Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379-2000

Robert A. Fenech
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April 27, 1993

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

Gentlemen:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

SEQUOYAH NUCLEAR PLANT (SQN) - NRC INSPECTION REPORT NOS. 50-327/90-18 AND 50-328/90-18 - UNRESOLVED ITEMS (URI) 88-12-03 AND 88-12-10

References:
1. TVA letter to NRC dated September 28, 1990, "Sequoyah Nuclear Plant (SQN) - NRC Inspection Report Nos. 50-327/90-18 and 50-328/90-18 - Unresolved Item (URI) 88-12-10"
2. TVA letter to NRC dated July 27, 1990, "Sequoyah Nuclear Plant (SQN) - NRC Inspection Report Nos. 50-327/90-18 and 50-328/90-18"

The purpose of this letter is to provide a revised response to the subject URIs (URI 88-12-03 is concerned with qualification of design bases accident and zero period acceleration effects while URI 88-12-10 is concerned with qualification of the effects of the revised reactor coolant loop spectra). Earlier conversations with NRC had indicated that there was a disagreement with TVA's position contained within the above references, which are the last written communication on the URIs.

In an effort to move forward with resolution of these issues, TVA with the review and concurrence of R. L. Cloud and Associates, has developed an alternate approach to resolution of the URIs. These approaches were discussed with NRC on February 4, 1993. Enclosure 1 contains the plan for resolution of URI 88-12-03, while Enclosure 2 is for URI 88-12-10.

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Commitments contained in this letter are summarized in Enclosure 3. Because these proposed resolutions represent a potentially significant effort, TVA requests confirmation of the acceptability of the proposed resolutions within 60 days.

Please direct questions concerning this issue to J. D. Smith at (615) 843-6672.

Sincerely,

Robert A. Fenech

Robert A. Fenech

Enclosures
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Enclosure 1

UNRESOLVED ITEM (URI) 88-12-03
DESIGN BASIS ACCIDENT (DBA)
ZERO PERIOD ACCELERATION (ZPA) EFFECTS

This URI concerns the issue of ZPA, also known as missing mass, which represents the effect of vibration modes above 33 hertz (Hz). DBA/ZPA is therefore the effect of ZPA on piping and pipe supports attached to the steel containment vessel (SCV) from a DBA. DBA/ZPA was not initially considered in the design of the piping and pipe supports rigidly attached to the SCV.

There are a total of 166 piping analysis problems rigidly attached to the SCV. Forty-nine of these problems have been reanalyzed to include DBA/ZPA effects, leaving 117 remaining problems that have not been specifically reanalyzed for DBA/ZPA effects.

A detailed screening review was recently undertaken to scope and study the remaining problems. The purpose of this review was threefold.

1. Determine if the previously reanalyzed piping analysis problems are representative with respect to the total population of piping analysis problems attached to the SCV.

2. Demonstrate that pipe-support modifications would not be expected to occur on the unreanalyzed piping because of DBA/ZPA effects.

3. Identify additional piping evaluations needed, if any, required to support the above determinations.

In an effort to graphically locate where the piping is attached to the SCV and to identify the ZPA magnitudes at these locations, two sets of tables were created. The first set, Tables 1.1, 1.2, and 1.3, identifies ZPA magnitude at each azimuth and elevation on the SCV for the north-south, east-west and vertical directions, respectively. The second set, Tables 2.1, 2.2, and 2.3, identifies the ZPA magnitude, and the number of piping analysis problems at locations where piping is rigidly attached to the SCV. Tables 2.1 through 2.3 also identify how many analysis problems in each grid have been reanalyzed. The key at the bottom of the tables defines how this information is delineated on the tables.

The next step in the review was to identify the susceptibility to DBA/ZPA of the unreanalyzed problems. A piping analysis problem is susceptible to DBA/ZPA if it is supported in a manner such that a significant portion of the system mass does not participate below 33 Hz.

To determine susceptibility, a screening review was initiated for the 117 unreanalyzed problems which were grouped by system and pipe size. Span lengths, support types, mode shapes of the piping, and comparison to previously reanalyzed analysis problems were all factors that were attributes used in determining susceptibility.

