRC

ATTACHMENT 1

LIST OF ATTENDEES
SEPTEMBER 19, 1979

Southern California Edison

W. Moody
H. Smith
J. Rainsberry

KMC, Inc.

R. Schaffstall

NRC

K. Jabbour
P. DiBenedetto
D. Crutchfield
R. Kiessel
C. Hofmayer
J. Shapaker

AGENDA

SEP TOPIC III-5.A, HIGH ENERGY
PIPE BREAK INSIDE CONTAINMENT
SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1
SEPTEMBER 19, 1979

I. Introduction

II. General Approach

III. Essential Systems

IV. High Energy Lines

V. Program

VI. Conclusion

PRELIMINARY

GENERAL APPROACH

1. Identify Essential Systems

   a. Safe shutdown
   b. Emergency Core Cooling Systems

2. Identify High Energy Lines

3. Identify Potential Impactees

4. Evaluate Effects of Breaks

   a. Coolable Core Geometry
   b. Safe Shutdown Capability
   c. Offsite Doses Less Than 10CFR 100

PRELIMINARY

EVALUATION ASSUMPTIONS

1. Lines 1" Diameter Not Analyzed
2. Piping Boundary is First Normally Closed Valve, Check Valve, Safety/Relief Valve or Valve Capable of Auto Closure
3. Single Active Failure
4. Pipe cannot Damage Pipe of Equal or Larger Size With the Same of Greater Wall Thickness
5. Reactor Coolant System Breaks To Be Evaluated As Part of Generic Issue on Asymmetric LOCA Loads.
6. Use of All Plant Systems to Shutdown is Acceptable
7. Operator Actions Permitted

PRELIMINARY

ESSENTIAL SYSTEMS LIST

		P&ID NO.
1.	Reactor Coolant System (RCS)	568766
2.	Chemical and Volume Control System (CVCS) a. RCS Letdown b. Charging c. Reactor Coolant Pump (RCP) seal water supply	568767
3.	Residual Heat Removal System (RHR)	568768
4.	Component Coolant Water System (CCWS) a. Cooling water for RHR b. Cooling water for RCP	568768
5.	Safety Injection System (SIS) and including a. Recirculation system b. Sphere spray system	568769
6.	Main Steam System	568773
7.	Main Feedwater System	568779
8.	Instrument Air System	

PRELIMINARY

A. CONTAINMENT ISOLATION PHASE**

Equipment Number	Name	Function in Accident
1. CV-40	Instrument air exhaust control valve	Isolates containment
SV-19	Solenoid valve for CV-40	Actuates CV-40
2. CV-116	Sphere pressure equalization valve	Isolates containment
SV-127	Solenoid valve for CV-116	Actuates CV-116
3. CV-146	Sphere vapor sample control valve	Isolates containment
SV-1212-6	Solenoid valve for CV-146	Actuates CV-146
4. CV-147	Sphere vapor sample (return) control valve	Isolates containment
SV-1212-7	Solenoid valve for CV-147	Actuates CV-147
5. CV-202, 203, 204	Loop A letdown isolation valves	Isolate containment
	Solenoid valves for CV-202, 203 and 204	Actuates CV-202, CV-203 and CV-204
6. CV-102, 104, 106	Sphere sump pump discharge valve, reactor coolant drain pump discharge valve, reactor coolant drain tank vent isolation valve.	Isolate containment on SIS.
SV-108, 110, 112	Solenoid valves for CV-102, 104, 106	Actuate CV-102, 104, 106
7. (Undesignated)	Containment isolation valve limit switches	Provide indication of containment isolation valve position.

**Pressure and radiation sensors which initiate containment isolation are located outside the containment sphere.

PRELIMINARY

B. INJECTION PHASE

Equipment Number	Name	Function in Accident
1. MOV-850 A, B & C	Safety injection valves	Open to permit safety injection flow to primary loops
2. PT-430*, PT-431*, PT-432*, PT-425**	Pressurizer pressure transmitters	*Provides automatic initiation of safety injection upon signals from 2 out of 3 transmitters indicating low pressurizer pressure. **Provides surveillance of RCS.
3. LT-430, 431, 432, 435	Level transmitters	Provide pressurizer level indication
4. Loop A 1. TE 402C Loop B 1. TE 412C Loop C 1. TE 422C Pressurizer 1. TE 430 A, B, C	Reactor coolant temperature detectors	Provide indication of reactor coolant temperature for surveillance of SIS performance.

