FORM NC.DE-AP.ZZ-0002-1 Cover Sheet

CALCULATION COVER SHEET

CALC. NO.: C-0031 **REVISION:** 7

CALC. TITLE: PIPING CODE COMPLIANCE

 # SHTS.(CALC): 107 **ATTACHMENTS: #/TOTAL SHTS.:** 10/398 **TOTAL SHTS.:** 505

CHECK ONE:
[ ] INTERIM (Proposed Plant Change) [ ] VOID

[X] FINAL (Supports Installed Condition)

DESCRIPTION OF CALCULATION REVISION (IF APPL.):

SEE SHT 2 OF 2

REASON FOR CALCULATION REVISION (IF APPL.):

SEE SHT 2 OF 2

HOPE CREEK [X] Q [ ] Qs [ ] Qsh [ ] F [ ]R [ ] N/A

Q - LIST (SALEM) ? [ ] YES [ ] NO

IMPORTANT TO SAFETY ? [X] YES [ ] NO

FUTURE CONFIRMATION REQUIRED ? [ ] YES [X] NO

OTHER DOCUMENTS AFFECTED? (CBDS, FSAR, etc.): NONE

ORIGINATOR/COMPANY NAME: [signature] / FPI — Date: 7/27/94

PEER REVIEWER/COMPANY NAME: _____ — Date: / /

VERIFIER/COMPANY NAME: Philip M. Stadel / FPI — Date: 7/29/94

REVIEWED: [signature] / FPI — Date: 8/15/94
Contractor Supervisor (as applicable)

APPROVED: [signature] — Date: 9/7/94
PSE&G Supervisor (Req'd)

If the calculation is either Q-List, Q, Qs, Qsh, F, R, or Important to Safety "YES", completion of the Certification for Design Verification (Form NC.DE-AP.ZZ-0010-1) is required.

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

PSEG CALCULATION COVER SHEET	TITLE: PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201		COVER SHEET 2 OF 2
	ID NUMBER: C-0031	REFERENCE:	

REVISION HISTORY

REV.	DESCRIPTION	BY	DATE	~~CHKD~~ VFR	DATE
7 IRØ	THIS CALCULATION IS DONE BY NUTECH UNDER SNUBBER REDUCTION PROGRAM. THIS REVISION INCORPORATES DCP 4EC-1021 CD# H683/0. SHT# 1A ADDED. FOR THE DESCRIPTION OF REVISION SEE SHT# 3.	bRP	8/30/93	BG	9/1/93
		CURRENT (VALID) LSP			
		CURRENT (VALID) PRINTOUT RUN ID# FICHE ID #			

REV.	DESCRIPTION	BY	DATE	~~CHKD~~ VFR	DATE
7	THIS REV SUPERSEDES & INCORPORATES DCP 4EC-1021, CD# H683/0	bRP	7/27/94	Gm8	7/29/94
		CURRENT (VALID) LSP			
		CURRENT (VALID) PRINTOUT RUN ID# — FICHE ID # —			

REV.	DESCRIPTION	BY	DATE	CHKD	DATE
		CURRENT (VALID) LSP			
		CURRENT (VALID) PRINTOUT RUN ID# FICHE ID #			

REV.	DESCRIPTION	BY	DATE	CHKD	DATE
		CURRENT (VALID) LSP			
		CURRENT (VALID) PRINTOUT RUN ID# FICHE ID #			

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201	ID NO. C-31 / REFERENCE NONE	SHEET 1 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-2-88 / 6/22/88	

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PSEG CALCULATION CONTINUATION SHEET	TITLE: PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM-P201	ID NO. C-0031	SHEET 1A OF
	ORIGINATOR / DATE: 8-30-93	REFERENCE	
	VFR ~~PEER REVIEW~~ / DATE: 9/1/93		

ATTACHMENTS:

ATTACH #	DESCRIPTION	# OF PAGES
1.	COMPUTER LISTING & TAPE LOG INFO.	68.
2	NUTECH HG CALCULATION	143
3	DECOUPLED BRANCH CONNECTION DISPLACEMENT EVALUATION	5
4	NUTECH DESIGN INPUT LOG / RECORD INDEX.	7
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PSE&G CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201.	ID NO. C-31 / REFERENCE NONE	SHEET 2 OF 106
	ORIGINATOR	CJT 7	
	DATE	5/31/88	
	VFR or CKR	ABT	
	DATE	5/31/88	

PREFACE

This Revision 7 of piping calculation C-31 is done by NUTECH (for PSE&G) to document the results of the snubber reduction program performed under Purchase Order No. P1-239820. The details of the description of Revision 7 are shown on the next page.

This revision consists of:

a) this sheet,
b) NUTECH calculation sheets
c) Attachment I - Computer Run Listing
d) Attachment II - Record Index
e) Attachment III - Computer Output (Hard Copy/Microfiche)
f) Attachment IV - Bechtel Calculation C-31-6Q.
g) Attachment V - Bechtel Calc SCF-31-1Q.
h) Attachment VI - Hanger Guidance Issue #5, dated 11-26-85.

THIS REVISION SUPERSEDES REVISION 6Q OF THIS CALCULATION C-31

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	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-22-88 / / 6/22/88	

DESCRIPTION OF REVISION NO. 7

1. Incorporation of Snubber Reduction Evaluation.

2. Incorporation of Zero Period Acceleration (ZPA) Results.

3. Incorporation of As-Built changes Documented in:

   a) Post Phase II Calculation C-31-6Q
   b) Post Phase II Calculation No. SCF-31-1Q
   c) Hanger Guidance Issue # 5 , Dated 11-26-85

4. As-Built Pipe Isometric and Pipe Support Drawings.

   (Actual drawing number and revisions are entered in the Record Index).

5. Incorporation of following revisions of the specifications listed below:

   a) Line Index: 10855-P-501(Q), Rev. 23

   b) Pipe Class Sheets: 10855-P-500(Q), Rev. 27

   c) Insulation Specification: 10855-P-516(Q), Rev. 11

   d) Branches 2 1/2" and larger Connection 10855-P-514(Q), Rev. 0 Specification

   e) Vent/Drain Connection Specification: 10855-P-511(Q), Rev. 1

   f) Branches 2" and Smaller Connection 10855-P-515(Q), Rev. 1 Specification.

   g) Piping Specification: 10855-M-068(Q), Rev. 6

   h) Seismic Specification: 10855-G-051(Q), Rev. 1

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 4 OF 106
	ORIGINATOR DATE	CJT 7 / 5-31-88	
	VFR or CKR DATE	ASH / 5/31/88	

INTRODUCTION

This revision of the original piping calculation documents the results of the Snubber Reduction Program implemented by NUTECH on Hope Creek Generating Station Unit 1 System P-201.

PROCEDURE OUTLINE

THE BASIC GEOMETRY

Geometry for this system is obtained from perm files on tape (Reference 1) available at NUTECH as qualifying analysis documentation.

A benchmark run is performed to confirm the original model. After establishing a good correlation with the original model, the model is updated to incorporate changes documented in Reference 2, and the latest pipe isometric and pipe support drawings The isometrics, pipe support drawings, and piping qualification calculations are shown on the Record Index (Reference 3) which is included with this calculation.

LOADINGS & LOAD COMBINATIONS

The loading cases and the combinations thereof used by NUTECH in this reanalysis are the same as those used in the PUA as documented in Reference 2, except for OBE & SSE response spectra. The OBE & SSE response spectra, based on PVRC damping, are taken at all appropriate attachment points from the data generated by NUTECH (Ref. 4). Snubber reduction requires that the applicable results be lower than capacities of the components. This enveloping is performed by using NUTECH's computer code PISTAR (Ref. 5.a).

ANALYSIS TECHNIQUE

The methods of analysis used for FSAR loads in this project are the same as in the original analysis documented in set of calculations (Ref. 2). Mark I loads analyses methods ~~either~~ are same as used in the original analysis ~~OR as outlined in procedure of Reference 6.~~ The choice of method to evaluate Mark I loads is also in accordance with criteria of technical instruction PSE-TI-002 (Ref. 7). NUTECH's computer code PISTAR is used to perform the various analyses required for this system.

EVALUATIONS

The results of these analyses are documented in various pages of this calculation. The categories of evaluations performed are in accordance with the ASME B&PV Code (Ref. 8) and are listed in the Table of Contents of this calculation. The results of the evaluations are documented in various tables of this calculation. The basis of the evaluation were computer runs listed in Reference 9. The revised support load combinations are generated by the post processor OPTSUPT (Ref. 5.b). The qualification of supports for revised loads is documented in a separate calculations (Ref. 10). The details of criteria used in the snubber reduction are available in Technical Instruction PSE-TI-002.

SUMMARY

The changes to the original analysis are listed in this calculation. A list of the snubbers status, i.e. whether snubber is deleted, replaced with strut, or left as-is is provided for reference only. A field walk down shall be performed prior to any removal/replacement of snubbers to confirm the piping clearances availability so as not to inhibit piping system predicted displacement.

CHANGES TO ANALYSIS OF RECORD

1. Use of E_c, E_h, α_h, are as required by ASME Code (Ref. 8).

2. Allowable stresses are obtained from Ref. 8 at design temperature at all service levels.

3. PVRC damping is used in accordance with ASME Code Case N-411 (Ref. 11).

4. When snubbers are replaced by struts, appropriate stiffness updates are incorporated in the PISTAR model.

5. The effects of ZPA (for both OBE & SSE) are included in the piping and pipe supports evaluations.

6. Effects of long term torus heatup are included in the piping and pipe support evaluations.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 6 OF 106
	ORIGINATOR DATE VFR or CKR DATE	CDJ 7 / 5-31-88 / ASH / 5/31/88	

ITEMS EXCLUDED FROM THE SNUBBER REDUCTION PROGRAM

1. Since TAP systems are either moderate or low energy systems, no check for pipe break criteria is required.

2. There are no pipe whip restraints on the TAP models, per FSAR (Ref. 12) and hence, no need to check the whip restraint gaps.

3. Since there is no set pipe deflection limit criteria, the check for interferences for pipe motions was not in the scope of snubber reduction program.

Additional Items Included in this Documentation

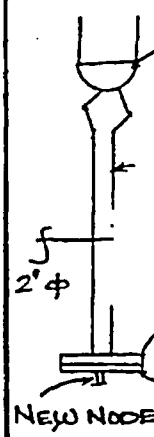
1. Rupture disc loads evaluation, which was originally documented in calculation D-034 (Ref. 23), is included in this package. This evaluation of rupture disc load is performed for geometry finalized after snubber reduction.

2. Operating Loads (OL) analysis was performed on the finalized geometry after the snubber reduction was completed. The loads and method of analysis was identical to those used in the original analysis of Ref. 24.

PSEG CALCULATION CONTINUATION SHEET	TITLE CODE COMPLIANCE DOCUMENTATION SYSTEM P201	ID NO. C-31	SHEET 7 OF 106
	ORIGINATOR DATE VFR or CKR DATE	REFERENCE NONE.	

SYSTEM: P 201

CHANGES PER DOCUMENTS RECIVED AFTER ABR PERFORMED UNDER PROJECT XBP-06

NO	DESCRIPTION OF CHANGE	REFERENCE/REMARKS	PISTAR GEOM. FILE UPDATE
1	ALL THE CHANGES LISTED IN SECTION-1 OF CALC. NO. C-31-6Q (N CALC. XBP006.0301) ARE INCORPORATED IN THE PISTAR FILE	REF: SECTION-1 OF CALC NO. C.31-6Q.	YES
2	FROM ABOVE FILE XBP006.0301 Deviation item NO 1 & 31 CHANGES ARE SHOWN below SHOWN BELOW.  20" PIPE CAP. NODE # 145CP. LINE # 007-HBB-4" Sch Std. 2" ϕ 150# psi WNRF W_T=16.5 150# psi Blind flg W_T=17 33½ NEW NODE No=147 BOLT WT.= 33½(20%)=6.7 TOTAL WEIGHT ≃ 40.5	As ABOVE. & 150# 1-P-FD-01 REV-19 LADISH CATALOG # 5T	NO DUE TO I_R/F_B RATIO > 40 OR PIPE SIZE D_B/O_B > 3 DECOUPLE CRITERIA IS APPLIED CUT-OFF POINT 145CP IS OK.

NOTES.

PSEG CALCULATION CONTINUATION SHEET	TITLE CODE COPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 8 OF 106
	ORIGINATOR DATE VFR or CKR DATE: 081 7, 1-5-88, ABM, 5/31/88		

SYSTEM: P 201

CHANGES PER DOCUMENTS RECIVED AFTER ABR PERFORMED UNDER PROJECT XBP-06

NO	DESCRIPTION OF CHANGE	REFERENCE/REMARKS	PISTAR GEOM. FILE UPDATE
3	SUPPORT #1-P-FD-006-H01 NODE H1A CHANGE H.L. FROM 1925# TO 2158# AND C.L FROM 2038# TO 2270#	Ref CALC. FILE# SCF-31-19 SHT 8/26, Pipe Support DWG REV-5	YES
3A	Sup # 1-P-FD-006-H06 NET STIFNESS K_{AB} = 1.402E6 #/IN INCLUDING SIF = 2.0 FOR LUGS	Ref SCF-31-19 SH 9/26	YES
4.	Supp #1-P-FD-006-H08 NODE H8 CHANGES H.L. FROM 2674# TO 2860# C.L. FROM 2385# TO 2560#	Ref Sup DWG REV# 4 & FILE# SCF-31-19 SHT 11/16	YES
5	Sup #1-P-FD-006-H19 NODE H19. CHANGE TOTAL H.L FROM 4706# TO 4940# C.L FROM 5020 TO 5240# and SIF = 2.0 FOR LUG'S	Ref Sup DWG REV-3 and file # SCF-31-19 SHT 13/26	YES
6	ADDED NEW NODE 27BR (20 1/4" up) FROM 26BR; 3" WELD CAP NEAR Sup# 1-P-FD-006-H19 and Corrected dimention accordigly on PISTAR GEOMATRY. SIF = 3.6 AT NODE 27BR.	150# 1-P-FD-01 REV-19 PER CALC. C31-60 SECTION 6 FILE # 11.2201 ·301.03 ITEM 8(a)	YES
7	CHANGE NODE NO. H1415 TO NODE 54BR FOR 1" BRANCH # 1-P-FD-211 WITH SIF = 1.0 AT 3 1/4" SOUTH OF Sup# 1-P-FD-006-H20	150# 1-P-FD-01 REV-19	YES

NOTES.

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation System P201	ID NO. C-31	SHEET 9 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE: DJT 7, 1-5-88, ASJ, 5/31/88	REFERENCE: None	

SYSTEM: P-201

CHANGES PER DOCUMENTS RECIVED AFTER ABR PERFORMED UNDER PROJECT XBP-06

NO	DESCRIPTION OF CHANGE	REFERENCE/REMARKS	PISTAR GEOM. FILE UPDATE
8	ADDED NEW NODE NO 91 & 92 FOR CONN PT/N056A & PT/N056E, & 006-HBB-1" RESPECTIVELY NEAR Sup# 1-P-006-H07. SIF=1.0 @ Node 91 & 92.	Ref PER No. 7 (PREVIOUS ITEM) REF NO 13 FOR SIF.	YES.
9	ADDED NEW NODE NO. 163 FOR 1" VENT COMPARTMEN (1-PFD-204) TO TORUS @ 30" UP(+Y) FROM 20"x16" TEE ON LINE NO. 1-P-FD-014-HBB-16", SIF=1.0 @ NODE NO. 163.	ISO # 1-P-FD-01 REV-19 PER Ref 13 FOR SIF.	YES
10	Sup# 1-P-FD-014-H01 NODE (H1B) PROVIDE SIF, PER CALC. NO SC-134. (=2.0)	Ref. FILE NO. SCF-31-19 SH 12/26	Yes.
11	Sup # 1-P-FD-014-H02 NODE (H2B) (a) LOAD Faulted reduced to 24000# b) ADD SIF for Lugs c) Stroke adjustment to 6"	HG issue #5 & Sup DWG REV. 2	a) NO b) Yes c) NO.

NOTES.

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation System P201	ID NO. C-31	SHEET 10 OF 106
	ORIGINATOR DATE VFR or CKR DATE	1-5-88	REFERENCE NONE

SYSTEM: P201

CHANGES PER DOCUMENTS RECIVED AFTER ABR PERFORMED UNDER PROJECT XBP-06

NO	DESCRIPTION OF CHANGE	REFERENCE/REMARKS	PISTAR GEOM. FILE UPDATE
13	Sup # 1-P-FD-006-H04 (NODE H4A) DESIGN LOADS & DISP CHANGED	Sup DWG REV-3	NO
14	Sup # 1-P-FD-006-H05 NODE (H5A) DESIGN LOADS & DISP. CHANGED.	Sup DWG REV 2	NO.
15	Sup # 1-P-FD-006-H07 (NODE H7) loads & DISPL. CHANGED.	Sup DWG REV-4	NO.
16	Sup # 1-P-FD-006-H13 (NODE H13) IS balanced to 4900 #	Sup DWG REV 6 and SCF-31-19 SH 26/26	NO
17	Sup # 1-P-FD-006-H03 (NODE H3A) NEW DISPL. AND LOADS CHANGE.	HG ISSUE NO.5 AND SUPPORT DWG REV-5.	NO.
N/A	FOLLOWING PAGES SHOW DETAILS CALCULATION REQUIRED TO UPDATE PISTAR FILE FOR DEVIATION # 27 and 28 OF CALC. FILE NO. XB006.0301	FILE NO. XBP006.0301	YES

NOTES.

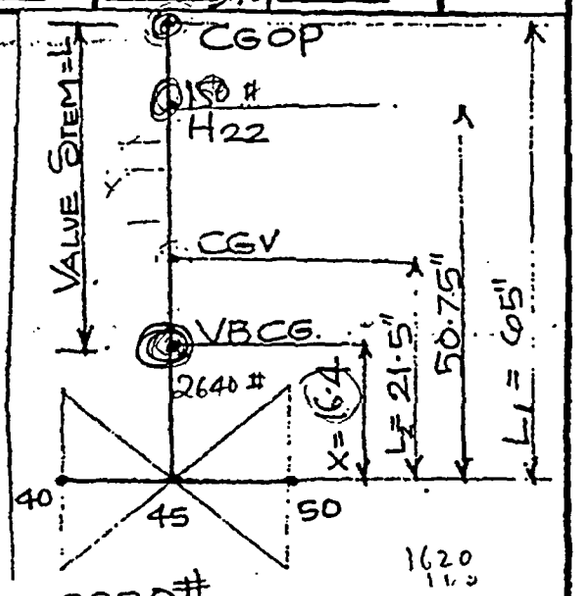
PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201(C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 11 OF 106
	ORIGINATOR DZ 7 / DATE 2-16-88 / VFR or CKR MSM / DATE 5/31/88	310	

VALVE PROPERTIES:-

DWG NO. 10855-P301(Q)-323-4-

REV. BC. REF FILE NO. PSE005.0016

18"-150# RATING GATE VALVE WITH LIMITORUE OPERATOR.



VALVE BODY PROPERTY:-

TOTAL VALVE WEIGHT W_T (lbs) = 2950#

OPERATOR WEIGHT W_{op} (lbs) = 310#

VALVE BODY WEIGHT $W_B = W_T - W_{op} = 2950 - 310 = 2640$#

$$W_T \times L_2 - W_{op} \times L_1 = W_B \times X.$$

$$\therefore X = \frac{W_T \times L_2 - W_{op} \times L_1}{W_B}$$

WHERE
L_2 = VALVE CG. (IN)
L_1 = OPERATOR CG. (IN)
X = VALVE BODY CG. (IN)

$$X = \frac{2950 \times 21.5 - 310 \times 65}{2640}$$

$\therefore X = 16.40$ IN. $\therefore L = 65 - 16.40 = 48.60$ IN.

$D_{VALVE\ Body} = D_o + 2(T) = 20 + 2(.375) = 20.75"$ WHERE D_o = RUN PIPE OD. (IN)

$t_{VALVE\ Body} = 2(T) = 2(.375) = 0.75"$ T = RUN PIPE THICKNESS

$\therefore$ VALVE BODY PROPERTY NO. 4 IN PISTAR ANALYSIS

OD = 20.75" t = 0.75" LUMP WEIGHT = 2640# @ NODE VBCG

WEIGHT LESS @ NODE 40-45, 45-VBCG. & 45-50.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 12 OF 106
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X_s OPERATOR

$$K_{op} = W_{op}(2\pi f)^2 \quad \& \quad K_{op} = \frac{P}{\delta}$$

f = fundamental mode of Valve assembly = 36.89 Cps
Ref: file # 11.2201.0715

OPERATOR DEFLECTION δ_{op} DUE TO BENDING & SHEAR

$$\delta_{op} = \delta_{bending} + \delta_{shear}$$

$$= \frac{PL^3}{3EI} + \frac{F(PL)}{AG} \quad \text{where } G = \frac{E}{2(1+\nu)} = \frac{E}{2.6}$$

& $F = 2.0$

REF: FORMULA FOR STRESS AND STRAIN BY ROARK. McGRAW HILL BOOK COMPANY, FOURTH EDITION.

$$\delta = \frac{PL^3}{3EI} + \frac{5.2\,PL}{AE} = \frac{P}{K}$$

where $I \simeq \pi R^3 t$ & $A \simeq 2\pi R t$

$$\therefore K = \frac{3EI}{L^3\left\{1 + \frac{3I(5.2)}{AL^2}\right\}}$$

$$K = \frac{W_o}{g}(2\pi f)^2 = \frac{310}{386.4}(2\pi \times 36.89)^2 = 43102 \text{ lb/in}$$

$E = 27.9\,E6$. Carbon Steel @ $T = 70^\circ$

$I = \pi R^3 t$, $A = 2\pi R t$, $L = 48.6$ and $t = 0.75$ use

$I/A = R^2/2$

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 13 OF 106
	ORIGINATOR DZ 7 / DATE 2-16-88 / VFR or CKR ASM / DATE 5/31/88		

$$43102 = \frac{729.12 I}{1 + 0.0066 I/A}$$

$$\therefore 0.03986 R^3 - 0.0033 R^2 - 1 = 0$$

$$\therefore R = 2.975' = D_o - 0.75/2$$

$\therefore D_o = 6.70''$ (Stem) and $t = 0.75''$ (Stem) use

∴ VALUE STEM PROPERTY #5 IN PISTAR ANALYSIS.

Stem OD = 6.70 IN Stem thickness = 0.75"

WEIGHTLESS FROM NODE VBCG — CGOP

Lump WEIGHT @ NODE CGOP = 310# OPERATOR

Lump WEIGHT @ NODE H22 = 150# CLAMP WEIGHT

(Supt # 1-P-FD-044-H22)

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201(C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 14 OF 106
	ORIGINATOR: OJT 7 / DATE: 2-16-88		
	VFR or CKR: ASM / DATE: 5/31/88		

INSULATION WEIGHT:-

REF. LINE INDEX DWG NO. 10855-P-0501 REF # 13(a)

INSULATION TICKNESS DWG NO. 10855-P-0511 REF # 13(c)

INSULATION TICKNESS = 2 IN (DENSITY $\rho_{INS} = 14 \frac{lbs}{ft^3}$)

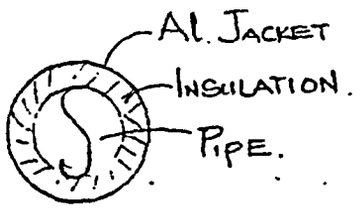
ALUMINIUM JACKETING = 0.032 IN (DENSITY ρ_{AL} 170 $\frac{lbs}{ft^3}$)

$$\text{TOTAL } \frac{\text{WEIGHT}}{\text{LENGTH}} = \frac{\pi}{4}\left[\underbrace{(OD_{PIPE} + 2t_{INS})}_{A}^2 - OD_{PIPE}^2\right]\rho_{INS} + \frac{\pi}{4}\left[(A + 2t_{AL})^2 - (A)^2\right]\rho_{AL}.$$

$$\therefore \text{TOTAL WEIGHT/LENGTH} = \frac{\pi}{4}\left\{\left[(OD_{PIPE} + 2t_{INS})^2 - OD_{PIPE}^2\right]\rho_{INS} + \left[(A + 2t_{AL})^2 - (A)^2\right]\rho_{AL}\right\}$$

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation System P20	ID NO. C-31	SHEET 15 OF 106
		REFERENCE None	
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 1-5-88 / ASM / 5/31/88	

DESCRIPTION: Properties (Cont.)



1) Run Pipe 24" ϕ

$$\therefore \frac{Wt}{Length} = \frac{\pi}{4}\left\{(28^2-24^2)\frac{14}{(144)(12)} + \left[(28.064)^2-28^2\right]\frac{170}{(144)(12)}\right\}$$

$$= 1.6 \text{ lbs/in}$$

2) Run Pipe 20" ϕ

$$\frac{Wt}{Length} = \frac{\pi}{4}\left\{(24^2-20^2)\frac{14}{(144)(12)} + \left[(24.064)^2-24^2\right]\frac{170}{(144)(12)}\right\}$$

$$= 1.36 \text{ lbs/in.}$$

3) 24" X 20 Red Calculating base on Avg O.D. 22.0"

$$\frac{Wt}{Length} = \frac{\pi}{4}\left\{(26^2-22^2)\frac{14}{(144)(12)} + \left[(26.064)^2-(26)^2\right]\frac{170}{(144)(12)}\right\}$$

$$= 1.48 \text{ lbs/in}$$

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

DESCRIPTION: PROPERTIES (CONCLUDED)

4) 16" ϕ RUN PIPE.

$$WT/LENGTH = \frac{\pi}{4}\left\{(20^2-16^2)\frac{14}{(144)(12)} + \left[(20.064)^2 + 20^2\right]\frac{170}{(144)(12)}\right\}$$

$$= 1.12 \text{ lbs/in.}$$

5) 10" ϕ PIPE

$$WT/Length = \frac{\pi}{4}\left\{\left[(14.75)^2-(10.75)^2\right]\frac{14}{(144)(12)} + \left[(14.814)^2-(14.75)^2\right]\frac{170}{144\times12}\right\}$$

$$= 0.80 \text{ lbs/in}$$

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 17 OF 106
	ORIGINATOR DATE	7 / 2-22-88	
	VFR or CKR DATE	5/31/88	

DESCRIPTION: SUPPORT STIFFNESS. TO CORRECT ERROR IN PUR

SUPPORT DWG NO. 1-P-FD-006-H14 REV-2 Node H14

REF:- BECHTEL PIPE SUPP. CALC. NO. 1-P-FD-006-C8 REV-2 FROM STRUDL.

$$\text{FRAME STIFFNESS} = \frac{\text{P APPLIED LOAD AT JOINT 13}}{\delta = \text{DEFLECTION AT JOINT 13}}$$

$$K_F = \frac{48.42 \times 1000}{0.004183}$$

$$= 11.575\,E6 \ \#/in$$

SUPPORT STRUT STIFFNESS

SIZE # 7 C-C. = 2'-10 3/4"

Fig # 211.

$$\therefore K_{ST} = \frac{1000}{0.0002} = 5.0E6 \ \#/in$$

{ REF file No. XBP006.0301 Pg 24/76.

TOTAL EFFECTIVE SUPPORT H14 STIFFNESS.

$$K_{H14} = \left\{ \frac{1}{K_F} + \frac{1}{K_{ST}} \right\}^{-1}$$

$$= \left\{ \frac{1}{11.575E6} + \frac{1}{5.0E6} \right\}^{-1}$$

$$K_{H14} = 3.491E6 \ lbs/in$$

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201(C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 18 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE: 7 / 2-22-88 / 5/31/88		

DESCRIPTION: SUPPORT STIFFNESS TO CORRECT ERROR IN PLVA

SUPPORT DWG # 1-P-FD-006-H17. REV. 1., Node H17

REF. BECHTEL PIPE SUPP. CALC. NO. 1-P-FD-006-C8 REV-2 FROM STRUDL ANALYSIS.

FRAME TS 8"x8"x 1/2 x 9'-9" LG. STIFFNESS

Applied LOAD = 38.4 KIP AT JOINT # 12 } BECHTEL CALC # 1-P-FD-006-C8 REV. 2

DEFLECTION AT JOIN 12 = 0.022219.

$$\therefore \text{FRAME STIFFNESS} = \frac{38.4 \times 1000}{0.022219}$$

$$K_F = 1.728E6 \ \#/IN$$

SUPPORT STRUT STIFFNESS

$P_{IP} - P_{IN}$ (C-C) = 2'-10 13/16"

$$K = \frac{AE}{L} = \frac{6.62 \times 29E6}{34\ 13/16} = 5.51E6 \ \#/IN$$

{ REF XBP006.0301 Page 26/76

$\therefore$ TOTAL EFFECTIVE SUPPORT H17 STIFFNESS K_{H17}

$$K_{H17} = \left\{ \frac{1}{1.728E6} + \frac{1}{5.51E6} \right\}^{-1}$$

$$\therefore K_{H17} = 1.31546E6. \ \#/IN$$

TABLE 1
ENVELOPED PVRC RESPONSE SPECTRA IDENTIFICATION (1,2,3)

SPECIFIC BUILDING ELEVATIONS (IN FEET) ENVELOPED ARE NOTED BELOW:

REACTOR BUILDING ELV. (FT)	REACTOR INTERIOR STRUCTURE ELV. (FT)
X 54	72.33
X 77	145
X 102	
Vertical Spectra For Both Wall & Slab Are Enveloped For Reactor Building.	

NOTES:
(1) Damping was per ASME Code Case N-411 (Ref. 10).
(2) Appendix A shows digitized listing of the spectra.
(3) Response spectra at El. 72'-4" for Reactor Building is used as torus penetration point.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201(C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 20 OF 106
	ORIGINATOR	OJ 7	
	DATE	2-16-88	
	VFR or CKR	MH	
	DATE	5/31/88	

TABLE 2

SEISMIC ANCHOR MOVEMENT DATA

Source: (Reference 2)

X	TORUS (EL. 72'-4")
X	REACTOR BLDG. (ELS. 54'-102')
	REACTOR BLDG. (ELS.) INTERIOR STRUCTURE
	NO ANCH MOTIONS

SAM INPUT VALUES (IN) FOR VARIOUS NODES ARE LISTED IN APPENDIX A

NOTES:

1. NET OBE/SSE SAM = $(DX^2 + DY^2 + DZ^2)^{1/2}$
2. OBE/SSE SAM ARE USED IN SUPPORT LOADS BUT ONLY OBE SAM IS USED IN ASME CODE EVALUATION.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 21 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 2-16-87 / 5/31/88	

TABLE-3

THERMAL ANCHOR MOVEMENTS DATA

VALUES (IN) (Ref. 2)

CONDITION	NODE	Dx	Dy	Dz
THAMA*	P201	0.021195	0.015141	−0.15411
	I958N	0.0000	−0.009546	−0.14295
	I7SAN	0.028850	−0.010980	−0.14510
	HPTUB	0.000500	−0.00400	−0.00690
THAM, THAM1 & THAM2	See Below.			

* TORUS ANCHOR DISP. @ 100°F ($\Delta T = 30°$)

THAM = TORUS ANCHOR DISP. @ 177°F ($\Delta T = 107°$)
= 3.567 $\left(= \frac{107}{30}\right)$ THAMA.

THAM1 = TORUS ANCHOR DISP @ 167°F ($\Delta T = 97°F$)
= 3.233 $\left(= \frac{97}{30}\right)$ THAMA

THAM2 = TORUS ANCHOR DISP @ 212°F ($\Delta T = 142$)
= 4.733 $\left(= \frac{142}{30}\right)$ THAMA.

TABLE-4

STATIC TORUS MOTION INPUT DATA

VALUES (IN) (Ref. 2)

CASES	NODE	DX	DY	DZ
TD	P201	0.00500	0.002900	-0.0882
	I9SBN	0.0000	-0.007660	-0.04816
	I7SAN	0.008065	-0.00400	-0.04053
TD1*	↓	↓	↓	↓
TD2*	↓	↓	↓	↓
TD3	N/A →			

* TD1 & TD2 ARE SAME AS TD CONSERVATIVELY.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 23 OF 106
	ORIGINATOR Ozt 7 / DATE 5/31/88 / VFR or CKR DATE 5/31/88		

TABLE 5
LOADING CONDITIONS

PISTAR LOAD CASE ID	DESCRIPTION	ANALYZED DURING ITERATIONS
DW	Dead Weight with Normal Contents	Yes
DWT	Dead Weight with Water	~~No~~ YES
OBEI	Operating Basis Earthquake (Inertia) including ZPA Effect	Yes
OBED	Operating Basis Earthquake Anchor Motions	Yes
SSEI	Safe Shutdown Earthquake (inertia) including ZPA Effects	Yes
SSED	Safe Shutdown Earthquake Anchor Motions	Yes
TE *	Normal Operating Thermal Expansion (Maximum of Different Modes.)	Yes
TE1 *	Maximum Operating Thermal Expansion (Maximum of Different Modes.)	Yes
TE2 *	Thermal Expansion for Long Term Torus Heatup	Yes
THAM	Normal Operating Thermal Anchor Motions	Yes
THAM1	Maximum Operating Thermal Anchor Motions	Yes
THAM2	Thermal Anchor Motions due to Long Term Torus Heatup	Yes
OL	Operating Loads	No
TD,TD1	Static Torus Displacement due to Normal Operating, and Maximum of SBA, IBA, DBA Conditions Respectively	No
TD2	Static Torus Displacement due to Deadweight of Water and Pressure of 62 psig.	Yes
QAB	SRV Hydrodynamic Load	No
QABI	SRV Torus Motion Inertia Effects (see page 32 for Details)	No
CO	Condensation Oscillation Hydrodynamic Loads	No
COI	Condensation Oscillation Torus Motion Inertia Effects	No
CHUG	Post-Chugging Hydrodynamic Loads	No
CHUGI	Post-Chugging Torus Motion Inertial Effects	No
RUPD1	RUPTURE DISC EVALUATION **	YES

* See Ref. 22 and next 3 pages for details of input
** See pages 27 through 31 for the details of input.

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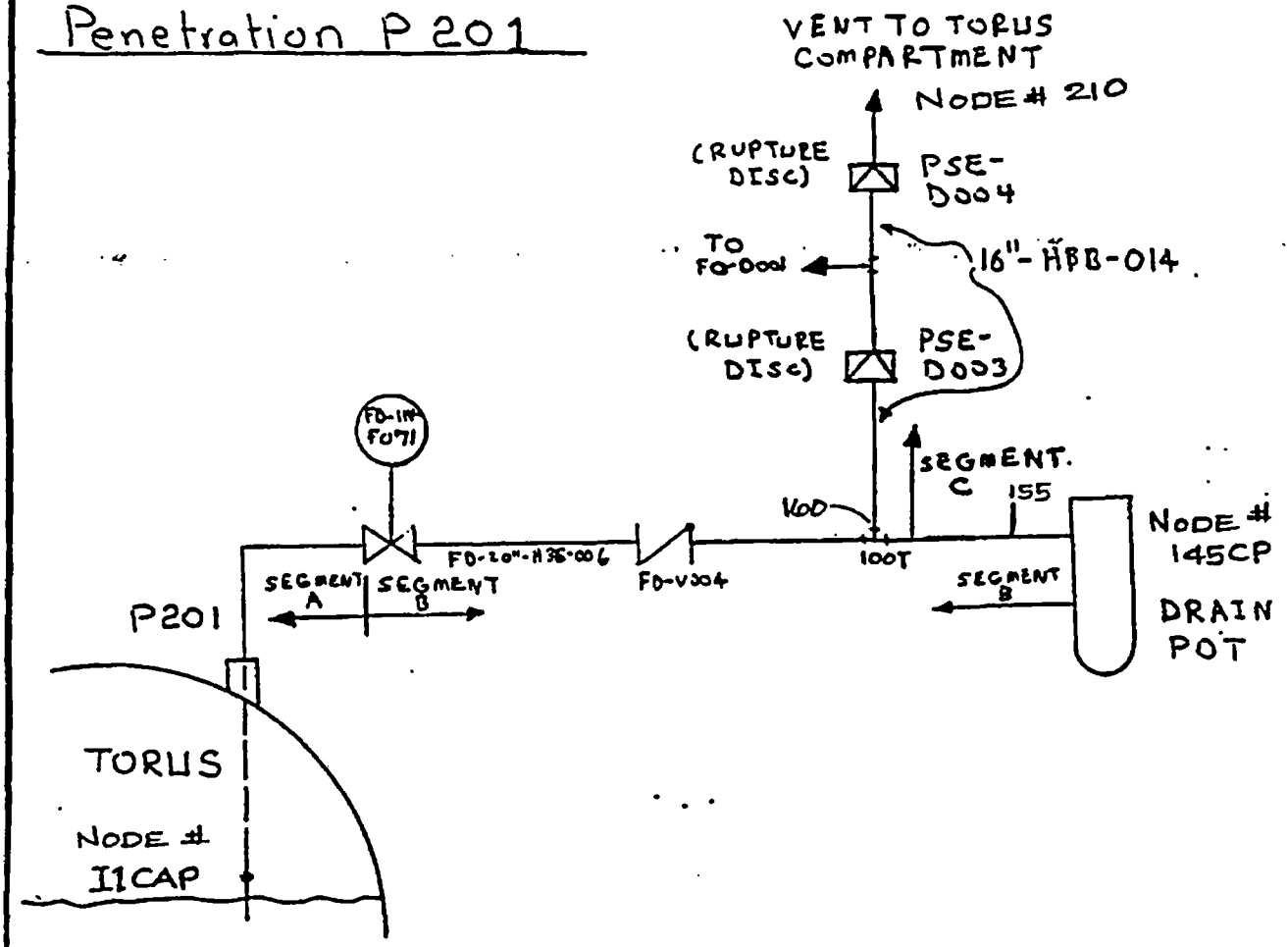
PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 24 OF 106
	ORIGINATOR DATE VFR or CKR DATE	05-18-88 / 5/31/88	

Penetration P 201



CASE: TE

FROM NODE.	TO NODE.	FROM THE ABOVE SKETCH OF REF-22 SECTION	THERMAL MODE = TE NORM. OPER. F.	ΔT F.
I1CAP	P201	N/A	177.0	107.0
EXNOZ	155.	A PLUS B.	283.0	213.0
160	210	C	110.0	40.0

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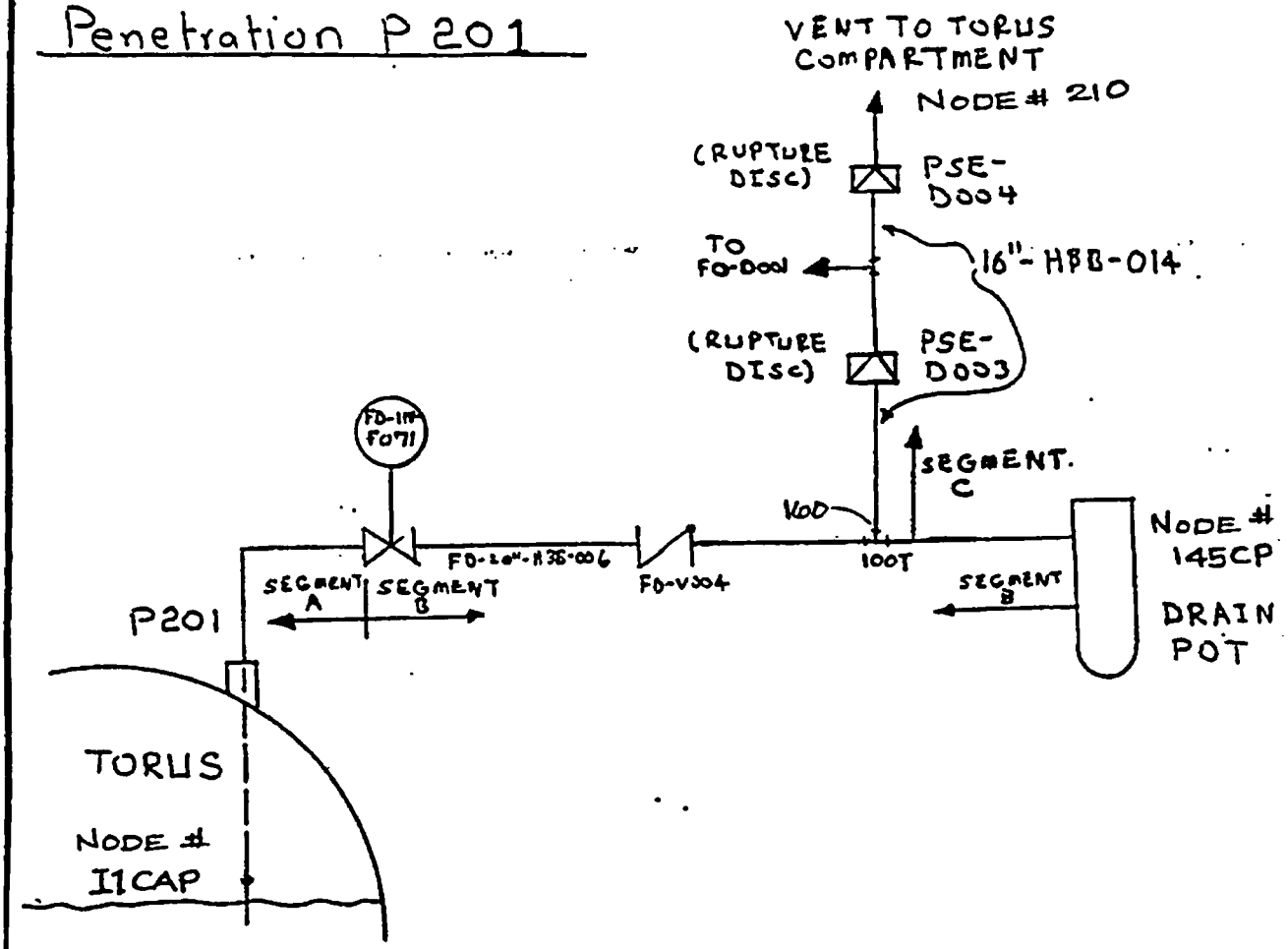
PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 25 OF 106
	ORIGINATOR DATE VFR or CKR DATE	5 / 05-18-88 / 5/31/88	

Penetration P 201

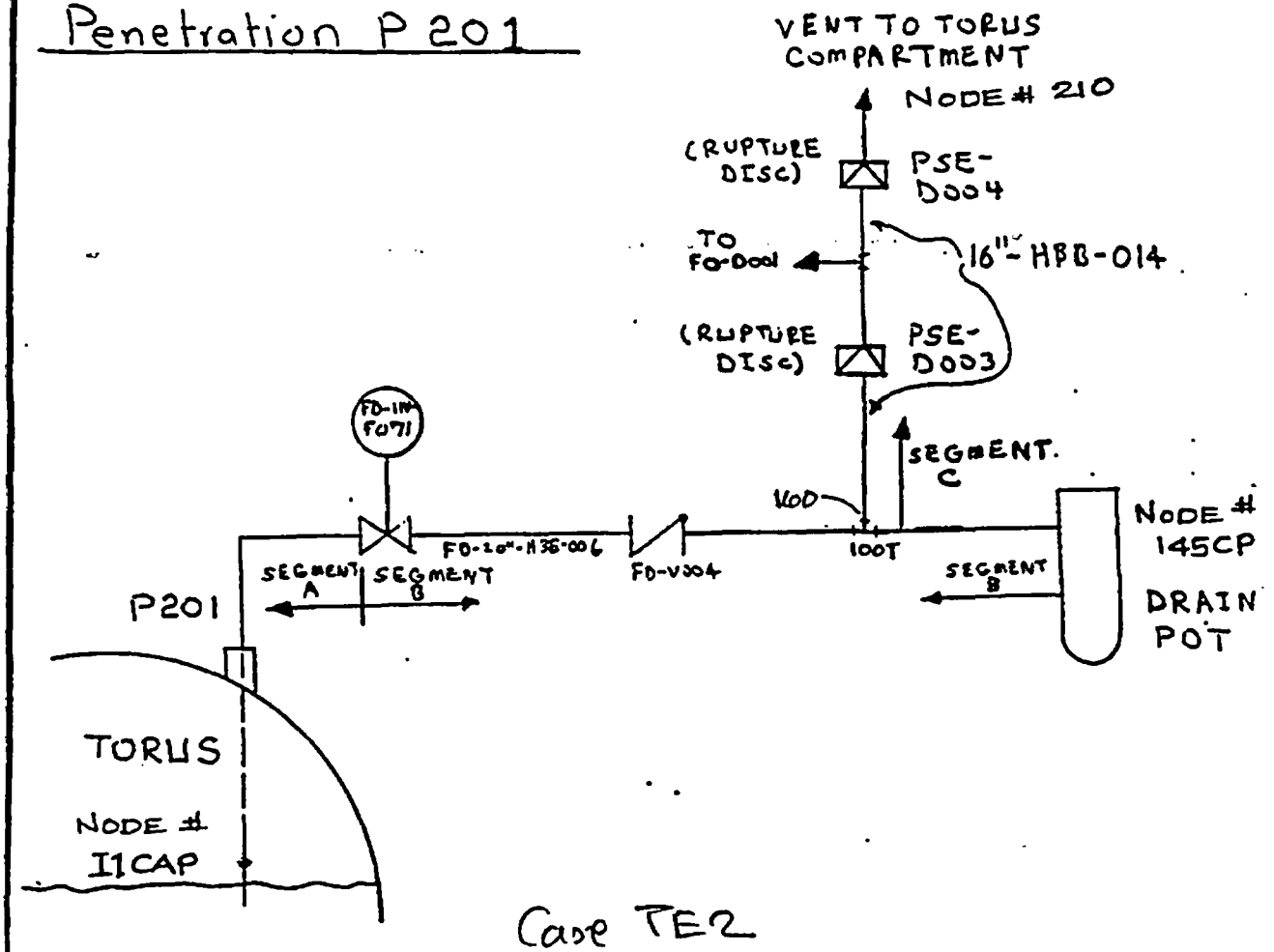


CASE - TE1.

FROM NODE.	TO NODE.	FROM THE ABOVE SKETCH OF REF-22 SECTION	THERMAL MODE = TE1. MAXM OP. F.	ΔT F.
I1CAP	P201	N/A	167.0	97.0
EXNOZ	155	A plus B	283.0	213.0
160	210	C	110.0	40.0

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 26 OF 106
	ORIGINATOR DATE 05-18-88 / VFR or CKR DATE 5/31/88		

Penetration P 201



Case TE2

FROM NODE.	TO NODE.	FROM THE ABOVE SKETCH OF REF-22 SECTION	THERMAL MODE LONG TERM TORUS HEAT-UP TE2 F.	ΔT F.
I1CAP	P201	A	212.0	142.0
EXNOZ	155	A-B	283	213.0
160	210	C	AMB = 110	40.0

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 27 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	05-08-88 / 5/31/88	

LOCA- TIME HISTORY ANALYSIS

CALCULATION DAMPING VALUES

REF.[25] R.W. CLOUGH, DYNAMICS OF STRUCTURE, 1976

PARIMETERS (damping for critical frequencies of loads)

$f_1 = 5$ hz. $\qquad T_1 = \frac{1}{f_1} = 0.2$

$f_2 = 50$ hz $\qquad T_2 = \frac{1}{f_2} = 0.02$

$\Delta t = 0.001$ Sec

Damping Due to Time Steps (Ref.[25] Pg 47 & 269)

$\frac{\Delta t}{T_1} = \frac{0.001}{0.2} = 0.005$ —— $AD_1 = 0$

$\frac{\Delta t}{T_2} = \frac{0.001}{0.02} = 0.05$ —— $AD_2 = 1.3$

} with $\theta = 1.4$ (Value in pistol).

$$(\xi_s)_{\Delta t} = \frac{V_n - V_{n+1}}{2\pi (V_{n+1})}$$

$V_n = 1$

$V_{n+1} = (1 - AD) V_n$

$$\therefore (\xi_s)_{\Delta T} = \frac{1.0 - [1.0 - (0.0)]^{1.0}}{2\pi [1.0 - (0.0)]^{1.0}} = 0.0$$

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 28 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	DJM 5 / 05-08-88 / ABM / 5/31/88	

$$(\xi_2)_{\Delta T} = \frac{\left[1 - (1 - 0.013)\right]\frac{1.0}{}}{2\pi\,(1 - 0.013)\,1.0} = 0.002$$

Damping Due to α & β (Ref. Pg 196)

$$\xi_n = \frac{1}{2\omega_n} \sum_b a_b \omega_n^{2b}$$

letting $\alpha = a_0$
$\beta = a_1$
$b = 0, 1$

Then $\xi_n = \frac{1}{2\omega_n}\left(\alpha + \beta\omega_n^2\right)$

given $\omega_1 = 2\pi f_1 = 2\pi(5) = 31.416$ Rad/sec
$\omega_2 = 2\pi f_2 = 2\pi(50) = 314.2$ Rad/sec.

$$\xi_1 = \frac{\alpha}{2\omega_1} + \frac{\beta\omega_1}{2}$$

$$\xi_2 = \frac{\alpha}{2\omega_2} + \frac{\beta\omega_1}{2}$$

$$D - (\xi_1)_{\Delta t} = \frac{\alpha}{2\omega_1} + \frac{\beta\omega_1}{2}$$

$$D - (\xi_2)_{\Delta t} = \frac{\alpha}{2\omega_1} + \frac{\beta\omega_2}{2}$$

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 29 OF 106
	ORIGINATOR DATE VFR or CKR DATE	CJT 5 / 05-08-88 / MSM / 5/31/88	

For 3 % Damping ($D = 0.03$)

$$0.03 - 0 = \frac{\alpha}{2(31.416)} + \frac{31.416\,\beta}{2} \quad \text{— Eqn 1}$$

$$0.03 - 0.002 = \frac{\alpha}{2(314.16)} + \frac{314.16\,\beta}{2} \quad \text{— Eqn 2}$$

$$\therefore\ 0.03 = 0.0159\alpha + 15.708\,\beta \quad \text{— Eqn 1}$$

$$0.028 = 0.00159\alpha + 157.08\,\beta \quad \text{— Eqn 2}$$

$$(0.03) \times 10 = 10\left[0.0159\alpha + 15.708\,\beta\right]$$

$$0.3 = 0.159\alpha + 157.08\,\beta \quad \text{— Eqn 1a}$$

$$0.028 = 0.00159\alpha + 157.08\,\beta \quad \text{— Eqn 2a}$$

$\therefore$ Solving Eqn 1a & 2a

$$0.3 = 0.159\alpha + \cancel{157.08\,\beta}$$

$$-\ 0.028 = -0.00159\alpha - \cancel{157.08\,\beta}$$

$$0.272 = 0.15741\alpha$$

$$\therefore\ \alpha = 1.727915$$

$$0.3 = 0.159(1.727915) + 157.08\,\beta$$

$$\beta = 16.08 \times 10^{-5}$$

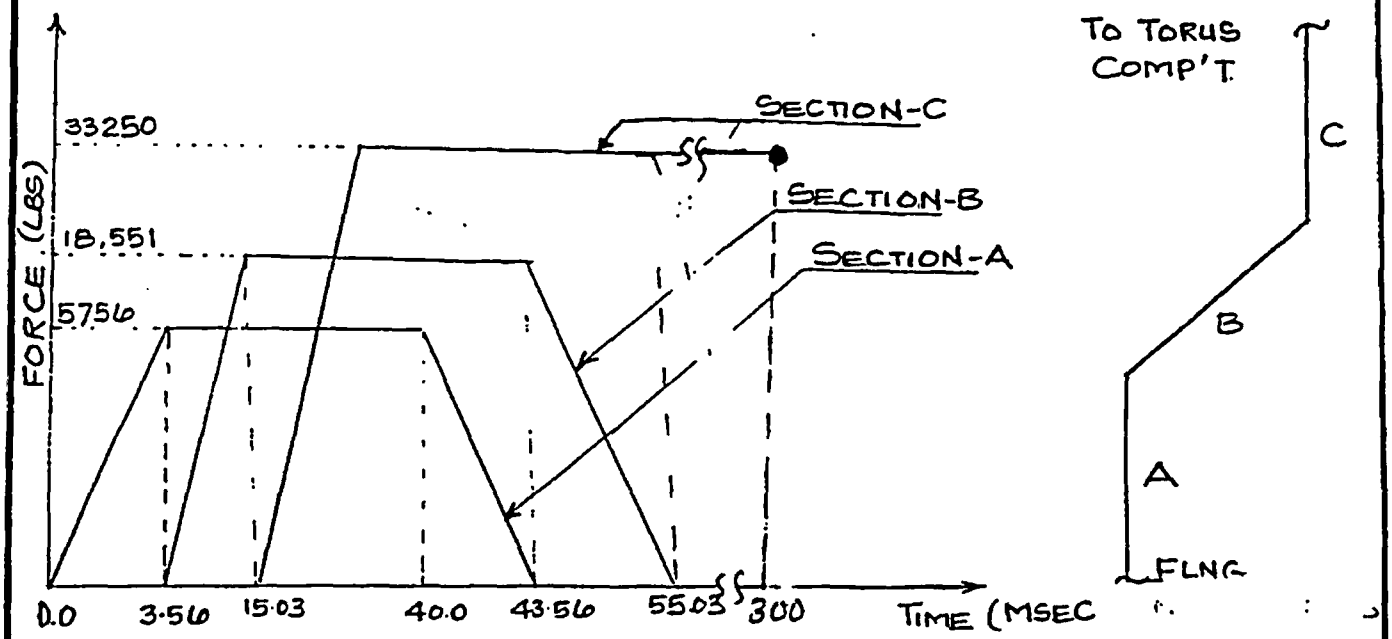
PISTAR INTEGRATE CARD $\alpha = 1.727915$ & $\beta = 16.08\text{E-}05$

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 30 OF 106
	ORIGINATOR DATE 05-11-88		
	VFR or CKR DATE 5/31/88		

Dynamic Time History

Dynamic Analysis for the HPCI Steam Exhust Line due to the 40 msec Rupture of the Pressure Relief Disk.

Ref: Bechtel Calc. Report No. 6/10855/D-034 Rev-1
Nutech File No. PSE005.0024.06 (Ref. 23)



Section	L_6 (Ft)	Force (Lbs)	t_6 (Msec)	Time (Msec) t_1	t_2	t_3	t_4
A	5.92	5756	3.56	0.0	3.56	40.00	43.56
B	19.08	18851	11.47	3.56	15.03	43.56	55.03
C	18.30	33250	11.00	15.03	55.03	steady —	state

Next Page Shows Pistar Input Card Amplitude → Time Versus Force Function for Section A, B, & C Amplitude 1, 2, and 3 Respectively.

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 31 OF 106
	ORIGINATOR DATE VFR or CKR DATE	CDT 7 / 5/31/88 / ASH / 5/31/88	

SECTION No.	AMPLITUDE No.	FORCE LBS	TIME t_1 SEC	FORCE LBS.	TIME. t_2 SEC.	FORCE LBS.	TIME. t_3 SEC.	FORCE LBS	TIME. t_4 SEC.
A	1	0.0	0.0	5756	0.004	5756	0.04	0.0	0.041
B	2	0.0	0.004	18551	0.015	18551	0.044	0.0	0.055
C	3	0.0	0.015	33250	0.055	33250	0.300	—	—

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-3))	ID NO. C-31 / REFERENCE NONE	SHEET 32 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-17-88 / 6/17/88	

Additional Load Cases for P201

Case ID	Description
QABIB	SRV Torus Motion @ 2% Damping (case C3.)
QABI	" " " " " " (case A1.2, C3.2
QABI3	" " " " 3% " " " "

(This case can be used in lieu of QABI if required)

Table 6

ASME CLASS 2 PIPING EVALUATION LOAD COMBINATIONS

DESCRIPTION	SERVICE LEVEL	ASME CODE (NC-3650) EQN	ALLOWABLE LIMIT
(WEIGHT) + (DESIGN PRESSURE)	Design	8	$1.0\ S_h$
(WEIGHT) + (PEAK PRESSURE) + (OBE) OR (SRV)	B	9	$1.2\ S_h$
(THERMAL RANGE) + (OBE ANCHOR MOTION + MARK 1 ANCHOR MOTIONS) OR 2 x (OBE ANCHOR MOTION) *	A & B	10	$S_A = f(1.25S_c + 0.25S_h)$
(WEIGHT) + (DESIGN PRESSURE) + (THERMAL RANGE) + (OBE ANCHOR MOTION + MARK 1 ANCHOR MOTIONS) OR (WEIGHT) + (DESIGN PRESSURE) + 2 x (OBE ANCHOR MOTION) *	A & B	11	$S_A + S_h$
(WEIGHT) + (PEAK PRESSURE) + (SRV & LOCA OR SSE COMBINED BY SRSS)	C	9	$1.8\ S_h$
(WEIGHT) + (PEAK PRESSURE) + [(SSE) + (LOCA) + (SRV) COMBINED BY SRSS] AND DW + RUP · DISC	D	9	$2.4S_h$
(HYDRO WEIGHT) + (1.25 DESIGN PRESSURE)	TEST	8	$1.0S_h$

NOTES:
1) OBE and SSE includes ZPA effects
2) See listing in Appendix A for the details of the evaluation of these load combinations.

*) Includes long Term Temp Heatup case.

Table 7

ASME CLASS 2 PIPE SUPPORT LOADING COMBINATIONS

DESCRIPTION	ASME CODE SERVICE LEVEL
(WEIGHT) + (OPERATING LOADS)	A
(WEIGHT) + (MAX. THERMAL) + (OBE PLUS OBE ANCHOR MOTION) OR (WEIGHT) + (MAX. THERMAL) + (SRV PLUS SRV ANCHOR MOTION)	B
(WEIGHT) + (MAX. THERMAL) + (SSE PLUS SSE ANCHOR MOTION COMBINED WITH SRV BY SRSS) OR (WEIGHT) + (MAX. THERMAL) + (LOCA PLUS LOCA ANCHOR MOTION COMBINED WITH SRV BY SRSS)	C
[(WEIGHT) + (MAX. THERMAL) + (SSE PLUS SSE ANCHOR MOTIONS, SRV, LOCA COMBINED BY SRSS)] OR DW + RUP DISC.	D

NOTES: 1) OBE and SSE includes ZPA effects
2) See listing in Appendix A for the details of the evaluation of these load combinations.

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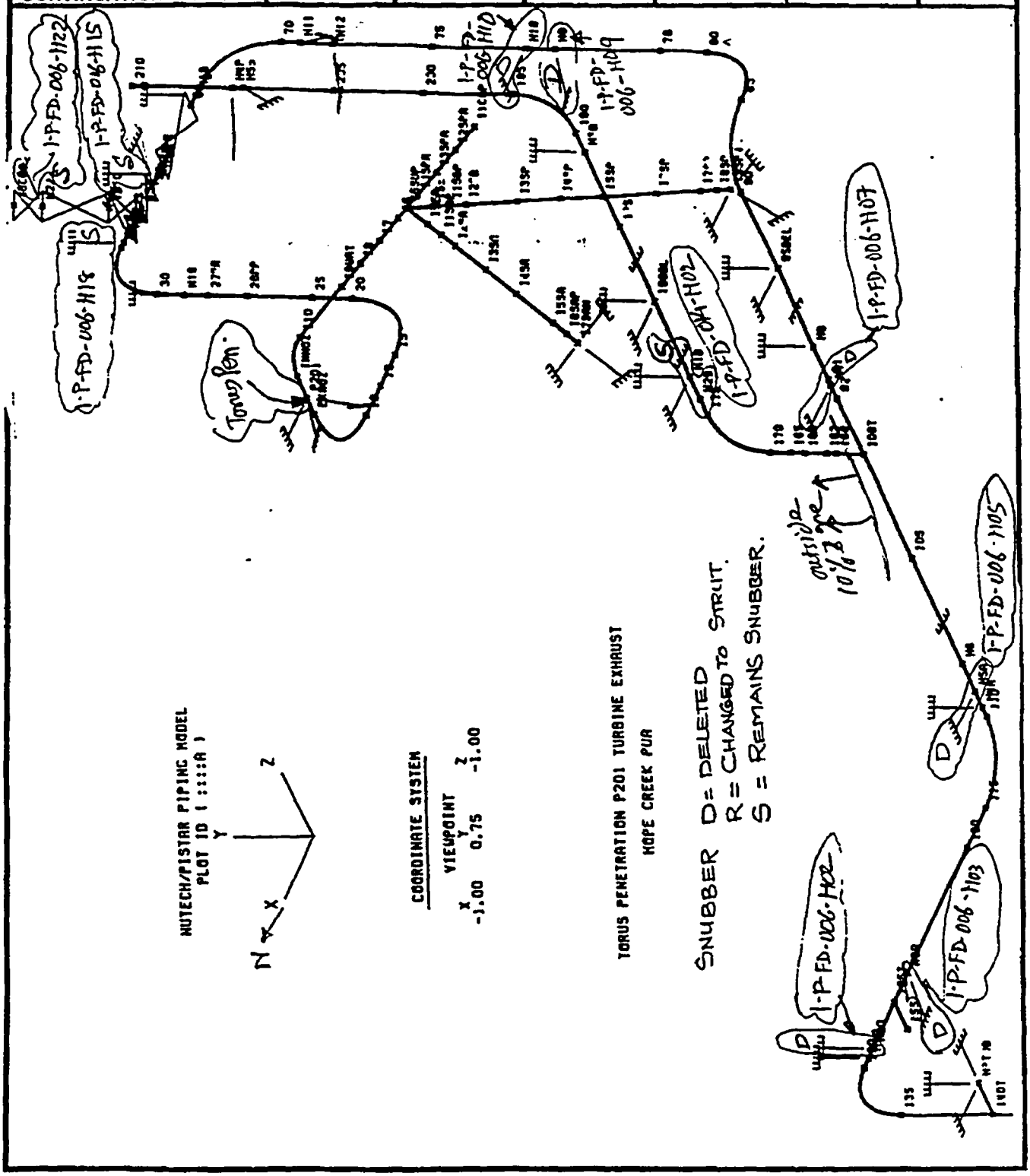
PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 35 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE: 7 / 2-16-88 / 5/31/88		



PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 36 OF 106
	ORIGINATOR DATE 6-9-88 / VFR or CKR DATE 6/22/88		

10% Exclusion Evaluation Summary (Stress in psi)

NODE	OABI Stress	CHUGI Stress	COI Stress	$(CHUGI^2+OABI^2)^{1/2}$	
	*				Main Line 20" NPS before Tee @ 100T.
					Main 20" NPS line after Tee @ 100T
					Branch Line 16" NPS
Allowable	1800 psi	N/A	=3600 psi	2700 psi	

* REVIEWING OF STRESS SUMMARY, 10% CUT-OFF ZONE IS BEYOND 20" MAIN LINE ie 16" BRANCH LINE FROM NODE NO. 1606 – TO NODE NO. 210.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 37 OF 106
	ORIGINATOR ODT 7 / DATE 06-22-88		
	VFR or CKR ABM / DATE 6/24/88		

TABLE 8
ASME CLASS 2 PIPING STRESS SUMMARY

Component: See Below
Material: SA-106, Gr. B

Allowable Stress; S_h = 15,000 psi
at Temperature; T = 366 °F

I. Maximum Primary Stress for Design Condition

ASME CRITERIA	Node/ Description	Stress in PSI Calculated	Allowable
Equation 8 of NC-3652.1 $S_{SL} \leq 1.0\ S_h$ (includes operating load)	EXNOZ/elbow	3,944	15,000

II. Maximum Primary Stress for Upset Condition

ASME CRITERIA	Node/ Description	Stress in PSI Calculated	Allowable
Equation 9 of NC-3652.2 $S_{SL} \leq 1.2\ S_h$	EXNOZ/elbow	11,664	18,000

III. Maximum Primary Stress for Emergency Condition

ASME CRITERIA	Node/ Description	Stress in PSI Calculated	Allowable
Equation 9 of NC-3652.2 $S_{SL} \leq 1.8\ S_h$	EXNOZ/elbow	19,239	27,000

IV. Maximum Primary Stress for Faulted Condition

ASME CRITERIA	Node/ Description	Stress in PSI Calculated	Allowable
Equation 9 of NC-3652.2 $S_{SL} \leq 2.4\ S_h$	190/elbow ①	20,804 ①	36,000
	EXNOZ/elbow ②	19,458	

V. Maximum Primary Stress for Test Condition (HYDRO TEST)

ASME CRITERIA	Node/ Description	Stress in PSI Calculated	Allowable
Equation 8 of NC-3652.1 * [1.25P + DWT] + OL. $\leq 1.0\ S_h$	65/ELBOW	5598 *	15,000

① FOR RUPTURE DISK ANALYSIS + OL. = 18,934 + 1870 = 20,804

② FOR REGULAR MARK 1 + OL ANALYSIS.

*(1.25 x 2067) + 2927 + 87 = 5598 psi

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 38 OF 106
	ORIGINATOR DATE VFR or CKR DATE	7 / 6-22-88 / 6/24/88	

TABLE 9

ASME CLASS 2 PIPING SECONDARY STRESS SUMMARY

Component: See Below
Material: SA-106, Gr. B

Allowable Stress; S_A = 22,500 psi
at Temperature; T = 366 °F

I. Maximum Secondary Stress

ASME CRITERIA	Node/ Description	Stress in PSI	
		Calculated	Allowable
Equation 10 of NC-3652.3(a) $S_E \leq S_A$	35/Elbow	12,984	22,500

II. Maximum Primary Plus Secondary Stress

ASME CRITERIA	Node/ Description	Stress in PSI	
		Calculated	Allowable
Equation 11 of NC-3652.3(c) $S_{TE} \leq S_A + S_h$)	35/Elbow	16,394	37,500

TABLE 10

SYSTEM FUNCTIONAL CAPABILITY CHECK (Ref 7) (1,2)

NODE	SIZE & SCH.	COMPONENT TYPE	MAX. OF LEVEL C OR D STRESS (PSI) (3)	ALLOWABLE STRESS ≤1.5 S_y (psi)	PASS FAIL
←		Straight Pipe	Enveloped by	Elbow value	→
		Elbow	21,989.	45,510	PASS
←		Tee	Enveloped by	Elbow value	→
N/A	N/A	Branch	N/A	N/A	N/A
←		Reducer	Enveloped by	Elbow values	→

NOTES: 1) Functionality Evaluation is not required for line 1-P-FD-014-HBB-16" per Ref. 7. And also for internal piping no evaluation is required.

2) Both 24" & 20" NPS pipes have $D_o/t > 50$.
$24.0/0.375 = 64$ and $20/0.375 = 53.33$ } and therefore 0.75i should be divided by (conservatively) lowest of two f factors for functionality evaluation

$f_1 = (1.3 - 0.006 \times 64)(1.033 - 0.00033t) = 0.9461$

$f_2 = (1.3 - 0.006 \times 53.33)(1.033 - 0.00033 \times 0.375) = 1.012$

[choose $f = 0.9461$]

3) Stress = PISTAR STRESS / 0.9461 = $\frac{20.804}{0.9461} = 21,989$

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 40 OF 106
	ORIGINATOR DATE VFR or CKR DATE	OJL 7 / 06-10-88 / 6/10/88	

TORUS PENETRATION LOADS EVALUATION

The revised loads for the torus penetration P-201 are shown on the next 6 pages. The qualification and acceptance of these revised loads is documented in NUTECH calculation listed as Reference 16.

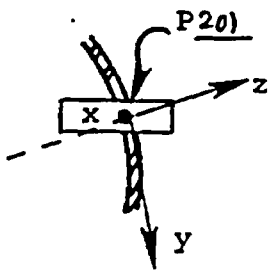
The revised coupled response spectra plots and the digitized values at torus penetration P-201 are shown in Attachment III of this calculation.

Rupture disc load reactions are very small compared to other dynamic load but they are reported for use in penetration evaluation.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 41 OF 106
	ORIGINATOR DATE VFR or CKR DATE	DJT 7 / 060388 / 6/6/88	

TORUS SHELL REACTIONS FORCES AND MOMENTS AT PENETRATION P201

LOAD TYPE	FORCES (~~kips~~ lbs)			MOMENTS (~~kips~~ lbs-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	+193	+5176	-5412	+1761	-589	+228	
OL	±208	±25531	±47638	±12355	±513	±186	
TD1	-210	-117	-440	-2010	+1490	+271	
TE1	+3022	+2026	-1057	-7487	+6556	-5872	
THAM1	-829	-168	-1821	+7053	+4110	+178	
OBEI	±802	±1160	±1627	±461	±3961	±1173	
OBED	±262	±322	±229	±140	±2708	±1026	
QAB	±693	±7522	±1128	±3299	±6486	±2441	
QABI *	±4631	±11691	±10491	±1499800	±447010	±284030	Case C3-1
	±8180	±14311	±17868	±1310000	±659540	±381150	Case C3-2
CHUG	±3661	±2831	±7848	±2913	±12275	±5447	
CHUGI	±843	±3615	±5544	±182070	±91013	±82961	
CO	← Same as CHUG			→			
COI	±2701	±9200	±14469	±805560	±310490	±226920	



* These values should be multiplied by a non-quencher bay reduction factor of 0.73 per Reference 26 before using in any further combinations. Case C-32 loads are reported for accident condition @ 2% while Case C3-1 is @ 2% normal condition.

PSEG

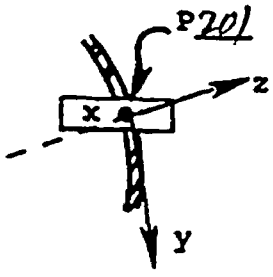
CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31	SHEET 42 OF 106
	REFERENCE NONE	

ORIGINATOR	DJT	7		
DATE	06-03-88			
VFR or CKR	MSM			
DATE	6/6/88			

TORUS SHELL REACTIONS FORCES AND MOMENTS AT PENETRATION P201

LOAD TYPE	FORCES (~~kips~~ lbs)			MOMENTS (~~kips~~ lbs-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±1225	±1866	±2692	±764	±5755	±1692	
SSED	±511	±633	±474	±267	±5334	±2015	
TD2	Included in TE2T Case						
TE2							
THAM2							
TE2T	+1765	+1610	-4277	-2332	+10292	-5695	
RUPD1	±546	±957	±1533	±494	±1409	±398	Rup. Disc load

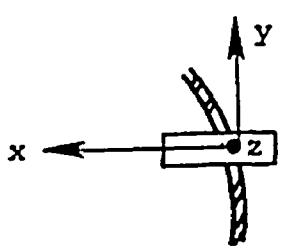


PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 43 OF 106
	ORIGINATOR UJT 7 / DATE 06-03-88 / VFR or CKR MSM / DATE 6/6/88		

INTERNAL NOZZLE FORCES AND MOMENTS AT PENETRATION P201

LOAD TYPE	FORCES (~~kips~~ lbs)			MOMENTS (~~kips~~ lbs-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	+4484	+5371	-74	+14754	-9162	-24544	
OL	±42777	±33457	±152	±14566	±18880	±59289	
TD 1	+171	-123	+183	-17566	+22783	+31680	
TE1	-163	+91	-246	+23548	-30553	-26859	
THAM1	+570	-343	+795	-76218	+98860	+97330	
OBEI	±1180	±1167	±639	±33106	±29967	±14688	
OBED	±46	±41	±111	±10618	±13772	±8479	
QAB	±225	±6358	±1053	±106713	±35871	±41706	
QABI *	±7396	±13543	±2498	±101380	±113160	±1423200	CASE C3.1
	±9578	±15088	±3029	±280000	±315220	±1412600	CASE C3.2
CHUG	±7943	±4286	±3053	±236938	±60399	±46187	
CHUGI	±4476	±4140	±953	±82668	±72812	±184580	
CO	Same as		CHUG →				
COI	±11696	±10744	±2321	±241950	±248070	±796110	

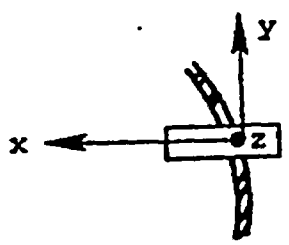
* SEE NOTE Pg. 41



PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201	ID NO. C- 31 / REFERENCE NONE	SHEET 44 OF 106
	ORIGINATOR DATE 06-03-88		
	VFR or CKR DATE 6/6/88		

INTERNAL NOZZLE FORCES AND MOMENTS AT PENETRATION P201

LOAD TYPE	FORCES (~~kips~~ lbs)			MOMENTS (~~kips~~ lbs-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±2010	±1942	±1012	±49313	±43991	±21040	
SSED	±91	±79	±226	±21656	±28087	±16515	
TD2	Included in TE2T Case						
TE2							
THAM2							
TE2T	+886	-609	+1034	-99192	+128648	+160689	
RUPD1	±1094	±977	±425	±15230	±15902	±14536	Rup Disc

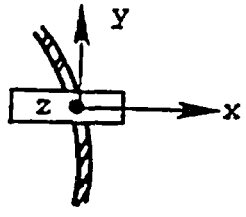


PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 45 OF 106
	ORIGINATOR DATE VFR or CKR DATE	DBT 7 / 06-03-88 / DBT / 6/6/88	

EXTERNAL NOZZLE FORCES AND MOMENTS AT PENETRATION P201

LOAD TYPE	FORCES (~~kips~~ lbs)			MOMENTS (~~kips~~ lbs-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	+52	-666	+119	+14876	-8543	-22783	
OL	±295	±43	±57	±14293	±18407	±46933	
TD 1	-283	-85	-27	-17039	+21363	+29670	
TE1	-851	-2088	+2777	+18903	-38029	-34346	
THAM1	-1253	-493	-35	-75330	+94844	+104383	
OBEI	±643	±414	±517	±32677	±32950	±14758	
OBED	±170	±307	±244	±10896	±12950	±8618	
QAB	±30	±1245	±359	±105435	±29060	±38406	
QABI *	±8025	±889	±3006	±8309	±469290	±78543	CASE C3.1
	±16993	±1704	±5854	±4207	±965550	±194340	CASE C3.2
CHUG	±270	±2603	±656	±233499	±47485	±47145	
CHUGI	±681	±319	±982	±17950	±43727	±12920	
CO	← Same as CHUG						→
COI	±2337	±1060	±2184	±64969	±154290	±45130	

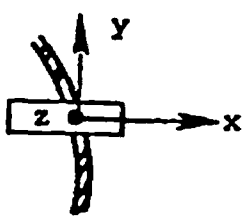
* SEE NOTE Pg. 41



PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 46 OF 106
	ORIGINATOR DATE VFR or CKR DATE	CJT 7 / 06-03-88 / MSM / 6/6/88	

EXTERNAL NOZZLE FORCES AND MOMENTS AT PENETRATION P201

LOAD TYPE	FORCES (~~kips~~ lbs)			MOMENTS (~~kips~~ lbs-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±952	±597	±766	±48686	±48252	±21101	
SSED	±355	±606	±476	±22183	±26668	±16781	
TD2	Included in TE2T Case						
TE2							
THAM2							
TE2T	-3047	-2936	+2799	-103014	+117524	+158357	
RUPD1	±305	±388	±402	±15125	±15654	±14546	Rup. Disc



PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 47 OF 106
	ORIGINATOR DATE	DJT 7 06-22-88	
	VFR or CKR DATE	ASM 6/24/88	

TORUS INTERNAL STRUT LOADS AND EVALUATIONS

The next 20 pages show the ~~combination of~~ loads for the torus internal struts at location~~s~~ 1,2,3,4. ~~These combinations are done for worst case Level D only using three options:~~

~~a) Static direct and dynamic by SRSS~~
~~b) Static direct and dynamic by ABS~~
~~c) All loads by ABS~~

REVIEW OF LOADS WAS DONE FOR F_x, M_y, M_z @ LOCATION-2 ~~Furthermore, these combinations were done only for three~~ @ LOCATION (1) and (3) and components, F_x, F_y, and F_z, as these are critical components per Reference 18. The revised torus internal strut loads are acceptable ~~because of one~~ of ~~the following (Circle applicable):~~

a) Revised loads (F_x, M_y, M_z) are lower than PUA loads (Ref. 19),

OR

b) Revised load combinations are lower than the PUA combinations for ~~the same system or~~ the loads used to qualify the group in which this system falls per Reference 18. See next page for further details.

OR

c) ~~Revised loads are qualified with new calculation or revision to the calculation of Reference~~ 18.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-20 (C-31)	ID NO. C-31.	SHEET 48 OF 106
		REFERENCE NONE	
	ORIGINATOR / DATE / VFR or CKR / DATE	07 / 06.22.88 / ABN / 6/24/88	

TOURUS INTERNAL STRUT LOADS EVALUATION CONT.

STRUTS

a) THE REVISED LOADS F_x, M_y, M_z – THE CRITICAL COMPONENTS FOR INTERNAL STRUT 'A' AND 'B' ARE APPROXIMATELY SAME AS PUA LOADS AT ALL (1-4) LOCATION FOR WORST LEVEL-D COMBINATION,

b) BUT LEVEL-B REVISED LOADS COMBINATION AT LOCATION-(2) OF STRUT A & B THE CRITICAL COMPONENTS (F_x, M_y, M_z) ARE INCREASED MAXIMUM OVERALL 5% THAN QUALIFIED PUA LOADS (REF-18). Thus strut can be QUALIFIED for new loads BY INCREASING OVERALL 5% TO INTERACTION EQUATION Pg 18/73 OF REF-18. ie $0.926 \times 1.05 = 0.9723 < 1$ ∴ OK

∴ No FURTHER DETAILS CALCULATION IS REQUIRED.

End Plates/Clevis

a) SIMMILARY FOR LEVEL-B REVISED LOADS COMBINATION AT LOCATION (1) AND (3) OF STRUT A & B THE CRITICAL COMPONENTS (F_x, F_y, F_z) ARE INCREASED MAXIMUM OVERALL 5%. Thus endplate/clevis CAN BE QUALIFIED for new loads BY INCREASING OVERALL 5% TO INTERACTION EQUATION Pg 31/73 OF REF: 18

ie $0.456 \times 1.05 = 0.479 < 1.0$ ∴ O.K.

No FURTHER DETAILS CALCULATION IS REQUIRED.

CONCLUSION: REVISED LOAD COMBINATION FOR LOCATION 1–4 FOR STRUT A & B ARE QUALIFIED PER REF 18.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 49 OF 106
	ORIGINATOR DATE VFR or CKR DATE	HHP 7 / 6/10/88 / 6/22/88	

[STRUT A.]

Summary of Internal Strut Reaction Loads

penetration P201 Strut A attached to Ring Beam

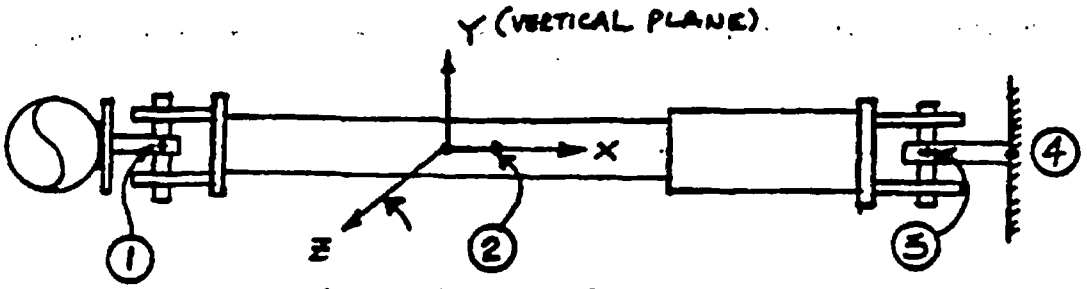


Figure 1 Local Strut Coordinate System

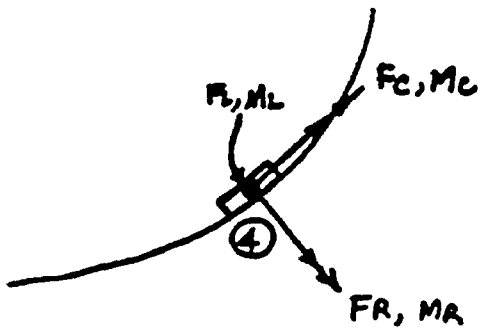


Figure 2 Shell Coordinate System

Loads are provided at the following locations except as noted in the attached tables.

Location 1	Node I1SAP
Location 2	Node I4SA
Location 3	Node I6SAP
Location 4	Node I7SAN

Locations 1, 2, & 3 are in local strut coordinate system as shown in Figure 1. Location 4 are in shell coordinate system as shown in Figure 2.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201

ID NO. C- 31

REFERENCE NONE

SHEET 50 OF 106

ORIGINATOR DATE VFR or CKR DATE: RGP 7, 6/10/88, RGP, 6/24/88

FORCES AND MOMENTS AT LOCA ① Node I1SAP

LOAD TYPE	FORCES (~~kips~~ lbs) Fx	Fy	Fz	MOMENTS (~~kips~~ lbs-in.) Mx	My	Mz	REMARKS
DW	-5027	-336	0	0	0	0	
OL	±5128	±1	0	0	0	0	
TD	-385	0	0	0	0	0	
TE1	+436	0	0	0	+4	0	
THAM1	-1463	0	0	0	-1	0	
OBEI	±1951	±83	±132	0	±1	0	
OBED	±149	0	0	0	±1	0	
QAB	±10984	±8589	±1482	±4	±1	0	
QABI *	0	0	0	0	±2	0	Case C3-2
	0	0	0	0	±2	0	Case C3-1
CHUG	±135692	±983	±6714	±3	±4	0	
CHUGI	0	0	0	0	0	0	
CO	Same as		CHUG				
COI	0	0	0	0	±2	0	

* These values should be multiplied by a non-quencher bay reduction factor of 0.73 per Ref. 26 before using in any further combinations. Case C3-1 is at 2% damping in T.H. while Case C3-2 is at 3% damping

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 20	ID NO. C- 31 / REFERENCE NONE	SHEET 51 OF 106
	ORIGINATOR DATE	RHP 7 / 6/10/88	
	VPR or CKR DATE	ASM / 6/22/88	

INTERNAL STRUT FORCES AND MOMENTS AT LOCATION (1) I1SAP

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±3412	±135	±207	0	±1	0	
SSED	±303	0	0	0	0	0	
TD2	SAME AS TO1						See TE2T
TE2							
THAM2	CAN BE TAKEN AS			4.733/3.567 (THAM1)			
TE2T	-2078	-1	0	0	+3	0	
RUPD1	±1663	±63	±59	0	0	0	

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 52 OF 106

ORIGINATOR DATE VFR or CKR DATE: RHP 7, 6/10/88, 6/29/88

FORCES AND MOMENTS AT LOCATION (2) - I4SA

LOAD TYPE	FORCES (~~kips~~ LBS) Fx	Fy	Fz	MOMENTS (~~kips~~ LBS-in.) Mx	My	Mz	REMARKS
DW	-5450	+88	0	0	-6	+6241	
OL	±5128	±1	0	0	±5	±13	
TD	-385	0	0	0	0	-1	
TE1	+436	0	0	0	+1	+1	
THAM1	-1463	0	0	0	-1	-4	
OBEI	±2016	±41	±55	0	±1749	±1470	
OBED	±149	0	0	0	0	0	
QAB	±9521	±3285	±622	±2	±23215	±117069	
QABI *	±13475	±94	±32	0	±561	±13139	CASE C3.2
	±14053	±100	±32	±1	±522	±14240	CASE C3.1
CHUG	±133588	±102	±345	±13	±68554	±14593	
CHUGI	±2936	±17	±6	0	±453	±3739	
CO	Same	as	CHUG				
COI	±8554	±53	±.24	0	±1639	±9650	

* SEE NOTE SHT. 50.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201		IO NO. C-31	SHEET 53 OF 106
		REFERENCE NONE	
ORIGINATOR	PHP	7	
DATE	6/10/88		
VFR or CKR	[illegible]		
DATE	6/22/88		

INTERNAL STRUT FORCES AND MOMENTS AT LOCATION (2) I45A

LOAD TYPE	FORCES (~~lbs~~ LBS)			MOMENTS (~~lbs~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±3539	±66	±86	0	±2754	±2387	
SSED	±303	0	0	0	0	±1	
TD2	SAME AS TD1						See
TE2							JE2T
THAM2	CAN BE TAKEN AS			4.733/3.567 (THAM1)			
JE2T	-2078	0	0	0	-2	-5	
RUPD1	±1683	±25	±24	± 0	±734	±771	

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201

ID NO. C- 31

REFERENCE NONE

SHEET 54 OF 106

ORIGINATOR DATE VFR or CKR DATE: RPP 7, 6/10/88, 6/21/88

FORCES AND MOMENTS AT LOCATION (3) - I6SAP

LOAD TYPE	FORCES ~~(kips)~~ LBS			MOMENTS ~~(kips~~ LBS -in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	-5702	+339	0	0	0	0	
OL	±5128	±1	0	0	0	0	
TD1	-385	0	0	0	+1	0	
TE1	+436	0	0	0	-2	0	
THAM1	-1463	0	0	0	+1	0	
OBEI	±2035	±78	±77	0	0	0	
OBED	±149	0	0	0	0	0	
QAB	±9210	±6012	±1270	±4	0	0	
QABI*	±13967	±710	±94	0	±436	0	CASE C3.2
	±14732	±797	0	±1	±400	0	CASE C3.1
CHUG	±132355	±767	±3379	±4	±1	±0	
CHUGI	±3083	±188	0	0	±31	0	
CO	Same	as	CHUG				
COI	±8942	±502	0	0	±218	0	

* SEE NOTE SHT. 50.

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 55 OF 106
	ORIGINATOR DATE	PHP 7 / 6/6/81	
	VFR or CKR DATE	8/22/81	

INTERNAL STRUT FORCES AND MOMENTS AT LOCATION ③ - I6SAP

LOAD TYPE	FORCES ~~(kips)~~ LBS			MOMENTS ~~(kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±3576	±126	±122	0	0	0	
SSED	±303	0	0	0	0	0	
TD2	SAME AS TOT						See
TE2							TE2T
THAM2	CAN BE TAKEN AS			4.733/3.567 (THAM1)			
TE2T	-2078	-1	0	0	-1	0	
RUPD1	±1686	±30	±29	±0	±0	±0	

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 56 OF 106

ORIGINATOR HP 7 DATE 6/10/88
VFR or CKR [illegible] DATE 6/22/88

FORCES AND MOMENTS AT LOCA. (4) - I7SAN

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	+201	+398	+5752	+2397	+98	-90	
OL	±192	±4	±5125	±15	±6	±1	
TD	+14	0	+384	-1	+1	0	
TE1	-16	0	-435	+2	-3	-1	
THAM1	+55	+1	+1462	-5	+3	0	
OBEI	±147	±96	±2042	±582	±549	±22	
OBED	±6	0	±149	0	0	0	
QAB	±2071	±8886	±8963	±60525	±16582	±2297	
QABI *	±265	±852	±14081	±5302	±434	±204	CASE C3.2
	±250	±985	±14887	±6119	±398	±231	CASE C3.1
CHUG	±2019	±1021	±131881	±6267	±32039	±274	
CHUGI	±19	±226	±3115	±1339	±31	±53	
CO	Same	as	CHUG	→			
COI	±133	±612	±9028	±3791	±217	±143	

* SEE NOTE SHT. 50.

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INTERNAL STRUT FORCES AND MOMENTS AT LOCATION (4) - I7SAN

LOAD TYPE	FORCES ~~(kips)~~ LBS			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±238	±156	±3589	±951	±874	±36	
SSED	±11	0	±303	±1	±1	0	
TD2	SAME AS	~~T01~~					See TE2T
TE2							
THAM2	CAN BE TAKEN AS			4.733/3.567 (THAM1)			
TE2T	+78	+2	+2077	-6	+2	0	
Rup01	± 80	± 29	± 1685	± 192	± 187	± 7	

[STRUT B]

Summary of Internal Strut Reaction Loads

penetration P20) Strut B attached to Ring Girder

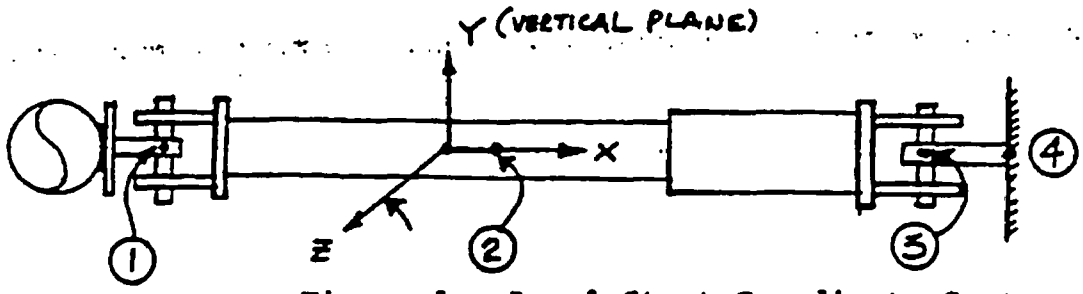

Figure 1 Local Strut Coordinate System

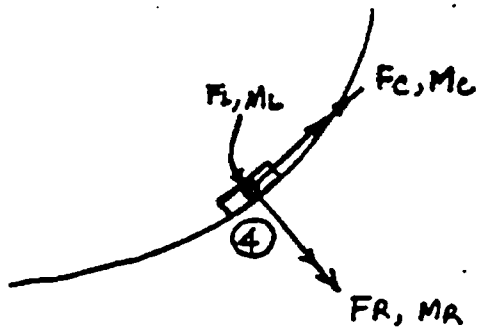

Figure 2 Shell Coordinate System

Loads are provided at the following locations except as noted in the attached tables.

Location 1 Node I15BP
Location 2 Node I6SB
Location 3 Node I8SBP
Location 4 Node I9SBN

Locations 1, 2, & 3 are in local strut coordinate system as shown in Figure 1. Location 4 are in shell coordinate system as shown in Figure 2.

PSEG

CALCULATION CONTINUATION SHEET

PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 59 OF 106

ORIGINATOR	RAP	7			
DATE	6/10/88				
VFR or CKR	RSD				
DATE	6/22/88				

FORCES AND MOMENTS AT LOCATION (1) – I1SBP

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	-1251	-579	0	+1	0	0	
OL	±1897	±1	0	0	0	0	
TD	+210	0	0	0	0	0	
TE1	-308	0	0	0	+1	0	
THAM1	+978	0	0	0	+1	0	
OBEI	±2392	±186	±182	0	0	0	
OBED	±156	0	0	0	0	0	
QAB	±15316	±14909	±13935	±39	±1	0	
QABI *	±1990	±1041	±770	±1	±1	0	CASE C3.2
	±1814	±1066	±776	±2	0	0	CASE C3.1
CHUG	±140196	±6251	±13206	±10	±1	0	
CHUGI	±418	±428	±219	0	0	0	
CO	Same as CHUG			→			
COI	±1240	±1004	±557	±1	±1	0	

* SEE NOTE SHT. 50.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201

ID NO. C-31

REFERENCE NONE

ORIGINATOR DPP 7
DATE 6/10/88
VFR or CIOR
DATE 6/22/88

INTERNAL STRUT FORCES AND MOMENTS AT LOCATION (1) - I15BP

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±3861	±299	±296	0	±1	0	
SSED	±318	0	0	0	±1	0	
TD2	SAME AS TO1						See TE2T
TE2							
THAM2	CAN BE TAKEN AS			4.733/3.567 (THAM1)			
TE2T	+1217	+1	0	0	+2	0	
RUPDI	± 1607	± 134	± 167	± 0	± 0	± 0	

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

ORIGINATOR RKP 7
DATE 6/10/88
VFR or CKR
DATE 6/22/88

FORCES AND MOMENTS AT LOCA (2) — I 6SB

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	-2172	+343	0	-2	0	+13615	
OL	±1897	0	0	0	±2	±12	
TD	+210	0	0	0	0	+1	
TE1	-308	0	0	0	+1	-2	
THAM1	+978	0	0	0	-1	+6	
OBEI	±2617	±108	±104	0	±3173	±3329	
OBED	±156	0	0	0	0	±1	
QAB	±15097	±9028	±11758	±65	±490331	±343215	
QABI *	±366	±998	±801	±7	±24950	±32862	CASE C3.2
	±366	±934	±630	±5	±20395	±30374	CASE C3.1
CHUG	±134243	±2006	±4390	±18	±133081	±59477	
CHUGI	±80	±309	±193	±1	±6312	±9872	
CO	Same as CHUG →						
COI	±216	±728	±467	±3	±15183	±23321	

* SEE NOTE SHT. 50.

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 62 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	PHP 7 / 6/10/88 / [illegible] / 6/22/88	

INTERNAL STRUT FORCES AND MOMENTS AT LOCATION (2) - I6SB

LOAD TYPE	FORCES (~~lbs~~ LBS)			MOMENTS (~~lbs~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±4188	±173	±175	±1	±5377	±5305	
SSED	±318	0	0	0	0	±2	
TD2	SAME AS TO1						See TE2T
TE2							
THAM2	CAN BE TAKEN AS			4.733/3.567 (THAM1)			
TE2T	+1217	0	0	0	-1	+7	
RUPD1	±1639	±52	±73	±1	±3576	±2397	

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 63 OF 106

ORIGINATOR DATE VFR or CKR DATE: RHT 7, 6/10/88, 6/22/88

FORCES AND MOMENTS AT LOCA-③ — IBSBP

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
DW	-2424	+594	0	-1	0	0	
OL	±1897	±1	0	0	0	0	
TD	+210	0	0	0	0	0	
TE1	-308	0	0	0	0	0	
THAM1	+978	0	0	0	-1	0	
OBEI	±2649	±135	±124	0	0	0	
OBED	±156	0	0	0	0	0	
QAB	±12585	±19209	±30422	±39	±2	0	
QABI *	±261	±1416	±980	±2	±16	±1	CASE C3.2
	±304	±1347	±906	±2	±16	±1	CASE C3.1
CHUG	±134452	±2169	±5111	±9	±1	0	
CHUGI	±98	±423	±282	0	±2	0	
CO	Same as CHUG			→			
COI	±246	±1006	±675	±1	±8	0	

* SEE NOTE SHT. 50.

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201		ID NO. C-31	SHEET 64 OF 106
		REFERENCE NONE	
ORIGINATOR	RLP	7	
DATE	6/10/88		
VFR or CIR			
DATE	6/22/88		

INTERNAL STRUT FORCES AND MOMENTS AT LOCATION 3 - I8SBP

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±4235	±214	±213	0	0	0	
SSED	±318	0	0	0	0	0	
TD2	SAME AS TO1						See
TE2							TE2T
THAM2	CAN BE TAKEN AS			4733/3.567 (THAM1)			
TE2T	+1217	+1	0	0	-1	0	
RUPD1	± 1646	± 87	± 130	± 0	± 0	± 0	

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

ORIGINATOR RBP 7
DATE 6/15/88
VFR or CKR
DATE 6/22/88

FORCES AND MOMENTS AT LOCATION (4) - I9SBN

LOAD TYPE	FORCES (~~kips~~ LBS) Fx	Fy	Fz	MOMENTS (~~kips~~ LBS-in.) Mx	My	Mz	REMARKS
DW	-1009	+991	+2136	+2530	-2258	+2244	
OL	±1046	±355	±1542	±12	±10	±6	
TD	+116	-39	-171	+1	+1	+1	
TE1	-170	+58	+250	-2	-2	-1	
THAM1	+539	-183	-795	+6	+5	+3	
OBEI	±1517	±541	±2132	±586	±999	±480	
OBED	±86	±29	±127	±1	±1	±1	
QAB	±15690	±33474	±1041	±180256	±87723	±102148	
QABI *	± 12	±1980	±131	±10085	±20	±6859	CASE C3.2
	± 11	±1880	± 145	± 9624	± 20	±6545	CASE C3.1
CHUG	±77828	±28081	±106264	±19194	±30114	±6080	
CHUGI	±1	±579	±27	±3005	±2	±2042	
CO	Same as CHUG →						
COI	±7	±1389	±83	±7161	±10	±4867	

* SEE NOTE SHT. 50.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

ORIGINATOR DATE VFR or CKR DATE: RGT 7 / 6/10/88 / RGM / 6/22/88

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INTERNAL STRUT FORCES AND MOMENTS AT LOCATION (4) - I9SBN

LOAD TYPE	FORCES (~~kips~~ LBS)			MOMENTS (~~kips~~ LBS-in.)			REMARKS
	Fx	Fy	Fz	Mx	My	Mz	
SSEI	±2434	±865	±3401	±1035	±1622	±788	
SSED	±176	±60	±239	±2	±2	±1	
TD2	SAME AS		T01				See
TE2							TE2T
THAM2	CAN BE TAKEN AS			4·733/3	567 (THAM1)		
TE2T	+671	-228	-990	+7	+6	+4	
RupD1	±889	±236	±1368	±534	±720	±275	

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 67 OF 106
	ORIGINATOR DATE	6-17-88	
	VFR or CKR DATE	6/17/88	

EQUIPMENT NOZZLE LOADS/EVALUATION

The revised loads for the equipment nozzle are shown on the next 4 pages. The acceptance of these loads (i.e., comparison of these loads with their appropriate allowables) is also documented in the pages that follow the nozzle loads summary sheets. If the revised equipment nozzle loads are higher than the existing nozzle loads, then equipment is listed as external interface on the interface document for this system (file number PSE008.1017).