If susceptibility could not readily be determined through the above screening review, a TPIPE study run was made to conclusively determine susceptibility. In the study runs, the only change made was the inclusion of missing mass effects in the DBA load case. A piping analysis problem was determined to be susceptible to DBA/ZPA effects if support load increases were observed in the study run.

Over twenty TPIPE study runs were made to determine actual susceptibility for the remaining problems. Using the system and pipe size groupings from the previous step, one or more study runs were performed on the most rigidly supported problem(s) in each group. The results of this screening review are shown in Table 3.0.

At this point in the review, it was found that the problems that have been reanalyzed to date were representative of the total population with respect to susceptibility and highly stressed supports (support interaction ratio greater than 0.9). However, TVA recognizes that these critical attributes were not utilized to identify the piping problems that have been reanalyzed to date. Therefore, to enhance the review, TVA will select six additional piping analysis problems for further evaluation that exemplify these attributes. These problems, in conjunction with the previously analyzed problems, will adequately bound piping and pipe support issues relative to DBA/ZPA effects.

To evaluate these six problems, additional TPIPE study runs will be performed as needed and the pipe support calculations will be evaluated for the increased loads from the TRIPE study runs. If the supports meet design criteria requirements, no further evaluation will be conducted. The documentation of this review, which will include the screening methodology, susceptibility determination, and evaluation of these six selected problems, will be completed by September 30, 1993.

If any pipe supports in these six piping analysis problems do not meet design criteria requirements based on the study run results, a formal reanalysis of those problems will be completed with subsequent support evaluation. In addition, the sample will be expanded as needed to identify and address other piping analysis problems that may have similar attributes that could cause other supports to exceed their design criteria requirements. The formal reanalysis, support modifications, and scope expansion, as required, will be implemented by the end of the respective Cycle 7 refueling outages.

TABLE 1.1, NORTH-SOUTH DIRECTION, DBA/ZPA ACCELERATIONS AT ALL SCV GRID POINTS

	AZIMUTH															
ELEV.	0	30	60	90	120	150	180	210	225	240	255	270	285	300	315	330
837.7	1.28	1.30	1.31	1.28	1.22	1.14	1.12	1.13	1.16	1.19	1.21	1.22	1.22	1.24	1.25	1.27
830.0	1.24	1.28	1.33	1.25	1.13	1.09	1.07	1.07	1.11	1.13	1.16	1.18	1.18	1.19	1.21	1.23
820.0	1.17	1.21	1.27	1.29	1.21	1.04	1.01	1.10	1.19	1.19	1.11	1.06	1.06	1.10	1.14	1.13
796.0	0.96	1.50	2.13	1.90	1.78	1.30	0.99	1.60	1.97	1.74	1.77	1.87	1.40	1.36	1.32	1.20
780.0	0.95	2.15	3.01	3.27	2.55	1.75	0.99	2.34	3.01	2.81	2.52	3.37	1.70	2.24	2.15	1.81
760.4	1.01	1.97	1.80	4.50	3.07	1.42	0.91	2.47	3.38	3.19	2.59	3.69	1.97	2.18	2.14	2.05
745.7	0.86	1.98	2.22	3.57	2.96	1.76	0.83	1.90	2.80	2.74	2.50	4.18	2.24	2.16	2.04	1.92
730.2	0.74	1.54	1.93	2.59	2.09	1.34	0.69	1.42	2.17	2.05	1.86	2.66	1.62	1.71	1.68	1.29
714.2	0.49	1.25	1.64	1.61	1.76	0.99	0.55	1.19	1.67	1.74	1.53	1.85	1.48	1.31	1.20	1.15
701.5	0.31	0.86	1.20	1.04	1.30	0.59	0.36	0.78	1.24	1.27	1.09	1.23	1.08	1.06	0.72	0.79

