GENERAL ELECTRIC

NUCLEAR ENERGY

PROJECTS DIVISION

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125

MC 682, (408) 925-5426

MFN 038-79

January 24, 1979

U. S. Nuclear Regulatory Commission
Office of Inspection & Enforcement
Washington, D. C. 20555

Attention: Edward Jordan
Assistant Director for Technical Programs

SUBJECT: EDS NUCLEAR INC. PIPING ANALYSIS

H. Wong of your staff requested that GE transmit the attached information:

Attachment 1 is EDS Nuclear's list of BWR's which could have been impacted by EDS analyses, the specific piping systems affected, and the acceptance rationale for the Cooper analyses.

Attachment 2 is the result of a "quick look" by GE to determine if a reanalysis had been performed to supercede the EDS analysis. Finding No. 3 of Attachment 2 indicates that we have no record of a reanalysis for the Cooper piping system. The Dresden analyses were all in the AE scope.

If you have additional concerns, please call.

Very truly yours,

Paul B. Stephens

P. B. Stephens, Senior Engineer
BWR Product Standards
Safety and Licensing Operation

PBS:gmm/590

Attachments

cc: F. L. Porter - EDS Nuclear
H. Wong - NRC
L.S. Gifford-GE (Bethesda)

ATTACHMENT 1

GENERAL ELECTRIC PIPING ANALYSIS

JOBS ACTIVE BEFORE NOVEMBER, 1969

POTENTIALLY IMPACTED BY PROGRAM DEFICIENCY

	Plant	EDS Job Number	Problem Description	Utility
1.	Brunswick	0103003	Main Steam Line - Loop B	Carolina Power & Light Company
2.	Shoreham	0103003	Main Steam Line - Loop B	Long Island Lighting Company
3.	Dresden	0300003	Recirculation Lines	Commonwealth Edison Company
4.	Dresden	0300004	Feedwater Lines	Commonwealth Edison Company
5.	Dresden	0103004	Torus	Commonwealth Edison Company
6.	Dresden	0103009	Core Spray Piping Pump Discharge	Commonwealth Edison Company
7.	Cooper	0103012	Main Steam - Loops A, B, C and D	Nebraska Public Power District
8.	Pilgrim	0300002	Recirculation	Boston Edison Company
9.	Vermont Yankee	0300002	Recirculation	Vermont Yankee Nuclear Power Corp.
10.	Brown's Ferry	0300002	Main Steam	Tennessee Valley Authority
11.	218 Standard Plant	0103003	Main Steam Line - Loops A and B	-
12.	218 Standard Plant	0103010	Recirculation Piping - Loop A	-
13.	218 Standard Plant	0103012	Main Steam Line - Loops A and B	-

Plant	EDS Job Number	Description	Discussion
Cooper	0103012	Main Steam - Loops A-D	A review of the spectra and associated modal response of these four lines shows the maximum acceleration which could occur for each mode is .5 g. Conservatively assuming all modes would have a .5 g acceleration the maximum possible increase in seismic stress is 4,200 psi. From FSAR Table C-3-7 for Main Steam Piping the stress margin for the upset condition is 3,800 psi (21,000 psi - 17,200 psi). This is slightly less (400 psi) than the maximum possible increase, but the minimum 3,800 psi margin occurs at a sweepolet connection to a safety valve while the 4,200 psi increase occurs at elbow. With the amount of conservatism used to calculate the maximum potential increase, the stresses are therefore not a problem. A review of support loads indicates very low loads (maximum of 2500 lbs.) for a 24-inch steam line. It is not apparent from the EDS model whether any of the supports are snubbers, but G.E. drawings do indicate some. It is assumed that snubbers would be purchased to the same size for all four lines, and this would require the snubbers to be sized to the maximum loads on any of the four lines. Based on the small loads, it is expected that the potential increase in loads will not exceed design allowables. For basically the same reasons as above, it is also expected that potential increases in nozzle loads will be acceptable.

BWR SYSTEMS ENGINEERING DEPARTMENT MEMO

TO: Jim Cleveland
M/C 682

FROM: E.O. Swain

SUBJECT: EDS Nuclear Dynamic Analysis

RECEIVED
NOV 30 1978
J.W. CLEVELAND

DATE: November 28, 1978

REQUIRED RESPONSE DATE:

FOR: ACTION ☐
DECISION ☐
INFORMATION ☐

This letter is a follow up to our discussions earlier this month with Larry Porter and John McCarthy of EDS Nuclear regarding their possible use of an early version of their PISOL computer program on GE piping.