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)

ID NO. C-31

REFERENCE NONE

ORIGINATOR DATE VFR or CKR DATE

SHEET 68 OF 106

EQUIPMENT NOZZLE LOAD SUMMARY NODE NO. HP TUB

LOAD	LOCAL REACTIONS					
	F_x Lbs.	F_y Lbs.	F_z Lbs.	M_x in.-Lbs	M_y in.-Lbs	M_z in.-Lbs
DW	-14	+35	-64	+3128	-4168	-3939
OBE_I	±524	±658	±1101	±63222	±28888	±41934
OBE_D	±34	±14	±33	±2656	±4392	±2576
SSE_I	±833	±909	±1531	±89616	±38885	±64465
SSE_D	±37	±23	±36	±4056	±5197	±3773
TD & TD1,8 TD2	0	-8	-7	-268	-259	-191
TE2T	+535	-294	+486	+22288	+28985	-44829
TE	+610	-151	+603	+23835	+44116	-46173
TE1	+610	-152	+602	+23793	+44082	-46192
THAM	-68	-98	-96	-1539	-11901	+2028
THAM1	-61	-89	-87	-1395	-10787	+1838
QAB	0	±15	±22	±1020	±680	±333
*QAB_I CASE 3.2	±375	±160	±2004	±124290	±45607	±4352
*QAB_I CASE 3.1	±269	±131	±1700	±105980	±37981	±18027
CHUG	±1	±28	±39	±1828	±1245	±644
$CHUG_I$	±167	±73	±231	±13359	±6074	±11515
CO	±1	±28	±39	±1828	±1245	±644
CO_I	±531	±285	±870	±50964	±22354	±38950
OL	0	±2	±4	±227	±118	±14
RWPD1	±1652	±1523	±2131	±111,666	±30244	±75,727

* THESE VALUES SHOULD BE MULTIPLIED BY A NON-QUENCHER BAY REDUCTION FACTOR

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 69 OF 106
	ORIGINATOR DATE 6-17-88 / VFR or CKR DATE 7/11/88		

HPCI Turbine Exhaust Nozzle Evaluation

Allowables are as follows (Ref. 12)

Level A – $F = (9930 - m)/3.0$ No Dyn. Loads

Level B – $F = (20,000 - m)/0.8$ Includes Dyn. Loads
but $\leq 11,500$#

Level C/D – $F = (20,000 - m)/0.8$ Includes SSE and Rup Dis effects
but $\leq 11,500$#

where:

m = Resultant Moment $= \sqrt{m_x^2 + m_y^2 + m_z^2}$ in Ft-lbs

F = " Force $= \sqrt{F_x^2 + F_y^2 + F_z^2}$ in lbs.

(A) Evaluation for Rupture Disc Loads [From MVEC.HG pkg] [DWH/RDPD1]

$$m = \left[(184103)^2 + (22120)^2 + (76078)^2\right]^{1/2} \frac{1}{12} = 9,629 \text{ Ft-lbs}$$

$$F_{Allow} = (20,000 - 9629)/0.8 = 12964 \text{ lbs.} > 11,500$$

$\therefore F_{Allow} = 11,500.$

$$F = \left[(1645)^2 + (1818)^2 + (1593)^2\right]^{1/2} = 2924 \text{ lbs} < 11,500 \text{ lbs}$$

Thus NOZZLE INLETS ALLOW FOR RUP. DISC load condition

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-3))	ID NO. C- 3)	SHEET 70 OF 106
		REFERENCE NONE	
	ORIGINATOR DATE VFR or CKR DATE	CDJ 7 / 6-17-88 / AM / 11/14/88	

Evaluation for Mark 1 loads

Level A

Max. Moment $M = \sqrt{M_x^2 + M_y^2 + M_z^2}$

$F = \sqrt{F_x^2 + F_y^2 + F_z^2}$

USING COMBINATIONS OF

DW, |TE+THAM+TD| OR |TE1+THAM1+TD1| or |TE2T|

and also are individual maximum components.

By using absolute summation of cases, for forces but signed values for moments, we get —

$F_x = 14 + 610 + 68 = 692$ lbs

$F_y = 35 + 294 = 329$ lbs $\quad F = 1081$ lbs

$F_z = 64 + 603 + 96 = 763$ lbs

$M_x = \frac{1}{12}[3128 + 23835 - 13957] = +2131$ FT-lbs

$M_y = \frac{1}{12}[-4168 + 44116 - 10767] = +2430$ FT-lbs $\quad M = 5161$ lbs

$M_z = \frac{1}{12}[-3939 - 46192 + 1838] = -4024$ FT-lbs

$\therefore F_{allow} = (9930 - 5161)/3 \doteq 1589$ lbs

$\therefore F_{actual} = 1081 < F_{all.}\ 1589 \quad \therefore$ OK

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 71 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 06-17-88 / 6/17/88	

Mark 1 Loads levels B, C, D Evaluation

Since allowables for levels B, C, D are same, use max Level D forces/moments using $[SSEI^2 + SSED^2]^{1/2}$

per Ref 15

$$|DW + TE + THAM + TD| + (SSEI)^2 + (SSED)^2 + \{0.73(GABI + QAB)\}^2 + (CHUGI + GHUG)^2 + OL$$

$$M = \left[(114288)^2 + (81278)^2 + (154700)^2\right]^{1/2} \frac{1}{12}$$

$$= 17400 \text{ FT-LBS}$$

$$F_{allw} = (20{,}000 - 17400)/0.8 = 3249 \text{ \#}$$

but less than 11,500 #

$$F_{actual} = \left[(1429)^2 + (1142)^2 + (2598)^2\right]^{1/2} = 3177 \text{ lbs}$$

$\therefore$ $F_{actual} \leq F_{allw}$, $\therefore$ OK

$\therefore$ HPCI Turbine Nozzle is OK

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EXPANSION JOINTS EVALUATION

Documentation of revised displacements at the expansion joints and their acceptance is documented on the next ~~4~~ pages.

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		REFERENCE NONE	
	ORIGINATOR / DATE / VFR or CKR / DATE	[illegible] 7 / 6-12-88 / [illegible] / 6/17/88	

EVALUATION OF EXPANSION JOINT

EXPANSION JT. ID: XJQ-7 NODE ID: 95BEL

GOVERNING (4) LOAD COMB. FOR MAX. DISPL.	GLOBAL (2) DISPL. (in)			LOCAL DISPL. ACTUAL (1)			LOCAL DISPL. ALLOWABLE (3)		
	X_G	Y_G	Z_G	AXIAL (in)	LATERAL (in)	ROTATION (DEG)	AXIAL (in)	LATERAL (in)	ROTATION (DEG)
Level B				0.373	0.531	see next page	5.2	0.70	5^0
Level C				0.385	0.587				
Level D*				0.395	0.604				

NOTES: 1. GLOBAL TO LOCAL AXIS TRANSFORMATION:

AXIAL = Z
LATERAL = $\sqrt{Y^2 + X^2}$] Read from HG pkg. data
ROTATION =

2. COMPUTER ~~RUN ID/DATE~~ output per : HG pkg ~~(REF 9)~~

3. REF. 14(2)

4. COMBINATION AS IN REF. 7

* Values for normal + Mark 1 loads reported here. Values for rupture disc are lower.

Conclusion: Actual displacements $\leq$ Allowable

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 74 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-17-88 / / 6/17/88	

EVALUATION OF EXPANSION JOINT

EXPANSION JT. ID: XJQ-7 NODE ID: 958L

DIRECTION COSINE OF SEGMENT 0.0, 0.0, -1.0

GOVERNING (4) LOAD COMB. FOR MAX. ROTATION IN RAD.	GLOBAL (2) ROTAION (RAD)			LOCAL DISPL. ACTUAL (1)		ALLOWABLE (3)		
	θ_x	θ_y	θ_z	$[\theta_x^2+\theta_y^2+\theta_z^2]^{1/2}$ (RAD)	ROTATION (DEG)	AXIAL (in)	LATERAL (in)	ROTATION (DEG)
DW								5.5
1= TMAX								
2= TMAX1								
3= TMAX2								
~~MAX OBED OR SSED~~								
4= D_1 + MXEQD								
5= D_3 + OBED								
** DW + MAX of 1,2,3 + MAX of 4,5	0.0022	0.0036	0.0049	0.00647	0.371			

NOTES: 1. GLOBAL TO LOCAL AXIS TRANSFORMATION:

AXIAL = N/A

LATERAL = N/A

ROTATION = $[\theta_x^2 + \theta_y^2 + \theta_z^2]^{1/2}$

2. COMPUTOR RUN ID / DATE : ACQD 6/6/88 (Ref 9)

3. REF. 14(2)

4. COMBINATION AS IN REF. 7

$D_1 = [Q_{ABI}^2 \pm C_{HUGI}^2 + M_{XEQI}^2]^{1/2}$

$D_3 = [C_{OI}^2 + OBE_I^2]^{1/2}$

** Using values from case SLD (Ref 9.d)

* DEG = $\frac{180}{\pi}$ x RAD (θ_x, θ_y or θ_z)

CONCLUSION: $0.371^\circ < 5.5^\circ$ ∴ OK

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 75 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-17-88 / 6/17/88	

EVALUATION OF EXPANSION JOINT

EXPANSION JT. ID: X5Q-8 NODE ID: 180BL

GOVERNING (4) LOAD COMB. FOR MAX. DISPL.	GLOBAL (2) DISPL. (in)			LOCAL DISPL. ACTUAL (1)			LOCAL DISPL. ALLOWABLE (4)		
	X_G	Y_G	Z_G	AXIAL (in)	LATERAL (in)	ROTATION (deg)	AXIAL (in)	LATERAL (in)	ROTATION (deg)
Level B				0.255	0.192		5.2	0.80	5.5
Level C				0.271	0.223				
Level D *				0.278	0.227				

NOTES: 1. GLOBAL TO LOCAL AXIS TRANSFORMATION:

AXIAL = Z'

LATERAL = $\sqrt{X^2+Y^2}$

ROTATION =

2. COMPUTER per ~~RUN DATE~~ : HG pkg ~~(REF)~~

3. REF. 14(2)

4. COMBINATION AS IN REF. 7

* Values reported for normal + mode 1 loads. Rupture disc values are lower than these.

∴ Expansion Joint is acceptable.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31	SHEET 76 OF 106
	ORIGINATOR / DATE	CDT 7 / 6-17-88	
	VPR or CKR / DATE	DSM / 6/17/88	
	REFERENCE	NONE	

EVALUATION OF EXPANSION JOINT

EXPANSION JT. ID: XJQ-78 NODE ID: ~~95BFL~~ 180BL

DIRECTION COSINE OF SEGMENT 0.0, 0.0, -1.0

GOVERNING (4) LOAD COMB. FOR MAX. ROTATION IN RAD.	GLOBAL (2) ROTATION (RAD)			LOCAL DISPL. ACTUAL (3)		ALLOWABLE (5)		
	θ_x	θ_y	θ_z	$[\theta_x^2+\theta_y^2+\theta_z^2]^{1/2}$ RAD	ROTATION (DEG)*	AXIAL (IN)	LATERAL (IN)	ROTATION (DEG)
DW								5
1= TMAX								
2= TMAX1								
3= TMAX2								
~~[illegible]~~								
4= D1+MXEQD								
5= D3+OBED								
** DW+MAX1+MAX2+MAX3+SOBE	0.00013	0.0041	0.0047	0.00624	0.357			

NOTES: 1. GLOBAL TO LOCAL AXIS TRANSFORMATION:

AXIAL = N/A

LATERAL = N/A

ROTATION = $[\theta_x^2+\theta_y^2+\theta_z^2]^{1/2}$

2. COMPUTOR RUN ID / DATE : ~~AB~~ ACOD 6/6/88 (Ref 9)

3. REF. 14(1)

4. COMBINATION AS IN REF. 7

$D_1 = [\cancel{Q_{ABSI}^2}^{\to 0} + \cancel{C_{HUGI}^2}^{\to 0} + M_{XEQI}^2]^{1/2}$

$D_3 = [\cancel{C_{OI}^2}^{\to 0} + OBEI^2]^{1/2}$

} Location is outside 10% zone.

** Case SLD for Ref 9.d

* DEG = $\frac{180}{\pi}$ x RAD (θ_x, θ_y or θ_z)

CONCLUSION: $0.357^\circ < 5.5$ o.k.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 77 OF 106
	ORIGINATOR DATE	DJT 7 / 6-17-88	
	VFR or CKR DATE	[illegible] / 6/17/88	

VALVE ACCELERATIONS EVALUATIONS

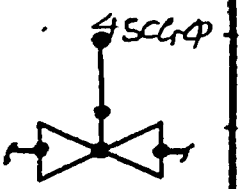
Valve Accelerations and their combinations as per original analysis (Ref. 2) are evaluated by hand calculations. The results are documented on the next 2 pages.

PSEG CALCULATION CONTINUATION SHEET	TITLE Piping Code compliance Doc. System: P201.	IDNO. C-31	SHEET 78 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	REFERENCE NONE	

SYSTEM : P201

VALVE ACCELERATION SUMMARY

Valve Tag No.: V006 Node No.: 45CG0



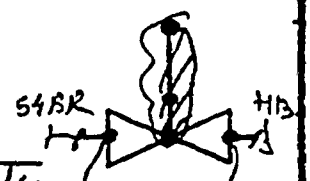
Comb. No.	Load Case/ Combination	Acceleration (g's)(*) Ax	Ay	Az	Remarks
	OBEI	0.714	0.254	0.205	
	SSEI	1.00	0.388	0.350	
	QABI	1.39	0.226	2.796	(4)
	CHUGI	0.441	0.232	1.04	
	COI	1.15	0.53	2.09	
D-1	$\sqrt{SSEI^2 + QABI^2 + CHUGI^2}$	1.768	0.505	3.004	
D-2	$\sqrt{OBEI^2 + COI^2}$	1.354	0.588	2.10	
D-1	Resultant Acceleration	3.52/3.485			PASS
D-2	$\sqrt{Ax^2 + Ay^2 + Az^2} / \sqrt{Ax^2 + Az^2}$	2.57/2.50			PASS
	Allowable Acceleration (1)	6.0/4.5			

Notes:
(*) Accelerations are in global coord.: X=N-S;Y=Vert;Z=E-W
(1) Reference: ~~13i~~ 14i
(2) Reference computer run ID: as Ref 9, Dt.
(3) Reference computer run ID: , Dt.
(4) Includes factor of 0.73 per Ref. 26

PSEG CALCULATION CONTINUATION SHEET	TITLE Piping Code compliance Doc. System: P201	ID NO. C-31	SHEET 79 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	REFERENCE NONE	

SYSTEM : P201

VALVE ACCELERATION SUMMARY



Valve Tag No.: V004 Node No.: _____

OBEI / SSEI → Max of 55/60

Mark 1 — Max. of: 54BR, H13

Comb. No.	Load Case/ Combination	Acceleration (g's)(*) Ax	Ay	Az	Remarks
	OBEI	0.328	0.247	0.145	
	SSEI	0.443	0.375	0.297	
	QABI	0.64	0.261	0.558	(4)
	CHUGI	0.119	0.135	0.175	
	COI	0.325	0.268	0.373	
D-1	$\sqrt{SSEI^2 + QABI^2 + CHUGI^2}$	0.787	0.476	0.656	
D-2	$\sqrt{OBEI^2 + COI^2}$	Enveloped by D-1			PASS
D-1	Resultant Acceleration	1.13 / 1.025			PASS
D-2	$\sqrt{Ax^2 + Ay^2 + Az^2} / \sqrt{Ax^2+Az^2}$	Enveloped by D-1			
	Allowable Acceleration (1)	6.0 / 4.5			

Notes:
(*) Accelerations are in global coord.: X=N-S; Y=Vert; Z=E-W
(1) Reference: ~~13i~~ 14i
(2) Reference computer run ID: as per Ref 8, Dt. _____
(3) Reference computer run ID: _____, Dt. _____
(4) Includes factor 0.73 per Ref. 26

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 80 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-17-88 / / 6/17/88	

FLANGE EVALUATIONS

The flange load combinations for Levels A, B, C, & D were evaluated in PISTAR Run of Ref 9.d, and only the resultants M_x, M_y, M_z are shown on the next 5 pages

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FLANGE EVALUATION Free End

FLANGE ID: Blind Flange
TYPE: WNRF
SIZE (ϕ): 4 IN.
RATING: 150 #
NODE ID: 145CP.
DESIGN TEMP. T_D: 366 °F
DESIGN PRESS. P_D: 175 PSIG
MAX. OPERATING PRESS. CONCURRENT WITH M_{fd} P_{fd}: 185 PSIG.

FLANGE MATERIAL: SP-105
YIELD STRESS @ T_D, S_Y = 31.17 KSI
DIA. OF BOLT CIRCLE, C = 7.5 IN.
No. OF BOLTS 5/8"ϕ, n = 8
ROOT AREA PER BOLT, a = 0.202 IN²
TOTAL ROOT AREA, n×a = A_b = 1.616 IN²
OUTSIDE DIAMETER OF RAISED FACE, D_f = 6.1875 IN.

ALLOWABLE MOMENTS:

SERVICE LEVEL	ALLOWABLE MOMENT/PRESSURE (NC-3658.3 OF REF. 8)	
A, B	$M_{fs} \leq 3125.(S_Y/36).C.A_b$	= 32,793 IN#
	$M_{fd} \leq 6250.(S_Y/36).C.A_b = 2M_{fs}$	= 65,586 IN#
C, D	$M_{fd} \leq [11250 A_b - (\pi/16) D_f^2 P_{fd}].C.(S_Y/36)$	= 107,095 IN.#
D	$P_{fd} \leq 2 \times P_D$	= 350 PSIG

SERVICE LEVEL	GOVERNING LOAD CASE (MAX. COMB. LOAD) (2)	M_X (1) (TORSION) (in #)	M_Y (1) (in #)	M_Z (1) (in #)	LARGEST OF M_X & $\sqrt{M_Y^2+M_Z^2}$ (in #)	REMARKS
A	STATIC	0	0	0	M_{fs} = 0	PASS
B	STATIC + DYN.	0	0	0	M_{fd} = 0	PASS
C	STATIC + DYN	ENVELOPED BY LEVEL D			M_{fd} =	PASS
D	STATIC + DYN.	0	0	0	M_{fd} = 0	PASS

NOTES: (1) COMPUTER RUN ID/DATE: ACGD/88/06/06 (Ref. 9)
(2) LOAD COMBINATIONS, AS PER REF. 7.

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation. System P-201	ID NO. C-31	SHEET 82 OF 106
		REFERENCE None	
	ORIGINATOR RGP 7		
	DATE 6-1-88		
	VFR or CKR ABN		
	DATE 6/17/88		

FLANGE EVALUATION

Free End

FLANGE ID: START UP 10 INV.
TYPE: WN RF (BLIND)
SIZE (ϕ): 10 IN.
RATING: 150 #
NODE ID: 155
DESIGN TEMP. T_D: 366 °F
DESIGN PRESS. P_D: 175 PSIG
MAX. OPERATING PRESS. CONCURRENT WITH M_{fd} P_{fd}: 185 PSIG.

FLANGE MATERIAL: SA-105
YIELD STRESS @ T_D, S_Y = 31.17 KSI
DIA. OF BOLT CIRCLE, C = 14.25 IN.
No. OF BOLTS 7/8" ϕ, n = 12
ROOT AREA PER BOLT, a = 0.419 IN^2
TOTAL ROOT AREA, n×a = A_b = 5.028 IN^2
OUTSIDE DIAMETER OF RAISED FACE, D_f = 12.75 IN.

ALLOWABLE MOMENTS:

SERVICE LEVEL	ALLOWABLE MOMENT/PRESSURE (NC-3658.3 OF REF. 8)	
A, B	$M_{fs} \leq 3125.(S_Y/36).C.A_b$	= 193,863 IN#
	$M_{fd} \leq 6250.(S_Y/36).C.A_b = 2M_{fs}$	= 387,726 IN#
C, D	$M_{fd} \leq \left[11250 A_b - (\pi/16) D_f^2 P_{fd}\right].C.(S_Y/36)$	= 625,049 IN.#
D	$P_{fd} \leq 2 \times P_D$	= 350 PSIG

SERVICE LEVEL	GOVERNING LOAD CASE (MAX. COMB. LOAD) (2)	M_x (1) (TORSION) (in #)	M_Y (1) (in #)	M_Z (1) (in #)	LARGEST OF M_x # / $\sqrt{M_Y^2+M_Z^2}$ (in #)	REMARKS
A	STATIC	0	0	0	M_{fs} = 0	PASS
B	STATIC + DYN.	0	0	0	M_{fd} = 0	PASS
C	STATIC + DYN	ENVELOPED BY LEVEL D			M_{fd} =	PASS
D	STATIC + DYN.	0	0	0	M_{fd} = 0	PASS

NOTES: (1) COMPUTER RUN ID/DATE: ^ACKD=/88/06/06 (Ref. 9)
(2) LOAD COMBINATIONS, AS PER REF. 7.

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation. System P-201		IDNO. C-31	SHEET 83 OF 106
	ORIGINATOR	PGP 7	REFERENCE None	
	DATE	6-7-88		
	VFR or CKR			
	DATE	6/13/88		

FLANGE EVALUATION

FLANGE ID: HPCI Turr. Noz.
TYPE: WN RF
SIZE (ϕ): 18 IN.
RATING: 150 #
NODE ID: HPTUB.
DESIGN TEMP. T_D: 366 °F
DESIGN PRESS. P_D: 175 PSIG
MAX. OPERATING PRESS. CONCURRENT WITH M_{fd} P_{fd}: 185 PSIG.

FLANGE MATERIAL: SA-105
YIELD STRESS @ T_D, S_Y = 31.17 KSI
DIA. OF BOLT CIRCLE, C = 22.75 IN.
No. OF BOLTS 1 1/8" ϕ, n = 16
ROOT AREA PER BOLT, a = 0.693 IN^2
TOTAL ROOT AREA, n×a = A_b = 11.09 IN^2
OUTSIDE DIAMETER OF RAISED FACE, D_f = 21.0 IN.

ALLOWABLE MOMENTS:

SERVICE LEVEL	ALLOWABLE MOMENT/PRESSURE (NC-3658.3 OF REF. 8)	
A, B	$M_{fs} \leq 3125.(S_Y/36).C.A_b$	= 682,649 IN#
	$M_{fd} \leq 6250.(S_Y/36).C.A_b = 2M_{fs}$	= 1,365,298 IN.#
C, D	$M_{fd} \leq [11250 A_b - (\pi/16) D_f^2 P_{fd}].C.(S_Y/36)$	= 2,141,994 IN.#
D	$P_{fd} \leq 2 \times P_D$	= 350 PSIG

SERVICE LEVEL	GOVERNING LOAD CASE (MAX. COMB. LOAD) (2)	M_x (1) (TORSION) (in #)	M_Y (1) (in #)	M_Z (1) (in #)	LARGEST of M_x & $\sqrt{M_Y^2+M_Z^2}$ (in #)	REMARKS
A	STATIC	25643	37321	48782	M_{fs} = 61421	PASS
B	STATIC + DYN.	104029	70601	93291	M_{fd} = 116994	PASS
C	STATIC + DYN	ENVELOPED BY LEVEL D			M_{fd} =	PASS
D MAX of	STATIC + DYN.* DW + RUPD1	232864	117810	118861	M_{fd} = 232864	PASS

NOTES: (1) COMPUTER RUN ID/DATE: ACQD/88/06/06 (Ref. 9)
ADCE/88-01-07 (RUP-DISK)
(2) LOAD COMBINATIONS, AS PER REF. 7.
* INCLUDING MARK-I LOADS.

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation. System P-201	NO. C-31	SHEET 84 OF 106
	ORIGINATOR RGP 7	REFERENCE None	
	DATE 6-7-86		
	VFR or CKR MGD		
	DATE 6/13/86		

FLANGE EVALUATION

FLANGE ID: PSEC03
TYPE: WN RF
SIZE (ϕ): 16 IN.
RATING: 150 #
NODE ID: 160-
DESIGN TEMP. T_D: 366 °F
DESIGN PRESS. P_D: 175 PSIG
MAX. OPERATING PRESS. CONCURRENT WITH M_{fd} } P_{fd}: 185 PSIG.

FLANGE MATERIAL: SA-105
YIELD STRESS @ T_D, S_Y = 31.17 KSI
DIA. OF BOLT CIRCLE, C = 21.25 IN.
No. OF BOLTS 1.0ϕ, n = 16
ROOT AREA PER BOLT, a = 0.551 IN^2
TOTAL ROOT AREA, n×a = A_b = 8.816 IN^2
OUTSIDE DIAMETER OF RAISED FACE, D_f = 18.5 IN.

ALLOWABLE MOMENTS:

SERVICE LEVEL	ALLOWABLE MOMENT/PRESSURE (NC-3658.3 OF REF. 8)	
A, B	$M_{fs} \leq 3125.(S_Y/36).C.A_b$	= 506,891 IN#
	$M_{fd} \leq 6250.(S_Y/36).C.A_b = 2M_{fs}$	= 1,013,782 IN#
C, D	$M_{fd} \leq \left[11250 A_b - (\pi/16) D_f^2 P_{fd}\right].C.(S_Y/36)$	= 1,596,071 IN#
D	$P_{fd} \leq 2 \times P_D$	= 350 PSIG

SERVICE LEVEL	GOVERNING LOAD CASE (MAX. COMB. LOAD) (2)	M_x (1) (TORSION) (in #)	M_Y (1) (in #)	M_Z (1) (in #)	LARGEST of M_x & $\sqrt{M_Y^2+M_Z^2}$ (in #)	REMARKS
A	STATIC	8898	17200	107571	M_{fs} = 108937	PASS
B	STATIC + DYN.	31962	108752	147910	M_{fd} = 163587	PASS
C	STATIC + DYN	ENVELOPED BY LEVEL D			M_{fd} =	PASS
D MAX OF	STATIC + DYN* OR DW + RUPDI*	23,184	33,764	316272	M_{fd} = 318,069	PASS

NOTES: (1) COMPUTER RUN ID/DATE: ACWD ADCE / PR/06/06 (Ref. 9)
(2) LOAD COMBINATIONS, AS PER REF. 7.
* INCLUDING MARK I LOADS

PSEG CALCULATION CONTINUATION SHEET	TITLE Code Compliance Documentation. System P-201	IGNO. C-31	SHEET 88 OF 106
	ORIGINATOR DATE VPR or CKR DATE: RHP 7, 6-7-88, 6/17/88	REFERENCE None	

FLANGE EVALUATION

FLANGE ID: PSE004
TYPE: WN RF
SIZE (φ): 16 IN.
RATING: 150 #
NODE ID: 165
DESIGN TEMP. T_D: 366 °F
DESIGN PRESS. P_D: 175 PSIG
MAX. OPERATING PRESS. CONCURRENT WITH M_{fd} } P_{fd}: 185 PSIG.

FLANGE MATERIAL: SA-105
YIELD STRESS @ T_D, S_Y = 31.17 KSI
DIA. OF BOLT CIRCLE, C = 21.25 IN.
No. OF BOLTS 1"φ, n = 16
ROOT AREA PER BOLT, a = 0.551 IN^2
TOTAL ROOT AREA, n×a = A_b = 8.816 IN^2
OUTSIDE DIAMETER OF RAISED FACE, D_f = 18.5 IN.

ALLOWABLE MOMENTS:

SERVICE LEVEL	ALLOWABLE MOMENT/PRESSURE (NC-3658.3 OF REF. 8)	
A, B	$M_{fs} \leq 3125.(S_Y/36).C.A_b$	= 506,891 IN#
	$M_{fd} \leq 6250.(S_Y/36).C.A_b = 2M_{fs}$	= 1,013,782 IN.#
C, D	$M_{fd} \leq [1250 A_b - (\pi/16) D_f^2 P_{fd}].C.(S_Y/36)$	= 1,596,071 IN.#
D	$P_{fd} \leq 2 \times P_D$	= 350 PSIG

SERVICE LEVEL	GOVERNING LOAD CASE (MAX. COMB. LOAD) (2)	M_x (1) (TORSION) (in #)	M_Y (1) (in #)	M_Z (1) (in #)	LARGEST OF M_x & $\sqrt{M_Y^2+M_Z^2}$ (in #)	REMARKS
A	STATIC	8898	7897	95151	M_{fs} = 95478	PASS
B	STATIC + DYN.	31982	60658	127753	M_{fd} = 141422	PASS
C	STATIC + DYN	ENVELOPED BY LEVEL D			M_{fd}	PASS
D MAX OF	STATIC + DYN* OR DW + RWD1	23,184	27130	183,759	M_{fd} = 185,751	PASS

NOTES: (1) COMPUTER RUN ID / DATE: ALQD / 88/06/06 (Ref. 9)
ADCE / 88/06/07 (RUD-DISK).
(2) LOAD COMBINATIONS, AS PER REF. 7.
* INCLUDING MARCH LOADS

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 86 OF 106
	ORIGINATOR DATE VFR or CKR DATE	DJT 7 / 6-17-88 / MJM / 6/17/88	

WELDED ATTACHMENT EVALUATIONS

Welded attachment evaluations (i.e., pipe lugs) for 3 supports listed below are evaluated using procedures of Ref. 13. The details are shown on the next 3 pages.

1) 1-P-FD-006-H19 (S.H.)
2) 1-P-FD-006-H06
3) 1-P-FD-014-H02

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 87 OF 106
	ORIGINATOR DATE VFR or CKR DATE	DOT 7 / 6-17-88 / NSM / 6/17/88	

WELDED ATTACHMENT EVALUATION:-

SUPPORT NO. 1-P-FD-006-H19

TYPE:- Spring Hanger

NODE NO. H19

NUMBER OF LUGS ON ONE SIDE OF CLAMP: N = 4 (1)

UNIT LOCAL STRESS: F = 3.27 ksi (1)

SERVICE LEVEL	LOAD J (2) LBS.	LOCAL STRESS (A) = F(J) × 2/N PSI.	MAX. PIPE STRESS (B) PSI.	TOTAL PIPE STRESS = C = A+B PSI.	ALLOWABLE STRESS PSI.
NORMAL UPSET	5378	8793	18,000	26,793	1.5 Sm = 30,000
EMERGENCY	5450	8911	27,500	36,411	2.25 Sm = 45,000
FAULTED	5521	9027	36,000	45027	3.0 Sm = 60,000
PRIMARY + SECONDARY	5521	(1.4)(9027) 12638	37,500	50,138	3.0 Sm = 60,000

NOTE: (1) REF CALC NO. C-31-6Q AND SCF-31-1Q

(2) NUTECH SUPPORT LOAD OUTPUT
RUN ID. SUPTJSRL DATE: 6/7/88
CONTAINED IN HANGER GUIDANCE PACKAGE,
C-31-HG. REV NO. 6

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 88 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	7 / 6-17-88 / 6/17/88	

WELDED ATTACHMENT EVALUATION:-

SUPPORT NO. 1-P-FD-006-H06

TYPE:- STRUT

NODE NO. #16

NUMBER OF LUGS ON ONE SIDE OF CLAMP: N = 2 per only one (1)

UNIT LOCAL STRESS: F = 5350 psi (1) min.
10,710 psi secm.
(UNIT Load = 8023 lbs)

SERVICE LEVEL	LOAD J (2) LBS.	LOCAL STRESS (A) = F(J) × 2/N PSI.	MAX. PIPE STRESS (B) PSI.	TOTAL PIPE STRESS = C = A+B PSI.	ALLOWABLE STRESS PSI.
NORMAL UPSET	3506 *	2338	18,000	20,338	1.5 Sm. = 30,000
EMERGENCY	4712 *	3142	27,000	30142	2.25 Sm = 45,000
FAULTED	** 9624	6418	36,000	42,418	3.0 Sm. = 60,000
PRIMARY + SECONDARY.	4769 * (Pure faulted)	(1.4)(10710/8023) = .6366.	37,500	43,866.	3.0 Sm = 60,000

NOTE: (1) REF CALC NO. C-31-6Q AND SCF-31-1Q

(2) NUTECH SUPPORT LOAD OUTPUT

* RUN ID. SUPTJSRL DATE: 6/7/88

** CONTAINED SUPT MVIC IN HANGER GUIDANCE PACKAGE, 6/7/88 (Rev Dis)

C-31-HG, REV NO. 6

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 89 OF 106
	ORIGINATOR DATE VFR or CKR DATE	7 / 6-12-88 / 6/11 / 6/17/88	

WELDED ATTACHMENT EVALUATION:-

SUPPORT NO. 1-P-FD-014-H02

TYPE:- STRUTS

NODE NO. H2B

NUMBER OF LUGS ON ONE SIDE OF CLAMP: N = 4 (1)

UNIT LOCAL STRESS: F = 2,220 (1) Prim. / 4340 Secon.
UNIT = 2500 lbs

SERVICE LEVEL	LOAD F(J)(2) LBS.	LOCAL STRESS(A) = F(J) × 2/N PSI.	MAX. PIPE STRESS.(B) PSI.	TOTAL PIPE STRESS = C = A+B PSI.	ALLOWABLE STRESS PSI.
NORMAL UPSET	800 *	355	18,000	18,355	1.5 Sm. = 30,000
EMERGENCY	1490 *	662	27,000	27,662	2.25 Sm = 45,000
FAULTED	23908 **	10,615	36,000	46,615	3.0 Sm. = 60,000
PRIMARY + SECONDARY.	1490 * (un faulted)	(1.4)(4340/5000) = 1811	37,500	39,311	3.0 Sm = 60,000

NOTE: (1) REF CALC NO. C-31-6Q AND SCF-31-1Q

(2) NUTECH SUPPORT LOAD OUTPUT

*RUN ID. SUPT USRL / SUPT MVIC DATE: 6/7/88 / 6/7/88 Rup Load.

** CONTAINED IN HANGER GUIDANCE PACKAGE, C-31-HG. REV NO. 6

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-20) (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 90 OF 106
	ORIGINATOR DATE	0 07 7 / 6-17-88	
	VFR or CKR DATE	1 8M / 6/17/88	

SBP INTERFACE DATA

The following 10 pages show the revised displacement/ acceleration data for the small bore piping connection points. The same pages also show the resolution of these interfaces as noted in the "Remark" column. Any interfaces that require requalification are shown as external interfaces on the interface document for this system (file number PSE005: 1017).

The revised acceleration spectra plots and the digitized values are shown in Attachment III of this calculation.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 96 OF 106

ORIGINATOR PGP 7
DATE 6-8-88
VFR or CKR
DATE 6/17/88

SBP INTERFACE DATA

LBP ~~SBP~~ system ID: P-204 LBP ~~SBP~~ Iso. No.: 1-P-BC-06 Node ID: 26BR

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DW				0.0013	0.0196	0.0023	This is
	TMAX				0.074	0.137	-0.264	separate
	TMAX1				0.072	0.129	-0.245	LBP system
	OBED				0.012	0.030	0.017	See calc #
	SSED				0.031	0.059	0.040	C-80;
	OBEI				0.026	0.011	0.021	for qualifi
	SSEI				0.032	0.016	0.030	cation
	~~QAS~~ QABI				0.012	0.006	0.007	
	~~CO~~ COI				0.021	0.014	0.013	
	~~CHUG~~ CHUGI				0.021	0.014	0.013	
Accele-rations (g's)	OBEI	—	—	—	0.335	0.506	0.438	
	SSEI	—	—	—	0.501	0.761	0.670	
	QABI							
	COI							
	CHUGI							

Does not reflect new SBP data here or will be used for the P204 qualification system

See Calc # 11-2201.01-3104-01 Rev 0, File No. 3104 11-2201 Ref. 2a

See Attach III of this calculation

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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SBP INTERFACE DATA

SBP system ID: 3" Weld Cap SBP Iso. No.: N/A Node ID: 27BR

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DW							
	TMAX							
	TMAX1							
	OBED							
	SSED		See note 3					
	OBEI							
	SSEI							
	~~QAS~~ QABI							
	~~CO~~ COI							
	~~CHUG~~ CHUGI							
Accele-rations (g's)	OBEI							
	SSEI							
	QABI							
	COI							
	CHUGI							

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

3) Since this is welded cap connection and connection is qualified by SIF input, no additional data is required to be reported here.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

NO. C-3)

REFERENCE NONE

SHEET 93 OF 106

ORIGINATOR	RGP 7			
DATE	6-8-88			
VFR or CKR	ABM			
DATE	6/17/88			

SBP INTERFACE DATA

SBP system ID: 1-P-FD-006-1" SBP Iso. No.: 1-P-FD-211, Rev. 9 Node ID: 54BR

(NUTECH Calc. No. 11.2201.3602.01) PUA NODE: MAX OF A1514/55

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DW	-0.012	-0.017	0	-0.013	-0.005	-0.00	All SRP
	TMAX (3)				0.058	0.116	0.003	displacement
	TMAXI (3)	0.018	0.214	-0.008	0.059	0.113	0.003	are less than
	(PUA OBEDI) OBED	0.031	0.015	0.022	0.029	0.014	0.022	or equal to
	(PUA SSEDI) SSED	0.069	0.030	0.050	0.065	0.028	0.050	PUA/ABR
	(PUA EQPSI) OBEI	0.032	0.002	0.001	0.040	0.002	0.001	Values.
	(PUA SSESI) SSEI	0.318	0.002	0.001	0.049	0.003	0.001	Acceptable
	QAB				0.004	0.001	0.0	
	QABI	negligible						
	CO				0.008	0.002	0.0	
	COI							Requalification
	CHUG	0	0	0	0.008	0.002	0.0	req
	CHUGI							
Accele-rations (g's)	(PUA EQPSI) OBEI	0.739	0.106	0.031	0.328	0.223	0.106	for new
	(PUA SSESI) SSEI	0.673	0.158	0.035	0.444	0.341	0.241	Acc
	QABI * **	N/A			0.240	0.088	0.048	CASE C3.2 CASE C3.1
	COI	N/A			0.325	0.268	0.097	
	CHUGI				0.119	0.136	0.049	

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

*) Includes factor 0.73 per Ref. 26 and is at 3% damping

**) " " " " " " " " 2% damping

3) These are values qualified for per Iso # 1-P-FD-211, Rev 9.

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 94 OF 106

ORIGINATOR	PGP	7		
DATE	6-3-88			
VFR or CKR	[illegible]			
DATE	6/17/88			

SBP INTERFACE DATA

SBP system ID: PT-N056A SBP Iso. No.: FSK-P1-FD-601 Node ID: 91

[Similar to Cantilever Type I of Ref 21] Rev. 8 PUA NODE H7

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DN							N/R
	TMAX							
	TMAX1							
	OBED							
	SSED							
	OBEI							
	SSEI							
	~~QAB~~ QABI							
	~~CO~~ COI							
	~~CHUG~~ CHUGI							
Accele-rations (g's)	(PUA ~~EQPSH~~) OBEI	0.243	1.497	0.069	0.497	0.838	0.092	OK
	(PUA ~~SSESI~~) SSEI	0.325	1.028	0.074	0.678	0.990	0.209	note 3
	QABI **	N/R			0.23	0.22	0.025	Case C3.2 Case C3.1
	COI	N/R			0.259	0.224	0.048	
	CHUGI				0.095	0.075	0.021	

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

*, **) Same as previous page for node 54BR

3) QABI, CHUGI, COI accelerations shown above are peak of time history response. The accelerations at 10 Hz (used to qualify Type I cantilever of Ref 21) from the spectra in attachment III are lower than FC-217 line qualified in Ref 21. OBE/SSE acceleration although individually high at SRP when combined N/A. Most of values give lower than ref values qualified in Ref 21.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31	SHEET 95 OF 106
		REFERENCE NONE	
	ORIGINATOR / DATE / VFR or CKR / DATE	P-GAP 7 / 6/8/88 / 6/17/88	

SBP INTERFACE DATA

SBP system ID: 006-HBB-1" (PT-N056E) SBP Iso. No.: FSK-P-1-FD-600 Rev. 6 Node ID: 92

(Similar to Cantilever Type I of Ref 21) PUA NODE H7

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displacements (in.)	DW							N/R
	TMAX							
	TMAX1							
	OBED							
	SSED							
	OBEI							
	SSEI							
	~~QAS~~ QABI							
	~~CO~~ COI							
	~~CHUG~~ CHUGI							
Accelerations (g's)	(PUA EQPSM) OBEI	0.243	1.497	0.069	0.497	0.791	0.092	OK
	(PUA SSESI) SSEI	0.325	1.028	0.074	0.688	0.936	0.209	note 3
	QABI * **	N/R						Case C3.2 Case C3.1
					0.271	0.196	0.024	
	COI	N/R			0.285	0.226	0.047	
	CHUGI				0.10	0.08	0.021	

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

*, **) Same as for node "54BR" page

3) See note 3 of previous page (node 91).

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ID NO. C-31

REFERENCE NONE

SHEET 96 OF 106

ORIGINATOR	RGF			
DATE	6/8/88			
VFR or CKR				
DATE	6/17/88			

SBP INTERFACE DATA

SBP system ID: 1-P-FD-014-HBB-1" SBP Iso. No.: 1-P-FD-204 Rev.2 Node ID: 163

(Chart method) PUA NODE: MAX OF 162/165

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DN	0.002	-0.008	-0.001	0.004	-0.005	-0.002	
	TMAX (3)	+0.003	-0.094	+0.364	-0.011	-0.035	0.212	ok
	TMAX1 (3)				-0.011	-0.035	0.212	note 4
	(PUA OBEDI) OBED	0.017	0.001	0.011	0.016	0.001	0.011	
	(PUA SSEDI) SSED	0.032	0.002	0.023	0.032	0.002	0.023	
	(PUA EQPGM) OBEI	0.056	0.030	0.007	0.032	0.015	0.003	
	(PUA SSEFI) SSEI	0.059	0.022	0.006	0.039	0.018	0.004	
	QABS QABI							Beyond 10% zero
	CO COI							
	CHUG CHUGI							
Accele-rations (g's)	(PUA EQPGM) OBEI	(see note 5)						ok
	(PUA SSEFI) SSEI							
	QABI							Beyond 10% zero
	COI							
	CHUGI							

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

3) These are values shown on Isometric 1-P-FD-204, Rev 2 and qualified here

4) All SBP displacements are less than or equal to PUA/ABR.

5) Accelerations from SBP are not reported as they are not directly used to qualify the SBP.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 97 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	RKY 7 / 6/8/88 / [illegible] / 6/17/88	

SBP INTERFACE DATA

SBP system ID: 1-P-FD-016-HBB-1 SBP Iso. No.: 1-P-FD-234, Rev 4 Node ID: 145CP

(Chart Method)

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displacements (in.)	DN	0	0	0	0.0	0.0	0.0	
	TMAX	—	—	—	0.002	-0.045	-0.054	OK
	TMAX1	—	—	—	0.002	-0.044	-0.051	note 3
	(PUA OBEDI) OBED	0.001	0	0	0.0	0.0	0.0	
	(PUA SSEDI) SSED	0.014	0	0.009	0.015	0.0	0.01	
	(PUA EQPSA) OBEI	0.001	0	0	0.001	0.0004	0.0008	
	(PUA SSESI) SSEI	0.002	0	0	0.002	0.001	0.001	
	QAS QABI							outside
	CO COI							10% zone
	CHUG CHUGI							
Accelerations (g's)	(PUA EQPSA) OBEI	0.056	0.013	0.021	0.158	0.258	0.120	OK
	(PUA SSESI) SSEI	0.091	0.021	0.033	0.254	0.397	0.265	note 3
	QABI							outside
	COI							10% zone
	CHUGI							

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

3) Displacements are negligible (< 1/16 IN). SRP accelerations although higher than PUA/ABR, they are below ZPA (at 33 Hz) of the input spectra applied in ME602, Table 12

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31	SHEET 98 OF 106
	REFERENCE NONE	

ORIGINATOR	Rtp	7			
DATE	6/8/88				
VFR or CKR	RBM				
DATE	6/17/88				

SBP INTERFACE DATA

SBP system ID: 1-P-FD-018-HB3/3/4" SBP Iso. No.: 1-P-FD-208, Rev 5 Node ID: 145CP

(Chart Method)

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DW							
	TMAX							
	TMAX1							
	OBED							
	SSED							
	OBEI							
	SSEI	See data for			1-P-FD-234 for			evaluation ok
	QAS QABI							
	CO COI							
	CHUG CHUGI							
Accele-rations (g's)	OBEI							
	SSEI							
	QABI							
	COI							
	CHUGI							

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET 99 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	PHP 7 / 6/8/88 / [illegible] / 6/17/88	

SBP INTERFACE DATA

SBP system ID: 1-P-FD-017-HBB-1" SBP Iso. No.: 1-P-FD-207, Rev 5 Node ID: 145CP

(Chart Method)

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DW							
	TMAX							
	TMAX1							
	OBED							
	SSED	See data for 1-P-FD-234 for evaluation						
	OBEI							
	SSEI							ok
	~~QAS~~ QABI							per
	~~CO~~ COI							FD-234
	~~CHUG~~ CHUGI							
Accele-rations (g's)	OBEI							
	SSEI							
	QABI							
	COI							
	CHUGI							

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

NO. C-31

REFERENCE NONE

SHEET 100 OF 106

ORIGINATOR DATE: ABP 7 / 6/8/87

VPR or CKR DATE: 6/19/87

SBP INTERFACE DATA

SBP system ID: * SBP Iso. No.: 1-P-FD-201, Rev 5 Node ID: 145CP

(Chart method)

Item	LOAD CASE	PUA/ABR (2) X	PUA/ABR (2) Y	PUA/ABR (2) Z	Per current Analysis (1) X	Per current Analysis (1) Y	Per current Analysis (1) Z	REMARKS
Displace-ments (in.)	DW							
	TMAX							
	TMAX1							
	OBED							
	SSED							
	OBEI	See 1-P-FD-234 for evaluation data						
	SSEI							
	~~QAS~~ QABI						OK per	
	~~CO~~ COI							FD-234
	~~CHUG~~ CHUGI							
Accele-rations (g's)	OBEI							
	SSEI							
	QABI							
	COI							
	CHUGI							

Notes: 1) See computer run identifications listed in Reference 9 for source of the data.

2) See PUA/ABR computer runs of Ref. 2(a)

*) This isometric contains following SBP lines
a) 1-P-FD-007-HBB-1" (both going to Barometric Condenser)
b) 1-P-FD-007-HBB-2"

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 101 OF 106
	ORIGINATOR / DATE: 7 / 5/31/88		
	VFR or CKR / DATE: ASM / 5/31/88		

PIPE SUPPORT LOADS AND EVALUATION

The pipe supports remaining after snubber reduction are qualified for the loads and load combinations listed earlier in this calculation. The details of qualification are available in the calculations listed in the Record Index which is part of this calculation. The load combinations required were performed by postprocess OPTSUPT. The output of OPTSUPT is made part of ~~the~~ the HG ~~this~~ pkg of this calculation.

CONCLUSIONS

As documented in previous pages of this calculation, the piping system P-201 meets all the applicable criteria of ASME Code (Ref. 6) and the applicable specification (Ref. 13) when modifications listed are implemented. The application of snubber reduction program on this system resulted in removing 8 snubbers, replacing 10 snubbers by rigid struts and leaving 6 snubbers in place. A list of the final status of the original snubbers is provided below.

SNUBBER I.D.	STATUS(1)	NODE
1-P-FD-006-H18	S	H18
1-P-FD-006-H22	S	H22
1-P-FD-006-H15 (PAIR)	2S	H15
1-P-FD-006-H10	D	H10
1-P-FD-006-H09	D	H9
1-P-FD-006-H07 (PAIR)	2D	H7
1-P-FD-006-H03	D	H3A
1-P-FD-006-H02	D	H2A
1-P-FD-006-H05 (PAIR)	2D	H5A
1-P-FD-014-H02 (PAIR)	2S	H2B

NOTE: D-Deleted; R-Replaced by Rigid Strut; S-Remain As-is.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 102 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE	0 7 / 6-10-88 / / 6/10/88	

REFERENCES

1. PISTAR input perm file from Tape No. VSN02917, Sym. Name No.A00376, NUTECH File No. PSE005.0050 (System P-201).

2. Piping calculation for system P-201, NUTECH File No. PSE005.1016.

   a) Calculation No. C-31-6Q
   b) Calculation No. SCF-31-1Q
   c) Hanger Guidance Issue #5, Dated 11-26-85

3. As-Built Isometrics, pipe support drawings and piping and pipe support design and qualification calculations. See entries in the Record Index (which is part of this calculation) for the details.

4. "HCGS - Unit 1 OBE and SSE PVRC acceleration response spectra" NUTECH Calculation No. SC-202, Revision 0, File No. PSE005.1001.

5. a. "PISTAR Versions 3.5.~~0~~1 Computer Program User's Manual", NUTECH document number TR-76-002, Revisions 12, File No. QASJO.SOFT.2.036.3.5.0.2.

   b. "OPTSUPT Version 1.0.0 Computer Program User's Manual", NUTECH document number OPT-87-005, Revision 0, File No. QASJO.SOFT.2.136.1.0.0.2.

   c. "OPTVALV Version 1.0.0 Computer Program User's Manual", NUTECH document number ARD-00-001, Revision 0, File No. QASJO.SOFT.2.137.1.0.0.1.

   d. "FLANGE Version 1.~~0~~2.0 Computer Program User's Manual", NUTECH document number XCE-28-023, Revision 0, File No. QASJO.SOFT.2.126.1.0.0.2.

6. "Guidelines for Evaluating Support Stiffness changes on Hope Creek Torus Attached Piping Systems", NUTECH document number BPC-01-426, Revision 0, File Number PSE005.1004.

7. "Snubber Reduction Evaluation", NUTECH Technical Instruction PSE-TI-002, Revision 1.

8. ASME B&PV Code, Section III, Div. 1, "Nuclear Power Plant Components (Subsections NA, NC, NF, APPENDICES)," 1977 Edition with Addenda up to and including Summer 1977 Addenda. (This is Code of Existing Qualifying Analysis of Record.) (1979 Summer Addenda for Flange evaluation).

PSE&G CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 103 OF 106
	ORIGINATOR DATE VFR or CKR DATE: DJT 7, 6-10-88, MM, 6/10/88		

REFERENCES (continued)

9. PISTAR RUNID/Date, NUTECH File No. PSE005.1016.
   a. AAKD/5-16-88 Modal Extraction + Seismic
   b. ABOA/5-18-88 Normal DW only
   c. ACBY/5-19-88 All thermal Cases
   d. ACQD/6-6-88 Code Evaluation + Flange loading Comb.

See last 2 pages of this calculation for additional runs.

10. "Pipe Support Design & Qualification Calculations", NUTECH File No. PSE005.1015. The list of calculation numbers and revisions is available in the record index for this system.

11. "Alternative Damping Values for Seismic Analysis of Class 1, 2, and 3 piping sections, Section III, Division 1", ASME B&PV Code Case N-411, Approval Date September 17, 1984.

12. HCGS 1 FSAR Sections 3.1 through 3.10, Amendments 4/84, - File No. PSE005.0046.

13. "Stress Group Procedures for Piping Stress Analysis for the HCGS-1 Job No. 10855, PSE&G Company", Bechtel Document, Revision 2 dated September 16, 1985 (including stress bulletins 1 through 25, and Appendixes A through X) NUTECH File No. PSE005.0027.

14. PSE&G Specifications (only Number, Revision, and File Number are listed below).

    a) 10855-P-501(Q), Rev. 23, PSE005.0012.35
    b) 10855-P-500(Q), Rev. 27, PSE005.0012.36
    c) 10855-P-516(Q), Rev. 11, PSE005.0012.27
    d) 10855-P-514(Q), Rev. 0, PSE005.0012.19
    e) 10855-P-511(Q), Rev. 1, PSE005.0012.18
    f) 10855-P-515(Q), Rev. 1, PSE005.0012.20
    g) 10855-M-068(Q), Rev. 6, PSE005.0012.22
    h) 10855-G-051(Q), Rev. 1, PSE005.0012.01

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 104 OF 106
	ORIGINATOR DATE VFR or CKR DATE	0 87 7 / 6-21-88 / 6/21/88	

REFERENCES (Continued)

i) 10855-P-401(Q), Rev. 8, 11.2201.0501
j) 10855-P-407(Q), REV. 19-1, 11.2201.0707

15. "Nozzle Loads for ~~RHR Heat Exchanger SC-205~~ HPCI Turbine Exhaust Nozzle", File No. PSE005.0023.06, Calculation Number SC-105-1, Rev. 1, ~~[illegible]~~ [illegible] 6/21/88

16. "Torus Attached Piping Penetration Analysis", Calculation No. SC-203, Rev. 0, File No. PSE005.1006.

17. Mark-I Torus Motion Coupled Analysis Input Tape Information, Rev. 0, File No. PSE005.1007.

18. "Torus Internal Supports Analysis TAP Systems P-201, 202, 207, 209, 212A, 212B, 213A, 213B, 217A, 217B, 222 (As-Built)", Calculation File No. XBP006.0323, Revision 0.

19. "Torus Internal Strut Loads - Results Summary", Calculation Number 11.2201.3103, Revision 0, File Number 11.2201.3103

20. "SBP Interface Spectra for QABI, COI, CHUGI for nodes 26BR etc., on LBP system P-201, Calculation Number 11.2201.3104, Revision 0, File Number 11.2201.3104.

21. "Analysis of SBP attached to LBP - Cantilever Lines", Calculation File Number 11.2201.3603, Revision 0.

22. "Thermal Modes TAP HCGS-1", Calculation Number SC-206, Rev. 0, File No. PSE005.1003.

23. "HPCI Turbine Exhaust - Rupture of Pressure Relief Disk Evaluation", Calculation No. S/10855/D-034, Rev. 1, File No. PSE005.0024.06.

24. "Dynamic Analysis for Design of the HPCI Turbine Exhaust Line Piping System Inside the Torus due to the Water Clearing Loads at Maximum Water Level Height", Calculation Number S/10855/D-067, Rev. 1, File No. PSE005.0024.04.

25. "Dynamics of Structures", R.W. Clough, 1976 Edition.

26. "SRV Load Attenuation in Non-Quencher Bay", Calculation No. SC-208, Revision 0, File No. PSE005.1501.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 105 OF 106
	ORIGINATOR / DATE / VFR or CKR / DATE: CDJ 7, 6-10-88, ABH, 7/22/88		

Reference 9 (continued)

e. AALS / 5-16-88 Hydrotest DW only

f ADCE / 6-07-88 Rupture Disc Evaluation.

g. ABCQ / 6-03-88 Coupled Modes, PSMODE, MODSUP runs for Mod<1

h. ABAM / 6-03-88 Selection of Critical Freq. TFTABL2 Run (2% T.H. Damp)

i ABQM / 6-03-88 SRVHIST Run Case C3.2 2% T.H. Damping

j ABDP / 6-03-88 " " " C3.1 " " "

k. ABRG / 6-03-88 TFUNCTION2 Run QABI [C3.2, C3.1, CQI, CHUGI] Resp. T.H.; TFPOST Run for same cases. PLSTAR for Code Evaluation (2% T.H. Damping)

l. AAGQ / 6-09-88 Mark I Load Accel. (2% T.H. Damping) Response T.H., Peak Values etc (Case C3.2, CQI, CHUGI)

m. AAQG / 6-09-88 RESGEN/DGTZR/PLOTSC Runs for QABI (C3.2) [2% T.H. Damping] Accelerations Resp. Spectra

n. AAQJ / 6-09-88 Same as above for CQI Case

o. AAQQ / 6-09-88 " " m. " CHUGI Case

p. ACWV / 6-15-88 Carrots/CMDOF etc Coupling Analysis Run (3% T.H. Damp) MODSUP, W.H. T.H. Responses etc

Q. ADPX / 6-15-88 TFUNCTION1 for 3% T.H. Damping

R. ADRQ / 6-15-88 TFTABL2 " " " " Selection for Case C3.2 SRV only

S AEGT / 6-16-88 SRVHIST Run for Case C3.2 - 3% Damping

T AESM / 6-17-88 TFUNCTION1, TFPOST, PLSTAR for Case C3.2 - 3% T.H.D.

U. AEXB / 6-17-88 TFUNCTION2, TFPOST for Case C3.1 QAB Accel. Resp T.H.

V. AFGZ / 6-17-88 RESGEN/DGTZR/PLOTSC for Case C3.1 - 2% T.H. Damping QABI only Accel. Resp Spectra

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201 (C-31)	ID NO. C-31 / REFERENCE NONE	SHEET 106 OF 106
	ORIGINATOR AM 7 / DATE 07/22/88 / VFR or CKR ASM / DATE 7/22/88		

Reference 9 (concluded).

W. AALY / 6-20-88 TFUNCTION1, TFUNCTION2, TFPOST Runs for OABI Case C3.2 (3% T-H Damping) Accelerations

X. AARK / 6-20-88 RESGEN/DGTZR/PLOTSC Run for above case.

Y. AECN / 07-13-88 TFUNCTION1, TFUNCTION2, TFPOST Runs for OABI Case C3.2 CDI, CHUGI (all for 2% T-H Damping) at node P201 only Acceleration runs

Z ABAV / 07-15-88 RESGEN/DGTZR/PLOTSC Run for OABI Case C3.2 2% T-H Damping at node P201 only Accel-Resp Spectra

AA. ABAY / 07-15-88 Same as Z above except for CDI case.

BB ABBB / 07-15-88 " " Z " " " CHUGI case.

PSEG CALCULATION CONTINUATION SHEET	TITLE Piping Code Compliance Documentation System P201	ID NO. C-31	SHEET I-1 OF 68
		REFERENCE NONE	
	ORIGINATOR	7	
	DATE	6-10-88	
	VFR or CKR		
	DATE	6/10/88	

ATTACHMENT I

COMPUTER RUN LISTINGS AND TAPE LOG INFORMATION

1) Computer Listings (57 Pages)

2) Tape Log Information (10 Pages)

```
CJM,P2.
USER(NU134WC,XNUTECX)
CHARGE,F3395JT,*311*XPS080501.
ROUTE(OUTPUT,DEF,DC=PR,FID=CJM40,ID)
SETTL,*.
SETJSL,*.
REWIND,OUTPUT.
*
*****************************************************
*   RESTART, INPUT, AND OUTPUT+DAYFILE ARE SAVED    *
*   IN THE FOLLOWING TAPE, IN THAT ORDER.           *
*****************************************************
COPYBR,INPUT,SYSIN.
REWIND,SYSIN.
GET,APPLIC/UN=LIBRARY.
BEGIN,PISTARR,APPLIC,LEVEL=351,NOTES=N,TSAVE=P201.
*************************************************
*   ATTACH PISTAR MODEL IMMEDIATELY BELOW "/EOR", *
*   FOLLOWED BY LOAD MODULE-1                     *
*************************************************
/*EOR
TITLE      HPCI TURBINE EXHAUST (P201)NORMAL LOADS MODEL.
COMMENT    THIS MODEL REFLECT AS BUILT CHANGE PER BECHTEL CALC NO.
COMMENT    C31-60 INCLUDING LATEST SUPPORT/VALVE DWG'S   LINE INDEX.
COMMENT    ***********************************
COMMENT          FILE: C311ST
COMMENT    ********************************************************
COMMENT     AS BULT CHANGES WITH ALL SNUBBER REMAIN
COMMENT    ********************************************************
ID         CLIENT         = PUBLIC SERVICE ELECTRIC AND GAS COMPANY
ID         PROJECT NAME   = HOPE CREEK SNUBBER REDUCTION
ID         PROJECT NUMBER = XPS-08
ID         FILE NUMBER    = PSE005.1016
ID         CALCULATION NO = C-31
ID         RUN NO         =
ID         PREPARED BY    = C. J. MEHTA
ID         CHECKED BY     = A. S. HERLEKAR
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                PISTAR GEOMETRY DEFINITION INPUT GROUP
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT
GEOMETRY   HPCI TURBINE EXHAUST (006-HBB-24",20")(014-HBB-16")
START      I1CAP     120.0     750.0     -682.0    70.0      386.4     Y
COMMENT    ************************************************************
COMMENT    REF. DWG. 1-P-FD-01 REV. 19 & PDM DWG. 51
COMMENT    ************************************************************
CLASS 2
DESIGN     I1CAP155  366.0     155.0
DESIGN     160  210  366.0     175.0
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT              PIPING AND SUPPORT DEFINITION INPUT GROUP
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COMMENT    ó*****ó*****ó*********ó*********ó*********ó*********ó*********ó
PIPE       I1CAPI2SPA0.0        15.21      -15.21                11   1
ADD WEIGHTI1CAP      105.0      105.0      105.0
SIF        I1CAP            2.0
COMMENT         END CAP WEIGHT(FROM TUBE TURNS CATALOG)
PIPE       I2SPAI3SPA0.0        15.21      -15.21                11   1
PIPE       I3SPAI4SPA0.0        15.21      -15.21                12   1
PIPE       I4SPAI5SUP0.0        8.485      -8.485                10   1
SIF        I5SUP            1.9
PIPE       I5SUP I5EA 2.093     -8.485     -8.22                 16   1
PIPE       I5EA I1SAP 1.395     -5.657     -5.48                 13   1
STIFFNESS  I1SAPI1SA2 0.1744    -0.7071    -0.685     DCOSINE        1
MATRIX     1          K11  1.0E8      K22  1.0E8      K33  1.0E8
MATRIX     1          K44  1.0E3      K55  1.0E3      K66  1.0E2
PIPE       I1SA2 I2SA 1.395     -5.657     -5.48                 13   1
PIPE       I2SA  I3SA 3.122     -12.657    -12.27                14   1
PIPE       I3SA  I4SA 3.122     -12.657    -12.27                14   1
PIPE       I4SA  I5SA 3.663     -14.849    -14.39                15   1
PIPE       I5SA I6SAP 1.395     -5.657     -5.48                 13   1
STIFFNESS  I6SAPI6SA2 0.1774    -0.7071    -0.685     DCOSINE        1
PIPE       I6SA2I7SAN 1.134     -4.596     -4.45                 13   1
RESTRAINT  I7SANTRAN .9808      0.0        .1951      SPRING     1.0E8
RESTRAINT  I7SANTRAN -.1379     -0.707     .6935      SPRING     1.0E8
RESTRAINT  I7SANTRAN .1379      -0.707     -.6935     SPRING     1.0E8
RESTRAINT  I7SANROT  0.9808     0.0        0.1951     SPRING     1.0E10
RESTRAINT  I7SANROT  -.1379     -0.707     .6935      SPRING     1.0E10
RESTRAINT  I7SANROT  .1379      -0.707     -0.6935    SPRING     1.0E10
SIF        I7SAN            2.1
PIPE       I5SUP I5EB -6.62     -8.49      -5.31                 16   1
PIPE       I5EB I1SBP -4.41     -5.66      -3.54                 13   1
STIFFNESS  I1SBPI1SB2 -0.5515   -0.7071    -0.442     DCOSINE        1
PIPE       I1SB2 I2SB -4.41     -5.66      -3.54                 13   1
PIPE       I2SB  I3SB -13.53    -17.35     -10.86                14   1
PIPE       I3SB  I4SB -11.18    -14.33     -8.97                 14   1
PIPE       I4SB  I5SB -11.18    -14.33     -8.97                 14   1
PIPE       I5SB  I6SB -14.02    -17.97     -11.25                14   1
PIPE       I6SB  I7SB -11.58    -14.85     -9.29                 15   1
PIPE       I7SB I8SBP -4.41     -5.66      -3.54                 13   1
STIFFNESS  I8SBPI8SB2 -0.5515   -0.7071    -0.442     DCOSINE        1
PIPE       I8SB2I9SBN -3.59     -4.60      -2.87                 13   1
RESTRAINT  I9SBNTRAN 1.0        0.0        0.0        SPRING     1.0E8
RESTRAINT  I9SBNTRAN 0.0        -0.707     0.707      SPRING     1.0E8
RESTRAINT  I9SBNTRAN 0.0        -0.707     -0.707     SPRING     1.0E8
RESTRAINT  I9SBNROT  1.0        0.0        0.0        SPRING     1.0E10
RESTRAINT  I9SBNROT  0.0        -0.707     0.707      SPRING     1.0E10
RESTRAINT  I9SBNROT  0.0        -0.707     -0.707     SPRING     1.0E10
SIF        I9SBN            2.1
PIPE       I5SUPI6   0.0        6.72       -6.72                 10   1
PIPE       I6   I7   0.0        15.21      -15.21                10   1
PIPE       I7   I8   0.0        15.21      -15.21                10   1
PIPE       I8   I9WAT0.0        15.21      -15.21                10   1
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PIPE       I9WATI10  0.0        43.58      -43.58                17   1
ELBOW      I10  INNOZ36.0                                         17   1
SIF        INNOZ P201      1.9
PIPE       INNOZP201 0.0        0.0        -28.5                 17   1
COMMENT    ***********************************************************
COMMENT    P201 STIFFNESSES ARE FOR STIFNNED TORUS
COMMENT    ***********************************************************
RESTRAINT  P201 TRAN 1.0        0.0        0.0        SPRING     31.60E6
RESTRAINT  P201 TRAN 0.0        -0.9848    -0.1736    SPRING     5.120E6
RESTRAINT  P201 TRAN 0.0        0.1736     -0.9848    SPRING     1.470E6
RESTRAINT  P201 ROT  1.0        0.0        0.0        SPRING     15.70E6
RESTRAINT  P201 ROT  0.0        -0.9848    -0.1736    SPRING     15.66E6
RESTRAINT  P201 ROT  0.0        0.1736     -0.9848    SPRING     2.970E6
PIPE       P201 EXNOZ0.0        0.0        -46.5                 17   1
SIF        EXNOZ P201      1.9
SIF        P201            2.1
ELBOW      EXNOZ10   36.0                                         1    1
PIPE       10   12   -55.50     0.69       0.0                   1    1
PIPE       12   15   -55.50     0.69       0.0                   1    1
ELBOW      15   20   36.0                                         1    1
REDUCER    20   25   0.0        56.00      0.0                   2    1
PIPE       25   26BR 0.0        33.375     0.0                   3    1
COMMENT    ***********************************************************
COMMENT    26BR IS 3" BRANCH LINE CONT. ON 1-P-BC-06 (P-204)
COMMENT    ***********************************************************
PIPE       26BR 27BR 0.0       20.25      0.0                   3    1
PIPE       27BR H19  0.0       12         0.0                   3    1
COMMENT    ***********************************************************
COMMENT    27BR     IS  3" WELD CAP.
COMMENT    ***********************************************************
SIF        27BR            3.6
SIF        26BR            3.6
HANGER     H19                            4940.0     SPRING     1800.0
SIF        H19             2.0
PIPE       H19  30   0.0       43.5       0.0                   3    1
ELBOW      30   35   30.0                                        3    1
PIPE       35   H18  -33.00    0.29975    0.0                   3    1
COMMENT    ***********************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H18 AT NODE H18
COMMENT    SNUBBER IS REMAIN
COMMENT    ***********************************************************
RESTRAINT  H18       0.0       1.0        0.0        SPRING     2.59E5
PIPE       H18  H17  -5.1875   0.048      0.0                   3    1
RESTRAINT  H17       0.0       0.0        1.0        SPRING     1.320E6
COMMENT    500LBS IS BEING APPLIED AS THE CONCENTRATED WEIGHT.
COMMENT      FOR THE PSA 35 SNUBBERS AND CLAMPS.REF PSA CATALOG.
ADD WEIGHTH18        500.0     500.0      500.0
PIPE       H17  40   -3.8125   0.055      0.0                   3    1
SIF        40              1.9
VALVE      40   45   -13.999   0.127      0.0                   4    1
VALVE      45   VBCG 0.0       16.4       0.0                   4    1
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ADD WEIGHTVBCG       2640.0     2640.0     2640.0
VALVE      VBCG H22   0.0       34.35      0.0                          5    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-006-H22 AT NODE H22 (WAS 45CGS)
COMMENT    SNUBBER IS REMAIN
COMMENT    ************************************************************
RESTRAINT H22         0.0        0.0        1.0        SPRING     8.700E4
ADD WEIGHTH22         150.0      150.0      150.0
VALVE      H22  45CG00.0         14.25      0.0                          5    1
ADD WEIGHT45CGO       310.0      310.0      310.0
VALVE      45   50   -13.999    0.127      0.0                          4    1
SIF        50              1.9
PIPE       50   H14  -3.25      0.030      0.0                          3    1
PIPE       H14  H15  -5.0       0.020      0.0                          3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H15 AT NODE H15.
COMMENT    SNUBBER IS REMAIN
COMMENT    ************************************************************
RESTRAINT H15         0.0        1.0        0.0        SPRING     4.950E5
RESTRAINT H14         0.0        0.0        1.0        SPRING     3.491E6
ADD WEIGHTH15         500.0      500.0      500.0
COMMENT    ************************************************************
COMMENT    1" DIA LINE  1-P-FD-211 @ NODE 54BR
COMMENT    ************************************************************
PIPE       H15  54BR -3.25      0.030      0.0                          3    1
PIPE       54BR 55   -3.0       0.027                                   3    1
VALVE      55   60   -38.498    0.350      0.0                          6    1
SIF        55              1.9
SIF        54BR            1.0
PIPE       60   H13  -6.625     0.060      0.0                          3    1
SIF        60              1.9
RESTRAINT H13         0.0        1.0        0.0        SPRING      4.8E5
PIPE       H13  65   -35.375    0.322      0.0                          3    1
ELBOW      65   70   30.0                                               3    1
PIPE       70   H11  0.0        -40.0      0.0                          3    1
RESTRAINT H11         -0.7844    0.0        -0.6202    SPRING      1.750E6
PIPE       H11  H12  0.0        -16.5      0.0                          3    1
RESTRAINT H12         0.4524     0.0        -0.8918    SPRING      3.066E6
PIPE       H12  75   0.0        -51.0      0.0                          3    1
PIPE       75   H10  0.0        -48.5      0.0                          3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-006-H10 AT NODE H10.
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H10        1.0        0.0        0.0        SPRING      0.00000
PIPE       H10  H9    0.0        -14.82     0.0                          3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-006-H09 AT NODE H9
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H9         0.2801     0.0        -0.96      SPRING      0.0000
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PIPE       H9    78    0.0        -54.0      0.0                    3    1
PIPE       78    80    0.0        -54.0      0.0                    3    1
ELBOW      80    85    30.0                                          3    1
TANGENT    TIP   85    30.00      0.0        0.0
TANGENT    85    TIP   30.00      0.0        0.0
ELBOW      85    90    30.0                                          3    1
COMMENT    ************************************************************
COMMENT    IT IS ASSUMED THAT THE BELLOWS ARE NEXT TO THE WALL
COMMENT    AND THE WALL IS APPROX 50 IN. FROM ELBOW WELD
PIPE       90    95BELO.0         -0.9       -80.0                  3    1
SIF        95BEL            2.0
COMMENT    ************************************************************
RESTRAINT  95BELTRAN 0.0          0.0        -1.0       SPRING     310.0
RESTRAINT  95BELTRAN 0.0          1.0        0.0        SPRING     1825.0
RESTRAINT  95BELTRAN 1.0          0.0        0.0        SPRING     1825.0
RESTRAINT  95BELROT  0.0          0.0        -1.0       SPRING     6.67E4
RESTRAINT  95BELROT  0.0          1.0        0.0        SPRING     6.67E4
RESTRAINT  95BELROT  1.0          0.0        0.0        SPRING     6.67E4
ADD WEIGHT95BEL      135.0        135.0      135.0
PIPE       95BELHB   0.0          -0.5       -50.0                  3    1
HANGER     H8                                2860.0     SPRING     1200.0
PIPE       H8    91    0.0        -0.233     -21.00                 3    1
SIF        91               1.0
COMMENT    ************************************************************
COMMENT    CONNECTION  PT/N056A IS AT NODE 91
COMMENT    ************************************************************
COMMENT    1" DIA LINE 006-HBB-1" (PTN056E) AT NODE 92
COMMENT    ************************************************************
PIPE       91    H7    0.0        0.05       -3.5                   3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H07 AT NODE H7
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H7         1.0        0.0        0.0        SPRING     0.00000
PIPE       H7    92    0.0        0.094      -8.5                   3    1
SIF        92               1.0
COMMENT    ************************************************************
COMMENT    1" DIA LINE
COMMENT    ************************************************************
PIPE       92    100T  0.0        -0.503     -36.00                 3    1
PIPE       100T  105   0.0        -0.819     -66.875                3    1
PIPE       105   H6    0.0        -0.819     -66.875                3    1
SIF        100T             2.95
RESTRAINT  H6         0.0        0.0        1.0        SPRING      1.402E6
SIF        H6               2.0
PIPE       H6    H5A   0.0        -0.082     -18.25                 3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H05 AT NODE H5A.
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H5A        1.0        0.0        0.0        SPRING     0.00000
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PIPE        H5A  H4A  0.0       -0.122    -10.750                3    1
RESTRAINT H4A        0.0       1.0       0.0       SPRING     6.160E5
PIPE        H4A  110  0.0       -0.408    -36.00                 3    1
ELBOW       110  115  30.0                                       3    1
PIPE        115  120  55.750    -0.578    0.0                    3    1
PIPE        120  H3A  82.00     -0.891    0.0                    3    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO 1-P-FD-006-H03 AT NODE H3A.
COMMENT     SNUBBER IS DELETED
COMMENT     ************************************************************
SNUBBER     H3A        0.0767    0.0       -0.9965   SPRING     0.000000
PIPE        H3A  125T 18.25      -0.156    0.0                    3    1
PIPE        125T H2A  30.00      -0.312    0.0                    3    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO 1-P-FD-006-H02 AT NODE H2A.
COMMENT     SNUBBER IS DELETED
COMMENT     ************************************************************
SNUBBER     H2A        0.0       1.0       0.0       SPRING     0.00000
PIPE        H2A  H1A  6.0        -0.063    0.0                    3    1
HANGER      H1A                            2158.0    SPRING     900.0
PIPE        H1A  130  36.00      -0.375    0.0                    3    1
ELBOW       130  135  30.0                                       3    1
PIPE        135  140T 0.0        -77.313   0.0                    3    1
PIPE        140T 145CP0.0        -21.0     0.0                    3    1
COMMENT     ************************************************************
COMMENT     SMALL BRANCHES 1IN AND 2IN CLOSE TO NODE 145CP.
COMMENT     THESE ARE SBP 1-P-FD-201, 207, 208 & 234
COMMENT     SIF FOR BUTT WELD AT NODE 145CP
COMMENT     ************************************************************
SIF         145CP            1.8
ADD WEIGHT145CP      79.0      79.0      79.0
COMMENT     ************************************************************
COMMENT     END OF MODEL.007.HBB-1,"AT 4" BLIND FLANGE.
COMMENT     ************************************************************
PIPE        140T HPTUB0.0        0.0       20.75                  9    1
SIF         140T             2.95
COMMENT     HPCI TURBINE
ADD WEIGHTHPTUB      306.0     306.0     306.0
RESTRAINT HPTUBTRAN 1.0          0.0       0.0       SPRING      1.0E8
RESTRAINT HPTUBTRAN 0.0          1.0       0.0       SPRING      1.0E8
RESTRAINT HPTUBTRAN 0.0          0.0       1.0       SPRING      1.0E8
RESTRAINT HPTUBROT  1.0          0.0       0.0       SPRING      1.0E12
RESTRAINT HPTUBROT  0.0          1.0       0.0       SPRING      1.0E12
RESTRAINT HPTUBROT  0.0          0.0       1.0       SPRING      1.0E12
SIF         HPTUB            2.10
PIPE        125T 155  0.0        0.0       -17.125                8    1
SIF         125T             2.95
ADD WEIGHT155        112.0     112.0     112.0
SIF         155              1.9
COMMENT     ************************************************************
COMMENT     1-P-FD-014-HBB-16" BR LINE
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```
COMMENT    ************************************************************
PIPE       100T 160  0.0        14.0       0.0                   7    1
SIF        160             1.90
SIF        165             1.90
PIPE       160  162  0.0        5.00       0.0                   7    1
PIPE       162  163  0.0        11.0       0.0                   7    1
COMMENT    ************************************************************
COMMENT    1" VENT TO TORUS COMPARTMENT (SBP 1-P-FD-204)
COMMENT    ************************************************************
SIF        163             1.0
PIPE       163  165  0.0        7.0625     0.0                   7    1
ADD WEIGHT160       282.0      282.0      282.0
ADD WEIGHT165       282.0      282.0      282.0
PIPE       165  170  0.0        34.0       0.0                   7    1
ELBOW      170  175  24.0                                        7    1
PIPE       175  H2B  0.0        0.353      34.0                  7    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-014-H02 AT NODE H2B.
COMMENT    SNUBBER IS REMAIN  (PAIR)
COMMENT    ************************************************************
RESTRAINT  H2B         0.0        0.0        1.0        SPRING     2.530E5
SIF        H2B             2.0
PIPE       H2B  H1B  0.0        0.145      13.999                7    1
RESTRAINT  H1B         1.0        0.0        0.0        SPRING     3.41E6
RESTRAINT  H1B         0.0        1.0        0.0        SPRING     3.41E6
SIF        H1B             2.0
PIPE       H1B  180BL0.0        0.501      48.330                7    1
COMMENT    ************************************************************
COMMENT    IT IS ASSUMED THAT THE BELLOWS ARE ABOUT 4FT FROM
COMMENT    THE SUPPORT H-01 ON 16IN LINE.
COMMENT    ************************************************************
RESTRAINT  180BLTRAN 0.0        0.0        1.0        SPRING     260.0
RESTRAINT  180BLTRAN 0.0        1.0        0.0        SPRING     1250.0
RESTRAINT  180BLTRAN 1.0        0.0        0.0        SPRING     1250.0
RESTRAINT  180BLROT  0.0        0.0        1.0        SPRING     5.13E4
RESTRAINT  180BLROT  0.0        1.0        0.0        SPRING     5.13E4
RESTRAINT  180BLROT  1.0        0.0        0.0        SPRING     5.13E4
SIF        180BL           2.0
ADD WEIGHT180BL     130.0      130.0      130.0
PIPE       180BL185  0.0        0.501      48.330                7    1
PIPE       185  H3B  0.0        0.501      48.330                7    1
RESTRAINT  H3B         0.0        1.0        0.0        SPRING     8.34E5
PIPE       H3B  190  0.0        0.37       35.998                7    1
ELBOW      190  195  24.0                                        7    1
PIPE       195  200  0.0        70.208     0.0                   7    1
PIPE       200  205  0.0        46.208     0.0                   7    1
PIPE       205  H5B  0.0        46.208     0.0                   7    1
PIPE       H5B  H4B  0.0        5.50       0.0                   7    1
RESTRAINT  H5B         -0.5210    0.0        -0.8535    SPRING     3.85E5
RESTRAINT  H4B         0.6264     0.0        -0.7795    SPRING     5.16E5
PIPE       H4B  210  0.0        51.500     0.0                   7    1
```

```
COMMENT    END OF MODEL.  SEE DWG. 1-P-FD-01 REV.19
COMMENT      ********************************************************
COMMENT       HYDROSTATIC LOAD ON INTERNAL SUBMERGED PIPING
COMMENT      ********************************************************
ADD WEIGHTI1CAP     173.5       123.0      123.0
ADD WEIGHTI2SPA     346.9       245.0      245.0
ADD WEIGHTI3SPA     346.9       245.0      245.0
ADD WEIGHTI4SPA     270.0       191.0      191.0
ADD WEIGHTI5SUP     199.0       199.00     199.00
ADD WEIGHTI6        250.0       177.0      177.0
ADD WEIGHTI7        346.9       245.0      245.0
ADD WEIGHTI8        346.9       245.0      245.0
ADD WEIGHTI9WAT     173.5       123.0      123.0
COMMENT    ************************************************************
COMMENT    HYDRO LOAD FOR STRUT IS BEING ADDED EQUALLY IN
COMMENT    ALL THREE DIRECTIONS BECAUSE IT IS SMALL.(CONSERVATIVE)
COMMENT    ************************************************************
ADD WEIGHTI1SAP     25.9        25.9       25.9
ADD WEIGHTI2SA      41.9        41.9       41.9
ADD WEIGHTI3SA      57.9        57.9       57.9
ADD WEIGHTI4SA      76.7        76.7       76.7
ADD WEIGHTI5SA      60.7        60.7       60.7
ADD WEIGHTI6SAP     23.5        23.5       23.5
ADD WEIGHTI7SAN     10.5        10.5       10.5
COMMENT      STRUT TWO
ADD WEIGHTI1SBP     25.9        25.9       25.9
ADD WEIGHTI2SB      52.6        52.6       52.6
ADD WEIGHTI3SB      72.5        72.5       72.5
ADD WEIGHTI4SB      65.6        65.6       65.6
ADD WEIGHTI5SB      73.9        73.9       73.9
ADD WEIGHTI6SB      88.9        88.9       88.9
ADD WEIGHTI7SB      60.7        60.7       60.7
ADD WEIGHTI8SBP     23.5        23.5       23.5
ADD WEIGHTI9SBN     10.5        10.5       10.5
COMMENT     ********************************************************
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                    PROPERTY AND MATERIAL DEFINITION
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
PROPERTY   1                                          24.0SCH20 STEAM     1.60
PROPERTY   2           22.0        0.375      8.1    24X20RED  STEAM     1.48
PROPERTY   3                                          20.0SCH20 STEAM     1.36
PROPERTY   4           20.75       0.75       00.000 V006BODY  STEAM     1.36
PROPERTY   5           6.70        0.750      0.0    V006 DP
PROPERTY   6           20.75       0.75       46.75  V004      STEAM     1.36
PROPERTY   7                                          16.0SCH30 STEAM     1.12
PROPERTY   8                                          10.0SCH40 STEAM     0.80
PROPERTY   9           18.0        0.375      5.88             STEAM     1.36
PROPERTY   10                                         24.0SCH80 WATER
PROPERTY   11          24.0        0.50       10.417           WATER
PROPERTY   12                                         24.0SCH40 WATER
PROPERTY   13                                         10.0SCH100
```

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PROPERTY  14                                        10.0SCH160
PROPERTY  15                                        12.0SCH140
PROPERTY  16        24.0      1.218     0.0         WTLESS
PROPERTY  17                                        24.0SCH80 STEAM
MATERIAL  1                                         CARBON
END GEOM
COMMENT
COMMENT   ******************************************************
COMMENT   *        LOAD AND CODE EVALUATION MODULE - 1         *
COMMENT   *====================================================*
COMMENT   *  THIS INCLUDES ALL NON-MARK1 DYNAMIC AND EQUIVALENT *
COMMENT   *  STATIC LOAD CASES. HENCE ALL ACTIVE SNUBBERS ARE   *
COMMENT   *  CODED AS RIGID RESTRAINTS.                         *
COMMENT   ******************************************************
COMMENT
COMMENT   ******************************************************
COMMENT   *  SNUBBER  REMAIN           :  006-H18,H22,H15,      *
COMMENT   *                              014-H02,               *
COMMENT   ******************************************************
COMMENT   *  SNUBBER  CHANGE TO STRUT :  NONE                   *
COMMENT   ******************************************************
COMMENT   *  SNUBBER  DELETED          : 006-H10,H07,H05,H03,H02 *
COMMENT   *                            : 006-H9,                *
COMMENT   ******************************************************
COMMENT   ******************************************************
COMMENT   ******************************************************
COMMENT   ******************************************************
COMMENT   *           LOAD CASE DEFINITIONS                    *
COMMENT   *====================================================*
COMMENT   *  OBED  = OPER. BASIS EARTHQUAKE     - DISPLACEMENTS *
COMMENT   *  OBEI  = OPER. BASIS EARTHQUAKE     - INERTIA       *
COMMENT   *  SSED  = SAFE SHUTDOWN EARTHQUAKE   - DISPLACEMENTS *
COMMENT   *  SSEI  = SAFE SHUTDOWN EARTHQUAKE   - INERTIA       *
COMMENT   ******************************************************
COMMENT
LOADING   LOAD MODULE-1
CASE      MODAL EXTRACTION
PRINT               NO        NO
FREQUENCY           40        33.0
COMMENT   ====================================================
CASE      OBEI      OBE - PVRC
COMMENT   ***************************************************
COMMENT   THE FOLLOWING SETS OF OBE PVRC SPECTRA AT APPLICABLE
COMMENT   ELEVATIONS WILL BE ENVELOPED IN X, Y, AND Z.
COMMENT   ***************************************************
ENVELOPE
COMMENT   ***** X-SPECTRA : N-S DIRECTION *****
SEISMIC       1     386.4     386.4     386.4     CSM       RSS       LOG
ZPA
COMMENT             - READ X-SHOCK CARDS BELOW -
COMMENT   ************************************************************
```

```
COMMENT    PVRC OBE N-S (SPEC. G51, FIG. F4), SPECTRA # P1
COMMENT    ***********************************************************
X-SHOCK    FREQ      ACCEL          .0100      .0500      .6400      .1300
X-SHOCK    FREQ      ACCEL         1.2000      .2100     2.6000      .2100
X-SHOCK    FREQ      ACCEL         3.0000      .2200     3.3000      .3100
X-SHOCK    FREQ      ACCEL         3.4000      .3700     3.6000      .4000
X-SHOCK    FREQ      ACCEL         3.8000      .4000     3.9000      .7000
X-SHOCK    FREQ      ACCEL         6.4000      .7000     7.0000      .5300
X-SHOCK    FREQ      ACCEL         7.5000      .4000     7.8000      .3000
X-SHOCK    FREQ      ACCEL         8.0000      .2800     8.5000      .2700
X-SHOCK    FREQ      ACCEL         9.0000      .2500     9.9000      .2320
X-SHOCK    FREQ      ACCEL        10.0000      .2300    11.0000      .1830
X-SHOCK    FREQ      ACCEL        12.0000      .1710    13.0000      .1250
X-SHOCK    FREQ      ACCEL        14.0000      .1250    15.0000      .1250
X-SHOCK    FREQ      ACCEL        16.0000      .1250    17.0000      .1250
X-SHOCK    FREQ      ACCEL        18.0000      .1250    19.0000      .1250
X-SHOCK    FREQ      ACCEL        20.0000      .1250    33.0000      .1250
COMMENT
SEISMIC       2      386.4      386.4      386.4      CSM        RSS
COMMENT                - READ X-SHOCK CARDS BELOW -
COMMENT    ***********************************************************
COMMENT    PVRC OBE N-S (SPEC. G51, FIG. F10), SPECTRA # P2
COMMENT    ***********************************************************
X-SHOCK    FREQ      ACCEL          .0100      .0500      .5000      .1300
X-SHOCK    FREQ      ACCEL         1.2300      .2300     2.9000      .2300
X-SHOCK    FREQ      ACCEL         3.2000      .2400     3.5000      .4200
X-SHOCK    FREQ      ACCEL         3.8000      .7000     6.4000      .7000
X-SHOCK    FREQ      ACCEL         7.0000      .5500     7.5000      .4000
X-SHOCK    FREQ      ACCEL         7.8000      .3200     8.0000      .3100
X-SHOCK    FREQ      ACCEL         8.5000      .3000     9.0000      .2700
X-SHOCK    FREQ      ACCEL         9.9000      .2430    10.0000      .2400
X-SHOCK    FREQ      ACCEL        11.0000      .2210    12.0000      .2000
X-SHOCK    FREQ      ACCEL        13.0000      .1700    14.0000      .1400
X-SHOCK    FREQ      ACCEL        15.0000      .1400    16.0000      .1400
X-SHOCK    FREQ      ACCEL        17.0000      .1400    18.0000      .1400
X-SHOCK    FREQ      ACCEL        19.0000      .1400    20.0000      .1400
X-SHOCK    FREQ      ACCEL        33.0000      .1400
COMMENT
SEISMIC       3      386.4      386.4      386.4      CSM        RSS
COMMENT                - READ X-SHOCK CARDS BELOW -
COMMENT    ***********************************************************
COMMENT    PVRC OBE N-S (SPEC. G51, FIG. F16), SPECTRA # P3
COMMENT    ***********************************************************
X-SHOCK    FREQ      ACCEL          .0100      .0700      .5000      .1200
X-SHOCK    FREQ      ACCEL          .8200      .1600     1.1700      .2300
X-SHOCK    FREQ      ACCEL         3.1000      .2300     3.4000      .3000
X-SHOCK    FREQ      ACCEL         3.6000      .4000     3.9000      .5400
X-SHOCK    FREQ      ACCEL         6.4000      .5400     7.0000      .4200
X-SHOCK    FREQ      ACCEL         7.5000      .3500     7.8000      .2800
X-SHOCK    FREQ      ACCEL         8.0000      .2700     8.5000      .2500
X-SHOCK    FREQ      ACCEL         9.0000      .2300     9.9000      .2210
```

```
X-SHOCK   FREQ      ACCEL      10.0000     .2200    11.0000     .1920
X-SHOCK   FREQ      ACCEL      12.0000     .1720    13.0000     .1430
X-SHOCK   FREQ      ACCEL      14.0000     .1000    15.0000     .1000
X-SHOCK   FREQ      ACCEL      16.0000     .1000    17.0000     .1000
X-SHOCK   FREQ      ACCEL      18.0000     .1000    19.0000     .1000
X-SHOCK   FREQ      ACCEL      20.0000     .1000    33.0000     .1000
COMMENT
COMMENT   ------------------------------------------------------------
COMMENT
COMMENT   ***** Y-SPECTRA : VERT. DIRECTION *****
SEISMIC       4     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC OBE VERT (SPEC. G51, FIG. G27), SPECTRA # P6
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL        .0100     .0400      .5000     .0900
Y-SHOCK   FREQ      ACCEL       1.0000     .1400     2.8000     .2900
Y-SHOCK   FREQ      ACCEL       3.0000     .3500     9.9000     .3500
Y-SHOCK   FREQ      ACCEL      10.0000     .3500    11.0000     .3620
Y-SHOCK   FREQ      ACCEL      12.0000     .3740    13.0000     .4000
Y-SHOCK   FREQ      ACCEL      13.7000     .4291    14.0000     .4560
Y-SHOCK   FREQ      ACCEL      15.0000     .5500    16.0000     .5760
Y-SHOCK   FREQ      ACCEL      17.0000     .6020    18.0000     .6280
Y-SHOCK   FREQ      ACCEL      19.0000     .6540    20.0000     .6800
Y-SHOCK   FREQ      ACCEL      21.0000     .3600    23.0000     .2250
Y-SHOCK   FREQ      ACCEL      28.0000     .2000    33.0000     .1800
COMMENT
SEISMIC       5     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC OBE VERT (SPEC. G51, FIG. G26), SPECTRA # P7
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL        .0100     .0500      .7000     .1500
Y-SHOCK   FREQ      ACCEL       1.5000     .2800     2.5000     .3700
Y-SHOCK   FREQ      ACCEL       7.0000     .3900     7.5000     .4500
Y-SHOCK   FREQ      ACCEL       8.0000     .5000     8.5000     .5700
Y-SHOCK   FREQ      ACCEL       9.0000     .6300     9.8000     .6900
Y-SHOCK   FREQ      ACCEL       9.9000     .6900    10.0000     .6900
Y-SHOCK   FREQ      ACCEL      11.0000     .7110    12.0000     .7320
Y-SHOCK   FREQ      ACCEL      13.0000     .7530    14.0000    1.0020
Y-SHOCK   FREQ      ACCEL      14.3000    1.0942    14.5000    1.1150
Y-SHOCK   FREQ      ACCEL      15.0000    1.1500    16.0000    1.2200
Y-SHOCK   FREQ      ACCEL      17.0000    1.2900    18.0000    1.3600
Y-SHOCK   FREQ      ACCEL      19.0000    1.4300    20.0000    1.5000
Y-SHOCK   FREQ      ACCEL      21.5000    1.0000    23.5000     .3000
Y-SHOCK   FREQ      ACCEL      24.0000     .2911    28.0000     .2200
Y-SHOCK   FREQ      ACCEL      29.0000     .2200    33.0000     .2200
COMMENT
SEISMIC       6     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
```

```
COMMENT    PVRC OBE VERT (SPEC. G51, FIG. F12), SPECTRA # P8
COMMENT    ************************************************************
Y-SHOCK    FREQ      ACCEL          .0100      .0300      .6400      .0900
Y-SHOCK    FREQ      ACCEL         1.4500      .1800     2.0000      .2600
Y-SHOCK    FREQ      ACCEL         2.3000      .3000     2.8000      .3000
Y-SHOCK    FREQ      ACCEL         3.2000      .3600     3.7000      .4200
Y-SHOCK    FREQ      ACCEL         4.2000      .4900     6.6000      .4900
Y-SHOCK    FREQ      ACCEL         7.0000      .4300     7.6000      .3200
Y-SHOCK    FREQ      ACCEL         9.0000      .3200     9.4000      .3000
Y-SHOCK    FREQ      ACCEL         9.9000      .3000    10.0000      .3000
Y-SHOCK    FREQ      ACCEL        11.0000      .3100    12.0000      .2840
Y-SHOCK    FREQ      ACCEL        13.0000      .2490    14.0000      .2460
Y-SHOCK    FREQ      ACCEL        15.0000      .2500    16.0000      .2540
Y-SHOCK    FREQ      ACCEL        17.0000      .2580    17.5000      .2600
Y-SHOCK    FREQ      ACCEL        18.0000      .2500    19.0000      .2270
Y-SHOCK    FREQ      ACCEL        20.0000      .1900    24.5000      .1400
Y-SHOCK    FREQ      ACCEL        33.0000      .1400
COMMENT
SEISMIC       7      386.4      386.4      386.4      CSM        RSS
COMMENT                  - READ Y-SHOCK CARDS BELOW -
COMMENT    ************************************************************
COMMENT    PVRC OBE VERT (SPEC. G51, FIG. G33), SPECTRA # P9
COMMENT    ************************************************************
Y-SHOCK    FREQ      ACCEL          .0100      .0300      .5000      .0800
Y-SHOCK    FREQ      ACCEL         1.0000      .1400     2.0000      .2000
Y-SHOCK    FREQ      ACCEL         2.8000      .2700     3.2000      .3700
Y-SHOCK    FREQ      ACCEL         9.9000      .3700    10.0000      .3700
Y-SHOCK    FREQ      ACCEL        11.0000      .3860    12.0000      .4020
Y-SHOCK    FREQ      ACCEL        13.0000      .4180    14.0000      .4340
Y-SHOCK    FREQ      ACCEL        15.0000      .4800    16.0000      .5020
Y-SHOCK    FREQ      ACCEL        17.0000      .5240    18.0000      .5460
Y-SHOCK    FREQ      ACCEL        19.0000      .5680    19.5000      .5790
Y-SHOCK    FREQ      ACCEL        20.0000      .5900    20.1000      .3500
Y-SHOCK    FREQ      ACCEL        21.0000      .3000    24.0000      .2300
Y-SHOCK    FREQ      ACCEL        27.0000      .1600    33.0000      .1500
COMMENT
SEISMIC       8      386.4      386.4      386.4      CSM        RSS
COMMENT                  - READ Y-SHOCK CARDS BELOW -
COMMENT    ************************************************************
COMMENT    PVRC OBE VERT (SPEC. G51, FIG. G34), SPECTRA # P10
COMMENT    ************************************************************
Y-SHOCK    FREQ      ACCEL          .0100      .0300      .6800      .1000
Y-SHOCK    FREQ      ACCEL         1.0000      .1800     2.0000      .2900
Y-SHOCK    FREQ      ACCEL         3.0000      .3600     4.0000      .4200
Y-SHOCK    FREQ      ACCEL         5.0000      .4500     6.0000      .4800
Y-SHOCK    FREQ      ACCEL         7.0000      .5200     8.0000      .5400
Y-SHOCK    FREQ      ACCEL         9.0000      .5700     9.9000      .5880
Y-SHOCK    FREQ      ACCEL        10.0000      .5900    11.0000      .6370
Y-SHOCK    FREQ      ACCEL        11.5000      .6600    12.0000      .9360
Y-SHOCK    FREQ      ACCEL        13.0000      .9840    14.0000     1.0320
Y-SHOCK    FREQ      ACCEL        15.0000     1.0800    15.1000     1.1766
```