Source: App. K of CEB Report
CEB SQN-86-20-C, R.1

TABLE 1.2, EAST-WEST DIRECTION, DBA/ZPA ACCELERATIONS AT ALL SCV GRID POINTS

	AZIMUTH															
ELEV.	0	30	60	90	120	150	180	210	225	240	255	270	285	300	315	330
837.7	2.18	2.15	2.08	2.03	2.06	2.14	2.22	2.22	2.21	2.19	2.17	2.15	2.15	2.15	2.16	2.17
830.0	2.07	1.99	1.91	1.88	1.92	2.03	2.18	2.18	2.15	2.10	2.05	2.03	2.02	2.02	2.03	2.06
820.0	1.93	2.00	1.80	1.71	1.83	2.05	2.20	2.13	2.10	2.03	1.93	1.87	1.84	1.83	1.82	1.85
796.0	2.29	2.22	1.68	1.49	1.98	2.78	2.73	2.02	2.17	2.01	1.60	1.45	1.44	1.78	2.03	2.09
780.0	3.24	3.00	2.35	1.37	2.06	3.60	3.97	2.60	2.69	2.45	1.41	1.23	1.50	2.51	2.60	2.59
760.4	3.42	3.45	1.49	1.44	2.42	3.46	5.08	2.73	2.76	2.14	1.19	1.07	1.38	2.21	2.83	2.89
745.7	4.19	2.77	1.55	1.23	2.32	3.03	3.46	2.74	3.16	2.15	1.11	0.89	1.15	2.08	2.49	2.66
730.2	2.83	2.16	1.08	1.05	1.88	2.07	2.61	1.95	2.32	1.55	0.88	0.77	0.99	1.51	1.70	1.92
714.2	1.90	1.93	0.84	0.72	1.31	1.63	1.85	1.50	1.70	1.09	0.63	0.55	0.77	1.07	1.24	1.75
701.5	1.18	1.41	0.62	0.44	0.73	1.17	1.12	1.24	1.05	0.70	0.45	0.37	0.48	0.75	0.80	1.25

Source: App. K of CEB Report
CEB SQN-86-20-C, R.1

TABLE 1.3, VERTICAL DIRECTION, DBA/ZPA ACCELERATIONS AT ALL SCV GRID POINTS

	AZIMUTH															
ELEV.	0	30	60	90	120	150	180	210	225	240	255	270	285	300	315	330
837.7	0.39	0.41	0.38	0.32	0.30	0.31	0.32	0.35	0.35	0.30	0.30	0.31	0.29	0.25	0.28	0.33
830.0	0.51	0.49	0.41	0.37	0.32	0.36	0.40	0.46	0.48	0.38	0.36	0.39	0.36	0.29	0.34	0.42
820.0	0.59	0.52	0.45	0.38	0.49	0.45	0.44	0.49	0.51	0.41	0.34	0.37	0.34	0.29	0.36	0.50
796.0	0.65	0.49	0.45	0.37	0.40	0.47	0.49	0.59	0.61	0.44	0.42	0.46	0.42	0.36	0.45	0.54
780.0	0.74	0.71	0.50	0.42	0.51	0.43	0.44	0.49	0.45	0.39	0.42	0.42	0.37	0.37	0.47	0.58
760.4	0.45	0.48	0.39	0.26	0.31	0.26	0.40	0.36	0.32	0.28	0.28	0.29	0.26	0.23	0.28	0.37
745.7	0.36	0.42	0.34	0.30	0.28	0.27	0.38	0.29	0.32	0.28	0.24	0.21	0.20	0.21	0.24	0.29
730.2	0.24	0.29	0.24	0.25	0.19	0.24	0.30	0.24	0.29	0.26	0.22	0.21	0.13	0.17	0.19	0.21
714.2	0.21	0.23	0.20	0.20	0.14	0.20	0.21	0.19	0.22	0.20	0.19	0.17	0.11	0.15	0.16	0.18
701.5	0.15	0.16	0.15	0.15	0.12	0.15	0.13	0.14	0.15	0.15	0.12	0.13	0.08	0.11	0.12	0.12

Source: App. H of CEB Report
CEB SQN-86-20-C, R.1

TABLE 2.1, NORTH-SOUTH DIRECTION, DBA/ZPA ACCELERATIONS AT LOCATIONS OF ATTACHED PIPING

	AZIMUTH															
ELEV.	(1) 0	(2) 30	(3) 60	(4) 90	(5) 120	(6) 150	(7) 180	(8) 210	(9) 225	(10) 240	(11) 255	(12) 270	(13) 285	(14) 300	(15) 315	(16) 330
(1) 837.7														6/6 1.24		
(2) 830.0																
(3) 820.0																
(4) 796.0																
(5) 780.0											2/2 2.52			9/29 2.24		
(6) 760.4																
(7) 745.7														1/12 2.16		
(8) 730.2														2/8 1.71		
(9) 714.2	0/4 0.49		0/4 1.64	0/8 1.61									2/14 1.48	9/18 1.31		
(10) 701.5	8/10 0.31						4/10 0.36						3/17 1.08	3/24 1.06		

x/y
z

x = number of piping problems at that grid point that have been analyzed for DBA/ZPA
y = total number of piping problems at that grid point
z = ZPA acceleration at that grid point