As I mentioned, we would spend a few hours to determine if there is a problem. We have completed a quick look and here are our findings:

1) Brunswick/Shoreham Main Steam Loop B -

The EDS analysis was not used in the final stress reports. In both cases the analysis used was done by GE.

2) Dresden Recirculation Line -

The stress report which we used in dynamic analysis was performed by John Blume and not the one performed by EDS Nuclear.

3) Cooper Main Steam Loops A & D -

It appears that the stress analysis for the Cooper Main Steam Lines was based on the EDS Nuclear earthquake analysis. EDS Nuclear presents a rational in the attached document on why the existing stress report is okay. We have not attempted to confirm their evaluation or make one of our own.

4) Pilgrim Recirculation -

The EDS Nuclear analysis was not used for the GE stress report. The dynamic analysis used was done by GE.

5) Vermont Yankee Recirculation -

The dynamic analysis used for Vermont Yankee Recirculation is contained in GE document # 383HA400. We have not been able to get a copy of this document, but since it is a GE document the analysis was no doubt done by GE.

6) Brown's Ferry Main Steam -

The dynamic analysis used for the Brown's Ferry Main Steam Piping is published in document # 257HA934. Since it is a GE document, the dynamic analysis in all probability is by GE.

7) 218 Standard Plant Main Steam and Recirculation Piping -

CC:

None of the EDS Nuclear Standard Plant analysis for 218 plants have been used or will be used on any requisition plans.

8) Dresden Feedwater, Dresden Torus, Dresden Core Spray Piping Pump Discharge -

The responsibility for analysis of the Feedwater and Core Spray Piping was by the AE (Sargent & Lundy). I don't know who has responsibility for Dresden Torus analysis, but I assume that was also the responsibility of the architect engineer.

It appears to me that no further work is justified at this time unless we receive specific questions from the utility operating the above listed plants.

E.O. Swain, Manager
Piping Design Subsection

EOS/dj

Attachment(s)

TABLE 3

BECHTEL POWER CORPORATION PIPING ANALYSIS

JOBS ACTIVE BEFORE NOVEMBER, 1969

POTENTIALLY IMPACTED BY PROGRAM DEFICIENCY

	Plant	EDS Job No.	Problem Description	Utility
1.	Oconee	0400001	Main Steam-West Generator	Duke Power Company
2.	Arkansas Nuclear One	0206600	Main Steam	Arkansas Power & Light Co.
3.	Point Beach	0206118	Main Steam-Outside Containment	Wisconsin Electric Power Co.
4.	Calvert Cliffs	0406750	Main Steam from West Generator	Baltimore Gas & Electric
5.	Fossil Plant	0206384	Cold Reheat Pipe	Mississippi Power & Light
6.	Trojan	0206478	Main Steam Line - Loop 2	Portland General Electric Co.
7.	Turkey Point	0405610	12 Lines - See Tables 1, 2 and 4	Florida Power & Light Co.
8.	Monticello	0205828	9 Lines - See Tables 1, 3 and 4	Northern States Power Co.
9.	Palisades	0205935	14 Lines - See Tables 1, 2 and 4	Consumers Power Co.
10.	Peach Bottom	0206280	Core Spray - Inside Drywell	Philadelphia Electric Co.
11.	Humboldt Bay	0208190	Main Steam Line	Pacific Gas & Electric Co.

SEQUENCE OF RESOLUTION

1. EDS reviewed records to identify lines initially analyzed or reanalyzed after November 1, 1969 and nonnuclear lines.

2. Bechtel Power Corporation reviewed records to identify lines reanalyzed after November 1, 1969.

3. EDS evaluated input spectra and natural frequencies of lines.

4. EDS performed seismic reanalysis, preliminary pipe stress evaluation and provide results to Bechtel.

   Bechtel performed nozzle load, support design review and final pipe stress evaluation to determine overall acceptability of lines.

