TERA

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

May 23, 1979

DOCKET NO. 50-293

MEMORANDUM FOR: Thomas A. Ippolito, Chief, Operating Reactors #3, DOR

FROM: J. N. Hannon, Project Manager, ORB#3, DOR

SUBJECT: MEETING SUMMARY

A meeting was held with representatives from Boston Edison Company (BECo), General Electric (GE), and Teledyne Engineering Services (TES) in Bethesda, Maryland on May 18, 1979. The purpose of the meeting was to discuss the results of seismic piping stress reanalysis done for Pilgrim Nuclear Power Station (PNPS) Unit 1 in connection with IE Bulletin 79-07. A list of meeting attendees and a copy of the BECo. Slide presentations are attached.

BECo indicated that the recirculation system piping and main steam piping located inside the dry well were originally analyzed using algebraic summation techniques. GE had reanalyzed the recirculation piping using PISYS. TES had reanalyzed the main steam piping using STARDYNE. During the review of PISYS results, it was determined that four snubbers in the recirculation system were undersized and would require replacing. As a result, PNPS was shutdown. PISYS was later re-run using as-built data and only two recirculation snubbers were finally declared inoperable (one of the 4 original suspect snubbers and one other.) As previously stated, TES had reanalyzed the main steam piping using STARDYNE. Six main steam snubbers were declared inoperable (not designed to withstand the calculated loads) after review of the STARDYNE results.

BECo has initiated a review of all 76 safety related snubbers to verify that they are capable of withstanding the calculated loads. This review will include the attachments and structural steel. To date 16 attachment welds in the recirculation system had been identified as requiring rework and structural steel stiffeners were necessary in Main Steam (1), HPCI (1), RHR (1), and Recirc (4). This review and associated modifications will be complete before the plant is returned to power operation.

BECo stated that 13 of 24 snubbers on the recirculation system had been verified on as built drawings which were used as inputs to the reanalysis. Six of 12 main steam snubbers had been verified and the remainder would be verified today.

309 240

374 Q

7907090

(13)

At the conclusion of the meeting the NRC indicated that prior to returning PNPS to power, BECo should document the results of the seismic reanalysis including the following:

- Code verification. Include a dynamic listing for PISYS and statement of the methodology used in the STARDYNE load combination processor.
- Describe the snubber problems and how they were corrected, including attachment anchors and structural steel.
- Confirm that changes in peak stress locations as a result of the reanalyses will have no adverse effect on the high energy pipe break criteria.
- onfirm that as-built data were used as input to reanalysis codes.
- Describe the results of the piping stress reanalyses under 79-07 and the basis for concluding that the plant can safely be returned to power operation.

The NRC stated that IE may be asked to perform a sampling inspection to verify as-built drawings were utilized in the reanalysis. NRR will continue code verification efforts for PISYS and STARDYNE. BECo indicated that they would have all required documentation by Monday, May 21, 1979 and expected to be ready to return to power operation by as early as Tuesday, May 22, 1979 but no later than Friday, May 25, 1979.

The NRC will review BECo's documented responses and issue a letter approving the return to power operation, provided it is found to be acceptable.

for John N. Hannon, Project Manager
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
1. List of Attendees
2. Agenda

309 241

LISTING OF MEETING ATTENDEES

NRC

J. Hannon
K. Wichman
J. Fair
J. Martore
W. Russell
E. Igne
R. Bevan
K. Herring
B. D. Liaw
H. Wong
B. Grimes
T. Ippolito
M. Hartzman

GE

N. Shirley
J. Kilty
J. Thompson

Boston Edison

C. Ondash
J. Famigietti
R. Machon

Teledyne Eng. Services

J. Flaherty

States News Service

J. Membrino

AGENDA

- INTRODUCTION
- OBJECTIVES
- RESULTS OF 79-07 REANALYSIS
- REASON FOR TECH SPEC. SHUTDOWN REQUIREMENT
- MODIFICATIONS NECESSARY FOR TECH SPEC. COMPLIANCE
- CONCLUSION

PILGRIM RECIRCULATION PIPING STRESSES

DESCRIPTION OF COMPONENT	*UPSET STRESS RATIOS			**EMERGENCY STRESS RATIOS		
	DAPS	PISYS	%OBE	DAPS	PISYS	% SSE
Header Reducer Cross Loop A	0.691	0.605	21.5	-	0.479	43.0
RHR Return Tee Loop A	0.76	0.595	42.3	0.603	0.543	57.9
Header Reducer Cross Loop B	0.696	0.614	25.1	-	0.497	38.7
Header Sweepolet Loop B	0.687	0.582	25.1	-	0.468	38.9
RHR Return Anchor Loop B	0.748	0.511	31.11	0.708	0.433	45.9
RHR Return Elbow Loop A	0.648	0.422	15.9	-	0.320	26.2
Header Sweepolet Loop B	0.745	0.595	23.9	0.543	0.452	37.1
Header Sweepolet Loop A	0.7	0.500	27.1	0.552	0.412	41.1
RHR Return Anchor Loop A	0.773	0.419	14.4	0.738	0.314	24.0
Pump Inlet Loop A	0.558	0.496	22.7	0.409	0.374	35.6
Pump Outlet Loop A	0.683	0.553	15.8	0.45	0.464	26.2