TABLE 2.2, EAST-WEST DIRECTION, DBA/ZPA ACCELERATIONS AT LOCATIONS OF ATTACHED PIPING

	AZIMUTH															
ELEV.	(1) 0	(2) 30	(3) 60	(4) 90	(5) 120	(6) 150	(7) 180	(8) 210	(9) 225	(10) 240	(11) 255	(12) 270	(13) 285	(14) 300	(15) 315	(16) 330
(1) 837.7														6/6 2.15		
(2) 830.0																
(3) 820.0																
(4) 796.0																
(5) 780.0											2/2 1.41			9/29 2.51		
(6) 760.4																
(7) 745.7														1/12 2.08		
(8) 730.2														2/8 1.51		
(9) 714.2	0/4 1.90		0/4 0.84	0/8 0.72									2/14 0.77	9/18 1.07		
(10) 701.5	8/10 1.18						4/10 1.12						3/17 0.48	3/24 0.75		

x/y
z

x = number of piping problems at that grid point that have been analyzed for DBA/ZPA
y = total number of piping problems at that grid point
z = ZPA acceleration at that grid point

TABLE 2.3, VERTICAL DIRECTION, DBA/ZPA ACCELERATIONS AT LOCATIONS OF ATTACHED PIPING

	AZIMUTH															
ELEV.	(1) 0	(2) 30	(3) 60	(4) 90	(5) 120	(6) 150	(7) 180	(8) 210	(9) 225	(10) 240	(11) 255	(12) 270	(13) 285	(14) 300	(15) 315	(16) 330
(1) 837.7														6/6 0.25		
(2) 830.0																
(3) 820.0																
(4) 796.0																
(5) 780.0											2/2 0.42			9/29 0.37		
(6) 760.4																
(7) 745.7														1/12 0.21		
(8) 730.2														2/8 0.17		
714.2	0/4 0.21		0/4 0.20	0/8 0.20									2/14 0.11	9/18 0.15		
(10) 701.5	8/10 0.15						4/10 0.13						3/17 0.08	3/24 0.11		

x/y
z

x = number of piping problems at that grid point that have been analyzed for DBA/ZPA
y = total number of piping problems at that grid point
z = ZPA acceleration at that grid point

Table 3.0: This table summarizes the reanalysis status of all SCV attached problems by SCV grid point. It also summarizes the review for DBA/ZPA susceptibility. Flexible lines are denoted as such based on a screening review. Representative TPIPE study runs are performed on lines where susceptibility cannot readily be determined. Acronyms and abbreviations are defined at the end of this table.

SCV GRID POINT	REANALYZED SIZES, SYSTEMS, AND NO. OF PROBLEMS	NON-REANALYZED SIZES, SYSTEMS, AND NUMBER OF PROBLEMS	COMMENTS
(1, 14)	12" (Ctmt. Spr.) (2)	None	ALL PROBLEMS IN THIS SCV GRID POINT HAVE BEEN REANALYZED
	8" (Ctmt. Spr.) (4)	None	
(5, 11)	12" (H2 Coll.) (2)	None	ALL PROBLEMS IN THIS SCV GRID POINT HAVE BEEN REANALYZED
(5, 14)	12" (H2 Coll.) (1)	12" (H2 Coll.) (1)	NEED REPRESENTATIVE TPIPE STUDY RUN
	2" (ERCW) (8)	2" (ERCW) (19)	NEED REP. TPIPE STUDY RUN
(7, 14)	2" (ERCW) (1)	2" (ERCW) (3)	NEED REP. TPIPE STUDY RUN
		2" (Glycol) (6)	NEED REP. TPIPE STUDY RUN
		3/8" (Sampling) (2)	OK, FLEXIBLE BY SCREENING REVIEW
(8, 14)	4" (AFW) (2)	1½ (Rad. Mon.) (3)	OK, FLEXIBLE BY SCREENING REVIEW
		3" (Svc. Air) (1)	OK, FLEXIBLE BY SCREENING REVIEW
		4" (AFW) (2)	NEED REP. TPIPE STUDY RUN
(9, 1)	None	3/8" (Sampling) (4)	OK, FLEXIBLE BY SCREENING REVIEW
(9, 3)	None	2" (Chld. Wtr.) (4)	NEED REP. TPIPE STUDY RUN