```
Y-SHOCK   FREQ      ACCEL        16.0000    1.2360   17.0000    1.3020
Y-SHOCK   FREQ      ACCEL        18.0000    1.3680   19.0000    1.4340
Y-SHOCK   FREQ      ACCEL        20.0000    1.5000   21.0000     .6400
Y-SHOCK   FREQ      ACCEL        23.0000     .5200   26.0000     .3900
Y-SHOCK   FREQ      ACCEL        29.0000     .2700   33.0000     .2600
COMMENT
SEISMIC      9      386.4     386.4     386.4     CSM       RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC OBE VERT (SPEC. G51, FIG. F18), SPECTRA # P11
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL          .0100     .0300     .6000     .1000
Y-SHOCK   FREQ      ACCEL         1.1500     .1400    1.6500     .2200
Y-SHOCK   FREQ      ACCEL         3.3000     .3500    3.9000     .3500
Y-SHOCK   FREQ      ACCEL         4.3000     .4900    6.8000     .4900
Y-SHOCK   FREQ      ACCEL         7.6000     .3500    9.9000     .3500
Y-SHOCK   FREQ      ACCEL        10.0000     .3500   11.0000     .3650
Y-SHOCK   FREQ      ACCEL        11.5000     .3513   12.0000     .3300
Y-SHOCK   FREQ      ACCEL        13.0000     .3000   13.5000     .2775
Y-SHOCK   FREQ      ACCEL        14.0000     .2740   15.0000     .2800
Y-SHOCK   FREQ      ACCEL        16.0000     .2860   17.0000     .2920
Y-SHOCK   FREQ      ACCEL        18.0000     .2980   19.0000     .3040
Y-SHOCK   FREQ      ACCEL        19.5000     .3058   20.0000     .2700
Y-SHOCK   FREQ      ACCEL        20.5000     .1900   25.0000     .1500
Y-SHOCK   FREQ      ACCEL        33.0000     .1500
COMMENT
SEISMIC     10      386.4     386.4     386.4     CSM       RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC OBE VERT (SPEC. G51, FIG. F6), SPECTRA # P12
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL          .0100     .0300     .3500     .0600
Y-SHOCK   FREQ      ACCEL         1.0000     .1400    1.6000     .2300
Y-SHOCK   FREQ      ACCEL         2.2000     .2800    2.7000     .3200
Y-SHOCK   FREQ      ACCEL         3.1000     .3400    4.3000     .4900
Y-SHOCK   FREQ      ACCEL         7.0000     .4900    7.5000     .3900
Y-SHOCK   FREQ      ACCEL         8.0000     .3000    9.9000     .3000
Y-SHOCK   FREQ      ACCEL        10.0000     .3000   11.0000     .2760
Y-SHOCK   FREQ      ACCEL        12.0000     .2580   12.5000     .2475
Y-SHOCK   FREQ      ACCEL        13.0000     .2420   14.0000     .2460
Y-SHOCK   FREQ      ACCEL        15.0000     .2500   16.0000     .2540
Y-SHOCK   FREQ      ACCEL        17.0000     .2580   17.5000     .2600
Y-SHOCK   FREQ      ACCEL        18.0000     .2580   19.0000     .2260
Y-SHOCK   FREQ      ACCEL        20.0000     .1900   20.5000     .1500
Y-SHOCK   FREQ      ACCEL        23.0000     .1300   33.0000     .1300
COMMENT
COMMENT   ADD MORE SHOCK CARDS IF NEEDED FOR ADDITIONAL ELEVATIONS
COMMENT   ------------------------------------------------------------
COMMENT
COMMENT   ***** Z-SPECTRA : E-W DIRECTION *****
SEISMIC     11      386.4     386.4     386.4     CSM       RSS
```

```
COMMENT                 - READ Z-SHOCK CARDS BELOW -
COMMENT     ************************************************************
COMMENT     PVRC OBE E-W (SPEC. G51, FIG. F5), SPECTRA # P16
COMMENT     ************************************************************
Z-SHOCK     FREQ        ACCEL          .0100      .0500      .4200      .0900
Z-SHOCK     FREQ        ACCEL          .6200      .1300     1.0600      .1400
Z-SHOCK     FREQ        ACCEL         1.6000      .2000     2.2000      .2850
Z-SHOCK     FREQ        ACCEL         3.2000      .2850     3.3000      .3000
Z-SHOCK     FREQ        ACCEL         3.4000      .3300     3.7000      .3400
Z-SHOCK     FREQ        ACCEL         4.4000      .3400     4.5000      .4000
Z-SHOCK     FREQ        ACCEL         7.8000      .4000     8.3000      .3300
Z-SHOCK     FREQ        ACCEL         8.8000      .2700     9.4000      .2000
Z-SHOCK     FREQ        ACCEL         9.9000      .1917    10.0000      .1900
Z-SHOCK     FREQ        ACCEL        11.0000      .1660    11.5000      .1458
Z-SHOCK     FREQ        ACCEL        12.0000      .1320    13.0000      .1230
Z-SHOCK     FREQ        ACCEL        14.0000      .1170    15.0000      .1100
Z-SHOCK     FREQ        ACCEL        16.0000      .1050    17.0000      .1000
Z-SHOCK     FREQ        ACCEL        18.0000      .1000    19.0000      .1000
Z-SHOCK     FREQ        ACCEL        20.0000      .1000    33.0000      .1000
COMMENT
SEISMIC       12        386.4      386.4      386.4      CSM        RSS
COMMENT                 - READ Z-SHOCK CARDS BELOW -
COMMENT     ************************************************************
COMMENT     PVRC OBE E-W (SPEC. G51, FIG. F11), SPECTRA # P17
COMMENT     ************************************************************
Z-SHOCK     FREQ        ACCEL          .0100      .0500      .3800      .0700
Z-SHOCK     FREQ        ACCEL          .6200      .1400      .7000      .1500
Z-SHOCK     FREQ        ACCEL         1.0000      .1750     1.2000      .1800
Z-SHOCK     FREQ        ACCEL         1.7000      .2700     2.1000      .3000
Z-SHOCK     FREQ        ACCEL         2.6000      .3400     3.1000      .3700
Z-SHOCK     FREQ        ACCEL         4.5000      .3700     4.6000      .3900
Z-SHOCK     FREQ        ACCEL         7.6000      .3900     8.6000      .2700
Z-SHOCK     FREQ        ACCEL         9.0000      .2500     9.9000      .2230
Z-SHOCK     FREQ        ACCEL        10.0000      .2200    10.5000      .1958
Z-SHOCK     FREQ        ACCEL        10.7000      .1921    11.0000      .1825
Z-SHOCK     FREQ        ACCEL        12.0000      .1320    13.0000      .1265
Z-SHOCK     FREQ        ACCEL        14.0000      .1200    15.0000      .1000
Z-SHOCK     FREQ        ACCEL        15.5000      .0800    16.0000      .0800
Z-SHOCK     FREQ        ACCEL        17.0000      .0800    18.0000      .0800
Z-SHOCK     FREQ        ACCEL        19.0000      .0800    20.0000      .0800
Z-SHOCK     FREQ        ACCEL        33.0000      .0800
COMMENT
SEISMIC       13        386.4      386.4      386.4      CSM        RSS
COMMENT                 - READ Z-SHOCK CARDS BELOW -
COMMENT     ************************************************************
COMMENT     PVRC OBE E-W (SPEC. G51, FIG. F17), SPECTRA # P18
COMMENT     ************************************************************
Z-SHOCK     FREQ        ACCEL          .0100      .0400      .4000      .0800
Z-SHOCK     FREQ        ACCEL          .6000      .1400     1.5500      .2300
Z-SHOCK     FREQ        ACCEL         1.8000      .2700     2.2000      .3200
Z-SHOCK     FREQ        ACCEL         2.9000      .3200     3.1000      .3700
```

```
Z-SHOCK   FREQ      ACCEL        3.3500     .5000     5.6000     .5000
Z-SHOCK   FREQ      ACCEL        5.9000     .3600     7.1000     .3600
Z-SHOCK   FREQ      ACCEL        7.6000     .2800     8.0000     .2700
Z-SHOCK   FREQ      ACCEL        9.9000     .2700    10.0000     .2700
Z-SHOCK   FREQ      ACCEL       10.4000     .2760    11.0000     .2190
Z-SHOCK   FREQ      ACCEL       12.0000     .1300    13.0000     .1250
Z-SHOCK   FREQ      ACCEL       14.0000     .1200    15.0000     .1150
Z-SHOCK   FREQ      ACCEL       16.0000     .1100    17.0000     .1000
Z-SHOCK   FREQ      ACCEL       18.0000     .0900    19.0000     .0850
Z-SHOCK   FREQ      ACCEL       20.0000     .0800    33.0000     .0800
COMMENT
COMMENT   ==========================================================
CASE      SSEI      SSE - PVRC
COMMENT   ****************************************************
COMMENT   THE FOLLOWING SETS OF SSE PVRC SPECTRA AT APPLICABLE
COMMENT   ELEVATIONS WILL BE ENVELOPED IN X, Y, AND Z.
COMMENT   ****************************************************
ENVELOPE
COMMENT   ***** X-SPECTRA : N-S DIRECTION *****
SEISMIC       1     386.4     386.4     386.4     CSM       RSS       LOG
ZPA
COMMENT             - READ X-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE N-S (SPEC. G51, FIG. F1), SPECTRA # P21
COMMENT   ************************************************************
X-SHOCK   FREQ      ACCEL         .0100     .1000      .8400     .3000
X-SHOCK   FREQ      ACCEL        1.0600     .3700     1.8000     .3700
X-SHOCK   FREQ      ACCEL        2.2000     .5700     2.6000     .7200
X-SHOCK   FREQ      ACCEL        2.7000     .8400     4.8000     .8400
X-SHOCK   FREQ      ACCEL        5.2000     .8000     5.6000     .4900
X-SHOCK   FREQ      ACCEL        6.3000     .4000     7.0000     .3000
X-SHOCK   FREQ      ACCEL        7.5000     .2900     8.0000     .2850
X-SHOCK   FREQ      ACCEL        8.5000     .2800     9.0000     .2750
X-SHOCK   FREQ      ACCEL        9.5000     .2700     9.9000     .2740
X-SHOCK   FREQ      ACCEL       10.0000     .2750    11.0000     .2615
X-SHOCK   FREQ      ACCEL       12.0000     .2500    13.0000     .2400
X-SHOCK   FREQ      ACCEL       14.0000     .2300    15.0000     .2250
X-SHOCK   FREQ      ACCEL       16.0000     .2250    17.0000     .2250
X-SHOCK   FREQ      ACCEL       18.0000     .2250    19.0000     .2250
X-SHOCK   FREQ      ACCEL       20.0000     .2250    33.0000     .2250
COMMENT
SEISMIC       2     386.4     386.4     386.4     CSM       RSS
COMMENT             - READ X-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE N-S (SPEC. G51, FIG. F7), SPECTRA # P22
COMMENT   ************************************************************
X-SHOCK   FREQ      ACCEL         .0100     .1100      .8000     .3200
X-SHOCK   FREQ      ACCEL        1.0700     .3800     1.7000     .3800
X-SHOCK   FREQ      ACCEL        1.8000     .4000     2.2000     .5500
X-SHOCK   FREQ      ACCEL        2.6000     .6700     2.8000     .7400
X-SHOCK   FREQ      ACCEL        4.8000     .7400     5.4000     .6900
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X-SHOCK   FREQ      ACCEL        5.6000     .4400    6.0000     .4000
X-SHOCK   FREQ      ACCEL        6.6000     .3500    7.2000     .2900
X-SHOCK   FREQ      ACCEL        9.9000     .2707   10.0000     .2700
X-SHOCK   FREQ      ACCEL       11.0000     .2610   12.0000     .2520
X-SHOCK   FREQ      ACCEL       13.0000     .2465   14.0000     .2400
X-SHOCK   FREQ      ACCEL       15.0000     .2300   16.0000     .2250
X-SHOCK   FREQ      ACCEL       17.0000     .2200   18.0000     .2100
X-SHOCK   FREQ      ACCEL       19.0000     .2000   20.0000     .2000
X-SHOCK   FREQ      ACCEL       33.0000     .2000
COMMENT
SEISMIC       3     386.4     386.4     386.4     CSM       RSS
COMMENT             - READ X-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE N-S (SPEC. G51, FIG. F13), SPECTRA # P23
COMMENT   ************************************************************
X-SHOCK   FREQ      ACCEL         .0100     .1200     .8600     .3500
X-SHOCK   FREQ      ACCEL        1.0700     .4200    1.7000     .4200
X-SHOCK   FREQ      ACCEL        1.7500     .4300    2.1000     .5500
X-SHOCK   FREQ      ACCEL        2.4500     .6600    2.5000     .7200
X-SHOCK   FREQ      ACCEL        4.4000     .7200    4.6000     .7100
X-SHOCK   FREQ      ACCEL        5.0000     .6300    5.5000     .5500
X-SHOCK   FREQ      ACCEL        6.0000     .4300    6.5000     .3500
X-SHOCK   FREQ      ACCEL        6.8000     .3000    8.5000     .2700
X-SHOCK   FREQ      ACCEL        9.9000     .2513   10.0000     .2500
X-SHOCK   FREQ      ACCEL       10.5000     .2498   11.0000     .2480
X-SHOCK   FREQ      ACCEL       12.0000     .2440   13.0000     .2400
X-SHOCK   FREQ      ACCEL       14.0000     .2320   15.0000     .2175
X-SHOCK   FREQ      ACCEL       16.0000     .2000   17.0000     .2000
X-SHOCK   FREQ      ACCEL       18.0000     .2000   19.0000     .2000
X-SHOCK   FREQ      ACCEL       20.0000     .2000   33.0000     .2000
COMMENT
COMMENT   ------------------------------------------------------------
COMMENT
COMMENT   ***** Y-SPECTRA : VERT. DIRECTION *****
SEISMIC       4     386.4     386.4     386.4     CSM       RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. F9), SPECTRA # P26
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL         .0100     .0700     .4500     .1300
Y-SHOCK   FREQ      ACCEL        1.1000     .3000    1.6000     .4300
Y-SHOCK   FREQ      ACCEL        1.6500     .4900    2.1000     .5800
Y-SHOCK   FREQ      ACCEL        2.4000     .6100    3.0000     .7000
Y-SHOCK   FREQ      ACCEL        4.0000     .7000    4.3000    1.0300
Y-SHOCK   FREQ      ACCEL        5.6000    1.0300    6.6000     .7000
Y-SHOCK   FREQ      ACCEL        9.9000     .7000   10.0000     .7000
Y-SHOCK   FREQ      ACCEL       11.0000     .7250   12.0000     .6480
Y-SHOCK   FREQ      ACCEL       13.0000     .5590   14.0000     .4900
Y-SHOCK   FREQ      ACCEL       14.5000     .4615   15.0000     .4450
Y-SHOCK   FREQ      ACCEL       16.0000     .4320   17.0000     .4190
Y-SHOCK   FREQ      ACCEL       18.0000     .4120   19.0000     .4040
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Y-SHOCK   FREQ      ACCEL        20.0000      .3500   22.0000      .2500
Y-SHOCK   FREQ      ACCEL        23.0000      .2300   26.0000      .2000
Y-SHOCK   FREQ      ACCEL        33.0000      .2000
COMMENT
SEISMIC       5     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. G23), SPECTRA # P27
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL          .0100      .1000     .9400      .2400
Y-SHOCK   FREQ      ACCEL         3.1000      .7200    6.0000      .7200
Y-SHOCK   FREQ      ACCEL         7.8000      .7800    9.9000      .7800
Y-SHOCK   FREQ      ACCEL        10.0000      .7800   11.0000      .8150
Y-SHOCK   FREQ      ACCEL        11.7000      .8395   12.0000      .8660
Y-SHOCK   FREQ      ACCEL        13.0000      .9700   13.5000     1.0173
Y-SHOCK   FREQ      ACCEL        14.0000     1.0390   15.0000     1.0825
Y-SHOCK   FREQ      ACCEL        16.0000     1.1260   17.0000     1.1695
Y-SHOCK   FREQ      ACCEL        18.0000     1.2130   19.0000     1.2565
Y-SHOCK   FREQ      ACCEL        20.0000     1.3000   20.5000     1.3000
Y-SHOCK   FREQ      ACCEL        22.0000     1.0000   24.0000      .7500
Y-SHOCK   FREQ      ACCEL        26.0000      .4200   29.0000      .4000
Y-SHOCK   FREQ      ACCEL        32.0000      .3500   33.0000      .3700
COMMENT
SEISMIC       6     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. G24), SPECTRA # P28
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL          .0100      .0700     .8600      .2300
Y-SHOCK   FREQ      ACCEL         1.6000      .4500    2.0000      .5200
Y-SHOCK   FREQ      ACCEL         2.4000      .6000    2.8000      .6600
Y-SHOCK   FREQ      ACCEL         3.1000      .7000    3.4000      .7400
Y-SHOCK   FREQ      ACCEL         9.9000      .7400   10.0000      .7400
Y-SHOCK   FREQ      ACCEL        11.0000      .7700   11.5000      .7850
Y-SHOCK   FREQ      ACCEL        11.7000      .7844   12.0000      .7800
Y-SHOCK   FREQ      ACCEL        13.0000      .7750   14.0000      .7560
Y-SHOCK   FREQ      ACCEL        15.0000      .7750   16.0000      .7940
Y-SHOCK   FREQ      ACCEL        17.0000      .8130   18.0000      .8320
Y-SHOCK   FREQ      ACCEL        18.5000      .8415   19.0000      .8500
Y-SHOCK   FREQ      ACCEL        20.0000      .8700   22.0000      .6450
Y-SHOCK   FREQ      ACCEL        24.0000      .4200   26.0000      .3000
Y-SHOCK   FREQ      ACCEL        29.0000      .2950   32.0000      .2900
Y-SHOCK   FREQ      ACCEL        33.0000      .2850
COMMENT
SEISMIC       7     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. F15), SPECTRA # P29
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL          .0100      .0600     .7000      .2100
Y-SHOCK   FREQ      ACCEL         1.5000      .3700    1.6000      .4800
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Y-SHOCK   FREQ      ACCEL        2.1000     .5600     2.5000     .6000
Y-SHOCK   FREQ      ACCEL        3.0000     .7000     4.1000     .7000
Y-SHOCK   FREQ      ACCEL        4.3000    1.0300     5.8000    1.0300
Y-SHOCK   FREQ      ACCEL        6.8000     .7000     8.0000     .7000
Y-SHOCK   FREQ      ACCEL        8.4000     .7400     9.9000     .7400
Y-SHOCK   FREQ      ACCEL       10.0000     .7400    11.0000     .7740
Y-SHOCK   FREQ      ACCEL       11.7000     .7978    12.0000     .7880
Y-SHOCK   FREQ      ACCEL       13.0000     .7100    14.0000     .6080
Y-SHOCK   FREQ      ACCEL       15.0000     .4750    15.3000     .4577
Y-SHOCK   FREQ      ACCEL       16.0000     .4640    17.0000     .4730
Y-SHOCK   FREQ      ACCEL       18.0000     .4820    19.0000     .4520
Y-SHOCK   FREQ      ACCEL       20.0000     .4100    22.0000     .3000
Y-SHOCK   FREQ      ACCEL       23.0000     .2850    25.0000     .2550
Y-SHOCK   FREQ      ACCEL       28.0000     .2500    31.0000     .2450
Y-SHOCK   FREQ      ACCEL       33.0000     .2400
COMMENT
SEISMIC       8     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. G30), SPECTRA # P30
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL         .0100     .0600      .8600     .2300
Y-SHOCK   FREQ      ACCEL        1.6000     .4500     2.0000     .4800
Y-SHOCK   FREQ      ACCEL        2.4000     .6000     2.8000     .6600
Y-SHOCK   FREQ      ACCEL        3.3000     .7200     6.4000     .7200
Y-SHOCK   FREQ      ACCEL        7.2000     .7300     7.7000     .7500
Y-SHOCK   FREQ      ACCEL        8.2000     .7800     8.6000     .8100
Y-SHOCK   FREQ      ACCEL        9.9000     .8100    10.0000     .8100
Y-SHOCK   FREQ      ACCEL       11.0000     .8440    12.0000     .8780
Y-SHOCK   FREQ      ACCEL       13.0000     .8380    14.0000     .7840
Y-SHOCK   FREQ      ACCEL       15.0000     .7450    15.3000     .7201
Y-SHOCK   FREQ      ACCEL       15.5000     .7125    16.0000     .7200
Y-SHOCK   FREQ      ACCEL       17.0000     .7350    18.0000     .7500
Y-SHOCK   FREQ      ACCEL       19.0000     .7650    19.5000     .7725
Y-SHOCK   FREQ      ACCEL       20.0000     .7800    22.0000     .6300
Y-SHOCK   FREQ      ACCEL       25.0000     .4500    28.0000     .3000
Y-SHOCK   FREQ      ACCEL       28.5000     .2992    31.0000     .2950
Y-SHOCK   FREQ      ACCEL       33.0000     .2900
COMMENT
SEISMIC       9     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. G31), SPECTRA # P31
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL         .0100     .0500      .9000     .2400
Y-SHOCK   FREQ      ACCEL         .9600     .2500     1.6000     .4500
Y-SHOCK   FREQ      ACCEL        2.0000     .5300     2.4000     .6000
Y-SHOCK   FREQ      ACCEL        2.8000     .6500     3.2000     .7300
Y-SHOCK   FREQ      ACCEL        3.5000     .7500     4.0000     .7600
Y-SHOCK   FREQ      ACCEL        4.5000     .7900     5.0000     .8000
Y-SHOCK   FREQ      ACCEL        5.5000     .8100     6.0000     .8200
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Y-SHOCK   FREQ      ACCEL        6.8000     .8300     7.3000     .8500
Y-SHOCK   FREQ      ACCEL        7.8000     .9500     8.3000    1.1000
Y-SHOCK   FREQ      ACCEL        8.8000    1.1500     9.3000    1.2000
Y-SHOCK   FREQ      ACCEL        9.6000    1.2700     9.9000    1.2700
Y-SHOCK   FREQ      ACCEL       10.0000    1.2700    11.0000    1.3260
Y-SHOCK   FREQ      ACCEL       12.0000    1.3820    13.0000    1.4380
Y-SHOCK   FREQ      ACCEL       14.0000    1.4940    15.0000    1.5500
Y-SHOCK   FREQ      ACCEL       16.0000    1.6060    17.0000    1.5070
Y-SHOCK   FREQ      ACCEL       18.0000    1.4120    19.0000    1.3120
Y-SHOCK   FREQ      ACCEL       20.0000    1.2000    22.0000     .9000
Y-SHOCK   FREQ      ACCEL       25.0000     .5000    25.5000     .4750
Y-SHOCK   FREQ      ACCEL       26.0000     .4500    28.0000     .4300
Y-SHOCK   FREQ      ACCEL       31.0000     .4100    33.0000     .4000
COMMENT
SEISMIC     10      386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Y-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE VERT (SPEC. G51, FIG. F3), SPECTRA # P32
COMMENT   ************************************************************
Y-SHOCK   FREQ      ACCEL         .0100     .0800      .5000     .1800
Y-SHOCK   FREQ      ACCEL         .7400     .2300     1.5000     .3800
Y-SHOCK   FREQ      ACCEL        2.0000     .5000     2.4000     .5700
Y-SHOCK   FREQ      ACCEL        2.8000     .6500     3.1000     .6900
Y-SHOCK   FREQ      ACCEL        3.6000     .7000     4.1000     .7200
Y-SHOCK   FREQ      ACCEL        4.3000     .9700     5.8000     .9700
Y-SHOCK   FREQ      ACCEL        6.2000     .8500     6.6000     .7500
Y-SHOCK   FREQ      ACCEL        7.0000     .6700     7.5000     .6400
Y-SHOCK   FREQ      ACCEL        8.0000     .6300     8.4000     .6200
Y-SHOCK   FREQ      ACCEL        9.0000     .6000     9.9000     .5730
Y-SHOCK   FREQ      ACCEL       10.0000     .5700    11.0000     .5520
Y-SHOCK   FREQ      ACCEL       12.0000     .5460    13.0000     .5240
Y-SHOCK   FREQ      ACCEL       14.0000     .5160    15.0000     .4900
Y-SHOCK   FREQ      ACCEL       16.0000     .4700    17.0000     .4530
Y-SHOCK   FREQ      ACCEL       18.0000     .4260    19.0000     .4130
Y-SHOCK   FREQ      ACCEL       20.0000     .3600    21.0000     .3200
Y-SHOCK   FREQ      ACCEL       21.1000     .2500    22.0000     .2300
Y-SHOCK   FREQ      ACCEL       24.0000     .2000    33.0000     .2000
COMMENT
COMMENT   ------------------------------------------------------------
COMMENT
COMMENT   ***** Z-SPECTRA : E-W DIRECTION *****
SEISMIC     11      386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Z-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE E-W (SPEC. G51, FIG. F2), SPECTRA # P36
COMMENT   ************************************************************
Z-SHOCK   FREQ      ACCEL         .0100     .1100      .3400     .1300
Z-SHOCK   FREQ      ACCEL         .4400     .2000      .4600     .2100
Z-SHOCK   FREQ      ACCEL         .8400     .2500     2.0000     .5300
Z-SHOCK   FREQ      ACCEL        2.1000     .5400     2.8000     .5400
Z-SHOCK   FREQ      ACCEL        2.9000     .6200     3.0000     .6300
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Z-SHOCK   FREQ      ACCEL        3.4000     .6300    3.6000     .7800
Z-SHOCK   FREQ      ACCEL        6.4000     .7500    6.6000     .7500
Z-SHOCK   FREQ      ACCEL        7.0000     .6800    7.5000     .5600
Z-SHOCK   FREQ      ACCEL        8.0000     .5100    8.5000     .4500
Z-SHOCK   FREQ      ACCEL        9.0000     .3800    9.6000     .3000
Z-SHOCK   FREQ      ACCEL        9.9000     .2850   10.0000     .2800
Z-SHOCK   FREQ      ACCEL       11.0000     .2630   12.0000     .2470
Z-SHOCK   FREQ      ACCEL       13.0000     .2260   14.0000     .2080
Z-SHOCK   FREQ      ACCEL       15.0000     .1900   16.0000     .1800
Z-SHOCK   FREQ      ACCEL       17.0000     .1800   18.0000     .1800
Z-SHOCK   FREQ      ACCEL       19.0000     .1800   20.0000     .1800
Z-SHOCK   FREQ      ACCEL       33.0000     .1800
COMMENT
SEISMIC      12     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Z-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE E-W (SPEC. G51, FIG. F8), SPECTRA # P37
COMMENT   ************************************************************
Z-SHOCK   FREQ      ACCEL         .0100     .0800     .4400     .2000
Z-SHOCK   FREQ      ACCEL         .7400     .2300     .8000     .2400
Z-SHOCK   FREQ      ACCEL        1.9000     .5500    2.2000     .5700
Z-SHOCK   FREQ      ACCEL        2.3000     .5700    2.4000     .6000
Z-SHOCK   FREQ      ACCEL        2.6000     .6900    6.2000     .6900
Z-SHOCK   FREQ      ACCEL        6.4000     .6400    7.0000     .5100
Z-SHOCK   FREQ      ACCEL        7.5000     .4400    8.0000     .4000
Z-SHOCK   FREQ      ACCEL        8.5000     .3300    9.0000     .2800
Z-SHOCK   FREQ      ACCEL        9.4000     .2400    9.9000     .2358
Z-SHOCK   FREQ      ACCEL       10.0000     .2350   11.0000     .2350
Z-SHOCK   FREQ      ACCEL       12.0000     .2330   13.0000     .2290
Z-SHOCK   FREQ      ACCEL       14.0000     .2250   15.0000     .2175
Z-SHOCK   FREQ      ACCEL       16.0000     .2080   17.0000     .2000
Z-SHOCK   FREQ      ACCEL       18.0000     .2000   19.0000     .2000
Z-SHOCK   FREQ      ACCEL       20.0000     .2000   33.0000     .2000
COMMENT
SEISMIC      13     386.4      386.4      386.4      CSM        RSS
COMMENT             - READ Z-SHOCK CARDS BELOW -
COMMENT   ************************************************************
COMMENT   PVRC SSE E-W (SPEC. G51, FIG. F14), SPECTRA # P38
COMMENT   ************************************************************
Z-SHOCK   FREQ      ACCEL         .0100     .0900     .4500     .2100
Z-SHOCK   FREQ      ACCEL         .6200     .2100     .6800     .2300
Z-SHOCK   FREQ      ACCEL        1.0700     .3400    2.1000     .6000
Z-SHOCK   FREQ      ACCEL        2.3500     .6000    2.6000     .8200
Z-SHOCK   FREQ      ACCEL        5.4000     .8200    5.7000     .8000
Z-SHOCK   FREQ      ACCEL        6.2000     .6700    6.6000     .5500
Z-SHOCK   FREQ      ACCEL        7.0000     .4800    7.5000     .4200
Z-SHOCK   FREQ      ACCEL        8.0000     .3800    8.5000     .3300
Z-SHOCK   FREQ      ACCEL        9.0000     .2700    9.9000     .2655
Z-SHOCK   FREQ      ACCEL       10.0000     .2650   10.7000     .2677
Z-SHOCK   FREQ      ACCEL       11.0000     .2670   12.0000     .2660
Z-SHOCK   FREQ      ACCEL       13.0000     .2620   14.0000     .2550
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Z-SHOCK   FREQ      ACCEL        15.0000     .2450   16.0000     .2300
Z-SHOCK   FREQ      ACCEL        17.0000     .2300   18.0000     .2300
Z-SHOCK   FREQ      ACCEL        19.0000     .2300   20.0000     .2300
Z-SHOCK   FREQ      ACCEL        33.0000     .2300
COMMENT
COMMENT   ==========================================================
COMMENT
COMMENT   ========================================================
COMMENT
CASE      OBEDX     OBE DISPL. IN X
COMMENT             - LIST "TRANSLATE" CARDS BELOW FOR ALL NODES
COMMENT               DYNAMICALLY RESTRAINED IN X, WITH THEIR
COMMENT               CORRESPONDING DISPLACEMENTS IN X.-
COMMENT
PRINT               NO        NO        NO        NO
TRANSLATE P201      -0.0129
TRANSLATE H11       0.03
TRANSLATE H12       0.03
TRANSLATE H10       0.02
TRANSLATE H9        0.02
TRANSLATE H7        0.015
TRANSLATE H5A       0.015
TRANSLATE H1B       0.020
TRANSLATE H5B       0.03
TRANSLATE H4B       0.03
TRANSLATE I7SAN     -0.0129
TRANSLATE I9SBN     -0.0125
COMMENT   --------------------------------------------------------
COMMENT
CASE      OBEDY     OBE DISPL. IN Y
COMMENT             - LIST "TRANSLATE" CARDS BELOW FOR ALL NODES
COMMENT               DYNAMICALLY RESTRAINED IN Y , WITH THEIR
COMMENT               CORRESPONDING DISPLACEMENTS IN Y.-
COMMENT
PRINT               NO        NO        NO        NO
TRANSLATE P201                0.0012
TRANSLATE H18                 -0.021
TRANSLATE H15                 -0.021
TRANSLATE H4A                 0.0067
TRANSLATE H2A                 0.0067
TRANSLATE H1B                 -0.0018
TRANSLATE H3B                 -0.0020
TRANSLATE I7SAN               0.00129
TRANSLATE I9SBN               0.00129
TRANSLATE H13                 0.00400
COMMENT   --------------------------------------------------------
COMMENT
CASE      OBEDZ     OBE DISPL. IN Z
COMMENT             - LIST "TRANSLATE" CARDS BELOW FOR ALL NODES
COMMENT               DYNAMICALLY RESTRAINED IN Z, WITH THEIR
COMMENT               CORRESPONDING DISPLACEMENTS IN Z.-
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COMMENT
PRINT                NO          NO          NO          NO
TRANSLATE P201                                -0.01165
TRANSLATE H17                                  0.022
TRANSLATE H14                                  0.022
TRANSLATE H11                                  0.020
TRANSLATE H12                                  0.020
TRANSLATE H9                                   0.013
TRANSLATE H6                                   0.010
TRANSLATE H3A                                  0.015
TRANSLATE H2B                                  0.013
TRANSLATE H5B                                  0.020
TRANSLATE H4B                                  0.020
TRANSLATE I7SAN                                -0.01165
TRANSLATE I9SBN                                -0.01239
COMMENT    ------------------------------------------------------
COMMENT
CASE       OBED      OBE DISPL. (X+Y+Z)
COMBINE    OBEDXRSS              OBEDYRSS              OBEDZRSS
COMMENT    ======================================================
COMMENT
CASE       SSEDX     SSE DISPL. IN X
COMMENT              - LIST "TRANSLATE" CARDS BELOW FOR ALL NODES
COMMENT                DYNAMICALLY RESTRAINED IN X,-WITH THEIR
COMMENT                CORRESPONDING DISPLACEMENTS IN X.-
COMMENT
PRINT                NO          NO          NO          NO
TRANSLATE P201       -0.0167
TRANSLATE H11        0.065
TRANSLATE H12        0.065
TRANSLATE H10        0.040
TRANSLATE H9         0.040
TRANSLATE H7         0.027
TRANSLATE H5A        0.027
TRANSLATE HPTUB      0.015
TRANSLATE H1B        0.038
TRANSLATE H5B        0.065
TRANSLATE H4B        0.065
TRANSLATE I7SAN      -0.0167
TRANSLATE I9SBN      -0.0161
COMMENT    ------------------------------------------------------
COMMENT
CASE       SSEDY     SSE DISPL. IN Y
COMMENT              - LIST "TRANSLATE" CARDS BELOW FOR ALL NODES
COMMENT                DYNAMICALLY RESTRAINED IN Y , WITH THEIR
COMMENT                CORRESPONDING DISPLACEMENTS IN Y.-
COMMENT
PRINT                NO          NO          NO          NO
TRANSLATE P201                   0.002
TRANSLATE H18                    -0.0418
TRANSLATE H15                    -0.0418
```

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TRANSLATE H4A                0.01200
TRANSLATE H2A                0.01200
TRANSLATE H1B                -0.0026
TRANSLATE H3B                -0.0040
TRANSLATE I7SAN              0.00215
TRANSLATE H13                0.00670
TRANSLATE I9SBN              0.00214
COMMENT   ------------------------------------------------------
COMMENT
CASE      SSEDZ      SSE DISPL. IN Z
COMMENT              - LIST "TRANSLATE" CARDS BELOW FOR ALL NODES
COMMENT                DYNAMICALLY RESTRAINED IN Z, WITH THEIR
COMMENT                CORRESPONDING DISPLACEMENTS IN Z.-
COMMENT
PRINT                NO         NO         NO         ND
TRANSLATE P201                             -0.0188
TRANSLATE H17                              0.05
TRANSLATE H14                              0.05
TRANSLATE H11                              0.045
TRANSLATE H12                              0.045
TRANSLATE H9                               0.030
TRANSLATE H6                               0.020
TRANSLATE H3A                              0.032
TRANSLATE HPTUB                            0.010
TRANSLATE H2B                              0.030
TRANSLATE H5B                              0.045
TRANSLATE H4B                              0.045
TRANSLATE I7SAN                            -0.0188
TRANSLATE I9SBN                            -0.0197
COMMENT   ------------------------------------------------------
COMMENT
CASE      SSED       SSE DISPL. (X+Y+Z)
COMBINE   SSEDXRSS             SSEDYRSS             SSEDZRSS
COMMENT   ======================================================
COMMENT
CASE      MXEQD      MAX. OF OBED/SSED
MAXIMUM   ABS        OBED       SSED
COMMENT
CASE      MXEQI      MAX. OF OBEI/SSEI
MAXIMUM   ABS        OBEI       SSEI
COMMENT   ======================================================
COMMENT   ======================================================
COMMENT   ======================================================
CASE      OL         OPERATING LOADS
FORCE     I6         0.0000     38424.0  -38424.0
COMMENT   ======================================================
COMMENT   ========================================================
CASE      QAB         SRV HYDRODYNAMIC
COMMENT   ========================================================
FORCE     I1CAP      347.4      350.9      1498.0
FORCE     I2SPA      643.3      651.7      2782.1
```

```
FORCE      I3SPA      711.7      866.7      3700.3
FORCE      I4SPA      925.30     1388.8     5929.2
FORCE      I5SUP      484.0      872.6      3725.2
FORCE      I6         312.2      888.0      3790.9
FORCE      I7         431.2      1427.1     6092.6
FORCE      I8         181.4      1747.4     7460.1
FORCE      I9WAT      26.60      509.9      2181.8
COMMENT
FORCE      I5SUP      0.20       1.44       -2.14
FORCE      I5EA       -1.10      -7.73      10.90
FORCE      I1SAP      934.9      1687.0     -2010.7
FORCE      I2SA       770.0      1331.0     -1569.2
FORCE      I3SA       1273.4     2154.8     -2526.9
FORCE      I4SA       1387.2     2185.7     -2512.9
FORCE      I5SA       1158.8     1708.8     -1924.4
FORCE      I6SAP      1559.6     2142.2     -2355.9
FORCE      I7SAN      -213.0     -285.3     310.9
COMMENT
FORCE      I5SUP      12.40      73.10      -73.80
FORCE      I5EB       70.80      -418.6     422.6
FORCE      I1SBP      -249.0     1467.3     -1480.0
FORCE      I2SB       -655.0     3263.0     -3225.2
FORCE      I3SB       238.4      3460.8     -4795.0
FORCE      I4SB       428.3      2410.2     -4418.6
FORCE      I5SB       1162.5     3120.9     -7515.4
FORCE      I6SB       1834.4     3040.6     -9299.3
FORCE      I7SB       4680.0     5420.0     -20175.0
FORCE      I8SBP      387.7      574.5      1865.1
FORCE      I9SBN      -81.30     -120.5     391.1
COMMENT    ==========================================================
CASE       CHUGO      POST CHUG  HYDRODYNAMIC
COMMENT    ==========================================================
FORCE      I1CAP      .3138E+04 .1829E+03 -.4377E+03
FORCE      I2SPA      .5840E+04 .3368E+03 -.8182E+03
FORCE      I3SPA      .1022E+05 .2889E+03 -.1738E+04
FORCE      I4SPA      .1819E+05 -.9722E+01-.3639E+04
FORCE      I5SUP      .1286E+05 -.3362E+03-.2835E+04
FORCE      I6         .8182E+04 -.3899E+01-.1762E+04
FORCE      I7         .1054E+05 .3188E+03 -.1438E+04
FORCE      I8         .3280E+04 .1405E+04 -.6852E+03
FORCE      I9WAT      .4203E+03 .4600E+03 -.4173E+03
COMMENT
FORCE      I5SUP      -.6791E+02.9325E+01 .6326E-01
FORCE      I5EA       .2794E+03 -.3836E+02-.2602E+00
FORCE      I1SAP      -.3329E+04.4571E+03 .3101E+01
FORCE      I2SA       -.8752E+03.1102E+03 .1151E+02
FORCE      I3SA       -.2450E+04.2885E+03 .5373E+02
FORCE      I4SA       -.1510E+04.1528E+03 .5983E+02
FORCE      I5SA       -.1126E+04.1090E+03 .4966E+02
FORCE      I6SAP      -.1244E+04.1108E+03 .6543E+02
FORCE      I7SAN      .1571E+03 -.1345E+02-.8868E+01
```

```
COMMENT
FORCE     I5SUP     .1603E+02 -.1812E+02-.1658E+02
FORCE     I5EB     -.6536E+02.7394E+02 .6748E+02
FORCE     I1SBP     .1485E+04 -.1541E+04-.1753E+04
FORCE     I2SB      .3194E+04 -.3232E+04-.3900E+04
FORCE     I3SB      .2966E+04 -.3016E+04-.3598E+04
FORCE     I4SB      .1280E+04 -.1329E+04-.1510E+04
FORCE     I5SB      .7678E+03 -.6938E+03-.1069E+04
FORCE     I6SB      .3666E+03 -.2514E+03-.6359E+03
FORCE     I7SB      .8828E+02 .4838E+02 -.3256E+03
FORCE     I8SBP     .1022E+03 .5122E+02 -.3697E+03
FORCE     I9SBN    -.2444E+02-.1181E+02.8769E+02
COMMENT   ==========================================================
COMMENT   ==========================================================
CASE      CHUGF     POST CHUG  FSI
COMMENT   ==========================================================
FORCE     I1CAP     .1153E+04 0.          0.
FORCE     I2SPA     .2140E+04 0.          0.
FORCE     I3SPA     .2356E+04 0.          0.
FORCE     I4SPA     .3440E+04 0.          0.
FORCE     I5SUP     .1977E+04 0.          0.
FORCE     I6        .1869E+04 0.          0.
FORCE     I7        .2941E+04 0.          0.
FORCE     I8        .3437E+04 0.          0.
FORCE     I9WAT     .9992E+03 0.          0.
COMMENT
FORCE     I5SUP      .2903E+01 3.0        0.75
FORCE     I5EA      -.1195E+02 12.33      3.09
FORCE     I1SAP      .1423E+03 146.9      36.85
FORCE     I2SA       .4386E+02 45.3       11.36
FORCE     I3SA       .2111E+03 217.9      54.66
FORCE     I4SA       .3887E+03 401.3      100.7
FORCE     I5SA       .3112E+03 321.2      80.6
FORCE     I6SAP      .2991E+03 308.7      77.5
FORCE     I7SAN     -.3517+02 -36.3       -9.11
COMMENT
FORCE     I5SUP      0.5       0.8       -0.6
FORCE     I5EB      -.1970E+01 -3.15      2.45
FORCE     I1SBP     .4805E+02  76.9     -59.95
FORCE     I2SB      .1053E+03  168.4    -131.4
FORCE     I3SB      .1071E+03  171.3    -133.6
FORCE     I4SB      .1534E+03  245.4    -191.4
FORCE     I5SB      .2485E+03  397.5    -310.1
FORCE     I6SB      .3419E+03  546.9    -426.6
FORCE     I7SB      .2402E+03  384.2    -299.7
FORCE     I8SBP     .1837E+03  293.9    -229.2
FORCE     I9SBN     -.4140E+02 -66.20   51.65
COMMENT   ==========================================================
CASE      CHUG      TOTAL CHUGO HYD + FSI
COMBINE   CHUGOABS            CHUGFABS
COMMENT   ==========================================================
```

```
COMMENT    ==========================================================
CASE       CO         CO  HYDRODYNAMIC
COMBINE    CHUG       1.0
COMMENT    ==========================================================
COMMENT    ==========================================================
COMMENT    ==========================================================
END LOADS
COMMENT    ******************************************************
COMMENT
COMMENT                          CODE EVALUATION
COMMENT
COMMENT       NOTE: INCLUDE ONE "ALLOWABLE" CARD CORRESPONDING TO
COMMENT       EVERY "MATERIAL" CARD IN THE MODEL, IN EACH OF THE
COMMENT       FOLLOWING CODE EVALUATION SEGMENTS. ALSO VERIFY AND
COMMENT       INCLUDE CORRESPONDING SH AND SC VALUES.
COMMENT
EVALUATE
COMMENT
COMMENT    *********************************************************
COMMENT    ******************************************************
CODE                CLASS 2   DESIGN    77ED S77
COMMENT    *********************************************************
COMMENT    *****          L.C. A-1 IS EQN. 8 BELOW            *****
COMMENT    *********************************************************
EQUATION   8    OL
EQUATION   9               OBEI
EQUATION   10                         OBED
PEAK PRES  I1CAP210  185.0
ALLOWABLE  1         15000.    15000.
COMMENT
COMMENT    ******************************************************
CODE                CLASS 2   DESIGN    77ED S77
EQUATION   9               QAB
PEAK PRES  I1CAP210  185
ALLOWABLE  1         15000.    15000.
COMMENT    ******************************************************
CODE                CLASS 2   LEVELC    77ED S77
EQUATION   9               CHUG
PEAK PRES  I1CAP210  185
ALLOWABLE  1         15000.    15000.
COMMENT    ******************************************************
CODE                CLASS 2   LEVELC    77ED S77
EQUATION   9               MXEQI
EQUATION   10                         MXEQD
PEAK PRES  I1CAP210  185.0
ALLOWABLE  1         15000.    15000.
COMMENT
END CODE
COMMENT    ******************************************************
RESTART
SAVE       LMOD1     100  200  20   20   20   100  5
```

```
END RESTRT
/*EOR
```

```
CJM,P3.
USER(NU134WC,XNUTECX)
CHARGE,F3395JT,*311*XPS080501.
ROUTE(OUTPUT,DEF,DC=PR,FID=CJM40,ID)
SETTL,*.
SETJSL,*.
REWIND,OUTPUT.
*
*****************************************************
*   RESTART, INPUT, AND OUTPUT+DAYFILE ARE SAVED    *
*   IN THE FOLLOWING TAPE, IN THAT ORDER.           *
*****************************************************
COPYBR,INPUT,SYSIN.
REWIND,SYSIN.
GET,APPLIC/UN=LIBRARY.
BEGIN,PISTARR,APPLIC,LEVEL=351,NOTES=N,TSTORE=P201,
TSAVE=P201,FN=1.
*************************************************
*   ATTACH PISTAR MODEL IMMEDIATELY BELOW "/EOR", *
*   FOLLOWED BY LOAD MODULE-1                     *
*************************************************
/*EOR
TITLE     HOPE CREEK TAP SYSTEM:HPCI TURBINE EXAUST P201
ID        CLIENT= PUBLIC SERVICE ELECTRIC & GAS COMPANY
ID        PROJECT NAME= HOPE CREEK TAP SNUBBER REDUCTION
ID        PROJECT NUMBER= XPS-0800
ID        JOB NUMBER= XPS-0800
ID        FILE NUMBER= PSE005.1016
ID        CALCULATION NUMBER=C-31
ID        RUN NUMBER=
ID        PREPARED BY= C. J. MEHTA
ID        CHECKED BY= A. S. HERLEKER
COMMENT   *******************************************************
COMMENT   *          FILE NAME : C31DWS                         *
COMMENT   *******************************************************
COMMENT   *          LOAD AND CODE EVALUATION MODULE - 2        *
COMMENT   *                                                     *
COMMENT   *  THIS CONTAINS ALL NON-MARK1 STATIC LOAD CASES.     *
COMMENT   *  ALSO LOAD COMBINATIONS ARE PERFORMED WITH THE LOAD  *
COMMENT   *  CASES OF LOAD MODULE-1, FOLLOWED BY CODE EVALUATION *
COMMENT   *  ---------------------------------------------------- *
COMMENT   *  SINCE THE LOAD CASES EVALUATED IN THIS MODULE ARE   *
COMMENT   *  STATIC CASES, THE SNUBBERS SHALL BE CODED BACK AS   *
COMMENT   *  "SNUBBERS" IN THIS RESTART RUN.                     *
COMMENT   *******************************************************
COMMENT   *******************************************************
COMMENT   *  SNUBBER  REMAIN           :  006-H18,H15,H22       *
COMMENT   *                               014-H02,              *
COMMENT   *******************************************************
COMMENT   *  SNUBBER  CHANGE TO STRUT :  NONE                    *
COMMENT   *******************************************************
```

```
COMMENT    *  SNUBBER  DELETED          :  006-H10,H09,H07,H05,H03 *
COMMENT    *                            :  006-H02,                *
COMMENT    ***********************************************
GEOMETRY
COMMENT    ***************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H18 AT NODE H18
COMMENT    ***************************************************************
SNUBBER    H18        0.0        1.0        0.0        SPRING    2.59E5
COMMENT    ***************************************************************
COMMENT    SNUBBER NO. 1-P-006-H22 AT NODE H22 (WAS 45CGS)
COMMENT    ***************************************************************
SNUBBER    H22        0.0        0.0        1.0        SPRING    8.700E4
COMMENT    ***************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H15 AT NODE H15.
COMMENT    ***************************************************************
SNUBBER    H15        0.0        1.0        0.0        SPRING    4.950E5
COMMENT    ***************************************************************
COMMENT    SNUBBER NO 1-P-FD-014-H02 AT NODE H2B.
COMMENT    ***************************************************************
SNUBBER    H2B        0.0        0.0        1.0        SPRING     2.530E5
COMMENT    ***************************************************************
COMMENT
END GEOM
COMMENT    ***********************************************
LOADING    LOAD MODULE - 2
COMMENT    ***********************************************
COMMENT
CASE       DW         DEAD WEIGHT
DEAD LOAD
END LOADS
COMMENT    ***********************************************
COMMENT    IN THE FOLLOWING CODE EVALUATION SEGMENTS, USE
COMMENT    AS MANY "ALLOWABLE" CARDS AS THERE ARE "MATERIAL"
COMMENT    CARDS IN THE MODEL. ALSO VERIFY AND INCLUDE THE
COMMENT    CORRESPONDING SH AND SC VALUES
COMMENT    ***********************************************
EVALUATE
COMMENT
COMMENT    ***********************************************
CODE                  CLASS 2   DESIGN    77ED S77
COMMENT    ***********************************************
COMMENT    *****          L.C. A-1 IS EQN. 8 BELOW              *****
COMMENT    ***********************************************
EQUATION   8    DW
PEAK PRES  I1CAP 210      185.0
ALLOWABLE  1          15000.    15000.
END CODE
COMMENT    ***********************************************
RESTART
RESTORE    LMOD1
SAVE       LMOD2
```

```
END RESTRT
/*EOR
```

```
CJM,P3.
USER(NU134WC,XNUTECX)
CHARGE,F3395JT,*311*XPS080501.
ROUTE(OUTPUT,DEF,DC=PR,FID=CJM40,ID)
SETTL,*.
SETJSL,*.
REWIND,OUTPUT.
*
*****************************************************
*   RESTART, INPUT, AND OUTPUT+DAYFILE ARE SAVED    *
*   IN THE FOLLOWING TAPE, IN THAT ORDER.           *
*****************************************************
COPYBR,INPUT,SYSIN.
REWIND,SYSIN.
GET,APPLIC/UN=LIBRARY.
BEGIN,PISTARR,APPLIC,LEVEL=351,NOTES=N,TSAVE=P201,
TSTORE=P201,FN=2.
*************************************************
*   ATTACH PISTAR MODEL IMMEDIATELY BELOW "/EOR", *
*   FOLLOWED BY LOAD MODULE-3                     *
*************************************************
/*EOR
TITLE      HOPE CREEK TAP SYSTEM:HPCI TURBINE EXAUST P201
ID         CLIENT= PUBLIC SERVICE ELECTRIC & GAS COMPANY
ID         PROJECT NAME= HOPE CREEK TAP SNUBBER REDUCTION
ID         PROJECT NUMBER= XPS-0800
ID         JOB NUMBER= XPS-0800
ID         FILE NUMBER= PSE005.1016
ID         CALCULATION NUMBER=C-31
ID         RUN NUMBER=
ID         PREPARED BY= C. J. MEHTA
ID         CHECKED BY= A. S. HERLEKER
COMMENT    ********************************************************
COMMENT    *          FILE NAME : C31TH                           *
COMMENT    ********************************************************
COMMENT    *          LOAD  MODULE - 3                            *
COMMENT    ********************************************************
COMMENT    ********************************************************
COMMENT    *  SNUBBER  REMAIN           :  006-H18,H15,H22        *
COMMENT    *                               014-H02,               *
COMMENT    ********************************************************
COMMENT    *  SNUBBER  CHANGE TO STRUT :  NONE                     *
COMMENT    ********************************************************
COMMENT    *  SNUBBER  DELETED          :  006-H10,H09,H07,H05,H03 *
COMMENT    *                            :  006-H02,                *
COMMENT    ********************************************************
GEOMETRY
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H18 AT NODE H18
COMMENT    ************************************************************
SNUBBER    H18        0.0        1.0        0.0        SPRING    2.59E5
```

```
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-006-H22 AT NODE H22 (WAS 45CGS)
COMMENT    ************************************************************
SNUBBER    H22        0.0        0.0        1.0        SPRING    8.700E4
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H15 AT NODE H15.
COMMENT    ************************************************************
SNUBBER    H15        0.0        1.0        0.0        SPRING    4.950E5
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-014-H02 AT NODE H2B.
COMMENT    ************************************************************
SNUBBER    H2B        0.0        0.0        1.0        SPRING     2.530E5
COMMENT    ************************************************************
COMMENT
COMMENT    ********************************************************
END GEOM
COMMENT    ********************************************************
LOADING    LOAD MODULE - 3
COMMENT    ********************************************************
COMMENT
COMMENT    ========================================================
CASE       TE         TH. EXP.- NORM. OPER.
THERMAL    I1CAP P201   107.00
THERMAL    EXNOZ  155   213.00
THERMAL    160    210    40.00
COMMENT
COMMENT    ========================================================
COMMENT    ========================================================
CASE       TE1        MAX OP. TEMP
THERMAL    I1CAP P201    97.00
THERMAL    EXNOZ  155   213.00
THERMAL    160    210    40.00
COMMENT    ========================================================
CASE       TE2         LONG TERM TORUS HEAT UP
THERMAL    I1CAP P201 142.0
THERMAL    EXNOZ  155 213.0
THERMAL    160    210  40.0
COMMENT    ========================================================
CASE       THAMA      TORUS ANC. DISP. @ 100F
TRANSLATE  P201       0.021195   0.015141 -0.15411
TRANSLATE  I9SBN      0.000000  -0.009546 -0.14295
TRANSLATE  I7SAN      0.028850  -0.010980 -0.14510
TRANSLATE  HPTUB      0.000500  -0.004000 -0.00690
COMMENT
COMMENT    ========================================================
CASE       THAM       TORUS ANC. DIS. 177 F
COMBINE    THAMA      3.567
COMMENT    ========================================================
CASE       THAM1      THAM1 ANC. MOV. @ 167 F
COMBINE    THAMA      3.233
COMMENT    ========================================================
```

```
CASE       THAM2      TORUS AT 212 F
COMBINE    THAMA      4.733
COMMENT    ==========================================================
CASE       TD    ANCH.MVT.DUE TO DW+SBA PRESS.
TRANSLATE  P201       0.005000   0.002900 -0.0882
TRANSLATE  I9SBN      0.000000  -0.007660 -0.04816
TRANSLATE  I7SAN      0.008060  -0.002107 -0.04053
COMMENT
COMMENT    ==========================================================
COMMENT    ==========================================================
COMMENT    TD1          SAME AS TD
CASE       TD1   ANCH.MVT.DUE TO DW+SBA PRESS.
COMBINE    TD         1.0
COMMENT
COMMENT    ==========================================================
COMMENT    TD2          SAME AS TD1
CASE       TD2   ANCH.MVT.DUE TO DW+SBA PRESS.
COMBINE    TD1        1.0
COMMENT
COMMENT    ==========================================================
CASE       TE2T     SUM THAM2 & TE2 & TD2
COMBINE    TE2   DIR  1.0282    THAM2DIR  1.0282    TD2   DIR
COMMENT    ==========================================================
COMMENT    ==========================================================
CASE       THTD       THAM+TD
COMBINE    THAM                  TD
PRINT                 NO        NO        NO        NO
CASE       TEHD       TE+THAM+TD
COMBINE    TE                    THAM                TD
PRINT                 NO        NO        NO        NO
CASE       THTD1      THAM1+TD1
COMBINE    THAM1                 TD1
PRINT                 NO        NO        NO        NO
CASE       TEHD1      TE1+THAM1+TD1
COMBINE    TE1                   THAM1               TD1
PRINT                 NO        NO        NO        NO
COMMENT
CASE       TMAX   MAX(THAM+TD,TE+THAM+TD)
MAXIMUM    ABS        THTD      TEHD
PRINT                 YES       NO        NO        NO
COMMENT
CASE       TMAX1 MAX(THAM1+TD1,TE1+THAM1+TD1)
MAXIMUM    ABS        THTD1     TEHD1
PRINT                 YES       NO        NO        NO
COMMENT
COMMENT
COMMENT    ***********      PIPNG LOAD COMBINATIONS      ***********
COMMENT
COMMENT      THE FOLLOWING LOAD COMBINATIONS DO NOT INCLUDE LINE
COMMENT      OPERATING LOAD (OL). IF OL IS APPLICABLE, OL SHALL BE
COMMENT      EVALUATED AND COMBINED WITH OTHER PRIMARY LOADS. IN
```

```
COMMENT      COMBINATIONS WHERE DYNAMIC LOADS ARE PRESENT, OL MAY
COMMENT      BE SRSS'ED WITH DYNAMIC LOADS. THE COMBINATIONS ARE
COMMENT      GIVEN IN TECHNICAL INSTRUCTION NO. PSE-TI-002.
COMMENT    ==========================================================
COMMENT
CASE       A2A          A2A = TMAX+OBED
COMMENT    ************************************************************
COMMENT    A FACTOR OF EC/EH =1.0282  IS APPLIED TO TMAX PER
COMMENT    NC-3672.6 Ec=27.9E6 T=70 & Eh=27.136E6 T=366, CARBON STEEL
COMMENT    ************************************************************
COMBINE    TMAX ABS  1.0282     OBED ABS
CASE       A-2     MAX.(TMAX+MXEQD, 2 X OBED)
MAXIMUM    ABS        A2A        OBED 2.0
PRINT                 NO         NO         NO         NO
COMMENT    ************************************************************
COMMENT    L.C. A-2 USES MAX OF OBED/SSED,THUS A-3 IS ENVELOPED BY A-2
COMMENT    ************************************************************
COMMENT
CASE       A3A          A3A = TMAX1+MXEQD
COMMENT    ************************************************************
COMMENT    A FACTOR OF EC/EH = 1.0282 IS APPLIED TO TMAX1 PER
COMMENT    NC-3672.6 Ec=27.9E6 T=70 & Eh=27.136E6 T=366, CARBON STEEL
COMMENT    ************************************************************
COMBINE    TMAX1ABS  1.0282     MXEQDABS
PRINT                 NO         NO         NO         NO
CASE       A-3    MAX.(TMAX1+MXEQD, 2 X MXEQD)
MAXIMUM    ABS        A3A        MXEQD 2.0
PRINT                 NO         NO         NO         NO
COMMENT    ***********************************************************
CASE       A4A
COMBINE    TE2T ABS              MXEQDABS
COMMENT    ==========================================================
CASE       A-4
MAXIMUM    ABS        A4A        MXEQD 2.0
PRINT                 NO         NO         NO         NO
COMMENT    ***********************************************************
END LOADS
COMMENT    ************************************************************
RESTART
RESTORE    LMOD2
SAVE       LMOD3
END RESTRT
/*EOR
```

```
JM,P2.
USER(NU134WC,XNUTECX)
CHARGE,F3395JT,*311*XPS080503.
ROUTE(OUTPUT,DEF,DC=PR,FID=CJM40,ID)
SETTL,*.
SETJSL,*.
REWIND,OUTPUT.
*
*****************************************************
*   RESTART, INPUT, AND OUTPUT+DAYFILE ARE SAVED    *
*   IN THE FOLLOWING TAPE, IN THAT ORDER.           *
*****************************************************
COPYBR,INPUT,SYSIN.
REWIND,SYSIN.
GET,APPLIC/UN=LIBRARY.
BEGIN,PISTARR,APPLIC,LEVEL=351,NOTES=N,TSAVE=201DW.
/*EOR
TITLE      HPCI TURBINE EXHAUST (P201)NORMAL LOADS MODEL.
COMMENT    THIS MODEL REFLECT AS BUILT CHANGE PER BECHTEL CALC NO.
COMMENT    C31-6Q INCLUDING LATEST SUPPORT/VALVE DWG'S   LINE INDEX.
COMMENT    ***************************************
COMMENT          FILE: C31DWT
COMMENT    *********************************************************
COMMENT     AS BULT CHANGES WITH ALL SNUBBER REMAIN
COMMENT    *********************************************************
ID         CLIENT          = PUBLIC SERVICE ELECTRIC AND GAS COMPANY
ID         PROJECT NAME    = HOPE CREEK SNUBBER REDUCTION
ID         PROJECT NUMBER  = XPS-08
ID         FILE NUMBER     = PSE005.1016
ID         CALCULATION NO  = C-31
ID         RUN NO          =
ID         PREPARED BY     = C. J. MEHTA
ID         CHECKED BY      = A. S. HERLEKAR
COMMENT    ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                PISTAR GEOMETRY DEFINITION INPUT GROUP
COMMENT    ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT
GEOMETRY   HPCI TURBINE EXHAUST (006-HBB-24",20")(014-HBB-16")
START      I1CAP      120.0      750.0      -682.0     70.0       386.4      Y
COMMENT    ************************************************************
COMMENT    REF. DWG. 1-P-FD-01 REV. 19 & PDM DWG. 51
COMMENT    ************************************************************
CLASS 2
DESIGN     I1CAP155  366.0      155.0
DESIGN     160  210  366.0      175.0
COMMENT    ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                PIPING AND SUPPORT DEFINITION INPUT GROUP
COMMENT    ò*****ò*********ò*********ò*********ò*********ò*********ò
PIPE       I1CAPI2SPA0.0        15.21      -15.21                11   1
ADD WEIGHTI1CAP      105.0      105.0      105.0
SIF        I1CAP           2.0
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COMMENT        END CAP WEIGHT(FROM TUBE TURNS CATALOG)
PIPE       I2SPAI3SPA0.0        15.21      -15.21                11   1
PIPE       I3SPAI4SPA0.0        15.21      -15.21                12   1
PIPE       I4SPAI5SUP0.0        8.485      -8.485                10   1
SIF        I5SUP          1.9
PIPE       I5SUP I5EA 2.093     -8.485     -8.22                 16   1
PIPE       I5EA I1SAP 1.395     -5.657     -5.48                 13   1
STIFFNESS  I1SAPI1SA2 0.1744    -0.7071    -0.685     DCOSINE        1
MATRIX     1          K11  1.0E8      K22  1.0E8      K33  1.0E8
MATRIX     1          K44  1.0E3      K55  1.0E3      K66  1.0E2
PIPE       I1SA2 I2SA 1.395     -5.657     -5.48                 13   1
PIPE       I2SA  I3SA 3.122     -12.657    -12.27                14   1
PIPE       I3SA  I4SA 3.122     -12.657    -12.27                14   1
PIPE       I4SA  I5SA 3.663     -14.849    -14.39                15   1
PIPE       I5SA I6SAP 1.395     -5.657     -5.48                 13   1
STIFFNESS  I6SAPI6SA2 0.1774    -0.7071    -0.685     DCOSINE        1
PIPE       I6SA2I7SAN 1.134     -4.596     -4.45                 13   1
RESTRAINT  I7SANTRAN .9808      0.0        .1951      SPRING     1.0E8
RESTRAINT  I7SANTRAN -.1379     -0.707     .6935      SPRING     1.0E8
RESTRAINT  I7SANTRAN .1379      -0.707     -.6935     SPRING     1.0E8
RESTRAINT  I7SANROT  0.9808     0.0        0.1951     SPRING     1.0E10
RESTRAINT  I7SANROT  -.1379     -0.707     .6935      SPRING     1.0E10
RESTRAINT  I7SANROT  .1379      -0.707     -0.6935    SPRING     1.0E10
SIF        I7SAN          2.1
PIPE       I5SUP I5EB -6.62     -8.49      -5.31                 16   1
PIPE       I5EB I1SBP -4.41     -5.66      -3.54                 13   1
STIFFNESS  I1SBPI1SB2 -0.5515   -0.7071    -0.442     DCOSINE        1
PIPE       I1SB2 I2SB -4.41     -5.66      -3.54                 13   1
PIPE       I2SB  I3SB -13.53    -17.35     -10.86                14   1
PIPE       I3SB  I4SB -11.18    -14.33     -8.97                 14   1
PIPE       I4SB  I5SB -11.18    -14.33     -8.97                 14   1
PIPE       I5SB  I6SB -14.02    -17.97     -11.25                14   1
PIPE       I6SB  I7SB -11.58    -14.85     -9.29                 15   1
PIPE       I7SB I8SBP -4.41     -5.66      -3.54                 13   1
STIFFNESS  I8SBPI8SB2 -0.5515   -0.7071    -0.442     DCOSINE        1
PIPE       I8SB2I9SBN -3.59     -4.60      -2.87                 13   1
RESTRAINT  I9SBNTRAN 1.0        0.0        0.0        SPRING     1.0E8
RESTRAINT  I9SBNTRAN 0.0        -0.707     0.707      SPRING     1.0E8
RESTRAINT  I9SBNTRAN 0.0        -0.707     -0.707     SPRING     1.0E8
RESTRAINT  I9SBNROT  1.0        0.0        0.0        SPRING     1.0E10
RESTRAINT  I9SBNROT  0.0        -0.707     0.707      SPRING     1.0E10
RESTRAINT  I9SBNROT  0.0        -0.707     -0.707     SPRING     1.0E10
SIF        I9SBN          2.1
PIPE       I5SUPI6   0.0        6.72       -6.72                 10   1
PIPE       I6   I7   0.0        15.21      -15.21                10   1
PIPE       I7   I8   0.0        15.21      -15.21                10   1
PIPE       I8   I9WAT0.0        15.21      -15.21                10   1
PIPE       I9WATI10  0.0        43.58      -43.58                17   1
ELBOW      I10  INNOZ36.0                                        17   1
SIF        INNOZ P201     1.9
PIPE       INNOZP201 0.0        0.0        -28.5                 17   1
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COMMENT    ************************************************************
COMMENT    P201 STIFFNESSES ARE FOR STIFNNED TORUS
COMMENT    ************************************************************
RESTRAINT  P201 TRAN 1.0        0.0        0.0        SPRING    31.60E6
RESTRAINT  P201 TRAN 0.0        -0.9848    -0.1736    SPRING    5.120E6
RESTRAINT  P201 TRAN 0.0        0.1736     -0.9848    SPRING    1.470E6
RESTRAINT  P201 ROT  1.0        0.0        0.0        SPRING    15.70E6
RESTRAINT  P201 ROT  0.0        -0.9848    -0.1736    SPRING    15.66E6
RESTRAINT  P201 ROT  0.0        0.1736     -0.9848    SPRING    2.970E6
PIPE       P201 EXNOZ0.0        0.0        -46.5                 17   1
SIF        EXNOZ P201      1.9
SIF        P201            2.1
ELBOW      EXNOZ10   36.0                                        1    1
PIPE       10   12   -55.50    0.69       0.0                    1    1
PIPE       12   15   -55.50    0.69       0.0                    1    1
ELBOW      15   20   36.0                                        1    1
REDUCER    20   25   0.0       56.00      0.0                    2    1
PIPE       25   26BR 0.0       33.375     0.0                    3    1
COMMENT    ************************************************************
COMMENT    26BR IS 3" BRANCH LINE CONT. ON 1-P-BC-06 (P-204)
COMMENT    ************************************************************
PIPE       26BR 27BR 0.0       20.25      0.0                    3    1
PIPE       27BR H19  0.0       12         0.0                    3    1
COMMENT    ************************************************************
COMMENT    27BR     IS  3" WELD CAP.
COMMENT    ************************************************************
SIF        27BR            3.6
SIF        26BR            3.6
HANGER     H19                            4940.0     SPRING    1800.0
SIF        H19             2.0
PIPE       H19  30   0.0       43.5       0.0                    3    1
ELBOW      30   35   30.0                                        3    1
PIPE       35   H18  -33.00    0.29975    0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H18 AT NODE H18
COMMENT    SNUBBER IS REMAIN
COMMENT    ************************************************************
RESTRAINT  H18       0.0       1.0        0.0        SPRING    2.59E5
PIPE       H18  H17  -5.1875   0.048      0.0                    3    1
RESTRAINT  H17       0.0       0.0        1.0        SPRING    1.320E6
COMMENT    500LBS IS BEING APPLIED AS THE CONCENTRATED WEIGHT.
COMMENT      FOR THE PSA 35 SNUBBERS AND CLAMPS.REF PSA CATALOG.
ADD WEIGHTH18        500.0     500.0      500.0
PIPE       H17  40   -3.8125   0.055      0.0                    3    1
SIF        40              1.9
VALVE      40   45   -13.999   0.127      0.0                    4    1
VALVE      45   VBCG 0.0       16.4       0.0                    4    1
ADD WEIGHTVBCG       2640.0    2640.0     2640.0
VALVE      VBCG H22   0.0      34.35      0.0                    5    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-006-H22 AT NODE H22 (WAS 45CGS)
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TANGENT    85    TIP   30.00      0.0        0.0
ELBOW      85    90    30.0                                          3    1
COMMENT    ************************************************************
COMMENT    IT IS ASSUMED THAT THE BELLOWS ARE NEXT TO THE WALL
COMMENT    AND THE WALL IS APPROX 50 IN. FROM ELBOW WELD
PIPE       90    95BEL0.0       -0.9       -80.0                      3    1
SIF        95BEL            2.0
COMMENT    ************************************************************
RESTRAINT  95BELTRAN 0.0        0.0        -1.0       SPRING     310.0
RESTRAINT  95BELTRAN 0.0        1.0        0.0        SPRING     1825.0
RESTRAINT  95BELTRAN 1.0        0.0        0.0        SPRING     1825.0
RESTRAINT  95BELROT  0.0        0.0        -1.0       SPRING     6.67E4
RESTRAINT  95BELROT  0.0        1.0        0.0        SPRING     6.67E4
RESTRAINT  95BELROT  1.0        0.0        0.0        SPRING     6.67E4
ADD WEIGHT95BEL      135.0      135.0      135.0
PIPE       95BELH8   0.0        -0.5       -50.0                      3    1
HANGER     H8                              2860.0     SPRING     1200.0
PIPE       H8    91    0.0        -0.233     -21.00                   3    1
SIF        91               1.0
COMMENT    ************************************************************
COMMENT    CONNECTION  PT/N056A IS AT NODE 91
COMMENT    ************************************************************
COMMENT    1" DIA LINE 006-HBB-1" (PTN056E) AT NODE 92
COMMENT    ************************************************************
PIPE       91    H7    0.0        0.05       -3.5                     3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H07 AT NODE H7
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H7         1.0        0.0        0.0        SPRING     0.00000
PIPE       H7    92    0.0        0.094      -8.5                     3    1
SIF        92               1.0
COMMENT    ************************************************************
COMMENT    1" DIA LINE
COMMENT    ************************************************************
PIPE       92    100T  0.0        -0.503     -36.00                   3    1
PIPE       100T  105   0.0        -0.819     -66.875                  3    1
PIPE       105   H6    0.0        -0.819     -66.875                  3    1
SIF        100T             2.95
RESTRAINT  H6         0.0        0.0        1.0        SPRING      1.402E6
SIF        H6               2.0
PIPE       H6    H5A   0.0        -0.082     -18.25                   3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H05 AT NODE H5A.
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H5A        1.0        0.0        0.0        SPRING     0.00000
PIPE       H5A   H4A   0.0        -0.122     -10.750                  3    1
RESTRAINT  H4A        0.0        1.0        0.0        SPRING     6.160E5
PIPE       H4A   110   0.0        -0.408     -36.00                   3    1
ELBOW      110   115   30.0                                          3    1
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COMMENT    SNUBBER IS REMAIN
COMMENT    ************************************************************
RESTRAINT  H22        0.0        0.0        1.0        SPRING     8.700E4
ADD WEIGHTH22         150.0      150.0      150.0
VALVE      H22  45CG00.0         14.25      0.0                    5    1
ADD WEIGHT45CG0       310.0      310.0      310.0
VALVE      45   50   -13.999    0.127      0.0                    4    1
SIF        50              1.9
PIPE       50   H14  -3.25      0.030      0.0                    3    1
PIPE       H14  H15  -5.0       0.020      0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H15 AT NODE H15.
COMMENT    SNUBBER IS REMAIN
COMMENT    ************************************************************
RESTRAINT  H15        0.0        1.0        0.0        SPRING     4.950E5
RESTRAINT  H14        0.0        0.0        1.0        SPRING     3.491E6
ADD WEIGHTH15         500.0      500.0      500.0
COMMENT    ************************************************************
COMMENT    1" DIA LINE  1-P-FD-211 @ NODE 54BR
COMMENT    ************************************************************
PIPE       H15  54BR -3.25      0.030      0.0                    3    1
PIPE       54BR 55   -3.0       0.027                             3    1
VALVE      55   60   -38.498    0.350      0.0                    6    1
SIF        55              1.9
SIF        54BR            1.0
PIPE       60   H13  -6.625     0.060      0.0                    3    1
SIF        60              1.9
RESTRAINT  H13        0.0        1.0        0.0        SPRING      4.8E5
PIPE       H13  65   -35.375    0.322      0.0                    3    1
ELBOW      65   70   30.0                                          3    1
PIPE       70   H11  0.0        -40.0      0.0                    3    1
RESTRAINT  H11        -0.7844    0.0        -0.6202    SPRING      1.750E6
PIPE       H11  H12  0.0        -16.5      0.0                    3    1
RESTRAINT  H12        0.4524     0.0        -0.8918    SPRING      3.066E6
PIPE       H12  75   0.0        -51.0      0.0                    3    1
PIPE       75   H10  0.0        -48.5      0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-006-H10 AT NODE H10.
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H10         1.0        0.0        0.0        SPRING      0.00000
PIPE       H10  H9     0.0        -14.82     0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-006-H09 AT NODE H9
COMMENT    SNUBBER IS DELETED
COMMENT    ************************************************************
SNUBBER    H9          0.2801     0.0        -0.96      SPRING      0.0000
PIPE       H9   78     0.0        -54.0      0.0                    3    1
PIPE       78   80     0.0        -54.0      0.0                    3    1
ELBOW      80   85     30.0                                          3    1
TANGENT    TIP  85     30.00      0.0        0.0
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PIPE        115  120  55.750    -0.578    0.0                    3    1
PIPE        120  H3A  82.00     -0.891    0.0                    3    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO 1-P-FD-006-H03 AT NODE H3A.
COMMENT     SNUBBER IS DELETED
COMMENT     ************************************************************
SNUBBER     H3A       0.0767    0.0       -0.9965   SPRING    0.000000
PIPE        H3A  125T 18.25     -0.156    0.0                    3    1
PIPE        125T H2A  30.00     -0.312    0.0                    3    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO 1-P-FD-006-H02 AT NODE H2A.
COMMENT     SNUBBER IS DELETED
COMMENT     ************************************************************
SNUBBER     H2A       0.0       1.0       0.0       SPRING    0.00000
PIPE        H2A  H1A  6.0       -0.063    0.0                    3    1
HANGER      H1A                           2158.0    SPRING    900.0
PIPE        H1A  130  36.00     -0.375    0.0                    3    1
ELBOW       130  135  30.0                                       3    1
PIPE        135  140T 0.0       -77.313   0.0                    3    1
PIPE        140T 145CP0.0       -21.0     0.0                    3    1
COMMENT     ************************************************************
COMMENT     SMALL BRANCHES 1IN AND 2IN CLOSE TO NODE 145CP.
COMMENT     THESE ARE SBP 1-P-FD-201, 207, 208 & 234
COMMENT     SIF FOR BUTT WELD AT NODE 145CP
COMMENT     ************************************************************
SIF         145CP          1.8
ADD WEIGHT145CP     79.0      79.0      79.0
COMMENT     ************************************************************
COMMENT     END OF MODEL.007.HBB-1,"AT 4" BLIND FLANGE.
COMMENT     ************************************************************
PIPE        140T HPTUB0.0       0.0       20.75                  9    1
SIF         140T           2.95
COMMENT     HPCI TURBINE
ADD WEIGHTHPTUB     306.0     306.0     306.0
RESTRAINT HPTUBTRAN 1.0       0.0       0.0       SPRING     1.0E8
RESTRAINT HPTUBTRAN 0.0       1.0       0.0       SPRING     1.0E8
RESTRAINT HPTUBTRAN 0.0       0.0       1.0       SPRING     1.0E8
RESTRAINT HPTUBROT  1.0       0.0       0.0       SPRING     1.0E12
RESTRAINT HPTUBROT  0.0       1.0       0.0       SPRING     1.0E12
RESTRAINT HPTUBROT  0.0       0.0       1.0       SPRING     1.0E12
SIF         HPTUB          2.10
PIPE        125T 155  0.0       0.0       -17.125                8    1
SIF         125T           2.95
ADD WEIGHT155       112.0     112.0     112.0
SIF         155            1.9
COMMENT     ************************************************************
COMMENT     1-P-FD-014-HBB-16" BR LINE
COMMENT     ************************************************************
PIPE        100T 160  0.0       14.0      0.0                    7    1
SIF         160            1.90
SIF         165            1.90
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PIPE        160  162  0.0        5.00       0.0                    7    1
PIPE        162  163  0.0        11.0       0.0                    7    1
COMMENT     ************************************************************
COMMENT     1" VENT TO TORUS COMPARTMENT (SBP 1-P-FD-204)
COMMENT     ************************************************************
SIF         163             1.0
PIPE        163  165  0.0        7.0625     0.0                    7    1
ADD WEIGHT160        282.0      282.0      282.0
ADD WEIGHT165        282.0      282.0      282.0
PIPE        165  170  0.0        34.0       0.0                    7    1
ELBOW       170  175  24.0                                          7    1
PIPE        175  H2B  0.0        0.353      34.0                   7    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO 1-P-FD-014-H02 AT NODE H2B.
COMMENT     SNUBBER IS REMAIN (PAIR)
COMMENT     ************************************************************
RESTRAINT H2B        0.0        0.0        1.0        SPRING     2.530E5
SIF         H2B             2.0
PIPE        H2B  H1B  0.0        0.145      13.999                 7    1
RESTRAINT H1B        1.0        0.0        0.0        SPRING     3.41E6
RESTRAINT H1B        0.0        1.0        0.0        SPRING     3.41E6
SIF         H1B             2.0
PIPE        H1B  180BL0.0        0.501      48.330                 7    1
COMMENT     ************************************************************
COMMENT     IT IS ASSUMED THAT THE BELLOWS ARE ABOUT 4FT FROM
COMMENT     THE SUPPORT H-01 ON 16IN LINE.
COMMENT     ************************************************************
RESTRAINT 180BLTRAN 0.0        0.0        1.0        SPRING     260.0
RESTRAINT 180BLTRAN 0.0        1.0        0.0        SPRING     1250.0
RESTRAINT 180BLTRAN 1.0        0.0        0.0        SPRING     1250.0
RESTRAINT 180BLROT  0.0        0.0        1.0        SPRING     5.13E4
RESTRAINT 180BLROT  0.0        1.0        0.0        SPRING     5.13E4
RESTRAINT 180BLROT  1.0        0.0        0.0        SPRING     5.13E4
SIF         180BL           2.0
ADD WEIGHT180BL      130.0      130.0      130.0
PIPE        180BL185 0.0        0.501      48.330                 7    1
PIPE        185  H3B  0.0        0.501      48.330                 7    1
RESTRAINT H3B        0.0        1.0        0.0        SPRING     8.34E5
PIPE        H3B  190  0.0        0.37       35.998                 7    1
ELBOW       190  195  24.0                                          7    1
PIPE        195  200  0.0        70.208     0.0                    7    1
PIPE        200  205  0.0        46.208     0.0                    7    1
PIPE        205  H5B  0.0        46.208     0.0                    7    1
PIPE        H5B  H4B  0.0        5.50       0.0                    7    1
RESTRAINT H5B        -0.5210    0.0        -0.8535    SPRING     3.85E5
RESTRAINT H4B        0.6264     0.0        -0.7795    SPRING     5.16E5
PIPE        H4B  210  0.0        51.500     0.0                    7    1
COMMENT     END OF MODEL.  SEE DWG. 1-P-FD-01 REV.19
COMMENT       ******************************************************
COMMENT        HYDROSTATIC LOAD ON INTERNAL SUBMERGED PIPING
COMMENT       ******************************************************
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ADD WEIGHTI1CAP      173.5      123.0      123.0
ADD WEIGHTI2SPA      346.9      245.0      245.0
ADD WEIGHTI3SPA      346.9      245.0      245.0
ADD WEIGHTI4SPA      270.0      191.0      191.0
ADD WEIGHTI5SUP      199.0      199.00     199.00
ADD WEIGHTI6         250.0      177.0      177.0
ADD WEIGHTI7         346.9      245.0      245.0
ADD WEIGHTI8         346.9      245.0      245.0
ADD WEIGHTI9WAT      173.5      123.0      123.0
COMMENT    ************************************************************
COMMENT    HYDRO LOAD FOR STRUT IS BEING ADDED EQUALLY IN
COMMENT    ALL THREE DIRECTIONS BECAUSE IT IS SMALL.(CONSERVATIVE)
COMMENT    ************************************************************
ADD WEIGHTI1SAP      25.9       25.9       25.9
ADD WEIGHTI2SA       41.9       41.9       41.9
ADD WEIGHTI3SA       57.9       57.9       57.9
ADD WEIGHTI4SA       76.7       76.7       76.7
ADD WEIGHTI5SA       60.7       60.7       60.7
ADD WEIGHTI6SAP      23.5       23.5       23.5
ADD WEIGHTI7SAN      10.5       10.5       10.5
COMMENT      STRUT TWO
ADD WEIGHTI1SBP      25.9       25.9       25.9
ADD WEIGHTI2SB       52.6       52.6       52.6
ADD WEIGHTI3SB       72.5       72.5       72.5
ADD WEIGHTI4SB       65.6       65.6       65.6
ADD WEIGHTI5SB       73.9       73.9       73.9
ADD WEIGHTI6SB       88.9       88.9       88.9
ADD WEIGHTI7SB       60.7       60.7       60.7
ADD WEIGHTI8SBP      23.5       23.5       23.5
ADD WEIGHTI9SBN      10.5       10.5       10.5
COMMENT    ************************************************************
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                    PROPERTY AND MATERIAL DEFINITION
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
PROPERTY   1                                         24.0SCH20 WATER     1.60
PROPERTY   2          22.0       0.375      8.1     24X20RED  WATER     1.48
PROPERTY   3                                         20.0SCH20 WATER     1.36
PROPERTY   4          20.75      0.75       00.000  V006BODY  WATER     1.36
PROPERTY   5          6.70       0.750      0.0     V006 OP
PROPERTY   6          20.75      0.75       46.75   V004      WATER     1.36
PROPERTY   7                                         16.0SCH30 WATER     1.12
PROPERTY   8                                         10.0SCH40 WATER     0.80
PROPERTY   9          18.0       0.375      5.88              WATER     1.36
PROPERTY   10                                        24.0SCH80 WATER
PROPERTY   11         24.0       0.50       10.417            WATER
PROPERTY   12                                        24.0SCH40 WATER
PROPERTY   13                                        10.0SCH100
PROPERTY   14                                        10.0SCH160
PROPERTY   15                                        12.0SCH140
PROPERTY   16         24.0       1.218      0.0     WTLESS
PROPERTY   17                                        24.0SCH80 WATER
```

```
MATERIAL  1                                          CARBON
END GEOM
COMMENT
LOADING
COMMENT
CASE      DWT        DEAD WEIGHT HYDRO TEST
DEAD LOAD
END LOADS
COMMENT   ******************************************************
EVALUATE
COMMENT   ******************************************************
COMMENT   ****           LEVELS A  EVALUATION                 *****
COMMENT   ******************************************************
CODE                CLASS 2   DESIGN    77ED S77
COMMENT   ******************************************************
COMMENT   *****          L.C. A-1 IS EQN. 8 BELOW             *****
COMMENT   ******************************************************
EQUATION  8    DWT
COMMENT   ******************************************************
COMMENT    FOR HYDRO TEST DESIGN PRESSURE =1.25 X P (=155)=194. **
COMMENT    FOR HYDRO TEST DESIGN PRESSURE =1.25 X P (=175)=219. **
COMMENT   ******************************************************
PEAK PRES I1CAP 155      194.0
PEAK PRES 160   210      219.0
ALLOWABLE 1          15000.    15000.
COMMENT   ******************************************************
END CODE
RESTART
SAVE      201DW
END RESTRT
/*EOR
```

```
CJM,P3.
USER(NU134WC,XNUTECX)
CHARGE,F3395JT,*311*XPS080501.
ROUTE(OUTPUT,DEF,DC=PR,FID=CJM40,ID)
SETTL,*.
SETJSL,*.
REWIND,OUTPUT.
*
**************************************************
*   RESTART, INPUT, AND OUTPUT+DAYFILE ARE SAVED    *
*   IN THE FOLLOWING TAPE, IN THAT ORDER.           *
**************************************************
COPYBR,INPUT,SYSIN.
REWIND,SYSIN.
GET,APPLIC/UN=LIBRARY.
BEGIN,PISTARR,APPLIC,LEVEL=351,NOTES=N,TSAVE=201R,
PTAPE,ROUTE=NES01.
GOTO,1.
EXIT.
1,REWIND,TAPE14,TAPE16.
TRS(LFN=TAPE,OP=W,D=PE,L=$P201_RPDISK$,SYM=P201RP,CT=PU)
COPYBF,TAPE14,TAPE.
COPYBF,TAPE16,TAPE.
**************************************************
*   ATTACH PISTAR MODEL IMMEDIATELY BELOW "/EOR", *
*   FOLLOWED BY LOAD MODULE-1                     *
**************************************************
/*EOR
TITLE     HPCI TURBINE EXHAUST (P201) RUPTURE OF PRESSURE RELIEF DISK
COMMENT   THIS MODEL REFLECT AS BUILT CHANGE PER BECHTEL CALC NO.
COMMENT   C31-6Q INCLUDING LATEST SUPPORT/VALVE DWG'S   LINE INDEX.
COMMENT   ************************************
COMMENT   ***********************************************************
COMMENT   ***********************************************************
COMMENT   *          FILE NAME : C31RUP                             *
COMMENT   ***********************************************************
ID        CLIENT          = PUBLIC SERVICE ELECTRIC AND GAS COMPANY
ID        PROJECT NAME    = HOPE CREEK SNUBBER REDUCTION
ID        PROJECT NUMBER  = XPS-08
ID        FILE NUMBER     = PSE005.1016
ID        CALCULATION NO  = C-31
ID        RUN NO          =
ID        PREPARED BY     = C. J. MEHTA
ID        CHECKED BY      = A. S. HERLEKAR
COMMENT   ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                PISTAR GEOMETRY DEFINITION INPUT GROUP
COMMENT   ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT
GEOMETRY  HPCI TURBINE EXHAUST (006-HBB-24",20")(014-HBB-16")
START     I1CAP     120.0     750.0     -682.0    70.0      386.4     Y
COMMENT   ***************************************************************
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COMMENT    REF. DWG. 1-P-FD-01 REV. 19 & PDM DWG. 51
COMMENT    ************************************************************
CLASS 2
DESIGN     I1CAP155  366.0     155.0
DESIGN     160  210  366.0     175.0
COMMENT    ********************************************************
COMMENT              PIPING AND SUPPORT DEFINITION INPUT GROUP
COMMENT    ********************************************************
PIPE       I1CAPI2SPA0.0       15.21     -15.21                11   1
ADD WEIGHTI1CAP      105.0     105.0     105.0
SIF        I1CAP          2.0
COMMENT         END CAP WEIGHT(FROM TUBE TURNS CATALOG)
PIPE       I2SPAI3SPA0.0       15.21     -15.21                11   1
PIPE       I3SPAI4SPA0.0       15.21     -15.21                12   1
PIPE       I4SPAI5SUP0.0       8.485     -8.485                10   1
SIF        I5SUP          1.9
PIPE       I5SUP I5EA 2.093    -8.485    -8.22                 16   1
PIPE       I5EA I1SAP 1.395    -5.657    -5.48                 13   1
STIFFNESS  I1SAPI1SA2 0.1744   -0.7071   -0.685    DCOSINE        1
MATRIX     1          K11  1.0E8     K22  1.0E8     K33  1.0E8
MATRIX     1          K44  1.0E3     K55  1.0E3     K66  1.0E2
PIPE       I1SA2 I2SA 1.395    -5.657    -5.48                 13   1
PIPE       I2SA  I3SA 3.122    -12.657   -12.27                14   1
PIPE       I3SA  I4SA 3.122    -12.657   -12.27                14   1
PIPE       I4SA  I5SA 3.663    -14.849   -14.39                15   1
PIPE       I5SA I6SAP 1.395    -5.657    -5.48                 13   1
STIFFNESS  I6SAPI6SA2 0.1774   -0.7071   -0.685    DCOSINE        1
PIPE       I6SA2I7SAN 1.134    -4.596    -4.45                 13   1
RESTRAINT  I7SANTRAN .9808     0.0       .1951     SPRING     1.0E8
RESTRAINT  I7SANTRAN -.1379    -0.707    .6935     SPRING     1.0E8
RESTRAINT  I7SANTRAN .1379     -0.707    -.6935    SPRING     1.0E8
RESTRAINT  I7SANROT  0.9808    0.0       0.1951    SPRING     1.0E10
RESTRAINT  I7SANROT  -.1379    -0.707    .6935     SPRING     1.0E10
RESTRAINT  I7SANROT  .1379     -0.707    -0.6935   SPRING     1.0E10
SIF        I7SAN          2.1
PIPE       I5SUP I5EB -6.62    -8.49     -5.31                 16   1
PIPE       I5EB I1SBP -4.41    -5.66     -3.54                 13   1
STIFFNESS  I1SBPI1SB2 -0.5515  -0.7071   -0.442    DCOSINE        1
PIPE       I1SB2 I2SB -4.41    -5.66     -3.54                 13   1
PIPE       I2SB  I3SB -13.53   -17.35    -10.86                14   1
PIPE       I3SB  I4SB -11.18   -14.33    -8.97                 14   1
PIPE       I4SB  I5SB -11.18   -14.33    -8.97                 14   1
PIPE       I5SB  I6SB -14.02   -17.97    -11.25                14   1
PIPE       I6SB  I7SB -11.58   -14.85    -9.29                 15   1
PIPE       I7SB I8SBP -4.41    -5.66     -3.54                 13   1
STIFFNESS  I8SBPI8SB2 -0.5515  -0.7071   -0.442    DCOSINE        1
PIPE       I8SB2I9SBN -3.59    -4.60     -2.87                 13   1
RESTRAINT  I9SBNTRAN 1.0       0.0       0.0       SPRING     1.0E8
RESTRAINT  I9SBNTRAN 0.0       -0.707    0.707     SPRING     1.0E8
RESTRAINT  I9SBNTRAN 0.0       -0.707    -0.707    SPRING     1.0E8
RESTRAINT  I9SBNROT  1.0       0.0       0.0       SPRING     1.0E10
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RESTRAINT I9SBNROT  0.0        -0.707     0.707      SPRING     1.0E10
RESTRAINT I9SBNROT  0.0        -0.707     -0.707     SPRING     1.0E10
SIF       I9SBN            2.1
PIPE      I5SUPI6   0.0        6.72       -6.72                 10   1
PIPE      I6   I7   0.0        15.21      -15.21                10   1
PIPE      I7   I8   0.0        15.21      -15.21                10   1
PIPE      I8   I9WAT0.0        15.21      -15.21                10   1
PIPE      I9WATI10  0.0        43.58      -43.58                17   1
ELBOW     I10  INNOZ36.0                                        17   1
SIF       INNOZ P201       1.9
PIPE      INNOZP201 0.0        0.0        -28.5                 17   1
RESTRAINT P201 TRAN 1.0        0.0        0.0        SPRING     31.60E6
RESTRAINT P201 TRAN 0.0        -0.9848    -0.1736    SPRING     5.120E6
RESTRAINT P201 TRAN 0.0        0.1736     -0.9848    SPRING     1.470E6
RESTRAINT P201 ROT  1.0        0.0        0.0        SPRING     15.70E6
RESTRAINT P201 ROT  0.0        -0.9848    -0.1736    SPRING     15.66E6
RESTRAINT P201 ROT  0.0        0.1736     -0.9848    SPRING     2.970E6
PIPE      P201 EXNOZ0.0        0.0        -46.5                 17   1
SIF       EXNOZ P201       1.9
SIF       P201             2.1
ELBOW     EXNOZ10   36.0                                        1    1
PIPE      10   12   -55.50    0.69       0.0                   1    1
PIPE      12   15   -55.50    0.69       0.0                   1    1
ELBOW     15   20   36.0                                        1    1
REDUCER   20   25   0.0       56.00      0.0                   2    1
PIPE      25   26BR 0.0       33.375     0.0                   3    1
COMMENT   ************************************************************
COMMENT   26BR IS 3" BRANCH LINE CONT. ON 1-P-BC-06 (P-204)
COMMENT   ************************************************************
PIPE      26BR 27BR 0.0        20.25      0.0                   3    1
PIPE      27BR H19  0.0        12         0.0                   3    1
COMMENT   ************************************************************
COMMENT   27BR     IS  3" WELD CAP.
COMMENT   ************************************************************
SIF       27BR             3.6
SIF       26BR             3.6
HANGER    H19                            4940.0     SPRING     1800.0
SIF       H19              2.0
PIPE      H19  30   0.0        43.5       0.0                   3    1
ELBOW     30   35   30.0                                        3    1
PIPE      35   H18  -33.00     0.29975    0.0                   3    1
COMMENT   ************************************************************
COMMENT   SNUBBER NO. 1-P-FD-006-H18 AT NODE H18
COMMENT   ************************************************************
SNUBBER   H18       0.0        1.0        0.0        SPRING     2.59E5
PIPE      H18  H17  -5.1875    0.048      0.0                   3    1
RESTRAINT H17       0.0        0.0        1.0        SPRING     1.320E6
COMMENT   500LBS IS BEING APPLIED AS THE CONCENTRATED WEIGHT.
COMMENT     FOR THE PSA 35 SNUBBERS AND CLAMPS.REF PSA CATALOG.
ADD WEIGHTH18       500.0      500.0      500.0
PIPE      H17  40   -3.8125    0.055      0.0                   3    1
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SIF        40                1.9
VALVE      40    45    -13.999    0.127      0.0                    4    1
VALVE      45    VBCG  0.0        16.4       0.0                    4    1
ADD WEIGHTVBCG         2640.0     2640.0     2640.0
VALVE      VBCG  H22    0.0        34.35      0.0                    5    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-006-H22 AT NODE H22 (WAS 45CGS)
COMMENT    ************************************************************
SNUBBER    H22           0.0        0.0        1.0        SPRING    8.700E4
ADD WEIGHTH22          150.0      150.0      150.0
VALVE      H22   45CG00.0           14.25      0.0                    5    1
ADD WEIGHT45CGO        310.0      310.0      310.0
VALVE      45    50    -13.999    0.127      0.0                    4    1
SIF        50                1.9
PIPE       50    H14   -3.25      0.030      0.0                    3    1
PIPE       H14   H15   -5.0       0.020      0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO. 1-P-FD-006-H15 AT NODE H15.
COMMENT    ************************************************************
SNUBBER    H15           0.0        1.0        0.0        SPRING    4.950E5
RESTRAINT  H14           0.0        0.0        1.0        SPRING    3.491E6
ADD WEIGHTH15          500.0      500.0      500.0
COMMENT    ************************************************************
COMMENT    1" DIA LINE  1-P-FD-211 @ NODE 54BR
COMMENT    ************************************************************
PIPE       H15   54BR -3.25       0.030      0.0                    3    1
PIPE       54BR  55   -3.0        0.027                             3    1
VALVE      55    60   -38.498     0.350      0.0                    6    1
SIF        55                1.9
SIF        54BR              1.0
PIPE       60    H13   -6.625     0.060      0.0                    3    1
SIF        60                1.9
RESTRAINT  H13           0.0        1.0        0.0        SPRING     4.8E5
PIPE       H13   65    -35.375     0.322      0.0                    3    1
ELBOW      65    70    30.0                                          3    1
PIPE       70    H11   0.0        -40.0      0.0                    3    1
RESTRAINT  H11          -0.7844    0.0        -0.6202    SPRING     1.750E6
PIPE       H11   H12   0.0        -16.5      0.0                    3    1
RESTRAINT  H12           0.4524     0.0        -0.8918    SPRING     3.066E6
PIPE       H12   75    0.0        -51.0      0.0                    3    1
PIPE       75    H10   0.0        -48.5      0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-006-H10 AT NODE H10.
COMMENT    ************************************************************
SNUBBER    H10           1.0        0.0        0.0        SPRING     0.00000
PIPE       H10   H9      0.0       -14.82      0.0                    3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-006-H09 AT NODE H9
COMMENT    ************************************************************
SNUBBER    H9            0.2801     0.0        -0.96      SPRING     0.0000
PIPE       H9    78    0.0        -54.0      0.0                    3    1
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PIPE        78   80   0.0        -54.0      0.0                    3    1
ELBOW       80   85   30.0                                         3    1
TANGENT     TIP  85   30.00      0.0        0.0
TANGENT     85   TIP  30.00      0.0        0.0
ELBOW       85   90   30.0                                         3    1
COMMENT     ************************************************************
COMMENT     IT IS ASSUMED THAT THE BELLOWS ARE NEXT TO THE WALL
COMMENT     AND THE WALL IS APPROX 50 IN. FROM ELBOW WELD
PIPE        90   95BEL0.0        -0.9       -80.0                  3    1
SIF         95BEL            2.0
COMMENT     ************************************************************
RESTRAINT 95BELTRAN 0.0        0.0        -1.0       SPRING    310.0
RESTRAINT 95BELTRAN 0.0        1.0        0.0        SPRING    1825.0
RESTRAINT 95BELTRAN 1.0        0.0        0.0        SPRING    1825.0
RESTRAINT 95BELROT  0.0        0.0        -1.0       SPRING    6.67E4
RESTRAINT 95BELROT  0.0        1.0        0.0        SPRING    6.67E4
RESTRAINT 95BELROT  1.0        0.0        0.0        SPRING    6.67E4
ADD WEIGHT95BEL     135.0      135.0      135.0
PIPE        95BELH8  0.0       -0.5       -50.0                  3    1
HANGER      H8                            2860.0     SPRING    1200.0
PIPE        H8   91   0.0       -0.233     -21.00                 3    1
SIF         91               1.0
COMMENT     ************************************************************
COMMENT     CONNECTION  PT/N056A IS AT NODE 91
COMMENT     ************************************************************
COMMENT     1" DIA LINE 006-HBB-1" (PTN056E) AT NODE 92
COMMENT     ************************************************************
PIPE        91   H7   0.0        0.05       -3.5                   3    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO. 1-P-FD-006-H07 AT NODE H7
COMMENT     ************************************************************
SNUBBER     H7       1.0        0.0        0.0        SPRING    0.00000
PIPE        H7   92   0.0        0.094      -8.5                   3    1
SIF         92               1.0
COMMENT     ************************************************************
COMMENT     1" DIA LINE
COMMENT     ************************************************************
PIPE        92   100T 0.0       -0.503     -36.00                 3    1
PIPE        100T 105  0.0       -0.819     -66.875                3    1
PIPE        105  H6   0.0       -0.819     -66.875                3    1
SIF         100T             2.95
RESTRAINT H6         0.0        0.0        1.0        SPRING     1.402E6
SIF         H6               2.0
PIPE        H6   H5A  0.0       -0.082     -18.25                 3    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO. 1-P-FD-006-H05 AT NODE H5A.
COMMENT     ************************************************************
SNUBBER     H5A      1.0        0.0        0.0        SPRING    0.00000
PIPE        H5A  H4A  0.0       -0.122     -10.750                3    1
RESTRAINT H4A        0.0        1.0        0.0        SPRING    6.160E5
PIPE        H4A  110  0.0       -0.408     -36.00                 3    1
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ELBOW      110  115  30.0                                          3    1
PIPE       115  120  55.750    -0.578    0.0                       3    1
PIPE       120  H3A  82.00     -0.891    0.0                       3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-006-H03 AT NODE H3A.
COMMENT    ************************************************************
SNUBBER    H3A       0.0767    0.0       -0.9965   SPRING    0.000000
PIPE       H3A  125T 18.25     -0.156    0.0                       3    1
PIPE       125T H2A  30.00     -0.312    0.0                       3    1
COMMENT    ************************************************************
COMMENT    SNUBBER NO 1-P-FD-006-H02 AT NODE H2A.
COMMENT    ************************************************************
SNUBBER    H2A       0.0       1.0       0.0       SPRING    0.00000
PIPE       H2A  H1A  6.0       -0.063    0.0                       3    1
HANGER     H1A                           2158.0    SPRING    900.0
PIPE       H1A  130  36.00     -0.375    0.0                       3    1
ELBOW      130  135  30.0                                          3    1
PIPE       135  140T 0.0       -77.313   0.0                       3    1
PIPE       140T 145CP0.0       -21.0     0.0                       3    1
COMMENT    ************************************************************
COMMENT    SMALL BRANCHES 1IN AND 2IN CLOSE TO NODE 145CP.
COMMENT    THESE ARE SBP 1-P-FD-201, 207, 208 & 234
COMMENT    SIF FOR BUTT WELD AT NODE 145CP
COMMENT    ************************************************************
SIF        145CP          1.8
ADD WEIGHT145CP      79.0      79.0      79.0
COMMENT    ************************************************************
COMMENT    END OF MODEL.007.HBB-1,"AT 4" BLIND FLANGE.
COMMENT    ************************************************************
PIPE       140T HPTUB0.0       0.0       20.75                     9    1
SIF        140T           2.95
COMMENT    HPCI TURBINE
ADD WEIGHTHPTUB      306.0     306.0     306.0
RESTRAINT  HPTUBTRAN 1.0       0.0       0.0       SPRING     1.0E8
RESTRAINT  HPTUBTRAN 0.0       1.0       0.0       SPRING     1.0E8
RESTRAINT  HPTUBTRAN 0.0       0.0       1.0       SPRING     1.0E8
RESTRAINT  HPTUBROT  1.0       0.0       0.0       SPRING     1.0E12
RESTRAINT  HPTUBROT  0.0       1.0       0.0       SPRING     1.0E12
RESTRAINT  HPTUBROT  0.0       0.0       1.0       SPRING     1.0E12
SIF        HPTUB          2.10
PIPE       125T 155  0.0       0.0       -17.125                   8    1
SIF        125T           2.95
ADD WEIGHT155        112.0     112.0     112.0
SIF        155            1.9
COMMENT    ************************************************************
COMMENT    1-P-FD-014-HBB-16" BR LINE
COMMENT    ************************************************************
PIPE       100T 160  0.0       14.0      0.0                       7    1
SIF        160            1.90
SIF        165            1.90
PIPE       160  162  0.0       5.00      0.0                       7    1
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PIPE        162  163  0.0        11.0       0.0                    7    1
COMMENT     ************************************************************
COMMENT     1" VENT TO TORUS COMPARTMENT (SBP 1-P-FD-204)
COMMENT     ************************************************************
SIF         163            1.0
PIPE        163  165  0.0        7.0625     0.0                    7    1
ADD WEIGHT160        282.0      282.0      282.0
ADD WEIGHT165        282.0      282.0      282.0
PIPE        165  170  0.0        34.0       0.0                    7    1
ELBOW       170  175  24.0                                          7    1
PIPE        175  H2B  0.0        0.353      34.0                   7    1
COMMENT     ************************************************************
COMMENT     SNUBBER NO 1-P-FD-014-H02 AT NODE H2B.
COMMENT     ************************************************************
SNUBBER     H2B        0.0       0.0        1.0        SPRING      2.530E5
SIF         H2B             2.0
PIPE        H2B  H1B  0.0        0.145      13.999                 7    1
RESTRAINT H1B          1.0       0.0        0.0        SPRING      3.41E6
RESTRAINT H1B          0.0       1.0        0.0        SPRING      3.41E6
SIF         H1B             2.0
PIPE        H1B  180BL0.0        0.501      48.330                 7    1
COMMENT     ************************************************************
COMMENT     IT IS ASSUMED THAT THE BELLOWS ARE ABOUT 4FT FROM
COMMENT     THE SUPPORT H-01 ON 16IN LINE.
COMMENT     ************************************************************
RESTRAINT 180BLTRAN 0.0      0.0        1.0        SPRING     260.0
RESTRAINT 180BLTRAN 0.0      1.0        0.0        SPRING     1250.0
RESTRAINT 180BLTRAN 1.0      0.0        0.0        SPRING     1250.0
RESTRAINT 180BLROT  0.0      0.0        1.0        SPRING     5.13E4
RESTRAINT 180BLROT  0.0      1.0        0.0        SPRING     5.13E4
RESTRAINT 180BLROT  1.0      0.0        0.0        SPRING     5.13E4
SIF         180BL           2.0
ADD WEIGHT180BL      130.0      130.0      130.0
PIPE        180BL185 0.0         0.501      48.330                 7    1
PIPE        185  H3B  0.0        0.501      48.330                 7    1
RESTRAINT H3B          0.0       1.0        0.0        SPRING     8.34E5
PIPE        H3B  190  0.0        0.37       35.998                 7    1
ELBOW       190  195  24.0                                          7    1
PIPE        195  200  0.0        70.208     0.0                    7    1
PIPE        200  205  0.0        46.208     0.0                    7    1
PIPE        205  H5B  0.0        46.208     0.0                    7    1
PIPE        H5B  H4B  0.0        5.50       0.0                    7    1
RESTRAINT H5B          -0.5210   0.0        -0.8535    SPRING      3.85E5
RESTRAINT H4B          0.6264    0.0        -0.7795    SPRING      5.16E5
PIPE        H4B  210  0.0        51.500     0.0                    7    1
COMMENT     END OF MODEL.  SEE DWG. 1-P-FD-01 REV.19
COMMENT       ******************************************************
COMMENT        HYDROSTATIC LOAD ON INTERNAL SUBMERGED PIPING
COMMENT       ******************************************************
ADD WEIGHTI1CAP      173.5      123.0      123.0
ADD WEIGHTI2SPA      346.9      245.0      245.0
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ADD WEIGHTI3SPA      346.9       245.0       245.0
ADD WEIGHTI4SPA      270.0       191.0       191.0
ADD WEIGHTI5SUP      199.0       199.00      199.00
ADD WEIGHTI6         250.0       177.0       177.0
ADD WEIGHTI7         346.9       245.0       245.0
ADD WEIGHTI8         346.9       245.0       245.0
ADD WEIGHTI9WAT      173.5       123.0       123.0
COMMENT    ************************************************************
COMMENT    HYDRO LOAD FOR STRUT IS BEING ADDED EQUALLY IN
COMMENT    ALL THREE DIRECTIONS BECAUSE IT IS SMALL.(CONSERVATIVE)
COMMENT    ************************************************************
ADD WEIGHTI1SAP      25.9        25.9        25.9
ADD WEIGHTI2SA       41.9        41.9        41.9
ADD WEIGHTI3SA       57.9        57.9        57.9
ADD WEIGHTI4SA       76.7        76.7        76.7
ADD WEIGHTI5SA       60.7        60.7        60.7
ADD WEIGHTI6SAP      23.5        23.5        23.5
ADD WEIGHTI7SAN      10.5        10.5        10.5
COMMENT      STRUT TWO
ADD WEIGHTI1SBP      25.9        25.9        25.9
ADD WEIGHTI2SB       52.6        52.6        52.6
ADD WEIGHTI3SB       72.5        72.5        72.5
ADD WEIGHTI4SB       65.6        65.6        65.6
ADD WEIGHTI5SB       73.9        73.9        73.9
ADD WEIGHTI6SB       88.9        88.9        88.9
ADD WEIGHTI7SB       60.7        60.7        60.7
ADD WEIGHTI8SBP      23.5        23.5        23.5
ADD WEIGHTI9SBN      10.5        10.5        10.5
COMMENT    ************************************************************
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
COMMENT                    PROPERTY AND MATERIAL DEFINITION
COMMENT    ò*****ò*****ò*********ò*********ò*********ò*********ò*********ò
PROPERTY   1                                         24.0SCH20 STEAM     1.60
PROPERTY   2          22.0        0.375       8.1   24X20RED  STEAM     1.48
PROPERTY   3                                         20.0SCH20 STEAM     1.36
PROPERTY   4          20.75       0.75        00.000 V006BODY STEAM     1.36
PROPERTY   5          6.70        0.750       0.0   V006 OP
PROPERTY   6          20.75       0.75        46.75 V004      STEAM     1.36
PROPERTY   7                                         16.0SCH30 STEAM     1.12
PROPERTY   8                                         10.0SCH40 STEAM     0.80
PROPERTY   9          18.0        0.375       5.88            STEAM     1.36
PROPERTY   10                                        24.0SCH80 WATER
PROPERTY   11         24.0        0.50        10.417          WATER
PROPERTY   12                                        24.0SCH40 WATER
PROPERTY   13                                        10.0SCH100
PROPERTY   14                                        10.0SCH160
PROPERTY   15                                        12.0SCH140
PROPERTY   16         24.0        1.218       0.0   WTLESS
PROPERTY   17                                        24.0SCH80 STEAM
MATERIAL   1                                         CARBON
END GEOM
```

```
COMMENT    ******************************************************
COMMENT    *          LOAD AND CODE EVALUATION MODULE           *
COMMENT    ******************************************************
COMMENT    ******************************************************
COMMENT    *  SNUBBER  REMAIN          :  006-H18,H22,H15,       *
COMMENT    *                              014-H02,              *
COMMENT    ******************************************************
COMMENT    *  SNUBBER  CHANGE TO STRUT :  NONE                   *
COMMENT    ******************************************************
COMMENT    *  SNUBBER  DELETED         : 006-H10,H07,H05,H03,H02 *
COMMENT                                  H09
COMMENT    ******************************************************
COMMENT    ******************************************************
LOADING    LOAD MODULE
COMMENT    ******************************************************
COMMENT
CASE       DW         DEAD WEIGHT
DEAD LOAD
COMMENT    ******************************************************
COMMENT
COMMENT    DYNAMIC ANALYSIS FOR THE HPCI STEAM EXHAUST LINE DUE TO THE
COMMENT    40 MSEC RUPTURE OF THE PRESSURE RELIEF DISK
COMMENT    REF: BECHTEL CALC REPORT NO. S/10855/D-034, REV-1 NUTECH
COMMENT    PSE005.0024.06
COMMENT
COMMENT    ******************************************************
COMMENT    HPCI TURBINE EXHAUST (P201) RUPTURE OF PRESSURE RELIEF DISK
COMMENT    ******************************************************
COMMENT
CASE       RUPD1  DYNAMIC TIME HISTORY
INTEGRATE            1.727915  16.08E-05
TIME-STEP            300       0.001      1
F-FUNCTION 162       Y-TRAN    1    -1.0      FOR AMPLITUDE-1 AT FG-PSE/D003
F-FUNCTION H1B       Z-TRAN    2    -1.0      FOR AMPLITUDE-2 AT SUP-014-H01
F-FUNCTION H4B       Y-TRAN    3    -1.0      FOR AMPLITUDE-3 AT SUP-014-H04
AMPLITUDE  1   0.0        0.0       5756.0    0.004     5756.0    0.04
AMPLITUDE  1   0.0        0.044
AMPLITUDE  2   0.0        0.000     0.0       0.004     18551.0   0.015
AMPLITUDE  2   18551.0   0.044     0.0       0.055
AMPLITUDE  3   0.0        0.000     0.0       0.015     33250.0   0.055
AMPLITUDE  3   33250.0   0.300
NODES      I1SAP I4SAI6SAPI7SANI1SBP I6SBI8SBPI9SBNINNOZEXNOZ   10   15   20
NODES       26BR 27BR   30   35  H18  H17   45  H22  H14  H15 54BR   55   60
NODES        H13   65   70  H11  H12  H10   H9   80   85   9095BEL   H8   91
NODES         H7   92 100T   H6  H5A  H4A  110  115  H3A 125T  H2A  H1A 140T
NODES      HPTUB  162  165  170  175  H2B  H1B180BL  H3B  190  195  H5B  H4B
NODES        21045CGO P201
PRINT
END LOADS
COMMENT    ******************************************************
EVALUATE
```

```
COMMENT    ********************************************************
COMMENT    DISK RUPTURE LOAD CONSIDERED FOR THE FAULTED CONDITION
COMMENT    IN ACCORDANCE WITH THE APPROPRIATE LOAD COMBINATIONS
COMMENT    GIVEN IN DESIGN SPECIFICATION 10855-M-68(Q)
COMMENT    ********************************************************
CODE                    CLASS 2   LEVELD    77ED S77
EQUATION  9    DW         RUPD1
PEAK PRES I1CAP 210       185.0
ALLOWABLE 1            15000.    15000.
END CODE
COMMENT    ********************************************************
RESTART
SAVE      201R
END RESTRT
/*EOR
```

```
ZUM,P3.
USER(NU134WC,XNUTECX)
CHARGE,F3395JT,*311*XPS080501.
ROUTE(OUTPUT,DEF,DC=PR,FID=CJM40,ID)
SETTL,*.
SETJSL,*.
REWIND,OUTPUT.
*
*****************************************************
*   RESTART, INPUT, AND OUTPUT+DAYFILE ARE SAVED    *
*   IN THE FOLLOWING TAPE, IN THAT ORDER.           *
*****************************************************
TRS,OP=R,VSN=A03114,LFN=RTAPE.
COPYBF,RTAPE,RESTART.
COPYBF,RTAPE,TAPE9.
COPYBF,RTAPE,TAPE31.
COPYBF,RTAPE,TAPE51.
COPYBF,RTAPE,TAPE52.
UNLOAD,RTAPE.
REWIND,RESTART,TAPE9.
REWIND,TAPE31.
REWIND,TAPE51,TAPE52.
COPYBR,INPUT,SYSIN.
REWIND,SYSIN.
GET,APPLIC/UN=LIBRARY.
BEGIN,PISTARR,APPLIC,LEVEL=351,NOTES=N,TSAVE=201MK,
TAPE,ROUTE=NES01.
**************************************************
*   ATTACH PISTAR MODEL IMMEDIATELY BELOW "/EOR", *
**************************************************
/*EOR
TITLE     HOPE CREEK TAP SYSTEM: HPCI TURBINE EXHAUST P-201
ID        CLIENT= PUBLIC SERVICE ELECTRIC & GAS COMPANY
ID        PROJECT NAME= HOPE CREEK TAP SNUBBER REDUCTION
ID        PROJECT NUMBER= XPS-0800
ID        JOB NUMBER= XPS-08
ID        FILE NUMBER= PSE005.1016
ID        CALCULATION NUMBER= C-31
ID        PREPARED BY= C. J. MEHTA
ID        CHECKED BY=  A. S. HERLEKAR
COMMENT   ***********************************************************
COMMENT   *                      LOAD MODULE - 4                    *
COMMENT   -----------------------------------------------------------
COMMENT   ===========================================================
COMMENT   ======            INPUT FILE : C31EVL              ======
COMMENT   ===========================================================
COMMENT
LOADING
COMMENT   ===========================================================
COMMENT   -----------------------------------------------------------
CASE      B-2   LOAD CASE B-2
```

```
COMBINE   QABIBABS  0.73      QAB  ABS
COMMENT   ==========================================================
CASE      B-MAX     MAXIMUM LEVEL-B
MAXIMUM   ABS       OBEI      B-2
COMMENT   ==========================================================
CASE      C2    LOAD CASE LEVEL C & D
COMBINE   QABI ABS  0.73      QAB  ABS
COMMENT   ==========================================================
CASE      C-1    LOAD CASE C-1
COMBINE   C2   RSS            MXEQIRSS
COMMENT   ==========================================================
COMMENT   C-2 IS ENVELOPED BY C-1
COMMENT   ==========================================================
CASE      C3A    CHUGI+CHUG
COMBINE   CHUGIABS            CHUG ABS
CASE      C-3    LOAD CASE C-3
COMBINE   C3A  RSS            C2   RSS
COMMENT   ==========================================================
CASE      C-MAX     MAIXIMUM LEVEL-C
MAXIMUM   ABS       C-1       C-3
COMMENT   ==========================================================
CASE      D-1    LOAD CASE D-1
COMBINE   C3A  RSS            C-1  RSS
COMMENT   ==========================================================
COMMENT   D-2 IS ENVELOPED BY D-1
COMMENT   ==========================================================
CASE      D3A    COI  +  CO
COMBINE   COI  ABS            CO   ABS
COMMENT   ==========================================================
CASE      D-3    LOAD CASE D-3
COMBINE   D3A  RSS            OBEI RSS
COMMENT   ==========================================================
CASE      D-MAX     MAIXIMUM LEVEL-D
MAXIMUM   ABS       D-1       D-3
COMMENT   ==========================================================
CASE      DWS    DW  +  OL
COMBINE   DW   ABS            OL   ABS
COMMENT   **********************************************************
COMMENT   **********************************************************
COMMENT   **********************************************************
COMMENT   *      FLANGE LOAD COMBINATION MODUAL                    *
COMMENT   **********************************************************
COMMENT   ==========================================================
CASE      OBID      OBEI+OBED
COMBINE   OBEI ABS            OBED ABS
PRINT               YES       NO        YES       NO
COMMENT   ==========================================================
CASE      SSID      SSEI + SSED
COMBINE   SSEI ABS            SSED ABS
PRINT               YES       NO        NO        NO
COMMENT   ==========================================================
```

```
CASE        MXEQ        MAX SSID  & OBID
MAXIMUM     ABS         SSID      OBID
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLA1        MAX TMAX TMAX1 TE2T
MAXIMUM     ABS         TMAX      TMAX1     TE2T
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLB1        MAX B-2  & OBID
MAXIMUM     ABS         B-2       OBID
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLD1        SRSS OF C2, C3A, MXEQ
COMBINE     C2   RSS              C3A  RSS            MXEQ RSS
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLD2        SRSS OF D3A & OBEID
COMBINE     D3A  RSS              OBID RSS
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLD3
MAXIMUM     ABS         SLD1      SLD2
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLA         SLA1+DWS
COMBINE     SLA1 ABS              DWS  ABS
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLB         SLB1+SLA
COMBINE     SLB1 ABS              SLA  ABS
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
CASE        SLD         SLD1+SLA
COMBINE     SLD3 ABS              SLA  ABS
PRINT                   YES       NO        YES       NO
COMMENT     ==========================================================
COMMENT     **********************************************************
END LOADS
COMMENT     **********************************************************
COMMENT     IN THE FOLLOWING CODE EVALUATION SEGMENTS, USE
COMMENT     AS MANY "ALLOWABLE" CARDS AS THERE ARE "MATERIAL"
COMMENT     CARDS IN THE MODEL. ALSO VERIFY AND INCLUDE THE
COMMENT     CORRESPONDING SH AND SC VALUES
COMMENT     **********************************************************
EVALUATE
CODE                    CLASS 2   DESIGN    77ED S77
COMMENT     **********************************************************
COMMENT       LOAD CASE DWS = DW + OL
COMMENT     **********************************************************
EQUATION    8    DWS
EQUATION    9    DWS        B-MAX
```

```
EQUATION  10                          A-2
EQUATION  11   DWS                    A-2
PEAK PRES I1CAP 210       185.0
ALLOWABLE 1          15000.    15000.
COMMENT
COMMENT   ******************************************************
CODE                 CLASS 2   DESIGN    77ED S77
EQUATION  10                          A-3
EQUATION  11   DWS                    A-3
PEAK PRES I1CAP 210       185.0
ALLOWABLE 1          15000.    15000.
COMMENT
CODE                 CLASS 2   DESIGN    77ED S77
EQUATION  10                          A-4
EQUATION  11   DWS                    A-4
ALLOWABLE 1          15000.    15000.
COMMENT
COMMENT   ******************************************************
CODE                 CLASS 2   LEVELC    77ED S77
EQUATION  9    DWS        C-MAX
PEAK PRES I1CAP 210       185.0
ALLOWABLE 1          15000.    15000.
COMMENT
COMMENT   ******************************************************
CODE                 CLASS 2   LEVELD    77ED S77
EQUATION  9    DWS        D-MAX
PEAK PRES I1CAP 210       185.0
ALLOWABLE 1          15000.    15000.
END CODE
COMMENT   ******************************************************
RESTART
RESTORE   201MK
SAVE      LOMD4
END RESTRT
/*EOR
```