5. Summary of Results

. Total number of lines affected	43
. Lines resolved by Step 1	22
. Lines resolved by Step 2	9
. Lines resolved by Step 3	1
. Lines resolved by Step 4	11

TABLE 4

LINES REANALYZED AFTER NOVEMBER 1, 1969 BY EDS
NO FURTHER ACTION REQUIRED

Project/ Job No.	Problem Description	Analysis Type	Original Transmittal Date	Letter No.	Reanalysis Transmittal Date	Letter No.
Oconee/ 0400001	Main Steam-West Generator	Seismic	5/24/69	RL-5	3/02/70 /	RL-77
Arkansas/ 0206600	Main Steam	Seismic	7/21/69	RL-14	1/13/71	RL-85
Point Beach/ 0206118	Main Steam-Outside Containment	Seismic	9/26/69	RL-31	7/08/70	RL-84
Calvert Cliffs/ 0406750	Main Steam from West Generator	Seismic	10/15/69	RL-37	1/05/71	RL-87
Mississippi P&L/ 0206384	Cold Reheat Pipe	Mode Shape & Frequency Analysis	10/30/69	RL-44	Nonnuclear	
Trojan/ 0206478	Main Steam Line - Loop 2	Seismic	11/03/69	RL-45	11/10/69	RL-48
Turkey Point/ 0405610	No. 3 Main Steam-Outside Containment	Seismic	6/24/69	RL-10	1/07/70	RL-75
Turkey Point/ 0405610	Feedwater-Inside Containment (Inadvertently counted as 3 lines, whereas review shows 1 line with 3 separate analyses)	Seismic	7/12/69	RL-12	6/21/72	RL-82
Turkey Point/ 0405610	Feedwater-Outside Containment	Seismic	7/31/69	RL-16	1/06/70	RL-74
Turkey Point/ 0405610	Charging Lines	Seismic	8/08/69	RL-17	3/22/71	RL-83
Turkey Point/ 0405610	Pressurizer Relief-Unit 3	Seismic	8/28/69	RL-21	2/19/70	RL-72
Turkey Point/ 0405610	Low Heat Safety Injection-Inside Containment	Seismic	10/03/69	RL-33	5/27/71	RL-71
Monticello/ 0205828	HPCI Turbine Steam Exhaust	Seismic	4/24/69	RL-1	12/31/69	RL-81
Monticello/ 0205828	Main Steamlines - NE	Seismic	5/02/69	RL-2	2/18/70	RL-80

TABLE 4

LINES REANALYZED AFTER NOVEMBER 1, 1969 BY EDS
NO FURTHER ACTION REQUIRED

Project/ Job No.	Problem Description	Analysis Type	Original Transmittal Date	Letter No.	Reanalysis Transmittal Date	Letter No.
Monticello/ 0205828	Steam Supply to HPCI Turbine	Seismic	5/07/69	RL-3	3/19/70	RL-78
Monticello/ 0205828	Feedwater	Seismic	4/24/69	RL-1	2/16/70	RL-86
Palisades/ 0205935	Feedwater-Outside Containment	Seismic	10/13/69	RL-36	5/31/73	RL-76
Palisades/ 0205935	Main Steam-Outside Containment	Seismic	10/20/69	RL-40	4/24/73	RL-79
Palisades/ 0205935	Shutdown Cooling Crossover to Auxiliary Building	Seismic	11/17/69	RL-52	1/22/70	RL-73
Peach Bottom/ 0206280	Core Spray - Inside Drywell	Seismic	5/24/69	RL-6	12/09/70	RL-57

TABLE 5

LINES REANALYZED AFTER NOVEMBER 1, 1969 BY BECHTEL
NO FURTHER ACTION REQUIRED

Project/ Job No.	Problem Description	Analysis Type	Original Transmittal Date	Letter No.	Reanalysis Date
Humboldt Bay/ 0208190	Main Steam Line	Seismic	8/29/69	RL-55	By Bechtel
Turkey Point/ 0405610	No. 3 Main Steam - Inside Containment N.	Seismic	5/31/69	RL-7	4/22/72
Turkey Point/ 0405610	Blowdown Lines from Steam Generator-Inside Containment -Outside Containment	Seismic	8/21/69	RL-19	4/28/72 8/8/72
Turkey Point/ 0405610	Pressurizer Relief	Seismic	8/29/69	RL-23	2/15/72
Turkey Point/ 0405610	Blowdown Line from Steam Generator 3E210A	Seismic	9/18/69	RL-28	4/28/72
Palisades/ 0205935	Component S.W. Cooling Pump Discharge - Outside Containment	Seismic	9/05/69	RL-26	11/8/73
Palisades/ 0205935	Component S.W. Cooling Pump Suction - Outside Containment	Seismic	9/19/69	RL-29	1/31/74
Palisades/ 0205935	Safety Injection Tank T82C to Loop 2A	Seismic	9/22/69	RL-30	3/5/75
Palisades/ 0205935	Pressurizer Spray	Seismic	11/14/69	RL-50	6/13/75

TABLE 6

LINES ACCEPTABLE BASED ON EVALUATION
OF INPUT SPECTRA AND NATURAL FREQUENCIES

Project/ Job No.	Problem Description	Analysis Type	Original Transmittal Date	Letter No.	Basis for Resolution of Acceptability
Monticello/ 0205828	RHR Discharge - Loop B Inside Drywell	Seismic	7/21/69	RL-14	A review of the first three modes shows the modes are at peak accelerations. A reanalysis would shift the modes off the peak which would result in lower stresses.