Table 3.0 (Continued)

SCV GRID POINT	REANALYZED SIZES, SYSTEMS, AND NO. OF PROBLEMS	NON-REANALYZED SIZES, SYSTEMS, AND NUMBER OF PROBLEMS	COMMENTS
(9, 4)	None	2" (Chld. Wtr.) (8)	NEED REP. TPIPE STUDY RUN
(9, 13)	2" (CVCS Seal Injection) (2)	4" (Fire. Prot.) (2)	OK, FLEXIBLE BY SCREENING REVIEW
		4" (CVCS, Seal Return) (3)	NEED REP. TPIPE STUDY RUN
		2" (CVCS, Seal Injection) (4)	NEED REP. TPIPE STUDY RUN
		2" (Ctrl. Air) (3)	NEED REP. TPIPE STUDY RUN
(9, 14)	3" (CVCS, Chrg.) (3)	None	ALL CHARGING LINES HAVE BEEN ANALYZED FOR DBA/ZPA
	3" (Comp. Clg.) (4)	3" (Comp. Clg.) (4)	NEED REP. TPIPE STUDY RUN
	2" (CVCS Seal Injection) (2)	2" (CVCS, Seal Injection) (1)	NEED REP. TPIPE STUDY RUN
		4" (Sp. Fuel) (4)	OK, FLEXIBLE BY SCREENING REVIEW
(10, 1)	6" (ERCW) (8)	6" (ERCW) (2)	OK, FLEXIBLE BY SCREENING REVIEW
(10, 7)	6" (ERCW) (4)	6" (ERCW) (6)	OK, FLEXIBLE BY SCREENING REVIEW
(10, 13)	3/8" (Sampl.) (1)	3/8" (Sampl.) (1)	OK, FLEXIBLE BY SCREENING REVIEW
	1" (Acc. Fill) (2)	1" (Acc. Fill) (3)	OK, FLEXIBLE BY SCREENING REVIEW
		2" (Ctrl. Air) (4)	NEED REP. TPIPE STUDY RUN
		6" (Sp. Fuel) (4)	NEED REP. TPIPE STUDY RUN
		6" (Comp. Clg.) (2)	NEED REP. TPIPE STUDY RUN

Table 3.0 (Continued)

SCV GRID POINT	REANALYZED SIZES, SYSTEMS, AND NO. OF PROBLEMS	NON-REANALYZED SIZES, SYSTEMS, AND NUMBER OF PROBLEMS	COMMENTS
(10, 14)	6" (Comp. Clg.) (3)	3/8" (Rx. Lvl.) (2)	OK, FLEXIBLE BY SCREENING REVIEW
		2" (Wst. Disp.) (2)	OK, FLEXIBLE BY SCREENING REVIEW
		2" (Dem. Wtr.) (3)	OK, FLEXIBLE BY SCREENING REVIEW
		2" (Ctrl. Air) (4)	NEED REP. TPIPE STUDY RUN
		2" (Svc. Air) (3)	OK, FLEXIBLE BY SCREENING REVIEW
		4" (Fire Prot.) (4)	OK, FLEXIBLE BY SCREENING REVIEW
		6" (Comp. Clg.) (3)	NEED REP. TPIPE STUDY RUN

Acronym/Abbreviation	Definition
Acc. Fill	Cold Leg Accumulator Fill Lines, part of Safety Injection System
AFW	Auxiliary Feedwater System
Chld. Wtr.	Chilled Water System
Comp. Clg.	Component Cooling System
Ctmt. Spr.	Containment Spray System
Ctrl. Air.	Control Air System
CVCS	Chemical and Volume Control System
Dem. Wtr.	Demineralized Water System
ERCW	Emergency Raw Cooling Water System
Fire Prot.	Fire Protection System
H_2 Coll.	Hydrogen Collection System
Rad. Mon.	Radiation Monitoring System
Rx. Lvl.	Reactor Level Instrumentation System
Sp. Fuel	Spent Fuel Pool Cooling System
Svc. Air	Service Air System
Wst. Disp.	Waste Disposal System