$$\text{*STRESS RATIO} = \frac{\text{UPSET STRESS}}{1.2\ S_h}$$

$$\text{**STRESS RATIO} = \frac{\text{EMERGENCY}}{1.8\ S_h}$$

SUMMARY OF SNUBBER LOADS

FOR RECIRCULATION PIPING OF PILGRIM

SNUBBER IDENTIFICATION		CALCULATED EARTHQUAKE LOAD *	
	LOOP	PISYS	DAPS
SS6	B	12.1	16
SS-8	B	14.1	19
SS-10	B	12.0	18
SS-14	B	16.2	28
SS-13	B	16.6	25
SS-16	B	13.6	3.7
SS-09	A	11.9	13
SS-07	A	13.2	13
SS-05	A	16.7	13
SS-11	A	19.2	18
SS-12	A	19.7	20
SS-15	A	15.0	3.0
B-14	A	8.9	6 3
B-15	A	5.8	5.2
B-26	A	7.3	3.5
B-29	A	1.9	1.5
B-262	B	17.2	8
SS-24	B	8.2	14.0
B-263	B	15.0	5.9
SH-1	B	12.3	13
SH-4	B	10.6	8.6
SS-19	B	10.9	14
SS-25	B	9.6	10
SH-2	A	11.3	13
B-104	A	8.0	15
B-105	A	6.7	9.6
SS-21	A	16.1	10
SS-26	B	23.2	11
SH-3	A	8.9	13
SS-23	A	17.6	13
SS-20	A	10.5	10
SS-22	A	11.7	6.1

*OBE LOAD IN KIPS

PILGRIM MAIN STEAM LINE D

COMPONENT DESCRIPTION	UPSET STRESS RATIO*			EMERGENCY STRESS RATIO**		
	DAPS	STARDYNE	%SEISMIC	DAPS	STARDYNE	SEISMIC
Elbow Before MSIV	0.82	0.51	26.0	0.85	0.36	33
Header Elbow Before SRV	0.75	0.45	16.0	0.75	0.35	20
SRV Sweeplot	0.83	0.934	16.0	0.82	0.83	20

$$*RATIO = \frac{\text{UPSET STRESS}}{1.2\ S_h}$$

$$**RATIO = \frac{\text{EMERGENCY STRESS}}{1.8\ S_h}$$

SUMMARY OF SNUBBER LOADS

FOR MAIN STEAM, HPCI AND RCIC PIPING

(INSIDE DRYWELL)

SNUBBER IDENTIFICATION	CALCULATED EARTHQUAKE LOAD*	
	STARDYNE	DAPS
Main Steam		
SA-1	9.7	20.0
SA-2	8.8	9.4
SA-3	4.2	3.8
SB-1	5.3	8.5
SB-2	7.2	12.0
SB-3	4.7	10.0
SC-1	5.1	8.5
SC-2	5.6	12.0
SC-3	3.8	10.0
SD-1	13.6	20.0
SD-2	9.6	9.4
SD-3	9.2	3.8
HPCI		
SS-13	4.5	2.7
SS-14	3.4	1.1
RCIC		
SS-15	0.34	0.10
SS-16	0.70	0.10

*OBE LOAD IN KIPS

PILGRIM STATION UNIT #1

REQUIRED SNUBBER MODIFICATIONS

SAFETY RELATED SYSTEMS

SYSTEM	TOTAL SNUBBERS	INOPERABLE SNUBBERS
Main Steam	12	6
RCIC	2	0
HPCI	10	0
Core Spray	4	0
RHR	11	0
Feedwater	10	0
Head Spray	2	0
Recirc.	24	2
RBCCW	1	0
	76	8

PILGRIM STATION UNIT #1

REQUIRED STEEL MODIFICATIONS

SAFETY RELATED SYSTEMS

	ATTACHMENTS	STRUCTUAL STEEL
Main Steam	0	1
RCIC	0	0
HPCI	0	1
Core Spray	0	0
RHR	0	1
Feedwater	0	0
Head Spray	0	0
Recirc.	16	4
RBCCW	0	0

CONCLUSIONS

PILGRIM REANALYSIS UNDER BULLETIN 79-07 HAS BEEN COMPLETED SUBJECT TO FINAL CHECKING.

MODIFICATIONS ARE NECESSARY TO BRING PILGRIM INTO COMPLIANCE WITH TECHNICAL SPECIFICATIONS.

WHEN MODIFICATIONS COMPLETE PILGRIM HAS NO TECH SPEC RESTRICTIONS FOR STARTUP.

THE HEALTH & SAFETY OF THE PUBLIC IS ADEQUATELY PROTECTED.

COMPUTER PROGRAM VERIFICATION
STARDYNE SEISMIC ANALYSIS

The HP Steam to Reactor Feed Pump Turbine Line was used as a test case to compare the results obtained from STARDYNE and ADLPIPE. This line was used because it was representative in that it included rigid restraints, spring hangers, tees, and elbows. The results that were compared are

a. deadweight
b. thermal
c. frequencies
d. seismic

The comparison of the deadweight runs showed that ADLPIPE is more conservative because it does not lump any weight at anchors or restraints resulting in more weight being lumped at an adjacent point, whereas STARDYNE lumps weight at every point. The results for the thermal, frequency, and seismic runs were very close, when compared.

The results are tabulated in Table 1.

TABLE 1

COMPARISON OF RESTRAINT LOADS AND MOMENTS FOR NODE 68

	DEADWEIGHT		THERMAL		SEISMIC	
NODE	STARDYNE	ADLPIPE	STARDYNE	ADLPIPE	STARDYNE	ADLPIPE
68 F_X	1	2	[illegible]0	320	536	537
F_Y	197	199	25	25	21	24
F_Z	1	1	375	375	230	232
M_X	2683	3239	1342	1332	2602	2650
M_Y	140	189	26207	26238	49090	49065
M_Z	1934	1766	2987	3013	5092	5093

FREQUENCIES

MODE	STARDYNE	ADLPIPE
1	1.6	1.6
2	2.25	2.25
3	2.67	2.67
4	4.12	4.12
5	4.36	4.43
6	6.19	6.18
7	6.97	6.93
8	7.72	7.72
9	9.58	9.56
10	12.35	12.31