TABLE 7

LINES REANALYZED IN 1978

Project/ Job No.	Problem Description	Analysis Type	Original Transmittal Date	Letter No.	Latest EDS Reanalysis Number	Basis for Resolution of Acceptability
Monticello/ 0205828	Off Gas Chimney	Seismic	10/06/69	RL-34	MR-4	Piping stresses are within Code allowables. EDS was informed by Bechtel that their review showed the existing designs are acceptable.
Monticello/ 0205828	RHR Discharge - Loop A Outside Drywell	Seismic	7/22/69	RL-15	MR-1	Piping stresses are within Code allowables. EDS was informed by Bechtel that their review showed the existing designs are acceptable.
Monticello/ 0205828	RHR Discharge - Loop B Outside Drywell	Seismic	7/22/69	RL-15	MR-2	Piping stresses are within Code allowables. EDS was informed by Bechtel that their review showed the existing designs are acceptable.
Monticello/ 0205828	RHR Suction	Seismic	6/24/69	RL-9	MR-3	Piping stresses are within Code allowables. Bechtel and the utility completed a program for incorporation of Bechtel recommendations. The NRC regional compliance officer has been informed and reviewed the modification package.

TABLE 7

LINES REANALYZED IN 1978

Project/ Job No.	Problem Description	Analysis Type	Original Transmittal Date	Letter No.	Latest EDS Reanalysis Number	Basis for Resolution of Acceptability
Palisades/ 0205935	Pressurizer Surge Line	Seismic	10/24/69	RL-43	PLS-1	Piping stresses are within Code allowables. EDS was informed by Bechtel that their review showed the existing designs are acceptable.
Palisades/ 0205935	Safety Injection Tank 82A to Loop 1A	Seismic	9/02/69	RL-25	PLS-8	Piping stresses are within Code allowables. EDS was informed by Bechtel that their review showed the existing designs are acceptable.
Palisades/ 0205935	Shutdown Cooling - Inside Containment	Seismic	8/29/69	RL-22	PLS-6	Piping stresses are within Code allowables. Bechtel has evaluated nozzle loads and support designs. Bechtel and the utility have a program underway for incorporating the Bechtel recommendations. The NRC has been informed by the utility of the proposed modifications.
Palisades/ 0205935	Main Steam - Inside Containment	Seismic	8/19/69	RL-18	PLS-10	Basis for resolution same as for shutdown cooling - inside containment.
Palisades/ 0205935	Feedwater - Inside Containment	Seismic	6/20/69	RL-8	PLS-5	Basis for resolution same as for shutdown cooling - inside containm ent.
Palisades/ 0205935	Safety Injection Tank 82B to Loop 1B	Seismic	11/07/69	RL-47	PLS-11	Bechtel reviewing for overall acceptability.
Palisades/ 0205935	Safety Injection Tank 82D	Seismic	11/10/69	RL-49	PLS-12	Bechtel reviewing for overall acceptability.

TABLE B-1

EDS DOCUMENT REVIEW

ANALYSIS PERFORMED AFTER NOVEMBER 1, 1969

ON UNCORRECTED PISOL VERSIONS

Item No.	Project/ Job No.	Problem Description	Analysis Type	1979 EDS Reanalysis Name	Basis For Resolution of Acceptability
1	Palisades/ 0205935	HP Safety Injection Pump Discharge	Seismic	PLS-13	EDS reanalyzed and changes are insignificant. Confirmation of Bechtel provided in attached Bechtel letter.
2	Monticello/ 0205828	Mainstream Seismic	Seismic	-	A review of the modes shows them to the left of the response spectra peak. A reanalysis would shift the modes further to the left which would result in lower stresses and loads. Therefore, the line is acceptable. See attachment B-1.1.
3	Monticello/ 0205828	HPCI Turbine Steam Exhaust	Seismic	MR- 5	EDS reanalyzed and changes are insignificant. Results transmitted to Bechtel. See Attachment B-1.2.
4	Monticello/ 0205828	Steam Supply to HPIC Turbine	Seismic	MR- 6	See Item 3. See Attachment B-1.3.
5	Monticello/ 0205828	Feedwater	Seismic	MR- 7	See Item 3. See Attachment B-1.4
6	Calvert Cliffs/ 0406750	CC No. 1 Main Steam in Containment East	Seismic	-	See Item 2. See Attachment B-1.5.