Enclosure 2

UNRESOLVED ITEM (URI) 88-12-10,
REACTOR COOLANT LOOP (RCL) SPECTRA EFFECTS

In 1989, a new seismic response spectra was developed for the RCL. A review of the spectra indicated that at corresponding frequencies, the new spectra often had higher accelerations than the old spectra. The RCL spectra provides seismic input to piping rigidly attached to the RCL. This piping and associated pipe supports must therefore be evaluated for the effects of the new spectra. URI 88-12-10 addresses the issue that not all of the piping and supports rigidly attached to RCL have been evaluated for the new spectra.

There are a total of 90 piping analysis problems rigidly attached to the RCL. Thirty of these problems have been reanalyzed to include the effects of the new RCL spectra, leaving 60 remaining problems that have not been specifically reanalyzed for the new RCL spectra.

A detailed screening review was recently undertaken to scope and study the remaining problems. The purpose of this review was threefold as follows:

1. Determine if the previously reanalyzed piping analysis problems are representative with respect to the total population of piping analysis problems attached to the RCL.

2. Demonstrate that pipe support modifications would not be expected to occur on the unreanalyzed piping because of the new RCL spectra.

3. Identify additional piping evaluations needed, if any, required to support the above determinations.

The first step in the review was to determine the relative susceptibility of the attached piping because of the effects of the new RCL spectra. Relative susceptibility was determined by comparing the old and new accelerations at frequencies of significant modal participation. Table 1.0 contains the ranking of the piping analysis problems based on relative susceptibility. The procedure used to determine relative susceptibility is in Table 2.0.

At this point in the screening review, it was found that the problems that have been reanalyzed to date were representative of the total population with respect to susceptibility and the presence of highly stressed supports (interaction ratio greater than 0.9). However, TVA recognizes that these critical attributes were not utilized to identify the piping problems that have been reanalyzed. Therefore, to enhance the review, TVA will select six additional piping analysis problems for further evaluation that exhibit susceptibility to the new spectra and that contain highly stressed supports. These problems, in conjunction with previously analyzed problems, will adequately bound piping and pipe support issues relative to RCL spectra acceleration increases.

The six problems to be evaluated will be near the top of Table 1.0 and will contain supports with interaction ratios greater than 0.9. TPIPE study runs will be performed on these problems and the only change made in the study runs will be replacement of the old RCL spectra with the new RCL spectra in the seismic loading condition.

Pipe support calculations will be evaluated for the increased loads from the TPIPE study runs. If the supports meet design criteria requirements, no further evaluation will be conducted. The documentation of the screening review and evaluation will be completed by September 30, 1993.

If any pipe supports in these six piping analysis problems do not meet design criteria requirements based on the study run results, a formal reanalysis of those problems will be completed with subsequent support evaluation. In addition, the sample will be expanded as needed to identify and address other piping analysis problems that may have similar attributes that could cause other supports to exceed their design criteria requirements. The formal reanalysis, support modifications, and scope expansion, as required, will be implemented by the end of the respective Cycle 7 refueling outages.

Enclosure 2
URI 88-12-10, RCL Spectra Effects

Table 1.0: SUSCEPTIBILITY RANKING

Tabulated below are the piping analysis problems attached to the RCL. This table contains a total of 90 problems.

The problems are sorted by relative susceptibility to the new RCL Spectra. Relative susceptibility was determined by comparing old and new accelerations at frequencies of significant modal participation. The procedure used to determine relative susceptability is in Table 2.0 of this submittal.

The six problems that were reanalyzed by Bechtel are denoted with a double asterisk by the problem number.

Twenty-four other RCL-attached problems from this table have been reanalyzed for other design reasons and are denoted with a single asterisk by the problem number.