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or COR DATE

ID NO. C-37

REFERENCE NONE

SHEET 7 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A03940	PE	PISTAR-SAVE P201	1	RESTART	PISTAR	AAKD 5/16/88	Seismic, Modal Extra char er (FN=1)
			2	TAPE9			
			3	TAPE31			
			4	TAPE51			No Data
			5	TAPE52			No Data
			6	INPUT			
			7	OUTPUT			
A04110		PISTAR-SAVE P201	1	RESTART		ABOA 5/18/88	DW only (FN=2)
			2	TAPE9			
			3	TAPE31			
			4	TAPE51			No Data
			5	TAPE52			No Data
			6	INPUT			
			7	OUTPUT			

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PRINTED 20041222

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201

ORIGINATOR DATE VFR or CKR DATE: UJT 06-10-88 7 6/10/88

ID NO. C- 31

REFERENCE NONE

SHEET 7 OF 18

TAPE STORAGE LOG

SYSTEM: P 201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A04234	PE	PISTAR-SAVE P201	1	RESTART	PISTAR	ACBY 5/19/88	All Thermal Cases (FN=3)
			2	TAPE9			
			3	TAPE31			
			4	TAPE 51			No Data
			5	TAPE52			No Data
			6	INPUT			
			7	OUTPUT			
A00481		PISTAR-SAVE 201MK	1	RESTART		ACQD 6/6/88	Code Evaluation, Flange Evaluation (FN=2)
			2	TAPE9			
			3	TAPE31			
			4	TAPE 51			
			5	TAPE52			
			6	INPUT			None
			7	OUTPUT			None

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P- 201

ORIGINATOR DATE VFR or CKR DATE

ID NO. C- 37

REFERENCE NONE

SHEET 7 OF 68

TAPE STORAGE LOG

SYSTEM: P 201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A03933	PE	PISTAR-SAVE 201DW	1	RESTART	PISTAR	AALS 5/16/88	Hydroweight Only (FN=1)
			2	TAPE9			
			3	TAPE31			
			4	TAPE 51			No Data
			5	TAPE52			No Data
			6	INPUT			
			7	OUTPUT			
A01251		PISTAR-SAVE 201R	1	RESTART		ADCE 6/7/88	Rupture Disc Analysis
			2	TAPE9			
			3	TAPE31			
			4	TAPE 51			
			5	TAPE52			
			6	INPUT			
			7	OUTPUT			
A01282		P201_RPDISK	1. 2.	TAPE-14 TAPE-16			

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE: AM 7/12/88 7/12/88

ID NO. C-31

REFERENCE None

SHEET I-62 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A0357H/ A0K271	GE	* P201-MK1-ASBUILT	1	RESTART	PISTAR	ABCD 06/03/88	Coupled Modes
			2	TAPE9			
			3	TAPE1			
			4	TAPE23			
			5	RESTART	PSMODE	"	Pseudo modes
			6	TAPE15	CARROTS/ CMDOF	"	coupling
			7	TAPE61			
			8	TAPE63			
			9	TAPE14	MODSUP	"	Modal superposition w.r.t. response
			10	TAPE16			
			11	TAPE34			
			12	TAPE36			
			13	TAPE11	TRUNCTION1	"	Transfer functions.

NOTES:

* Even though the Label is "As BUILT", the contents are actually for "snubber-reduced" configuration.

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PRINTED 20041222

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE: AM 2/12/88 7/22/88 7

ID NO. C-31

REFERENCE None

SHEET 7 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
—	—	—	—	—	TFTABL2	ABMM 06/03/88	Selection of Critical frequencies
—	—	—	—	Tuned T.Hist. file: "C32φ201"	SRNHIST	ABφM 06/03/88	Tuning of φABI (C3.2) Time History
			—	"C31φ201"	"	ABφP 06/03/88	Tuning of φABI (C3.1) Time History
A03544/ A04271	(cont'd...)		14	TAPE13	TFUNCTION.2	ABRG 06/03/88	φABI (C3.2) Response T.Hist
			15	"	"		φABI (C3.1) " "
			16	"	"		COI (CHG OPTION - ABS SUM) RESP. T.Hist
			17	"	"		CHUGI Resp. T.Hist
			18	RESTART	TFPOST	"	φABI (C3.2) Response
			19	"	"		φABI (C3.1) "
			20	"	"		COI "
			21	"	"		CHUGI "
			—	—	PISTAR	"	Code Evaluation.

NOTES:

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE

AM 07/12/88 ABH 7/22/88 7

ID NO. C-81

REFERENCE None

SHEET J-64 OF 66

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A03574/ A04271	GE	P201-MRA-ASRNLY	22	TAPE11	TFUNCTION1	AAGQ 06/09/88	Transfer Functions - Acceleration
	(Cont'd.....)		23	TAPE13	TFUNCTION2	"	ΦABI (C3.2) Accel. Response T. Hist
			24	"	"		COI Accel " "
			25	"	"		CHUG " " "
			26	"	"		CHUGI (CO OPTION) " "
			27	RESTART	TFPOST	"	ΦABI (C3.2) Accel.
			28	"	"		COI Accel.
			29	"	"		CHUGI (CO OPTION) Accel.
			—	Accel. Resp. Spectra file "P201AQB"	REGGEN/ DGTZR/PLOTSC	AAQG 06/09/88	ΦABI (C3.2) Accel Resp. Spectra
			—	"P201ACΦ"	"	AAQJ 06/09/88	COI " "
			—	"P201ACH"	"	AAQΦ 06/09/88	CHUGI (CO OPTION) " "

NOTES:

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PRINTED 20041222

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CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE: AM 07/11/83 RGT 7/22/83

7

ID NO. C-31

REFERENCE None

SHEET I-65 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A05544/ A04271	GE	P201-MK1-ASBUILT*	30	TAPE15	CARROTS/ CMDOR	ACWV 06/15/88	Coupling w/ 3% piping Damping
			31	TAPE61			
			32	TAPE63			
			33	TAPE14	MODSUP	"	Modal Superposition w. noise T.H.
			34	TAPE16			
			35	TAPE34			
			36	TAPE36			
			37	TAPE11	TRANCTION1	ADPX 06/15/88	Transfer functions 3% Piping Damp.
			—	—	TFTABL2	ADRQ 06/15/88	Selection of Critical Freq. (3% Piping Damp)
			—	Tuned T.History file "201CB23"	SRNHIST	AEGT 06/16/88	Tuning of PASE(C3.2) T.History (3% piping Damping)

NOTES:

*Eventhough label is "AS-BUILT" the contents are actually for "snubber-reduced" configuration.

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE

ID NO. C-31

REFERENCE None

SHEET T.66 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A03574/ A04271	GE	P201-MKI-ASBUILT	38	TAPE13	TFUNCTION1	AESM 06/17/88	QABS (C3.2) Response T. Hist (3% Piping Damping)
(Concluded)			39	RESTART	TFPOST	"	QABS (C3.2) Response (3% Piping Damping)
			-	-	PISTAR	"	Code Evaluation
			40	TAPE13	TFUNCTION2	AEXB 06/17/88	QABS (C3.1) Accel Resp. T. Hist (2% Damping)
			41	RESTART	TFPOST	"	QABS (C3.1) Accel Resp (2% Damping)
			-	Resp. Spectra file "QBSP201A"	RESGEN/DGTOQ PLOTSC	AFGZ 06/17/88	QABS (C3.1) Accel Resp. Spectra (2% Piping Damping)
			42	TAPE11	TFUNCTION1	AALY 06/20/88	QABS (C3.2) Accel. Transfer Functions. (3% Piping Damp.)
			43	TAPE13	TFUNCTION2	"	QABS (C3.2) Accel Response T. History (3% Piping Damp)
			44	RESTART	TFPOST	"	QABS (C3.2) Accel Response (3% Piping Damp.)

NOTES:

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE

ID NO. REFERENCE C-31

SHEET 26 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
			—	Accel. Resp. Spectra file "QB3P201"	RESGEN/DGTOR/ PLOTSC	AARK 06-20-88	Accel. Resp. Spectra QABI (C3.2) 3% Piping Damp'g
A03151	GE	P201ACCL-@P201	1	TAPE11	TFUNCTION1	AEGN 07/13/88	Transfer functions Accel. - @ P201 (2% Piping Damp'g)
			2	TAPE13	TFUNCTION 2	"	QABI (C3.2) Accel Response T.H @ P201 (2% Piping Damp'g)
			3	"	"	"	COI " " "
			4	"	"	"	CHUGI " " "
			5	"	"	"	CHUGI (CO OPTION) " "
			6	RESTART	TFPOST	"	QABI (C3.2) Accel Response (2% Piping Damp'g)
			7	"	"	"	COI " "
			8	"	"	"	CHUGI (CO OPTION) " "
			—	Accel Resp. Spectra file "QBAP201"	RESGEN/DGTOR/ PLOTEC	ABAV 07/15/88	QABI (C3.2) Accel Spectra @ node P201 (2% Damp'g)
			—	"COAP201"	"	ABAV 07/15/88	COI " " "
			—	"CHAP201"	"	ABBB 07/15/88	CHUGI " " "

NOTES:

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PSEG

CALCULATION CONTINUATION SHEET

TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201

ORIGINATOR DATE VFR or CKR DATE: AM 03/22/88 7 / 7/22/88

ID NO. C-31

REFERENCE None

SHEET 1-68 OF 68

TAPE STORAGE LOG

SYSTEM: P201

TAPE DETAILS VSN=	D=	L=$.....$	FILE NO.	INFO./FILE SAVED	COMPUTER PROGRAM	COMPUTER OUTPUT ID / DATE	REMARKS
A03114	PE	PISTAR-SAVE-201MK	1	RESTART	PISTAR	ABRG 06/03/88	Pistar Restart containing all MK I
			2	TAPE9	"		Tapes motions
			3	TAPE31	"		cases (2b Dmpg) for
			4	TAPES1	"		use in Supp. Comb
			5	TAPES2	"		
			6	INPUT	"		
			7	OUTPUT	"		
A02386	PE	PISTAR-SAVE-P201M	1	RESTART	PISTAR	AESM 06/17/88	SAME AS ABOVE
			2	TAPE9			BUT INCLUDING
			3	TAPE31			ΦAB I (C3.2) CASE W/
			4	TAPES1			3% piping Dmpg.
			5	TAPES2			
			6	INPUT			
			7	OUTPUT			

NOTES:

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-29, HANGER GUIDANCE	ID NO. C-31-HG / REFERENCE NONE	SHEET 1 OF 3
	ORIGINATOR DATE / VFR or CKR DATE	DAT 6 / 06-07-88 / ABN / 6/8/88	

HOPE CREEK GENERATING STATION - UNIT 1

FINAL STRESS HANGER GUIDANCE

Reactor Building

Attached herewith is the hanger guidance for the following isometrics:

STARTUP SYSTEM	CALCULATION NUMBER	GUIDANCE ISSUE NUMBER	ISOMETRIC/REVISION NUMBER*	REASON FOR REVISION
EEA BJA	C-31-HG	6	1-P-FD-01 Rev.	SNUBBER REDUCTION IMPLEMENTATION

*Revision number to be assigned later.

NOTES:

1. Linear footage of this calculation - .
2. Number of hangers 20 (SNB 6 RAD 11 ANC - SPD 3).
3. Hanger guidance accounts for hanger minimum design load as applicable per S.G. Bulletin 24 Yes ☐ No ■
4. Essential Safety related calc. Yes ■ No ☐
5. Small Bore Piping included: Yes ☐ No ■
6. Hanger Load Changes: Yes ■ No ☐
7. Calculated load may be used if minimum design load results in hardware impact.
8. For torus attached piping: X = North, Y = Up, Z = East.

ATTACHMENT 2
PAGE 1 OF 143
CALC. NO. C-0031/7IRO

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201, HANGER GUIDANCE	ID NO. C-31-HG / REFERENCE NONE	SHEET 2 OF 3
	ORIGINATOR / DATE / VFR or CKR / DATE	OJI 6 / 06-07-88 / MM / 6/7/88	

HANGER GUIDANCE:

1) Support Loads and Maximum Displacements to be used for evaluation of the pipe supports on system P-201 are contained in OPTSUPT RUNID No. SUPTJSRU dated 06-07-88 (Attachment A).

2) Dead weight loads and normal operating displacements are obtained from OPTSUPT RUNID No. SUPTJYVD, dated 06-07-88 (Attachment B). For this run, Level-B load is DW reaction and Level-3B displacements are maximum normal operating values. Loads from Level-3B are purely thermal normal operating loads.

3) RUPTURE OF PRESSURE RELIEF DISK LOADS AND DISPLACEMENTS (LEVEL-D) ARE OBTAINED FROM OPTSUPT RUNID NO. SUPTMVTC, DATED 06-07-88 (ATTACHMENT-C)

4 FOR SERVICE LEVEL-D MAXIMUM OF FAULTED LOADS FROM ATTACHMENT A OR C ARE TO BE USED FOR SUPPORT EVALUATION.

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201, HANGER GUIDANCE	ID NO. C-31-HG / REFERENCE NONE	SHEET 3 OF 3
	ORIGINATOR	[illegible] 6	
	DATE	06-07-88	
	VFR or CKR	[illegible]	
	DATE	6/7/88	

ATTACHMENTS

A. OPTSUPT RUNID SUPTJSRL, dated 06-07-88

B. OPTSUPT RUNID SUPTJYVD, dated 06-07-88

C. OPTSUPT RUNID SUPTMVIC, dated 06-07-88

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201, HANGER GUIDANCE	ID NO. C-31-HG / REFERENCE NONE	SHEET A-1 OF 59
	ORIGINATOR DATE VFR or CKR DATE	DJ 6 / 06-07-88 / ABN / 6/7/88	

ATTACHMENT A

OPTSUPT RUNID SUPTJSRL DATED 06-07-88

(58 Pages)

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```
N   N  U   U  TTTTT  EEEEE   CCCC  H   H
NN  N  U   U    T    E      C     H   H
N N N  U   U    T    EEEEE  C     HHHHH
N  NN  U   U    T    E      C     H   H
N   N  UUUUU    T    EEEEE   CCCC H   H

OOOOO  PPPPP  TTTTT  SSSSS  U   U  PPPPP  TTTTT
O   O  P   P    T    S      U   U  P   P    T
O   O  PPPPP    T    SSSSS  U   U  PPPPP    T
O   O  P        T        S  U   U  P        T
OOOOO  P        T    SSSSS  UUUUU  P        T
```

REVISION 1.0.0
LEVEL FEB-25-1988

OPTSUPT RUN: ID = SUPTJSRL TIME = 9:38:17.58 DATE = 6/ 7/1988

CALCULATION PACKAGE FILE NUMBER = (C-31) PSE005.1016

COMPUTER RUN FILE NUMBER = ACQD

COMPUTER RUN OUTPUT FILE NAME = P201SUP.S1

OPTPIPE TAPE 51 INPUT:
FILE NAME = P201SUP.T51 RUN ID = ACQD DATE = 88/06/06

OPTPIPE TAPE 52 INPUT:
FILE NAME = P201SUP.T52 RUN ID = ACQD DATE = 88/06/06

FILE CONTAINING ADDITIONAL LOAD CASE DATA:
FILE NAME =

PREPARED BY/DATE: C J Mehta 06-07-88
C. J. MEHTA

CHECKED BY/DATE: A S Herlekar 06/7/88
A. S. HERLEKAR

NUTECH ENGINEERS

PIPE SUPPORT LOAD COMP SYSTEM (P201)

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PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005 1016
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

HPCI TURBINE EXHAUST (P201)NORMAL LOADS MODEL.

NUMBER OF POINTS = 111 NUMBER OF PIPE RUNS = 1

NUMBER OF SUPPORTS = 61 NUMBER OF TEES = 0

NUMBER OF PIPES = 106 NUMBER OF BEAMS = 0

NUMBER OF LOAD CASES = 69

CASE ID	LOAD CASE DESCRIPTION	CASE ID	LOAD CASE DESCRIPTION
OBEDX		OBEDY	
OBEDZ		SSEDX	
SSEDY		SSEDZ	
OL		GAB	
CHUGO		CHUGF	
DW		TE	
TE1		TE2	
THAMA		TD	
GABI		GABIB	
CO1		CHUGI	
OBEI		SSEI	
OBED		SSED	
MXEOD		MXEQI	
CHUO		CO	
THAM		THAM1	
THAM2		TD1	
TD2		TE2T	
THTD		TEHD	
THTD1		TEHD1	
TMAX		TMAX1	
A2A		A-2	
A3A		A-3	
A4A		A-4	
B-2		B-MAX	
C2		C-1	
C3A		C-3	
C-MAX		D-1	

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

CASE ID	LOAD CASE DESCRIPTION	CASE ID	LOAD CASE DESCRIPTION
D3A		D-3	
D-MAX		DWS	
OBID		SSID	
MXEQ		SLA1	
SLB1		SLD1	
SLD2		SLD3	
SLA		SLB	
SLD			

ECHO OF COMBINATION PROCEDURE INPUT FILE SUPP201

```
CAS(1)- SERVICE LEVEL B
CAS(2)- SERVICE LEVEL C
CAS(3)- SERVICE LEVEL D
CAS(4)- SERVICE LEVEL 3*B
CAS(1)- L.C.NO. A-1 OL+VE
LID(DW)
LID(OL)
ABS
ADD
CAS(1)- L.C.NO. A-1 OL-VE
LID(DW)
LID(OL)
ABS
SUB
CAS(1)- L.C.NO. B-1 OBEI +VE
LID(DW)
LID(OL)
ABS
ADD
LID(OBEI)
ADD
CAS(1)- L.C. NO. B-1 OBEI-VE
LID(DW)
LID(OL)
ABS
SUB
LID(OBEI)
SUB
CAS(1)- L.C.NO. B-2 GADIB+VE
LID(DW)
LID(OL)
ABS
ADD
LID(GADIB)
```

SUPTJSRL 9:38:17.58 6/ 7/1988 PAGE 3

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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) :RPP201

```
INP=0.73
MLT
ADD
LID(GAB)
ADD
CAS(1)- L.C. NO. B-2 GABIB-VE
LID(DW)
LID(OL)
ABS
SUB
LID(GABIB)
INP=0.73
MLT
SUB
LID(GAB)
SUB
CAS(1)-L.C.NO. B-3 OBE+VE (W/ TE)
LID(DW)
LID(TE)
ADD
LID(THAM)
ADD
LID(TD)
ADD
LID(OL)
ABS
ADD
LID(OBEI)
ADD
LID(OBED)
ADD
CAS(1)-L.C.NO. B-3 OBE+VE (W/O TE)
LID(DW)
LID(THAM)
ADD
LID(TD)
ADD
LID(OL)
ABS
ADD
LID(OBEI)
ADD
LID(OBED)
ADD
CAS(1)-L.C.NO. B-3 OBE+VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
```

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
ADD
LID(OBEI)
ADD
LID(OBED)
ADD
CAS(1)-L.C.NO. B-3 OBE -VE (W/ TE)
LID(DW)
LID(TE)
ADD
LID(THAM)
ADD
LID(TD)
ADD
LID(DL)
ABS
SUB
LID(OBEI)
SUB
LID(OBED)
SUB
CAS(1)-L.C.NO. B-3 OBE-VE (W/O TE)
LID(DW)
LID(THAM)
ADD
LID(TD)
ADD
LID(DL)
ABS
SUB
LID(OBEI)
SUB
LID(OBED)
SUB
CAS(1)-L.C.NO. B-3 OBE-VE (W/ DW ONLY)
LID(DW)
LID(DL)
ABS
SUB
LID(OBEI)
SUB
LID(OBED)
SUB
CAS(1)-L.C.NO. B-4 OABIB+VE (W/ TE)
LID(DW)
LID(TE)
ADD
LID(THAM)
ADD
```


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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(TD)
ADD
LID(DL)
ABS
ADD
LID(GABIB)
INP=0.73
MLT
ADD
LID(GAB)
ADD
CAS(1)-L.C.NO. B-4 GABIB+VE (W/O TE)
LID(DW)
LID(THAM)
ADD
LID(TD)
ADD
LID(DL)
ABS
ADD
LID(GABIB)
INP=0.73
MLT
ADD
LID(GAB)
ADD
CAS(1)-L.C.NO. B-4 GABIB+VE (W/ DW ONLY)
LID(DW)
LID(DL)
ABS
ADD
LID(GABIB)
INP=0.73
MLT
ADD
LID(GAB)
ADD
CAS(1)-L.C.NO. B-4 GABIB-VE (W/ TE)
LID(DW)
LID(TE)
ADD
LID(THAM)
ADD
LID(TD)
ADD
LID(DL)
ABS
SUB
```


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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(GABIB)
INP=0.73
MLT
SUB
LID(GAB)
SUB
CAS(1)-L.C.NO. B-4 GABIB-VE (W/O TE)
LID(DW)
LID(THAM)
ADD
LID(TD)
ADD
LID(OL)
ABS
SUB
LID(GABIB)
INP=0.73
MLT
SUB
LID(GAB)
SUB
CAS(1)-L.C.NO. B-4 GABIB-VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
SUB
LID(GABIB)
INP=0.73
MLT
SUB
LID(GAB)
SUB
CAS(2)-L.C.NO. C-1 DYN+VE
LID(DW)
LID(OL)
ABS
ADD
LID(MXEGI)
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
ADD
```

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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
CAS(2)-L.C.NO. C-1 DYN-VE
LID(DW)
LID(DL)
ABS
SUB
LID(MXEGI)
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB).
ADD
PW2
ADD
SQR
SUB
CAS(2)-L.C.NO. C-2 DYN+VE
LID(DW)
LID(DL)
ABS
ADD
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
LID(CHUGI)
LID(CHUG)
ADD
PW2
ADD
SQR
ADD
CAS(2)-L.C.NO. C-2 DYN-VE
LID(DW)
LID(DL)
ABS
SUB
LID(GABI)
INP=0 73
MLT
LID(GAB)
ADD
PW2
LID(CHUGI)
LID(CHUG)
ADD
```

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
PW2
ADD
SQR
SUB
CAS(2)-L.C.NO.  C-3 DYN+VE (W/ TE1)
LID(DW)
LID(TE1)
ADD
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
ADD
LID(QABI)
INP=0.73
MLT
LID(QAB)
ADD
PW2
LID(CHUQI)
LID(CHUQ)
ADD
PW2
ADD
SQR
ADD
CAS(2)-L.C.NO.  C-3 DYN-VE (W/ TE1)
LID(DW)
LID(TE1)
ADD
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
SUB
LID(QABI)
INP=0.73
MLT
LID(QAB)
ADD
PW2
LID(CHUQI)
LID(CHUQ)
ADD
```

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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
PW2
ADD
SQR
SUB
CAS(2)-L.C.NO. C-3 DYN+VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
ADD
LID(QABI)
INP=0.73
MLT
LID(QAB)
ADD
PW2
LID(CHUQI)
LID(CHUQ)
ADD
PW2
ADD
SQR
ADD
CAS(2)-L.C.NO. C-3 DYN-VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
SUB
LID(QABI)
INP=0.73
MLT
LID(QAB)
ADD
PW2
LID(CHUQI)
LID(CHUQ)
ADD
PW2
ADD
SQR
SUB
```

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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
CAS(2)-L.C.NO.  C-4 DYN+VE (W/ TE1)
LID(DW)
LID(TE1)
ADD
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
ADD
LID(MXEQI)
LID(MXEQD)
ADD
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
ADD
CAS(2)-L C.NO.  C-4 DYN-VE (W/ TE1)
LID(DW)
LID(TE1)
ADD
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
SUB
LID(MXEQI)
LID(MXEQD)
ADD
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
SUB
```

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
CAS(2)-L.C.NO. C-4 DYN+VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
ADD
LID(MXEQI)
LID(MXEQD)
ADD
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
ADD
CAS(2)-L.C.NO. 4 C-4 DYN-VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
SUB
LID(MXEQI)
LID(MXEQD)
ADD
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
SUB
CAS(2)-L.C.NO. C-4 DYN+VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
```


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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
ADD
LID(MXEQI)
LID(MXEQD)
ADD
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
ADD
CAS(2)-L.C.NO. C-4 DYN-VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
SUB
LID(MXEQI)
LID(MXEQD)
ADD
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO. D-1 DYN+VE
LID(DW)
LID(OL)
ABS
ADD
LID(MXEQI)
PW2
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
ADD
LID(CHUGI)
LID(CHUG)
```

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ATTACHMENT 2
PAGE 17 OF 143
CALC. NO C-0031/TID

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO. D-1 DYN-VE
LID(DW)
LID(DL)
ABS
SUB
LID(MXEQI)
PW2
LID(QABI)
INP=0.73
MLT
LID(QAB)
ADD
PW2
ADD
LID(CHUQI)
LID(CHUQ)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO. D-2 DYN+VE (W/ TE1)
LID(DW)
LID(TE1)
ADD
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
ADD
LID(QABI)
INP=0.73
MLT
LID(QAB)
ADD
PW2
LID(MXEQI)
LID(MXEQD)
ADD
PW2
ADD
```


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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(CHUGI)
LID(CHUG)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO.  D-2 DYN-VE (W/ TE1)
LID(DW)
LID(TE1)
ADD
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
SUB
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
LID(MXEGI)
LID(MXEGD)
ADD
PW2
ADD
LID(CHUGI)
LID(CHUG)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO.  D-2 DYN+VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
ADD
LID(GABI)
INP=0.73
MLT
```

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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(GAB)
ADD
PW2
LID(MXEQI)
LID(MXEQD)
ADD
PW2
ADD
LID(CHUQI)
LID(CHUQ)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO. D-2 DYN-VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(OL)
ABS
SUB
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
LID(MXEQI)
LID(MXEQD)
ADD
PW2
ADD
LID(CHUQI)
LID(CHUQ)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO. D-2 DYN+VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
ADD
LID(GABI)
```


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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
INP=0.73
MLT
LID(GAB)
ADD
PW2
LID(MXEQI)
LID(MXEQD)
ADD
PW2
ADD
LID(CHUGI)
LID(CHUG)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO.  D-2 DYN-VE (W/ DW ONLY)
LID(DW)
LID(DL)
ABS
SUB
LID(GABI)
INP=0.73
MLT
LID(GAB)
ADD
PW2
LID(MXEQI)
LID(MXEQD)
ADD
PW2
ADD
LID(CHUGI)
LID(CHUG)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO.  D-3 DYN+VE
LID(DW)
LID(DL)
ABS
ADD
LID(OBEI)
PW2
LID(COI)
```


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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(CD)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO. D-3 DYN-VE
LID(DW)
LID(DL)
ABS
SUB
LID(OBEI)
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO. D-4 DYN+VE (W/ TEI)
LID(DW)
LID(TEI)
ADD
LID(THAMI)
ADD
LID(TDI)
ADD
LID(DL)
ABS
ADD
LID(OBEI)
LID(OBED)
ADD
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO. D-4 DYN-VE (W/ TEI)
LID(DW)
LID(TEI)
ADD
LID(THAMI)
ADD
```


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ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(TD1)
ADD
LID(DL)
ABS
SUB
LID(OBEI)
LID(OBED)
ADD
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO.  D-4 DYN+VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
ADD
LID(OBEI)
LID(OBED)
ADD
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO.  D-4 DYN-VE (W/O TE1)
LID(DW)
LID(THAM1)
ADD
LID(TD1)
ADD
LID(DL)
ABS
SUB
LID(OBEI)
LID(OBED)
ADD
```

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.NO. D-4 DYN+VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
ADD
LID(OBEI)
LID(OBED)
ADD
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
ADD
CAS(3)-L.C.NO. D-4 DYN+VE (W/ DW ONLY)
LID(DW)
LID(OL)
ABS
SUB
LID(OBEI)
LID(OBED)
ADD
PW2
LID(COI)
LID(CO)
ADD
PW2
ADD
SQR
SUB
CAS(3)-L.C.FOR LONG TERM HEATUP DYN +VE (W/ TE2 ONLY)
LID(DW)
LID(TE2T)
ADD
LID(TD2)
ADD
LID(MXEQI)
ADD
```


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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

ECHO OF COMBINATION PROCEDURE INPUT FILE (CONT.) SUPP201

```
LID(MXEQD)
ADD
CAS(3)-L.C.FOR LONG TERM HEATUP DYN -VE (W/ TE2 ONLY)
LID(DW)
LID(TE2T)
ADD
LID(TD2)
ADD
LID(MXEQI)
SUB
LID(MXEQD)
SUB
CAS(3)-L.C.FOR LONG TERM HEATUP DYN +VE (W/O TE2 ONLY)
LID(DW)
LID(THAM2)
ADD
LID(TD2)
ADD
LID(MXEQI)
ADD
LID(MXEQD)
ADD
CAS(3)-L.C.FOR LONG TERM HEATUP DYN -VE (W/O TE2 ONLY)
LID(DW)
LID(THAM2)
ADD
LID(TD2)
ADD
LID(MXEQI)
SUB
LID(MXEQD)
SUB
```

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P701

PROJECT: HOPE CREEK SNUBBER REDUCTION ____ FILE NUMBERS ____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

NODE = 175AN SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .1745, Y = -.7074, Z = -.6849

SUPT: 1 RIGID	SUPT: 2 RIGID	SUPT: 3 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.9808 .0000 .1951	-.1379 -.7071 .6936	.1379 -.7071 -.6936

**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 2719.753	FORCE MAX. 8562.867	FORCE MAX. 15064.400
FORCE MIN. -2243.923	FORCE MIN. -7765.216	FORCE MIN. -1562.997
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= 1.9323, .0491	TEN.= .0353, 1.9326	TEN.= .0341, 1.9326
TEN.= 1.9323, .5753	TEN.= .3378, 1.9876	COMP= .4658, 1.9616
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
1.0953 .0491 .3760	.6231 .6235 1.9295	.1399 .2594 .1003
-1.7843 -.0905 -.9342	-1.0153 -1.0160 -1.9598	-.1399 -.2594 -.1003

**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. 3190.898	FORCE MAX. 10248.100	FORCE MAX. 149523.900
FORCE MIN. -2720.718	FORCE MIN. -9450.559	FORCE MIN. -136173.600
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= 2.6617, .0683	TEN.= .0601, 2.6619	TEN.= .0323, 2.6623
TEN.= 2.6617, .5104	TEN.= .2808, 2.6956	COMP= .4265, 2.6764
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
2.6144 .0653 .4998	.8449 .8455 2.6568	.0000 .0000 .0000
-2.5130 -.1030 -1.0096	-1.2030 -1.2039 -2.6845	.0000 .0000 .0000

**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 3202.260	FORCE MAX. 10249.340	FORCE MAX. 153649.300
FORCE MIN. -2732.080	FORCE MIN. -9451.801	FORCE MIN. -140299.000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= 2.6618, .0682	TEN.= .0599, 2.6620	TEN.= .0326, 2.6625
TEN.= 2.6618, .5107	TEN.= .2810, 2.6958	COMP= .4267, 2.6766
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
2.6144 .0654 .5002	.8452 .8458 2.6570	.1399 .2594 .1003
-2.5131 -.1031 -1.0099	-1.2033 -1.2041 -2.6846	.0000 .0000 .0000

**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

NODE = 17SAN SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .1745, Y = -.7074, Z = -.6849

SUPT: 4 RIGID	SUPT: 5 RIGID	SUPT: 6 RIGID
ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.9808 .0000 .1951	-.1379 -.7071 .6936	.1379 -.7071 -.6936
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 58440.310	MOMT. MAX. 16388.220	MOMT. MAX. 2375.940
MOMT. MIN. -53652.210	MOMT. MIN. -16187.730	MOMT. MIN. -2556.113
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
1.8953 .0491 .3760	.6231 .6235 1.9295	.1399 .2594 .1003
-1.7843 -.0905 -.9342	-1.0153 -1.0160 -1.9598	-.1399 -.2594 -.1003
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. 68844.550	MOMT. MAX. 36400.630	MOMT. MAX. 2025.159
MOMT. MIN. -64055.990	MOMT. MIN. -36200.500	MOMT. MIN. -2205.371
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
2.6144 .0653 .4998	.8449 .8455 2.6568	.0000 .0000 .0000
-2.5130 -.1030 -1.0096	-1.2030 -1.2039 -2.6845	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 68851.370	MOMT. MAX. 36411.160	MOMT. MAX. 2025.469
MOMT. MIN. -64062.810	MOMT. MIN. -36211.030	MOMT. MIN. -2205.681
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
2.6144 .0654 .5002	.8452 .8458 2.6570	.1399 .2594 .1003
-2.5131 -.1031 -1.0099	-1.2033 -1.2041 -2.6846	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACQD

NODE = 19SBN SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = -.5521, Y = -.7074, Z = -.4414

SUPT: 7 RIGID	SUPT: 8 RIGID	SUPT: 9 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.7071 .7071	.0000 -.7071 -.7071
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 16445.800	FORCE MAX. 32737.940	FORCE MAX. 5936.116
FORCE MIN. -17752.190	FORCE MIN. -30997.740	FORCE MIN. -2713.413
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0770, .0943	COMP= .0078, .1215	TEN.= .0940, .0774
TEN.= .0770, .6384	TEN.= .3729, .5238	COMP= .5181, .3808
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0770 .0609 .0720	.1173 .1174 .1043	.1398 .2606 .0998
-.0770 -.1026 -.6300	-.3932 -.3934 -.5402	-.1398 -.2606 -.0998
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. 80089.580	FORCE MAX. 46778.520	FORCE MAX. 109972.800
FORCE MIN. -81451.680	FORCE MIN. -45019.420	FORCE MIN. -106667.900
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0954, .1271	COMP= .0201, .1577	TEN.= .1255, .0975
TEN.= .0954, .6237	TEN.= .3537, .5224	COMP= .5137, .3664
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0954 .0745 .1030	.1509 .1509 .1400	.0000 .0000 .0000
-.0954 -.1131 -.6133	-.4034 -.4036 -.5386	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 80132.450	FORCE MAX. 46787.930	FORCE MAX. 110048.200
FORCE MIN. -81494.550	FORCE MIN. -45028.830	FORCE MIN. -106743.300
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0961, .1274	COMP= .0204, .1583	TEN.= .1258, .0983
TEN.= .0961, .8195	TEN.= .4940, .6610	COMP= .6540, .5032
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0961 .0746 .1033	.1514 .1515 .1407	.1398 .2606 .0998
-.0961 -.1131 -.8117	-.4914 -.4916 -.6940	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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N·U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P:01

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

NODE = 195BN SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = -.5521, Y = -.7074, Z = -.4414

SUPT: 10 RIGID	SUPT: 11 RIGID	SUPT: 12 RIGID
ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.7071 .7071	.0000 -.7071 -.7071
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 175755.300	MOMT. MAX. 85446.630	MOMT. MAX. 109168.200
MOMT. MIN. -170687.000	MOMT. MIN. -89956.550	MOMT. MIN. -104677.000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0770 .0609 .0720	.1173 .1174 .1043	.1398 .2606 .0998
-.0770 -.1026 -.6300	-.3932 -.3934 -.5402	-.1398 -.2606 -.0998
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. 193120.000	MOMT. MAX. 90518.600	MOMT. MAX. 98610.910
MOMT. MIN. -188032.400	MOMT. MIN. -95029.020	MOMT. MIN. -94120.030
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0954 .0745 .1030	.1509 .1509 .1400	.0000 .0000 .0000
-.0954 -.1131 -.6133	-.4034 -.4036 -.5386	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 193122.800	MOMT. MAX. 90532.820	MOMT. MAX. 98614.140
MOMT. MIN. -188055.200	MOMT. MIN. -95043.230	MOMT. MIN. -94123.270
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0961 .0746 .1033	.1514 .1515 .1407	.1398 .2606 .0998
-.0961 -.1131 -.8117	-.4914 -.4916 -.6940	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACGD

NODE = P201 SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = -1.0000

SUPT: 13 RIGID	SUPT: 14 RIGID	SUPT: 15 RIGID
TRAN. STIF. = .3160E+08	TRAN. STIF. = .5120E+07	TRAN. STIF. = .1470E+07
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.9848 -.1736	.0000 .1736 -.9848
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 4594.202	FORCE MAX. 33890.350	FORCE MAX. 51012.880
FORCE MIN. -3410.168	FORCE MIN. -22139.210	FORCE MIN: -65345.130
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0936, .0820	TEN.= .0743, .0998	TEN.= .0347, .1195
TEN.= .0129, .6766	COMP= .1310, .6639	COMP= .6638, .1316
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0936 .0672 .0471	.0471 .0672 .0936	.1400 .2381 .1258
-.0129 -.0138 -.6764	-.6764 -.0138 -.0129	-.1400 -.2381 -.1258
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. 10428.550	FORCE MAX. 51538.010	FORCE MAX. 60152.280
FORCE MIN. -9098.201	FORCE MIN. -39729.700	FORCE MIN. -74294.500
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0903, .0839	TEN.= .0721, .1000	TEN.= .0429, .1155
TEN.= .0167, .6330	COMP= .1248, .6208	COMP= .6206, .1259
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0903 .0635 .0548	.0548 .0635 .0903	.0000 .0000 .0000
-.0167 -.0152 -.6328	-.6328 -.0152 -.0167	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 10613.850	FORCE MAX. 51700.960	FORCE MAX. 64620.400
FORCE MIN. -9283.506	FORCE MIN. -39892.650	FORCE MIN. -78762.630
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .1299, .0970	TEN.= .0879, .1362	TEN.= .0408, .1569
TEN.= .0167, .9402	COMP= .1783, .9233	COMP= .9232, .1791
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1299 .0795 .0554	.0554 .0795 .1299	.1400 .2381 .1258
-.0167 -.0153 -.9401	-.9401 -.0153 -.0167	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY — CALC. (C-31) PSE005 1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY — COMP. ACQD

NODE = P201 SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = -1.0000

SUPT: 16 RIGID	SUPT: 17 RIGID	SUPT: 18 RIGID
ROT. STIF. = .1570E+08	ROT. STIF. = .1566E+08	ROT. STIF. = .2970E+07
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.9848 -.1736	.0000 .1736 -.9848
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 1111443.000	MOMT. MAX. 330415.700	MOMT. MAX. 210291.000
MOMT. MIN. **********	MOMT. MIN. -319904.900	MOMT. MIN. -214815.600
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0936 .0672 .0471	.0471 .0672 .0936	.1400 .2381 .1258
-.0129 -.0138 -.6764	-.6764 -.0138 -.0129	-.1400 -.2381 -.1258
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. 1140140.000	MOMT. MAX. 498156.800	MOMT. MAX. 290482.600
MOMT. MIN. **********	MOMT. MIN. -487179.000	MOMT. MIN. -295001.600
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0903 .0635 .0548	.0548 .0635 .0903	.0000 .0000 .0000
-.0167 -.0152 -.6328	-.6328 -.0152 -.0167	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 1140140.000	MOMT. MAX. 498283.300	MOMT. MAX. 290506.300
MOMT. MIN. **********	MOMT. MIN. -487305.500	MOMT. MIN. -295025.300
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1299 .0795 .0554	.0554 .0795 .1299	.1400 .2381 .1258
-.0167 -.0153 -.9401	-.9401 -.0153 -.0167	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
NODE = H19      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000

 SUPT:  19       ~~RIGID~~  | SPRING HANGER
 TRAN. STIF. = .1800E+04    | HOT LOAD = 4940.
   (X)    (Y)    (Z)        |
DIRECTION COSINES:          |
 .0000  1.0000   .0000      |

***************            CAS(1)- SERVICE LEVEL B            ***************
FORCE MAX.        437.919
FORCE MIN.        -37.963
AXIAL, SWING  MAX/MIN:
COMP=   .2433,    .2096
TEN. =  .0211,    .2482
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .1879   .2433   .0930    .2433   .0930   .1879    .3594   .5036   .2469
 -.0537  -.0211  -.2424   -.0211  -.2424  -.0537   -.3594  -.5036  -.2469

***************            CAS(2)- SERVICE LEVEL C            ***************
FORCE MAX.        509.406
FORCE MIN.       -123.140
AXIAL, SWING  MAX/MIN:
COMP=   .2830,    .3026
TEN. =  .0684,    .3484
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .2297   .2830   .1970    .2830   .1970   .2297    .0000   .0000   .0000
 -.0961  -.0684  -.3349   -.0684  -.3349  -.0961    .0000   .0000   .0000

***************            CAS(3)- SERVICE LEVEL D            ***************
FORCE MAX.        580.731
FORCE MIN.       -127.047
AXIAL, SWING  MAX/MIN:
COMP=   .3226,    .3038
TEN. =  .0706,    .3491
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .2310   .3226   .1973    .3226   .1973   .2310    .3594   .5036   .2469
 -.0975  -.0706  -.3352   -.0706  -.3352  -.0975    .0000   .0000   .0000

***************            CAS(4)- SERVICE LEVEL 3*B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000

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06-07-88

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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P:01

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-------------------------------------------------------------------------+
!                                                                         !
! NODE = H18      SUPPORT  1 OF  1                          (Trans. only) !
!                                                                         !
!      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0091, Z =   .0000      !
!                                                                         !
!  SUPT:  20    SNUBBER  !                                                !
!  TRAN. STIF. = .2590E+06 !                                              !
!     (X)     (Y)     (Z)  !                                              !
! DIRECTION COSINES:       !                                              !
!  .0000  1.0000   .0000 !                                               !
!                          !                                              !
! ***************          CAS(1)- SERVICE LEVEL B          *************** !
! FORCE MAX.      2763.677 !                                              !
! FORCE MIN.     -2763.677 !                                              !
! AXIAL, SWING  MAX/MIN:  !                                              !
! COMP=   .2575,    .1868 !                                              !
! TEN =   .0248,    .1033 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .1853   .2575   .0232    .1877   .2592   .0232    .3303   .3189   .0987!
!  -.0992  -.0248  -.0288   -.0994  -.0257  -.0288   -.3303  -.3189  -.0987!
!                                                                         !
! ***************          CAS(2)- SERVICE LEVEL C          *************** !
! FORCE MAX.      6331.530 !                                              !
! FORCE MIN.     -6331.530 !                                              !
! AXIAL, SWING  MAX/MIN:  !                                              !
! COMP=   .2817,    .2383 !                                              !
! TEN. =  .0549,    .1548 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .2325   .2817   .0520    .2351   .2838   .0520    .0000   .0000   .0000!
!  -.1439  -.0549  -.0572   -.1444  -.0562  -.0572    .0000   .0000   .0000!
!                                                                         !
! ***************          CAS(3)- SERVICE LEVEL D          *************** !
! FORCE MAX.      7126.389 !                                              !
! FORCE MIN.     -7126.389 !                                              !
! AXIAL, SWING  MAX/MIN:  !                                              !
! COMP=   .3227,    .2387 !                                              !
! TEN =   .0561,    .1588 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .2330   .3227   .0521    .2359   .3248   .0521    .3303   .3189   .0987!
!  -.1481  -.0561  -.0575   -.1486  -.0575  -.0575    .0000   .0000   .0000!
!                                                                         !
! ***************          CAS(4)- SERVICE LEVEL 3*B        *************** !
! FORCE MAX.          .000 !                                              !
! FORCE MIN.          .000 !                                              !
! AXIAL, SWING  MAX/MIN:  !                                              !
! N/A =   .0000,    .0000 !                                              !
! N/A =   .0000,    .0000 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                         !
!                                                                         !
!    SUPTJSRL            9:38:17.58     6/ 7/1988            PAGE  29    !
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NODE = H17      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0093, Z =   .0000

 SUPT:  21       RIGID
 TRAN.STIF. = .1320E+07
    (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.     6267.544
FORCE MIN.   -12099.760
AXIAL, SWING  MAX/MIN:
COMP=   .0229,    .3016
TEN. =   .0273,    .1023
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1778   .2436   .0229    .1801   .2453   .0229    .3301   .3013   .0982
 -.0993  -.0248  -.0273   -.0995  -.0257  -.0273   -.3301  -.3013  -.0982

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.    12160.950
FORCE MIN.   -17352.610
AXIAL, SWING  MAX/MIN:
COMP=   .0516,    .3488
TEN =   .0556,    .1534
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .2250   .2665   .0516    .2275   .2686   .0516    .0000   .0000   .0000
 -.1439  -.0532  -.0556   -.1444  -.0545  -.0556    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.    12291.300
FORCE MIN.   -17482.960
AXIAL, SWING  MAX/MIN:
COMP=   .0516,    .3798
TEN. =   .0559,    .1578
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   2255   .3056   .0516    .2283   .3077   .0516    .3301   .3013   .0982
 -.1481  -.0543  -.0559   -.1486  -.0557  -.0559    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3+B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = H22      SUPPORT  1 OF  1                              (Trans. only)   !
!                                                                               !
!      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000            !
!                                                                               !
!  SUPT:  22    SNUBBER  !                                                      !
!  TRAN. STIF. = .8700E+05 !                                                    !
!    (X)     (Y)     (Z)  !                                                     !
! DIRECTION COSINES:      !                                                     !
!  .0000   .0000  1.0000  !                                                     !
!                         !                                                     !
! ***************         CAS(1)- SERVICE LEVEL B          ***************     !
! FORCE MAX.     3889.186 !                                                     !
! FORCE MIN.    -3889.186 !                                                     !
! AXIAL, SWING  MAX/MIN:  !                                                     !
! COMP=   .1123,   .2739  !                                                     !
! TEN. =  .0454,   .1684  !                                                     !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:    !
!  .0533   .2687   .1123    .2687   .1123   .0533    .5351   .2537   .1743!   !
! -.1667  -.0241  -.0454   -.0241  -.0454  -.1667   -.5351  -.2537  -.1743!   !
!                                                                               !
! ***************         CAS(2)- SERVICE LEVEL C          ***************     !
! FORCE MAX.     7946.756 !                                                     !
! FORCE MIN.    -7946.756 !                                                     !
! AXIAL, SWING  MAX/MIN:  !                                                     !
! COMP=   .1534,   .3083  !                                                     !
! TEN. =  .0920,   .2256  !                                                     !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:    !
!  .1125   .2871   .1534    .2871   .1534   .1125    .0000   .0000   .0000!   !
! -.2207  -.0469  -.0920   -.0469  -.0920  -.2207    .0000   .0000   .0000!   !
!                                                                               !
! ***************         CAS(3)- SERVICE LEVEL D          ***************     !
! FORCE MAX.     8022.469 !                                                     !
! FORCE MIN.    -8022.469 !                                                     !
! AXIAL, SWING  MAX/MIN:  !                                                     !
! COMP=   .1542,   .3411  !                                                     !
! TEN. =  .0929,   .2384  !                                                     !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:    !
!  .1138   .3216   .1542    .3216   .1542   .1138    .5351   .2537   .1743!   !
! -.2336  -.0477  -.0929   -.0477  -.0929  -.2336    .0000   .0000   .0000!   !
!                                                                               !
! ***************        CAS(4)- SERVICE LEVEL 3*B         ***************     !
! FORCE MAX.         .000 !                                                     !
! FORCE MIN.         .000 !                                                     !
! AXIAL, SWING  MAX/MIN:  !                                                     !
! N/A =   .0000,   .0000  !                                                     !
! N/A =   .0000,   .0000  !                                                     !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:    !
!  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!                                                                               !
!                                                                               !
!    SUPTJSRL            9:38:17.58     6/ 7/1988            PAGE  31          !
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P001

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
NODE = H14      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0092, Z =   .0000

 SUPT:  24      RIGID
 TRAN.STIF. = .3491E+07
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.     7139.972
FORCE MIN.    -6483.155
AXIAL, SWING  MAX/MIN:
COMP=   .0237,    .1961
TEN. =  .0235,    .1022
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1267   .1496   .0237    .1281   .1508   .0237    .3289   .2273   .1022
 -.0997  -.0223  -.0235   -.0999  -.0232  -.0235   -.3289  -.2273  -.1022

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.     8711.959
FORCE MIN.    -8861.945
AXIAL, SWING  MAX/MIN:
COMP=   .0515,    .2390
TEN. =  .0515,    .1498
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1740   .1639   .0515    .1755   .1655   .0515    .0000   .0000   .0000
 -.1444  -.0401  -.0515   -.1447  -.0414  -.0515    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     9674.324
FORCE MIN.    -9246.945
AXIAL, SWING  MAX/MIN:
COMP=   .0519,    .2575
TEN. =  .0515,    .1541
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1745   .1894   .0519    .1762   .1910   .0519    .3289   .2273   .1022
 -.1487  -.0404  -.0515   -.1490  -.0418  -.0515    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL D+B         ***************
FORCE MAX.         .000
FORCE MIN.         .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P:01

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H15      SUPPORT  1 OF  1                          (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0040, Z =   .0000

 SUPT:  23    SNUBBER
 TRAN.STIF. = .4950E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.      4227.485
FORCE MIN.     -4227.485
AXIAL, SWING  MAX/MIN:
COMP=   .1362,    .1221
TEN.=   .0217,    .1027
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:   GLOBAL ACCEL. MAX/MIN:
  .1195   .1362   .0248    .1201   .1367   .0248    .3286   .2243   .1044
 -.0997  -.0217  -.0245   -.0998  -.0221  -.0245   -.3286  -.2243  -.1044

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.      7843.962
FORCE MIN.     -7843.962
AXIAL, SWING  MAX/MIN:
COMP=   .1494,    .1749
TEN.=   .0381,    .1537
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:   GLOBAL ACCEL. MAX/MIN:
  .1668   .1494   .0526    .1674   .1501   .0526    .0000   .0000   .0000
 -.1444  -.0381  -.0527   -.1445  -.0387  -.0527    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.      8116.966
FORCE MIN.     -8116.966
AXIAL, SWING  MAX/MIN:
COMP=   .1728,    .1755
TEN.=   .0383,    .1577
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:   GLOBAL ACCEL. MAX/MIN:
  .1672   .1728   .0532    .1679   .1735   .0532    .3286   .2243   .1044
 -.1487  -.0383  -.0527   -.1488  -.0389  -.0527    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:   GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

   SUPTJSRL            9:38:17.58     6/ 7/1988            PAGE  33
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N·U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H13      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0091, Z =   .0000

 SUPT:  25      RIGID
 TRAN STIF. = .4800E+06
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.     3362.215
FORCE MIN.    -9860.547
AXIAL, SWING  MAX/MIN:
COMP=   .0037,   .0678
TEN. =  .0172,   .1079
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0567   .0037   .0371    .0568   .0042   .0371    .3253   .2543   .1528
 -.1002  -.0172  -.0400   -.1004  -.0181  -.0400   -.3253  -.2543  -.1528

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.     7700.582
FORCE MIN.   -14242.010
AXIAL, SWING  MAX/MIN:
COMP=   .0119,   .1240
TEN. =  .0256,   .1627
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1028   .0119   .0693    .1029   .0129   .0693    .0000   .0000   .0000
 -.1449  -.0256  -.0741   -.1451  -.0269  -.0741    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     7856.343
FORCE MIN.   -14397.770
AXIAL, SWING  MAX/MIN:
COMP=   .0124,   .1244
TEN. =  .0260,   .1668
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1033   .0124   .0694    .1034   .0133   .0694    .3253   .2543   .1528
 -.1493  -.0260  -.0742   -.1496  -.0273  -.0742    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H11       SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  26       RIGID
 TRAN. STIF. = .1750E+07
   (X)     (Y)     (Z)
DIRECTION COSINES:
-.7844   .0000  -.6202

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.      3832.994
FORCE MIN.     -2288.341
AXIAL, SWING  MAX/MIN:
TEN. =   .0503,   .0053
COMP=    .0513,   .1673
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0409   .0047   .0294    .0047   .0294   .0409    .1208   .2716   .1109
 -.0373  -.1672  -.0355   -.1672  -.0355  -.0373   -.1208  -.2716  -.1109

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.      6493.863
FORCE MIN.     -4962.235
AXIAL, SWING  MAX/MIN:
TEN. =   .0955,   .0245
COMP=    .0965,   .1852
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0773   .0242   .0562    .0242   .0562   .0773    .0000   .0000   .0000
 -.0734  -.1852  -.0627   -.1852  -.0627  -.0734    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.      6620.108
FORCE MIN.     -5088.480
AXIAL, SWING  MAX/MIN:
TEN. =   .0959,   .0253
COMP=    .0969,   .1898
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0774   .0251   .0568    .0251   .0568   .0774    .1208   .2716   .1109
 -.0739  -.1898  -.0627   -.1898  -.0627  -.0739    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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                    N U T E C H   E N G I N E E R S

                PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  FILE NUMBERS
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005 1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD
+-----------------------------------------------------------------------+
!                                                                       !
! NODE = H12      SUPPORT  1 OF  1                          (Trans. only) !
!                                                                       !
!      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000    !
!                                                                       !
!  SUPT:  27       RIGID  !                                             !
!  TRAN.STIF. = .3066E+07 !                                             !
!    (X)     (Y)     (Z)  !                                             !
! DIRECTION COSINES:      !                                             !
!  .4524   .0000  -.8918  !                                             !
!                         !                                             !
! ***************          CAS(1)- SERVICE LEVEL B          *************** !
! FORCE MAX.     2308.176 !                                             !
! FORCE MIN.    -8391.790 !                                             !
! AXIAL, SWING  MAX/MIN:  !                                             !
! TEN. =   .0062,   .0925 !                                             !
! COMP=    .0042,   .1970 !                                             !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0796   .0047   .0474    .0047   .0474   .0796    .1336   .2714   .1021!
!  -.0416  -.1909  -.0258   -.1909  -.0258  -.0416   -.1336  -.2714  -.1021!
!                                                                       !
! ***************          CAS(2)- SERVICE LEVEL C          *************** !
! FORCE MAX.     3253.307 !                                             !
! FORCE MIN.    -9347.229 !                                             !
! AXIAL, SWING  MAX/MIN:  !                                             !
! TEN. =   .0128,   .1392 !                                             !
! COMP=    .0108,   .2289 !                                             !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .1165   .0241   .0735    .0241   .0735   .1165    .0000   .0000   .0000!
!  -.0786  -.2089  -.0520   -.2089  -.0520  -.0786    .0000   .0000   .0000!
!                                                                       !
! ***************          CAS(3)- SERVICE LEVEL D          *************** !
! FORCE MAX.     3432.731 !                                             !
! FORCE MIN.    -9526.652 !                                             !
! AXIAL, SWING  MAX/MIN:  !                                             !
! TEN =    .0129,   .1408 !                                             !
! COMP=    .0108,   .2337 !                                             !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .1178   .0251   .0742    .0251   .0742   .1178    .1336   .2714   .1021!
!  -.0786  -.2141  -.0520   -.2141  -.0520  -.0786    .0000   .0000   .0000!
!                                                                       !
! ***************         CAS(4)- SERVICE LEVEL 3*B         *************** !
! FORCE MAX.          .000 !                                            !
! FORCE MIN.          .000 !                                            !
! AXIAL, SWING  MAX/MIN:  !                                             !
! N/A =    .0000,   .0000 !                                             !
! N/A =    .0000,   .0000 !                                             !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                       !
!                                                                       !
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ATTACHMENT 2
PAGE 40 OF 143
CALC. NO. C-0031/TIR0

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PRINTED 20041222

N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H10      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  28    SNUBBER
 TRAN. STIF. = .0000E+00
    (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .3482,   .2856
TEN. =  .1398,   .3353
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .3482   .0045   .2856    .0045   .2856   .3482    .4085   .2700   .4524
 -.1398  -.3336  -.0332   -.3336  -.0332  -.1398   -.4085  -.2700  -.4524

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .3997,   .3099
TEN. =  .1926,   .3563
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .3997   .0241   .3089    .0241   .3089   .3997    .0000   .0000   .0000
 -.1926  -.3518  -.0567   -.3518  -.0567  -.1926    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .4118,   .3152
TEN. =  .1930,   .3653
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .4118   .0251   .3142    .0251   .3142   .4118    .4085   .2700   .4524
 -.1930  -.3609  -.0568   -.3609  -.0568  -.1930    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H9        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  29    SNUBBER
 TRAN. STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .2801   .0000  -.9600

***************          CAS(1)- SERVICE LEVEL B           ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .2037,   .4621
TEN. =   .0101,   .3886
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .3865   .0045   .3250    .0045   .3250   .3865    .4497   .2699   .5081
 -.1548  -.3549  -.0346   -.3549  -.0346  -.1548   -.4497  -.2699  -.5081

***************          CAS(2)- SERVICE LEVEL C           ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .2101,   .5203
TEN. =   .0040,   .4318
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .4401   .0241   .3473    .0241   .3473   .4401    .0000   .0000   .0000
 -.2098  -.3730  -.0571   -.3730  -.0571  -.2098    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D           ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .2133,   .5354
TEN. =   .0041,   .4404
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .4536   .0251   .3545    .0251   .3545   .4536    .4497   .2699   .5081
 -.2103  -.3827  -.0571   -.3827  -.0571  -.2103    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000


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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

NODE = 95DEL SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = -.0112, Z = -.9999

SUPT: 30 RIGID	SUPT: 31 RIGID	SUPT: 32 RIGID
TRAN. STIF. = .3100E+03	TRAN. STIF. = .1825E+04	TRAN. STIF. = .1825E+04
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 -1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 3.507	FORCE MAX. 98.207	FORCE MAX. 967.101
FORCE MIN. -115.645	FORCE MIN. -472.795	FORCE MIN. -343.467
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN.= .3730, .5309	COMP= .0319, .6481	COMP= .5299, .3744
COMP= .0113, .3202	TEN.= .2591, .1885	TEN.= .1882, .2593
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.5299 .0319 .3730	.3734 .0361 .5299	.5463 1.0454 .0922
-.1882 -.2591 -.0113	-.0142 -.2592 -.1882	-.5463 -1.0454 -.0922
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. 6.909	FORCE MAX. 98.481	FORCE MAX. 1065.758
FORCE MIN. -119.068	FORCE MIN. -511.985	FORCE MIN. -445.276
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN.= .3841, .5865	COMP= .0540, .6990	COMP= .5840, .3879
COMP= .0223, .3718	TEN.= .2805, .2430	TEN.= .2440, .2814
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.5840 .0540 .3841	.3847 .0583 .5840	.0000 .0000 .0000
-.2440 -.2805 -.0223	-.0254 -.2808 -.2440	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 6.948	FORCE MAX. 98.679	FORCE MAX. 1096.497
FORCE MIN. -122.166	FORCE MIN. -512.184	FORCE MIN. -446.251
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN.= .3941, .6032	COMP= .0541, .7185	COMP= .6008, .3978
COMP= .0224, .3722	TEN.= .2806, .2455	TEN.= .2445, .2815
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.6008 .0541 .3941	.3947 .0585 .6008	.5463 1.0454 .0922
-.2445 -.2806 -.0224	-.0256 -.2809 -.2445	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACOD

NODE = 958EL SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = -.0112, Z = -.9999

SUPT: 33 RIGID	SUPT: 34 RIGID	SUPT: 35 RIGID
ROT. STIF. = .6670E+05	ROT. STIF. = .6670E+05	ROT. STIF. = .6670E+05
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 -1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000

CAS(1)- SERVICE LEVEL B

MOMT. MAX. 90.674	MOMT. MAX. 220.088	MOMT. MAX. 136.706
MOMT. MIN. -292.023	MOMT. MIN. -66.546	MOMT. MIN. -11.390
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.5299 .0319 .3730	.3734 .0361 .5299	.5463 1.0454 .0922
-.1882 -.2591 -.0113	-.0142 -.2592 -.1882	-.5463 -1.0454 -.0922

CAS(2)- SERVICE LEVEL C

MOMT. MAX. 114.823	MOMT. MAX. 239.615	MOMT. MAX. 145.628
MOMT. MIN. -315.139	MOMT. MIN. -86.670	MOMT. MIN. -20.597
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.5840 .0540 .3841	.3847 .0583 .5840	.0000 .0000 .0000
-.2440 -.2805 -.0223	-.0254 -.2808 -.2440	.0000 .0000 .0000

CAS(3)- SERVICE LEVEL D

MOMT. MAX. 115.104	MOMT. MAX. 242.942	MOMT. MAX. 147.224
MOMT. MIN. -326.171	MOMT. MIN. -86.998	MOMT. MIN. -20.695
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.6008 .0541 .3941	.3947 .0585 .6008	.5463 1.0454 .0922
-.2445 -.2806 -.0224	-.0256 -.2809 -.2445	.0000 .0000 .0000

CAS(4)- SERVICE LEVEL 3*B

MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACQD

```
NODE = H8        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0100, Z =  -.9999

 SUPT:  36        ~~RIGID~~
 TRAN. STIF. = .1200E+04
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.        29.881
FORCE MIN.      -196.428
AXIAL, SWING  MAX/MIN:
COMP=   .0249,    .4762
TEN. =  .1637,    .1423
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .3693   .0249   .3006    .3008   .0279   .3693    .4988   .9140   .0923
 -.1418  -.1637  -.0114   -.0130  -.1638  -.1418   -.4988  -.9140  -.0923

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.        48.132
FORCE MIN.      -214.231
AXIAL, SWING  MAX/MIN:
COMP=   .0401,    .5177
TEN. =  .1785,    .1886
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .4134   .0401   .3116    .3120   .0432   .4134    .0000   .0000   .0000
 -.1873  -.1785  -.0223   -.0241  -.1787  -.1873    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.        48.219
FORCE MIN.      -214.318
AXIAL, SWING  MAX/MIN:
COMP=   .0402,    .5320
TEN. =  .1786,    .1890
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .4253   .0402   .3195    .3199   .0434   .4253    .4988   .9140   .0923
 -.1877  -.1786  -.0224   -.0242  -.1788  -.1877    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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SPRING HANGER
HOT LOAD = 2860.# } DJ Nettle 06-07-88

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                    N U T E C H   E N G I N E E R S

                PIPE SUPPORT LOAD COMB   SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 ------ FILE NUMBERS ------
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H7        SUPPORT  1 OF  1                              (Trans. only) !
!                                                                             !
!       PIPE DIRECTION COSINES: X =   .0000, Y =   .0143, Z =  -.9999         !
!                                                                             !
!  SUPT:  37     SNUBBER  !                                                   !
!  TRAN. STIF. = .0000E+00 !                                                  !
!     (X)     (Y)     (Z)  !                                                  !
! DIRECTION COSINES:       !                                                  !
! 1.0000   .0000   .0000   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .2921,    .2660  !                                                  !
! TEN. =  .1208,    .1255  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .2921   .0200   .2652    .2655   .0238   .2921    .4966   .8241   .0923!
!  -.1208  -.1250  -.0114   -.0131  -.1251  -.1208   -.4966  -.8241  -.0923!
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN           .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .3314,    .2781  !                                                  !
! TEN. =  .1612,    .1386  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .3314   .0321   .2762    .2766   .0360   .3314    .0000   .0000   .0000!
!  -.1612  -.1368  -.0223   -.0242  -.1371  -.1612    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .3415,    .2830  !                                                  !
! TEN. =  .1616,    .1387  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .3415   .0322   .2832    .2836   .0362   .3415    .4966   .8241   .0923!
!  -.1616  -.1369  -.0224   -.0244  -.1372  -.1616    .0000   .0000   .0000!
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =   .0000,    .0000  !                                                  !
! N/A =   .0000,    .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
!                                                                             !
!    SUPTJSRL              9:38:17.58      6/ 7/1988            PAGE  42     !
+-----------------------------------------------------------------------------+
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ATTACHMENT 2
PAGE 46 OF 143
CALC. NO. C-0031/7IRD

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

```
                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.   SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  ------ FILE NUMBERS ------
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H6        SUPPORT  1 OF  1                            (Trans. only) !
!                                                                             !
!       PIPE DIRECTION COSINES: X =   .0000, Y =  -.0122, Z =  -.9999         !
!                                                                             !
!  SUPT:  38       RIGID  !                                                  !
!  TRAN. STIF. = .1402E+07 !                                                  !
!     (X)     (Y)     (Z)  !                                                  !
! DIRECTION COSINES:       !                                                  !
!  .0000   .0000  1.0000   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          ***************  !
! FORCE MAX.      748.945  !                                                  !
! FORCE MIN.    -3506.439  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=    .0105,   .0344  !                                                  !
! TEN. =   .0125,   .2455  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0341   .0039   .0105    .0106   .0041   .0341    .3486   .2872   .0923!
!  -.2452  -.0130  -.0125   -.0126  -.0131  -.2452   -.3486  -.2872  -.0923!
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          ***************  !
! FORCE MAX.     1990.683  !                                                  !
! FORCE MIN.    -4711.733  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=    .0213,   .0751  !                                                  !
! TEN. =   .0232,   .2872  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0746   .0088   .0213     0214   .0090   .0746    .0000   .0000   .0000!
!  -.2866  -.0178  -.0232   -.0234  -.0181  -.2866    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          ***************  !
! FORCE MAX.     2014.963  !                                                  !
! FORCE MIN.    -4769.406  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=    .0213,   .0752  !                                                  !
! TEN. =   .0234,   .2873  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0747   .0088   .0213    .0214   .0090   .0747    .3486   .2872   .0923!
!  -.2867  -.0178  -.0234   -.0236  -.0181  -.2867    .0000   .0000   .0000!
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************  !
! FORCE MAX.          .000  !                                                 !
! FORCE MIN.          .000  !                                                 !
! AXIAL, SWING  MAX/MIN:    !                                                 !
! N/A =    .0000,   .0000   !                                                 !
! N/A =    .0000,   .0000   !                                                 !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
!                                                                             !
!    SUPTJSRL            9:38:17.58      6/ 7/1988            PAGE  43      !
+-----------------------------------------------------------------------------+
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PRINTED 20041222

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. AC0D

```
NODE = H5A      SUPPORT  1 OF  1                                  (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0045, Z = -1.0000

 SUPT:  39    SNUBBER
 TRAN STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0271,    .0118
TEN.=   .2755,    .0402
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0271   .0053   .0105    .0105   .0053   .0271    .3165   .2606   .0922
 -.2755  -.0108  -.0387   -.0387  -.0110  -.2755   -.3165  -.2606  -.0922

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0663,    .0237
TEN.=   .3156,    .0520
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0663   .0105   .0213    .0213   .0106   .0663    .0000   .0000   .0000
 -.3156  -.0160  -.0494   -.0495  -.0162  -.3156    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0664,    .0237
TEN.=   .3156,    .0528
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0664   .0105   .0213    .0213   .0106   .0664    .3165   .2606   .0922
 -.3156  -.0160  -.0503   -.0504  -.0163  -.3156    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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PRINTED 20041222

N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM C201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H4A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0113, Z =  -.9999

 SUPT:  40       RIGID
 TRAN. STIF. = .6160E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.       350.005
FORCE MIN.     -2663.162
AXIAL, SWING  MAX/MIN:
COMP=    .0069,    .0259
TEN =    .0106,    .2984
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0236   .0069   .0105    .0106   .0070  -.0236    .2993   .2559   .0921
 -.2934  -.0106  -.0542   -.0543  -.0112  -.2934   -.2993  -.2559  -.0921

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.       937.435
FORCE MIN.     -3249.640
AXIAL, SWING  MAX/MIN:
COMP=    .0125,    .0654
TEN. =   .0163,    .3388
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0618   .0125   .0213    .0214   .0128   .0618    .0000   .0000   .0000
 -.3325  -.0163  -.0649   -.0651  -.0170  -.3325    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.       943.295
FORCE MIN.     -3255.499
AXIAL, SWING  MAX/MIN:
COMP=    .0125,    .0655
TEN. =   .0163,    .3391
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0619   .0125   .0213    .0214   .0128   .0619    .2993   .2559   .0921
 -.3326  -.0163  -.0662   -.0664  -.0170  -.3326    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =     0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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ATTACHMENT 2
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CALC. NO. C-0031/TIRD

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACGD

```
NODE = H3A      SUPPORT  1 OF  1                                  (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y = -.0109, Z =   .0000

 SUPT:  41    SNUBBER
 TRAN.STIF. = .0000E+00
   (X)    (Y)    (Z)
DIRECTION COSINES:
  0767   .0000  -.9971

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .0114,   .0892
COMP=    .0960,   .1486
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0183   .0871   .0128    .0192   .0873   .0128    .2675   .2749   .4880
 -.1390  -.0228  -.1070   -.1393  -.0243  -.1070   -.2675  -.2749  -.4880

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .0241,   .1122
COMP=    .1072,   .1825
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0494   .0997   .0280    .0504   .1002   .0280    .0000   .0000   .0000
 -.1706  -.0340  -.1206   -.1709  -.0358  -.1206    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN =    .0242,   .1123
COMP=    .1160,   .1833
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0494   .0998   .0281    .0505   .1003   .0281    .2675   .2749   .4880
 -.1706  -.0341  -.1295   -.1710  -.0359  -.1295    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P:01

PROJECT: HOPE CREEK SNUBBER REDUCTION ____ FILE NUMBERS ____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H2A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0104, Z =   .0000

 SUPT:  42    SNUBBER
 TRAN.STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0976,    .0211
TEN. =  .0173,    .1141
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0182   .0976   .0106    .0192   .0978   .0106    .2660   .2423   .4993
 -.0695  -.0173  -.0905   -.0697  -.0180  -.0905   -.2660  -.2423  -.4993

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .1088,    .0553
TEN. =  .0263,    .1443
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0491   .1088   .0253    .0503   .1093   .0253    .0000   .0000   .0000
 -.1009  -.0263  -.1032   -.1011  -.0274  -.1032    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .1088,    .0554
TEN. =  .0264,    .1525
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0492   .1088   .0255    .0503   .1093   .0255    .2660   .2423   .4993
 -.1009  -.0264  -.1143   -.1012  -.0274  -.1143    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. AC00

```
NODE = H1A        SUPPORT  1 OF  1                                  (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0105, Z =   .0000

 SUPT:  43        ~~RIGID~~
 TRAN. STIF. = .9000E+03
   (X)     (Y)     (Z)
DIRECTION COSINES:
  0000  1.0000   .0000

 ***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.        88.826
FORCE MIN.       -15.044
AXIAL, SWING  MAX/MIN:
COMP=   .0987,    .0209
TEN. =  .0167,    .1073
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0182  .0987   .0103    .0192  .0989   .0103    .2658  .2406  .4950
 -.0608 -.0167  -.0884   -.0610 -.0174  -.0884   -.2658 -.2406 -.4950

 ***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.        98.580
FORCE MIN.       -22.748
AXIAL, SWING  MAX/MIN:
COMP=   .1095,    .0551
TEN. =  .0253,    .1367
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0491  .1095   .0249    .0503  .1100   .0249    .0000  .0000  .0000
 -.0922 -.0253  -.1009   -.0925 -.0262  -.1009    .0000  .0000  .0000

 ***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.        98.606
FORCE MIN.       -22.775
AXIAL, SWING  MAX/MIN:
COMP=   .1096,    .0552
TEN =   .0253,    .1452
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
   0492  .1096   .0250    .0503  .1101   .0250    .2658  .2406  .4950
 -.0923 -.0253  -.1122   -.0925 -.0263  -.1122    .0000  .0000  .0000

 ***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000  .0000   .0000     0000  .0000   .0000    .0000  .0000  .0000
  .0000  .0000   .0000    .0000  .0000   .0000    .0000  .0000  .0000

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Spring Hanger
Hot Load = 2158.4 } Ozzella

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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N.U.T.E.C.H ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

NODE = HPTUB SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = 1.0000

SUPT: 44 RIGID	SUPT: 45 RIGID	SUPT: 46 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 1.0000 .0000	.0000 .0000 1.0000
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 1703.105	FORCE MAX. 656.056	FORCE MAX. 645.566
FORCE MIN. -1433.061	FORCE MIN. -1080.599	FORCE MIN. -1092.247
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0018, .0000	COMP= .0000, .0018	COMP= .0000, .0018
TEN.= .0000, .0285	TEN.= .0143, .0246	TEN.= .0246, .0143
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0018 .0000 .0000	.0000 .0000 .0018	.1399 .2599 .0999
-.0000 -.0143 -.0246	-.0246 -.0143 -.0000	-.1399 -.2599 -.0999
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. 3813.992	FORCE MAX. 970.428	FORCE MAX. 1042.311
FORCE MIN. -3527.023	FORCE MIN. -1403.293	FORCE MIN. -1501.642
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0166, .0100	COMP= .0000, .0194	COMP= .0100, .0166
TEN.= .0150, .0348	TEN.= .0129, .0356	TEN.= .0323, .0198
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0166 .0000 .0100	.0100 .0000 .0166	.0000 .0000 .0000
-.0150 -.0129 -.0323	-.0323 -.0129 -.0150	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 3824.777	FORCE MAX. 1005.350	FORCE MAX. 1056.830
FORCE MIN. -3537.808	FORCE MIN. -1408.086	FORCE MIN. -1516.161
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0175, .0100	COMP= .0000, .0201	COMP= .0100, .0175
TEN.= .0150, .0477	TEN.= .0195, .0461	TEN.= .0436, .0246
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0175 .0000 .0100	.0100 .0000 .0175	.1399 .2599 .0999
-.0150 -.0195 -.0436	-.0436 -.0195 -.0150	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACQD

NODE = HPTUB SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = 1.0000

SUPT: 47 RIGID	SUPT: 48 RIGID	SUPT: 49 RIGID
ROT. STIF. = .1000E+13	ROT. STIF. = .1000E+13	ROT STIF. = .1000E+13
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 1.0000 .0000	.0000 .0000 1.0000
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 42421.870	MOMT. MAX. 49725.810	MOMT. MAX. 76839.390
MOMT. MIN. -92798.200	MOMT. MIN. -61184.600	MOMT. MIN. -103314.600
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0018 .0000 .0000	.0000 .0000 .0018	.1399 .2599 .0999
-.0000 -.0143 -.0246	-.0246 -.0143 -.0000	-.1399 -.2599 -.0999
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. 70235.080	MOMT. MAX. 95487.690	MOMT. MAX. 205426.400
MOMT MIN. -121010.700	MOMT. MIN. -109141.500	MOMT. MIN. -232148.400
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0166 .0000 .0100	.0100 .0000 .0166	.0000 .0000 .0000
-.0150 -.0129 -.0323	-.0323 -.0129 -.0150	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 71247.480	MOMT. MAX. 95821.190	MOMT MAX. 205983.700
MOMT. MIN. -122023.100	MOMT. MIN. -109475.000	MOMT. MIN. -232705.700
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0175 .0000 .0100	.0100 .0000 .0175	.1399 .2599 .0999
-.0150 -.0195 -.0436	-.0436 -.0195 -.0150	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

ATTACHMENT 2
PAGE 54 OF 143
CALC. NO. C-0031/7ERD

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H20      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999

 SUPT:  50    SNUBBER
 TRAN. STIF. = .2530E+06
    (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.       799.888
FORCE MIN.      -799.888
AXIAL, SWING  MAX/MIN:
COMP=   .2380,    .0354
TEN. =  .0195,    .0666
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0351   .0046   .2380    .2380   .0070   .0351    .1541   .2910   .1416
 -.0648  -.0151  -.0195   -.0197  -.0153  -.0648   -.1541  -.2910  -.1416

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.      1489.455
FORCE MIN.     -1489.455
AXIAL, SWING  MAX/MIN:
COMP=   .2541,    .0561
TEN. =  .0357,    .0871
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0557   .0068   .2541    .2542   .0095   .0557    .0000   .0000   .0000
 -.0854  -.0173  -.0357   -.0359  -.0177  -.0854    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.      1494.598
FORCE MIN.     -1494.598
AXIAL, SWING  MAX/MIN:
COMP=   .2607,    .0561
TEN. =  .0357,    .0881
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0557   .0069   .2607    .2608   .0096   .0557    .1541   .2910   .1416
 -.0864  -.0174  -.0357   -.0359  -.0177  -.0864    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACQD

```
NODE = HID      SUPPORT  1 OF  1                                  (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999

 SUPT:  51        RIGID  | SUPT:  52        RIGID  |
 TRAN. STIF. = .3410E+07 | TRAN. STIF. = .3410E+07 |
   (X)     (Y)     (Z)   |   (X)     (Y)     (Z)   |
DIRECTION COSINES:       | DIRECTION COSINES:      |
1.0000   .0000   .0000   | .0000  1.0000   .0000   |
                         |                         |
***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.      2702.804 | FORCE MAX.      1395.319 |
FORCE MIN.     -2548.954 | FORCE MIN.     -9285.303 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
COMP=    .0207,   .2417  | COMP=    .0021,   .2426  |
TEN. =   .0207,   .0200  | TEN. =   .0044,   .0285  |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0207   .0021   .2417    .2417   .0046   .0207    .1385   .2568   .1427
 -.0207  -.0044  -.0195   -.0196  -.0046  -.0207   -.1385  -.2568  -.1427
                         |                         |
***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.      3298.809 | FORCE MAX.      2655.231 |
FORCE MIN.     -3177.653 | FORCE MIN.    -10521.610 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
COMP=    .0389,   .2579  | COMP=    .0030,   .2607  |
TEN. =   .0388,   .0361  | TEN. =   .0053,   .0528  |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0389   .0030   .2578    .2579   .0057   .0389    .0000   .0000   .0000
 -.0388  -.0053  -.0357   -.0358  -.0057  -.0388    .0000   .0000   .0000
                         |                         |
***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.      3309.095 | FORCE MAX.      2663.851 |
FORCE MIN.     -3187.939 | FORCE MIN.    -10530.230 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
COMP=    .0389,   .2646  | COMP=    .0030,   .2674  |
TEN. =   .0388,   .0361  | TEN. =   .0054,   .0528  |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0389   .0030   .2645     2646   .0058   .0389    .1385   .2568   .1427
 -.0388  -.0054  -.0357   -.0358  -.0057  -.0388    .0000   .0000   .0000
                         |                         |
***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000 | FORCE MAX.          .000 |
FORCE MIN.          .000 | FORCE MIN.          .000 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
N/A =    .0000,   .0000  | N/A =    .0000,   .0000  |
N/A =    .0000,   .0000  | N/A =    .0000,   .0000  |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
                         |                         |
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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P:01

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005 1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

NODE = 180DL SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0104, Z = .9999

SUPT: 53 RIGID	SUPT: 54 RIGID	SUPT: 55 RIGID
TRAN. STIF. = .2600E+03	TRAN. STIF. = .1250E+04	TRAN. STIF. = .1250E+04
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000

CAS(1)- SERVICE LEVEL B

FORCE MAX. 66.196	FORCE MAX. 18.952	FORCE MAX. 239.015
FORCE MIN. -5.093	FORCE MIN. -9.187	FORCE MIN. -111.084
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .2546, .1918	COMP= .0152, .3184	COMP= .1912, .2551
TEN.= .0196, .0892	TEN.= .0073, .0910	TEN.= .0889, .0209
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1912 .0152 .2546	.2547 .0178 .1912	.2067 .4201 .1452
-.0889 -.0073 -.0196	-.0197 -.0076 -.0889	-.2067 -.4201 -.1452

CAS(2)- SERVICE LEVEL C

FORCE MAX. 70.405	FORCE MAX. 23.416	FORCE MAX. 277.164
FORCE MIN. -9.308	FORCE MIN. -13.710	FORCE MIN. -149.420
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .2708, .2225	COMP= .0187, .3500	COMP= .2217, .2714
TEN.= .0358, .1200	TEN.= .0110, .1248	TEN.= .1195, .0374
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.2217 .0187 .2708	.2710 .0215 .2217	.0000 .0000 .0000
-.1195 -.0110 -.0358	-.0359 -.0113 -.1195	.0000 .0000 .0000

CAS(3)- SERVICE LEVEL D

FORCE MAX. 72.242	FORCE MAX. 23.441	FORCE MAX. 282.110
FORCE MIN. -9.309	FORCE MIN. -13.735	FORCE MIN. -149.430
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .2779, .2265	COMP= .0188, .3580	COMP= .2257, .2785
TEN.= .0358, .1200	TEN.= .0110, .1248	TEN.= .1195, .0375
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.2257 .0188 .2779	.2780 .0216 .2257	.2067 .4201 .1452
-.1195 -.0110 -.0358	-.0359 -.0114 -.1195	.0000 .0000 .0000

CAS(4)- SERVICE LEVEL 3*B

FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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N·U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

NODE = 180BL SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0104, Z = .9999

SUPT: 56 RIGID	SUPT: 57 RIGID	SUPT: 58 RIGID
ROT. STIF. = .5130E+05	ROT. STIF. = .5130E+05	ROT. STIF. = .5130E+05
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 214.082	MOMT. MAX. 189.002	MOMT. MAX. 2.763
MOMT. MIN. -88.879	MOMT. MIN. -79.025	MOMT. MIN. -5.179
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1912 .0152 .2546	.2547 .0178 .1912	.2067 .4201 .1452
-.0889 -.0073 -.0196	-.0197 -.0076 -.0889	-.2067 -.4201 -.1452
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. 234.966	MOMT. MAX. 204.197	MOMT. MAX. 4.425
MOMT. MIN. -110.381	MOMT. MIN. -94.401	MOMT. MIN. -6.820
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.2217 .0187 .2708	.2710 .0215 .2217	.0000 .0000 .0000
-.1195 -.0110 -.0358	-.0359 -.0113 -.1195	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 241.327	MOMT. MAX 208.552	MOMT. MAX. 4.436
MOMT. MIN. -110.572	MOMT. MIN. -94.416	MOMT. MIN. -6.831
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.2257 .0188 .2779	.2780 .0216 .2257	.2067 .4201 .1452
-.1195 -.0110 -.0358	-.0359 -.0114 -.1195	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P701

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = H3B       SUPPORT  1 OF  1.                              (Trans. only) !
!                                                                               !
!       PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999           !
!                                                                               !
!  SUPT:  59       RIGID  !                                                    !
!  TRAN. STIF. = .8340E+06 !                                                    !
!    (X)     (Y)     (Z)   !                                                    !
! DIRECTION COSINES:       !                                                    !
!  .0000  1.0000   .0000   !                                                    !
!                          !                                                    !
! ***************          CAS(1)- SERVICE LEVEL B          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.    -2775.906  !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! COMP=   .0018,    .6226  !                                                    !
! TEN. =  .0053,    .2490  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .5557   .0018   .2807    .2807   .0047   .5557    .5625   .2431   .1464!
!  -.2482  -.0053  -.0196   -.0196  -.0055  -.2482   -.5625  -.2431  -.1464!
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C          ***************    !
! FORCE MAX.      211.305  !                                                    !
! FORCE MIN.    -3175.498  !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! COMP=   .0042,    .6852  !                                                    !
! TEN. =  .0077,    .3126  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .6175   .0042   .2969    .2969   .0072   .6175    .0000   .0000   .0000!
!  -.3105  -.0077  -.0358   -.0359  -.0081  -.3105    .0000   .0000   .0000!
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D          ***************    !
! FORCE MAX.      216.096  !                                                    !
! FORCE MIN.    -3180.289  !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! COMP=   .0042,    .6984  !                                                    !
! TEN. =  .0077,    .3127  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .6284   .0042   .3047    .3047   .0074   .6284    .5625   .2431   .1464!
!  -.3106  -.0077  -.0358   -.0359  -.0081  -.3106    .0000   .0000   .0000!
!                                                                               !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                               !
!                                                                               !
!    SUPTJSRL            9:38:17.58     6/ 7/1988            PAGE  55         !
+-------------------------------------------------------------------------------+
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ATTACHMENT 2
PAGE 59 OF 143
CALC NO. C-0031/7180

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P:01

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 FILE NUMBERS
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD
+-----------------------------------------------------------------------+
!                                                                       !
! NODE = H5B      SUPPORT  1 OF  1                          (Trans. only) !
!                                                                       !
!      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000    !
!                                                                       !
!  SUPT:  60       RIGID  !                                             !
!  TRAN. STIF. = .3850E+06 !                                            !
!    (X)     (Y)     (Z)   !                                            !
! DIRECTION COSINES:       !                                            !
! -.5210   .0000  -.8535 !                                              !
!                          !                                            !
! ***************          CAS(1)- SERVICE LEVEL B          ************** !
! FORCE MAX.       122.807 !                                            !
! FORCE MIN.      -464.223 !                                            !
! AXIAL, SWING  MAX/MIN:  !                                             !
! TEN. =   .0392,   .0613 !                                             !
! COMP=    .0384,   .0236 !                                             !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!  .0358   .0586   .0241    .0586   .0241   .0358    .1386   .2775   .0981!
!  -.0356  -.0148  -.0232   -.0148  -.0232  -.0356   -.1386  -.2775  -.0981!
!                                                                       !
! ***************          CAS(2)- SERVICE LEVEL C          ************** !
! FORCE MAX.       224.480 !                                            !
! FORCE MIN.      -568.905 !                                            !
! AXIAL, SWING  MAX/MIN:  !                                             !
! TEN. =   .0796,   .0716 !                                             !
! COMP=    .0787,   .0401 !                                             !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!  .0715   .0624   .0496    .0624   .0496   .0715    .0000   .0000   .0000!
!  - 0713  -.0186  -.0486   -.0186  -.0486  -.0713    .0000   .0000   .0000!
!                                                                       !
! ***************          CAS(3)- SERVICE LEVEL D          ************** !
! FORCE MAX.       232.925 !                                            !
! FORCE MIN.      -577.350 !                                            !
! AXIAL, SWING  MAX/MIN:  !                                             !
! TEN. =   .0796,   .0729 !                                             !
! COMP=    .0787,   .0401 !                                             !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!  .0715   .0638   .0496    .0638   .0496   .0715    .1386   .2775   .0981!
!  -.0713  -.0186  -.0487   -.0186  -.0487  -.0713    .0000   .0000   .0000!
!                                                                       !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ************** !
! FORCE MAX.          .000 !                                            !
! FORCE MIN.          .000 !                                            !
! AXIAL, SWING  MAX/MIN:  !                                             !
! N/A =    .0000,   .0000 !                                             !
! N/A =    .0000,   .0000 !                                             !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                       !
!                                                                       !
!    SUPTJSRL              9:38:17.58      6/ 7/1988          PAGE  56  !
+-----------------------------------------------------------------------+
```

```
N U I L L H   L N G I N E L L R J

PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H4B      SUPPORT  1 OF  1                              (Trans. only) !
!                                                                             !
!      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000          !
!                                                                             !
!  SUPT:  61       RIGID  !                                                   !
!  TRAN. STIF. = .5160E+06 !                                                  !
!    (X)     (Y)     (Z)   !                                                  !
! DIRECTION COSINES:       !                                                  !
!  .6264   .0000  -.7795   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          ***************  !
! FORCE MAX.        85.395 !                                                  !
! FORCE MIN.      -403.786 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .0029,   .0729   !                                                  !
! TEN. =  .0035,   .0591   !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:  !
!  .0340   .0600   .0236    .0600   .0236   .0340    .1455   .2776   .1019!  !
!  -.0468  -.0148  -.0332   -.0148  -.0332  -.0468   -.1455  -.2776  -.1019!  !
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          ***************  !
! FORCE MAX.       171.750 !                                                  !
! FORCE MIN.      -488.398 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .0052,   .1067   !                                                  !
! TEN. =  .0058,   .1031   !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:  !
!  .0699   .0639   .0494    .0639   .0494   .0699    .0000   .0000   .0000!  !
!  -.0827  -.0186  -.0590   -.0186  -.0590  -.0827    .0000   .0000   .0000!  !
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          ***************  !
! FORCE MAX.       175.813 !                                                  !
! FORCE MIN.      -494.595 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .0052,   .1076   !                                                  !
! TEN. =  .0059,   .1037   !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:  !
!  .0699   .0654   .0494    .0654   .0494   .0699    .1455   .2776   .1019!  !
!  -.0832  -.0186  -.0593   -.0186  -.0593  -.0832    .0000   .0000   .0000!  !
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =   .0000,   .0000   !                                                  !
! N/A =   .0000,   .0000   !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:  !
!  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!  !
!  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!  !
!                                                                             !
!                                                                             !
!    SUPTJSRL            9:38:17.58     6/ 7/1988            PAGE  57        !
+-----------------------------------------------------------------------------+
```

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

OUTPUT SAVED IN FILE : P201SUP.S1

NORMAL COMPLETION AT 9:42: 5.30 6/ 7/1988

ATTACHMENT 2
PAGE 62 OF 143
CALC. NO. C-0031/7IRD

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201, HANGER GUIDANCE	ID NO. C-31-HG / REFERENCE NONE	SHEET B-1 OF 41
	ORIGINATOR	OJT 6	
	DATE	06-07-88	
	VFR or CKR	MSM	
	DATE	6/7/88	

ATTACHMENT B

OPTSUPT RUNID SUPTJYVD DATED 06-07-88

(40 Pages)

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMD. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
N   N  U   U  TTTTT  EEEEE   CCCC  H   H
NN  N  U   U    T    E      C      H   H
N N N  U   U    T    EEEEE  C      HHHHH
N  NN  U   U    T    E      C      H   H
N   N  UUUUU    T    EEEEE   CCCC  H   H

OOOOO, PPPPP  TTTTT  SSSSS  U   U  PPPPP  TTTTT
O   O  P   P    T    S      U   U  P   P    T
O   O  PPPPP    T    SSSSS  U   U  PPPPP    T
O   O  P        T        S  U   U  P        T
OOOOO  P        T    SSSSS  UUUUU  P        T
```

REVISION 1.0.0
LEVEL FEB-25-1988

OPTSUPT RUN: ID = SUPTJYVD TIME = 9:44:21.2 DATE = 6/7/1988

CALCULATION PACKAGE FILE NUMBER = (C-31) PSE005.1016

COMPUTER RUN FILE NUMBER = ACOD

COMPUTER RUN OUTPUT FILE NAME = P201SUP.S2

OPTPIPE TAPE 51 INPUT:
FILE NAME = P201SUP.T51 RUN ID = ACOD DATE = 88/06/06

OPTPIPE TAPE 52 INPUT:
FILE NAME = P201SUP.T52 RUN ID = ACOD DATE = 88/06/06

FILE CONTAINING ADDITIONAL LOAD CASE DATA:
FILE NAME =

PREPARED BY/DATE: Ozetta 06-07-88
C.J. MEHTA

CHECKED BY/DATE: Aherlekar 6/7/88
A.S. HERLEKAR

SUPTJYVD 9:44:21.2 6/7/1988 PAGE 1

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACOD

HPCI TURBINE EXHAUST (P201)NORMAL LOADS MODEL.

NUMBER OF POINTS =	111	NUMBER OF PIPE RUNS =	1
NUMBER OF SUPPORTS =	61	NUMBER OF TEES =	0
NUMBER OF PIPES =	106	NUMBER OF BEAMS =	0

NUMBER OF LOAD CASES = 69

CASE ID	LOAD CASE DESCRIPTION	CASE ID	LOAD CASE DESCRIPTION
OBEDX		OBEDY	
OBEDZ		SSEDX	
SSEDY		SSEDZ	
DL		GAB	
CHUGO		CHUGF	
DW		TE	
TE1		TE2	
THAMA		TD	
GABI		GABIB	
COI		CHUGI	
OBEI		SSEI	
OBED		SSED	
MXEQD		MXEQI	
CHUG		CO	
THAM		THAM1	
THAM2		TD1	
TD2		TE2T	
THTD		TEHD	
THTD1		TEHD1	
TMAX		TMAX1	
A2A		A-2	
A3A		A-3	
A4A		A-4	
B-2		B-MAX	
C2		C-1	
C3A		C-3	
C-MAX		D-1	

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

CASE ID	LOAD CASE DESCRIPTION	CASE ID	LOAD CASE DESCRIPTION
D3A		D-3	
D-MAX		DWS	
DBID		SSID	
MXEQ		SLA1	
SLB1		SLD1	
SLD2		SLD3	
SLA		SLB	
SLD			

ECHO OF COMBINATION PROCEDURE INPUT FILE SUPT1

```
CAS(1)- SERVICE LEVEL B
CAS(2)- SERVICE LEVEL C
CAS(3)- SERVICE LEVEL D
CAS(4)- SERVICE LEVEL D*B
CAS(1)- L.C.NO. A-1 (DW ONLY)
LID(DW)
CAS(4)- L.C.NO. TMAX (N.O.C.THERMAL ONLY)
LID(TMAX)
```

SUPTJYVD 9:44:21. 2 6/ 7/1988 PAGE 3

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P701

PROJECT: HOPE CREEK SNUBBER REDUCTION ____ FILE NUMBERS ____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

NODE = I7SAN SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .1745, Y = -.7074, Z = -.6849

SUPT: 1 RIGID	SUPT: 2 RIGID	SUPT: 3 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.9808 .0000 .1951	-.1379 -.7071 .6936	.1379 -.7071 -.6936
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 200.557	FORCE MAX. 398.108	FORCE MAX. 5752.025
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0000	TEN.= .0000, .0000	COMP= .0000, .0000
TEN.= .0000, .0001	COMP= .0000, .0001	COMP= .0001, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 -.0000 -.0000	.0001 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. 74.715	FORCE MAX. 1.434	FORCE MAX. 1997.349
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .1088, .0217	TEN.= .0153, .1099	COMP= .0153, .1099
TEN.= .1089, .3489	TEN.= .3579, .4302	COMP= .4163, .3740
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1110 .0000 .0000	.0194 .0194 .1075	.0000 .0000 .0000
.0000 -.0413 -.3581	-.4115 -.4118 -.1378	.0000 .0000 .0000

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PRINTED 20041222

N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

NODE = I7SAN SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .1745, Y = -.7074, Z = -.6849

SUPT: 4 RIGID	SUPT: 5 RIGID	SUPT: 6 RIGID
ROT STIF. = .1000E+11	ROT. STIF. = .1000E+11	ROT STIF. = .1000E+11
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.9808 .0000 .1951	-.1379 -.7071 .6936	.1379 -.7071 -.6936
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 2397.099	MOMT. MAX. 97.829	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. -90.351
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 -.0000 -.0000	.0001 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. 4.833	MOMT. MAX. .529
MOMT. MIN. -6.102	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1110 .0000 .0000	.0194 .0194 .1075	.0000 .0000 .0000
.0000 -.0413 -.5581	-.4115 -.4118 -.1378	.0000 .0000 .0000

SUPTJYVD 9:44:21. 2 6/ 7/1988 PAGE 5

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PRINTED 20041222

```
                    N U I E L M   E N G I N E E R .

                 PIPE SUPPORT LOAD COMB.   SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = 19SBN    SUPPORT  1 OF  2                              (Trans. only)   !
!                                                                               !
!       PIPE DIRECTION COSINES: X =  -.5521, Y =  -.7074, Z =  -.4414           !
!                                                                               !
!  SUPT:   7       RIGID  !  SUPT:   8       RIGID  !  SUPT:   9       RIGID   !
!  TRAN.STIF. = .1000E+09 !  TRAN.STIF. = .1000E+09 !  TRAN.STIF. = .1000E+09  !
!    (X)    (Y)    (Z)    !    (X)    (Y)    (Z)    !    (X)    (Y)    (Z)     !
! DIRECTION COSINES:      ! DIRECTION COSINES:      ! DIRECTION COSINES:       !
! 1.0000   .0000   .0000  !  .0000  -.7071   .7071  !  .0000  -.7071  -.7071   !
!                         !                         !                          !
! ***************          CAS(1)- SERVICE LEVEL B          *************** !
! FORCE MAX.          .000 ! FORCE MAX.       990.717 ! FORCE MAX.     2135.455 !
! FORCE MIN.    -1008.751  ! FORCE MIN.          .000 ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000  !
! TEN. =  .0000,   .0000   ! COMP=   .0000,   .0000   ! COMP=   .0000,   .0000  !
! GLOBAL DISPL. MAX/MIN:     LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!  -.0000  -.0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C          *************** !
! FORCE MAX.          .000 ! FORCE MAX.          .000 ! FORCE MAX.         .000 !
! FORCE MIN.          .000 ! FORCE MIN.          .000 ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000  !
! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000  !
! GLOBAL DISPL. MAX/MIN:     LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D          *************** !
! FORCE MAX.          .000 ! FORCE MAX.          .000 ! FORCE MAX.         .000 !
! FORCE MIN.          .000 ! FORCE MIN.          .000 ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000  !
! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000   ! N/A =   .0000,   .0000  !
! GLOBAL DISPL. MAX/MIN:     LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                               !
! ***************         CAS(4)- SERVICE LEVEL 3*B         *************** !
! FORCE MAX.        711.117 ! FORCE MAX.          .000 ! FORCE MAX.         .000 !
! FORCE MIN.          .000 ! FORCE MIN.     -241.233 ! FORCE MIN.    -1048.208 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! N/A =   .0000,   .0000   ! TEN. =  .0000,   .0000   ! TEN. =  .0000,   .0000  !
! TEN. =  .0000,   .5596   ! TEN. =  .3651,   .4241   ! COMP=   .4241,   .3651  !
! GLOBAL DISPL. MAX/MIN:     LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000  -.0417  -.5581   -.2758  -.2760  -.4359    .0000   .0000   .0000!
!                                                                               !
!                                                                               !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE   6         !
+-------------------------------------------------------------------------------+
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ATTACHMENT 2
PAGE 69 OF 143
CALC. NO. C-0031/7LRD

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

```
N U I L L H   L N U I N L L R J

PIPE SUPPORT LOAD COMB.   SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = 195BN    SUPPORT  2 OF  2                              (Rotation only) !
!                                                                               !
!       PIPE DIRECTION COSINES. X =  -.5521. Y =  -.7074. Z =  -.4414           !
!                                                                               !
!  SUPT:  10       RIGID  !  SUPT:  11       RIGID  !  SUPT:  12       RIGID   !
!  ROT. STIF. = .1000E+11 !  ROT. STIF. = .1000E+11 !  ROT. STIF. = .1000E+11  !
!     (X)     (Y)     (Z) !     (X)     (Y)     (Z) !     (X)     (Y)     (Z)  !
! DIRECTION COSINES:     ! DIRECTION COSINES:      ! DIRECTION COSINES:        !
! 1.0000   .0000   .0000 !  .0000  -.7071   .7071 !  .0000  -.7071  -.7071    !
!                        !                         !                           !
! ***************        ! CAS(1)- SERVICE LEVEL B !         ***************   !
!                        !                         !                           !
! MOMT. MAX.     2530.344 ! MOMT. MAX.         .000 ! MOMT. MAX.     2243.646  !
! MOMT. MIN.         .000 ! MOMT. MIN.    -2258.183 ! MOMT. MIN.         .000  !
!                        !                         !                           !
! GLOBAL DISPL. MAX/MIN: ! LOCAL DISPL. MAX/MIN:   ! GLOBAL ACCEL. MAX/MIN:     !
!  .0000   .0000   .0000 !  .0000   .0000   .0000 !  .0000   .0000   .0000!    !
! -.0000  -.0000   .0000 !  .0000   .0000   .0000 !  .0000   .0000   .0000!    !
!                        !                         !                           !
! ***************        ! CAS(2)- SERVICE LEVEL C !         ***************   !
!                        !                         !                           !
! MOMT. MAX.         .000 ! MOMT. MAX.         .000 ! MOMT. MAX.         .000  !
! MOMT. MIN.         .000 ! MOMT. MIN.         .000 ! MOMT. MIN.         .000  !
!                        !                         !                           !
! GLOBAL DISPL. MAX/MIN: ! LOCAL DISPL. MAX/MIN:   ! GLOBAL ACCEL. MAX/MIN:     !
!  .0000   .0000   .0000 !  .0000   .0000   .0000 !  .0000   .0000   .0000!    !
!  .0000   .0000   .0000 !   0000   .0000   .0000 !  .0000   .0000   .0000!    !
!                        !                         !                           !
! ***************        ! CAS(3)- SERVICE LEVEL D !         ***************   !
!                        !                         !                           !
! MOMT. MAX.         .000 ! MOMT. MAX.         .000 ! MOMT. MAX.         .000  !
! MOMT. MIN.         .000 ! MOMT. MIN.         .000 ! MOMT  MIN.         .000  !
!                        !                         !                           !
! GLOBAL DISPL. MAX/MIN: ! LOCAL DISPL. MAX/MIN:   ! GLOBAL ACCEL. MAX/MIN:     !
!  .0000   .0000   .0000 !  .0000   .0000   .0000 !  .0000   .0000   .0000!    !
!  .0000   .0000   .0000 !  .0000   .0000   .0000 !  .0000   .0000   .0000!    !
!                        !                         !                           !
! ***************        ! CAS(4)- SERVICE LEVEL 3*B         ***************   !
!                        !                         !                           !
! MOMT. MAX         7.552 ! MOMT. MAX.        6.451 ! MOMT. MAX.        3.875  !
! MOMT. MIN          .000 ! MOMT. MIN.         .000 ! MOMT  MIN.         .000  !
!                        !                         !                           !
! GLOBAL DISPL. MAX/MIN: ! LOCAL DISPL. MAX/MIN:   ! GLOBAL ACCEL. MAX/MIN:     !
!  .0000   .0000   .0000 !  .0000   .0000   .0000 !  .0000   .0000   .0000!    !
!  .0000  -.0417  -.5581 !  -.2758  -.2760  -.4359 !  .0000   .0000   .0000!    !
!                                                                               !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE   7          !
+-------------------------------------------------------------------------------+
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACOD

NODE = P201 SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = -1.0000

SUPT: 13 RIGID	SUPT: 14 RIGID	SUPT: 15 RIGID
TRAN. STIF. = .3160E+08	TRAN. STIF. = .5120E+07	TRAN. STIF. = .1470E+07
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.9848 -.1736	.0000 .1736 -.9848
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. 192.986	FORCE MAX. 5175.962	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. -5412.059
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0035	TEN.= .0006, .0034	TEN.= .0034, .0006
TEN.= .0000, .0016	COMP= .0016, .0003	TEN.= .0003, .0016
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0035	-.0035 .0000 .0000	.0000 .0000 .0000
.0000 -.0016 .0000	.0000 -.0016 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL D*B	**********
FORCE MAX. 1922.614	FORCE MAX 1701.451	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. -3508.132
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0807, .0567	TEN.= .0558, .0813	COMP= .0098, .0981
TEN.= .0000, .6363	COMP= .1105, .6266	COMP= .6266, .1105
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0807 .0567 .0000	.0000 .0567 .0807	.0000 .0000 .0000
.0000 .0000 -.6363	-.6363 .0000 .0000	.0000 .0000 .0000

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ATTACHMENT 2
PAGE 71 OF 143
CALC. NO. C-0031/7180

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W U I L U H   L H U I H L L H J

PIPE SUPPORT LOAD COMB.   SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP  ACGD

NODE = P201     SUPPORT  2 OF  2                          (Rotation only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0000, Z = -1.0000

 SUPT:  16       RIGID  | SUPT:  17       RIGID  | SUPT:  18       RIGID
 ROT. STIF. = .1570E+08 | ROT. STIF. = .1566E+08 | ROT. STIF. = .2970E+07
   (X)    (Y)    (Z)    |   (X)    (Y)    (Z)    |   (X)    (Y)    (Z)
DIRECTION COSINES:      | DIRECTION COSINES:     | DIRECTION COSINES:
1.0000   .0000   .0000  | .0000  -.9848  -.1736  | .0000   .1736  -.9848

***************          CAS(1)- SERVICE LEVEL B          ***************

MOMT. MAX.     1761.167 | MOMT. MAX.         .000 | MOMT. MAX.      227.921
MOMT. MIN.         .000 | MOMT. MIN.     -589.058 | MOMT. MIN.         .000

GLOBAL DISPL. MAX/MIN:  LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0035   -.0035   .0000   .0000    .0000   .0000   .0000
  .0000  -.0016   .0000    .0000  -.0016   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************

MOMT. MAX.         .000 | MOMT. MAX.         .000 | MOMT. MAX.         .000
MOMT. MIN.         .000 | MOMT. MIN.         .000 | MOMT. MIN.         .000

GLOBAL DISPL. MAX/MIN:  LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************

MOMT. MAX.         .000 | MOMT. MAX.         .000 | MOMT. MAX.         .000
MOMT. MIN.         .000 | MOMT. MIN.         .000 | MOMT. MIN.         .000

GLOBAL DISPL. MAX/MIN:  LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************

MOMT. MAX.     5771.816 | MOMT. MAX.   11688.840 | MOMT. MAX.         .000
MOMT. MIN.         .000 | MOMT. MIN.         .000 | MOMT. MIN.   -5447.514

GLOBAL DISPL. MAX/MIN:  LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0807   .0567   .0000    .0000   .0567   .0807    .0000   .0000   .0000
  .0000   .0000  -.6363   -.6363   .0000   .0000    .0000   .0000   .0000

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N.UTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
NODE = H19      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000

 SUPT:  19      ~~R1010~~  Spring Hanger.
 TRAN.STIF. = .1800E+04    Hot Load = 4940. #  } Ozolla 06-07-88
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.        35.435
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0197,    .0019
TEN.=   .0000,    .0013
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0197   .0019    .0197   .0019   .0000    .0000   .0000   .0000
 -.0013   .0000   .0000    .0000   .0000  -.0013    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.       329.086
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .1828,    .1367
TEN.=   .0000,    .1532
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1367   .1828   .0000    .1828   .0000   .1367    .0000   .0000   .0000
  .0000   .0000  -.1532    .0000  -.1532   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P:01

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H18      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000,  Y =   .0091,  Z =   .0000

 SUPT:  20    SNUBBER
 TRAN. STIF. = .2590E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0065,   .0001
TEN. =  .0000,   .0128
GLOBAL DISPL  MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0065   .0001    .0001   .0065  -.0001    .0000   .0000   .0000
 -.0128   .0000   .0000    .0128  -.0001   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .2197,   .1285
TEN. =  .0000,   .0059
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .1285   .2197   .0000    .1305   .2208   .0000    .0000   .0000   .0000
  .0000   .0000  -.0059    .0000   .0000  -.0059    .0000   .0000   .0000

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                    N U T E C H   E N G I N E E R S

                PIPE SUPPORT LOAD COMB.  SYSTEM  P001

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC.  (C-31) PSE005.1016
CLIENT.   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP  ACGD
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H17       SUPPORT  1 OF  1                              (Trans. only) !
!                                                                             !
!       PIPE DIRECTION COSINES: X = -1.0000, Y =   .0093, Z =   .0000         !
!                                                                             !
!  SUPT:  21        RIGID  !                                                  !
!  TRAN. STIF. = .1320E+07 !                                                  !
!     (X)     (Y)     (Z)  !                                                  !
! DIRECTION COSINES:       !                                                  !
!  .0000   .0000  1.0000   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          *************** !
! FORCE MAX.       148.664 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=   .0001,    .0050  !                                                  !
! TEN =   .0000,    .0128  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!    0000   .0050   .0001    .0000   .0050  -.0001    .0000   .0000   .0000!
!  -.0128   .0000   .0000    .0128  -.0001   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          *************** !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN           .000 !                                                  !
! AXIAL, SWING  MAX/MIN.   !                                                  !
! N/A =   .0000,    .0000  !                                                  !
! N/A =   .0000,    .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          *************** !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =   .0000,    .0000  !                                                  !
! N/A =   .0000,    .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         *************** !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.    -6129.540  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! TEN. =   .0000,    .2414 !                                                  !
! TEN. =   .0046,    .0000 !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .1210   .2089   .0000    .1229   .2100   .0000    .0000   .0000   .0000!
!   .0000   .0000  -.0046    .0000   .0000  -.0046    .0000   .0000   .0000!
!                                                                             !
!                                                                             !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  12       !
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PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACOD

```
NODE = H22      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000

 SUPT:  22    SNUBBER
 TRAN.STIF. = .8700E+05
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =    .0000,    .0002
TEN. =    .0007,    .0250
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0002   .0000    .0002   .0000   .0000    .0000   .0000   .0000
 -.0250   .0000  -.0007    .0000  -.0007  -.0250    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=     .0683,    .2441
TEN. =    .0000,    .0635
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .2441   .0683    .2441   .0683   .0000    .0000   .0000   .0000
 -.0635   .0000   .0000    .0000   .0000  -.0635    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACGD

```
NODE = H14        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0092, Z =   .0000

 SUPT:  24        RIGID
 TRAN. STIF. = .3491E+07
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.       -82.637
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
TEN. =   .0000,    .0134
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
 -.0129  -.0035  -.0000    .0129  -.0036   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.     5067.824
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=    .0015,    .1514
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0700   .1343   .0015    .0712   .1349   .0015    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H15      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000,  Y =   .0040,  Z =   .0000

 SUPT:  23    SNUBBER
 TRAN. STIF. = .4950E+06
    (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
TEN. =   .0045,   .0129
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
 -.0129  -.0045  -.0000    .0129  -.0045   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .1234,    .0628
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0628   .1234   .0024    .0632   .1236   .0024    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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ATTACHMENT 2
PAGE 78 OF 143
CALC. NO. C-0031 | TIRO

NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H13      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0091, Z =   .0000

 SUPT:  25      RIGID
 TRAN. STIF. = .4800E+06
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.     -6081.771
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
TEN. =   .0127,    .0130
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
 -.0130  -.0127  -.0002    .0128  -.0128   .0002    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.     5665.209
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0118,    .0000
TEN. =   .0000,    .0234
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0118   .0000    .0001   .0118   .0000    .0000   .0000   .0000
 -.0176   .0000  -.0155   -.0176  -.0002  -.0155    .0000   .0000   .0000

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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005 1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = H11       SUPPORT  1 OF  1                              (Trans. only) !
!                                                                               !
!       PIPE DIRECTION COSINES. X =   .0000, Y = -1.0000, Z =   .0000           !
!                                                                               !
!  SUPT:  26       RIGID  !                                                     !
!  TRAN.STIF. = .1750E+07 !                                                     !
!    (X)     (Y)     (Z)  !                                                     !
! DIRECTION COSINES:      !                                                     !
! -.7844   .0000  -.6202  !                                                     !
!                         !                                                     !
! ***************          CAS(1)- SERVICE LEVEL B          ***************    !
! FORCE MAX.       199.088 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! TEN. =   .0005,   .0006  !                                                    !
! COMP=    .0006,   .0247  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0008    .0000   .0008   .0000    .0000   .0000   .0000!   !
!  -.0008  -.0247   .0000    .0247   .0000   .0008    .0000   .0000   .0000!   !
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =    .0000,   .0000  !                                                    !
! N/A =    .0000,   .0000  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =    .0000,   .0000  !                                                    !
! N/A =    .0000,   .0000  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!                                                                               !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************    !
! FORCE MAX.      1146.476 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! TEN =    .0055,   .0044  !                                                    !
! COMP=    .0062,   .1133  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0071   .0000   .0000    .0000   .0000    0071    .0000   .0000   .0000!   !
!   .0000  -.1130  -.0100   -.1130  -.0100   .0000    .0000   .0000   .0000!   !
!                                                                               !
!                                                                               !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  17          !
+-------------------------------------------------------------------------------+
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PIPE SUPPORT LOAD COMB. SYSTEM P701

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H12      SUPPORT  1 OF  1                          (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  27      RIGID
 TRAN. STIF. = .3066E+07
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .4524   .0000  -.8918

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.      -180.331
AXIAL, SWING  MAX/MIN:
TEN. =   .0001,   .0025
TEN. =   .0000,   .0248
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0022   .0000   .0012    .0000   .0012  - 0022   .0000   .0000   .0000
  .0000  -.0248   .0000    .0248   .0000   .0000   .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.     -5849.268
AXIAL, SWING  MAX/MIN:
TEN. =   .0019,   .0385
TEN. =   .0000,   .1366
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   0335   .0000   .0191    .0000   .0191   .0335   .0000   .0000   .0000
  .0000  -.1366   .0000   -.1366   .0000   .0000   .0000   .0000   .0000


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N.U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
NODE = H10      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  28     SNUBBER
 TRAN. STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0157,    .0039
TEN. =   .0000,   .0250
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0157   .0000   .0039    .0000   .0039  -.0157    .0000   .0000   .0000
  .0000  -.0250   .0000    .0250   .0000   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .1770,    .2445
TEN. =   .0000,   .2791
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1770   .0000   .2445    .0000   .2445   .1770    .0000   .0000   .0000
  .0000  -.2791   .0000   -.2791   .0000   .0000    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION ____ FILE NUMBERS ____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
NODE = H9        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  29    SNUBBER
 TRAN. STIF. = .0000E+00
    (X)     (Y)     (Z)
DIRECTION COSINES:
 .2801   .0000  -.9600

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=  .0007,    .0177
TEN. =  .0000,    .0250
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0172   .0000   .0043    .0000   .0043  -.0172    .0000   .0000   .0000
  .0000  -.0250   .0000    .0250   .0000   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
TEN. =   .2153,    .2684
TEN. =   .0000,    .3003
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1973   .0000   .2819    .0000   .2819   .1973    .0000   .0000   .0000
  .0000  -.3003   .0000   -.3003   .0000   .0000    .0000   .0000   .0000

    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  20
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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC.  (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP.  ACQD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = 95BEL    SUPPORT  1 OF  2                                (Trans. only) !
!                                                                               !
!       PIPE DIRECTION COSINES: X =   .0000, Y =  -.0112, Z =  -.9999           !
!                                                                               !
!  SUPT:  30       RIGID  !  SUPT:  31       RIGID  !  SUPT:  32       RIGID  !
!  TRAN. STIF. = .3100E+03 !  TRAN. STIF. = .1825E+04 !  TRAN. STIF. = .1825E+04 !
!     (X)     (Y)     (Z)  !     (X)     (Y)     (Z)  !     (X)     (Y)     (Z)  !
! DIRECTION COSINES:      ! DIRECTION COSINES:      ! DIRECTION COSINES:      !
!  .0000   .0000 -1.0000  !  .0000  1.0000   .0000  ! 1.0000   .0000   .0000  !
!                         !                         !                         !
! ***************          CAS(1)- SERVICE LEVEL B          *************** !
! FORCE MAX.          .033 ! FORCE MAX.          .000 ! FORCE MAX.       31.162 !
! FORCE MIN.          .000 ! FORCE MIN.      -15.508 ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! TEN. =   .0000,   .0171  ! TEN. =   .0000,   .0171  ! N/A =   .0171,   .0000  !
! COMP=    .0001,   .0085  ! TEN. =   .0085,   .0001  ! TEN. =   .0000,   .0085 !
! GLOBAL DISPL. MAX/MIN:   ! LOCAL DISPL. MAX/MIN:    ! GLOBAL ACCEL. MAX/MIN:  !
!   .0171   .0000   .0000  !   .0000   .0000   .0171  !   .0000   .0000   .0000!
!   .0000  -.0085  -.0001  !   .0002  -.0085   .0000  !   .0000   .0000   .0000!
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C          *************** !
! FORCE MAX.          .000 ! FORCE MAX.          .000 ! FORCE MAX.         .000 !
! FORCE MIN.          .000 ! FORCE MIN.          .000 ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000 !
! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000 !
! GLOBAL DISPL. MAX/MIN:   ! LOCAL DISPL. MAX/MIN:    ! GLOBAL ACCEL. MAX/MIN:  !
!   .0000   .0000   .0000  !   .0000   .0000   .0000  !   .0000   .0000   .0000!
!   .0000   .0000   .0000  !   .0000   .0000   .0000  !   .0000   .0000   .0000!
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D          *************** !
! FORCE MAX.          .000 ! FORCE MAX.          .000 ! FORCE MAX.         .000 !
! FORCE MIN.          .000 ! FORCE MIN.          .000 ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000 !
! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000  ! N/A =    .0000,   .0000 !
! GLOBAL DISPL. MAX/MIN:   ! LOCAL DISPL. MAX/MIN:    ! GLOBAL ACCEL. MAX/MIN:  !
!   .0000   .0000   .0000  !   .0000   .0000   .0000  !   .0000   .0000   .0000!
!   .0000   .0000   .0000  !   .0000   .0000   .0000  !   .0000   .0000   .0000!
!                                                                               !
! ***************          CAS(4)- SERVICE LEVEL 3*B        *************** !
! FORCE MAX.          .000 ! FORCE MAX.          .000 ! FORCE MAX.     561.309 !
! FORCE MIN.     -112.332  ! FORCE MIN.     -383.572  ! FORCE MIN.         .000 !
! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:   ! AXIAL, SWING  MAX/MIN:  !
! TEN. =   .3624,   .3076  ! TEN. =   .0000,   .4753  ! COMP=   .3076,   .3624 !
! TEN. =   .0000,   .2102  ! TEN. =   .2102,   .0000  ! TEN. =   .0000,   .2102 !
! GLOBAL DISPL. MAX/MIN:   ! LOCAL DISPL. MAX/MIN:    ! GLOBAL ACCEL. MAX/MIN:  !
!   .3076   .0000   .3624  !   .3623   .0041   .3076  !   .0000   .0000   .0000!
!    0000  -.2102   .0000  !  -.0024  -.2102   .0000  !   .0000   .0000   .0000!
!                                                                               !
!                                                                               !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  21          !
+-------------------------------------------------------------------------------+
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ATTACHMENT 2
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CALC. NO. C-0031/71R0

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT. HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

NODE = 950EL SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = -.0112, Z = -.9999

SUPT: 33 RIGID	SUPT: 34 RIGID	SUPT: 35 RIGID
ROT. STIF. = .6670E+05	ROT. STIF. = .6670E+05	ROT. STIF = .6670E+05
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 -1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. .000	MOMT. MAX. 6.821	MOMT. MAX. 9.392
MOMT. MIN. -7.555	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0171 .0000 .0000	.0000 .0000 .0171	.0000 .0000 .0000
.0000 -.0085 -.0001	.0002 -.0085 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. 139.899	MOMT. MAX. 106.532
MOMT. MIN. -186.240	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.3076 .0000 .3624	.3623 .0041 .3076	.0000 .0000 .0000
.0000 -.2102 .0000	-.0024 -.2102 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H8        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0100, Z =  -.9999

 SUPT:  36        ~~R1010~~  SPRING HANGER
 TRAN.STIF. = .1200E+04      HOT LOAD = 2860.#  } Dzoke 06-07-88
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.        -3.493
AXIAL, SWING  MAX/MIN:
TEN. =   .0000,   .0123
TEN. =   .0029,   .0002
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0123   .0000   .0000    .0000   .0000   .0123    .0000   .0000   .0000
  .0000  -.0029  -.0002    .0002  -.0029   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
    0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX           .000
FORCE MIN.      -159.561
AXIAL, SWING  MAX/MIN:
TEN. =   .0000,   .3539
TEN. =   .1330,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .2029   .0000   .2900    .2899   .0029   .2029    .0000   .0000   .0000
  .0000  -.1330   .0000   -.0013  -.1330   .0000    .0000   .0000   .0000

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PROJECT. HOPE CREEK SNUBBER REDUCTION ——— FILE NUMBERS ———
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACOD

```
NODE = H7        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0143, Z =  -.9999

 SUPT:  37    SNUBBER
 TRAN.STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0102,    .0000
TEN. =   .0000,    .0027
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0102   .0000   .0000    .0000   .0000  ..0102   .0000   .0000   .0000
  .0000  -.0027  -.0002    .0001  -.0027   .0000   .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000   .0000 ..  .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
COMP=    .1508,    .2546
TEN. =   .0000,    .0995
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .1508   .0000   .2546    .2546   .0036   .1508   .0000   .0000   .0000
  .0000  -.0995   .0000   -.0014  -.0995   .0000   .0000   .0000   .0000

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N U I L L H   L N G I N E E R I

PIPE SUPPORT LOAD COMB.   SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  ______ FILE NUMBERS ______
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H6        SUPPORT  1 OF  1                              (Trans. only) !
!                                                                             !
!       PIPE DIRECTION COSINES: X =   .0000, Y =  -.0122, Z =  -.9999         !
!                                                                             !
!  SUPT:  38        RIGID  !                                                  !
!  TRAN. STIF. = .1402E+07 !                                                  !
!     (X)     (Y)     (Z)  !                                                  !
! DIRECTION COSINES:       !                                                  !
!  .0000   .0000  1.0000   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.      -156.044 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! TEN. =   .0000,   .0025  !                                                  !
! TEN. =   .0001,   .0039  !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:   !
!   .0025   .0000   .0000    .0000   .0000   .0025    .0000   .0000   .0000!
!   .0000  -.0039  -.0001    .0002  -.0039   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.     -2445.405 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! TEN. =   .0017,   .2219  !                                                  !
! GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL  MAX/MIN:   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!  -.2219  -.0012  -.0017   -.0018  -.0012  -.2219    .0000   .0000   .0000!
!                                                                             !
!                                                                             !
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```
NODE = H5A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0045, Z = -1.0000

 SUPT:  39    SNUBBER
 TRAN. STIF. = .0000E+00
    (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0022,    .0000
TEN. =   .0000,    .0032
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0022   .0000   .0000    .0000   .0000   .0022    .0000   .0000   .0000
  .0000  -.0032  -.0001    .0001  -.0032   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .0000,    .0009
TEN. =   .2578,    .0280
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0009   .0000    .0000   .0009   .0000    .0000   .0000   .0000
 -.2578   .0000  -.0280   -.0280  -.0001  -.2578    .0000   .0000   .0000

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PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H4A      SUPPORT  1 OF  1                          (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0113, Z =  -.9999

 SUPT:  40       RIGID
 TRAN.STIF. = .6160E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.     -1743.452
AXIAL, SWING  MAX/MIN:
TEN =    .0000,    .0020
TEN. =   .0028,    .0001
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0020   .0000   .0000    .0000   .0000   .0020    .0000   .0000   .0000
  .0000  -.0028  -.0001    .0002  -.0028   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.       1175.073
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0019,    .0000
TEN. =   .0000,    .2818
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0019   .0000    .0000   .0019   .0000    .0000   .0000   .0000
 -.2784   .0000  -.0434   -.0434  -.0005  -.2784    .0000   .0000   .0000

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PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H3A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0109, Z =   .0000

 SUPT:  41    SNUBBER
 TRAN. STIF. = .0000E+00
    (X)     (Y)     (Z)
DIRECTION COSINES:
 .0767   .0000  -.9971

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0001,    .0015
COMP=   .0013,    .0026
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0015   .0000   .0000    .0015   .0000   .0000    .0000   .0000   .0000
  .0000  -.0026  -.0013    .0000  -.0026  -.0013    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN. =   .0000,    .0769
COMP=   .0816,    .1328
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0769   .0000    .0008   .0769   .0000    .0000   .0000   .0000
 -.1262   .0000  -.0915   -.1262  -.0014  -.0915    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

```
NODE = H2A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0104, Z =   .0000

 SUPT:  42    SNUBBER
 TRAN.STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0006,    .0016
TEN.=   .0000,    .0016
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0016   .0006   .0000    .0015   .0006   .0000    .0000   .0000   .0000
  .0000   .0000  -.0016    .0000   .0000  -.0016    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0906,    .0000
TEN.=   .0000,    .0954
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0906   .0000    .0009   .0906   .0000    .0000   .0000   .0000
 -.0568   .0000  -.0767   -.0568  -.0006  -.0767    .0000   .0000   .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H1A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0105, Z =   .0000

 SUPT:  43        ~~R1018~~
 TRAN. STIF. = .9000E+03
    (X)     (Y)     (Z)
 DIRECTION COSINES:
 .0000  1.0000   .0000

 ***************          CAS(1)- SERVICE LEVEL B          ***************
 FORCE MAX.          .852
 FORCE MIN.          .000
 AXIAL, SWING  MAX/MIN:
 COMP=   .0009,    .0016
 TEN. =  .0000,    .0016
 GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   .0016   .0009   .0000    .0015   .0010   .0000    .0000   .0000   .0000
   .0000   .0000  -.0016    .0000   .0000  -.0016    .0000   .0000   .0000

 ***************          CAS(2)- SERVICE LEVEL C          ***************
 FORCE MAX.          .000
 FORCE MIN.          .000
 AXIAL, SWING  MAX/MIN:
 N/A =   .0000,    .0000
 N/A =   .0000,    .0000
 GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

 ***************          CAS(3)- SERVICE LEVEL D          ***************
 FORCE MAX.          .000
 FORCE MIN.          .000
 AXIAL, SWING  MAX/MIN:
 N/A =   .0000,    .0000
 N/A =   .0000,    .0000
 GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

 ***************          CAS(4)- SERVICE LEVEL 3*B        ***************
 FORCE MAX.        82.956
 FORCE MIN.          .000
 AXIAL, SWING  MAX/MIN:
 N/A =   .0922,    .0000
 TEN. =  .0000,    .0890
 GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   .0000   .0922.  .0000    .0010   .0922   .0000    .0000   .0000   .0000
  -.0481   .0000  -.0748   -.0481  -.0005  -.0748    .0000   .0000   .0000

    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  30
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Spring Hanger.
Hot Load = 2158. # } [illegible] 06-07-88

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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  ------ FILE NUMBERS ------
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD
+-------------------------------------------------------------------------------+
|                                                                               |
| NODE = HPTUB    SUPPORT  1 OF  2                                (Trans. only) |
|                                                                               |
|       PIPE DIRECTION COSINES: X =   .0000, Y =   .0000, Z =  1.0000           |
|                                                                               |
|  SUPT:  44       RIGID  |  SUPT:  45       RIGID  |  SUPT:  46       RIGID  |
|  TRAN. STIF. = .1000E+09 |  TRAN. STIF. = .1000E+09 |  TRAN. STIF. = .1000E+09 |
|     (X)    (Y)    (Z)   |     (X)    (Y)    (Z)   |     (X)    (Y)    (Z)   |
| DIRECTION COSINES:      | DIRECTION COSINES:      | DIRECTION COSINES:      |
| 1.0000   .0000   .0000  |  .0000  1.0000   .0000  |  .0000   .0000  1.0000  |
|                         |                         |                         |
| ***************         |  CAS(1)- SERVICE LEVEL B          *************** |
| FORCE MAX.        .000  | FORCE MAX.        .000  | FORCE MAX.      14.363  |
| FORCE MIN.     -63.778  | FORCE MIN.    -340.984  | FORCE MIN.        .000  |
| AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
| TEN. =   .0000,   .0000 | TEN. =   .0000,   .0000 | N/A =   .0000,   .0000  |
| TEN. =   .0000,   .0000 | TEN. =   .0000,   .0000 | TEN. =   .0000,   .0000 |
| GLOBAL DISPL. MAX/MIN:  | LOCAL DISPL. MAX/MIN:   | GLOBAL ACCEL. MAX/MIN:  |
|  .0000   .0000   .0000  |  .0000   .0000   .0000  |  .0000   .0000   .0000  |
|  .0000   .0000   .0000  |  .0000   .0000   .0000  |  .0000   .0000   .0000  |
|                         |                         |                         |
| ***************         |  CAS(2)- SERVICE LEVEL C          *************** |
| FORCE MAX.        .000  | FORCE MAX.        .000  | FORCE MAX.        .000  |
| FORCE MIN.        .000  | FORCE MIN.        .000  | FORCE MIN.        .000  |
| AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
| N/A =   .0000,   .0000  | N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
| N/A =   .0000,   .0000  | N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
| GLOBAL DISPL. MAX/MIN:  | LOCAL DISPL. MAX/MIN:   | GLOBAL ACCEL. MAX/MIN:  |
|  .0000   .0000   .0000  |  .0000   .0000   .0000  |  .0000   .0000   .0000  |
|  .0000   .0000   .0000  |  .0000   .0000   .0000  |  .0000   .0000   .0000  |
|                         |                         |                         |
| ***************         |  CAS(3)- SERVICE LEVEL D          *************** |
| FORCE MAX.        .000  | FORCE MAX.        .000  | FORCE MAX.        .000  |
| FORCE MIN.        .000  | FORCE MIN.        .000  | FORCE MIN.        .000  |
| AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
| N/A =   .0000,   .0000  | N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
| N/A =   .0000,   .0000  | N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
| GLOBAL DISPL. MAX/MIN:  | LOCAL DISPL. MAX/MIN:   | GLOBAL ACCEL. MAX/MIN:  |
|  .0000   .0000   .0000  |  .0000   .0000   .0000  |  .0000   .0000   .0000  |
|  .0000   .0000   .0000  |  .0000   .0000   .0000  |  .0000   .0000   .0000  |
|                         |                         |                         |
| ***************         |  CAS(4)- SERVICE LEVEL 3*B        *************** |
| FORCE MAX.    500.120   | FORCE MAX.    256.625   | FORCE MAX.        .000  |
| FORCE MIN.        .000  | FORCE MIN.        .000  | FORCE MIN.    -542.563  |
| AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
| N/A =   .0018,   .0000  | TEN. =   .0000,   .0018 | TEN. =   .0000,   .0018 |
| TEN. =   .0000,   .0285 | TEN. =   .0143,   .0246 | TEN. =   .0246,   .0143 |
| GLOBAL DISPL. MAX/MIN:  | LOCAL DISPL. MAX/MIN:   | GLOBAL ACCEL. MAX/MIN:  |
|  .0018   .0000   .0000  |  .0000   .0000   .0018  |  .0000   .0000   .0000  |
|  .0000  -.0143  -.0246  | -.0246  -.0143   .0000  |  .0000   .0000   .0000  |
|                                                                               |
|                                                                               |
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+-------------------------------------------------------------------------------+
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PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

NODE = HPTUB SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = 1.0000

SUPT: 47 RIGID	SUPT: 48 RIGID	SUPT: 49 RIGID
ROT STIF. = .1000E+13	ROT. STIF. = .1000E+13	ROT. STIF. = .1000E+13
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 1.0000 .0000	.0000 .0000 1.0000
********** CAS(1)- SERVICE LEVEL B **********		
MOMT. MAX. .000	MOMT. MAX. 4167.737	MOMT. MAX. .000
MOMT. MIN. -3938.715	MOMT. MIN. .000	MOMT. MIN. -3127.802
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
********** CAS(2)- SERVICE LEVEL C **********		
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
********** CAS(3)- SERVICE LEVEL D **********		
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
********** CAS(4)- SERVICE LEVEL 3*B **********		
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. -44335.700	MOMT. MIN. -31954.950	MOMT. MIN. -22027.230
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0018 .0000 .0000	.0000 .0000 .0018	.0000 .0000 .0000
.0000 -.0143 -.0246	-.0246 -.0143 .0000	.0000 .0000 .0000

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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC.  (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP.  ACQD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = H2B       SUPPORT  1 OF  1                                (Trans. only) !
!                                                                               !
!      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999            !
!                                                                               !
!  SUPT:  50    SNUBBER  !                                                      !
!  TRAN. STIF. = .2530E+06 !                                                    !
!    (X)     (Y)     (Z)  !                                                     !
! DIRECTION COSINES:      !                                                     !
!  .0000   .0000  1.0000  !                                                     !
!                         !                                                     !
! ***************          CAS(1)- SERVICE LEVEL B          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! TEN. =  .0050,    .0012  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!  -.0001  -.0012  -.0050   -.0050  -.0012   .0001    .0000   .0000   .0000!   !
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! N/A =   .0000,    .0000  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!   !
!                                                                               !
! ***************          CAS(4)- SERVICE LEVEL 3*B        ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .2285,    .0000  !                                                    !
! TEN. =  .0000,    .0306  !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .2285    .2285   .0024   .0000    .0000   .0000   .0000!   !
!  -.0295  -.0081   .0000   -.0001  -.0081  -.0295    .0000   .0000   .0000!   !
!                                                                               !
!                                                                               !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  33          !
+-------------------------------------------------------------------------------+
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PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACOD

```
NODE = H1B      SUPPORT  1 OF  1                                  (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999

 SUPT:  51       RIGID  |  SUPT:  52       RIGID  |
 TRAN. STIF. = .3410E+07 |  TRAN. STIF. = .3410E+07 |
   (X)    (Y)    (Z)    |    (X)    (Y)    (Z)    |
DIRECTION COSINES:      | DIRECTION COSINES:      |
1.0000   .0000   .0000  |  .0000  1.0000   .0000  |

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.      166.040 | FORCE MAX.          .000 |
FORCE MIN.         .000 | FORCE MIN.    -1138.333 |
AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
N/A =   .0000,   .0000  | TEN. =   .0000,   .0000 |
TEN. =   .0000,  .0050  | TEN. =   .0003,   .0050 |
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000  -.0000    .0000   .0000   .0000
  .0000  -.0003  -.0050   -.0050  -.0003   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.         .000 | FORCE MAX.          .000 |
FORCE MIN.         .000 | FORCE MIN.          .000 |
AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.         .000 | FORCE MAX.          .000 |
FORCE MIN.         .000 | FORCE MIN.          .000 |
AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
N/A =   .0000,   .0000  | N/A =   .0000,   .0000  |
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.         .000 | FORCE MAX.          .000 |
FORCE MIN.     -378.712 | FORCE MIN.    -5613.299 |
AXIAL, SWING  MAX/MIN:  | AXIAL, SWING  MAX/MIN:  |
TEN. =   .0000,   .2322 | TEN. =   .0000,   .2322 |
TEN. =   .0001,   .0016 | TEN. =   .0016,   .0001 |
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .2322    .2322   .0024   .0000    .0000   .0000   .0000
 -.0001  -.0016   .0000   -.0000  -.0016  -.0001    .0000   .0000   .0000

    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  34
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N.UTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACGD

NODE = 180BL SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0104, Z = .9999

SUPT: 53 RIGID	SUPT: 54 RIGID	SUPT: 55 RIGID
TRAN. STIF. = .2600E+03	TRAN. STIF. = .1250E+04	TRAN. STIF. = .1250E+04
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000

CAS(1)- SERVICE LEVEL B

FORCE MAX. .000	FORCE MAX. .739	FORCE MAX. 1.248
FORCE MIN. -1.309	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN.= .0000, .0012	COMP= .0006, .0010	COMP= .0010, .0006
TEN.= .0050, .0000	TEN.= .0000, .0050	TEN.= .0000, .0050
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0010 .0006 .0000	.0000 .0006 -.0010	.0000 .0000 .0000
.0000 .0000 -.0050	-.0050 .0001 .0000	.0000 .0000 .0000

CAS(2)- SERVICE LEVEL C

FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

CAS(3)- SERVICE LEVEL D

FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

CAS(4)- SERVICE LEVEL 3*B

FORCE MAX. 63.720	FORCE MAX. 8.286	FORCE MAX. 125.434
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .2451, .1006	COMP= .0066, .2648	COMP= .1003, .2452
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1003 .0066 .2451	.2451 .0092 .1003	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

ATTACHMENT 2
PAGE 98 OF 143
CALC. NO. C-0031/7120

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACQD

NODE = 180BL SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0104, Z = .9999

SUPT: 56 RIGID	SUPT: 57 RIGID	SUPT: 58 RIGID
ROT. STIF. = .5130E+05	ROT. STIF. = .5130E+05	ROT. STIF. = .5130E+05
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 5.350	MOMT. MAX. 1.253	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. -.199
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0010 .0006 .0000	.0000 .0006 -.0010	.0000 .0000 .0000
.0000 .0000 -.0050	-.0050 .0001 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. 114.504	MOMT. MAX. 107.471	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. -2.019
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.1003 .0066 .2451	.2451 .0092 .1003	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

PROJECT: HOPE CREEK SNUBBER REDUCTION ____ FILE NUMBERS ____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H38      SUPPORT  1 OF  1                          (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999

 SUPT:  59      RIGID
 TRAN.STIF. = .8340E+06
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.    -2154.021
AXIAL, SWING  MAX/MIN:
TEN. =   .0000,   .0038
TEN. =   .0026,   .0050
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0038   .0000   .0000    .0000   .0000  -.0038    .0000   .0000   .0000
  .0000  -.0026  -.0050   -.0050  -.0025   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.     1348.264
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=    .0016,   .4043
N/A =     0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .2999   .0016   .2711    .2711   .0044   .2999    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

   SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  37
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD

```
NODE = H58       SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000

 SUPT:  60       RIGID
 TRAN. STIF. = .3850E+06
    (X)     (Y)     (Z)
DIRECTION COSINES:
-.5210   .0000  -.8535

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.       -47.775
AXIAL, SWING  MAX/MIN:
TEN. =   .0001,    .0001
TEN. =   .0000,    .0090
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0001    .0000   .0001   .0000    .0000   .0000   .0000
  .0000  -.0090   .0000   -.0090   .0000   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.      -264.605
AXIAL, SWING  MAX/MIN:
TEN. =   .0007,    .0620
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0001   .0620   .0008    .0620   .0008   .0001    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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                    N U T E C H   E N G I N E E R S

                 PIPE SUPPORT LOAD COMB.  SYSTEM  P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ACQD
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = H4B      SUPPORT  1 OF  1                                (Trans. only) !
!                                                                               !
!      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000            !
!                                                                               !
!  SUPT:  61       RIGID  !                                                     !
!  TRAN.STIF. = .5160E+06 !                                                     !
!    (X)    (Y)    (Z)    !                                                     !
! DIRECTION COSINES:      !                                                     !
!  .6264   .0000  -.7795  !                                                     !
!                         !                                                     !
! ***************          CAS(1)- SERVICE LEVEL B          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.       -65.655 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! TEN. =   .0001,    .0000 !                                                    !
! TEN. =   .0001,    .0090 !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0001    .0000   .0001   .0000    .0000   .0000   .0000!    !
!  -.0001  -.0090   .0000   -.0090   .0000  -.0001    .0000   .0000   .0000!    !
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =    .0000,    .0000 !                                                    !
! N/A =    .0000,    .0000 !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D          ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =    .0000,    .0000 !                                                    !
! N/A =    .0000,    .0000 !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!                                                                               !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************    !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.     -187.082 !                                                     !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! TEN. =   .0000,    .0634 !                                                    !
! TEN =    .0004,    .0159 !                                                    !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0634   .0000    .0634   .0000   .0000    .0000   .0000   .0000!    !
!  -.0126   .0000  -.0097    .0000  -.0097  -.0126    .0000   .0000   .0000!    !
!                                                                               !
!                                                                               !
!    SUPTJYVD            9:44:21. 2     6/ 7/1988            PAGE  39          !
+-------------------------------------------------------------------------------+
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N.U T E C H . E N G I N E E R S

PIPE SUPPORT LOAD COMB. SYSTEM P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ACQD

OUTPUT SAVED IN FILE : P201SUP.S2

NORMAL COMPLETION AT 9:46:58.94 6/ 7/1988

PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201, HANGER GUIDANCE	ID NO. C-31-HG / REFERENCE NONE	SHEET A-1 OF 40
	ORIGINATOR / DATE / VFR or CKR / DATE	06-07-88 / 6/7/88	

ATTACHMENT - C

OPTSUPT RUNID SUPTMVIC DATED 06-07-88

(39 Pages)

```
N   N  U   U  TTTTT  EEEEE   CCCC  H   H
NN  N  U   U    T    E      C     H   H
N N N  U   U    T    EEEEE  C     HHHHH
N  NN  U   U    T    E      C     H   H
N   N  UUUUU    T    EEEEE   CCCC H   H


OOOOO  PPPPP  TTTTT  SSSSS  U   U  PPPPP  TTTTT
O   O  P   P    T    S      U   U  P   P    T
O   O  PPPPP    T    SSSSS  U   U  PPPPP    T
O   O  P        T        S  U   U  P        T
OOOOO  P        T    SSSSS  UUUUU  P        T
```

REVISION 1.0.0
LEVEL FEB-25-1988

OPTSUPT RUN: ID = SUPTMVIC TIME = 12:47: 8.22 DATE = 6/ 7/1988

CALCULATION PACKAGE FILE NUMBER = (C-31) PSE005.1016

COMPUTER RUN FILE NUMBER = ADCE

COMPUTER RUN OUTPUT FILE NAME = P201RUP.SUP

OPTPIPE TAPE 51 INPUT:
FILE NAME = P201RUP.T51 RUN ID = ADCE DATE = 88/06/07

OPTPIPE TAPE 52 INPUT:
FILE NAME = P201RUP T52 RUN ID = ADCE DATE = 88/06/07

FILE CONTAINING ADDITIONAL LOAD CASE DATA:
FILE NAME =

PREPARED BY/DATE: C.J. Mehta 06-07-88
C.J. MEHTA

CHECKED BY/DATE: A.S. Herlekar 6/7/88
A S HERLEKAR

SUPTMVIC 12:47: 8.22 6/ 7/1988 PAGE 1

NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

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PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005 1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

HPCI TURBINE EXHAUST (P201) RUPTURE OF PRESSURE RELIEF DISK

NUMBER OF POINTS =	111	NUMBER OF PIPE RUNS =	1
NUMBER OF SUPPORTS =	61	NUMBER OF TEES =	0
NUMBER OF PIPES =	106	NUMBER OF BEAMS =	0

NUMBER OF LOAD CASES = 2

CASE ID	LOAD CASE DESCRIPTION	CASE ID	LOAD CASE DESCRIPTION
DW		RUPD1	

ECHO OF COMBINATION PROCEDURE INPUT FILE SUPT2

```
CAS(1)- SERVICE LEVEL B
CAS(2)- SERVICE LEVEL C
CAS(3)- SERVICE LEVEL D
CAS(4)- SERVICE LEVEL 3*B
CAS(1)- L.C.NO. A-1 (DW ONLY)
LID(DW)
CAS(3)- L.C. D  FAULTED ( RUPTURE LOAD + VE )
LID(DW)
LID(RUPD1)
ABS
CAS(3)- L.C. D  FAULTED ( RUPTURE LOAD - VE )
LID(DW)
LID(RUPD1)
SUB
```


ATTACHMENT 2
PAGE 106 OF 143
CALC. NO. C-0031/7IR0

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = I7SAN SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .1745, Y = -.7074, Z = -.6849

SUPT: 1 RIGID	SUPT: 2 RIGID	SUPT: 3 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.9808 .0000 .1951	-.1379 -.7071 .6936	.1379 -.7071 -.6936

CAS(1)- SERVICE LEVEL B

SUPT: 1	SUPT: 2	SUPT: 3
FORCE MAX. 200.557	FORCE MAX. 398.108	FORCE MAX. 5752.025
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0000	TEN.= .0000, .0000	COMP= .0000, .0000
TEN.= .0000, .0001	COMP= .0000, .0001	COMP= .0001, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 -.0000 -.0000	.0001 .0000 .0000	.0000 .0000 .0000

CAS(2)- SERVICE LEVEL C

SUPT: 1	SUPT: 2	SUPT: 3
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

CAS(3)- SERVICE LEVEL D

SUPT: 1	SUPT: 2	SUPT: 3
FORCE MAX. 120.715	FORCE MAX. 368.887	FORCE MAX. 4067.330
FORCE MIN .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0000	TEN.= .0000, .0000	TEN.= .0000, .0000
TEN.= .0000, .0001	COMP= .0000, .0001	COMP= .0001, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 -.0001 -.0000	-.0001 -.0001 -.0000	.0000 .0000 .0000

CAS(4)- SERVICE LEVEL 3*B

SUPT: 1	SUPT: 2	SUPT: 3
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = 17SAN SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .1745, Y = -.7074, Z = -.6849

SUPT: 4 RIGID	SUPT: 5 RIGID	SUPT: 6 RIGID
ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.9808 .0000 .1951	-.1379 -.7071 .6936	.1379 -.7071 -.6936
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 2397.099	MOMT. MAX. 97.829	MOMT. MAX. .000
MOMT MIN .000	MOMT. MIN. .000	MOMT. MIN. -90.391
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 -.0000 -.0000	.0001 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 2205.522	MOMT. MAX. 186.629	MOMT. MAX. 7.306
MOMT. MIN. .000	MOMT. MIN. -88.800	MOMT. MIN. -97.656
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 -.0001 -.0000	-.0001 -.0001 -.0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

NODE = 195BN SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = -.5521, Y = -.7074, Z = -.4414

SUPT: 7 RIGID	SUPT: 8 RIGID	SUPT: 9 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.7071 .7071	.0000 -.7071 -.7071
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. .000	FORCE MAX. 990.717	FORCE MAX. 2135.455
FORCE MIN. -1008.751	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
TEN. = .0000, .0000	COMP= .0000, .0000	COMP= .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
-.0000 -.0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 889.259	FORCE MAX. 754.244	FORCE MAX. 1368.226
FORCE MIN. -1898.010	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0000	TEN. = .0000, .0000	TEN. = .0000, .0000
TEN. = .0000, .0000	COMP= .0000, .0000	COMP= .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
-.0000 -.0000 -.0000	-.0000 -.0000 -.0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

NODE = 1950N SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = -.5521, Y = -.7074, Z = -.4414

SUPT: 10 RIGID	SUPT: 11 RIGID	SUPT: 12 RIGID
ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11	ROT. STIF. = .1000E+11
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.7071 .7071	.0000 -.7071 -.7071
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 2530.344	MOMT. MAX. .000	MOMT. MAX. 2243.646
MOMT. MIN. .000	MOMT. MIN. -2258.183	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
-.0000 -.0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 1995.882	MOMT. MAX. 720.382	MOMT. MAX. 1968.499
MOMT MIN. .000	MOMT. MIN. -2978.565	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
-.0000 -.0000 -.0000	-.0000 -.0000 -.0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = P201 SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = -1.0000

SUPT: 13 RIGID	SUPT: 14 RIGID	SUPT: 15 RIGID
TRAN. STIF. = .3160E+08	TRAN. STIF. = .5120E+07	TRAN. STIF. = .1470E+07
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.9848 -.1736	.0000 .1736 -.9848

CAS(1)- SERVICE LEVEL B

FORCE MAX. 192.986	FORCE MAX. 5175.962	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. -5412.059
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0035	TEN. = .0006, .0034	TEN. = .0034, .0006
TEN. = .0000, .0016	COMP= .0016, .0003	TEN. = .0003, .0016
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0035	-.0035 .0000 .0000	.0000 .0000 .0000
.0000 -.0016 .0000	.0000 -.0016 .0000	.0000 .0000 .0000

CAS(2)- SERVICE LEVEL C

FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

CAS(3)- SERVICE LEVEL D

FORCE MAX. 546.104	FORCE MAX. 4218.779	FORCE MAX. 1532.769
FORCE MIN. -353.119	FORCE MIN. .000	FORCE MIN. -6944.828
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0025	TEN. = .0008, .0024	TEN. = .0024, .0008
TEN. = .0000, .0020	COMP= .0019, .0003	TEN. = .0003, .0019
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0003 .0025	.0025 .0003 .0000	.0000 .0000 .0000
-.0000 -.0020 .0000	.0000 -.0020 -.0000	.0000 .0000 .0000

CAS(4)- SERVICE LEVEL 3*B

FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = P201 SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = -1.0000

SUPT: 16 RIGID	SUPT: 17 RIGID	SUPT: 18 RIGID
ROT. STIF. = .1570E+08	ROT. STIF. = .1566E+08	ROT. STIF. = .2970E+07
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 -.9848 -.1736	.0000 .1736 -.9848
********** CAS(1)- SERVICE LEVEL B **********		
MOMT. MAX. 1761.167	MOMT. MAX. .000	MOMT. MAX. 227.921
MOMT. MIN. .000	MOMT. MIN. -589.058	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0035	-.0035 .0000 .0000	.0000 .0000 .0000
.0000 -.0016 .0000	.0000 -.0016 .0000	.0000 .0000 .0000
********** CAS(2)- SERVICE LEVEL C **********		
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
********** CAS(3)- SERVICE LEVEL D **********		
MOMT. MAX. 1266.897	MOMT. MAX. 1408.985	MOMT. MAX. 398.052
MOMT. MIN. .000	MOMT. MIN. -1998.043	MOMT. MIN. -170.131
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0003 .0025	.0025 .0003 .0000	.0000 .0000 .0000
-.0000 -.0020 .0000	.0000 -.0020 -.0000	.0000 .0000 .0000
********** CAS(4)- SERVICE LEVEL 3*B **********		
MOMT. MAX. .000	MOMT. MAX .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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N.UTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____. FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005 1016
CLIENT PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = H19 SUPPORT 1 OF 1 (Trans. only)

PIPE DIRECTION COSINES. X = .0000, Y = 1.0000, Z = .0000

SUPT: 19 ~~RIGID~~ | SPRING HANGER.
TRAN STIF = .1800E+04 | HOT LOAD = 4940.# } [illegible] 06-07-88
(X) (Y) (Z)
DIRECTION COSINES:
.0000 1.0000 .0000

```
**************          CAS(1)- SERVICE LEVEL B          **************
FORCE MAX.        35.435
FORCE MIN           .000
AXIAL, SWING  MAX/MIN.
COMP=   .0197,    .0019
TEN.=   .0000,    .0013
GLOBAL DISPL  MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
   0000   .0197   .0019     0197   .0019   .0000    .0000   .0000   .0000
 -.0013   .0000   .0000    .0000   .0000  -.0013    .0000   .0000   .0000

**************          CAS(2)- SERVICE LEVEL C          **************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000

**************          CAS(3)- SERVICE LEVEL D          **************
FORCE MAX.        35.435
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0197,    .0019
TEN.=   .0000,    .0013
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0197   .0019    .0197   .0019   .0000    .0000   .0000   .0000
 -.0013   .0000   .0000    .0000   .0000  -.0013    .0000   .0000   .0000

**************         CAS(4)- SERVICE LEVEL 3*B         **************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL  MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL.  MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H18      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0091, Z =   .0000

 SUPT:  20    SNUBBER
 TRAN. STIF. = .2590E+06
    (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0065,    .0001
TEN. =   .0000,   .0128
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0065   .0001    .0001   .0065  -.0001    .0000   .0000   .0000
 -.0128   .0000   .0000    .0128  -.0001   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.       688.094
FORCE MIN.      -688.094
AXIAL, SWING  MAX/MIN:
COMP=   .0038,    .0111
TEN. =   .0000,   .0239
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0111   .0038   .0007    .0111   .0039   .0007    .0000   .0000   .0000
 -.0239   .0000  -.0006   -.0239  -.0002  -.0006    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H17      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0093, Z =   .0000

 SUPT:  21       RIGID
 TRAN.STIF. = .1320E+07
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.       148.664
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0001,    .0050
TEN. =  .0000,    .0128
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0050   .0001    .0000   .0050  -.0001    .0000   .0000   .0000
 -.0128   .0000   .0000    .0128  -.0001   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.       766.348
FORCE MIN.      -617.685
AXIAL, SWING  MAX/MIN:
COMP=   .0006,    .0114
TEN. =  .0005,    .0239
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0111   .0026   .0006    .0111   .0027   .0006    .0000   .0000   .0000
 -.0239   .0000  -.0005   -.0239  -.0002  -.0005    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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              PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 ____ FILE NUMBERS ____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1014
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE
+-------------------------------------------------------------------------+
!                                                                         !
! NODE = H22      SUPPORT  1 OF  1                          (Trans. only) !
!                                                                         !
!      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000      !
!                                                                         !
!  SUPT:   22    SNUBBER  !                                               !
!  TRAN. STIF. = .8700E+05 !                                              !
!    (X)     (Y)     (Z)   !                                              !
! DIRECTION COSINES:       !                                              !
!  .0000   .0000  1.0000   !                                              !
!                          !                                              !
! ***************          CAS(1)- SERVICE LEVEL B          ************** !
! FORCE MAX.          .000 !                                              !
! FORCE MIN.          .000 !                                              !
! AXIAL, SWING  MAX/MIN:   !                                              !
! TEN. =   .0000,    .0002 !                                              !
! TEN =    .0007,    .0250 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0000   .0002   .0000    .0002   .0000   .0000    .0000   .0000   .0000!
!  -.0250   .0000  -.0007    .0000  -.0007  -.0250    .0000   .0000   .0000!
!                                                                         !
! ***************          CAS(2)- SERVICE LEVEL C          ************** !
! FORCE MAX.          .000 !                                              !
! FORCE MIN.          .000 !                                              !
! AXIAL, SWING  MAX/MIN:   !                                              !
! N/A =    .0000,    .0000 !                                              !
! N/A =    .0000,    .0000 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                         !
! ***************          CAS(3)- SERVICE LEVEL D          ************** !
! FORCE MAX.       342.669 !                                              !
! FORCE MIN.      -342.669 !                                              !
! AXIAL, SWING  MAX/MIN:   !                                              !
! COMP=    .0039,    .0176 !                                              !
! TEN. =   .0046,    .0424 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0174   .0026   .0039    .0026   .0039   .0174    .0000   .0000   .0000!
!  -.0424  -.0023  -.0046   -.0023  -.0046  -.0424    .0000   .0000   .0000!
!                                                                         !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ************** !
! FORCE MAX.          .000 !                                              !
! FORCE MIN.          .000 !                                              !
! AXIAL, SWING  MAX/MIN:   !                                              !
! N/A =    .0000,    .0000 !                                              !
! N/A =    .0000,    .0000 !                                              !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN: !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                         !
!                                                                         !
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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H14      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0092, Z =   .0000

 SUPT:  24       RIGID
 TRAN. STIF. = .3491E+07
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.       -82.637
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
TEN. =  .0000,   .0134
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
 -.0129  -.0035  -.0000    .0129  -.0036   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     1486.106
FORCE MIN.    -1568.743
AXIAL, SWING  MAX/MIN:
COMP. =  .0004,   .0115
TEN. =   .0004,   .0248
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   0111   .0030   .0004    .0111   .0031   .0004    .0000   .0000   .0000
 -.0240  -.0065  -.0004   -.0240  -.0068  -.0004    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H15      SUPPORT  1 OF  1                          (Trans. only)

      PIPE DIRECTION COSINES: X = -1.0000, Y =  .0040, Z =  .0000

 SUPT:  23    SNUBBER
 TRAN STIF. = .4950E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
TEN. =   .0045,   .0129
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
 - 0129  -.0045  -.0000    .0129  -.0045   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     1616.753
FORCE MIN     -1616.753
AXIAL, SWING  MAX/MIN:
COMP=   .0033,    .0111
TEN. =   .0077,   .0239
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0110   .0033   .0006    .0111   .0033   .0006    .0000   .0000   .0000
 -.0239  -.0077  -.0006   -.0240  -.0078  -.0006    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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PROJECT:  HOPE CREEK SNUBBER REDUCTION                  ____ FILE NUMBERS ____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H13      SUPPORT  1 OF  1                            (Trans. only)   !
!                                                                             !
!      PIPE DIRECTION COSINES: X = -1.0000, Y =   .0091, Z =   .0000          !
!                                                                             !
!  SUPT:  25       RIGID  !                                                   !
!  TRAN. STIF. = .4800E+06 !                                                  !
!    (X)     (Y)     (Z)   !                                                  !
! DIRECTION COSINES:       !                                                  !
!  .0000  1.0000   .0000   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.    -6081.771  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,    .0000 !                                                  !
! TEN. =   .0127,    .0130 !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!  -.0130  -.0127  -.0002    .0128  -.0128   .0002    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,    .0000 !                                                  !
! N/A =    .0000,    .0000 !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          ***************  !
! FORCE MAX.     3830.846  !                                                  !
! FORCE MIN.    -9912.617  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=    .0080,    .0113 !                                                  !
! TEN. =   .0207,    .0241 !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0109   .0080   .0029    .0110   .0081   .0029    .0000   .0000   .0000!
!  -.0239  -.0207  -.0031   -.0240  -.0209  - 0031    .0000   .0000   .0000!
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =     0000,    .0000 !                                                  !
! N/A =    .0000,    .0000 !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!
!                                                                             !
!                                                                             !
!    SUPTHVIC            12:47: 8.22     6/ 7/1988            PAGE  15       !
+-----------------------------------------------------------------------------+
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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

```
NODE = H11        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  26        RIGID
 TRAN. STIF. = .1750E+07
   (X)     (Y)     (Z)
DIRECTION COSINES:
-.7844   .0000  -.6202

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.        199.088
FORCE MIN.           .000
AXIAL, SWING  MAX/MIN:
TEN. =   .0005,    .0006
COMP=    .0006,    .0247
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0008    .0000   .0008   .0000    .0000   .0000   .0000
 -.0008  -.0247   .0000    .0247   .0000   .0008    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.           .000
FORCE MIN.           .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.       4752.394
FORCE MIN.      -4553.306
AXIAL, SWING  MAX/MIN:
TEN =    .0043,    .0161
COMP=    .0044,    .0408
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0042   .0160   .0016    .0160   .0016   .0042    .0000   .0000   .0000
 -.0050  -.0408  -.0008   -.0408  -.0008  -.0050    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.           .000
FORCE MIN.           .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,    .0000
N/A =    .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:     GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

    SUPTMVIC            12:47: 8.22     6/ 7/1988            PAGE  16
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PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H12      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  27      RIGID
 TRAN. STIF. = .3066E+07
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .4524   .0000  -.8918

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.      -180.331
AXIAL, SWING  MAX/MIN:
TEN. =   .0001,   .0025
TEN. =   .0000,   .0248
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0022   .0000   .0012    .0000   .0012  -.0022    .0000   .0000   .0000
  .0000  -.0248   .0000    .0248   .0000   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     2970.485
FORCE MIN.    -3150.815
AXIAL, SWING  MAX/MIN:
COMP=    .0005,   .0169
TEN. =   .0006,   .0410
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0048   .0161   .0019    .0161   .0019   .0048    .0000   .0000   .0000
 -.0026  -.0409  -.0007   -.0409  -.0007  -.0026    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
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ATTACHMENT 2
PAGE 121 OF 143
CALC. NO. C-0031/7180

NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H10      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000

 SUPT:  28    SNUBBER
 TRAN. STIF. = .0000E+00
    (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0157,    .0039
TEN. =   .0000,   .0250
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0157   .0000   .0039    .0000   .0039  -.0157    .0000   .0000   .0000
  .0000  -.0250   .0000    .0250   .0000   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0220,    .0199
TEN. =   .0063,   .0420
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0220   .0163   .0114    .0163   .0114   .0220    .0000   .0000   .0000
 -.0063  -.0413  -.0074   -.0413  -.0074  -.0063    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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                    N U T E C H   E N G I N E E R S

              PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC.  (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP.  ADCE
+-------------------------------------------------------------------------------+
!                                                                               !
! NODE = H9        SUPPORT  1 OF  1                              (Trans. only) !
!                                                                               !
!       PIPE DIRECTION COSINES: X =   .0000, Y = -1.0000, Z =   .0000           !
!                                                                               !
!  SUPT:  29    SNUBBER  !                                                      !
!  TRAN. STIF. = .0000E+00 !                                                    !
!    (X)     (Y)     (Z)  !                                                     !
! DIRECTION COSINES:      !                                                     !
!  .2801   .0000  -.9600 !                                                      !
!                         !                                                     !
! ***************          CAS(1)- SERVICE LEVEL B           ***************  !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! COMP=   .0007,    .0177 !                                                     !
! TEN =   .0000,    .0250 !                                                     !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0172   .0000   .0043    .0000   .0043  -.0172    .0000   .0000   .0000!    !
!   .0000  -.0250   .0000    .0250   .0000   .0000    .0000   .0000   .0000!    !
!                                                                               !
! ***************          CAS(2)- SERVICE LEVEL C           ***************  !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .0000,    .0000 !                                                     !
! N/A =    0000,    .0000 !                                                     !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!                                                                               !
! ***************          CAS(3)- SERVICE LEVEL D           ***************  !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! TEN. =  .0054,    .0309 !                                                     !
! COMP=   .0061,    .0422 !                                                     !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!   .0236   .0163   .0126    .0163   .0126   .0236    .0000   .0000   .0000!    !
!  -.0064  -.0414  -.0083   -.0414  -.0083  -.0064    .0000   .0000   .0000!    !
!                                                                               !
! ***************         CAS(4)- SERVICE LEVEL 3*B          ***************  !
! FORCE MAX.          .000 !                                                    !
! FORCE MIN.          .000 !                                                    !
! AXIAL, SWING  MAX/MIN:   !                                                    !
! N/A =   .0000,    .0000 !                                                     !
! N/A =   .0000,    .0000 !                                                     !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      !
!    0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!   .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000!    !
!                                                                               !
!                                                                               !
!    SUPTMVIC            12:47: 8.22     6/ 7/1988            PAGE  19         !
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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = 95BEL SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = -.0112, Z = -.9999

SUPT: 30 RIGID	SUPT: 31 RIGID	SUPT: 32 RIGID
TRAN. STIF. = .3100E+03	TRAN. STIF. = .1825E+04	TRAN. STIF. = .1825E+04
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 -1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. .033	FORCE MAX. .000	FORCE MAX. 31.162
FORCE MIN. .000	FORCE MIN. -15.508	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN. = .0000, .0171	TEN. = .0000, .0171	N/A = .0171, .0000
COMP= .0001, .0085	TEN. = .0085, .0001	TEN = .0000, .0085
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0171 .0000 .0000	.0000 .0000 .0171	.0000 .0000 .0000
.0000 -.0085 -.0001	.0002 -.0085 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 2.693	FORCE MAX. 87.032	FORCE MAX. 36.482
FORCE MIN. -2.661	FORCE MIN. -102.540	FORCE MIN. -5.320
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN. = .0087, .0517	COMP= .0477, .0218	COMP= .0200, .0485
COMP= .0088, .0563	TEN. = .0562, .0093	TEN. = .0029, .0569
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0200 .0477 .0087	.0092 .0478 .0200	.0000 .0000 .0000
-.0029 -.0562 -.0088	-.0094 -.0563 -.0029	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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PIPE SUPPORT LOAD COMB RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = 95BEL SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = -.0112, Z = -.9999

SUPT: 33 RIGID	SUPT: 34 RIGID	SUPT: 35 RIGID
ROT. STIF. = .6670E+05	ROT. STIF. = .6670E+05	ROT. STIF. = .6670E+05
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 -1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
********** CAS(1)- SERVICE LEVEL B **********		
MOMT. MAX. .000	MOMT. MAX. 6.821	MOMT. MAX. 9.392
MOMT. MIN. -7.555	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0171 .0000 .0000	.0000 .0000 .0171	.0000 .0000 .0000
.0000 -.0085 -.0001	.0002 -.0085 .0000	.0000 .0000 .0000
********** CAS(2)- SERVICE LEVEL C **********		
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
********** CAS(3)- SERVICE LEVEL D **********		
MOMT. MAX. 37.010	MOMT. MAX. 7.997	MOMT MAX. 31.277
MOMT. MIN. -44.565	MOMT. MIN. -1.176	MOMT. MIN. -21.885
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0200 .0477 .0087	.0092 .0478 .0200	.0000 .0000 .0000
-.0029 -.0562 -.0088	-.0094 -.0563 -.0029	.0000 .0000 .0000
********** CAS(4)- SERVICE LEVEL 3*B **********		
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H8        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0100, Z =  -.9999

 SUPT:  36        ~~RIGID~~
 TRAN. STIF. = .1200E+04
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.        -3.493
AXIAL, SWING  MAX/MIN:
TEN. =    .0000,    .0123
TEN =     .0029,    .0002
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0123   .0000   .0000    .0000   .0000   .0123    .0000   .0000   .0000
  .0000  -.0029  -.0002    .0002  -.0029   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.        76.759
FORCE MIN.       -80.252
AXIAL, SWING  MAX/MIN:
COMP=     .0640,    .0162
TEN. =    .0669,    .0089
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0138   .0640   .0086    .0092   .0640   .0138    .0000   .0000   .0000
 -.0015  -.0669  -.0087   -.0094  -.0670  -.0015    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

   SUPTHVIC            12:47: 8.22      6/ 7/1988            PAGE  22
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Spring Hanger
Hot Load = 2860# } [illegible] 06-07-88

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H7        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0143, Z =  -.9999

 SUPT:  37    SNUBBER
 TRAN. STIF. = .0000E+00
    (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0102,    .0000
TEN. =  .0000,    .0027
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0102   .0000   .0000    .0000   .0000   .0102    .0000   .0000   .0000
  .0000  -.0027  -.0002    .0001  -.0027   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0127,    .0725
TEN. =  .0024,    .0752
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0127   .0720   .0085    .0095   .0721   .0127    .0000   .0000   .0000
 -.0024  -.0747  -.0086   -.0097  -.0748  -.0024    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H6        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0122, Z =  -.9999

 SUPT:  38       RIGID
 TRAN. STIF. = .1402E+07
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000   .0000  1.0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.      -156.044
AXIAL, SWING  MAX/MIN:
TEN. =    .0000,    .0025
TEN. =    .0001,    .0039
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0025   .0000   .0000    .0000   .0000   .0025    .0000   .0000   .0000
  .0000  -.0039  -.0001    .0002  -.0039   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL  MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     9467.834
FORCE MIN.    -9623.878
AXIAL, SWING  MAX/MIN:
COMP=     .0068,    .0328
TEN =     .0069,    .0360
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0099   .0313   .0068    .0071   .0314   .0099    .0000   .0000   .0000
 -.0073  -.0353  -.0069   -.0073  -.0354  -.0073    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN           .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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ATTACHMENT 2
PAGE 128 OF 143
CALC. NO. C-0031/TIRD

NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H5A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0045, Z = -1.0000

 SUPT:  39    SNUBBER
 TRAN. STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
1.0000   .0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0022,   .0000
TEN. =  .0000,   .0032
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
   0022   .0000   .0000    .0000   .0000   .0022    .0000   .0000   .0000
  .0000  -.0032  -.0001    .0001  -.0032   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0093,   .0168
TEN. =  .0071,   .0198
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0093   .0154   .0068    .0069   .0154   .0093    .0000   .0000   .0000
 -.0071  -.0186  -.0070   -.0070  -.0186  -.0071    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H4A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  -.0113, Z =  -.9999

 SUPT:  40       RIGID
 TRAN. STIF. = .6160E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
  0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.     -1743.452
AXIAL, SWING  MAX/MIN:
TEN. =    .0000,    .0020
TEN. =    .0028,    .0001
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0020   .0000   .0000    .0000   .0000   .0020    .0000   .0000   .0000
  .0000  -.0028  -.0001    .0002  -.0028   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     3652.928
FORCE MIN.    -5396.381
AXIAL, SWING  MAX/MIN:
COMP=     .0059,    .0113
TEN. =    .0088,    .0099
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0089   .0059   .0070    .0070   .0060   .0089    .0000   .0000   .0000
 -.0069  -.0088  -.0071   -.0072  -.0088  -.0069    .0000   .0000   .0000

***************         CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =     .0000,    .0000
N/A =     .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

```
NODE = H3A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0109, Z =   .0000

 SUPT:  41    SNUBBER
 TRAN. STIF. = .0000E+00
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .0767   .0000  -.9971

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0001,    .0015
COMP=   .0013,    .0026
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0015   .0000   .0000    .0015   .0000   .0000    .0000   .0000   .0000
  .0000  -.0026  -.0013    .0000  -.0026  -.0013    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
TEN =   .0163,    .0194
COMP=   .0178,    .0210
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0088   .0165   .0171    .0090   .0166   .0171    .0000   .0000   .0000
 -.0073  -.0191  -.0184   -.0075  -.0192  -.0184    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION — FILE NUMBERS
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H2A      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0104, Z =   .0000

 SUPT:  42    SNUBBER
 TRAN. STIF. = .0000E+00
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0006,    .0016
TEN. =  .0000,    .0016
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0016   .0006   .0000    .0015   .0006   .0000    .0000   .0000   .0000
  .0000   .0000  -.0016    .0000   .0000  -.0016    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0076,    .0197
TEN. =  .0070,    .0206
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0088   .0076   .0177    .0089   .0077   .0177    .0000   .0000   .0000
 -.0073  -.0070  -.0193   -.0073  -.0071  -.0193    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:    LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT. PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

```
NODE = H1A        SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .9999, Y =  -.0105, Z =   .0000

 SUPT:  43        ~~[illegible]~~
 TRAN. STIF. = .9000E+03
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .0000  1.0000   .0000

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .852
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
COMP=   .0009,    .0016
TEN. =  .0000,    .0016
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0016   .0009   .0000    .0015   .0010   .0000    .0000   .0000   .0000
  .0000   .0000  -.0016    .0000   .0000  -.0016    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX           .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN.
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.         5.680
FORCE MIN.        -4.828
AXIAL, SWING  MAX/MIN:
COMP=   .0063,    .0197
TEN. =  .0054,    .0205
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0088   .0063   .0176    .0089   .0064   .0176    .0000   .0000   .0000
 -.0073  -.0054  -.0192   -.0073  -.0054  -.0192    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,    .0000
N/A =   .0000,    .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000

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Spring Hanger
Hot Load = 2158.# } [illegible] 06-07-88

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

NODE = HPTUB SUPPORT 1 OF 2 (Trans. only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = 1.0000

SUPT: 44 RIGID	SUPT: 45 RIGID	SUPT: 46 RIGID
TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09	TRAN. STIF. = .1000E+09
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 1.0000 .0000	.0000 .0000 1.0000
**********	CAS(1)- SERVICE LEVEL B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. 14.363
FORCE MIN. -63.778	FORCE MIN. -340.584	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN. = .0000, .0000	TEN. = .0000, .0000	N/A = .0000, .0000
TEN. = .0000, .0000	TEN. = .0000, .0000	TEN. = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
FORCE MAX. 1580.809	FORCE MAX. 1477.202	FORCE MAX. 1592.908
FORCE MIN. -1644.587	FORCE MIN. -1817.786	FORCE MIN. -1578.545
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0000, .0000	COMP= .0000, .0000	COMP= .0000, .0000
TEN. = .0000, .0000	TEN. = .0000, .0000	TEN = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
-.0000 -.0000 -.0000	-.0000 -.0000 -.0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT. HOPE CREEK SNUBBER REDUCTION _____. FILE NUMBERS _____
OWNER. PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

NODE = HPTUB SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0000, Z = 1.0000

SUPT: 47 RIGID	SUPT: 48 RIGID	SUPT: 49 RIGID
ROT. STIF. = .1000E+13	ROT. STIF. = .1000E+13	ROT. STIF. = .1000E+13
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
1.0000 .0000 .0000	.0000 1.0000 .0000	.0000 .0000 1.0000
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. .000	MOMT. MAX. 4167.737	MOMT. MAX. .000
MOMT. MIN. -3938.715	MOMT. MIN. .000	MOMT. MIN. -3127.802
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 80163.800	MOMT. MAX. 22119.520	MOMT. MAX. 72950.340
MOMT. MIN. -84102.520	MOMT. MIN. -17951.780	MOMT. MIN. -76078.140
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
-.0000 -.0000 -.0000	-.0000 -.0000 -.0000	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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                    N U T E C H   E N G I N E E R S

              PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                  _____ FILE NUMBERS _____
OWNER:    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE
+-------------------------------------------------------------------------------+
:                                                                               :
: NODE = H20      SUPPORT  1 OF  1                                (Trans. only) :
:                                                                               :
:      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999            :
:                                                                               :
:  SUPT:  50    SNUBBER  :                                                      :
:  TRAN. STIF. = .2530E+06 :                                                    :
:    (X)     (Y)     (Z)  :                                                     :
: DIRECTION COSINES:      :                                                     :
:  .0000   .0000  1.0000  :                                                     :
:                         :                                                     :
: ***************          CAS(1)- SERVICE LEVEL B          ***************    :
: FORCE MAX.          .000 :                                                    :
: FORCE MIN.          .000 :                                                    :
: AXIAL, SWING  MAX/MIN:   :                                                    :
: N/A =   .0000,    .0000 :                                                     :
: TEN. =   .0050,   .0012 :                                                     :
: GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      :
:  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000:    :
:  -.0001  -.0012  -.0050   -.0050  -.0012   .0001    .0000   .0000   .0000:   :
:                                                                               :
: ***************          CAS(2)- SERVICE LEVEL C          ***************    :
: FORCE MAX.          .000 :                                                    :
: FORCE MIN           .000 :                                                    :
: AXIAL, SWING  MAX/MIN:   :                                                    :
: N/A =   .0000,    .0000 :                                                     :
: N/A =   .0000,    .0000 :                                                     :
: GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      :
:  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000:    :
:  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000:    :
:                                                                               :
: ***************          CAS(3)- SERVICE LEVEL D          ***************    :
: FORCE MAX.   23907.820 :                                                      :
: FORCE MIN.  -23907.820 :                                                      :
: AXIAL, SWING  MAX/MIN:   :                                                    :
: COMP=   .0945,    .0218 :                                                     :
: TEN. =   .0995,   .0230 :                                                     :
: GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      :
:  .0049   .0212   .0945    .0947   .0222   .0049    .0000   .0000   .0000:    :
:  .0050  -.0224  -.0995   -.0997  -.0235  -.0050    .0000   .0000   .0000:    :
:                                                                               :
: ***************          CAS(4)- SERVICE LEVEL 3*B        ***************    :
: FORCE MAX.          .000 :                                                    :
: FORCE MIN.          .000 :                                                    :
: AXIAL, SWING  MAX/MIN:   :                                                    :
: N/A =   .0000,    .0000 :                                                     :
: N/A =   .0000,    .0000 :                                                     :
: GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:      :
:  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000:    :
:  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000:    :
:                                                                               :
:                                                                               :
:    SUPTMVIC            12:47: 8.22     6/ 7/1988            PAGE  32         :
+-------------------------------------------------------------------------------+
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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H18      SUPPORT  1 OF  1                                  (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999

 SUPT:  51       RIGID  |  SUPT:  52       RIGID  |
 TRAN. STIF. = .3410E+07 |  TRAN. STIF. = .3410E+07 |
    (X)    (Y)    (Z)    |    (X)    (Y)    (Z)    |
DIRECTION COSINES:       | DIRECTION COSINES:      |
1.0000   .0000   .0000   |  .0000  1.0000   .0000  |
                         |                         |
***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.       166.040 | FORCE MAX.          .000 |
FORCE MIN.          .000 | FORCE MIN.    -1138.333  |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
N/A =   .0000,   .0000   | TEN. =   .0000,   .0000  |
TEN. =  .0000,   .0050   | TEN. =   .0003,   .0050  |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000  -.0000    .0000   .0000   .0000
  .0000  -.0003  -.0050   -.0050  -.0003   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000 | FORCE MAX.          .000 |
FORCE MIN.          .000 | FORCE MIN.          .000 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
N/A =   .0000,   .0000   | N/A =   .0000,   .0000   |
N/A =   .0000,   .0000   | N/A =   .0000,   .0000   |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.       863.293 | FORCE MAX.   14380.260 |
FORCE MIN.      -697.253 | FORCE MIN.  -15518.590 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
COMP=   .0003,   .0955   | COMP=   .0042,   .0954   |
TEN. =  .0002,   .1006   | TEN. =  .0046,   .1005   |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0003   .0042   .0954    .0955   .0052   .0003    .0000   .0000   .0000
 -.0002  -.0046  -.1005   -.1005  -.0056  -.0002    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000 | FORCE MAX.          .000 |
FORCE MIN.          .000 | FORCE MIN.          .000 |
AXIAL, SWING  MAX/MIN:   | AXIAL, SWING  MAX/MIN:   |
N/A =   .0000,   .0000   | N/A =   .0000,   .0000   |
N/A =   .0000,   .0000   | N/A =   .0000,   .0000   |
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N·U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

NODE = 180BL SUPPORT 1 OF 2 (Trans only)

PIPE DIRECTION COSINES: X = .0000, Y = .0104, Z = .9999

SUPT: 53 RIGID	SUPT: 54 RIGID	SUPT: 55 RIGID
TRAN. STIF. = .2600E+03	TRAN. STIF. = .1250E+04	TRAN. STIF. = .1250E+04
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
********** CAS(1)- SERVICE LEVEL B **********		
FORCE MAX. .000	FORCE MAX. .739	FORCE MAX. 1.248
FORCE MIN. -1.309	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
TEN.= .0000, .0012	COMP= .0006, .0010	COMP= .0010, .0006
TEN.= .0050, .0000	TEN.= .0000, .0050	TEN.= .0000, .0050
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0010 .0006 .0000	.0000 .0006 -.0010	.0000 .0000 .0000
.0000 .0000 -.0050	-.0050 .0001 .0000	.0000 .0000 .0000
********** CAS(2)- SERVICE LEVEL C **********		
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN.	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
********** CAS(3)- SERVICE LEVEL D **********		
FORCE MAX. 25.095	FORCE MAX. 54.223	FORCE MAX. 18.724
FORCE MIN -26.403	FORCE MIN. -53.484	FORCE MIN. -17.476
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
COMP= .0965, .0459	COMP= .0434, .0977	COMP= .0150, .1058
TEN.= .1016, .0450	TEN.= .0428, .1025	TEN.= .0140, .1102
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0150 .0434 .0965	.0970 .0444 .0150	.0000 .0000 .0000
-.0140 -.0428 -.1016	-.1020 -.0438 -.0140	.0000 .0000 .0000
********** CAS(4)- SERVICE LEVEL 3*B **********		
FORCE MAX. .000	FORCE MAX. .000	FORCE MAX. .000
FORCE MIN. .000	FORCE MIN. .000	FORCE MIN. .000
AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:	AXIAL, SWING MAX/MIN:
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
N/A = .0000, .0000	N/A = .0000, .0000	N/A = .0000, .0000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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NUTECH ENGINEERS

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005 1016
COMP. ADCE

NODE = 180BL SUPPORT 2 OF 2 (Rotation only)

PIPE DIRECTION COSINES: X = .0000, Y = .0104, Z = .9999

SUPT: 56 RIGID	SUPT: 57 RIGID	SUPT: 58 RIGID
ROT. STIF. = .5130E+05	ROT. STIF. = .5130E+05	ROT. STIF. = .5130E+05
(X) (Y) (Z)	(X) (Y) (Z)	(X) (Y) (Z)
DIRECTION COSINES:	DIRECTION COSINES:	DIRECTION COSINES:
.0000 .0000 1.0000	.0000 1.0000 .0000	1.0000 .0000 .0000
**********	CAS(1)- SERVICE LEVEL B	**********
MOMT. MAX. 5.350	MOMT. MAX. 1.253	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. -.199
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0010 .0006 .0000	.0000 .0006 -.0010	.0000 .0000 .0000
.0000 .0000 -.0050	-.0050 .0001 .0000	.0000 .0000 .0000
**********	CAS(2)- SERVICE LEVEL C	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
**********	CAS(3)- SERVICE LEVEL D	**********
MOMT. MAX. 11.706	MOMT. MAX. 14.330	MOMT. MAX. 25.569
MOMT. MIN. -6.356	MOMT. MIN. -13.077	MOMT. MIN. -25.768
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0150 .0434 .0965	.0970 .0444 .0150	.0000 .0000 .0000
-.0140 -.0428 -.1016	-.1020 -.0438 -.0140	.0000 .0000 .0000
**********	CAS(4)- SERVICE LEVEL 3*B	**********
MOMT. MAX. .000	MOMT. MAX. .000	MOMT. MAX. .000
MOMT. MIN. .000	MOMT. MIN. .000	MOMT. MIN. .000
GLOBAL DISPL. MAX/MIN:	LOCAL DISPL. MAX/MIN:	GLOBAL ACCEL. MAX/MIN:
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000
.0000 .0000 .0000	.0000 .0000 .0000	.0000 .0000 .0000

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                    N U T E C H   E N G I N E E R S

              PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT:  HOPE CREEK SNUBBER REDUCTION                 _____ FILE NUMBERS _____
OWNER.    PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT:   PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE
+-----------------------------------------------------------------------------+
!                                                                             !
! NODE = H30      SUPPORT  1 OF  1                              (Trans. only) !
!                                                                             !
!      PIPE DIRECTION COSINES: X =   .0000, Y =   .0104, Z =   .9999          !
!                                                                             !
!  SUPT:  59       RIGID  !                                                   !
!  TRAN. STIF. = .8340E+06 !                                                  !
!    (X)     (Y)     (Z)   !                                                  !
! DIRECTION COSINES:       !                                                  !
!  .0000  1.0000   .0000   !                                                  !
!                          !                                                  !
! ***************          CAS(1)- SERVICE LEVEL B          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.    -2154.021  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! TEN. =   .0000,   .0038  !                                                  !
! TEN. =   .0026,   .0050  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0038   .0000   .0000    .0000   .0000  -.0038   .0000   .0000   .0000!  !
!   .0000  -.0026  -.0050   -.0050  -.0025   .0000   .0000   .0000   .0000!  !
!                                                                             !
! ***************          CAS(2)- SERVICE LEVEL C          ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000!  !
!   .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000!  !
!                                                                             !
! ***************          CAS(3)- SERVICE LEVEL D          ***************  !
! FORCE MAX.    49865.160  !                                                  !
! FORCE MIN.   -52019.180  !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! COMP=    .0598,   .1031  !                                                  !
! TEN. =   .0624,   .1067  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL  MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0341   .0598   .0973    .0979   .0608   .0341   .0000   .0000   .0000!  !
!  -.0303  -.0624  -.1023   -.1029  -.0634  -.0303   .0000   .0000   .0000!  !
!                                                                             !
! ***************         CAS(4)- SERVICE LEVEL 3*B         ***************  !
! FORCE MAX.          .000 !                                                  !
! FORCE MIN.          .000 !                                                  !
! AXIAL, SWING  MAX/MIN:   !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! N/A =    .0000,   .0000  !                                                  !
! GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:    !
!   .0000   .0000   .0000     0000   .0000   .0000   .0000   .0000   .0000!  !
!   .0000   .0000   .0000    .0000   .0000   .0000   .0000   .0000   .0000!  !
!                                                                             !
!                                                                             !
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PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCG

```
NODE = H50      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000

 SUPT:  60      RIGID
 TRAN. STIF. = .3850E+06
   (X)    (Y)    (Z)
DIRECTION COSINES:
 .5210   .0000  -.8535

***************          CAS(1)- SERVICE LEVEL B          ***************
FORCE MAX.          .000
FORCE MIN.       -47.775
AXIAL, SWING  MAX/MIN:
TEN =   .0001,   .0001
TEN. =  .0000,   .0090
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0001    .0000   .0001   .0000    .0000   .0000   .0000
  .0000  -.0090   .0000   -.0090   .0000   .0000    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C          ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D          ***************
FORCE MAX.     2595.078
FORCE MIN.    -2642.853
AXIAL, SWING  MAX/MIN:
TEN. =   .0134,   .2517
COMP=    .0132,   .2607
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0086   .2517   .0104    .2517   .0104   .0086    .0000   .0000   .0000
 -.0086  -.2607  -.0103   -.2607  -.0103  -.0086    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B        ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =   .0000,   .0000
N/A =   .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000     0000   .0000   .0000    .0000   .0000   .0000
   0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

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N U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION _____ FILE NUMBERS _____
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY CALC. (C-31) PSE005.1016
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY COMP. ADCE

```
NODE = H4B      SUPPORT  1 OF  1                                (Trans. only)

      PIPE DIRECTION COSINES: X =   .0000, Y =  1.0000, Z =   .0000

 SUPT:  61       RIGID
 TRAN. STIF. = .5160E+06
   (X)     (Y)     (Z)
DIRECTION COSINES:
 .6264   .0000  -.7795

***************          CAS(1)- SERVICE LEVEL B           ***************
FORCE MAX.          .000
FORCE MIN.       -65.655
AXIAL, SWING  MAX/MIN:
TEN. =   .0001,   .0000
TEN. =   .0001,   .0090
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0001    .0000   .0001   .0000    .0000   .0000   .0000
 -.0001  -.0090   .0000   -.0090   .0000  -.0001    .0000   .0000   .0000

***************          CAS(2)- SERVICE LEVEL C           ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

***************          CAS(3)- SERVICE LEVEL D           ***************
FORCE MAX.     2951.515
FORCE MIN.    -3017.169
AXIAL, SWING  MAX/MIN:
COMP=    .0012,   .2523
TEN. =   .0013,   .2613
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0083   .2521   .0051    .2521   .0051   .0083    .0000   .0000   .0000
 -.0084  -.2611  -.0050   -.2611  -.0050  -.0084    .0000   .0000   .0000

***************          CAS(4)- SERVICE LEVEL 3*B         ***************
FORCE MAX.          .000
FORCE MIN.          .000
AXIAL, SWING  MAX/MIN:
N/A =    .0000,   .0000
N/A =    .0000,   .0000
GLOBAL DISPL. MAX/MIN:   LOCAL DISPL. MAX/MIN:    GLOBAL ACCEL. MAX/MIN:
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000
  .0000   .0000   .0000    .0000   .0000   .0000    .0000   .0000   .0000

    SUPTMVIC            12:47: 8.22     6/ 7/1988            PAGE  38
```

2.