Item No.	Project/ Job No.	Problem Description	Analysis Type	1979 EDS Reanalysis Name	Basis For Resolution of Acceptability
7	Calvert Cliffs/ 0406750	Unit 1 Shutdown Heat Exchanger	Seismic	CC-1	See Item 3. See Attachment B-1.6.
8	Calvert Cliffs/ 0406750	Shutdown Heat Exchanger Prob. 3	Seismic	CC-2	See Item 3. See Attachment B-1.7.
9	Point Beach/ 0206118	Mainstream Outside Containment	Seismic	PB-1	EDS reanalyzed and results in the safety related portion of the line are within FSAR committments. Results transmitted to Bechtel. Wisconsin Electric and Bechtel are completing their evaluation of the non-safety related portion.
10	Turkey Point/ 0405610	Feedwater Outside Containment-Unit 4	Seismic	-	EDS analysis not used. Bechtel used Unit 3 results for design due to similarity of configurations.

Bechtel Associates Professional Corporation

777 East Eisenhower Parkway
Ann Arbor, Michigan

mailing address: P.O. Box 1000, Ann Arbor, Michigan 48106

May 18, 1979

EDS Nuclear Inc.
220 Montgomery Street
San Francisco, CA 94104

Attention: Mr. J. B. McCarthy

Subject: Palisades Plant - High Pressure Injection Piping - Pump Discharge Computer Analysis date, May 4, 1979

Gentlemen:

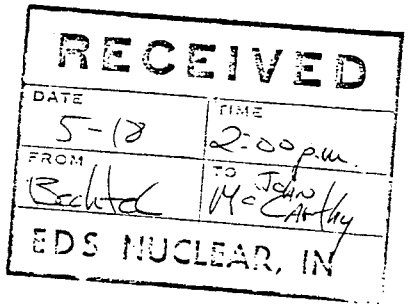
This letter hereby acknowledges receipt of the computer reanalysis of the subject Piping System. This reanalysis by EDS was to correct the original EDS computer analysis performed either in late 1969 or early 1970.

No modifications were required as a result of this reanalysis. Stresses in the pipe are within the code allowables and the effect on pipe supports and equipment borzles are insignificant.