Problem No.	Unit	Description
**N2-68-17R	1	3/8" Volume Sensor, Loop 3
N2-68-18R	1	3/8" Volume Sensor, Loop 1
N2-68-20R	2	3/8" Volume Sensor, Loop 1
N2-68-21R	2	3/8" Volume Sensor, Loop 3
**154-07-02	2	1",2" Steam Generator (S/G) Blowdown, Loop 2
104-02-03	1	16" Main Feedwater, Loop 2
N2-62-8R	2	1" #2 Seal Leakoff, Loop 4
104-02-04	1	16" Main Feedwater, Loop 3
104-02-01	1	16" Main Feedwater, Loop 1
*N2-62-3R	1	1" #2 Seal Leakoff, Loop 3
*N2-62-2R	1	1" #2 Seal Leakoff, Loop 2
154-07-03	2	1",2" S/G Blowdown, Loop 3
*N2-43-A-309R	2	3/4" Sampling, Loop 1
104-02-02	1	16" Main Feedwater, Loop 4
*N2-68-1R	2	3/4" Sampling, Loop 3
154-02-02	2	16" Main Feedwater, Loop 4
*N2-62-1R	1	1" #2 Seal Leakoff, Loop 1
104-08-07	1	1½" #1 Seal Leakoff, Loop 1
*N2-43-A-96R	1	3/4" Sampling, Loop 3
N2-62-5R	2	1" #2 Seal Leakoff, Loop 1
N2-62-4R	1	1" #2 Seal Leakoff, Loop 4
104-08-03	1	1½" Seal Water Injection, Loop 3
*104-08-15	1	3/4" #1 Seal Bypass, Loop 1
N2-62-10R	2	1½" Seal Water Injection, Loop 1
*N2-43-A-97R	1	3/4" Sampling, Loop 1
104-08-14	1	1½" #1 Seal Leakoff, Loop 3
*154-08-17	2	3/4" #1 Seal Bypass, Loop 3
N2-62-7R	2	1" #2 Seal Leakoff, Loop 3
104-07-04	1	1",2" S/G Blowdown, Loop 4
*154-03-01	2	14" Residual Heat Removal (RHR) Suction
104-08-13	1	1½" #1 Seal Leakoff, Loop 2

Enclosure 2
URI 88-12-10, RCL Spectra Effects

Table 1.0 (Continued)

Problem No.	Unit	Description
104-09-11	1	6" Safety Injection (SI), Hot Leg, Loops 1 & 3
**154-09-11	2	6" SI, Hot Leg, Loops 1 & 3
104-08-06	1	1½" #1 Seal Leakoff, Loop 4
N2-62-11R	2	1½" Seal Water Injection, Loop 2
*104-13-01	1	14" Pressurizer Surge Line
*154-13-01	2	14" Pressurizer Surge Line
154-02-04	2	16" Main Feedwater, Loop 3
154-08-10	2	3" Normal Letdown Line
154-08-18	2	3/4" #1 Seal Bypass, Loop 4
*104-08-17	1	3/4" #1 Seal Bypass, Loop 3
*104-08-18	1	3/4" #1 Seal Bypass, Loop 4
104-07-01	1	1",2" S/G Blowdown, Loop 1
104-08-10	1	3" Normal Letdown Line
154-02-01	2	16" Main Feedwater, Loop 1
154-02-03	2	16" Main Feedwater, Loop 3
N2-62-6R	2	1" #2 Seal Leakoff, Loop 2
154-08-14	2	1½" #1 Seal Leakoff, Loop 3
N2-62-12R	2	1½" #1 Seal Leakoff, Loop 4
*104-08-16	1	3/4" #1 Seal Bypass, Loop 2
104-08-01	1	1½" Seal Water Injection, Loop 1
154-09-02	2	10" SI, Cold Leg, Loops 2 & 3
154-07-01	2	1",2" S/G Blowdown, Loop 1
154-08-16	2	3/4" #1 Seal Bypass, Loop 2
154-08-07	2	1½" #1 Seal Leakoff, Loop 1
104-09-01	1	10" SI, Cold Leg, Loops 1 & 4
**154-09-01	2	10" SI, Cold Leg, Loops 1 & 4
104-07-02	1	1",2" S/G Blowdown, Loop 2
154-08-13	2	1½" #1 Seal Leakoff, Loop 2
104-09-10	1,2	6" SI, Hot Leg, Loop 2
104-09-05	1	1½" SI, Cold Leg, Loops 1 & 4
154-08-03	2	1½" Seal Water Injection, Loop 3
154-09-05	2	1½" SI, Cold Leg, Loops 1 & 4
104-07-03	1	1",2" S/G Blowdown, Loop 3
154-08-15	2	3/4" #1 Seal Bypass, Loop 1
104-08-11	1,2	3" Charging Line, Loops 1 & 4
104-08-12	1,2	1" Excess Letdown Line
**N2-68-26R	1	2" Crossover Leg Drain, Loop 4
104-13-12	2	2" Crossover Leg Drain, Loop 4
154-07-04	2	1",2" S/G Blowdown, Loop 4
104-08-04	1	1½" Seal Water Injection, Loop 4
N2-62-13R	2	1½" Seal Water Injection, Loop 4
104-13-09	1,2	2" Crossover Leg Drain, Loop 1
104-08-02	1	1½" Seal Water Injection, Loop 2
104-13-10	1,2	2" Crossover Leg Drain, Loop 2
104-13-02	1	4" Pressurizer Spray Line
**154-13-02	2	4" Pressurizer Spray Line
*104-03-01	1	14" RHR Suction
104-09-02	1	10" SI, Cold Leg, Loops 2 & 3
104-09-06	1,2	1½" SI, Cold Leg, Loops 2 & 3