N·U T E C H E N G I N E E R S

PIPE SUPPORT LOAD COMB. RUP-DISK ANALYSIS P201

PROJECT: HOPE CREEK SNUBBER REDUCTION
OWNER: PUBLIC SERVICE ELECTRIC AND GAS COMPANY
CLIENT: PUBLIC SERVICE ELECTRIC AND GAS COMPANY

FILE NUMBERS
CALC. (C-31) PSE005.1016
COMP. ADCE

```
OUTPUT SAVED IN FILE : P201RUP.SUP

NORMAL COMPLETION AT 12:48:17.75    6/ 7/1988
```

SUPTMVIC 12:47: 8.22 6/ 7/1988 PAGE 39

PSEG CALCULATION CONTINUATION SHEET	TITLE	ID NO. HG-1-P-FD-201	SHEET
		REFERENCE C-31, REV. 7	OF
	ORIGINATOR DATE	AKB 1/25/93	
	VFR ~~or CKR~~ DATE	JDS 2-16-'93	

DECOUPLED BRANCH CONNECTION DISPLACEMENT EVALUATION(S)

The following displacements were tabulated for review of impact upon associated calculations. Assessments as to the impact are given at the bottom of this sheet.

(✓) DATA POINT 145CP HEADER CALCULATION C-31 CURRENT REVISION 7
(_). DATA POINT ____ BRANCH CALCULATION _____ CURRENT REVISION ____
(check calculation which is being worked)

LOADCASE THERMAL NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	-0.02	-0.012	0.021			
NEW	-0.002	-0.045	0.054			

LOADCASE SAMOB NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.001	0.0	0.0			

LOADCASE SAMSS NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.015	0.001	0.01			

LOADCASE ____ NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD						
NEW						

CONCLUSIONS: [X] BASED UPON MINIMAL INCREASE/ACTUAL DISPLACEMENTS , NO IMPACT TO BRANCH CALCULATIONS.

[ ]

ATTACHMENT 3
PAGE 1 OF 5
CALC. NO. C-0031/7IRQ

PSEG CALCULATION CONTINUATION SHEET	TITLE	ID NO. HG-1-P-FD-204	SHEET
		REFERENCE C-31, REV. 7	OF
	ORIGINATOR DATE	RKB 1/25/93	
	VFR ~~or CKR~~ DATE	HK 3-16-'93	

DECOUPLED BRANCH CONNECTION DISPLACEMENT EVALUATION(S)

The following displacements were tabulated for review of impact upon associated calculations. Assessments as to the impact are given at the bottom of this sheet.

(✓) DATA POINT 163 HEADER CALCULATION C-31 CURRENT REVISION 7
(_) DATA POINT ____ BRANCH CALCULATION ____ CURRENT REVISION ____
(check calculation which is being worked)

LOADCASE THERMAL NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.0052	-0.0879	0.2393			
NEW	0.011	-0.035	-0.212			

LOADCASE SAMOB NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.044	0.039	0.0122			
NEW	0.036	0.015	0.011			

LOADCASE SAMSS NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.041	0.0281	0.0224			
NEW	0.05	0.018	0.023			

LOADCASE ____ NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD						
NEW						

CONCLUSIONS: [X] BASED UPON MINIMAL INCREASE/ACTUAL DISPLACEMENTS , NO IMPACT TO BRANCH CALCULATIONS.

[ ]

ATTACHMENT 3
PAGE 2 OF 5
CALC. NO. C-0031/IRØ

PSEG CALCULATION CONTINUATION SHEET	TITLE	ID NO. HG-1-P-FD-207	SHEET
		REFERENCE C-31, REV. 7	OF
	ORIGINATOR DATE	BKB 1/25/93	
	VFR ~~or CKR~~ DATE	JLK 3-16-93	

DECOUPLED BRANCH CONNECTION DISPLACEMENT EVALUATION(S)

The following displacements were tabulated for review of impact upon associated calculations. Assessments as to the impact are given at the bottom of this sheet.

(✓) DATA POINT 145CP HEADER CALCULATION C-31 CURRENT REVISION 7
(_) DATA POINT ____ BRANCH CALCULATION _____ CURRENT REVISION ____
(check calculation which is being worked)

LOADCASE THERMAL NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	-0.02	-0.012	0.021			
NEW	-0.002	-0.045	0.054			

LOADCASE SAMOB NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.001	0.0	0.0			

LOADCASE SAMSS NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.015	0.001	0.01			

LOADCASE _____ NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD						
NEW						

CONCLUSIONS: [X] BASED UPON MINIMAL INCREASE/ACTUAL DISPLACEMENTS , NO IMPACT TO BRANCH CALCULATIONS.

[ ]

ATTACHMENT 3
PAGE 3 OF 5
CALC. NO. C-0031/7IRØ

PSEG CALCULATION CONTINUATION SHEET	TITLE	ID NO. HG-1-P-FD-208	SHEET
		REFERENCE C-31, REV. 7	OF
	ORIGINATOR DAKB		
	DATE 1/25/93		
	VFR ~~or CKR~~ JDK		
	DATE 2-16-93		

DECOUPLED BRANCH CONNECTION DISPLACEMENT EVALUATION(S)

The following displacements were tabulated for review of impact upon associated calculations. Assessments as to the impact are given at the bottom of this sheet.

(✓) DATA POINT 145CP HEADER CALCULATION C-31 CURRENT REVISION 7
(_) DATA POINT ____ BRANCH CALCULATION ____ CURRENT REVISION ____
(check calculation which is being worked)

LOADCASE THERMAL NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	-0.02	-0.012	0.021			
NEW	-0.002	-0.045	0.054			

LOADCASE SAMOB NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.001	0.0	0.0			

LOADCASE SAMSS NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.015	0.001	0.01			

LOADCASE ____ NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD						
NEW						

CONCLUSIONS: [X] BASED UPON MINIMAL INCREASE/ACTUAL DISPLACEMENTS , NO IMPACT TO BRANCH CALCULATIONS.

[ ]

ATTACHMENT 3
PAGE 4 OF 5
CALC. NO. C-0031/IRP

PSEG CALCULATION CONTINUATION SHEET	TITLE	ID NO. HG-1-P-FD-234	SHEET
		REFERENCE C-31, REV. 7	OF
	ORIGINATOR DATE	DKS 1/25/93	
	VFR ~~or CKR~~ DATE	JDS 2-16-'93	

DECOUPLED BRANCH CONNECTION DISPLACEMENT EVALUATION(S)

The following displacements were tabulated for review of impact upon associated calculations. Assessments as to the impact are given at the bottom of this sheet.

(✓) DATA POINT 145CP HEADER CALCULATION C-31 CURRENT REVISION 7
(_) DATA POINT ____ BRANCH CALCULATION ____ CURRENT REVISION ____
(check calculation which is being worked)

LOADCASE THERMAL NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	-0.02	-0.012	0.021			
NEW	-0.002	-0.045	0.054			

LOADCASE SAMOB NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.001	0.0	0.0			

LOADCASE SAMSS NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD	0.001	0.0	0.0			
NEW	0.015	0.001	0.01			

LOADCASE ____ NOTE: Displacements in inches , rotations in radians.

	DX	DY	DZ	RX	RY	RZ
OLD						
NEW						

CONCLUSIONS: [X] BASED UPON MINIMAL INCREASE/ACTUAL DISPLACEMENTS , NO IMPACT TO BRANCH CALCULATIONS.

[ ]

ATTACHMENT 3
PAGE 5 OF 5
CALC. NO. C-0031/7IRØ

DESIGN INPUT LOG/RECORDS INDEX

Document File PSE005.1011
Revision No. 5
Date 12-18-89

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
PSE005.0010	Generic Design Input Log/ Records Index	7	PSE005.0010	NP	N	Y	AM for ASH	8/28/89
Bechtel Documents for LBP P-201								
--	PUA Calculation Review Comments	8/16/85	XBP006.0102	NP	Y	N	ASH	1/30/88
Pipe Support Drawings (On Aperture Cards)								
1-P-FD-006-H01(Q)	Hanger H01 Details	5	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H02(Q)	Hanger H02 Details	4	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H03(Q)	Hanger H03 Details (Shts 1 & 2)	5	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H04(Q)	Hanger H04 Details	3	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H05(Q)	Hanger H05 Details	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H06(Q)	Hanger H06 Details	5	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H07(Q)	Hanger H07 Details	4	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H08(Q)	Hanger H08 Details	4	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H09(Q)	Hanger H09 Details	3	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H10(Q)	Hanger H10 Details (Shts 1,2, & 3)	3	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H11(Q)	Hanger H11 Details	1	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H12(Q)	Hanger H12 Details (Shts 1 & 2)	1	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H13(Q)	Hanger H13 Details (Shts 1 & 2)	6	PSE005.0020	L	Y	N	ASH	1/30/88

ATTACHMENT 4
PAGE 1 OF 7
CALC. NO. C-0031/7IRP

* Asterisk Designates Preliminary Input
P-201

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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PRINTED 20041222

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
Pipe Support Drawings (On Aperture Cards)								
1-P-FD-006-H14(Q)	Hanger H14 Details (Shts 1, 2 & 3)	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H15(Q)	Hanger H15 Details (Shts 1 & 2)	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H17(Q)	Hanger H17 Details (Shts 1 & 2)	1	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H18(Q)	Hanger H18 Details (Shts 1 & 2)	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H19(Q)	Hanger H19 Details (Shts 1 & 2)	3	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-006-H22(Q)	Hanger H22 Details (Shts 1 & 2)	1	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-014-H01(Q)	Hanger H01 Details	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-014-H02(Q)	Hanger H02 Details (Shts 1, 2 & 3)	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-014-H03(Q)	Hanger H03 Details (Shts 1,2,3&4)	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-014-H04(Q)	Hanger H04 Details	2	PSE005.0020	L	Y	N	ASH	1/30/88
1-P-FD-014-H05(Q)	Hanger H05 Details	2	PSE005.0020	L	Y	N	ASH	1/30/88
Piping Isometric (On Aperture Card)								
1-P-FD-01(Q)	Pipe Isometric	21	PSE005.0019	L	Y	N	ASH	1/30/88
Valve Drawings								
10855-P301(Q)-347-5	Anchor/Darling Valve Co. 20"-150 Weld Ends w/SMB-0-25 Limitorque Operator	C	PSE005.0016	L	Y	N	ASH	1/30/88
10855-P301(Q)-305-4	Anchor/Darling Valve Co. 20"-150 Swing Check Valve	C	PSE005.0016	L	Y	N	ASH	1/30/88

ATTACHMENT 4
PAGE 2 OF 7
CALC. NO. C-0031/TSR0

* Asterisk Designates Preliminary Input
P-201

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
Pipe Support Calculation (On Microfiche)								
1-P-FD-006-C015	Hanger H01 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C015	Hanger H02 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C016	Hanger H03 Design Calculation	0	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C017	Hanger H04 Design Calculation	0	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C018	Hanger H05 Design Calculation	0	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C011	Hanger H06 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C019	Hanger H07 Design Calculation	0	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C020	Hanger H08 Design Calculation	0	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C012	Hanger H09 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C014	Hanger H10 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C002	Hanger H11 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C009	Hanger H12 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C007	Hanger H13 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C008	Hanger H14 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88

ATTACHMENT 4
PAGE 3 OF 7
CALC. NO. C-0031/7IR0

* Asterisk Designates Preliminary Input
P-201

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PRINTED 20041222

DESIGN INPUT LOG/RECORD INDEX

Document File PSE005.1011
Revision No. 5

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
Pipe Support Calculation (On Microfiche)								
1-P-FD-006-C007	Hanger H15 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C008	Hanger H17 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C007	Hanger H18 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C006	Hanger H19 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-006-C010	Hanger H22 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-014-C001	Hanger H01 Design Calculation	2	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-014-C003	Hanger H02 Design Calculation	3	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-014-C004	Hanger H03 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-014-C005	Hanger H04 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
1-P-FD-014-C006	Hanger H05 Design Calculation	1	PSE005.1015	L	Y	N	ASH	1/30/88
Piping Calculation								
C-31	LBP P-201 Piping Calculation	6	PSE005.1016	L	Y	N	ASH	1/30/88
SCF-31	Post Phase 2 Piping Calculation	1	PSE005.1016	L	Y	N	ASH	1/30/88
N/A	Hanger Guidance Issue # 5	11/26/86	PSE005.1016	L	Y	N	ASH	1/30/88

ATTACHMENT 4
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CALC. NO. C-0031/7IR0

* Asterisk Designates Preliminary Input
P-201

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
SB Branch Pipe Documents								
1-P-FD-201	SBP Isometric	5	PSE005.0019	L	Y	N	ASH	6/24/88
1-P-FD-204	SBP Isometric	2	PSE005.0019	L	Y	N	ASH	6/24/88
1-P-FD-207	SBP Isometric	5	PSE005.0019	L	Y	N	ASH	6/24/88
1-P-FD-208	SBP Isometric	5	PSE005.0019	L	Y	N	ASH	6/24/88
1-P-FD-211	SBP Isometric	9	PSE005.0019	L	Y	N	ASH	6/24/88
1-P-FD-234	SBP Isometric	4	PSE005.0019	L	Y	N	ASH	6/24/88
FSK-P-1-FD-600	SBP Sketch for PT-N056E	6	PSE005.0019	L	Y	N	ASH	6/24/88
FSK-P-1-FD-601	SBP Sketch for PT-N056A	8	PSE005.0019	L	Y	N	ASH	6/24/88
Outgoing Documents								
--	Document and Interface Requirement Summary	0	PSE005.1017	NP	N	Y	N/A	1/27/89**
1-P-FD-01	Isometric Drawing	21	PSE005.1016	NP	N	Y	N/A	1/27/89**
1-P-FD-006-H02	Hanger Drawing	4	PSE005.1016	NP	N	Y	N/A	1/27/89**
1-P-FD-006-H03	Hanger Drawing	5	PSE005.1016	NP	N	Y	N/A	1/27/89**
1-P-FD-006-H05	Hanger Drawing	2	PSE005.1016	NP	N	Y	N/A	1/27/89**

ATTACHMENT 4
PAGE 5 OF 7
CALC. NO. C-0031/IRO

* Asterisk Designates Preliminary Input
** Date of Document Transmittal to PSE&G
P-201

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PRINTED 20041222

DESIGN INPUT LOG/RECORD INDEX

Document File [redacted]005.1011
Revision No. 5

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
Outgoing Documents								
1-P-FD-006-H07	Hanger Drawing	4	PSE005.1016	NP	N	Y	N/A	1/27/89**
1-P-FD-006-H09	Hanger Drawing	3	PSE005.1016	NP	N	Y	N/A	1/27/89**
1-P-FD-006-H10	Hanger Drawing	3	PSE005.1016	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C015	Hanger H01 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C015	Hanger H02 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C016	Hanger H03 Design Calculation	P11	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C017	Hanger H04 Design Calculation	P11	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C018	Hanger H05 Design Calculation	P11	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C011	Hanger H06 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C019	Hanger H07 Design Calculation	P11	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C020	Hanger H08 Design Calculation	P11	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C012	Hanger H09 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C014	Hanger H10 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C002	Hanger H11 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C009	Hanger H12 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**

ATTACHMENT ~~/~~
PAGE ~~/~~ OF ~~/~~

ATTACHMENT 4
PAGE 6 OF 7
CALC. NO. C-0031/IIRP

* Asterisk Designates ~~ORIGINAL~~ Preliminary Input
** Date of Document Transmittal to PSE&G
P-201

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DESIGN INPUT LOG/RECORD INDEX

Document File: PSE005.1011
Revision No. 5

Project: XPS-05 System: LBP P-201 (C-31) Hope Creek TAP Records Retention

Document Number	Title or Subject	Revision or Date	File Number	Classif. L/NP	D. I. Y/N	Outgoing Tech. Doc. Y/N	Responsible PE Approval	Date
Outgoing Documents (Continued)								
1-P-FD-006-C007	Hanger H13 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C008	Hanger H14 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C007	Hanger H15 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C008	Hanger H17 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C007	Hanger H18 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C006	Hanger H19 Design Calculation	P41	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-006-C010	Hanger H22 Design Calculation	P21-1	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-014-C001	Hanger H01 Design Calculation	P31	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-014-C003	Hanger H02 Design Calculation	P41	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-014-C004	Hanger H03 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-014-C005	Hanger H04 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
1-P-FD-014-C006	Hanger H05 Design Calculation	P21	PSE005.1015	NP	N	Y	N/A	1/27/89**
Piping Calculation Outgoing								
C-31	LBP P-201 Piping Calculation	P71	PSE005.1016	NP	N	Y	N/A	1/27/89**
N/A	Hanger Guidance Issue #5	P61	PSE005.1016	NP	N	Y	N/A	1/27/89**

ATTACHMENT 4
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CALC. NO. C-0031/IIR0

* Asterisk Designates Preliminary Input
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P-201

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HOPE CREEK GENERATION STATION -
UNIT 1
TORUS ATTACHED PIPING SNUBBER REDUCTION PROJECT
DCP NUMBER: 4-EC-1021

DOCUMENTATION AND INTERFACE REQUIREMENTS SUMMARY

SYSTEM: HPCI Turbine Exhaust **TORUS PENETRATION NO.:** P-201

CONTENTS:

This document contains the following information related to this system:

Attachment 1 - Snubber Reduction Summary
Attachment 2 - List of Calculations
Attachment 3 - List of Operational Design Change Notices
Attachment 4 - Interface Requirements

NUTECH Approvals:

RDQ for ASH/7.22.88
Project Engineer - Piping

TWSoo Hoo 6/30/88
Project Engineer - Pipe Supports

Robert S. Quinn/7.22.88
Project Engineer - Structures

PSE&G Approvals:

ATTACHMENT 5
PAGE 1 OF 12
CALC. NO. C-0031/7IRQ

SNUBBER REDUCTION SUMMARY

The following provides a summary of the results of the snubber reduction effort on this system:

SNUBBERS REMOVED: 8

SUPPORT NO.
1-P-FD-006-H10
1-P-FD-006-H09
1-P-FD-006-H07 (Pair)
1-P-FD-006-H05 (Pair)
1-P-FD-006-H03
1-P-FD-006-H02

SNUBBERS REPLACED: 0

SUPPORT NO.
None

NUMBER OF SNUBBERS REMAINING: 6

LIST OF CALCULATIONS

The following calculations document the snubber reduction analysis performed for this system.

A. PIPING CALCULATIONS

CD NO.*	CALC. NO.	CALCULATION TITLE	REV.
	C-31	Piping Code Compliance Documentation System P-201	P7I

B. HANGER GUIDANCE PACKAGES

CD NO.*	CALC. NO.	CALCULATION TITLE	REV.
	C-31-HG	Piping Code Compliance Documentation System P-201 - Hanger Guidance Package	P6I

C. PIPE SUPPORT CALCULATIONS

CD NO.*	CALCULATION NOS.	REV.
	1-P-FD-006-C002	P3I
	1-P-FD-006-C006	P4I
	1-P-FD-006-C007	P3I
	1-P-FD-006-C008	P3I
	1-P-FD-006-C009	P2I
	1-P-FD-006-C010	P2I
	1-P-FD-006-C011	P2I
	1-P-FD-006-C012	P2I
	1-P-FD-006-C014	P2I
	1-P-FD-006-C015	P2I
	1-P-FD-006-C016	P1I
	1-P-FD-006-C017	P1I
	1-P-FD-006-C018	P1I
	1-P-FD-006-C019	P1I
	1-P-FD-006-C020	P1I
	1-P-FD-014-C001	P3I
	1-P-FD-014-C003	P4I
	1-P-FD-014-C004	P2I
	1-P-FD-014-C005	P2I
	1-P-FD-014-C006	P2I

* CD number to be assigned by PSE&G.

LIST OF CALCULATIONS
(Concluded)

D. OTHER CALCULATIONS**

CD NO.*	CALC. NO.	CALCULATION TITLE	REV.
		(None)	

* CD number to be assigned by PSE&G.

** Refer to PSE005.1008 for list of calculations generic to all systems.

LIST OF OPERATIONAL DESIGN CHANGE NOTICES

The following Operational Design Change Notices (ODCN's) implement the design changes resulting from the snubber reduction analysis.

ODCN NO.*	REV.	DOCUMENT CHANGED TYPE	NUMBER	REV.
	0	Isometric Drawing	1-P-FD-01	21
	0	Hanger Drawing	1-FD-006-H02	4
	0	Hanger Drawing	1-FD-006-H03	5
	0	Hanger Drawing	1-FD-006-H05	2
	0	Hanger Drawing	1-FD-006-H07	2
	0	Hanger Drawing	1-FD-006-H09	3
	0	Hanger Drawing	1-FD-006-H10	3

* ODCN number to be assigned by PSE&G.

INTERFACE REQUIREMENTS

The following interface requirements must be completed prior to the final issuance of the ODCN's for implementation.

A. BUILDING STRUCTURE REEVALUATION

1. The following pipe supports have increased reaction loads due to snubber reduction and a total reaction load over 5,000 lbs. The building structure to which they are attached require requalification for the interface loads documented in the calculation for that pipe support.

SUPPORT NOS.

None

2. The following equipment have increased reaction loads due to snubber reduction. The building evaluation to which they are attached require requalification to the nozzle load documented in the Piping Calculation C-31.

EQUIPMENT (Type and Number)

HPCI Turbine 10S211 Exhaust Nozzle

INTERFACE REQUIREMENTS
(Continued)

B. DECOUPLED BRANCH LINE REQUALIFICATION

The following decoupled branch lines have increased displacements and/or accelerations due to snubber reduction as documented in the Piping Calculation C-31. These decoupled branch lines require requalification for these increased displacements and/or accelerations.

BRANCH LINE DESIGNATION (ISO. NO/CALC.NO.)	PISTAR NODE ID	BRANCH TYPE*
1-P-FD-006-1" (1-P-FD-211/11.2201.3602.01)	54BR	I-C

* See Table 4.B-1 of description of branch types.

TABLE 4.B-1

DECOUPLED BRANCH LINE TYPES

BRANCH TYPE	DESCRIPTION
I-A	Cantilevered vent or drain within Mark I region.
I-B	Branch line within Mark I region qualified by simplified methods.
I-C	Branch line within Mark I region qualified by computerized analysis methods.
II-A	Cantilevered vent or drain outside Mark I region.
II-B	Branch line outside Mark I region qualified by simplified (chart) methods.
II-C	Branch line outside Mark I region qualified by computerized analysis methods.

INTERFACE REQUIREMENTS
(Concluded)

C. FIELD WALKDOWNS

Displacements of the piping have increased in some locations due to snubber reduction. Field walkdowns may need to be performed to confirm that the revised displacements of the piping during a seismic or other dynamic event would not interfere with or adversely interact with other structures or piping adjacent to the TAP system.

STRESS ANALYSIS CHECKLIST

SYSTEM: P-201

CALCULATION NO./REV.: C-31 / P7I

PISTAR RUN ID/DATE: Ref. 9 of the Calc.

		Yes	No	N/A
1.0	PISTAR MODEL GEOMETRY			
1.1	Have all updates, if any, been incorporated in the PISTAR model?	✓		
1.2	Have as-built deviations reconciled in XBP-06 Piping Calculation been incorporated in the PISTAR model?	✓		
1.3	a. Are the revision levels of the As-Built Isometrics referenced in Piping Calculation, the latest revision of the XBP-06 isometrics?	✓		
	b. If no, have the changes in the later revisions of the isometric been incorporated in the PISTAR model?			✓
1.4	Have the changes from an outstanding SCF calculations incorporated in the piping model?	✓		
1.5	Has the revised support stiffness been considered?	✓		
2.0	LOADS AND LOAD COMBINATIONS			
2.1	If the system is a branch line from another subsystem included within the scope of this project, have the revised thermal and seismic movements been used in the branch line subsystem stress analysis?			✓
2.2	Have at least 33 Hz been extracted for use in the seismic response spectra analysis?	✓		

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SYSTEM: P-201

		Yes	No	N/A
2.3	Are ZPA effects included in the analysis?	✓		
2.4	Have the modal responses for a seismic response spectra analysis been combined using the grouping method for closely spaced modes specified in NRC Regulatory Guide 1.92 been used?	✓		
3.0	EVALUATION			
3.1	Pipe Stress			
3.1.1	Have provisions of editions or addenda of the ASME Code, Section III, 1977 Edition other than the Summer 1977 Addenda for piping and the Summer 1979 Addenda for flanges been used? (If so, list the provisions and edition or addenda used in the REMARKS section of this checklist and document the PSE&G's approval for their use.)		✓	
3.1.2	Have all flanges been evaluated?	✓		
3.1.3	Have all welded attachments been evaluated?	✓		
3.1.4	Have all SBP interfaces been assessed for their effects on branch lines?	✓		
3.1.5	Has the functionality of ASME Class 2 and 3 stainless steel elbows and bends been demonstrated?	✓		
3.2	Valve Accelerations(1)			
3.2.1	Have the valve accelerations been shown to be either (1) less than the allowable values given in the system design specification; or (2) less than those obtained in the ~~existing analysis?~~	✓		

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SYSTEM: P-201

		Yes	No	N/A
3.3	Pipe Supports			
3.3.1	Have the effects of the change in preload on a spring hanger been reconciled?	✓		
3.3.2	Have the effects of uplift on one-way supports been reconciled?			✓
3.4	Equipment Loads/Displacements(1)			
3.4.1	Have loads on equipment (including expansion joints) been shown to be either: (1) less than the allowable values given in the subsystem design specification; or (2) ~~less than the values obtained from the existing analyses?~~	✓		
3.5	Penetration Loads(1)			
3.5.1	Are the loads on the torus penetration less than the loads obtained in the existing analysis?		✓	

Note:

(1) An answer of "No" would require requalification and documentation in the piping calculations.

Remarks

3.5.1 . Penetration qualification for revised loads has been documented in calculation number SC-203.

Approved: A Kerdekar — Project Engineer - Piping 7/22/88 — Date

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CALC. NO. C-0031/7IR0

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PSEG CALCULATION COVER SHEET	TITLE Piping Code Compliance Documentation System P-201		SHEET 1 OF 1
	ID NUMBER C-31	REFERENCE (IF APPL.) None	
REVISION	P7I		
DCP NUMBER (If applicable)	4-EC-1021		
REVISION HISTORY (List calc status & sheets revised)	Added pages 1 thru 106 & Att I-VI Interim Revision per 4-EC-1021, CD-MOOX "Interim"		
FUTURE CONFIRMATION REQUIRED:	Yes		
ORIGINATOR (Initial & Date)	R. PACKER RGP 6/7/88 DJL 6/20/88 AM 07/22/88		
REVIEWER (Initial & Date)	Asher Leller ASM 6/22/88		
SUPERVISOR APPROVAL (Initial & Date)	Asher Leller ASM 7/22/88		
NUMBER PAGES (Cover Sheet)	One		
NUMBER PAGES (Calculation) (Excluding Attachments)	106		
NUMBER OF ATTACHMENTS/ TOTAL PAGES	6/ 424		
TOTAL PAGES	531		

IMPORTANT TO SAFETY [x] YES [ ] NO

IF YES, DESIGN VERIFICATION REQUIRED PER REFERENCE 5.3

ATTACHMENT 6
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MKT-D87.06M

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P-201 #1

CALCULATION CHANGE DOCUMENT

DC No. _____

Package No. _____

MD/CD No. _____
(Circle One)

Page No. 1 of 1

Rev. No. 0

AFFECTED DOCUMENT

Parent Calculation [x] C-31, Rev. 6

New Calculation [ ] _____, Rev. _____

EXPEDITED DCP

YES	NO		PARENT CALC.	INTERIM REVISION	
[ ]	[x]				
	[ ]	New Calculation		_____	(2)
	[x]	Interim Revision	6	P7I	
	[ ]	Eng. Assessment	_____		
[ ]		New Calculation		_____	(1 & 2)
[ ]		Interim Revision	_____	_____	(1)
[ ]		Eng. Assessment	_____	_____	

(1) To follow within 10 days
(2) New calculation number

REV NO	REVISION SUMMARY	ORIGINATOR (Initial & Date)	REVIEWER (Initial & Date	APPROVAL (Initial & Date
0	ORG. ISSUE	[illegible] 6/21/88	Asherdekar [illegible] 6/22/88	Asherdekar [illegible] 7/12/88

ATTACHMENT 6
PAGE 2 OF 2
CALC. NO. C-0031/7IRP

ATTACHMENT VII

MARK I SPECTRA AT SBP INTERFACE (SYSTEM P201, CALC. NO. C-31)

The acceleration response spectra were regenerated in order to obtain the spectra in magnetic media for use in the small bore piping (SBP) analysis (Project XPS-025). The QABI, CHUGI, and COI spectra were regenerated using the RESGEN and ENVELOP computer programs.

QABI:

Spectra were generated for the QABI (C3.2) load case. Spectra were generated for all the critical tuned frequency cases as in the large bore analysis (LBP). The spectra thus generated for each tuned frequency case were enveloped using the ENVELOP computer program. The output spectra of the ENVELOP run are in ready-to-use PISTAR computer program input format, for use in the SBP PISTAR analysis.

CHUGI, COI:

Spectra were regenerated for COI, and CHUGI cases also using the RESGEN computer program. Even though only one load case exists within these loads, the ENVELOP computer program was run for these loads also in order to obtain the spectra in the PISTAR input format, for use in the SBP analysis.

This attachment includes the following spectra for SBP analysis:

1. Enveloped spectra in PISTAR format for QABI (C3.2) load case. (Pg 2-15)
2. Response spectra in PISTAR format for the CHUGI load case. (Pg. 16-29)
3. Response spectra in PISTAR format for the COI load case. (Pg. 30-43)

REVISION P7T-1 PAGE 1/43
PREPARED BY AM 6/3/93
CHECKED BY [illegible] 6/3/93

Cover Page

QABT (C3.2)

NODE 54BR

REVISION P7I-1 PAGE 2/43
PREPARED BY AM 6/3/93
CHECKED BY Angsnlaydt 6/3/93

```
      program jvelop
c
c *-------------------------------------------------------------------*
c
c                 N U T E C H   E N G I N E E R S  --  Chicago
c
c                          JVELOP  Program
c
c                           Version 2.0.0
c
c                           April 16, 1991
c
c *-------------------------------------------------------------------*
c
c     This program computes an envolped response spectra from the
c     individual loadcase spectras created by RESGEN and outputs
c     the enveloped spectra in PISTAR format.
c
c     The program reads TAPE1 and TAPE2 data from a RESGEN response
c     spectra computation. TAPE1 contains the spectra control
c     parameters (for input to PLOTSC) and TAPE2 the individual load
c     spectras.
c
c
c     Variable definitions:
c
c         Tape01.dat Input
c
c          Name      Type      Definition
c          ----      ----     -----------------------
c          nspec     int    no. of spectras on tape02.dat
c          npoint    int    no. of frequency points/spectra
c          ntitle    int    no. of title cards on tape02.dat
c          node(i)   chr    PISTAR node id
c          idir(i)   chr    direction of spectra (X, Y, or Z)
c          type      chr    type of spectra (tran or rot)
c          icase     int    spectra load case no.
c
c         Tape02.dat Input
c
c          Name      Type      Definition
c          ----      ----     -----------------------
c          a(i,j)    real     spectra frequency amplitude pairs
c
c
c         Output
c
c               tape03.dat -- enveloped spectra in PISTAR format
c               tape04.dat -- enveloped spectra in RESGEN format
c               jvelop.out -- standard output file (text file)
c
c
c     Program Limitations:
c                        200 individual spectra
c                        500 frequencies/spectra
c
```

```
c
      character*5  node, idir, knode, kdir, lnode
      character*72 source, junk
      character*80 qablok
c
      dimension node(200), idir(200), knode(200), kdir(200), lnode(200)
      dimension a(200,1000), amp(200,500)
c
c
c                    Open input/output devices
c
      open ( unit= 1, file= 'tape01.dat', err= 801 )
      open ( unit= 2, file= 'tape02.dat', err= 802 )
      open ( unit= 3, file= 'tape03.dat', err= 803 )
      open ( unit= 4, file= 'tape04.dat', err= 804 )
      open ( unit= 5, file= 'jvelop.for', err= 805 )
      open ( unit= 6, file= 'jvelop.out', err= 806 )
      open ( unit= 7, file= 'qablok.dat', err= 807 )
c
c     write qablock to output file
c
      write(6, '(a1 /)' ) '1'
    1 read(7, 7001, end= 2 ) qablok
      write( 6, 7002 ) qablok
      go to 1
c
c     Echo program source file
c
    2 write( 6, 6001 )
      num = 0
    5    read( 5, 1001, end= 10 ) source
         num = num + 1
         if ( num .eq. 50) then
            write(6, '(a1 ///)' ) '1'
            num = 0
         end if
         write( 6, 6002 ) source
      go to 5
c
c     read and check tape1 input data
c
   10 read( 1, 1000 ) nspec, npoint, ntitle
      write(6, '(a1 ///)' ) '1'
      do 15 n = 1, ntitle + 5
         read( 1, 1001 ) junk
         if ( n .gt. 5) write( 6, 6002 ) junk
   15 continue
      if (nspec .gt. 200) then
          write(6, 6901) nspec
          go to 999
      endif
      if (npoint .gt. 500) then
          write(6, 6902) npoint
          go to 999
      endif
c
```

```
      write( 6, 6003 ) nspec, npoint
      np2 = npoint*2
      write(6, 6004)
      do 20 i = 1, nspec
         read( 1, 1002 ) node(i), idir(i), type, icase
         write(6, 6005 ) i, node(i), idir(i), type, icase
         if (i .gt. 50) write(6, '(a1 ///)' ) '1'
   20 continue
c
c     read spectra from tape2
c
      do 30 i = 1, nspec
         read( 2, 2001 ) ( a(i,j), j = 1, np2 )
         do 30 j = 1, npoint
            if ( a(i, j*2-1) .eq. a(1, j*2-1) ) go to 25
            write( 6, 6902 )
            go to 999
   25    continue
   30 continue
c
c     Identify Node/Direction Pairs
c
      k = 1
      knode(1) = node(1)
      kdir(1) = idir(1)
      do 40 i = 1, nspec
         do 35 kk = 1, k
            if (knode(kk) .eq. node(i) .and. kdir(kk) .eq. idir(i))
     +      go to 40
   35    continue
         k = k + 1
         knode(k) = node(i)
         kdir(k) = idir(i)
   40 continue
      kount = k
c
c     zero node/direction pair amplitudes
c
      do 50 k = 1, kount
         do 45 j = 1, npoint
            amp(k,j) = 0.0
   45    continue
   50 continue
c
c     envelope amplitudes for node/direction pairs
c
      do 70 i = 1, nspec
         do 65 k = 1, kount
            if (knode(k) .eq. node(i) .and. kdir(k) .eq. idir(i))
     +      go to 55
            go to 65
   55       continue
            do 60 j = 1, npoint
               if (a(i, j*2) .gt. amp(k, j)) amp(k, j)=a(i, j*2)
   60       continue
            go to 70
```

```
   65    continue
   70 continue
c
c     identify nodes
c
      l = 1
      lnode(1) = knode(1)
      do 80 k = 1, kount
         do 75 ll = 1, l
            if (lnode(ll) .eq. knode(k)) go to 80
   75    continue
         l = l + 1
         lnode(l) = knode(k)
   80 continue
      lount=l
c
c     write enveloped spectra to tape03.dat in PISTAR format
c                           and to tape04.dat in RESGEN format
c
      do 90 l = 1, lount
         write( 3, 3001 ) lnode(l)
         write( 3, 3002 )
         write( 3, 3003 )
         do 85 k = 1, kount
            if (lnode(l) .ne. knode(k)) go to 85
            write( 3, 3005 ) kdir(k), a(1, 1), amp(k, 1),
     +                       a(1, 3), amp(k, 2)
            write( 3, 3006 ) (a(1, j*2-1), amp(k, j), j = 3, npoint)
            write( 4, 4001 ) (a(1, j*2-1), amp(k, j), j = 1, npoint)
   85    continue
   90 continue
c
c
c     write enveloped spectra to output tape06.dat
c
c
      write(6, '(a1 /)' ) '1'
      do 100 l = 1, lount
         write( 6, 6006 ) lnode(l)
         write( 6, 6007 )
         write( 6, 6008 )
         do 95 k = 1, kount
            if (lnode(l) .ne. knode(k)) go to 95
            write( 6, 6009 ) kdir(k), a(1, 1), amp(k, 1),
     +                       a(1, 3), amp(k, 2)
            write( 6, 6010 ) (a(1, j*2-1), amp(k, j), j = 3, npoint)
   95    continue
  100 continue
      goto 999
c
c                    write error messages
c
  801 write(6, 6904) 'tape01.dat'
      stop
  802 write(6, 6904) 'tape02.dat'
      stop
```

```
  803 write(6, 6905) 'tape03.dat'
      stop
  804 write(6, 6905) 'tape04.dat'
      stop
  805 write(6, 6904) 'tape05.dat'
      stop
  806 write(6, 6905) 'tape06.dat'
      stop
  807 write(6, 6904) 'qablok.dat'
      stop
c
 1000 format(i5, 5x, 2i5)
 1001 format( a72 )
 1002 format(32x, a5, 2x, a1, 1x, a4, 6x, i2)
c
 2001 format(8f10.0)
c
 6001 format('1' /// 5x, 'ENVELOPE --- VERSION 1.0.0' //
     +       5x, 'SOURCE CODE' // )
 6002 format(5x, a72)
 6003 format(// 5x, 'NO. OF SPECTRA          = ', i3 /
     +       5x, 'NO. OF FREQUENCY POINTS = ', i3 / )
 6004 format(5x, 'SPECTRA', 25x, 'LOAD' / 4x, 'NO', 5x, 'NODE',
     +       3x, 'DIR', 4x, 'TYPE', 4x, 'CASE')
 6005 format(1x, i5, 5x, a5, 3x, a1, 5x, a4, 5x, i2)
 6006 format(// 5x, 'COMMENT', 3x, 'NODE = ', a5, 5x,
     +       'ACCELERATION SPECTRA')
 6007 format(5x, 'CASE', 6x, 'XXXXX')
 6008 format(5x, 'SEISMIC', 7x, '1', 10x, '386.4', 5x, '386.4',
     +       5x, '386.4', 7x, 'CSM', 7x, 'RSS')
 6009 format(5x, a1, '-SHOCK', 9x, 'FREQ', 5x, 'ACCEL', 4F10.3)
 6010 format(5x, 16x, 'FREQ', 5x, 'ACCEL', 4F10.3)
c
 3001 format(// 'COMMENT', 3x, 'NODE = ', a5, 5x,
     +       'ACCELERATION SPECTRA')
 3002 format('CASE', 6x, 'XXXXX')
 3003 format('SEISMIC', 7x, '1', 10x, '386.4', 5x, '386.4',
     +       5x, '386.4', 7x, 'CSM', 7x, 'RSS')
 3005 format( a1, '-SHOCK', 9x, 'FREQ', 5x, 'ACCEL', 4F10.3)
 3006 format( 16x, 'FREQ', 5x, 'ACCEL', 4F10.3)
c
 4001 format(8f10.3)
c
 6901 format(5x, 'ERROR...NSPEC = ', i5, ' > 200 (INTERNAL LIMIT)')
 6902 format(5x, 'ERROR...NPOINT = ', i5, ' > 70 (INTERNAL LIMIT)')
 6903 format(5x, 'ERROR...FREQUENCY POINTS NOT UNIFORM')
 6904 format(5x, 'ERROR...INPUT FILE -> ', a10, 'IS MISSING.' )
 6905 format(5x, 'ERROR...UNABLE TO OPEN OUTPUT FILE -> ', a10)
c
 7001 format( a80 )
 7002 format(10x, a80 )
  999 stop
      end
```

COMMENT NODE = 54BR ACCELERATION SPECTRA QASI
CASE XXXXX
SEISMIC 1
X-SHOCK

	386.4	386.4	386.4	CSM	RSS
FREQ	ACCEL	1.000	0.006	2.000	0.031
FREQ	ACCEL	3.000	0.072	4.000	0.122
FREQ	ACCEL	4.100	0.125	4.200	0.121
FREQ	ACCEL	4.300	0.135	4.400	0.145
FREQ	ACCEL	4.500	0.157	4.600	0.161
FREQ	ACCEL	4.700	0.155	4.800	0.141
FREQ	ACCEL	4.900	0.163	5.000	0.185
FREQ	ACCEL	5.100	0.199	5.200	0.204
FREQ	ACCEL	5.300	0.202	5.400	0.190
FREQ	ACCEL	5.500	0.218	5.600	0.246
FREQ	ACCEL	5.700	0.268	5.800	0.277
FREQ	ACCEL	5.900	0.272	6.000	0.269
FREQ	ACCEL	6.100	0.291	6.200	0.323
FREQ	ACCEL	6.300	0.344	6.400	0.347
FREQ	ACCEL	6.500	0.351	6.600	0.369
FREQ	ACCEL	6.700	0.378	6.800	0.400
FREQ	ACCEL	6.900	0.402	7.000	0.417
FREQ	ACCEL	7.100	0.455	7.200	0.474
FREQ	ACCEL	7.300	0.479	7.400	0.465
FREQ	ACCEL	7.500	0.505	7.600	0.548
FREQ	ACCEL	7.700	0.574	7.800	0.573
FREQ	ACCEL	7.900	0.555	8.000	0.613
FREQ	ACCEL	8.100	0.654	8.200	0.669
FREQ	ACCEL	8.300	0.650	8.400	0.674
FREQ	ACCEL	8.500	0.718	8.600	0.734
FREQ	ACCEL	8.700	0.758	8.800	0.803
FREQ	ACCEL	8.900	0.835	9.000	0.837
FREQ	ACCEL	9.100	0.884	9.200	0.956
FREQ	ACCEL	9.300	0.990	9.400	1.007
FREQ	ACCEL	9.500	1.045	9.600	1.116
FREQ	ACCEL	9.700	1.150	9.800	1.145
FREQ	ACCEL	9.900	1.214	10.000	1.273
FREQ	ACCEL	10.100	1.272	10.200	1.293
FREQ	ACCEL	10.300	1.351	10.400	1.347
FREQ	ACCEL	10.500	1.365	10.600	1.411
FREQ	ACCEL	10.700	1.514	10.800	1.628
FREQ	ACCEL	10.900	1.710	11.000	1.808
FREQ	ACCEL	11.100	1.932	11.200	2.054
FREQ	ACCEL	11.300	2.139	11.400	2.301
FREQ	ACCEL	11.500	2.412	11.600	2.498
FREQ	ACCEL	11.700	2.666	11.800	2.756
FREQ	ACCEL	11.900	2.840	12.000	2.988
FREQ	ACCEL	12.100	3.040	12.200	3.071
FREQ	ACCEL	12.300	3.151	12.400	3.136
FREQ	ACCEL	12.500	3.122	12.600	3.114
FREQ	ACCEL	12.700	3.046	12.800	2.960
FREQ	ACCEL	12.900	2.901	13.000	2.916
FREQ	ACCEL	13.100	3.040	13.200	3.298
FREQ	ACCEL	13.300	3.703	13.400	4.217
FREQ	ACCEL	13.500	4.829	13.600	5.482
FREQ	ACCEL	13.700	6.122	13.800	6.858

FREQ	ACCEL	13.900	7.621	14.000	8.324
FREQ	ACCEL	14.100	9.046	14.200	9.688
FREQ	ACCEL	14.300	10.370	14.400	11.020
FREQ	ACCEL	14.500	11.520	14.600	12.100
FREQ	ACCEL	14.700	12.780	14.800	13.710
FREQ	ACCEL	14.900	14.660	15.000	15.290
FREQ	ACCEL	15.100	15.810	15.200	16.060
FREQ	ACCEL	15.300	16.000	15.400	15.650
FREQ	ACCEL	15.500	15.240	15.600	14.780
FREQ	ACCEL	15.700	14.110	15.800	13.580
FREQ	ACCEL	15.900	12.930	16.000	12.270
FREQ	ACCEL	16.100	11.640	16.200	10.960
FREQ	ACCEL	16.300	10.250	16.400	9.518
FREQ	ACCEL	16.500	8.837	16.600	8.135
FREQ	ACCEL	16.700	7.487	16.800	6.818
FREQ	ACCEL	16.900	6.263	17.000	5.749
FREQ	ACCEL	17.100	5.312	17.200	4.883
FREQ	ACCEL	17.300	4.487	17.400	4.165
FREQ	ACCEL	17.500	3.886	17.600	3.681
FREQ	ACCEL	17.700	3.548	17.800	3.461
FREQ	ACCEL	17.900	3.402	18.000	3.349
FREQ	ACCEL	18.100	3.287	18.200	3.202
FREQ	ACCEL	18.300	3.133	18.400	3.074
FREQ	ACCEL	18.500	3.022	18.600	2.955
FREQ	ACCEL	18.700	2.885	18.800	2.798
FREQ	ACCEL	18.900	2.712	19.000	2.621
FREQ	ACCEL	19.100	2.526	19.200	2.433
FREQ	ACCEL	19.300	2.349	19.400	2.278
FREQ	ACCEL	19.500	2.225	19.600	2.194
FREQ	ACCEL	19.700	2.182	19.800	2.178
FREQ	ACCEL	19.900	2.177	20.000	2.173
FREQ	ACCEL	20.100	2.162	20.200	2.149
FREQ	ACCEL	20.300	2.130	20.400	2.101
FREQ	ACCEL	20.500	2.062	20.600	2.016
FREQ	ACCEL	20.700	1.966	20.800	1.916
FREQ	ACCEL	20.900	1.868	21.000	1.826
FREQ	ACCEL	21.100	1.802	21.200	1.775
FREQ	ACCEL	21.300	1.747	21.400	1.736
FREQ	ACCEL	21.500	1.730	21.600	1.727
FREQ	ACCEL	21.700	1.727	21.800	1.726
FREQ	ACCEL	21.900	1.724	22.000	1.722
FREQ	ACCEL	22.100	1.721	22.200	1.721
FREQ	ACCEL	22.300	1.722	22.400	1.726
FREQ	ACCEL	22.500	1.731	22.600	1.736
FREQ	ACCEL	22.700	1.740	22.800	1.739
FREQ	ACCEL	22.900	1.731	23.000	1.712
FREQ	ACCEL	23.100	1.680	23.200	1.668
FREQ	ACCEL	23.300	1.666	23.400	1.673
FREQ	ACCEL	23.500	1.662	23.600	1.645
FREQ	ACCEL	23.700	1.687	23.800	1.715
FREQ	ACCEL	23.900	1.760	24.000	1.788
FREQ	ACCEL	24.100	1.792	24.200	1.768
FREQ	ACCEL	24.300	1.827	24.400	1.882
FREQ	ACCEL	24.500	1.932	24.600	1.998
FREQ	ACCEL	24.700	2.041	24.800	2.060
FREQ	ACCEL	24.900	2.103	25.000	2.169

	FREQ	ACCEL	25.100	2.230	25.200	2.302
	FREQ	ACCEL	25.300	2.374	25.400	2.498
	FREQ	ACCEL	25.500	2.585	25.600	2.632
	FREQ	ACCEL	25.700	2.674	25.800	2.760
	FREQ	ACCEL	25.900	2.806	26.000	2.809
	FREQ	ACCEL	26.100	2.799	26.200	2.850
	FREQ	ACCEL	26.300	2.873	26.400	2.893
	FREQ	ACCEL	26.500	2.952	26.600	2.973
	FREQ	ACCEL	26.700	3.073	26.800	3.117
	FREQ	ACCEL	26.900	3.120	27.000	3.130
	FREQ	ACCEL	27.100	3.154	27.200	3.141
	FREQ	ACCEL	27.300	3.139	27.400	3.155
	FREQ	ACCEL	27.500	3.146	27.600	3.141
	FREQ	ACCEL	27.700	3.178	27.800	3.182
	FREQ	ACCEL	27.900	3.172	28.000	3.205
	FREQ	ACCEL	28.100	3.258	28.200	3.273
	FREQ	ACCEL	28.300	3.249	28.400	3.188
	FREQ	ACCEL	28.500	3.193	28.600	3.195
	FREQ	ACCEL	28.700	3.160	28.800	3.090
	FREQ	ACCEL	28.900	3.066	29.000	3.008
	FREQ	ACCEL	29.100	2.902	29.200	2.869
	FREQ	ACCEL	29.300	2.811	29.400	2.709
	FREQ	ACCEL	29.500	2.569	29.600	2.462
	FREQ	ACCEL	29.700	2.365	29.800	2.236
	FREQ	ACCEL	29.900	2.128	30.000	2.063
	FREQ	ACCEL	31.000	1.425	32.000	1.301
	FREQ	ACCEL	33.000	1.159	34.000	1.158
	FREQ	ACCEL	35.000	1.109	36.000	1.072
	FREQ	ACCEL	37.000	1.144	38.000	1.038
	FREQ	ACCEL	39.000	1.059	40.000	0.990
	FREQ	ACCEL	41.000	1.063	42.000	1.039
	FREQ	ACCEL	43.000	0.995	44.000	1.008
	FREQ	ACCEL	45.000	1.001	46.000	0.992
	FREQ	ACCEL	47.000	1.011	48.000	0.933
	FREQ	ACCEL	49.000	1.008	50.000	1.016
	FREQ	ACCEL	51.000	0.953	52.000	0.993
	FREQ	ACCEL	53.000	0.922	54.000	1.028
	FREQ	ACCEL	55.000	0.958	56.000	0.950
	FREQ	ACCEL	57.000	0.992	58.000	0.928
	FREQ	ACCEL	59.000	0.962	60.000	0.904
Y-SHOCK	FREQ	ACCEL	1.000	0.000	2.000	0.001
	FREQ	ACCEL	3.000	0.003	4.000	0.005
	FREQ	ACCEL	4.100	0.005	4.200	0.005
	FREQ	ACCEL	4.300	0.006	4.400	0.006
	FREQ	ACCEL	4.500	0.007	4.600	0.007
	FREQ	ACCEL	4.700	0.008	4.800	0.008
	FREQ	ACCEL	4.900	0.009	5.000	0.010
	FREQ	ACCEL	5.100	0.011	5.200	0.011
	FREQ	ACCEL	5.300	0.012	5.400	0.014
	FREQ	ACCEL	5.500	0.016	5.600	0.017
	FREQ	ACCEL	5.700	0.019	5.800	0.022
	FREQ	ACCEL	5.900	0.024	6.000	0.027
	FREQ	ACCEL	6.100	0.031	6.200	0.034
	FREQ	ACCEL	6.300	0.038	6.400	0.043
	FREQ	ACCEL	6.500	0.048	6.600	0.051
	FREQ	ACCEL	6.700	0.051	6.800	0.048

FREQ	ACCEL	6.900	0.042	7.000	0.036
FREQ	ACCEL	7.100	0.028	7.200	0.024
FREQ	ACCEL	7.300	0.023	7.400	0.024
FREQ	ACCEL	7.500	0.025	7.600	0.025
FREQ	ACCEL	7.700	0.026	7.800	0.026
FREQ	ACCEL	7.900	0.027	8.000	0.027
FREQ	ACCEL	8.100	0.028	8.200	0.028
FREQ	ACCEL	8.300	0.028	8.400	0.028
FREQ	ACCEL	8.500	0.029	8.600	0.030
FREQ	ACCEL	8.700	0.032	8.800	0.033
FREQ	ACCEL	8.900	0.035	9.000	0.037
FREQ	ACCEL	9.100	0.038	9.200	0.040
FREQ	ACCEL	9.300	0.042	9.400	0.044
FREQ	ACCEL	9.500	0.046	9.600	0.048
FREQ	ACCEL	9.700	0.049	9.800	0.051
FREQ	ACCEL	9.900	0.053	10.000	0.056
FREQ	ACCEL	10.100	0.058	10.200	0.060
FREQ	ACCEL	10.300	0.063	10.400	0.067
FREQ	ACCEL	10.500	0.071	10.600	0.075
FREQ	ACCEL	10.700	0.080	10.800	0.084
FREQ	ACCEL	10.900	0.088	11.000	0.092
FREQ	ACCEL	11.100	0.096	11.200	0.100
FREQ	ACCEL	11.300	0.104	11.400	0.107
FREQ	ACCEL	11.500	0.113	11.600	0.121
FREQ	ACCEL	11.700	0.129	11.800	0.137
FREQ	ACCEL	11.900	0.146	12.000	0.155
FREQ	ACCEL	12.100	0.163	12.200	0.172
FREQ	ACCEL	12.300	0.181	12.400	0.189
FREQ	ACCEL	12.500	0.196	12.600	0.203
FREQ	ACCEL	12.700	0.210	12.800	0.217
FREQ	ACCEL	12.900	0.225	13.000	0.232
FREQ	ACCEL	13.100	0.240	13.200	0.248
FREQ	ACCEL	13.300	0.259	13.400	0.277
FREQ	ACCEL	13.500	0.299	13.600	0.319
FREQ	ACCEL	13.700	0.336	13.800	0.351
FREQ	ACCEL	13.900	0.367	14.000	0.383
FREQ	ACCEL	14.100	0.396	14.200	0.405
FREQ	ACCEL	14.300	0.423	14.400	0.445
FREQ	ACCEL	14.500	0.467	14.600	0.491
FREQ	ACCEL	14.700	0.516	14.800	0.541
FREQ	ACCEL	14.900	0.555	15.000	0.573
FREQ	ACCEL	15.100	0.584	15.200	0.592
FREQ	ACCEL	15.300	0.598	15.400	0.596
FREQ	ACCEL	15.500	0.586	15.600	0.572
FREQ	ACCEL	15.700	0.552	15.800	0.530
FREQ	ACCEL	15.900	0.501	16.000	0.469
FREQ	ACCEL	16.100	0.446	16.200	0.422
FREQ	ACCEL	16.300	0.407	16.400	0.404
FREQ	ACCEL	16.500	0.398	16.600	0.390
FREQ	ACCEL	16.700	0.381	16.800	0.373
FREQ	ACCEL	16.900	0.366	17.000	0.357
FREQ	ACCEL	17.100	0.347	17.200	0.336
FREQ	ACCEL	17.300	0.324	17.400	0.311
FREQ	ACCEL	17.500	0.298	17.600	0.284
FREQ	ACCEL	17.700	0.271	17.800	0.258
FREQ	ACCEL	17.900	0.248	18.000	0.246

FREQ	ACCEL	18.100	0.244	18.200	0.242
FREQ	ACCEL	18.300	0.239	18.400	0.235
FREQ	ACCEL	18.500	0.232	18.600	0.228
FREQ	ACCEL	18.700	0.224	18.800	0.219
FREQ	ACCEL	18.900	0.215	19.000	0.211
FREQ	ACCEL	19.100	0.207	19.200	0.203
FREQ	ACCEL	19.300	0.200	19.400	0.198
FREQ	ACCEL	19.500	0.196	19.600	0.199
FREQ	ACCEL	19.700	0.203	19.800	0.208
FREQ	ACCEL	19.900	0.212	20.000	0.215
FREQ	ACCEL	20.100	0.219	20.200	0.222
FREQ	ACCEL	20.300	0.225	20.400	0.227
FREQ	ACCEL	20.500	0.228	20.600	0.230
FREQ	ACCEL	20.700	0.231	20.800	0.232
FREQ	ACCEL	20.900	0.233	21.000	0.234
FREQ	ACCEL	21.100	0.237	21.200	0.241
FREQ	ACCEL	21.300	0.246	21.400	0.254
FREQ	ACCEL	21.500	0.262	21.600	0.271
FREQ	ACCEL	21.700	0.285	21.800	0.300
FREQ	ACCEL	21.900	0.317	22.000	0.336
FREQ	ACCEL	22.100	0.356	22.200	0.377
FREQ	ACCEL	22.300	0.399	22.400	0.422
FREQ	ACCEL	22.500	0.445	22.600	0.468
FREQ	ACCEL	22.700	0.491	22.800	0.513
FREQ	ACCEL	22.900	0.534	23.000	0.559
FREQ	ACCEL	23.100	0.588	23.200	0.616
FREQ	ACCEL	23.300	0.642	23.400	0.669
FREQ	ACCEL	23.500	0.716	23.600	0.761
FREQ	ACCEL	23.700	0.800	23.800	0.834
FREQ	ACCEL	23.900	0.869	24.000	0.921
FREQ	ACCEL	24.100	0.966	24.200	1.002
FREQ	ACCEL	24.300	1.033	24.400	1.086
FREQ	ACCEL	24.500	1.127	24.600	1.160
FREQ	ACCEL	24.700	1.211	24.800	1.242
FREQ	ACCEL	24.900	1.279	25.000	1.318
FREQ	ACCEL	25.100	1.343	25.200	1.371
FREQ	ACCEL	25.300	1.395	25.400	1.443
FREQ	ACCEL	25.500	1.470	25.600	1.493
FREQ	ACCEL	25.700	1.507	25.800	1.526
FREQ	ACCEL	25.900	1.542	26.000	1.539
FREQ	ACCEL	26.100	1.536	26.200	1.530
FREQ	ACCEL	26.300	1.514	26.400	1.520
FREQ	ACCEL	26.500	1.526	26.600	1.517
FREQ	ACCEL	26.700	1.495	26.800	1.460
FREQ	ACCEL	26.900	1.452	27.000	1.452
FREQ	ACCEL	27.100	1.442	27.200	1.424
FREQ	ACCEL	27.300	1.399	27.400	1.373
FREQ	ACCEL	27.500	1.362	27.600	1.346
FREQ	ACCEL	27.700	1.326	27.800	1.322
FREQ	ACCEL	27.900	1.337	28.000	1.348
FREQ	ACCEL	28.100	1.356	28.200	1.360
FREQ	ACCEL	28.300	1.359	28.400	1.353
FREQ	ACCEL	28.500	1.341	28.600	1.342
FREQ	ACCEL	28.700	1.365	28.800	1.382
FREQ	ACCEL	28.900	1.392	29.000	1.394
FREQ	ACCEL	29.100	1.386	29.200	1.369

	FREQ	ACCEL	29.300	1.349	29.400	1.364
	FREQ	ACCEL	29.500	1.369	29.600	1.362
	FREQ	ACCEL	29.700	1.342	29.800	1.310
	FREQ	ACCEL	29.900	1.287	30.000	1.275
	FREQ	ACCEL	31.000	1.024	32.000	0.731
	FREQ	ACCEL	33.000	0.739	34.000	0.826
	FREQ	ACCEL	35.000	0.943	36.000	1.033
	FREQ	ACCEL	37.000	1.057	38.000	1.086
	FREQ	ACCEL	39.000	1.101	40.000	1.104
	FREQ	ACCEL	41.000	1.022	42.000	0.984
	FREQ	ACCEL	43.000	0.923	44.000	0.948
	FREQ	ACCEL	45.000	0.917	46.000	0.820
	FREQ	ACCEL	47.000	0.766	48.000	0.730
	FREQ	ACCEL	49.000	0.854	50.000	0.915
	FREQ	ACCEL	51.000	0.918	52.000	0.868
	FREQ	ACCEL	53.000	0.804	54.000	0.800
	FREQ	ACCEL	55.000	0.740	56.000	0.721
	FREQ	ACCEL	57.000	0.674	58.000	0.622
	FREQ	ACCEL	59.000	0.660	60.000	0.636
Z-SHOCK	FREQ	ACCEL	1.000	0.001	2.000	0.004
	FREQ	ACCEL	3.000	0.009	4.000	0.016
	FREQ	ACCEL	4.100	0.016	4.200	0.017
	FREQ	ACCEL	4.300	0.018	4.400	0.019
	FREQ	ACCEL	4.500	0.020	4.600	0.021
	FREQ	ACCEL	4.700	0.021	4.800	0.019
	FREQ	ACCEL	4.900	0.022	5.000	0.025
	FREQ	ACCEL	5.100	0.026	5.200	0.026
	FREQ	ACCEL	5.300	0.025	5.400	0.026
	FREQ	ACCEL	5.500	0.028	5.600	0.031
	FREQ	ACCEL	5.700	0.033	5.800	0.033
	FREQ	ACCEL	5.900	0.034	6.000	0.036
	FREQ	ACCEL	6.100	0.038	6.200	0.039
	FREQ	ACCEL	6.300	0.041	6.400	0.043
	FREQ	ACCEL	6.500	0.045	6.600	0.046
	FREQ	ACCEL	6.700	0.048	6.800	0.050
	FREQ	ACCEL	6.900	0.052	7.000	0.054
	FREQ	ACCEL	7.100	0.056	7.200	0.058
	FREQ	ACCEL	7.300	0.060	7.400	0.062
	FREQ	ACCEL	7.500	0.063	7.600	0.065
	FREQ	ACCEL	7.700	0.067	7.800	0.069
	FREQ	ACCEL	7.900	0.071	8.000	0.073
	FREQ	ACCEL	8.100	0.076	8.200	0.077
	FREQ	ACCEL	8.300	0.079	8.400	0.083
	FREQ	ACCEL	8.500	0.088	8.600	0.088
	FREQ	ACCEL	8.700	0.091	8.800	0.095
	FREQ	ACCEL	8.900	0.098	9.000	0.101
	FREQ	ACCEL	9.100	0.106	9.200	0.111
	FREQ	ACCEL	9.300	0.115	9.400	0.119
	FREQ	ACCEL	9.500	0.123	9.600	0.127
	FREQ	ACCEL	9.700	0.131	9.800	0.136
	FREQ	ACCEL	9.900	0.141	10.000	0.144
	FREQ	ACCEL	10.100	0.148	10.200	0.157
	FREQ	ACCEL	10.300	0.160	10.400	0.166
	FREQ	ACCEL	10.500	0.171	10.600	0.178
	FREQ	ACCEL	10.700	0.185	10.800	0.191
	FREQ	ACCEL	10.900	0.198	11.000	0.207

FREQ	ACCEL	11.100	0.213	11.200	0.226
FREQ	ACCEL	11.300	0.237	11.400	0.241
FREQ	ACCEL	11.500	0.255	11.600	0.264
FREQ	ACCEL	11.700	0.276	11.800	0.289
FREQ	ACCEL	11.900	0.300	12.000	0.313
FREQ	ACCEL	12.100	0.328	12.200	0.342
FREQ	ACCEL	12.300	0.359	12.400	0.383
FREQ	ACCEL	12.500	0.404	12.600	0.423
FREQ	ACCEL	12.700	0.444	12.800	0.471
FREQ	ACCEL	12.900	0.497	13.000	0.530
FREQ	ACCEL	13.100	0.555	13.200	0.596
FREQ	ACCEL	13.300	0.627	13.400	0.675
FREQ	ACCEL	13.500	0.719	13.600	0.766
FREQ	ACCEL	13.700	0.813	13.800	0.868
FREQ	ACCEL	13.900	0.926	14.000	0.990
FREQ	ACCEL	14.100	1.052	14.200	1.119
FREQ	ACCEL	14.300	1.193	14.400	1.275
FREQ	ACCEL	14.500	1.356	14.600	1.446
FREQ	ACCEL	14.700	1.535	14.800	1.618
FREQ	ACCEL	14.900	1.708	15.000	1.788
FREQ	ACCEL	15.100	1.842	15.200	1.903
FREQ	ACCEL	15.300	1.944	15.400	1.960
FREQ	ACCEL	15.500	1.954	15.600	1.932
FREQ	ACCEL	15.700	1.905	15.800	1.857
FREQ	ACCEL	15.900	1.805	16.000	1.739
FREQ	ACCEL	16.100	1.660	16.200	1.579
FREQ	ACCEL	16.300	1.490	16.400	1.401
FREQ	ACCEL	16.500	1.309	16.600	1.213
FREQ	ACCEL	16.700	1.127	16.800	1.041
FREQ	ACCEL	16.900	0.961	17.000	0.882
FREQ	ACCEL	17.100	0.808	17.200	0.745
FREQ	ACCEL	17.300	0.680	17.400	0.620
FREQ	ACCEL	17.500	0.567	17.600	0.521
FREQ	ACCEL	17.700	0.480	17.800	0.442
FREQ	ACCEL	17.900	0.416	18.000	0.412
FREQ	ACCEL	18.100	0.408	18.200	0.402
FREQ	ACCEL	18.300	0.395	18.400	0.389
FREQ	ACCEL	18.500	0.382	18.600	0.374
FREQ	ACCEL	18.700	0.363	18.800	0.350
FREQ	ACCEL	18.900	0.337	19.000	0.326
FREQ	ACCEL	19.100	0.317	19.200	0.310
FREQ	ACCEL	19.300	0.307	19.400	0.306
FREQ	ACCEL	19.500	0.306	19.600	0.306
FREQ	ACCEL	19.700	0.306	19.800	0.303
FREQ	ACCEL	19.900	0.299	20.000	0.295
FREQ	ACCEL	20.100	0.293	20.200	0.287
FREQ	ACCEL	20.300	0.286	20.400	0.284
FREQ	ACCEL	20.500	0.279	20.600	0.271
FREQ	ACCEL	20.700	0.266	20.800	0.259
FREQ	ACCEL	20.900	0.252	21.000	0.243
FREQ	ACCEL	21.100	0.237	21.200	0.232
FREQ	ACCEL	21.300	0.233	21.400	0.236
FREQ	ACCEL	21.500	0.236	21.600	0.233
FREQ	ACCEL	21.700	0.230	21.800	0.226
FREQ	ACCEL	21.900	0.224	22.000	0.222
FREQ	ACCEL	22.100	0.225	22.200	0.224

FREQ	ACCEL	22.300	0.221	22.400	0.215
FREQ	ACCEL	22.500	0.209	22.600	0.203
FREQ	ACCEL	22.700	0.197	22.800	0.195
FREQ	ACCEL	22.900	0.196	23.000	0.196
FREQ	ACCEL	23.100	0.202	23.200	0.207
FREQ	ACCEL	23.300	0.216	23.400	0.227
FREQ	ACCEL	23.500	0.240	23.600	0.251
FREQ	ACCEL	23.700	0.259	23.800	0.262
FREQ	ACCEL	23.900	0.267	24.000	0.276
FREQ	ACCEL	24.100	0.283	24.200	0.291
FREQ	ACCEL	24.300	0.294	24.400	0.292
FREQ	ACCEL	24.500	0.297	24.600	0.299
FREQ	ACCEL	24.700	0.304	24.800	0.313
FREQ	ACCEL	24.900	0.319	25.000	0.324
FREQ	ACCEL	25.100	0.327	25.200	0.333
FREQ	ACCEL	25.300	0.342	25.400	0.348
FREQ	ACCEL	25.500	0.351	25.600	0.351
FREQ	ACCEL	25.700	0.350	25.800	0.358
FREQ	ACCEL	25.900	0.360	26.000	0.359
FREQ	ACCEL	26.100	0.358	26.200	0.364
FREQ	ACCEL	26.300	0.381	26.400	0.399
FREQ	ACCEL	26.500	0.412	26.600	0.426
FREQ	ACCEL	26.700	0.435	26.800	0.439
FREQ	ACCEL	26.900	0.435	27.000	0.434
FREQ	ACCEL	27.100	0.429	27.200	0.416
FREQ	ACCEL	27.300	0.409	27.400	0.398
FREQ	ACCEL	27.500	0.391	27.600	0.380
FREQ	ACCEL	27.700	0.363	27.800	0.352
FREQ	ACCEL	27.900	0.338	28.000	0.318
FREQ	ACCEL	28.100	0.303	28.200	0.287
FREQ	ACCEL	28.300	0.268	28.400	0.247
FREQ	ACCEL	28.500	0.245	28.600	0.245
FREQ	ACCEL	28.700	0.244	28.800	0.243
FREQ	ACCEL	28.900	0.241	29.000	0.238
FREQ	ACCEL	29.100	0.235	29.200	0.231
FREQ	ACCEL	29.300	0.227	29.400	0.224
FREQ	ACCEL	29.500	0.223	29.600	0.222
FREQ	ACCEL	29.700	0.220	29.800	0.218
FREQ	ACCEL	29.900	0.215	30.000	0.212
FREQ	ACCEL	31.000	0.246	32.000	0.329
FREQ	ACCEL	33.000	0.331	34.000	0.384
FREQ	ACCEL	35.000	0.487	36.000	0.667
FREQ	ACCEL	37.000	1.045	38.000	1.253
FREQ	ACCEL	39.000	1.093	40.000	0.889
FREQ	ACCEL	41.000	0.656	42.000	0.496
FREQ	ACCEL	43.000	0.378	44.000	0.312
FREQ	ACCEL	45.000	0.258	46.000	0.235
FREQ	ACCEL	47.000	0.254	48.000	0.303
FREQ	ACCEL	49.000	0.350	50.000	0.393
FREQ	ACCEL	51.000	0.454	52.000	0.443
FREQ	ACCEL	53.000	0.429	54.000	0.379
FREQ	ACCEL	55.000	0.342	56.000	0.332
FREQ	ACCEL	57.000	0.318	58.000	0.301
FREQ	ACCEL	59.000	0.325	60.000	0.338

COVER PAGE

CHUGI

NODE 54BR

REVISION P7I-1 PAGE 16/43
PREPARED BY AM 6/3/93
CHECKED BY [illegible]
6/3/93

```
      program jvelop
c
c *-------------------------------------------------------------------*
c
c                 N U T E C H   E N G I N E E R S  --  Chicago
c
c                         JVELOP  Program
c
c                          Version 2.0.0
c
c                          April 16, 1991
c
c *-------------------------------------------------------------------*
c
c     This program computes an envolped response spectra from the
c     individual loadcase spectras created by RESGEN and outputs
c     the enveloped spectra in PISTAR format.
c
c     The program reads TAPE1 and TAPE2 data from a RESGEN response
c     spectra computation. TAPE1 contains the spectra control
c     parameters (for input to PLOTSC) and TAPE2 the individual load
c     spectras.
c
c
c     Variable definitions:
c
c         Tape01.dat Input
c
c          Name      Type      Definition
c          ----      ----     ----------------------
c          nspec     int    no. of spectras on tape02.dat
c          npoint    int    no. of frequency points/spectra
c          ntitle    int    no. of title cards on tape02.dat
c          node(i)   chr    PISTAR node id
c          idir(i)   chr    direction of spectra (X, Y, or Z)
c          type      chr    type of spectra (tran or rot)
c          icase     int    spectra load case no.
c
c         Tape02.dat Input
c
c          Name      Type      Definition
c          ----      ----     ----------------------
c          a(i,j)    real     spectra frequency amplitude pairs
c
c
c         Output
c
c               tape03.dat -- enveloped spectra in PISTAR format
c               tape04.dat -- enveloped spectra in RESGEN format
c               jvelop.out -- standard output file (text file)
c
c
c     Program Limitations:
c                         200 individual spectra
c                         500 frequencies/spectra
c
```

```
c
      character*5  node, idir, knode, kdir, lnode
      character*72 source, junk
      character*80 qablok
c
      dimension node(200), idir(200), knode(200), kdir(200), lnode(200)
      dimension a(200,1000), amp(200,500)
c
c
c                    Open input/output devices
c
      open ( unit= 1, file= 'tape01.dat', err= 801 )
      open ( unit= 2, file= 'tape02.dat', err= 802 )
      open ( unit= 3, file= 'tape03.dat', err= 803 )
      open ( unit= 4, file= 'tape04.dat', err= 804 )
      open ( unit= 5, file= 'jvelop.for', err= 805 )
      open ( unit= 6, file= 'jvelop.out', err= 806 )
      open ( unit= 7, file= 'qablok.dat', err= 807 )
c
c     write qablock to output file
c
      write(6, '(a1 /)' ) '1'
    1 read(7, 7001, end= 2 ) qablok
      write( 6, 7002 ) qablok
      go to 1
c
c     Echo program source file
c
    2 write( 6, 6001 )
      num = 0
    5    read( 5, 1001, end= 10 ) source
         num = num + 1
         if ( num .eq. 50) then
            write(6, '(a1 ///)' ) '1'
            num = 0
         end if
         write( 6, 6002 ) source
      go to 5
c
c     read and check tape1 input data
c
   10 read( 1, 1000 ) nspec, npoint, ntitle
      write(6, '(a1 ///)' ) '1'
      do 15 n = 1, ntitle + 5
         read( 1, 1001 ) junk
         if ( n .gt. 5) write( 6, 6002 ) junk
   15 continue
      if (nspec .gt. 200) then
          write(6, 6901) nspec
          go to 999
      endif
      if (npoint .gt. 500) then
          write(6, 6902) npoint
          go to 999
      endif
c
```

```
      write( 6, 6003 ) nspec, npoint
      np2 = npoint*2
      write(6, 6004)
      do 20 i = 1, nspec
         read( 1, 1002 ) node(i), idir(i), type, icase
         write(6, 6005 ) i, node(i), idir(i), type, icase
         if (i .gt. 50) write(6, '(a1 ///)' ) '1'
   20 continue
c
c     read spectra from tape2
c
      do 30 i = 1, nspec
         read( 2, 2001 ) ( a(i,j), j = 1, np2 )
         do 30 j = 1, npoint
            if ( a(i, j*2-1) .eq. a(1, j*2-1) ) go to 25
            write( 6, 6902 )
            go to 999
   25    continue
   30 continue
c
c     Identify Node/Direction Pairs
c
      k = 1
      knode(1) = node(1)
      kdir(1) = idir(1)
      do 40 i = 1, nspec
         do 35 kk = 1, k
            if (knode(kk) .eq. node(i) .and. kdir(kk) .eq. idir(i))
     +      go to 40
   35    continue
         k = k + 1
         knode(k) = node(i)
         kdir(k) = idir(i)
   40 continue
      kount = k
c
c     zero node/direction pair amplitudes
c
      do 50 k = 1, kount
         do 45 j = 1, npoint
            amp(k,j) = 0.0
   45    continue
   50 continue
c
c     envelope amplitudes for node/direction pairs
c
      do 70 i = 1, nspec
         do 65 k = 1, kount
            if (knode(k) .eq. node(i) .and. kdir(k) .eq. idir(i))
     +      go to 55
            go to 65
   55       continue
            do 60 j = 1, npoint
               if (a(i, j*2) .gt. amp(k, j)) amp(k, j)=a(i, j*2)
   60       continue
            go to 70
```

```
   65    continue
   70 continue
c
c     identify nodes
c
      l = 1
      lnode(1) = knode(1)
      do 80 k = 1, kount
         do 75 ll = 1, l
            if (lnode(ll) .eq. knode(k)) go to 80
   75    continue
         l = l + 1
         lnode(l) = knode(k)
   80 continue
      lount=l
c
c     write enveloped spectra to tape03.dat in PISTAR format
c                           and to tape04.dat in RESGEN format
c
      do 90 l = 1, lount
         write( 3, 3001 ) lnode(l)
         write( 3, 3002 )
         write( 3, 3003 )
         do 85 k = 1, kount
            if (lnode(l) .ne. knode(k)) go to 85
            write( 3, 3005 ) kdir(k), a(1, 1), amp(k, 1),
     +                       a(1, 3), amp(k, 2)
            write( 3, 3006 ) (a(1, j*2-1), amp(k, j), j = 3, npoint)
            write( 4, 4001 ) (a(1, j*2-1), amp(k, j), j = 1, npoint)
   85    continue
   90 continue
c
c
c     write enveloped spectra to output tape06.dat
c
c
      write(6, '(a1 /)' ) '1'
      do 100 l = 1, lount
         write( 6, 6006 ) lnode(l)
         write( 6, 6007 )
         write( 6, 6008 )
         do 95 k = 1, kount
            if (lnode(l) .ne. knode(k)) go to 95
            write( 6, 6009 ) kdir(k), a(1, 1), amp(k, 1),
     +                       a(1, 3), amp(k, 2)
            write( 6, 6010 ) (a(1, j*2-1), amp(k, j), j = 3, npoint)
   95    continue
  100 continue
      goto 999
c
c                    write error messages
c
  801 write(6, 6904) 'tape01.dat'
      stop
  802 write(6, 6904) 'tape02.dat'
      stop
```

```
  803 write(6, 6905) 'tape03.dat'
      stop
  804 write(6, 6905) 'tape04.dat'
      stop
  805 write(6, 6904) 'tape05.dat'
      stop
  806 write(6, 6905) 'tape06.dat'
      stop
  807 write(6, 6904) 'qablok.dat'
      stop
c
 1000 format(i5, 5x, 2i5)
 1001 format( a72 )
 1002 format(32x, a5, 2x, a1, 1x, a4, 6x, i2)
c
 2001 format(8f10.0)
c
 6001 format('1' /// 5x, 'ENVELOPE --- VERSION 1.0.0' //
     +       5x, 'SOURCE CODE' // )
 6002 format(5x, a72)
 6003 format(// 5x, 'NO. OF SPECTRA          = ', i3 /
     +       5x, 'NO. OF FREQUENCY POINTS = ', i3 / )
 6004 format(5x, 'SPECTRA', 25x, 'LOAD' / 4x, 'NO', 5x, 'NODE',
     +       3x, 'DIR', 4x, 'TYPE', 4x, 'CASE')
 6005 format(1x, i5, 5x, a5, 3x, a1, 5x, a4, 5x, i2)
 6006 format(// 5x, 'COMMENT', 3x, 'NODE = ', a5, 5x,
     +       'ACCELERATION SPECTRA')
 6007 format(5x, 'CASE', 6x, 'XXXXX')
 6008 format(5x, 'SEISMIC', 7x, '1', 10x, '386.4', 5x, '386.4',
     +       5x, '386.4', 7x, 'CSM', 7x, 'RSS')
 6009 format(5x, a1, '-SHOCK', 9x, 'FREQ', 5x, 'ACCEL', 4F10.3)
 6010 format(5x, 16x, 'FREQ', 5x, 'ACCEL', 4F10.3)
c
 3001 format(// 'COMMENT', 3x, 'NODE = ', a5, 5x,
     +       'ACCELERATION SPECTRA')
 3002 format('CASE', 6x, 'XXXXX')
 3003 format('SEISMIC', 7x, '1', 10x, '386.4', 5x, '386.4',
     +       5x, '386.4', 7x, 'CSM', 7x, 'RSS')
 3005 format( a1, '-SHOCK', 9x, 'FREQ', 5x, 'ACCEL', 4F10.3)
 3006 format( 16x, 'FREQ', 5x, 'ACCEL', 4F10.3)
c
 4001 format(8f10.3)
c
 6901 format(5x, 'ERROR...NSPEC = ', i5, ' > 200 (INTERNAL LIMIT)')
 6902 format(5x, 'ERROR...NPOINT = ', i5, ' > 70 (INTERNAL LIMIT)')
 6903 format(5x, 'ERROR...FREQUENCY POINTS NOT UNIFORM')
 6904 format(5x, 'ERROR...INPUT FILE -> ', a10, 'IS MISSING.' )
 6905 format(5x, 'ERROR...UNABLE TO OPEN OUTPUT FILE -> ', a10)
c
 7001 format( a80 )
 7002 format(10x, a80 )
  999 stop
      end
```

COMMENT NODE = 54BR ACCELERATION SPECTRA CHUGI
CASE XXXXX
SEISMIC 1
X-SHOCK

		386.4	386.4	386.4	CSM	RSS
	FREQ	ACCEL	1.000	0.003	2.000	0.005
	FREQ	ACCEL	3.000	0.008	4.000	0.011
	FREQ	ACCEL	4.100	0.012	4.200	0.012
	FREQ	ACCEL	4.300	0.012	4.400	0.012
	FREQ	ACCEL	4.500	0.013	4.600	0.013
	FREQ	ACCEL	4.700	0.014	4.800	0.014
	FREQ	ACCEL	4.900	0.015	5.000	0.015
	FREQ	ACCEL	5.100	0.016	5.200	0.016
	FREQ	ACCEL	5.300	0.017	5.400	0.017
	FREQ	ACCEL	5.500	0.018	5.600	0.019
	FREQ	ACCEL	5.700	0.019	5.800	0.020
	FREQ	ACCEL	5.900	0.020	6.000	0.021
	FREQ	ACCEL	6.100	0.022	6.200	0.022
	FREQ	ACCEL	6.300	0.023	6.400	0.023
	FREQ	ACCEL	6.500	0.024	6.600	0.025
	FREQ	ACCEL	6.700	0.025	6.800	0.026
	FREQ	ACCEL	6.900	0.027	7.000	0.027
	FREQ	ACCEL	7.100	0.028	7.200	0.029
	FREQ	ACCEL	7.300	0.030	7.400	0.030
	FREQ	ACCEL	7.500	0.031	7.600	0.032
	FREQ	ACCEL	7.700	0.032	7.800	0.033
	FREQ	ACCEL	7.900	0.034	8.000	0.035
	FREQ	ACCEL	8.100	0.035	8.200	0.036
	FREQ	ACCEL	8.300	0.037	8.400	0.038
	FREQ	ACCEL	8.500	0.038	8.600	0.039
	FREQ	ACCEL	8.700	0.040	8.800	0.041
	FREQ	ACCEL	8.900	0.041	9.000	0.042
	FREQ	ACCEL	9.100	0.043	9.200	0.044
	FREQ	ACCEL	9.300	0.044	9.400	0.045
	FREQ	ACCEL	9.500	0.046	9.600	0.047
	FREQ	ACCEL	9.700	0.047	9.800	0.048
	FREQ	ACCEL	9.900	0.049	10.000	0.050
	FREQ	ACCEL	10.100	0.050	10.200	0.051
	FREQ	ACCEL	10.300	0.052	10.400	0.052
	FREQ	ACCEL	10.500	0.053	10.600	0.054
	FREQ	ACCEL	10.700	0.055	10.800	0.055
	FREQ	ACCEL	10.900	0.056	11.000	0.057
	FREQ	ACCEL	11.100	0.058	11.200	0.058
	FREQ	ACCEL	11.300	0.060	11.400	0.062
	FREQ	ACCEL	11.500	0.064	11.600	0.066
	FREQ	ACCEL	11.700	0.067	11.800	0.069
	FREQ	ACCEL	11.900	0.071	12.000	0.073
	FREQ	ACCEL	12.100	0.075	12.200	0.077
	FREQ	ACCEL	12.300	0.079	12.400	0.080
	FREQ	ACCEL	12.500	0.081	12.600	0.082
	FREQ	ACCEL	12.700	0.083	12.800	0.084
	FREQ	ACCEL	12.900	0.087	13.000	0.089
	FREQ	ACCEL	13.100	0.099	13.200	0.105
	FREQ	ACCEL	13.300	0.111	13.400	0.115
	FREQ	ACCEL	13.500	0.116	13.600	0.115
	FREQ	ACCEL	13.700	0.115	13.800	0.111