C. RECIRCULATION PHASE

Equipment Number	Name	Function in Accident
1. G45 A&B	Recirculation pumps	Operate to provide for long-term cooling subsequent to safety injection in LOCA
2. MOV-866 A,B	Recirculation pump isolation valves	Open to line up long-term recirculation subsequent to safety injection in LOCA
3. MOV-356, 357, 358	Recirculation line isolation valves	Open to line up long-term recirculation subsequent to safety injection in LOCA
4. Loop A 1. TE 402C Loop B 1. TE 412C Loop C 1. TE 422C Pressurizer 1. TE 430 A, B, C	Reactor coolant temperature detectors	Provide indication of reactor coolant temperature for surveillance of cool down.
5. PT-430, 431, 432, 435	Pressurizer pressure transmitters	Provide indication of pressurizer pressure and level
LT-430, 431, 432, 435	Pressurizer level transmitters	
6. FT 500, 501	Flow transmitter for recirculation	Monitors recirculation flow from the recirc pumps.

D. HOT LEG RECIRCULATION

Equipment Number	Name	Function in Accident
1. CV 304	Charging line to Loop A isolation valve	CV isolates the loop A charging line during hot leg recirculation
2. CV 305	Pressurizer aux. spray valve	CV allows flow of recirculation water to loop B hot leg.
3. FCV 430C and 430H	Pressurizer spray valves	Isolates loop A and B cold legs during hot leg recirculation
4. Loop A 1. TE 402C Loop B 1. TE 412C Loop C 1. TE 422C Pressurizer 1. TE 430 A, B, C	Reactor coolant temperature detectors	Provide indication of reactor coolant temperature for surveillance of cool down.

E. RESIDUAL HEAT REMOVAL PHASE**

Equipment Number	Name	Function in Accident
1. G-14 A&B	Residual heat removal pumps	Operate to provide for long-term cooling subsequent to safety injection in MSB
2. MOV-813, 834	Residual heat removal pressure interlock valves	Open to line up long-term cooling subsequent to safety injection in MSB
3. MOV-814, 833	Residual heat removal isolation valves	Open to line up long-term subsequent to safety injection in MSB
4. HCV-602	Residual heat exchanger flow control valve	Regulates flow through the residual heat exchangers during during long-term cooling subsequent to MSB
5. FT-602	RHR flow transmitter	Provide indication of RHR flow
6. Loop A 1. TE 402C Loop B 1. TE 412C Loop C 1. TE 422C Pressurizer 1. TE 430 A, B, C	Reactor coolant temperature detectors	Provide indication of reactor coolant temperature for surveillance of cool down.
7. MOV 822 A&B	RHR heat exchanger isolation valve	Provide flow path to RHR heat exchangers

**RHR not required post-LOCA.

Equipment Number	Name	Function in Accident
8. TE 600 TE 601 A, B	RHR hot and cold leg temperature transmitter	Monitor RHR performance
9. RV 206	RHR pressure relief valve	Provide overpressure protection during RHR operation

F. CONTAINMENT SPRAY

1. CV-82, 114	Sphere spray control valves	Reduce fission product concentration and containment pressure during LOCA and containment pressure during MSB
SV-118, 128	Solenoid valves for CV-82,	Actuates CV-82, CV-114

G. MISCELLANEOUS

1. LT-450, 451, 452	Steam generator level transmitters	Monitor steam generator inventory
2. FCV 1115 A, B, C	Reactor coolant pump seal water control valves	Provide seal and cooling water to maintain seal integrity
3. LCV 1112 and associated SV	RCS letdown control valve	Cool down and depressurize RCS post-MSLB
4. CV 530, 531, 532, 533, 545, 546	RCS safety and pressure valves	Provide overpressure protection for RCS