Very truly yours,

D. S. Rist
Supervisor
Piping & Stress Analysis

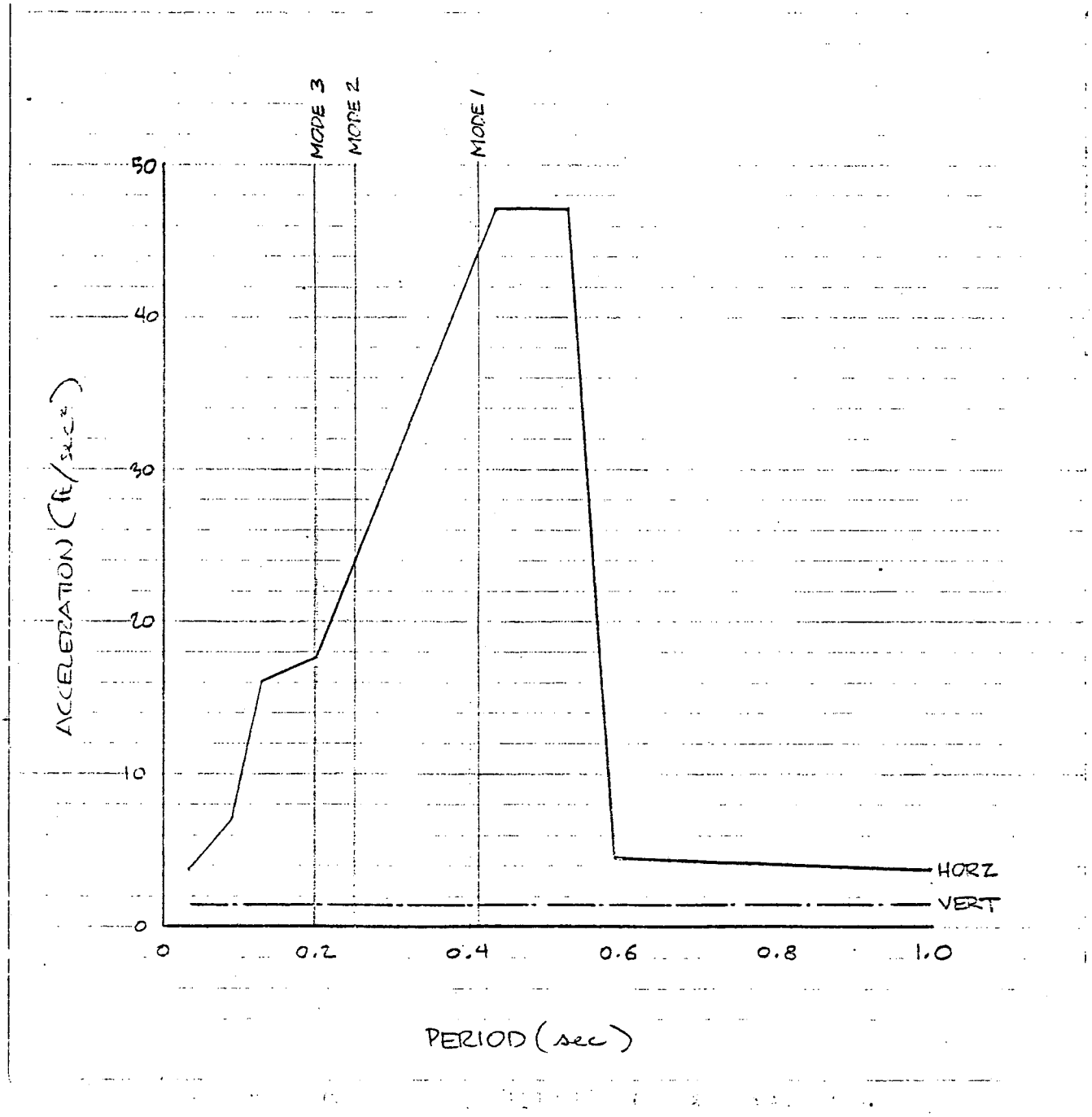
DSR/ch



ATTACHMENT B 1.1
RESULTS COMPARISON

Client: Bechtel, San Francisco
Plant: Monticello
Old Computer Run Description: Main Steam Line Seismic Analysis

1. Modal Comparison



Periods will decrease when the line is reanalyzed on a correct version. With a monotonically decreasing spectra, lower loads and stresses will result. Therefore, existing analysis provides conserative results.

ATTACHMENT B 1.4
RESULTS COMPARISON

Client: Bechtel, San Francisco Plant: Monticello

Old Computer Run Description: Feedwater to Nozzles 4 D and 4 C Seismic Analysis 4

1. Maximum Seismic Stress Comparison (PSI)

Joint	Old	1979	
7	9833	7244	Max. Old, X + Y or Z + Y
7	9833	7244	Max. 1979, X + Y or Z + Y

2. Seimic Loads on Anchors

All anchors specified in the analysis are shown below. The Maximum X + Y or Z + Y load from the 1979 analysis was compared to the maximum old load. Only those cases where the 1979 load is greater than the old load are tabulated below. A check mark is used when the old load was greater.

Joint Name	Support Code	Global Force and Moment					
		X	Y	Z	X	Y	Z
		(LB)	(LB)	(LB)	(FT-LB)	(FT-LB)	(FT-LB)
1	Anchor	✓	✓	✓	6070/5630	✓	7267/5697
40		376/184	✓	2119/2070	✓	2528/1238	✓
42		✓	✓	✓	✓	✓	✓

Typically, in the time period of the original analysis specific seismic allowable loads were not available and therefore it was common to compare the nominal pipe stress at the anchors to the maximum pipe stress. If the maximum stress did not occur at the nozzle the loads were considered acceptable.

Joint	Old	1979	
7	9833	7244	Max. Old, X + Y or Z + Y
7	9833	7244	Max. 1979, X + Y or Z + Y
1	2395	2261	Max. Old and 1979
40	1173	790	Max. Old and 1979

3. Seismic Loads on Supports

All seismic supports specified in the analysis are shown below. The maximum X+Y or Z + Y load from the 1979 analysis was compared to the maximum old load. Only those cases where the 1979 load is greater than the old load are tabulated below. A check mark is used when the old load was greater.

Joint Name	Support Code	Global Force			Discussion on Changes
		X	Y	Z	
		(LB)	(LB)	(LB)	
12	Z	-	-	✓	
15	X	✓	-	-	
34	X	✓	-	-	