FREQ	ACCEL	13.900	0.109	14.000	0.113
FREQ	ACCEL	14.100	0.114	14.200	0.118
FREQ	ACCEL	14.300	0.120	14.400	0.124
FREQ	ACCEL	14.500	0.127	14.600	0.129
FREQ	ACCEL	14.700	0.135	14.800	0.157
FREQ	ACCEL	14.900	0.175	15.000	0.189
FREQ	ACCEL	15.100	0.200	15.200	0.223
FREQ	ACCEL	15.300	0.241	15.400	0.255
FREQ	ACCEL	15.500	0.266	15.600	0.273
FREQ	ACCEL	15.700	0.278	15.800	0.275
FREQ	ACCEL	15.900	0.273	16.000	0.311
FREQ	ACCEL	16.100	0.323	16.200	0.315
FREQ	ACCEL	16.300	0.289	16.400	0.265
FREQ	ACCEL	16.500	0.243	16.600	0.220
FREQ	ACCEL	16.700	0.202	16.800	0.191
FREQ	ACCEL	16.900	0.190	17.000	0.194
FREQ	ACCEL	17.100	0.198	17.200	0.192
FREQ	ACCEL	17.300	0.181	17.400	0.167
FREQ	ACCEL	17.500	0.159	17.600	0.153
FREQ	ACCEL	17.700	0.155	17.800	0.157
FREQ	ACCEL	17.900	0.159	18.000	0.161
FREQ	ACCEL	18.100	0.162	18.200	0.164
FREQ	ACCEL	18.300	0.166	18.400	0.167
FREQ	ACCEL	18.500	0.169	18.600	0.170
FREQ	ACCEL	18.700	0.171	18.800	0.173
FREQ	ACCEL	18.900	0.176	19.000	0.178
FREQ	ACCEL	19.100	0.180	19.200	0.183
FREQ	ACCEL	19.300	0.185	19.400	0.187
FREQ	ACCEL	19.500	0.189	19.600	0.191
FREQ	ACCEL	19.700	0.193	19.800	0.195
FREQ	ACCEL	19.900	0.197	20.000	0.200
FREQ	ACCEL	20.100	0.204	20.200	0.208
FREQ	ACCEL	20.300	0.212	20.400	0.216
FREQ	ACCEL	20.500	0.220	20.600	0.224
FREQ	ACCEL	20.700	0.227	20.800	0.231
FREQ	ACCEL	20.900	0.234	21.000	0.237
FREQ	ACCEL	21.100	0.241	21.200	0.243
FREQ	ACCEL	21.300	0.246	21.400	0.249
FREQ	ACCEL	21.500	0.252	21.600	0.254
FREQ	ACCEL	21.700	0.256	21.800	0.258
FREQ	ACCEL	21.900	0.260	22.000	0.262
FREQ	ACCEL	22.100	0.266	22.200	0.271
FREQ	ACCEL	22.300	0.274	22.400	0.278
FREQ	ACCEL	22.500	0.282	22.600	0.285
FREQ	ACCEL	22.700	0.289	22.800	0.292
FREQ	ACCEL	22.900	0.296	23.000	0.300
FREQ	ACCEL	23.100	0.304	23.200	0.307
FREQ	ACCEL	23.300	0.310	23.400	0.318
FREQ	ACCEL	23.500	0.326	23.600	0.334
FREQ	ACCEL	23.700	0.341	23.800	0.349
FREQ	ACCEL	23.900	0.361	24.000	0.373
FREQ	ACCEL	24.100	0.385	24.200	0.395
FREQ	ACCEL	24.300	0.405	24.400	0.414
FREQ	ACCEL	24.500	0.423	24.600	0.437
FREQ	ACCEL	24.700	0.451	24.800	0.464
FREQ	ACCEL	24.900	0.476	25.000	0.487

	FREQ	ACCEL	25.100	0.496	25.200	0.509
	FREQ	ACCEL	25.300	0.519	25.400	0.531
	FREQ	ACCEL	25.500	0.531	25.600	0.545
	FREQ	ACCEL	25.700	0.558	25.800	0.571
	FREQ	ACCEL	25.900	0.581	26.000	0.591
	FREQ	ACCEL	26.100	0.601	26.200	0.618
	FREQ	ACCEL	26.300	0.676	26.400	0.714
	FREQ	ACCEL	26.500	0.720	26.600	0.707
	FREQ	ACCEL	26.700	0.703	26.800	0.738
	FREQ	ACCEL	26.900	0.831	27.000	0.978
	FREQ	ACCEL	27.100	1.153	27.200	1.308
	FREQ	ACCEL	27.300	1.483	27.400	1.612
	FREQ	ACCEL	27.500	1.652	27.600	1.665
	FREQ	ACCEL	27.700	1.622	27.800	1.541
	FREQ	ACCEL	27.900	1.410	28.000	1.288
	FREQ	ACCEL	28.100	1.184	28.200	1.133
	FREQ	ACCEL	28.300	1.144	28.400	1.184
	FREQ	ACCEL	28.500	1.285	28.600	1.361
	FREQ	ACCEL	28.700	1.379	28.800	1.351
	FREQ	ACCEL	28.900	1.320	29.000	1.228
	FREQ	ACCEL	29.100	1.113	29.200	1.011
	FREQ	ACCEL	29.300	0.948	29.400	0.930
	FREQ	ACCEL	29.500	0.944	29.600	0.986
	FREQ	ACCEL	29.700	1.016	29.800	1.022
	FREQ	ACCEL	29.900	1.003	30.000	0.973
	FREQ	ACCEL	31.000	0.715	32.000	0.559
	FREQ	ACCEL	33.000	0.510	34.000	0.467
	FREQ	ACCEL	35.000	0.428	36.000	0.408
	FREQ	ACCEL	37.000	0.394	38.000	0.398
	FREQ	ACCEL	39.000	0.391	40.000	0.375
	FREQ	ACCEL	41.000	0.356	42.000	0.350
	FREQ	ACCEL	43.000	0.392	44.000	0.396
	FREQ	ACCEL	45.000	0.330	46.000	0.331
	FREQ	ACCEL	47.000	0.330	48.000	0.340
	FREQ	ACCEL	49.000	0.374	50.000	0.404
	FREQ	ACCEL	51.000	0.364	52.000	0.373
	FREQ	ACCEL	53.000	0.394	54.000	0.460
	FREQ	ACCEL	55.000	0.312	56.000	0.266
	FREQ	ACCEL	57.000	0.262	58.000	0.257
	FREQ	ACCEL	59.000	0.251	60.000	0.244
Y-SHOCK	FREQ	ACCEL	1.000	0.000	2.000	0.001
	FREQ	ACCEL	3.000	0.001	4.000	0.002
	FREQ	ACCEL	4.100	0.002	4.200	0.003
	FREQ	ACCEL	4.300	0.003	4.400	0.003
	FREQ	ACCEL	4.500	0.003	4.600	0.003
	FREQ	ACCEL	4.700	0.003	4.800	0.003
	FREQ	ACCEL	4.900	0.004	5.000	0.004
	FREQ	ACCEL	5.100	0.004	5.200	0.004
	FREQ	ACCEL	5.300	0.004	5.400	0.004
	FREQ	ACCEL	5.500	0.004	5.600	0.005
	FREQ	ACCEL	5.700	0.005	5.800	0.005
	FREQ	ACCEL	5.900	0.005	6.000	0.005
	FREQ	ACCEL	6.100	0.005	6.200	0.006
	FREQ	ACCEL	6.300	0.006	6.400	0.006
	FREQ	ACCEL	6.500	0.006	6.600	0.006
	FREQ	ACCEL	6.700	0.006	6.800	0.007

FREQ	ACCEL	6.900	0.007	7.000	0.007
FREQ	ACCEL	7.100	0.007	7.200	0.007
FREQ	ACCEL	7.300	0.008	7.400	0.008
FREQ	ACCEL	7.500	0.008	7.600	0.008
FREQ	ACCEL	7.700	0.009	7.800	0.010
FREQ	ACCEL	7.900	0.010	8.000	0.009
FREQ	ACCEL	8.100	0.009	8.200	0.010
FREQ	ACCEL	8.300	0.010	8.400	0.010
FREQ	ACCEL	8.500	0.010	8.600	0.010
FREQ	ACCEL	8.700	0.010	8.800	0.011
FREQ	ACCEL	8.900	0.011	9.000	0.011
FREQ	ACCEL	9.100	0.012	9.200	0.012
FREQ	ACCEL	9.300	0.012	9.400	0.013
FREQ	ACCEL	9.500	0.013	9.600	0.014
FREQ	ACCEL	9.700	0.014	9.800	0.015
FREQ	ACCEL	9.900	0.015	10.000	0.015
FREQ	ACCEL	10.100	0.016	10.200	0.016
FREQ	ACCEL	10.300	0.017	10.400	0.017
FREQ	ACCEL	10.500	0.017	10.600	0.018
FREQ	ACCEL	10.700	0.018	10.800	0.019
FREQ	ACCEL	10.900	0.019	11.000	0.020
FREQ	ACCEL	11.100	0.021	11.200	0.021
FREQ	ACCEL	11.300	0.022	11.400	0.022
FREQ	ACCEL	11.500	0.023	11.600	0.023
FREQ	ACCEL	11.700	0.024	11.800	0.024
FREQ	ACCEL	11.900	0.025	12.000	0.026
FREQ	ACCEL	12.100	0.026	12.200	0.027
FREQ	ACCEL	12.300	0.028	12.400	0.028
FREQ	ACCEL	12.500	0.029	12.600	0.030
FREQ	ACCEL	12.700	0.030	12.800	0.031
FREQ	ACCEL	12.900	0.032	13.000	0.032
FREQ	ACCEL	13.100	0.033	13.200	0.034
FREQ	ACCEL	13.300	0.034	13.400	0.035
FREQ	ACCEL	13.500	0.036	13.600	0.037
FREQ	ACCEL	13.700	0.037	13.800	0.038
FREQ	ACCEL	13.900	0.039	14.000	0.040
FREQ	ACCEL	14.100	0.040	14.200	0.041
FREQ	ACCEL	14.300	0.042	14.400	0.043
FREQ	ACCEL	14.500	0.044	14.600	0.045
FREQ	ACCEL	14.700	0.045	14.800	0.046
FREQ	ACCEL	14.900	0.047	15.000	0.048
FREQ	ACCEL	15.100	0.049	15.200	0.050
FREQ	ACCEL	15.300	0.050	15.400	0.051
FREQ	ACCEL	15.500	0.052	15.600	0.053
FREQ	ACCEL	15.700	0.054	15.800	0.055
FREQ	ACCEL	15.900	0.056	16.000	0.057
FREQ	ACCEL	16.100	0.058	16.200	0.059
FREQ	ACCEL	16.300	0.060	16.400	0.061
FREQ	ACCEL	16.500	0.061	16.600	0.062
FREQ	ACCEL	16.700	0.063	16.800	0.064
FREQ	ACCEL	16.900	0.065	17.000	0.066
FREQ	ACCEL	17.100	0.067	17.200	0.068
FREQ	ACCEL	17.300	0.069	17.400	0.070
FREQ	ACCEL	17.500	0.071	17.600	0.072
FREQ	ACCEL	17.700	0.073	17.800	0.074
FREQ	ACCEL	17.900	0.075	18.000	0.076

FREQ	ACCEL	18.100	0.077	18.200	0.078
FREQ	ACCEL	18.300	0.079	18.400	0.080
FREQ	ACCEL	18.500	0.081	18.600	0.082
FREQ	ACCEL	18.700	0.083	18.800	0.084
FREQ	ACCEL	18.900	0.085	19.000	0.086
FREQ	ACCEL	19.100	0.087	19.200	0.088
FREQ	ACCEL	19.300	0.089	19.400	0.090
FREQ	ACCEL	19.500	0.091	19.600	0.092
FREQ	ACCEL	19.700	0.093	19.800	0.094
FREQ	ACCEL	19.900	0.095	20.000	0.096
FREQ	ACCEL	20.100	0.097	20.200	0.098
FREQ	ACCEL	20.300	0.099	20.400	0.100
FREQ	ACCEL	20.500	0.101	20.600	0.102
FREQ	ACCEL	20.700	0.105	20.800	0.108
FREQ	ACCEL	20.900	0.111	21.000	0.113
FREQ	ACCEL	21.100	0.116	21.200	0.118
FREQ	ACCEL	21.300	0.121	21.400	0.123
FREQ	ACCEL	21.500	0.126	21.600	0.128
FREQ	ACCEL	21.700	0.130	21.800	0.133
FREQ	ACCEL	21.900	0.135	22.000	0.137
FREQ	ACCEL	22.100	0.142	22.200	0.146
FREQ	ACCEL	22.300	0.151	22.400	0.155
FREQ	ACCEL	22.500	0.159	22.600	0.163
FREQ	ACCEL	22.700	0.167	22.800	0.171
FREQ	ACCEL	22.900	0.175	23.000	0.178
FREQ	ACCEL	23.100	0.182	23.200	0.185
FREQ	ACCEL	23.300	0.189	23.400	0.192
FREQ	ACCEL	23.500	0.196	23.600	0.202
FREQ	ACCEL	23.700	0.207	23.800	0.213
FREQ	ACCEL	23.900	0.218	24.000	0.222
FREQ	ACCEL	24.100	0.231	24.200	0.235
FREQ	ACCEL	24.300	0.237	24.400	0.244
FREQ	ACCEL	24.500	0.251	24.600	0.258
FREQ	ACCEL	24.700	0.264	24.800	0.269
FREQ	ACCEL	24.900	0.275	25.000	0.291
FREQ	ACCEL	25.100	0.320	25.200	0.333
FREQ	ACCEL	25.300	0.348	25.400	0.354
FREQ	ACCEL	25.500	0.347	25.600	0.324
FREQ	ACCEL	25.700	0.332	25.800	0.339
FREQ	ACCEL	25.900	0.349	26.000	0.358
FREQ	ACCEL	26.100	0.365	26.200	0.376
FREQ	ACCEL	26.300	0.417	26.400	0.442
FREQ	ACCEL	26.500	0.452	26.600	0.447
FREQ	ACCEL	26.700	0.442	26.800	0.449
FREQ	ACCEL	26.900	0.487	27.000	0.558
FREQ	ACCEL	27.100	0.649	27.200	0.746
FREQ	ACCEL	27.300	0.849	27.400	0.924
FREQ	ACCEL	27.500	0.962	27.600	0.969
FREQ	ACCEL	27.700	0.950	27.800	0.893
FREQ	ACCEL	27.900	0.803	28.000	0.720
FREQ	ACCEL	28.100	0.651	28.200	0.616
FREQ	ACCEL	28.300	0.621	28.400	0.655
FREQ	ACCEL	28.500	0.718	28.600	0.769
FREQ	ACCEL	28.700	0.784	28.800	0.765
FREQ	ACCEL	28.900	0.747	29.000	0.694
FREQ	ACCEL	29.100	0.631	29.200	0.578

	FREQ	ACCEL	29.300	0.551	29.400	0.553
	FREQ	ACCEL	29.500	0.573	29.600	0.601
	FREQ	ACCEL	29.700	0.617	29.800	0.623
	FREQ	ACCEL	29.900	0.614	30.000	0.581
	FREQ	ACCEL	31.000	0.510	32.000	0.390
	FREQ	ACCEL	33.000	0.403	34.000	0.428
	FREQ	ACCEL	35.000	0.438	36.000	0.455
	FREQ	ACCEL	37.000	0.486	38.000	0.503
	FREQ	ACCEL	39.000	0.510	40.000	0.495
	FREQ	ACCEL	41.000	0.587	42.000	0.595
	FREQ	ACCEL	43.000	0.969	44.000	1.015
	FREQ	ACCEL	45.000	0.842	46.000	0.731
	FREQ	ACCEL	47.000	0.936	48.000	0.923
	FREQ	ACCEL	49.000	1.018	50.000	1.240
	FREQ	ACCEL	51.000	0.935	52.000	1.168
	FREQ	ACCEL	53.000	1.088	54.000	1.191
	FREQ	ACCEL	55.000	0.889	56.000	0.621
	FREQ	ACCEL	57.000	0.465	58.000	0.476
	FREQ	ACCEL	59.000	0.416	60.000	0.412
Z-SHOCK	FREQ	ACCEL	1.000	0.000	2.000	0.000
	FREQ	ACCEL	3.000	0.001	4.000	0.001
	FREQ	ACCEL	4.100	0.001	4.200	0.001
	FREQ	ACCEL	4.300	0.001	4.400	0.001
	FREQ	ACCEL	4.500	0.001	4.600	0.001
	FREQ	ACCEL	4.700	0.001	4.800	0.001
	FREQ	ACCEL	4.900	0.001	5.000	0.001
	FREQ	ACCEL	5.100	0.002	5.200	0.002
	FREQ	ACCEL	5.300	0.002	5.400	0.002
	FREQ	ACCEL	5.500	0.002	5.600	0.002
	FREQ	ACCEL	5.700	0.002	5.800	0.002
	FREQ	ACCEL	5.900	0.002	6.000	0.002
	FREQ	ACCEL	6.100	0.002	6.200	0.002
	FREQ	ACCEL	6.300	0.002	6.400	0.002
	FREQ	ACCEL	6.500	0.002	6.600	0.002
	FREQ	ACCEL	6.700	0.003	6.800	0.003
	FREQ	ACCEL	6.900	0.003	7.000	0.003
	FREQ	ACCEL	7.100	0.003	7.200	0.003
	FREQ	ACCEL	7.300	0.003	7.400	0.003
	FREQ	ACCEL	7.500	0.003	7.600	0.003
	FREQ	ACCEL	7.700	0.003	7.800	0.003
	FREQ	ACCEL	7.900	0.003	8.000	0.004
	FREQ	ACCEL	8.100	0.004	8.200	0.004
	FREQ	ACCEL	8.300	0.004	8.400	0.004
	FREQ	ACCEL	8.500	0.004	8.600	0.004
	FREQ	ACCEL	8.700	0.004	8.800	0.004
	FREQ	ACCEL	8.900	0.004	9.000	0.004
	FREQ	ACCEL	9.100	0.005	9.200	0.005
	FREQ	ACCEL	9.300	0.005	9.400	0.005
	FREQ	ACCEL	9.500	0.005	9.600	0.005
	FREQ	ACCEL	9.700	0.005	9.800	0.005
	FREQ	ACCEL	9.900	0.005	10.000	0.005
	FREQ	ACCEL	10.100	0.006	10.200	0.006
	FREQ	ACCEL	10.300	0.006	10.400	0.006
	FREQ	ACCEL	10.500	0.006	10.600	0.006
	FREQ	ACCEL	10.700	0.006	10.800	0.006
	FREQ	ACCEL	10.900	0.006	11.000	0.006

FREQ	ACCEL	11.100	0.007	11.200	0.007
FREQ	ACCEL	11.300	0.007	11.400	0.007
FREQ	ACCEL	11.500	0.007	11.600	0.007
FREQ	ACCEL	11.700	0.008	11.800	0.008
FREQ	ACCEL	11.900	0.008	12.000	0.008
FREQ	ACCEL	12.100	0.008	12.200	0.008
FREQ	ACCEL	12.300	0.008	12.400	0.009
FREQ	ACCEL	12.500	0.009	12.600	0.009
FREQ	ACCEL	12.700	0.009	12.800	0.010
FREQ	ACCEL	12.900	0.010	13.000	0.010
FREQ	ACCEL	13.100	0.010	13.200	0.011
FREQ	ACCEL	13.300	0.011	13.400	0.011
FREQ	ACCEL	13.500	0.011	13.600	0.012
FREQ	ACCEL	13.700	0.012	13.800	0.013
FREQ	ACCEL	13.900	0.013	14.000	0.014
FREQ	ACCEL	14.100	0.014	14.200	0.014
FREQ	ACCEL	14.300	0.014	14.400	0.014
FREQ	ACCEL	14.500	0.015	14.600	0.017
FREQ	ACCEL	14.700	0.018	14.800	0.020
FREQ	ACCEL	14.900	0.024	15.000	0.027
FREQ	ACCEL	15.100	0.029	15.200	0.028
FREQ	ACCEL	15.300	0.031	15.400	0.032
FREQ	ACCEL	15.500	0.034	15.600	0.036
FREQ	ACCEL	15.700	0.037	15.800	0.038
FREQ	ACCEL	15.900	0.038	16.000	0.042
FREQ	ACCEL	16.100	0.046	16.200	0.046
FREQ	ACCEL	16.300	0.045	16.400	0.041
FREQ	ACCEL	16.500	0.036	16.600	0.033
FREQ	ACCEL	16.700	0.029	16.800	0.026
FREQ	ACCEL	16.900	0.024	17.000	0.024
FREQ	ACCEL	17.100	0.025	17.200	0.026
FREQ	ACCEL	17.300	0.027	17.400	0.026
FREQ	ACCEL	17.500	0.024	17.600	0.025
FREQ	ACCEL	17.700	0.025	17.800	0.025
FREQ	ACCEL	17.900	0.026	18.000	0.026
FREQ	ACCEL	18.100	0.027	18.200	0.027
FREQ	ACCEL	18.300	0.027	18.400	0.028
FREQ	ACCEL	18.500	0.028	18.600	0.028
FREQ	ACCEL	18.700	0.029	18.800	0.029
FREQ	ACCEL	18.900	0.030	19.000	0.030
FREQ	ACCEL	19.100	0.030	19.200	0.031
FREQ	ACCEL	19.300	0.031	19.400	0.032
FREQ	ACCEL	19.500	0.032	19.600	0.032
FREQ	ACCEL	19.700	0.033	19.800	0.033
FREQ	ACCEL	19.900	0.033	20.000	0.034
FREQ	ACCEL	20.100	0.034	20.200	0.035
FREQ	ACCEL	20.300	0.035	20.400	0.035
FREQ	ACCEL	20.500	0.036	20.600	0.036
FREQ	ACCEL	20.700	0.036	20.800	0.037
FREQ	ACCEL	20.900	0.037	21.000	0.038
FREQ	ACCEL	21.100	0.038	21.200	0.038
FREQ	ACCEL	21.300	0.039	21.400	0.039
FREQ	ACCEL	21.500	0.039	21.600	0.040
FREQ	ACCEL	21.700	0.040	21.800	0.040
FREQ	ACCEL	21.900	0.041	22.000	0.041
FREQ	ACCEL	22.100	0.042	22.200	0.043

FREQ	ACCEL	22.300	0.043	22.400	0.044
FREQ	ACCEL	22.500	0.045	22.600	0.046
FREQ	ACCEL	22.700	0.047	22.800	0.048
FREQ	ACCEL	22.900	0.048	23.000	0.049
FREQ	ACCEL	23.100	0.050	23.200	0.051
FREQ	ACCEL	23.300	0.052	23.400	0.053
FREQ	ACCEL	23.500	0.053	23.600	0.054
FREQ	ACCEL	23.700	0.055	23.800	0.056
FREQ	ACCEL	23.900	0.057	24.000	0.058
FREQ	ACCEL	24.100	0.063	24.200	0.069
FREQ	ACCEL	24.300	0.071	24.400	0.068
FREQ	ACCEL	24.500	0.066	24.600	0.069
FREQ	ACCEL	24.700	0.071	24.800	0.073
FREQ	ACCEL	24.900	0.075	25.000	0.077
FREQ	ACCEL	25.100	0.079	25.200	0.080
FREQ	ACCEL	25.300	0.081	25.400	0.083
FREQ	ACCEL	25.500	0.084	25.600	0.085
FREQ	ACCEL	25.700	0.087	25.800	0.088
FREQ	ACCEL	25.900	0.091	26.000	0.093
FREQ	ACCEL	26.100	0.096	26.200	0.100
FREQ	ACCEL	26.300	0.104	26.400	0.109
FREQ	ACCEL	26.500	0.109	26.600	0.112
FREQ	ACCEL	26.700	0.116	26.800	0.123
FREQ	ACCEL	26.900	0.132	27.000	0.159
FREQ	ACCEL	27.100	0.187	27.200	0.211
FREQ	ACCEL	27.300	0.233	27.400	0.257
FREQ	ACCEL	27.500	0.263	27.600	0.271
FREQ	ACCEL	27.700	0.264	27.800	0.256
FREQ	ACCEL	27.900	0.234	28.000	0.204
FREQ	ACCEL	28.100	0.183	28.200	0.170
FREQ	ACCEL	28.300	0.168	28.400	0.164
FREQ	ACCEL	28.500	0.165	28.600	0.173
FREQ	ACCEL	28.700	0.172	28.800	0.172
FREQ	ACCEL	28.900	0.167	29.000	0.152
FREQ	ACCEL	29.100	0.135	29.200	0.134
FREQ	ACCEL	29.300	0.133	29.400	0.132
FREQ	ACCEL	29.500	0.129	29.600	0.128
FREQ	ACCEL	29.700	0.129	29.800	0.129
FREQ	ACCEL	29.900	0.128	30.000	0.127
FREQ	ACCEL	31.000	0.121	32.000	0.131
FREQ	ACCEL	33.000	0.140	34.000	0.153
FREQ	ACCEL	35.000	0.155	36.000	0.181
FREQ	ACCEL	37.000	0.267	38.000	0.345
FREQ	ACCEL	39.000	0.463	40.000	0.315
FREQ	ACCEL	41.000	0.263	42.000	0.218
FREQ	ACCEL	43.000	0.249	44.000	0.224
FREQ	ACCEL	45.000	0.200	46.000	0.189
FREQ	ACCEL	47.000	0.212	48.000	0.205
FREQ	ACCEL	49.000	0.304	50.000	0.371
FREQ	ACCEL	51.000	0.434	52.000	0.665
FREQ	ACCEL	53.000	0.600	54.000	0.535
FREQ	ACCEL	55.000	0.393	56.000	0.269
FREQ	ACCEL	57.000	0.196	58.000	0.197
FREQ	ACCEL	59.000	0.153	60.000	0.155

COVER PAGE

COI

NODE 54BR

REVISION P7I-1 PAGE 30/43
PREPARED BY AM 6/3/93
CHECKED BY [illegible] 6/3/93

```
      program jvelop
c
c *-------------------------------------------------------------------*
c
c                 N U T E C H   E N G I N E E R S  --  Chicago
c
c                          JVELOP  Program
c
c                           Version 2.0.0
c
c                           April 16, 1991
c
c *-------------------------------------------------------------------*
c
c     This program computes an envolped response spectra from the
c     individual loadcase spectras created by RESGEN and outputs
c     the enveloped spectra in PISTAR format.
c
c     The program reads TAPE1 and TAPE2 data from a RESGEN response
c     spectra computation. TAPE1 contains the spectra control
c     parameters (for input to PLOTSC) and TAPE2 the individual load
c     spectras.
c
c
c     Variable definitions:
c
c         Tape01.dat Input
c
c          Name      Type      Definition
c          ----      ----     -----------------------
c          nspec     int    no. of spectras on tape02.dat
c          npoint    int    no. of frequency points/spectra
c          ntitle    int    no. of title cards on tape02.dat
c          node(i)   chr    PISTAR node id
c          idir(i)   chr    direction of spectra (X, Y, or Z)
c          type      chr    type of spectra (tran or rot)
c          icase     int    spectra load case no.
c
c         Tape02.dat Input
c
c          Name      Type      Definition
c          ----      ----     -----------------------
c          a(i,j)    real     spectra frequency amplitude pairs
c
c
c         Output
c
c               tape03.dat -- enveloped spectra in PISTAR format
c               tape04.dat -- enveloped spectra in RESGEN format
c               jvelop.out -- standard output file (text file)
c
c
c     Program Limitations:
c                        200 individual spectra
c                        500 frequencies/spectra
c
```

```
c
      character*5  node, idir, knode, kdir, lnode
      character*72 source, junk
      character*80 qablok
c
      dimension node(200), idir(200), knode(200), kdir(200), lnode(200)
      dimension a(200,1000), amp(200,500)
c
c
c                    Open input/output devices
c
      open ( unit= 1, file= 'tape01.dat', err= 801 )
      open ( unit= 2, file= 'tape02.dat', err= 802 )
      open ( unit= 3, file= 'tape03.dat', err= 803 )
      open ( unit= 4, file= 'tape04.dat', err= 804 )
      open ( unit= 5, file= 'jvelop.for', err= 805 )
      open ( unit= 6, file= 'jvelop.out', err= 806 )
      open ( unit= 7, file= 'qablok.dat', err= 807 )
c
c     write qablock to output file
c
      write(6, '(a1 /)' ) '1'
    1 read(7, 7001, end= 2 ) qablok
      write( 6, 7002 ) qablok
      go to 1
c
c     Echo program source file
c
    2 write( 6, 6001 )
      num = 0
    5    read( 5, 1001, end= 10 ) source
         num = num + 1
         if ( num .eq. 50) then
            write(6, '(a1 ///)' ) '1'
            num = 0
         end if
         write( 6, 6002 ) source
      go to 5
c
c     read and check tape1 input data
c
   10 read( 1, 1000 ) nspec, npoint, ntitle
      write(6, '(a1 ///)' ) '1'
      do 15 n = 1, ntitle + 5
         read( 1, 1001 ) junk
         if ( n .gt. 5) write( 6, 6002 ) junk
   15 continue
      if (nspec .gt. 200) then
          write(6, 6901) nspec
          go to 999
      endif
      if (npoint .gt. 500) then
          write(6, 6902) npoint
          go to 999
      endif
c
```

```
      write( 6, 6003 ) nspec, npoint
      np2 = npoint*2
      write(6, 6004)
      do 20 i = 1, nspec
         read( 1, 1002 ) node(i), idir(i), type, icase
         write(6, 6005 ) i, node(i), idir(i), type, icase
         if (i .gt. 50) write(6, '(a1 ///)' ) '1'
   20 continue
c
c     read spectra from tape2
c
      do 30 i = 1, nspec
         read( 2, 2001 ) ( a(i,j), j = 1, np2 )
         do 30 j = 1, npoint
            if ( a(i, j*2-1) .eq. a(1, j*2-1) ) go to 25
            write( 6, 6902 )
            go to 999
   25    continue
   30 continue
c
c     Identify Node/Direction Pairs
c
      k = 1
      knode(1) = node(1)
      kdir(1) = idir(1)
      do 40 i = 1, nspec
         do 35 kk = 1, k
            if (knode(kk) .eq. node(i) .and. kdir(kk) .eq. idir(i))
     +      go to 40
   35    continue
         k = k + 1
         knode(k) = node(i)
         kdir(k) = idir(i)
   40 continue
      kount = k
c
c     zero node/direction pair amplitudes
c
      do 50 k = 1, kount
         do 45 j = 1, npoint
            amp(k,j) = 0.0
   45    continue
   50 continue
c
c     envelope amplitudes for node/direction pairs
c
      do 70 i = 1, nspec
         do 65 k = 1, kount
            if (knode(k) .eq. node(i) .and. kdir(k) .eq. idir(i))
     +      go to 55
            go to 65
   55       continue
            do 60 j = 1, npoint
               if (a(i, j*2) .gt. amp(k, j)) amp(k, j)=a(i, j*2)
   60       continue
            go to 70
```

```
   65    continue
   70 continue
c
c     identify nodes
c
      l = 1
      lnode(1) = knode(1)
      do 80 k = 1, kount
         do 75 ll = 1, l
            if (lnode(ll) .eq. knode(k)) go to 80
   75    continue
         l = l + 1
         lnode(l) = knode(k)
   80 continue
      lount=l
c
c     write enveloped spectra to tape03.dat in PISTAR format
c                           and to tape04.dat in RESGEN format
c
      do 90 l = 1, lount
         write( 3, 3001 ) lnode(l)
         write( 3, 3002 )
         write( 3, 3003 )
         do 85 k = 1, kount
            if (lnode(l) .ne. knode(k)) go to 85
            write( 3, 3005 ) kdir(k), a(1, 1), amp(k, 1),
     +                       a(1, 3), amp(k, 2)
            write( 3, 3006 ) (a(1, j*2-1), amp(k, j), j = 3, npoint)
            write( 4, 4001 ) (a(1, j*2-1), amp(k, j), j = 1, npoint)
   85    continue
   90 continue
c
c
c     write enveloped spectra to output tape06.dat
c
c
      write(6, '(a1 /)' ) '1'
      do 100 l = 1, lount
         write( 6, 6006 ) lnode(l)
         write( 6, 6007 )
         write( 6, 6008 )
         do 95 k = 1, kount
            if (lnode(l) .ne. knode(k)) go to 95
            write( 6, 6009 ) kdir(k), a(1, 1), amp(k, 1),
     +                       a(1, 3), amp(k, 2)
            write( 6, 6010 ) (a(1, j*2-1), amp(k, j), j = 3, npoint)
   95    continue
  100 continue
      goto 999
c
c                  write error messages
c
  801 write(6, 6904) 'tape01.dat'
      stop
  802 write(6, 6904) 'tape02.dat'
      stop
```

```
  803 write(6, 6905) 'tape03.dat'
      stop
  804 write(6, 6905) 'tape04.dat'
      stop
  805 write(6, 6904) 'tape05.dat'
      stop
  806 write(6, 6905) 'tape06.dat'
      stop
  807 write(6, 6904) 'qablok.dat'
      stop
c
 1000 format(i5, 5x, 2i5)
 1001 format( a72 )
 1002 format(32x, a5, 2x, a1, 1x, a4, 6x, i2)
c
 2001 format(8f10.0)
c
 6001 format('1' /// 5x, 'ENVELOPE --- VERSION 1.0.0' //
     +        5x, 'SOURCE CODE' // )
 6002 format(5x, a72)
 6003 format(// 5x, 'NO. OF SPECTRA           = ', i3 /
     +        5x, 'NO. OF FREQUENCY POINTS = ', i3 / )
 6004 format(5x, 'SPECTRA', 25x, 'LOAD' / 4x, 'NO', 5x, 'NODE',
     +        3x, 'DIR', 4x, 'TYPE', 4x, 'CASE')
 6005 format(1x, i5, 5x, a5, 3x, a1, 5x, a4, 5x, i2)
 6006 format(// 5x, 'COMMENT', 3x, 'NODE = ', a5, 5x,
     +        'ACCELERATION SPECTRA')
 6007 format(5x, 'CASE', 6x, 'XXXXX')
 6008 format(5x, 'SEISMIC', 7x, '1', 10x, '386.4', 5x, '386.4',
     +        5x, '386.4', 7x, 'CSM', 7x, 'RSS')
 6009 format(5x, a1, '-SHOCK', 9x, 'FREQ', 5x, 'ACCEL', 4F10.3)
 6010 format(5x, 16x, 'FREQ', 5x, 'ACCEL', 4F10.3)
c
 3001 format(// 'COMMENT', 3x, 'NODE = ', a5, 5x,
     +        'ACCELERATION SPECTRA')
 3002 format('CASE', 6x, 'XXXXX')
 3003 format('SEISMIC', 7x, '1', 10x, '386.4', 5x, '386.4',
     +        5x, '386.4', 7x, 'CSM', 7x, 'RSS')
 3005 format( a1, '-SHOCK', 9x, 'FREQ', 5x, 'ACCEL', 4F10.3)
 3006 format( 16x, 'FREQ', 5x, 'ACCEL', 4F10.3)
c
 4001 format(8f10.3)
c
 6901 format(5x, 'ERROR...NSPEC = ', i5, ' > 200 (INTERNAL LIMIT)')
 6902 format(5x, 'ERROR...NPOINT = ', i5, ' > 70 (INTERNAL LIMIT)')
 6903 format(5x, 'ERROR...FREQUENCY POINTS NOT UNIFORM')
 6904 format(5x, 'ERROR...INPUT FILE -> ', a10, 'IS MISSING.' )
 6905 format(5x, 'ERROR...UNABLE TO OPEN OUTPUT FILE -> ', a10)
c
 7001 format( a80 )
 7002 format(10x, a80 )
  999 stop
      end
```

Cor

COMMENT NODE = 54BR ACCELERATION SPECTRA
CASE XXXXX
SEISMIC 1
X-SHOCK

		386.4	386.4	386.4	CSM	RSS
	FREQ	ACCEL	1.000	0.009	2.000	0.019
	FREQ	ACCEL	3.000	0.031	4.000	0.046
	FREQ	ACCEL	4.100	0.047	4.200	0.053
	FREQ	ACCEL	4.300	0.053	4.400	0.050
	FREQ	ACCEL	4.500	0.061	4.600	0.066
	FREQ	ACCEL	4.700	0.072	4.800	0.082
	FREQ	ACCEL	4.900	0.092	5.000	0.110
	FREQ	ACCEL	5.100	0.125	5.200	0.132
	FREQ	ACCEL	5.300	0.122	5.400	0.117
	FREQ	ACCEL	5.500	0.123	5.600	0.134
	FREQ	ACCEL	5.700	0.130	5.800	0.118
	FREQ	ACCEL	5.900	0.111	6.000	0.100
	FREQ	ACCEL	6.100	0.091	6.200	0.086
	FREQ	ACCEL	6.300	0.082	6.400	0.084
	FREQ	ACCEL	6.500	0.086	6.600	0.088
	FREQ	ACCEL	6.700	0.090	6.800	0.092
	FREQ	ACCEL	6.900	0.095	7.000	0.097
	FREQ	ACCEL	7.100	0.099	7.200	0.101
	FREQ	ACCEL	7.300	0.104	7.400	0.106
	FREQ	ACCEL	7.500	0.109	7.600	0.112
	FREQ	ACCEL	7.700	0.114	7.800	0.116
	FREQ	ACCEL	7.900	0.118	8.000	0.121
	FREQ	ACCEL	8.100	0.123	8.200	0.126
	FREQ	ACCEL	8.300	0.128	8.400	0.131
	FREQ	ACCEL	8.500	0.133	8.600	0.135
	FREQ	ACCEL	8.700	0.138	8.800	0.140
	FREQ	ACCEL	8.900	0.143	9.000	0.145
	FREQ	ACCEL	9.100	0.148	9.200	0.150
	FREQ	ACCEL	9.300	0.153	9.400	0.155
	FREQ	ACCEL	9.500	0.157	9.600	0.160
	FREQ	ACCEL	9.700	0.162	9.800	0.165
	FREQ	ACCEL	9.900	0.167	10.000	0.169
	FREQ	ACCEL	10.100	0.172	10.200	0.174
	FREQ	ACCEL	10.300	0.176	10.400	0.178
	FREQ	ACCEL	10.500	0.182	10.600	0.190
	FREQ	ACCEL	10.700	0.197	10.800	0.204
	FREQ	ACCEL	10.900	0.211	11.000	0.217
	FREQ	ACCEL	11.100	0.225	11.200	0.242
	FREQ	ACCEL	11.300	0.254	11.400	0.264
	FREQ	ACCEL	11.500	0.264	11.600	0.262
	FREQ	ACCEL	11.700	0.275	11.800	0.267
	FREQ	ACCEL	11.900	0.284	12.000	0.292
	FREQ	ACCEL	12.100	0.284	12.200	0.288
	FREQ	ACCEL	12.300	0.292	12.400	0.296
	FREQ	ACCEL	12.500	0.298	12.600	0.313
	FREQ	ACCEL	12.700	0.368	12.800	0.416
	FREQ	ACCEL	12.900	0.438	13.000	0.479
	FREQ	ACCEL	13.100	0.489	13.200	0.482
	FREQ	ACCEL	13.300	0.496	13.400	0.506
	FREQ	ACCEL	13.500	0.507	13.600	0.500
	FREQ	ACCEL	13.700	0.478	13.800	0.445

FREQ	ACCEL	13.900	0.441	14.000	0.456
FREQ	ACCEL	14.100	0.468	14.200	0.479
FREQ	ACCEL	14.300	0.500	14.400	0.518
FREQ	ACCEL	14.500	0.535	14.600	0.561
FREQ	ACCEL	14.700	0.632	14.800	0.751
FREQ	ACCEL	14.900	0.854	15.000	0.922
FREQ	ACCEL	15.100	0.992	15.200	1.022
FREQ	ACCEL	15.300	1.092	15.400	1.141
FREQ	ACCEL	15.500	1.185	15.600	1.195
FREQ	ACCEL	15.700	1.193	15.800	1.172
FREQ	ACCEL	15.900	1.117	16.000	1.252
FREQ	ACCEL	16.100	1.322	16.200	1.281
FREQ	ACCEL	16.300	1.167	16.400	1.058
FREQ	ACCEL	16.500	0.971	16.600	0.865
FREQ	ACCEL	16.700	0.784	16.800	0.740
FREQ	ACCEL	16.900	0.725	17.000	0.733
FREQ	ACCEL	17.100	0.744	17.200	0.723
FREQ	ACCEL	17.300	0.714	17.400	0.648
FREQ	ACCEL	17.500	0.598	17.600	0.567
FREQ	ACCEL	17.700	0.572	17.800	0.578
FREQ	ACCEL	17.900	0.584	18.000	0.590
FREQ	ACCEL	18.100	0.595	18.200	0.600
FREQ	ACCEL	18.300	0.605	18.400	0.610
FREQ	ACCEL	18.500	0.616	18.600	0.625
FREQ	ACCEL	18.700	0.633	18.800	0.641
FREQ	ACCEL	18.900	0.648	19.000	0.656
FREQ	ACCEL	19.100	0.669	19.200	0.681
FREQ	ACCEL	19.300	0.693	19.400	0.705
FREQ	ACCEL	19.500	0.716	19.600	0.726
FREQ	ACCEL	19.700	0.736	19.800	0.746
FREQ	ACCEL	19.900	0.755	20.000	0.764
FREQ	ACCEL	20.100	0.772	20.200	0.779
FREQ	ACCEL	20.300	0.786	20.400	0.793
FREQ	ACCEL	20.500	0.798	20.600	0.804
FREQ	ACCEL	20.700	0.814	20.800	0.826
FREQ	ACCEL	20.900	0.838	21.000	0.849
FREQ	ACCEL	21.100	0.860	21.200	0.870
FREQ	ACCEL	21.300	0.879	21.400	0.889
FREQ	ACCEL	21.500	0.897	21.600	0.905
FREQ	ACCEL	21.700	0.913	21.800	0.920
FREQ	ACCEL	21.900	0.927	22.000	0.933
FREQ	ACCEL	22.100	0.938	22.200	0.943
FREQ	ACCEL	22.300	0.947	22.400	0.950
FREQ	ACCEL	22.500	0.953	22.600	0.958
FREQ	ACCEL	22.700	0.969	22.800	0.979
FREQ	ACCEL	22.900	1.079	23.000	1.225
FREQ	ACCEL	23.100	1.315	23.200	1.322
FREQ	ACCEL	23.300	1.300	23.400	1.182
FREQ	ACCEL	23.500	1.111	23.600	1.150
FREQ	ACCEL	23.700	1.185	23.800	1.217
FREQ	ACCEL	23.900	1.245	24.000	1.268
FREQ	ACCEL	24.100	1.410	24.200	1.524
FREQ	ACCEL	24.300	1.606	24.400	1.606
FREQ	ACCEL	24.500	1.532	24.600	1.470
FREQ	ACCEL	24.700	1.496	24.800	1.518
FREQ	ACCEL	24.900	1.535	25.000	1.691

	FREQ	ACCEL	25.100	1.857	25.200	2.024
	FREQ	ACCEL	25.300	2.112	25.400	2.191
	FREQ	ACCEL	25.500	2.135	25.600	1.974
	FREQ	ACCEL	25.700	1.788	25.800	1.747
	FREQ	ACCEL	25.900	1.759	26.000	1.936
	FREQ	ACCEL	26.100	2.294	26.200	2.695
	FREQ	ACCEL	26.300	3.025	26.400	3.231
	FREQ	ACCEL	26.500	3.441	26.600	3.454
	FREQ	ACCEL	26.700	3.335	26.800	3.177
	FREQ	ACCEL	26.900	3.071	27.000	3.018
	FREQ	ACCEL	27.100	3.077	27.200	3.245
	FREQ	ACCEL	27.300	3.462	27.400	3.632
	FREQ	ACCEL	27.500	3.696	27.600	3.781
	FREQ	ACCEL	27.700	3.684	27.800	3.404
	FREQ	ACCEL	27.900	3.084	28.000	2.767
	FREQ	ACCEL	28.100	2.513	28.200	2.407
	FREQ	ACCEL	28.300	2.455	28.400	2.594
	FREQ	ACCEL	28.500	2.777	28.600	3.003
	FREQ	ACCEL	28.700	3.113	28.800	3.058
	FREQ	ACCEL	28.900	2.899	29.000	2.756
	FREQ	ACCEL	29.100	2.520	29.200	2.273
	FREQ	ACCEL	29.300	2.094	29.400	2.026
	FREQ	ACCEL	29.500	2.068	29.600	2.176
	FREQ	ACCEL	29.700	2.281	29.800	2.315
	FREQ	ACCEL	29.900	2.256	30.000	2.208
	FREQ	ACCEL	31.000	1.494	32.000	1.375
	FREQ	ACCEL	33.000	1.229	34.000	1.112
	FREQ	ACCEL	35.000	1.065	36.000	1.024
	FREQ	ACCEL	37.000	0.956	38.000	0.939
	FREQ	ACCEL	39.000	0.935	40.000	0.924
	FREQ	ACCEL	41.000	0.904	42.000	0.877
	FREQ	ACCEL	43.000	0.844	44.000	0.826
	FREQ	ACCEL	45.000	0.823	46.000	0.815
	FREQ	ACCEL	47.000	0.802	48.000	0.784
	FREQ	ACCEL	49.000	0.847	50.000	0.735
	FREQ	ACCEL	51.000	0.705	52.000	0.673
	FREQ	ACCEL	53.000	0.706	54.000	0.779
	FREQ	ACCEL	55.000	0.624	56.000	0.611
	FREQ	ACCEL	57.000	0.595	58.000	0.577
	FREQ	ACCEL	59.000	0.558	60.000	0.551
Y-SHOCK	FREQ	ACCEL	1.000	0.003	2.000	0.007
	FREQ	ACCEL	3.000	0.011	4.000	0.017
	FREQ	ACCEL	4.100	0.017	4.200	0.018
	FREQ	ACCEL	4.300	0.018	4.400	0.019
	FREQ	ACCEL	4.500	0.019	4.600	0.019
	FREQ	ACCEL	4.700	0.020	4.800	0.020
	FREQ	ACCEL	4.900	0.020	5.000	0.021
	FREQ	ACCEL	5.100	0.021	5.200	0.021
	FREQ	ACCEL	5.300	0.022	5.400	0.023
	FREQ	ACCEL	5.500	0.024	5.600	0.025
	FREQ	ACCEL	5.700	0.029	5.800	0.027
	FREQ	ACCEL	5.900	0.027	6.000	0.028
	FREQ	ACCEL	6.100	0.029	6.200	0.030
	FREQ	ACCEL	6.300	0.031	6.400	0.032
	FREQ	ACCEL	6.500	0.033	6.600	0.034
	FREQ	ACCEL	6.700	0.035	6.800	0.036

FREQ	ACCEL	6.900	0.037	7.000	0.038
FREQ	ACCEL	7.100	0.039	7.200	0.040
FREQ	ACCEL	7.300	0.041	7.400	0.042
FREQ	ACCEL	7.500	0.043	7.600	0.044
FREQ	ACCEL	7.700	0.045	7.800	0.046
FREQ	ACCEL	7.900	0.047	8.000	0.048
FREQ	ACCEL	8.100	0.050	8.200	0.051
FREQ	ACCEL	8.300	0.052	8.400	0.053
FREQ	ACCEL	8.500	0.054	8.600	0.056
FREQ	ACCEL	8.700	0.057	8.800	0.058
FREQ	ACCEL	8.900	0.059	9.000	0.060
FREQ	ACCEL	9.100	0.062	9.200	0.063
FREQ	ACCEL	9.300	0.064	9.400	0.065
FREQ	ACCEL	9.500	0.067	9.600	0.068
FREQ	ACCEL	9.700	0.069	9.800	0.071
FREQ	ACCEL	9.900	0.072	10.000	0.073
FREQ	ACCEL	10.100	0.074	10.200	0.076
FREQ	ACCEL	10.300	0.077	10.400	0.078
FREQ	ACCEL	10.500	0.080	10.600	0.081
FREQ	ACCEL	10.700	0.082	10.800	0.084
FREQ	ACCEL	10.900	0.085	11.000	0.086
FREQ	ACCEL	11.100	0.088	11.200	0.089
FREQ	ACCEL	11.300	0.091	11.400	0.093
FREQ	ACCEL	11.500	0.094	11.600	0.096
FREQ	ACCEL	11.700	0.097	11.800	0.099
FREQ	ACCEL	11.900	0.100	12.000	0.102
FREQ	ACCEL	12.100	0.104	12.200	0.105
FREQ	ACCEL	12.300	0.107	12.400	0.108
FREQ	ACCEL	12.500	0.110	12.600	0.112
FREQ	ACCEL	12.700	0.113	12.800	0.115
FREQ	ACCEL	12.900	0.117	13.000	0.118
FREQ	ACCEL	13.100	0.120	13.200	0.122
FREQ	ACCEL	13.300	0.123	13.400	0.125
FREQ	ACCEL	13.500	0.127	13.600	0.129
FREQ	ACCEL	13.700	0.130	13.800	0.132
FREQ	ACCEL	13.900	0.134	14.000	0.135
FREQ	ACCEL	14.100	0.137	14.200	0.139
FREQ	ACCEL	14.300	0.141	14.400	0.142
FREQ	ACCEL	14.500	0.144	14.600	0.146
FREQ	ACCEL	14.700	0.147	14.800	0.149
FREQ	ACCEL	14.900	0.151	15.000	0.153
FREQ	ACCEL	15.100	0.154	15.200	0.156
FREQ	ACCEL	15.300	0.159	15.400	0.162
FREQ	ACCEL	15.500	0.166	15.600	0.169
FREQ	ACCEL	15.700	0.172	15.800	0.175
FREQ	ACCEL	15.900	0.178	16.000	0.182
FREQ	ACCEL	16.100	0.185	16.200	0.188
FREQ	ACCEL	16.300	0.191	16.400	0.195
FREQ	ACCEL	16.500	0.199	16.600	0.203
FREQ	ACCEL	16.700	0.207	16.800	0.211
FREQ	ACCEL	16.900	0.215	17.000	0.219
FREQ	ACCEL	17.100	0.223	17.200	0.227
FREQ	ACCEL	17.300	0.230	17.400	0.234
FREQ	ACCEL	17.500	0.238	17.600	0.242
FREQ	ACCEL	17.700	0.245	17.800	0.249
FREQ	ACCEL	17.900	0.253	18.000	0.256

FREQ	ACCEL	18.100	0.260	18.200	0.263
FREQ	ACCEL	18.300	0.267	18.400	0.270
FREQ	ACCEL	18.500	0.273	18.600	0.278
FREQ	ACCEL	18.700	0.286	18.800	0.293
FREQ	ACCEL	18.900	0.300	19.000	0.306
FREQ	ACCEL	19.100	0.313	19.200	0.320
FREQ	ACCEL	19.300	0.326	19.400	0.333
FREQ	ACCEL	19.500	0.339	19.600	0.345
FREQ	ACCEL	19.700	0.350	19.800	0.356
FREQ	ACCEL	19.900	0.361	20.000	0.367
FREQ	ACCEL	20.100	0.372	20.200	0.379
FREQ	ACCEL	20.300	0.387	20.400	0.395
FREQ	ACCEL	20.500	0.403	20.600	0.410
FREQ	ACCEL	20.700	0.418	20.800	0.425
FREQ	ACCEL	20.900	0.432	21.000	0.439
FREQ	ACCEL	21.100	0.446	21.200	0.456
FREQ	ACCEL	21.300	0.466	21.400	0.476
FREQ	ACCEL	21.500	0.486	21.600	0.496
FREQ	ACCEL	21.700	0.505	21.800	0.513
FREQ	ACCEL	21.900	0.521	22.000	0.529
FREQ	ACCEL	22.100	0.540	22.200	0.550
FREQ	ACCEL	22.300	0.563	22.400	0.580
FREQ	ACCEL	22.500	0.597	22.600	0.613
FREQ	ACCEL	22.700	0.628	22.800	0.642
FREQ	ACCEL	22.900	0.656	23.000	0.669
FREQ	ACCEL	23.100	0.706	23.200	0.706
FREQ	ACCEL	23.300	0.705	23.400	0.719
FREQ	ACCEL	23.500	0.742	23.600	0.763
FREQ	ACCEL	23.700	0.783	23.800	0.801
FREQ	ACCEL	23.900	0.818	24.000	0.833
FREQ	ACCEL	24.100	0.849	24.200	0.897
FREQ	ACCEL	24.300	0.941	24.400	0.935
FREQ	ACCEL	24.500	0.923	24.600	0.943
FREQ	ACCEL	24.700	0.961	24.800	0.976
FREQ	ACCEL	24.900	1.022	25.000	1.173
FREQ	ACCEL	25.100	1.338	25.200	1.455
FREQ	ACCEL	25.300	1.546	25.400	1.541
FREQ	ACCEL	25.500	1.497	25.600	1.374
FREQ	ACCEL	25.700	1.236	25.800	1.195
FREQ	ACCEL	25.900	1.206	26.000	1.318
FREQ	ACCEL	26.100	1.594	26.200	1.891
FREQ	ACCEL	26.300	2.154	26.400	2.346
FREQ	ACCEL	26.500	2.481	26.600	2.500
FREQ	ACCEL	26.700	2.448	26.800	2.328
FREQ	ACCEL	26.900	2.182	27.000	2.072
FREQ	ACCEL	27.100	2.026	27.200	2.056
FREQ	ACCEL	27.300	2.144	27.400	2.239
FREQ	ACCEL	27.500	2.299	27.600	2.309
FREQ	ACCEL	27.700	2.281	27.800	2.143
FREQ	ACCEL	27.900	1.936	28.000	1.722
FREQ	ACCEL	28.100	1.550	28.200	1.459
FREQ	ACCEL	28.300	1.475	28.400	1.555
FREQ	ACCEL	28.500	1.651	28.600	1.777
FREQ	ACCEL	28.700	1.838	28.800	1.803
FREQ	ACCEL	28.900	1.710	29.000	1.634
FREQ	ACCEL	29.100	1.502	29.200	1.363

	FREQ	ACCEL	29.300	1.263	29.400	1.231
	FREQ	ACCEL	29.500	1.268	29.600	1.349
	FREQ	ACCEL	29.700	1.433	29.800	1.477
	FREQ	ACCEL	29.900	1.457	30.000	1.392
	FREQ	ACCEL	31.000	0.999	32.000	0.962
	FREQ	ACCEL	33.000	0.919	34.000	0.903
	FREQ	ACCEL	35.000	0.911	36.000	0.890
	FREQ	ACCEL	37.000	0.909	38.000	0.927
	FREQ	ACCEL	39.000	1.039	40.000	0.885
	FREQ	ACCEL	41.000	0.883	42.000	0.898
	FREQ	ACCEL	43.000	0.983	44.000	1.198
	FREQ	ACCEL	45.000	1.162	46.000	0.868
	FREQ	ACCEL	47.000	1.118	48.000	1.327
	FREQ	ACCEL	49.000	1.628	50.000	1.751
	FREQ	ACCEL	51.000	1.238	52.000	1.505
	FREQ	ACCEL	53.000	1.288	54.000	1.679
	FREQ	ACCEL	55.000	1.218	56.000	0.780
	FREQ	ACCEL	57.000	0.728	58.000	0.720
	FREQ	ACCEL	59.000	0.708	60.000	0.692
Z-SHOCK	FREQ	ACCEL	1.000	0.001	2.000	0.002
	FREQ	ACCEL	3.000	0.003	4.000	0.004
	FREQ	ACCEL	4.100	0.004	4.200	0.004
	FREQ	ACCEL	4.300	0.004	4.400	0.004
	FREQ	ACCEL	4.500	0.004	4.600	0.005
	FREQ	ACCEL	4.700	0.005	4.800	0.005
	FREQ	ACCEL	4.900	0.005	5.000	0.005
	FREQ	ACCEL	5.100	0.006	5.200	0.006
	FREQ	ACCEL	5.300	0.006	5.400	0.006
	FREQ	ACCEL	5.500	0.007	5.600	0.008
	FREQ	ACCEL	5.700	0.008	5.800	0.008
	FREQ	ACCEL	5.900	0.008	6.000	0.008
	FREQ	ACCEL	6.100	0.008	6.200	0.008
	FREQ	ACCEL	6.300	0.009	6.400	0.009
	FREQ	ACCEL	6.500	0.009	6.600	0.010
	FREQ	ACCEL	6.700	0.010	6.800	0.010
	FREQ	ACCEL	6.900	0.010	7.000	0.011
	FREQ	ACCEL	7.100	0.011	7.200	0.011
	FREQ	ACCEL	7.300	0.012	7.400	0.012
	FREQ	ACCEL	7.500	0.012	7.600	0.013
	FREQ	ACCEL	7.700	0.013	7.800	0.013
	FREQ	ACCEL	7.900	0.014	8.000	0.014
	FREQ	ACCEL	8.100	0.014	8.200	0.015
	FREQ	ACCEL	8.300	0.015	8.400	0.016
	FREQ	ACCEL	8.500	0.016	8.600	0.016
	FREQ	ACCEL	8.700	0.017	8.800	0.017
	FREQ	ACCEL	8.900	0.017	9.000	0.018
	FREQ	ACCEL	9.100	0.018	9.200	0.019
	FREQ	ACCEL	9.300	0.019	9.400	0.019
	FREQ	ACCEL	9.500	0.020	9.600	0.020
	FREQ	ACCEL	9.700	0.021	9.800	0.021
	FREQ	ACCEL	9.900	0.022	10.000	0.022
	FREQ	ACCEL	10.100	0.022	10.200	0.023
	FREQ	ACCEL	10.300	0.023	10.400	0.024
	FREQ	ACCEL	10.500	0.024	10.600	0.025
	FREQ	ACCEL	10.700	0.025	10.800	0.026
	FREQ	ACCEL	10.900	0.026	11.000	0.027

FREQ	ACCEL	11.100	0.027	11.200	0.027
FREQ	ACCEL	11.300	0.028	11.400	0.028
FREQ	ACCEL	11.500	0.029	11.600	0.029
FREQ	ACCEL	11.700	0.031	11.800	0.030
FREQ	ACCEL	11.900	0.031	12.000	0.031
FREQ	ACCEL	12.100	0.032	12.200	0.033
FREQ	ACCEL	12.300	0.033	12.400	0.034
FREQ	ACCEL	12.500	0.034	12.600	0.035
FREQ	ACCEL	12.700	0.035	12.800	0.036
FREQ	ACCEL	12.900	0.037	13.000	0.037
FREQ	ACCEL	13.100	0.038	13.200	0.038
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FREQ	ACCEL	13.500	0.041	13.600	0.043
FREQ	ACCEL	13.700	0.045	13.800	0.045
FREQ	ACCEL	13.900	0.048	14.000	0.049
FREQ	ACCEL	14.100	0.052	14.200	0.055
FREQ	ACCEL	14.300	0.058	14.400	0.060
FREQ	ACCEL	14.500	0.066	14.600	0.072
FREQ	ACCEL	14.700	0.081	14.800	0.095
FREQ	ACCEL	14.900	0.113	15.000	0.131
FREQ	ACCEL	15.100	0.138	15.200	0.134
FREQ	ACCEL	15.300	0.140	15.400	0.149
FREQ	ACCEL	15.500	0.155	15.600	0.159
FREQ	ACCEL	15.700	0.161	15.800	0.158
FREQ	ACCEL	15.900	0.155	16.000	0.167
FREQ	ACCEL	16.100	0.177	16.200	0.175
FREQ	ACCEL	16.300	0.164	16.400	0.152
FREQ	ACCEL	16.500	0.134	16.600	0.120
FREQ	ACCEL	16.700	0.108	16.800	0.101
FREQ	ACCEL	16.900	0.098	17.000	0.099
FREQ	ACCEL	17.100	0.100	17.200	0.098
FREQ	ACCEL	17.300	0.094	17.400	0.088
FREQ	ACCEL	17.500	0.086	17.600	0.080
FREQ	ACCEL	17.700	0.079	17.800	0.079
FREQ	ACCEL	17.900	0.081	18.000	0.079
FREQ	ACCEL	18.100	0.078	18.200	0.080
FREQ	ACCEL	18.300	0.081	18.400	0.082
FREQ	ACCEL	18.500	0.083	18.600	0.085
FREQ	ACCEL	18.700	0.086	18.800	0.087
FREQ	ACCEL	18.900	0.088	19.000	0.089
FREQ	ACCEL	19.100	0.090	19.200	0.091
FREQ	ACCEL	19.300	0.092	19.400	0.093
FREQ	ACCEL	19.500	0.095	19.600	0.098
FREQ	ACCEL	19.700	0.103	19.800	0.112
FREQ	ACCEL	19.900	0.120	20.000	0.137
FREQ	ACCEL	20.100	0.144	20.200	0.143
FREQ	ACCEL	20.300	0.140	20.400	0.135
FREQ	ACCEL	20.500	0.124	20.600	0.113
FREQ	ACCEL	20.700	0.115	20.800	0.117
FREQ	ACCEL	20.900	0.118	21.000	0.119
FREQ	ACCEL	21.100	0.126	21.200	0.131
FREQ	ACCEL	21.300	0.126	21.400	0.124
FREQ	ACCEL	21.500	0.126	21.600	0.128
FREQ	ACCEL	21.700	0.130	21.800	0.132
FREQ	ACCEL	21.900	0.133	22.000	0.134
FREQ	ACCEL	22.100	0.135	22.200	0.141

FREQ	ACCEL	22.300	0.145	22.400	0.139
FREQ	ACCEL	22.500	0.143	22.600	0.147
FREQ	ACCEL	22.700	0.150	22.800	0.153
FREQ	ACCEL	22.900	0.155	23.000	0.158
FREQ	ACCEL	23.100	0.160	23.200	0.166
FREQ	ACCEL	23.300	0.171	23.400	0.166
FREQ	ACCEL	23.500	0.170	23.600	0.173
FREQ	ACCEL	23.700	0.176	23.800	0.179
FREQ	ACCEL	23.900	0.181	24.000	0.189
FREQ	ACCEL	24.100	0.216	24.200	0.243
FREQ	ACCEL	24.300	0.267	24.400	0.273
FREQ	ACCEL	24.500	0.268	24.600	0.257
FREQ	ACCEL	24.700	0.247	24.800	0.234
FREQ	ACCEL	24.900	0.225	25.000	0.227
FREQ	ACCEL	25.100	0.239	25.200	0.256
FREQ	ACCEL	25.300	0.268	25.400	0.270
FREQ	ACCEL	25.500	0.262	25.600	0.249
FREQ	ACCEL	25.700	0.253	25.800	0.258
FREQ	ACCEL	25.900	0.261	26.000	0.266
FREQ	ACCEL	26.100	0.315	26.200	0.363
FREQ	ACCEL	26.300	0.401	26.400	0.432
FREQ	ACCEL	26.500	0.453	26.600	0.455
FREQ	ACCEL	26.700	0.438	26.800	0.418
FREQ	ACCEL	26.900	0.410	27.000	0.412
FREQ	ACCEL	27.100	0.429	27.200	0.467
FREQ	ACCEL	27.300	0.514	27.400	0.550
FREQ	ACCEL	27.500	0.561	27.600	0.571
FREQ	ACCEL	27.700	0.559	27.800	0.516
FREQ	ACCEL	27.900	0.468	28.000	0.417
FREQ	ACCEL	28.100	0.357	28.200	0.321
FREQ	ACCEL	28.300	0.318	28.400	0.313
FREQ	ACCEL	28.500	0.327	28.600	0.352
FREQ	ACCEL	28.700	0.363	28.800	0.375
FREQ	ACCEL	28.900	0.378	29.000	0.359
FREQ	ACCEL	29.100	0.325	29.200	0.285
FREQ	ACCEL	29.300	0.273	29.400	0.272
FREQ	ACCEL	29.500	0.270	29.600	0.267
FREQ	ACCEL	29.700	0.263	29.800	0.257
FREQ	ACCEL	29.900	0.257	30.000	0.259
FREQ	ACCEL	31.000	0.276	32.000	0.287
FREQ	ACCEL	33.000	0.294	34.000	0.309
FREQ	ACCEL	35.000	0.314	36.000	0.390
FREQ	ACCEL	37.000	0.575	38.000	0.705
FREQ	ACCEL	39.000	0.960	40.000	0.636
FREQ	ACCEL	41.000	0.438	42.000	0.391
FREQ	ACCEL	43.000	0.336	44.000	0.326
FREQ	ACCEL	45.000	0.309	46.000	0.308
FREQ	ACCEL	47.000	0.312	48.000	0.314
FREQ	ACCEL	49.000	0.436	50.000	0.513
FREQ	ACCEL	51.000	0.557	52.000	0.831
FREQ	ACCEL	53.000	0.708	54.000	0.752
FREQ	ACCEL	55.000	0.541	56.000	0.346
FREQ	ACCEL	57.000	0.273	58.000	0.271
FREQ	ACCEL	59.000	0.268	60.000	0.262

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PSEG CALCULATION CONTINUATION SHEET	TITLE PIPING CODE COMPLIANCE DOCUMENTATION SYSTEM P-201	ID NO. C-31 / REFERENCE NONE	SHEET III.1 OF 347
	ORIGINATOR DATE	7-15-88	
	VFR or CKR DATE	7/15/88	

ATTACHMENT 8
PAGE 1 OF 108
CALC. NO. C-0031/7IRP

ATTACHMENT III

1) PISTAR OUTPUT (Under separate cover)

2) OPTSUPT OUTPUT (Included in ~~this~~ HG package)

3) FLANGE OUTPUT (0 pages)

4) Acceleration Spectra plots — Total 107 pages

RUNID/Date	Case Description	Pages
AFGZ 6/17/88	SRV Case C3-1 (2% D T.H.)	19
AAQG 6/9/88	SRV Case C3-2 (2% D T.H.)	19
AAQJ 6/9/88	CQI (2% D-T.H.)	19
AAQO 6/9/88	CHUGI (2% D T.H.)	19
AARK 6/20/88	SRV Case C3-2 (3% D T.H.)	19
ABAV 7/14/88	" " " (2% D T.H. P201)	4
ABAY 7/14/88	CQI (2% D T.H. note P201)	4
ABBB 7/14/88	CHUGI (" " " ")	4

5) Acceleration Spectra Digitized output Total 239 pages

File Name	Description	Pages
QABP201A	SRV Case C3-1 (2% D T.H.)	43
P201AQB	SRV Case C3-2 (")	43
P201ACQ	CQ Acceleration (")	43
P201ACH	CHUG " (")	43
QB3P201	SRV Case C3-2 (3% D T.H.)	43
QBAP201	" " " (2% " " -P201 Note)	8
CQA P201	CQI " " (" " " " ")	8
CHA P201	CHUGI " " (" " " " ")	8

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JOB NAME = AFGZ DATE = 88/06/17 CHARGE = F3395JT

PROJECT = *311*XPS080502

OPTICOM

QAB1B (2% for Case C3.1)

spectra at 1% damping

(Total 19 pages)

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AFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 26BR X-TRAN LC = 3

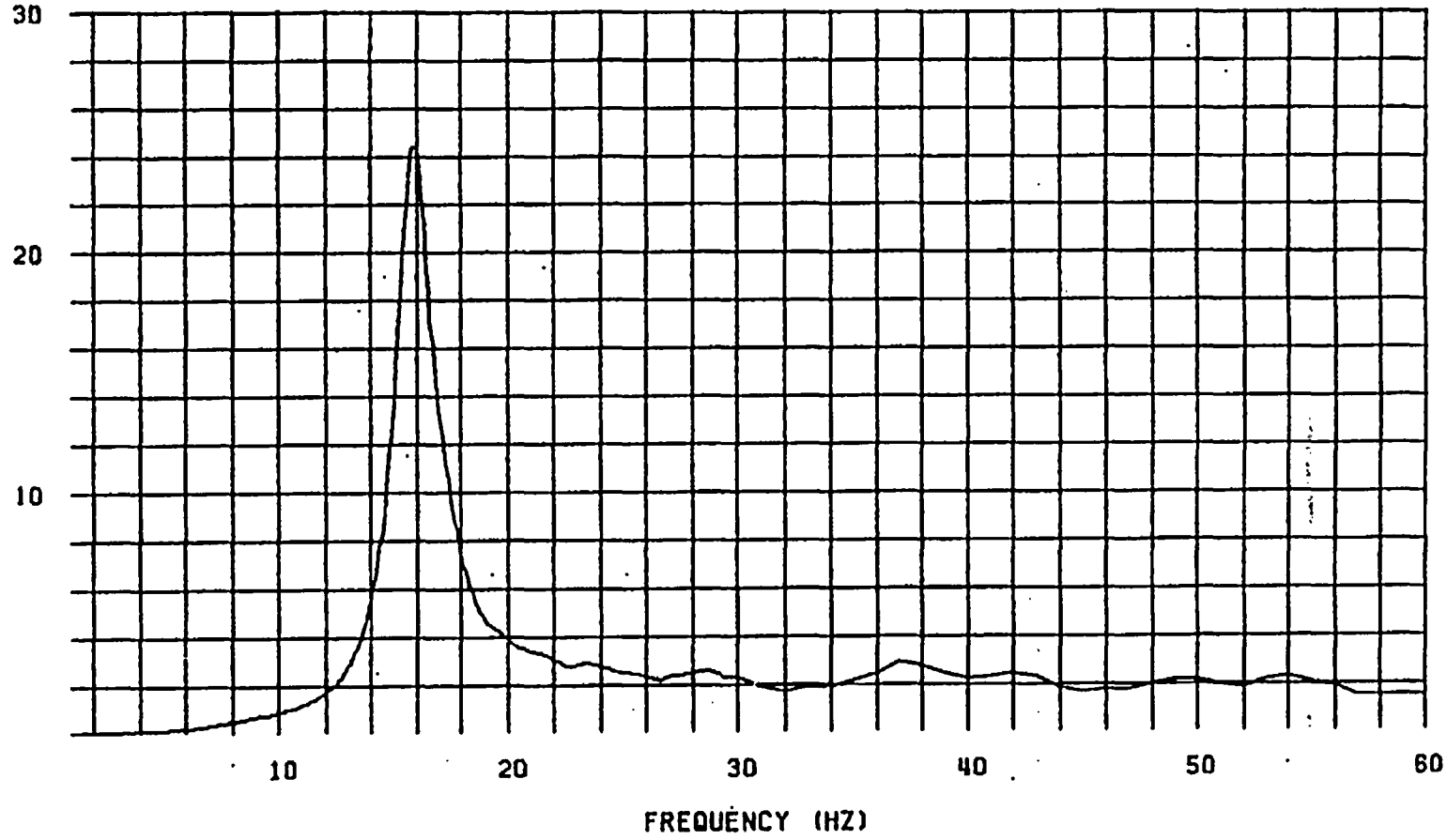

FIGURE 1

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/7IR0

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RFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 26BR Y-TRAN LC = 3

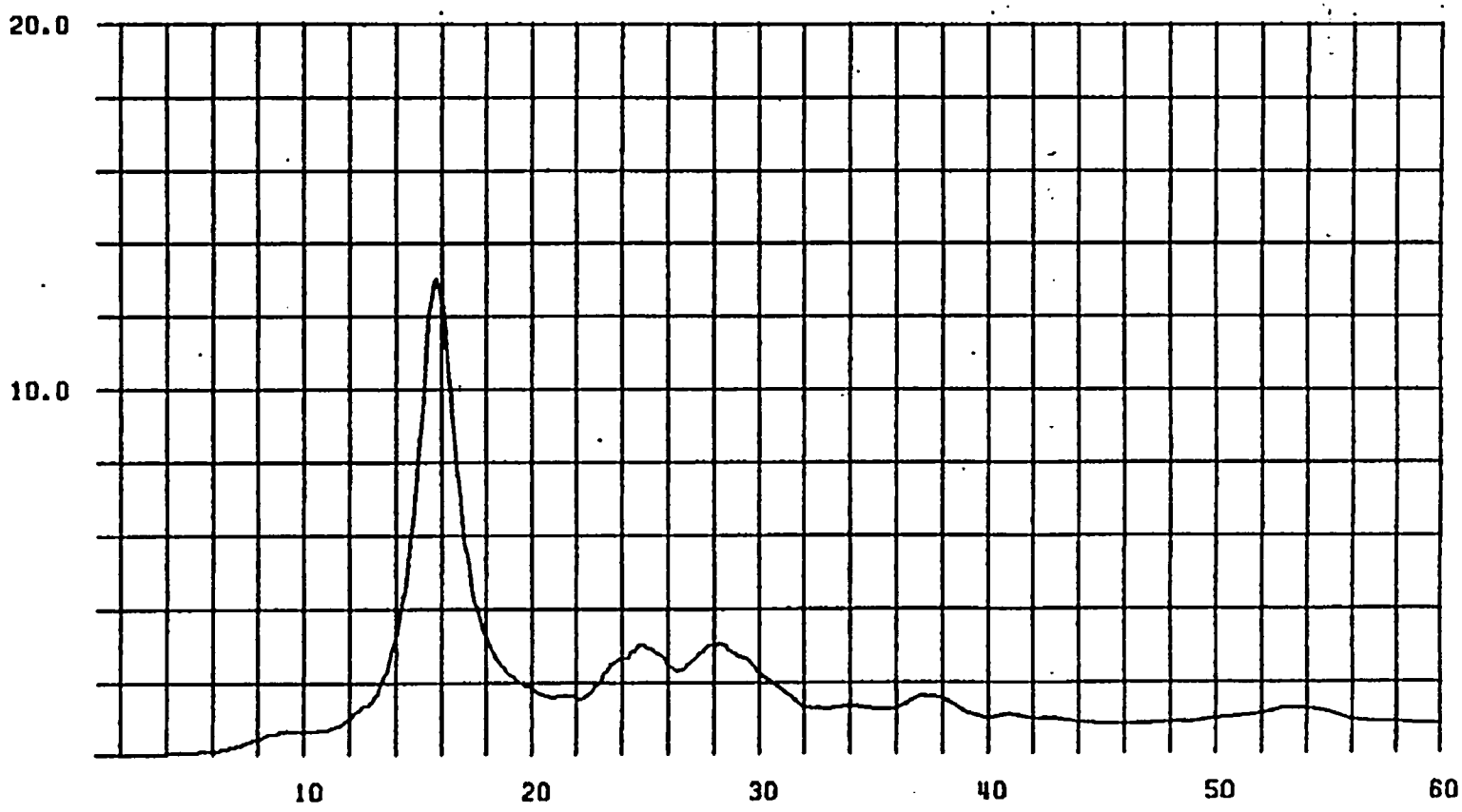

FIGURE 2

LEGEND

AFGZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 26BR Z-TRAN LC = 3

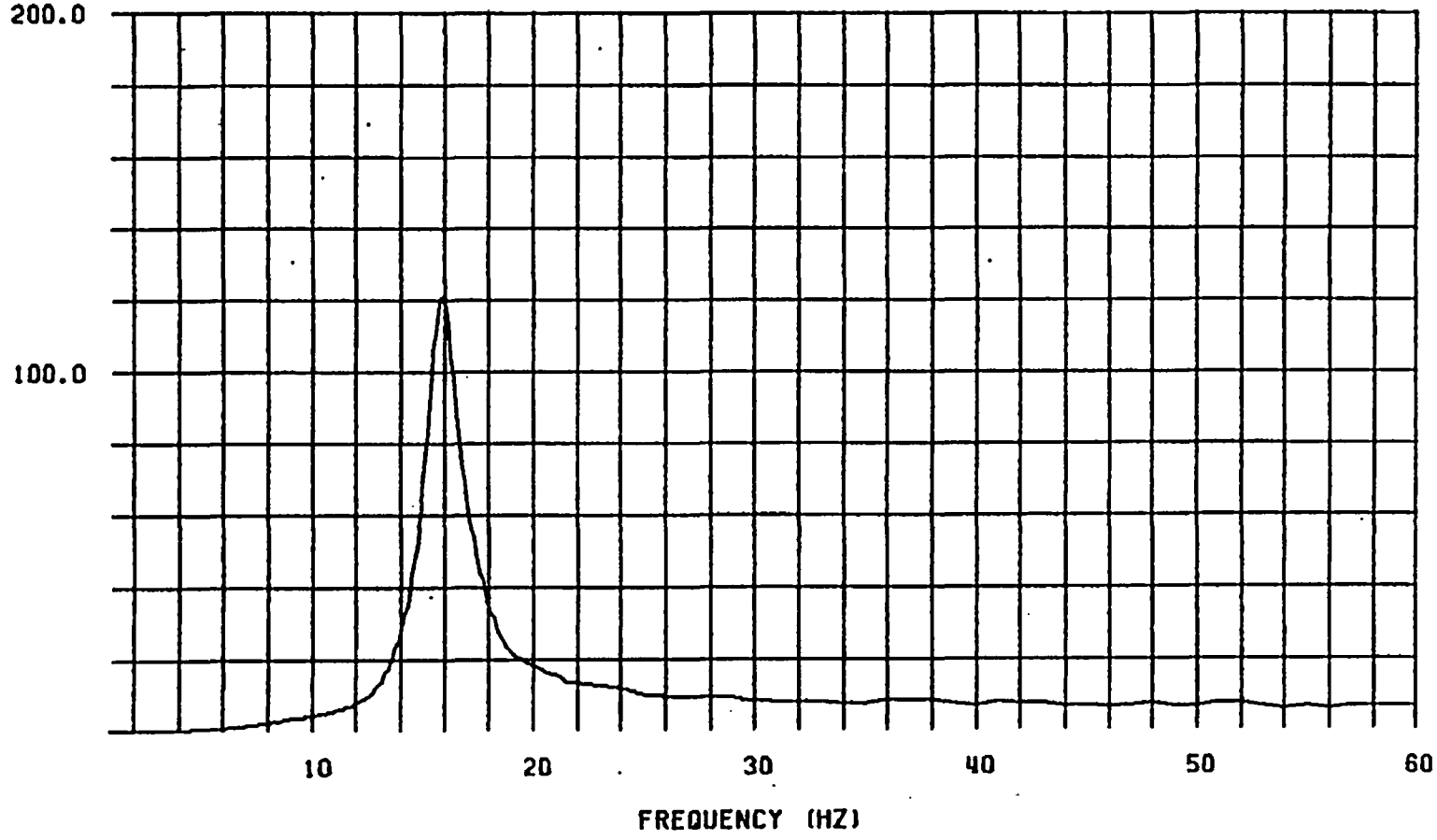

FIGURE 3

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 27BR X-TRAN LC = 3

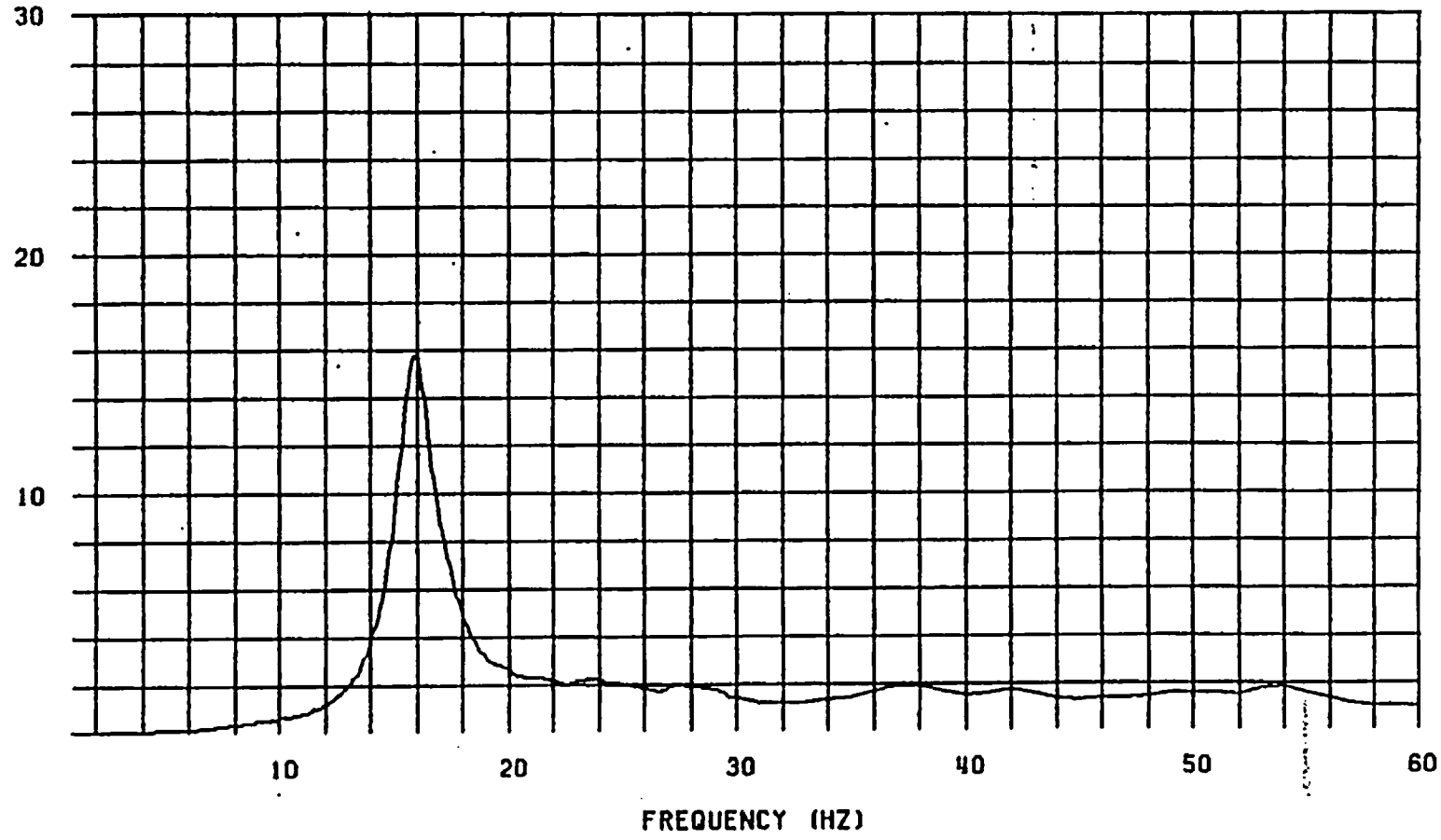

FIGURE 4

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 27BR Y-TRAN LC = 3

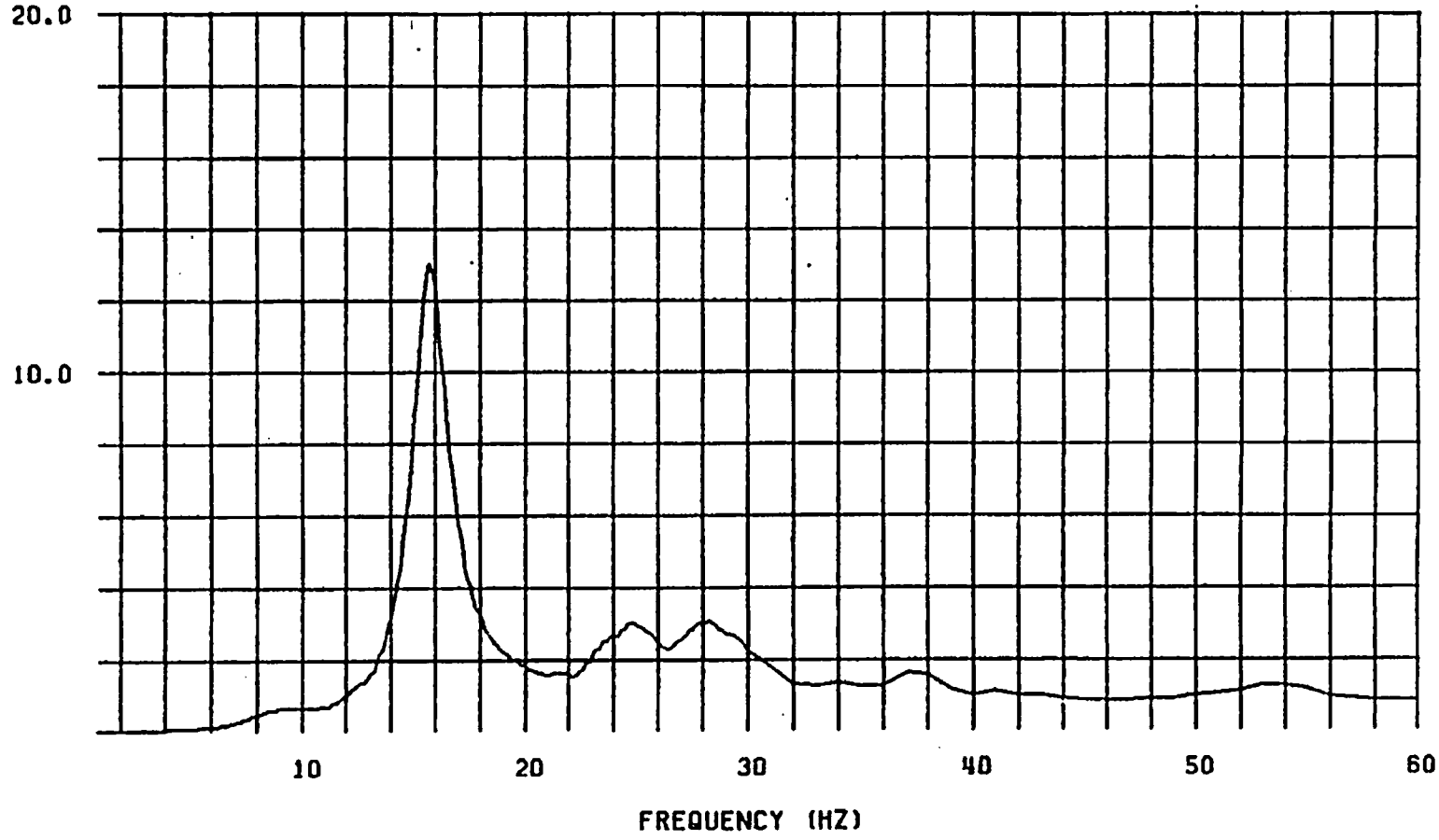

FIGURE 5

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/7IRO

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AFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 27BR Z-TRAN LC = 3

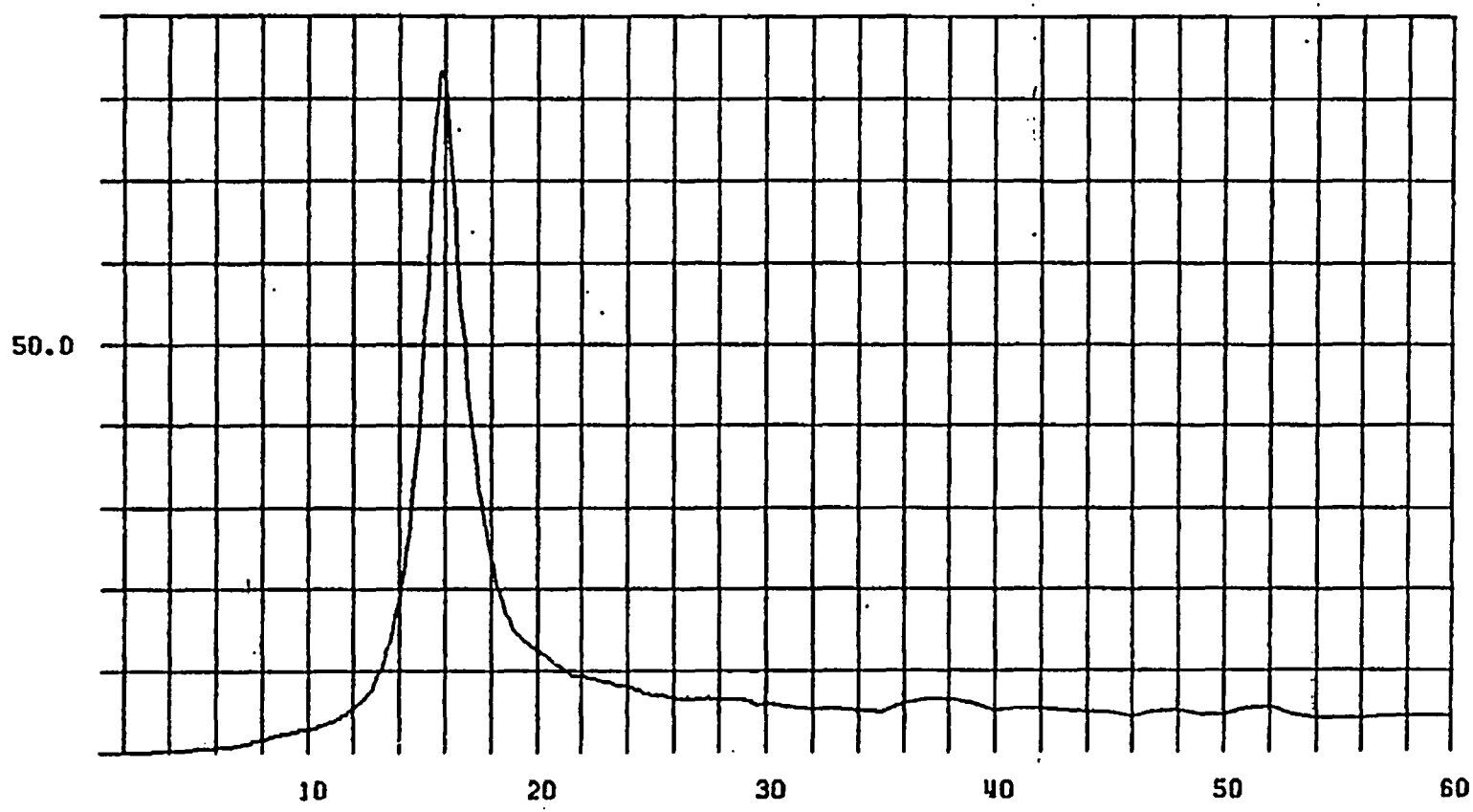

FIGURE 6

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/7IR0

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AFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 54BR X-TRAN LC = 3

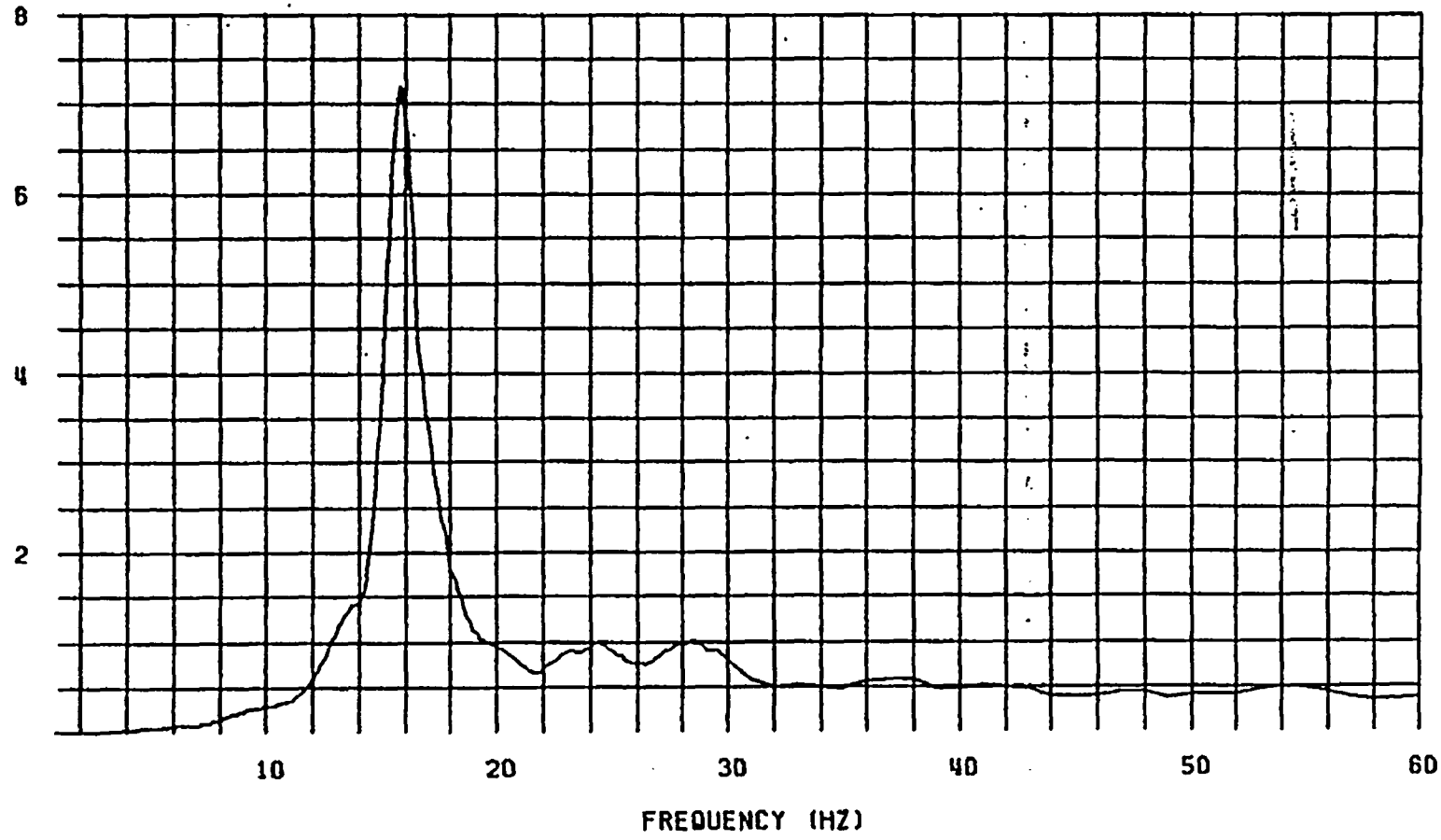

FIGURE 7

LEGEND

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AFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QAB1 ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 54BR Y-TRAN LC = 3