Enclosure 2
URI 88-12-10, RCL Spectra Effects

Table 1.0 (Continued)

Problem No.	Unit	Description
*104-06-02	1	32" Main Steam, Loop 2
*154-06-02	2	32" Main Steam, Loop 2
*104-06-01	1	32" Main Steam, Loop 1
*154-06-01	2	32" Main Steam, Loop 1
*104-06-03	1	32" Main Steam, Loop 3
*154-06-03	2	32" Main Steam, Loop 3
*104-06-04	1	32" Main Steam, Loop 4
*154-06-04	2	32" Main Steam, Loop 4
N2-03-IC1-I	1	½" S/G Level Tap
N2-03-IC2-I	2	½" S/G Level Tap

Enclosure 2
URI 88-12-10, RCL Spectra Effects

Table 2.0: Procedure Used to Determine Relative Susceptibility Factor

- This procedure was used for each global direction (North-South, East-West, and Vertical) of each rigorous analysis problem attached to the RCL.
- From the TPIPE output, find the highest modal participation factor in the RCL Zone and multiply this by 0.25 to find the lowest significant mode.
- Tabulate all modal participation factors in the RCL Zone above the lowest significant mode.
- Calculate the sum of the modal participation factors in the RCL Zone to obtain the base participation factor, BPF.
- From the TPIPE output, tabulate the frequencies corresponding to each modal participation factor.
- From the Revisions 1 and 2 of Report CEB-80-4, "Acceleration Response Spectra at Nozzle Attachment Points of the Primary Loop System," tabulate the old and new accelerations corresponding to each frequency.
- At each frequency, multiply the modal participation factor by the ratio of the new to the old accelerations.
- Calculate the sum of the ratioed participation factors to obtain the accelerated participation factor, APF.
- The susceptibility factor for this global direction is determined by calculating APF/BPF.
- To obtain the **Relative Susceptibility Factor** for this piping analysis problem, calculate the square-root-of-sum-of-squares of the susceptibility factors for each of the three global directions.
- The piping analysis problems were then ranked by this relative susceptibility factor.

Enclosure 3

Commitments

1. For Unresolved Item (URI) 88-12-03, six additional problems will be evaluated for the increased loads from the TPIPE study runs. Documentation of this review, which will include the screening methodology, susceptibility determination, and evaluation of these six selected problems, will be completed by September 30, 1993.

2. For URI 88-12-03, formal reanalysis, support modifications, and scope expansion, as required, will be implemented by the end of each unit's respective Cycle 7 refueling outages.

3. For URI 88-12-10, six additional pipe support calculations will be evaluated for the increased loads from the TPIPE study runs. Documentation of the screening review and evaluation will be completed by September 30, 1993.

4. For URI 88-12-10, formal reanalysis, support modifications, and scope expansion, as required, will be implemented by the end of each unit's respective Cycle 7 refueling outages.