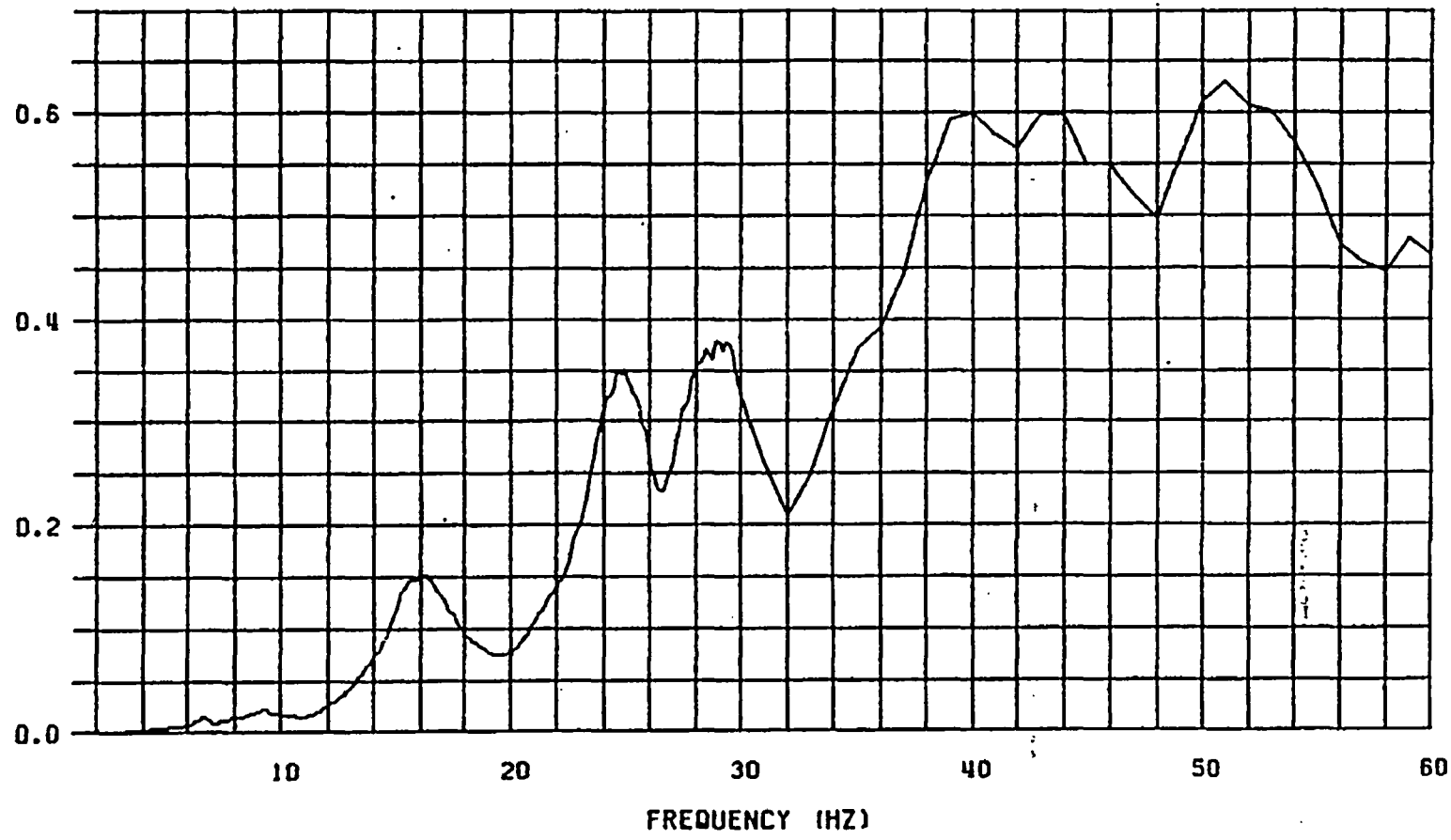

FIGURE 8

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 54BR Z-TRAN LC = 3

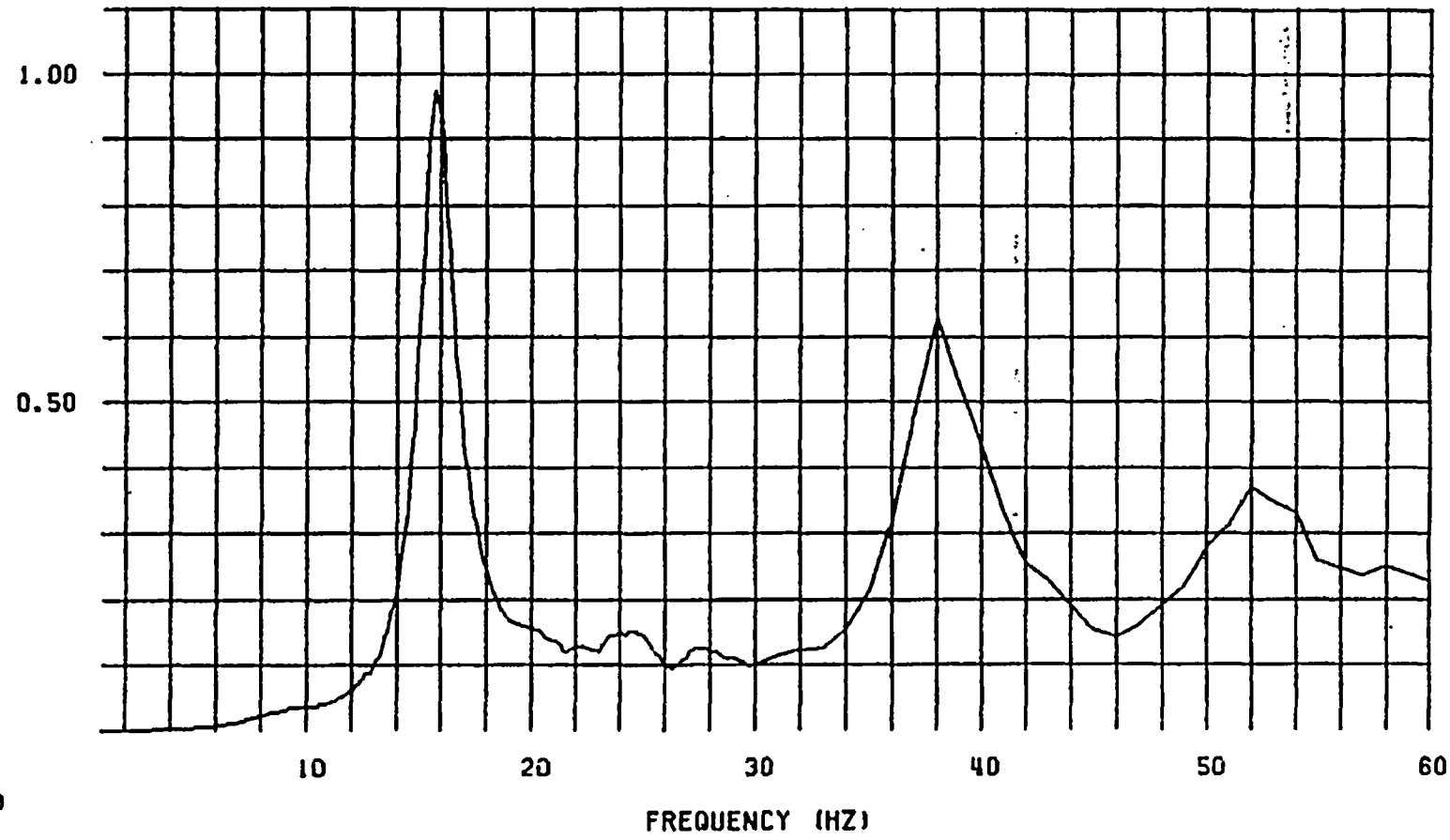

FIGURE 9

LEGEND

ATTACHMENT B
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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 91 X-TRAN LC = 3

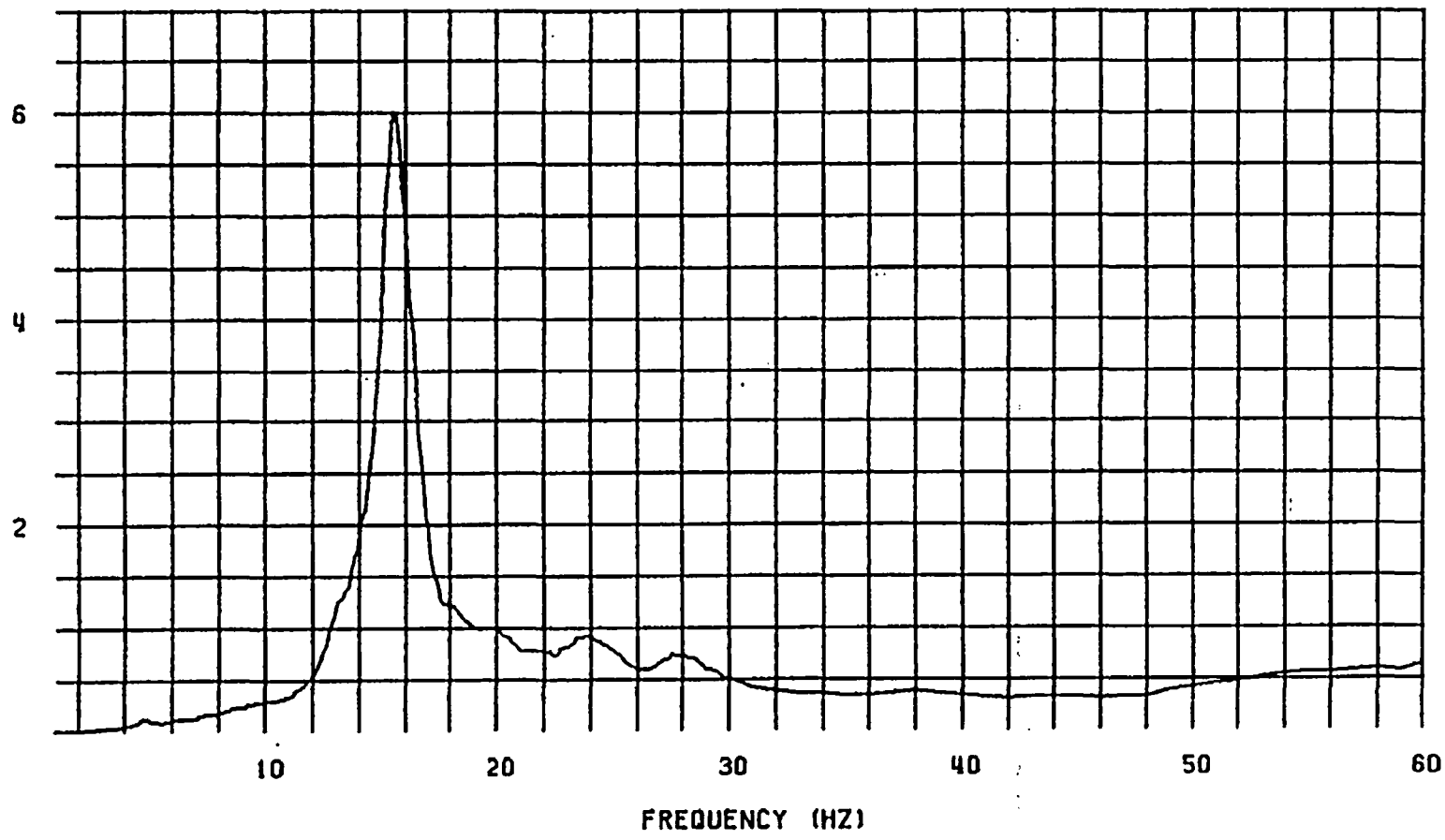

FIGURE 10

LEGEND

ATTACHMENT 8
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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 91 Y-TRAN LC = 3

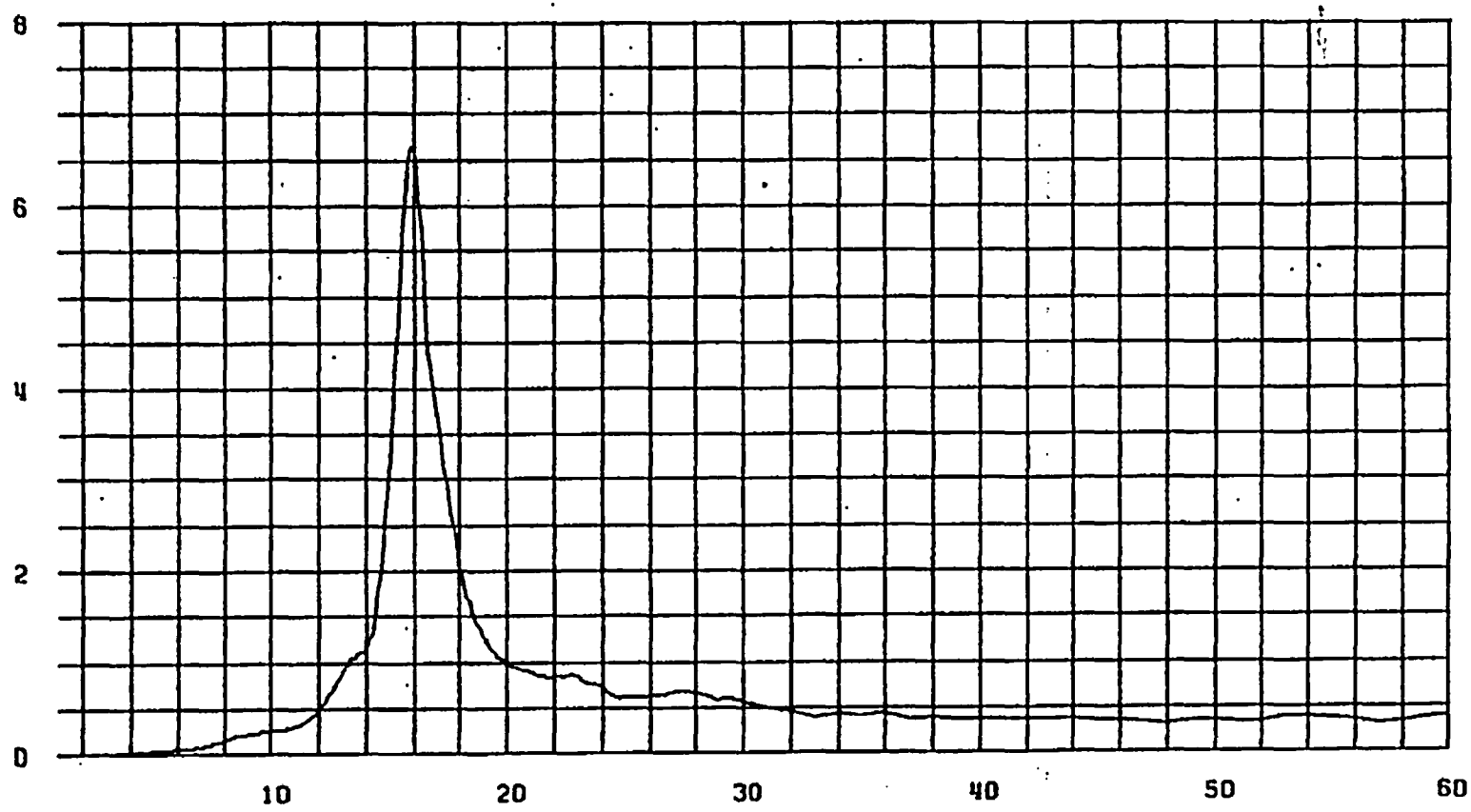

FIGURE 11

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 91 Z-TRAN LC = 3

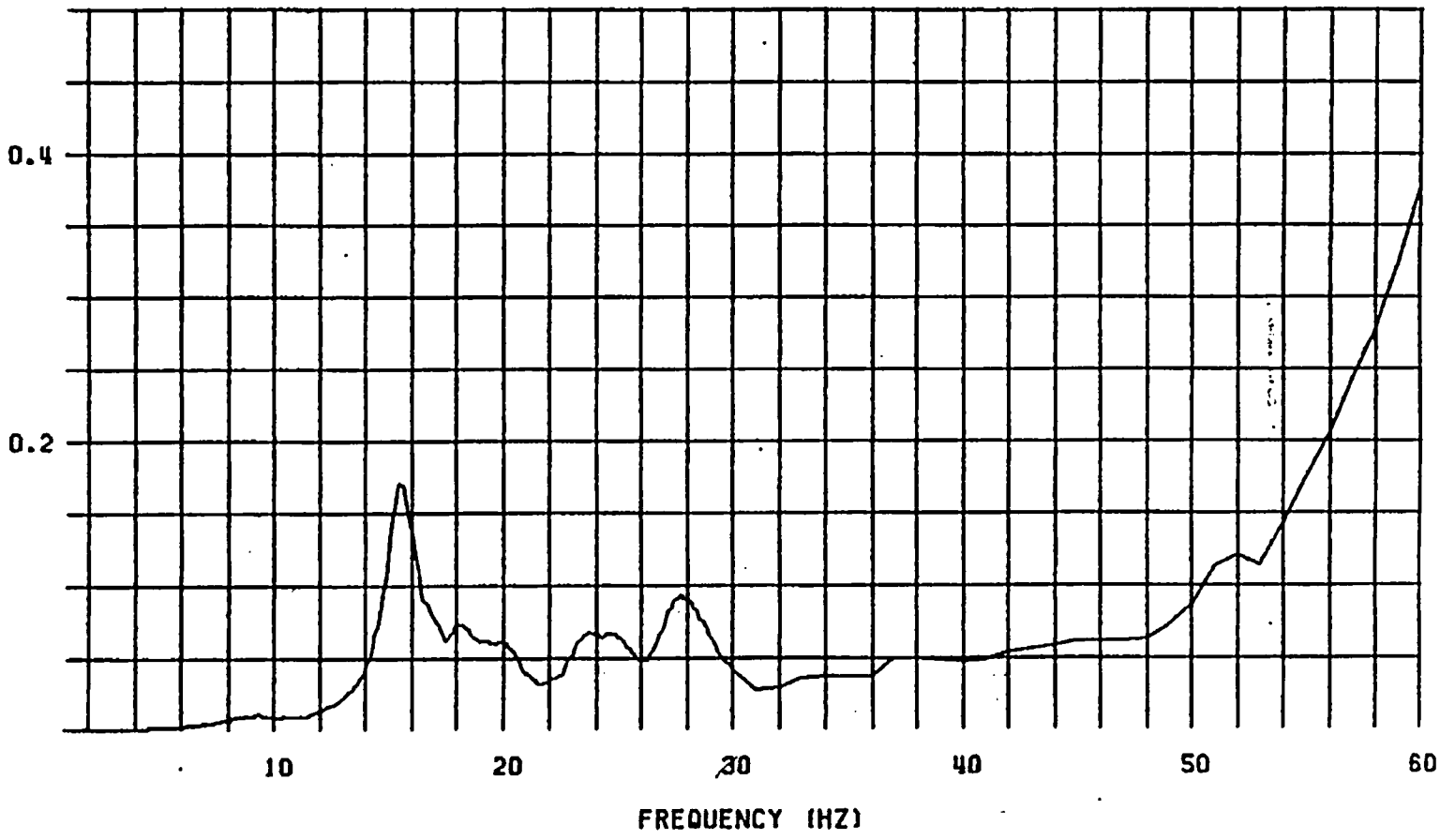

FIGURE 12

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 92 X-TRAN LC = 3

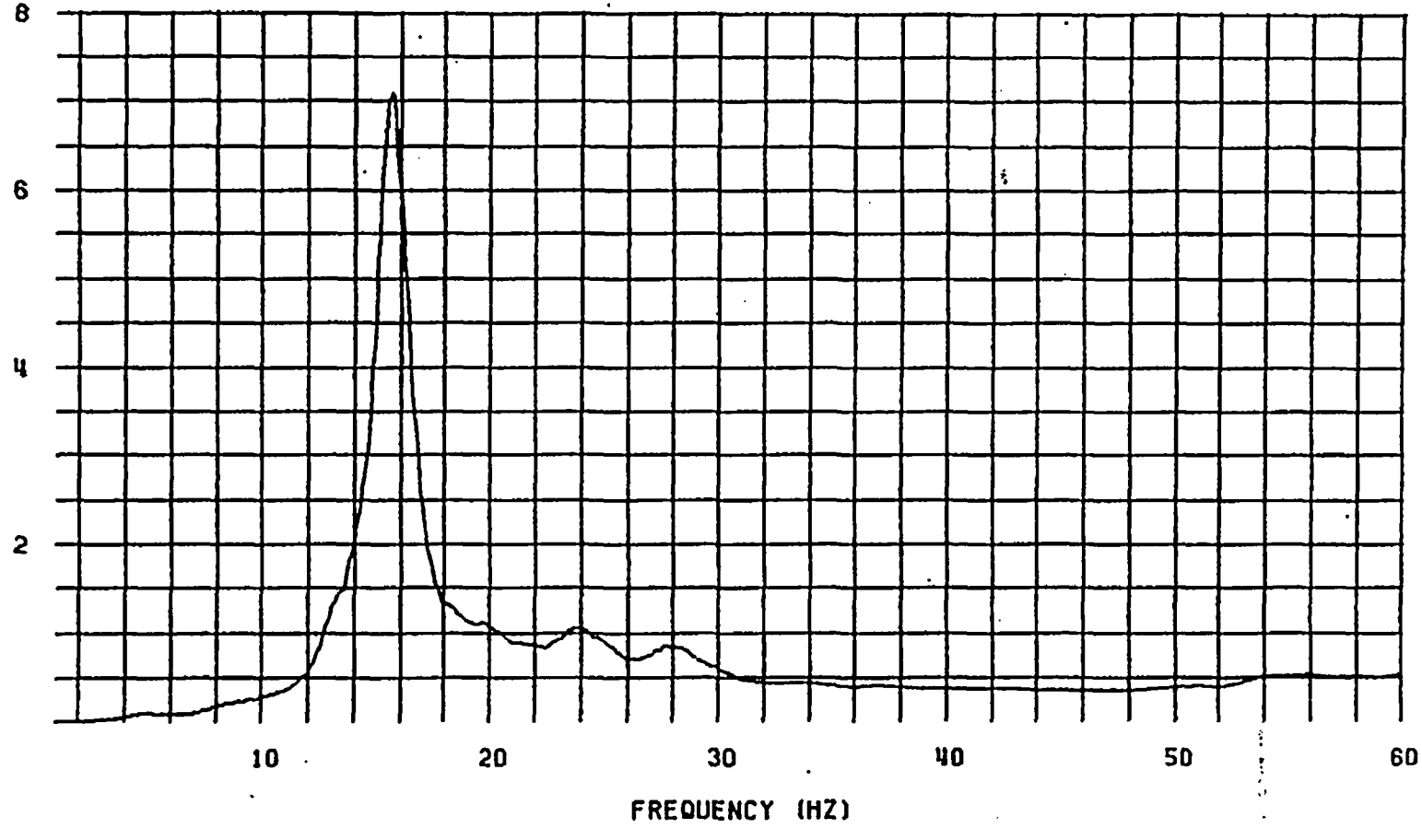

FIGURE 13

LEGEND

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RFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 92 Y-TRAN LC = 3

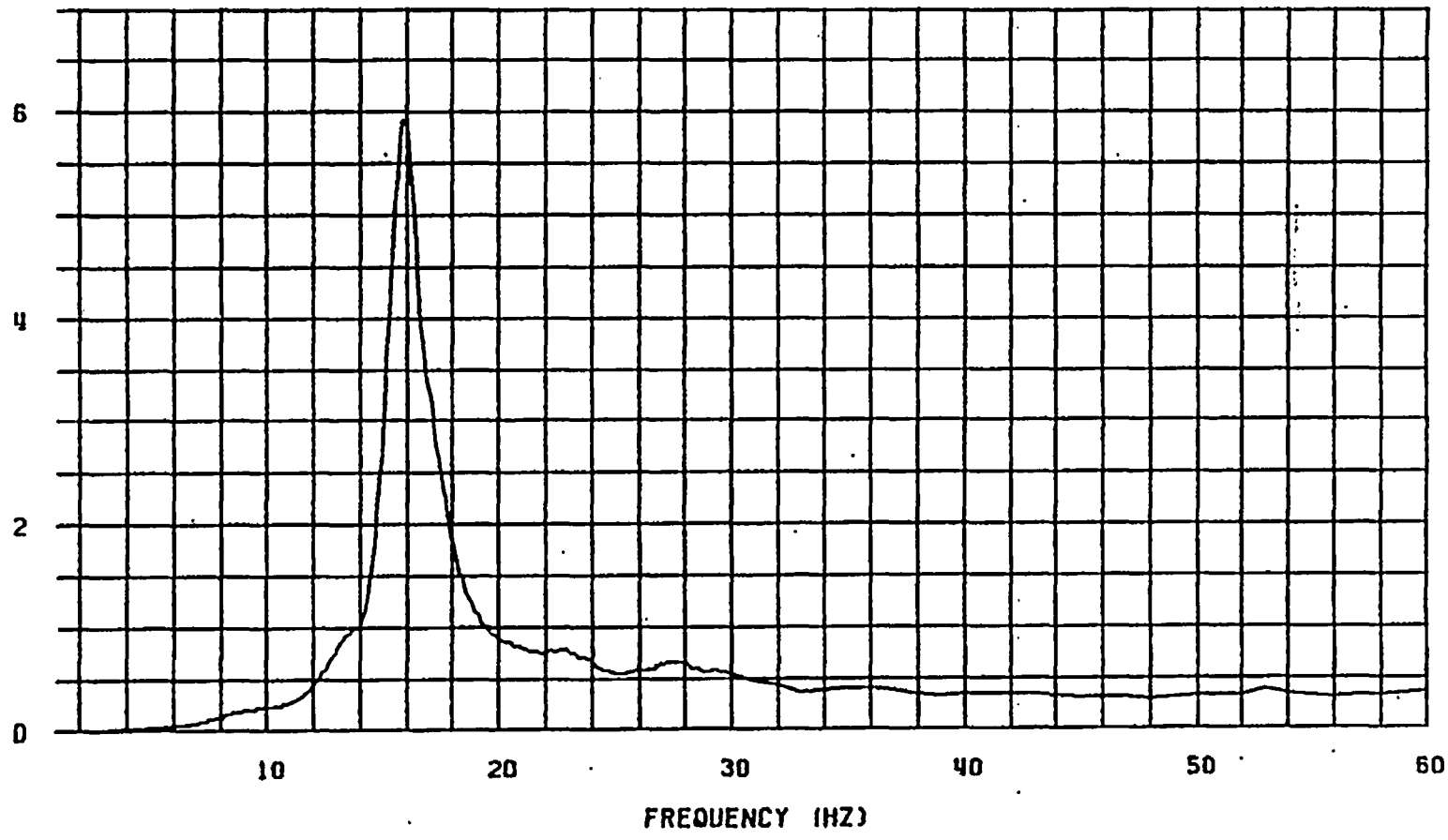

FIGURE 14

LEGEND

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CALC. NO. C-0031/7180

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AFGZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 92 Z-TRAN LC = 3

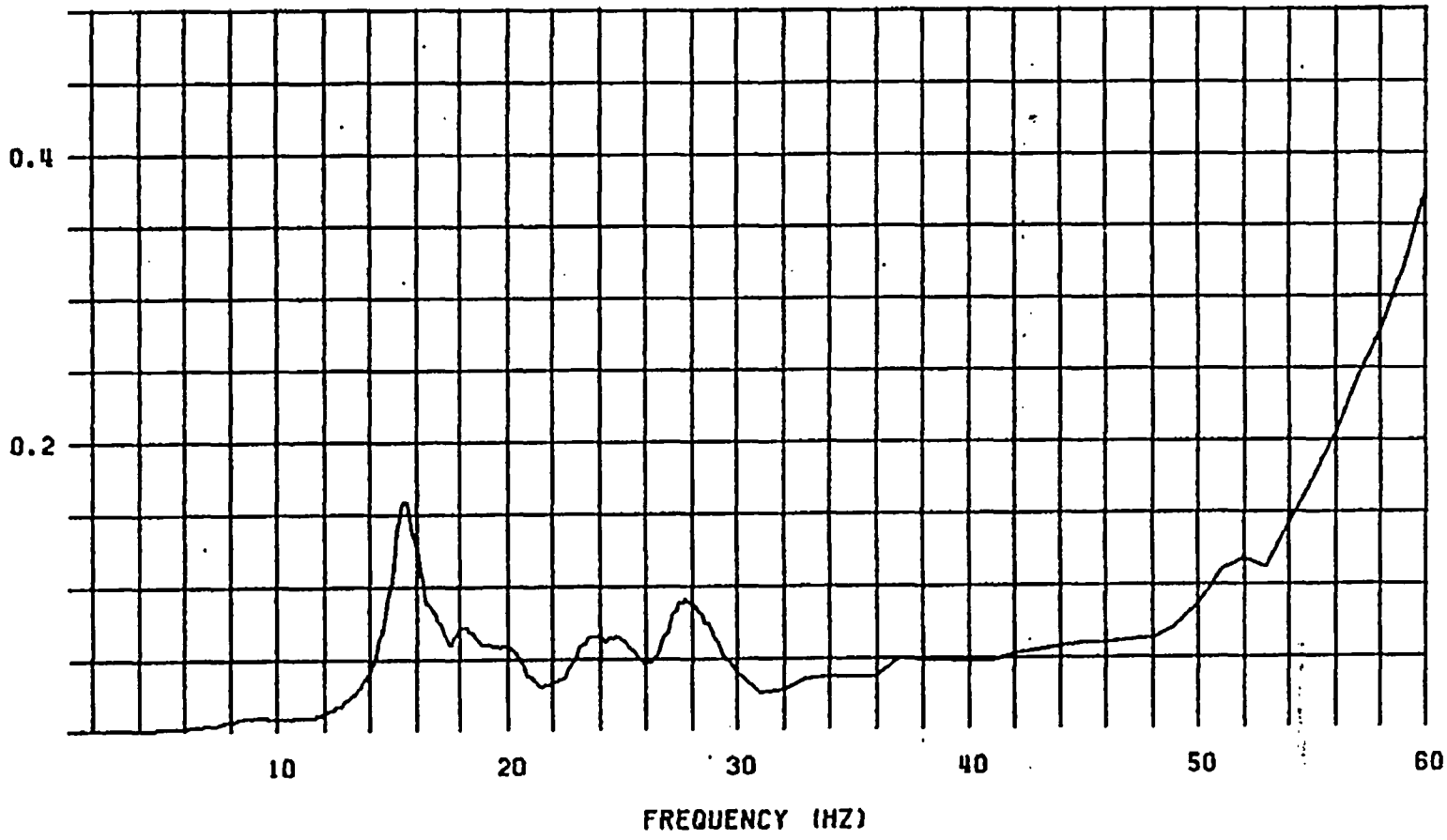

FIGURE 15

LEGEND

ATTACHMENT 8
PAGE 17 OF 108
CALC. NO. C-0031/7IRD

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AFGZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G); CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 145CP X-TRAN LC = 3

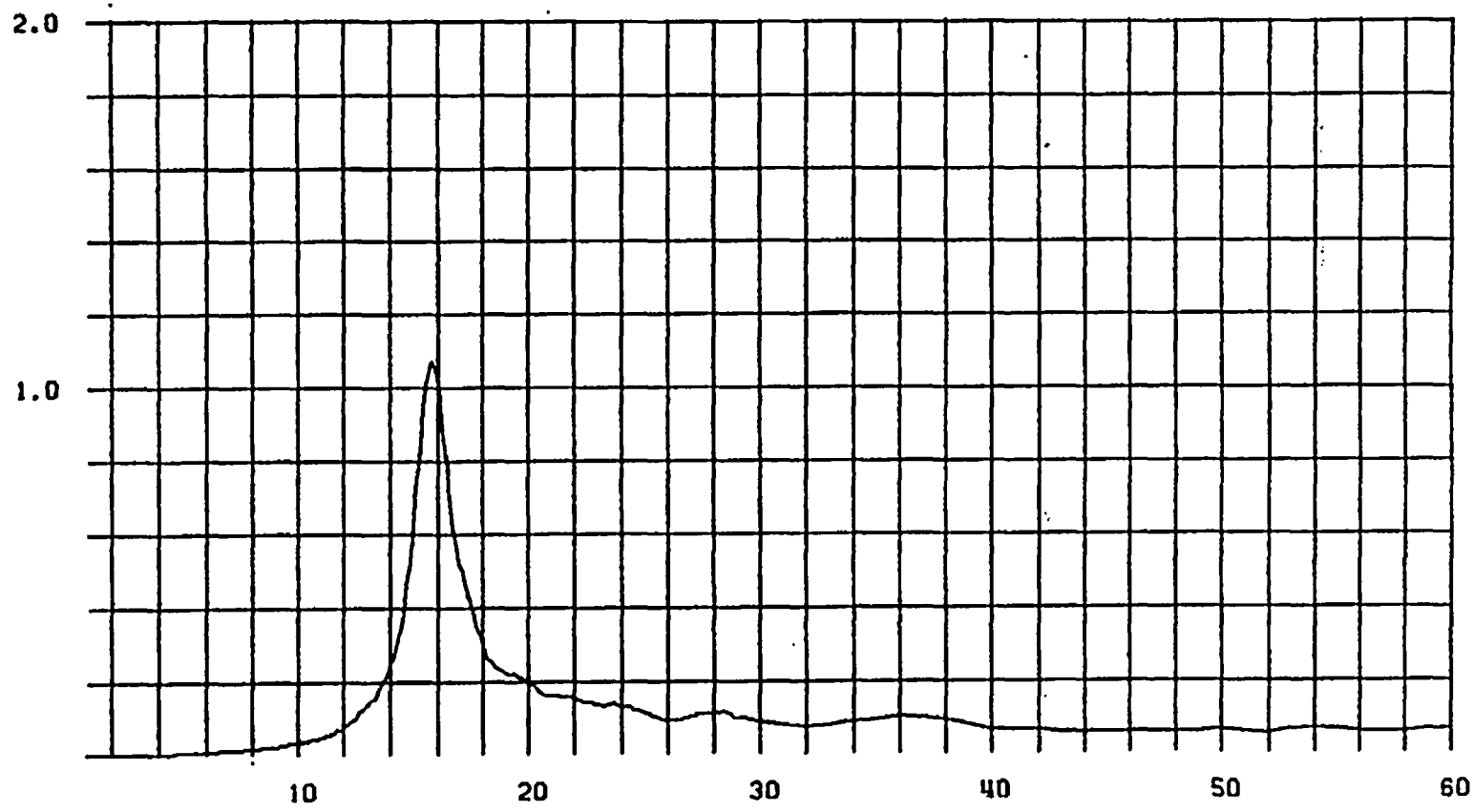

FIGURE 16

LEGEND

ATTACHMENT 8
PAGE 18 OF 108
CALC. NO. C-0031/TIRD

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AFGZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 145CP Y-TRAN LC = 3

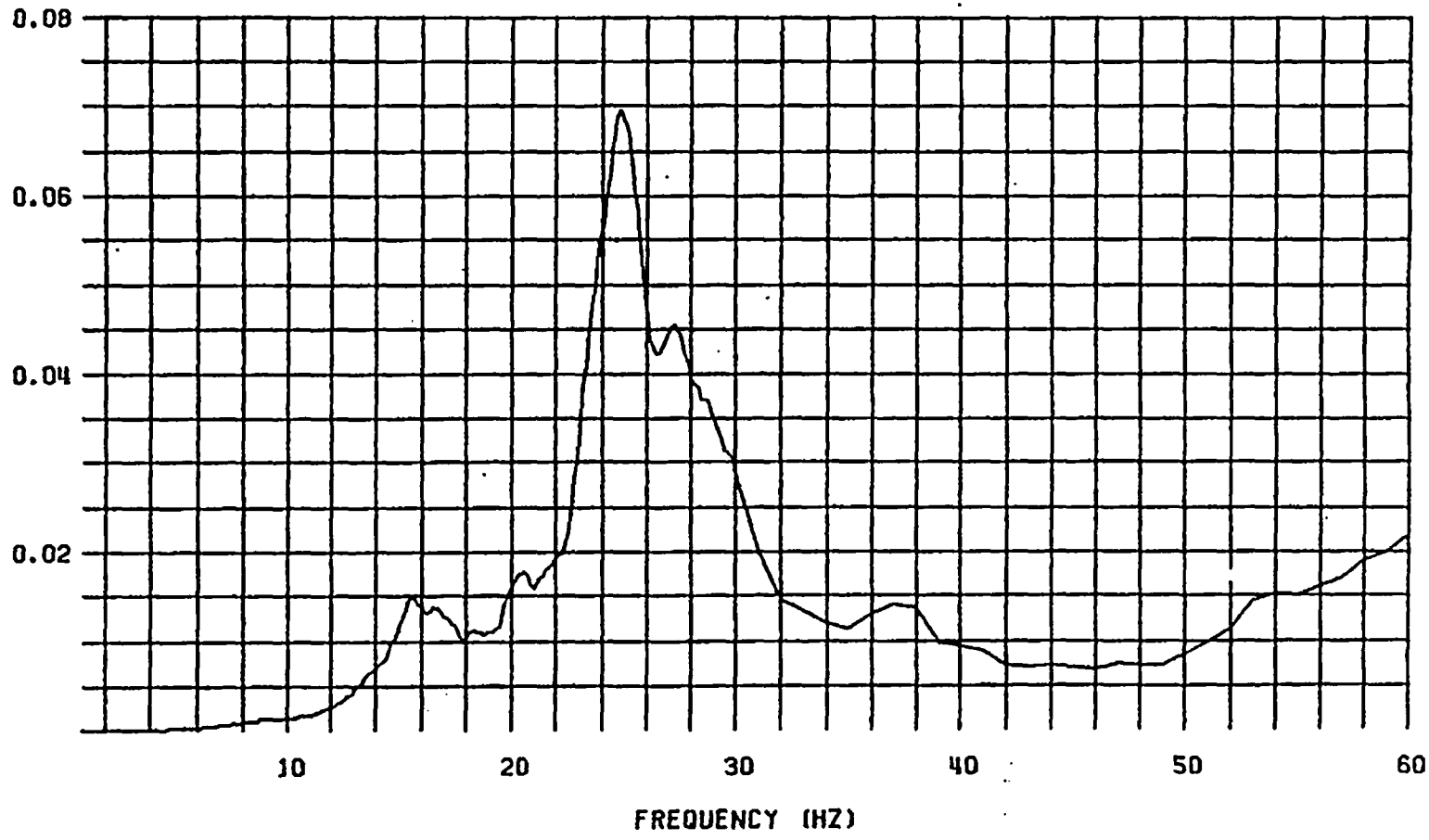

FIGURE 17

LEGEND

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AFCZ 88/06/17 15.01.06

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.1
ACCEL RESPONSE SPECTRUM AT NODE 145CP Z-TRAN LC = 3

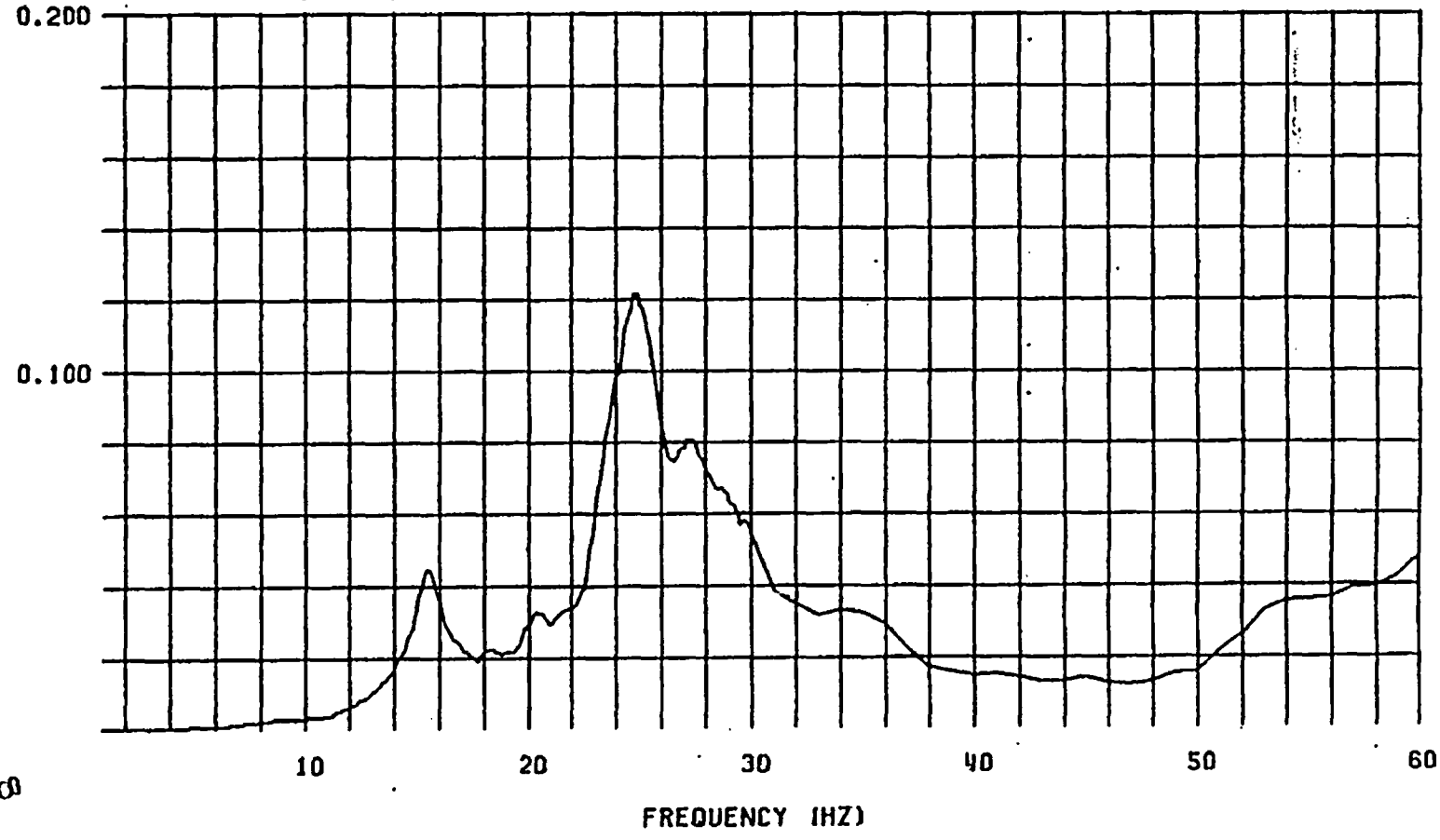

FIGURE 18

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/TJR0

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JOB NAME = AAQG DATE = 88/06/09 CHARGE = F3395JT

PROJECT = *311*XPS080502

OPTICOM

QABI (Case C3.2)
2% Damping in Coupling Analysis
(Total 19 pages)

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR X-TRAN LC = 1

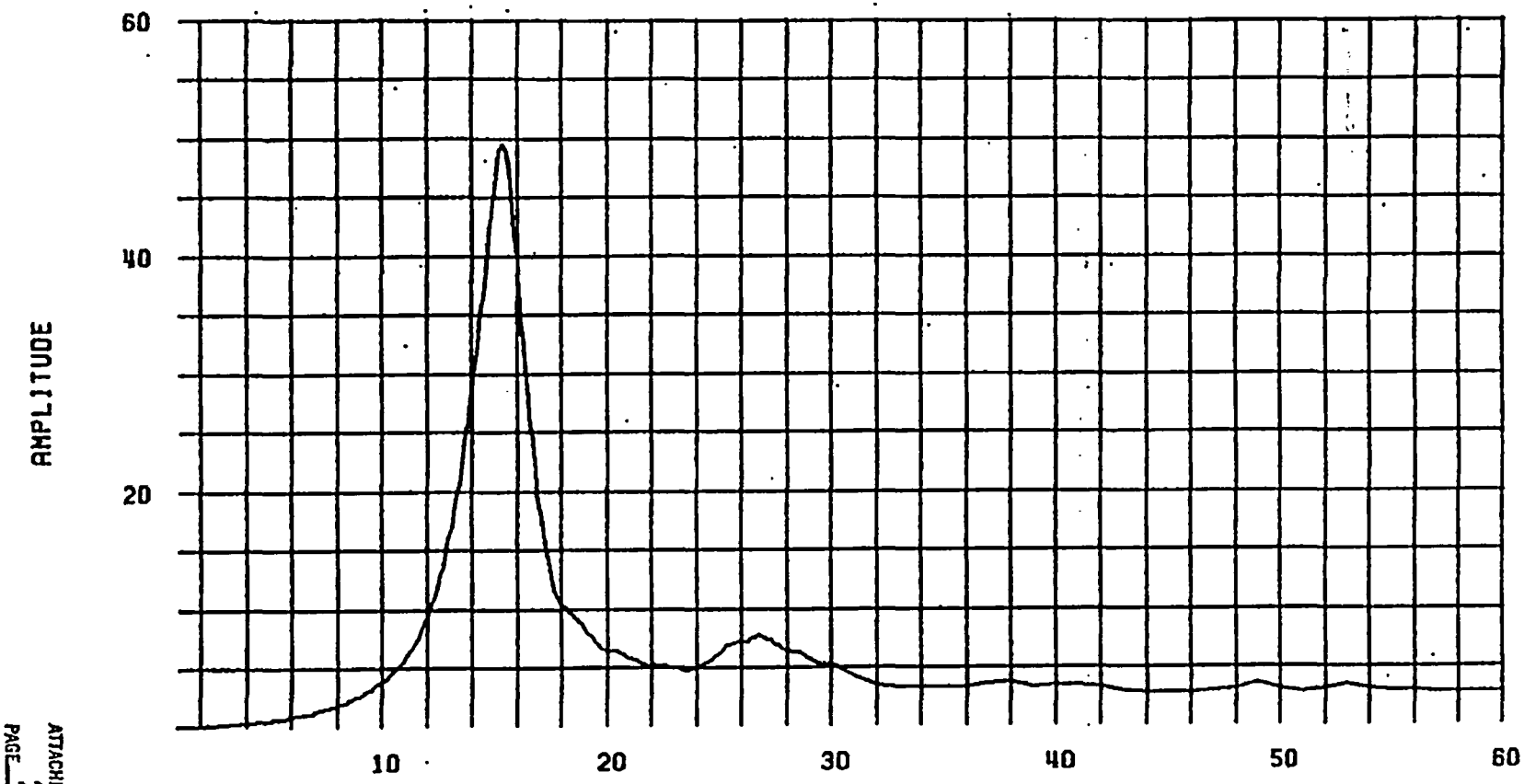

FIGURE 1

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Y-TRAN LC = 1

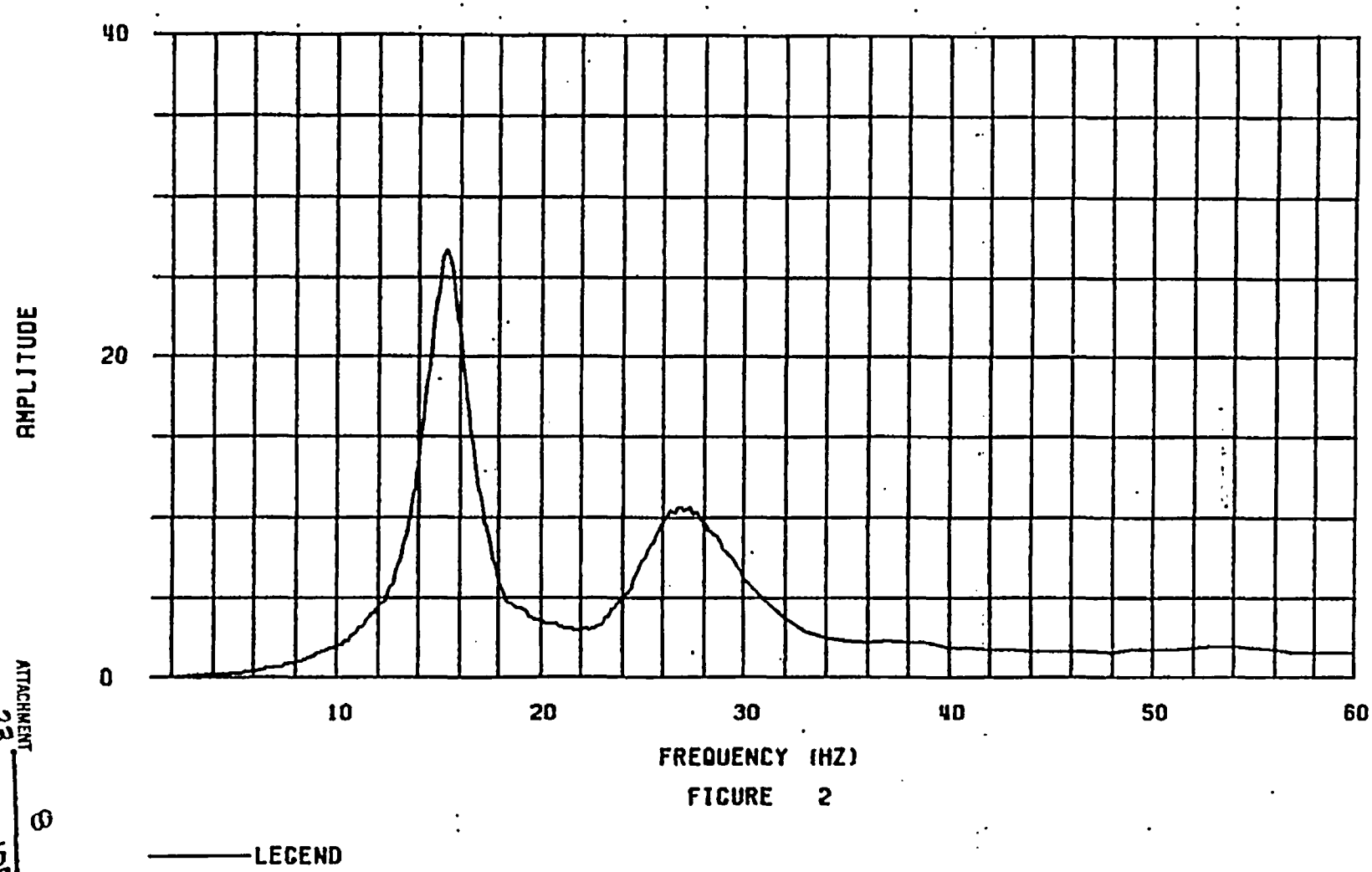

FIGURE 2

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AAQC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Z-TRAN LC = 1

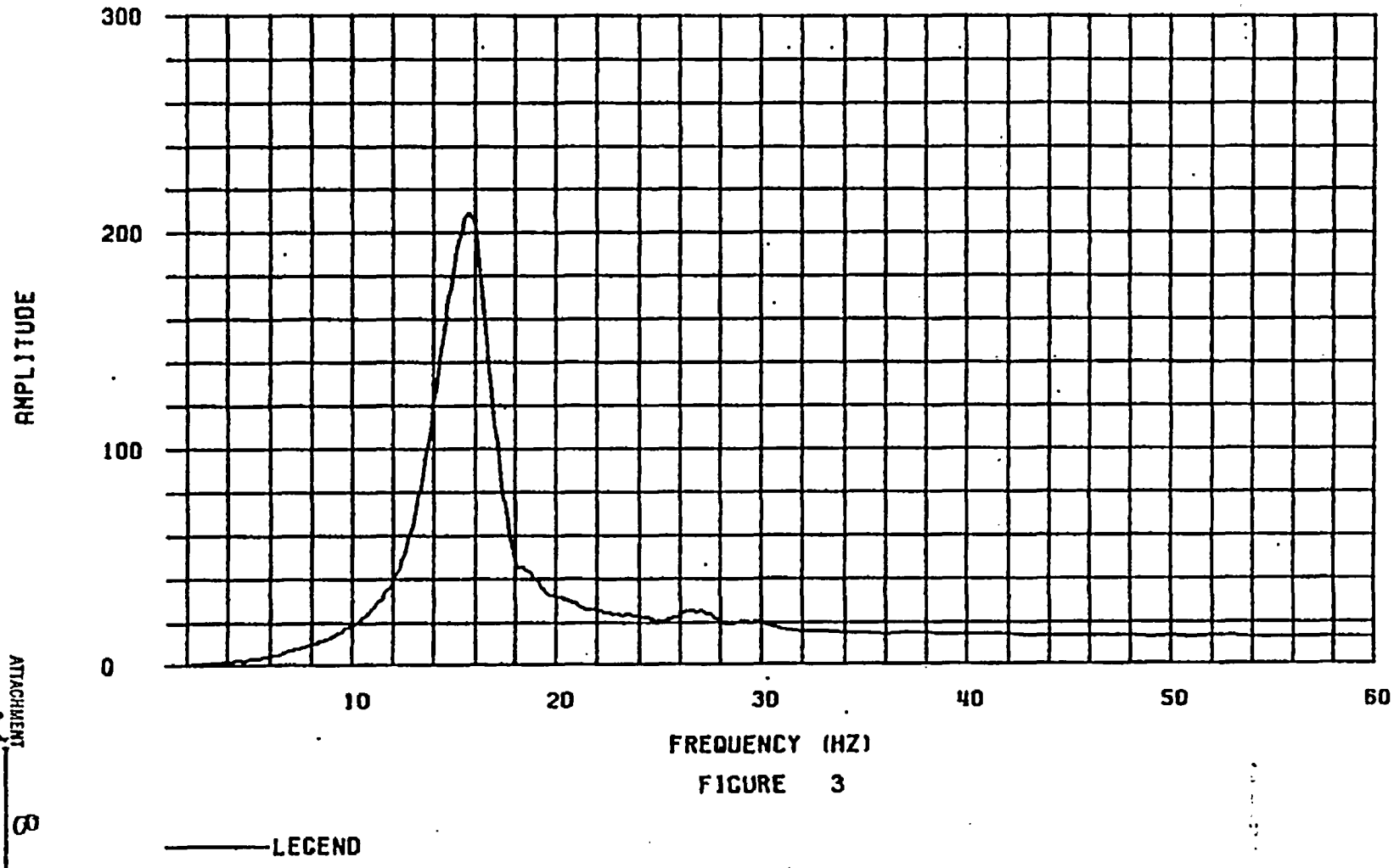

FIGURE 3

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AAOC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR X-TRAN LC = 1

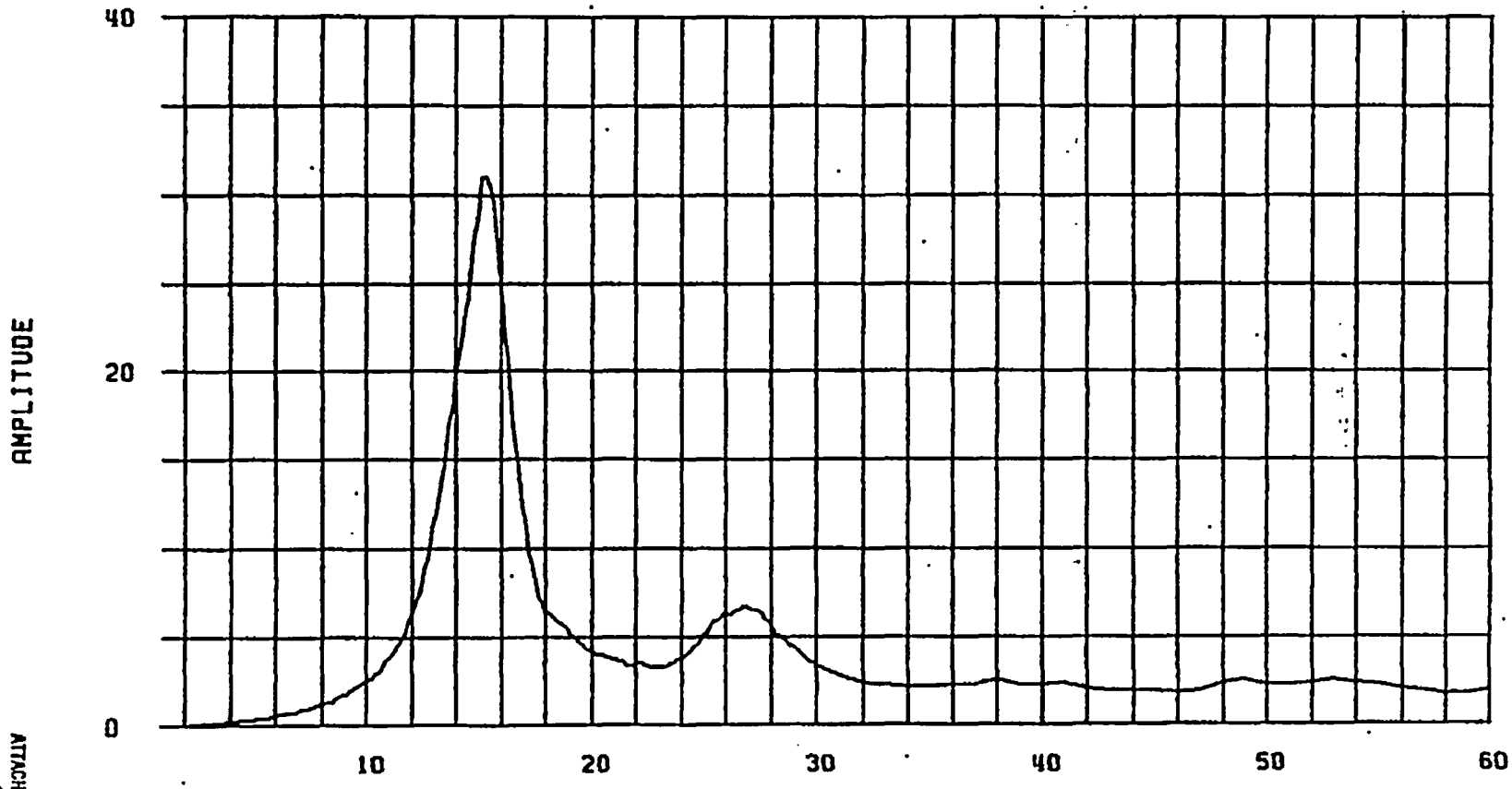

FIGURE 4

LEGEND

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CALC. NO. C-0031/71RD

AAOC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Y-TRAN LC = 1

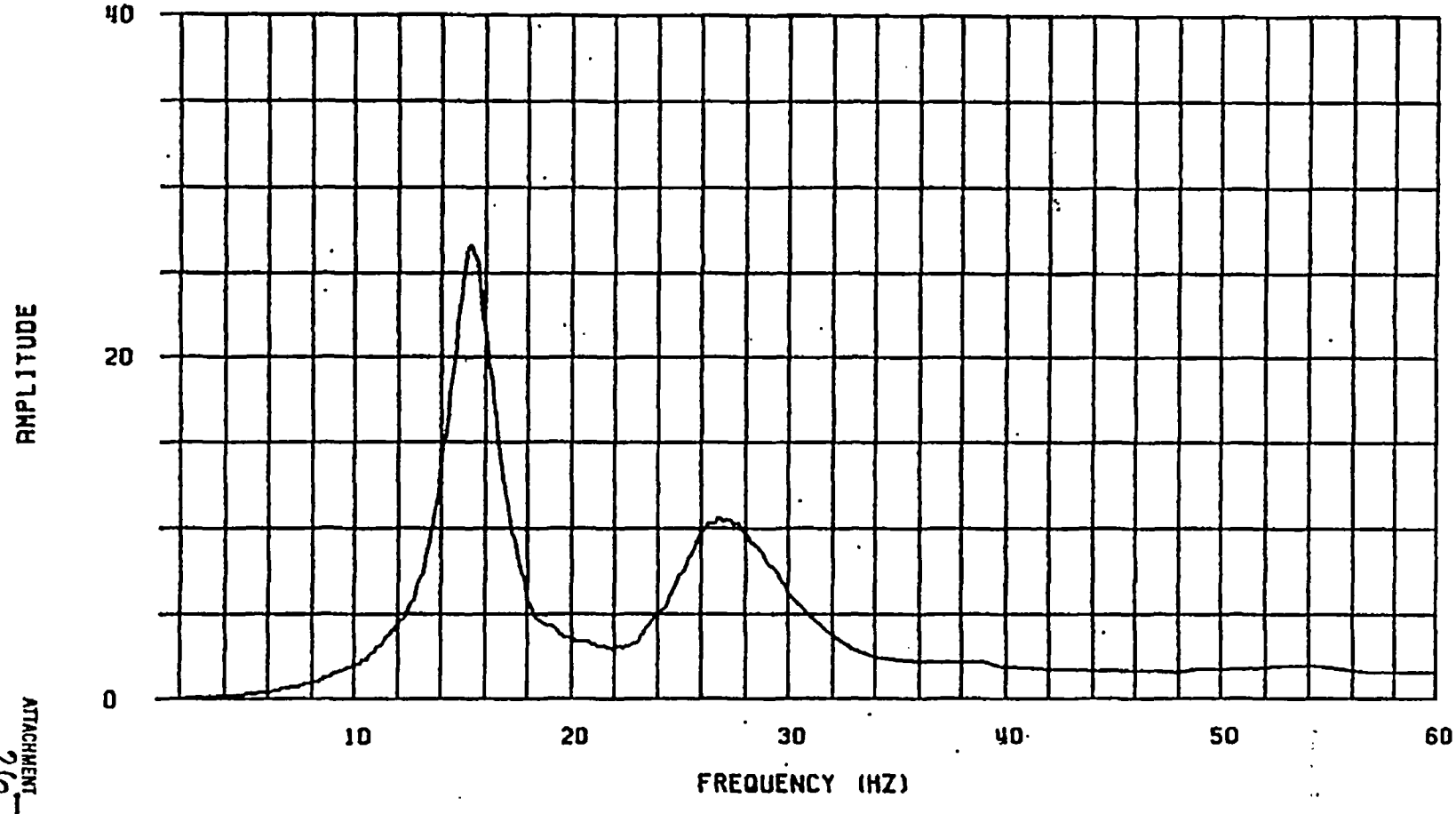

FIGURE 5

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Z-TRAN LC = 1

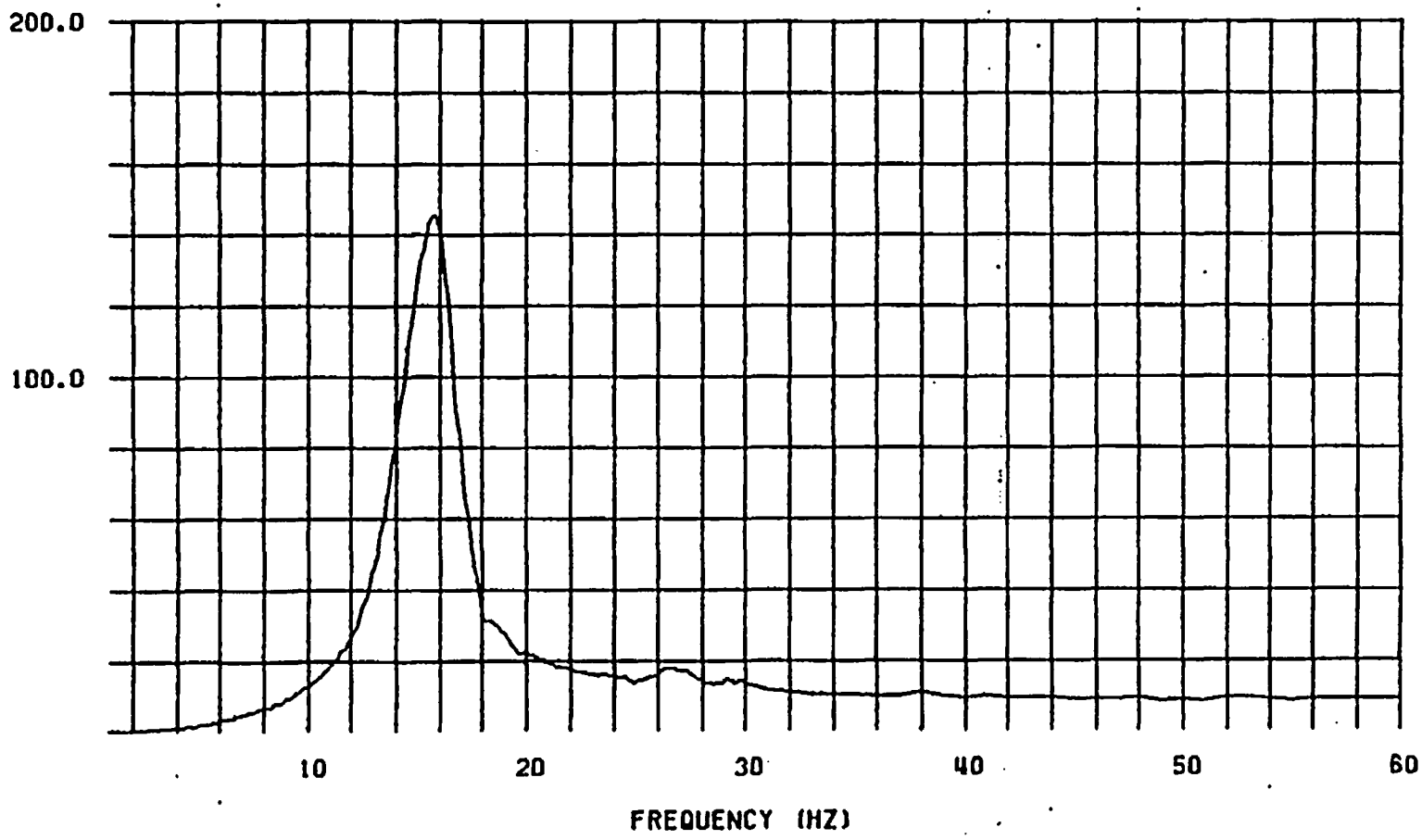

FIGURE 6

LEGEND

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RAOC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR X-TRAN LC = 1

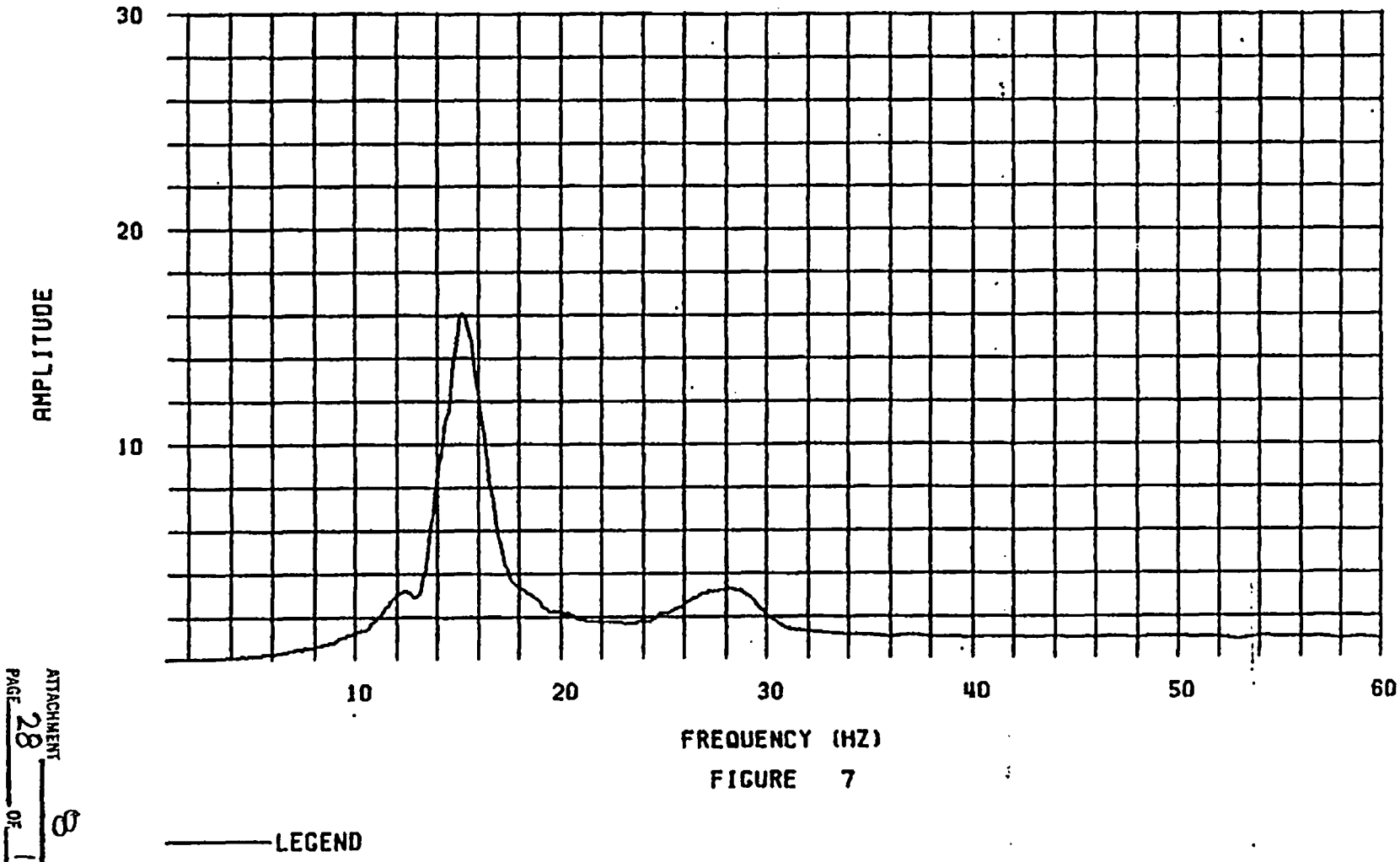

FIGURE 7

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Y-TRAN LC = 1

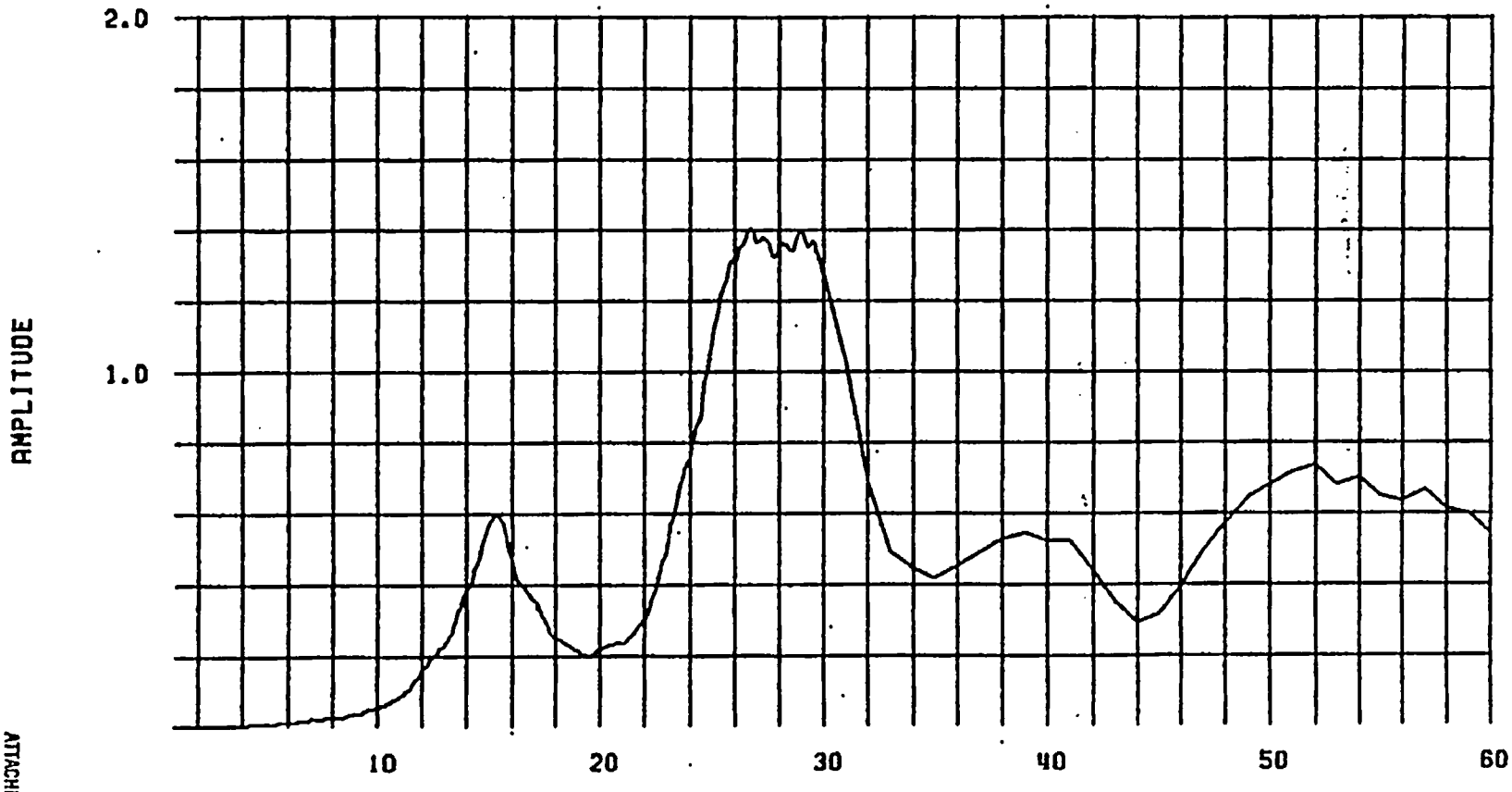

FIGURE 8

LEGEND

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ARQC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Z-TRAN LC = 1

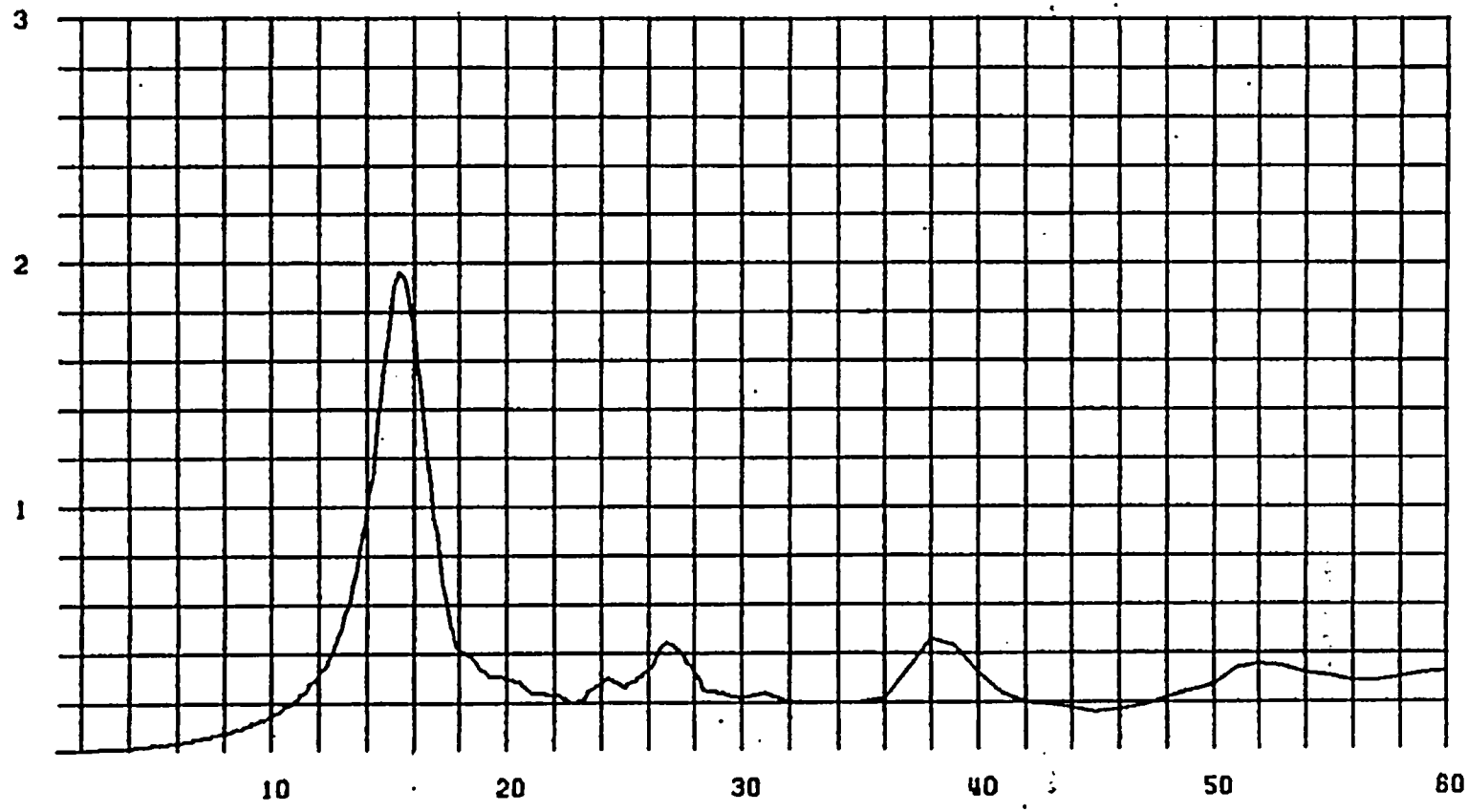

FIGURE 9

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 X-TRAN LC = 1

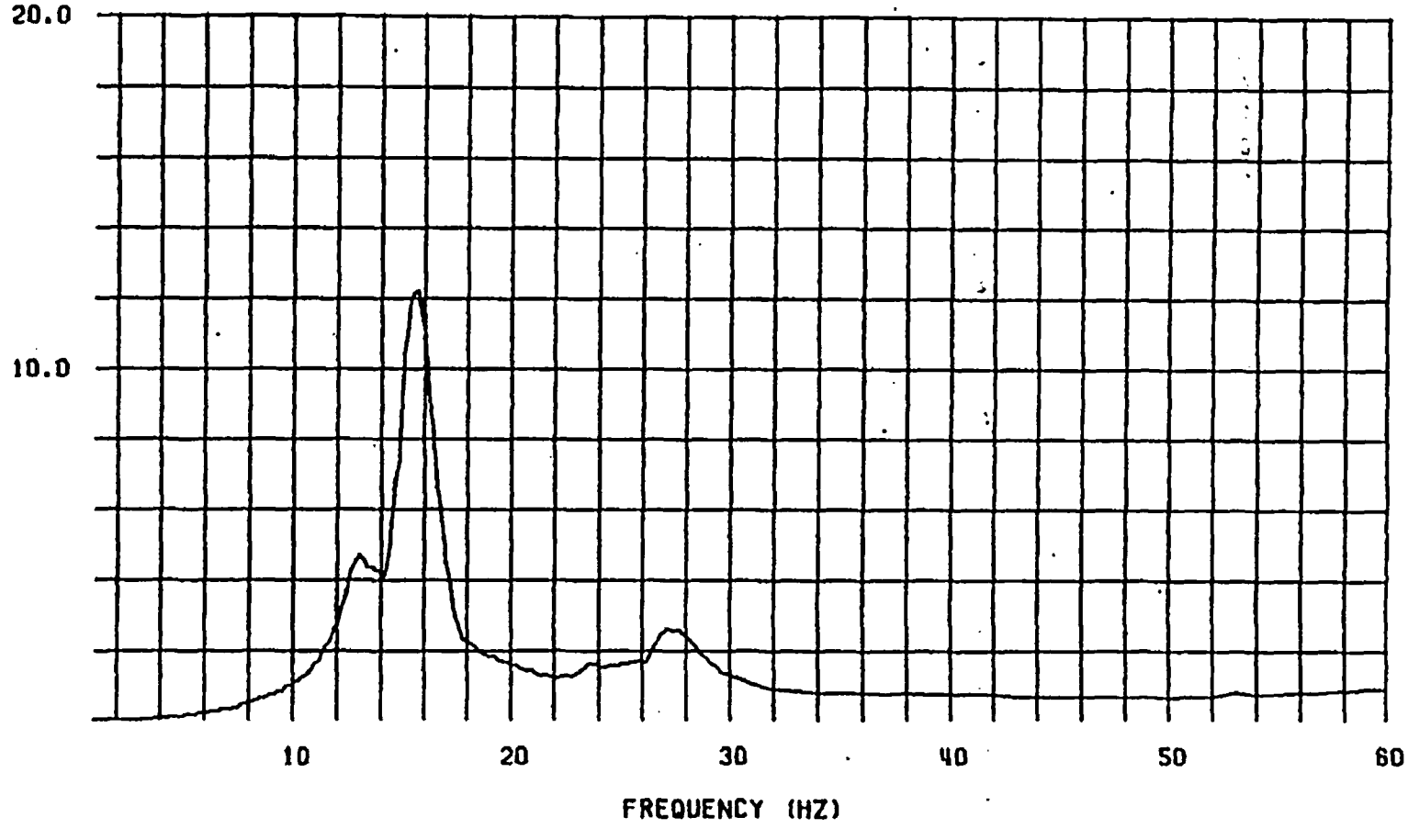

FIGURE 10

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 Y-TRAN LC = 1

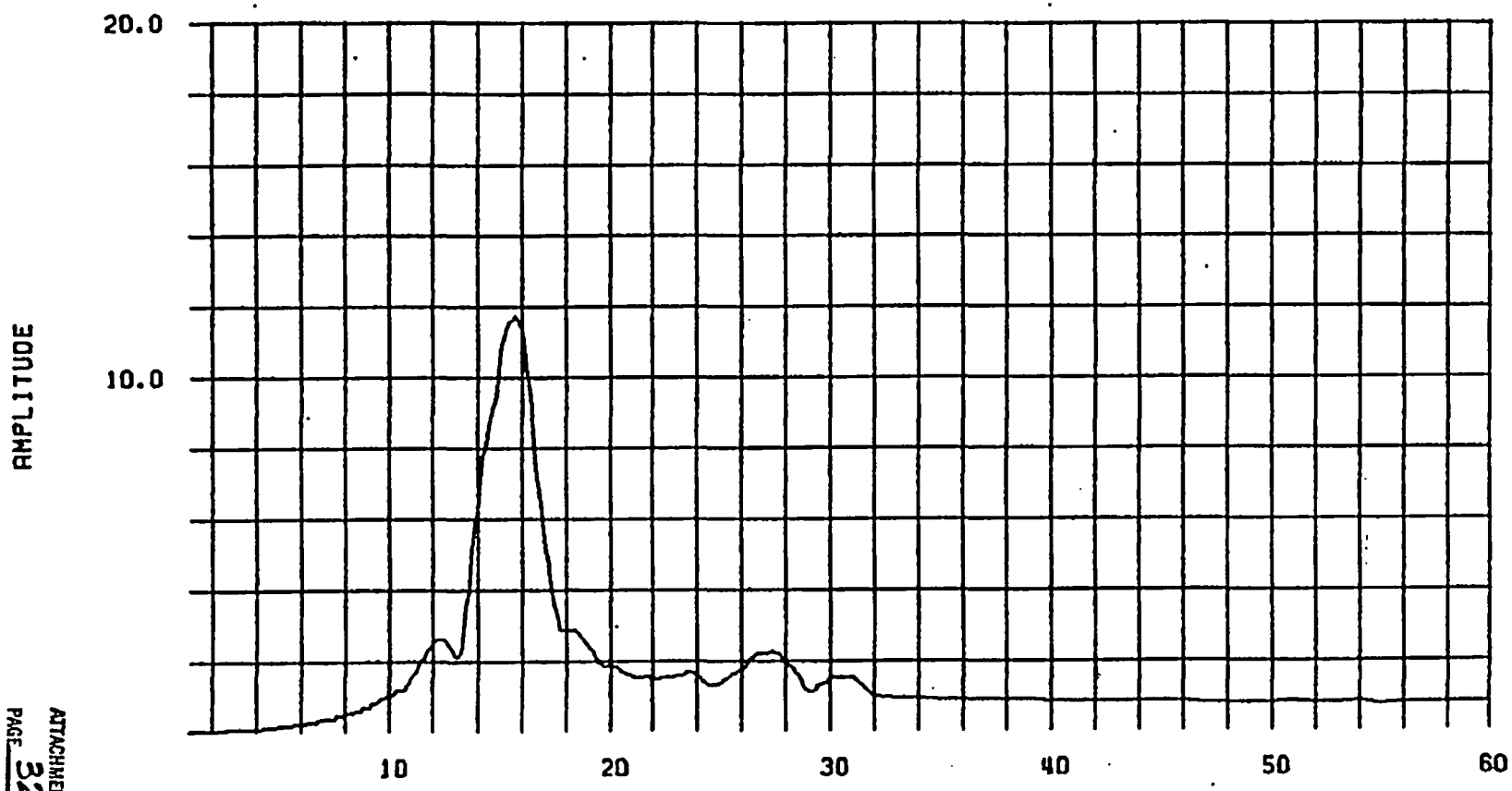

FIGURE 11

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 Z-TRAN LC = 1

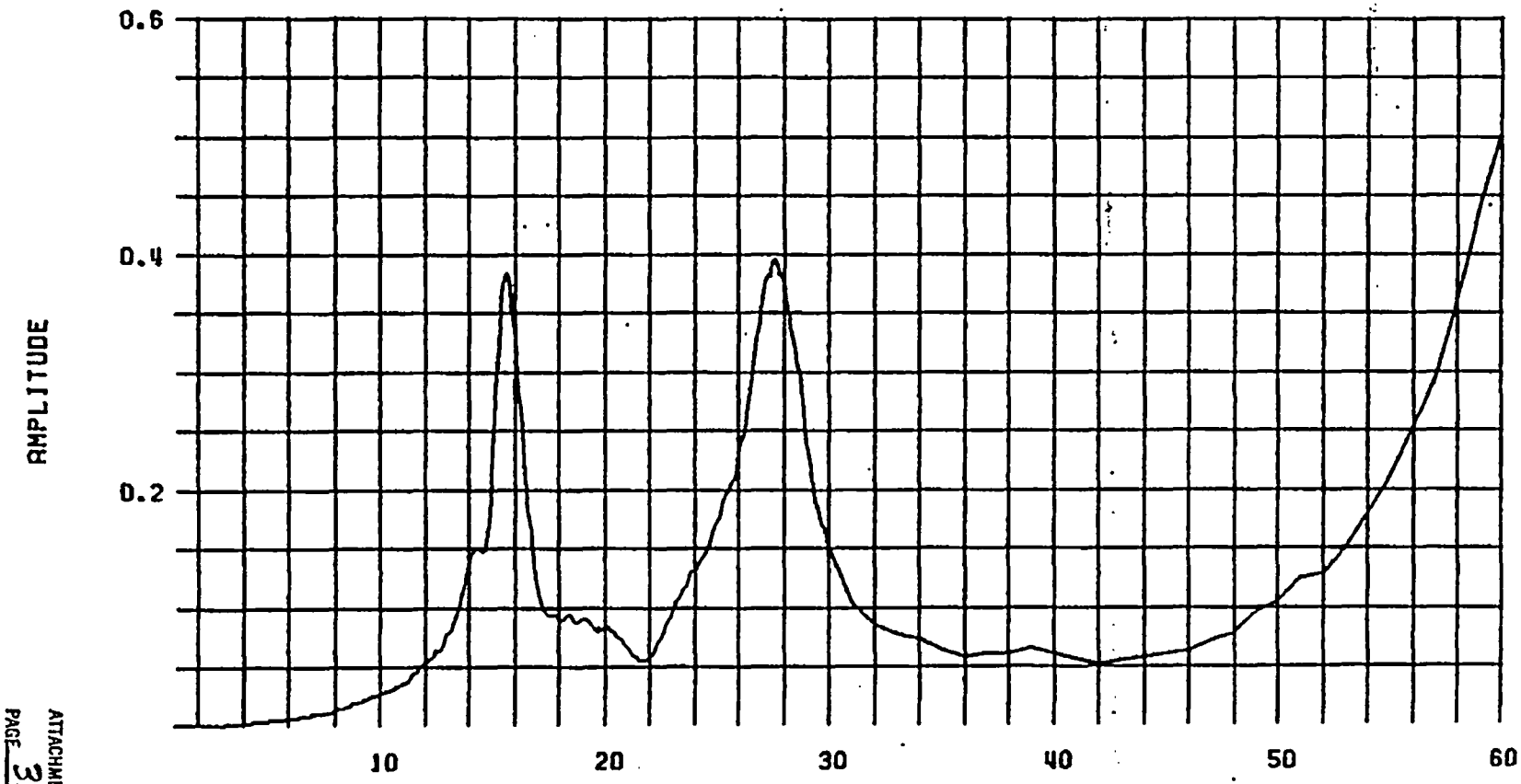

FIGURE 12

LEGEND

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RAQC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 X-TRAN LC = 1

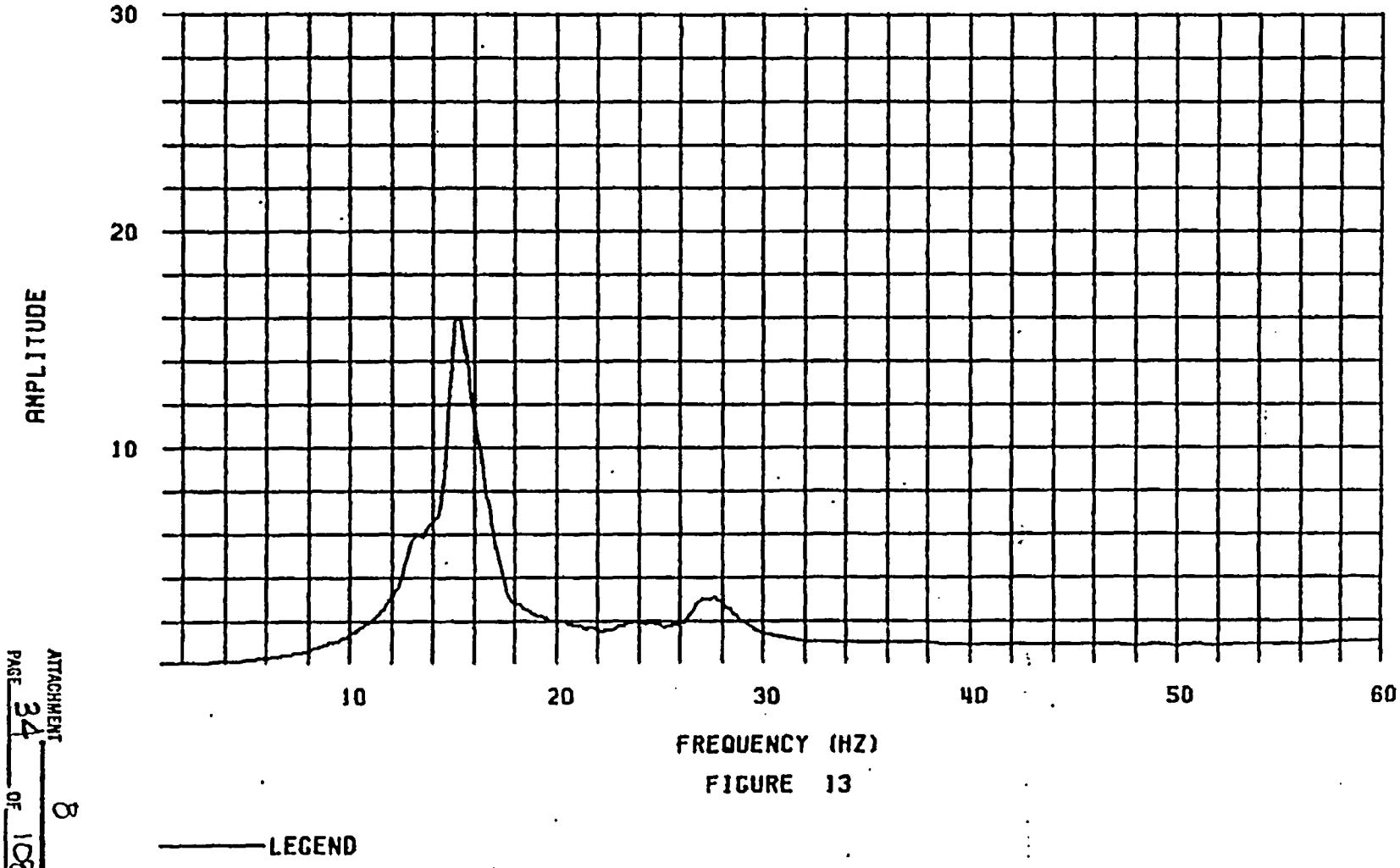

FIGURE 13

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AAOG 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 Y-TRAN LC = 1

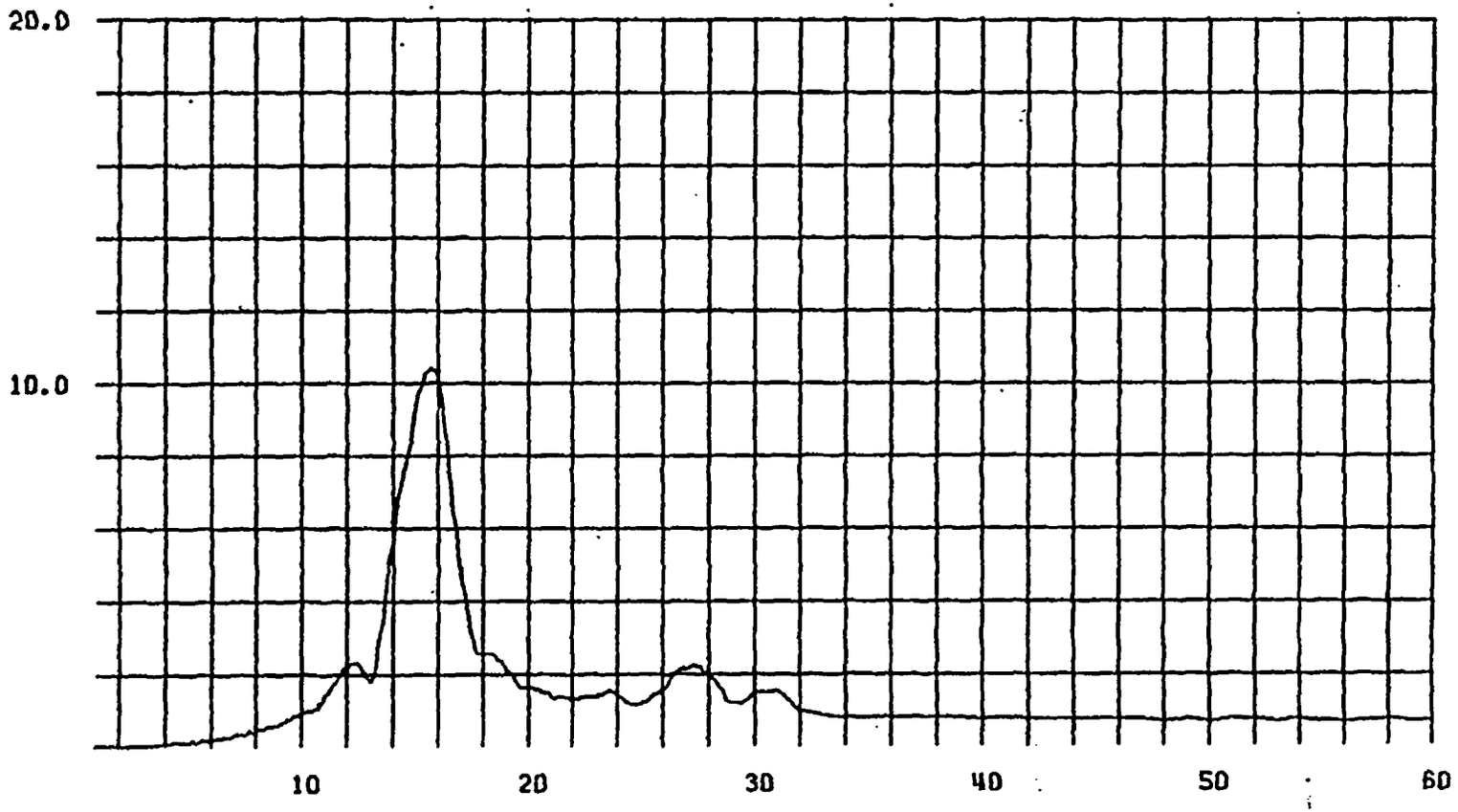

FIGURE 14

LEGEND

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CALC NO C-0031/7IR0

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 Z-TRAN LC = 1

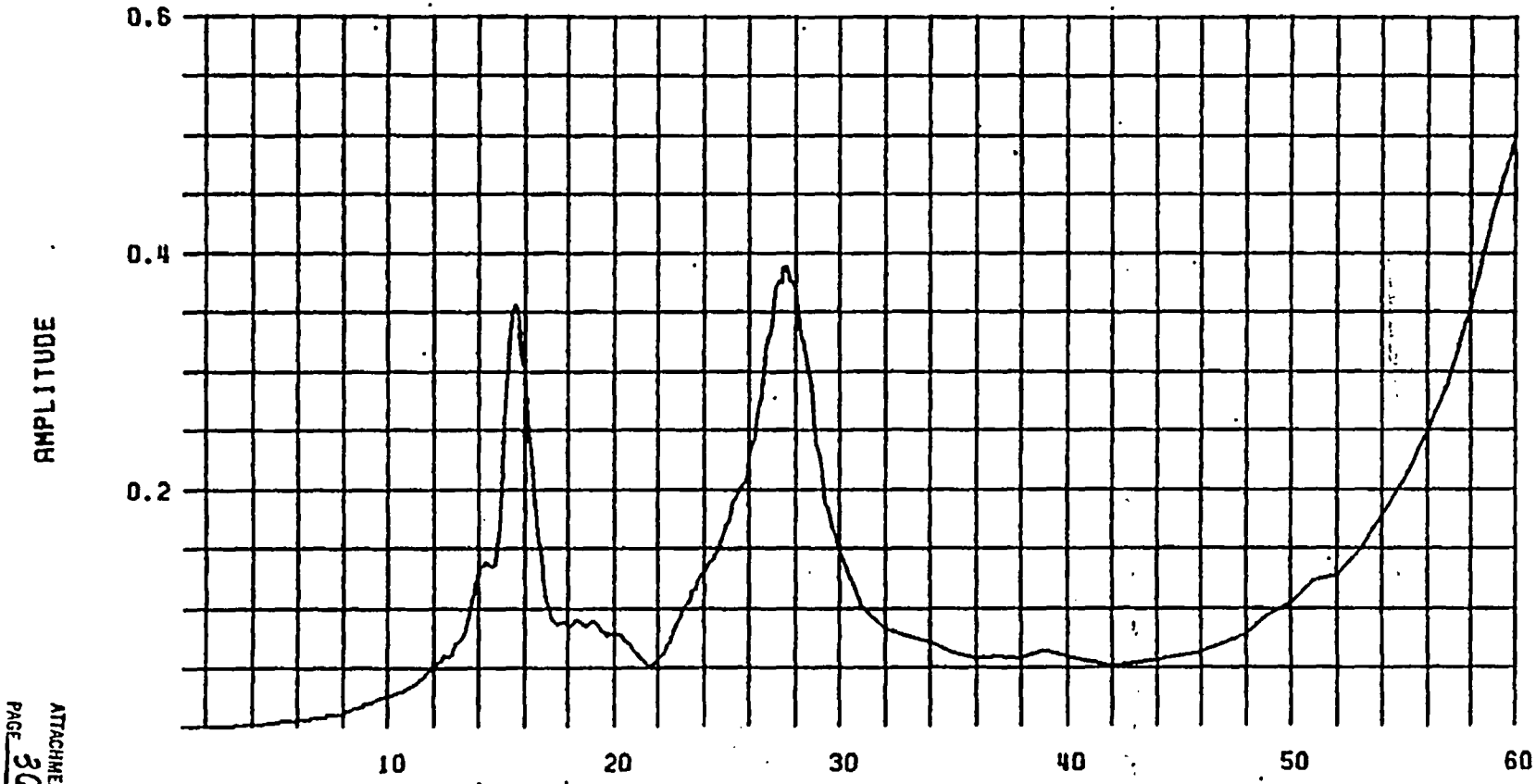

FIGURE 15

LEGEND

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CALC. NO. C-0031/TIRD

AAQC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP X-TRAN LC = 1

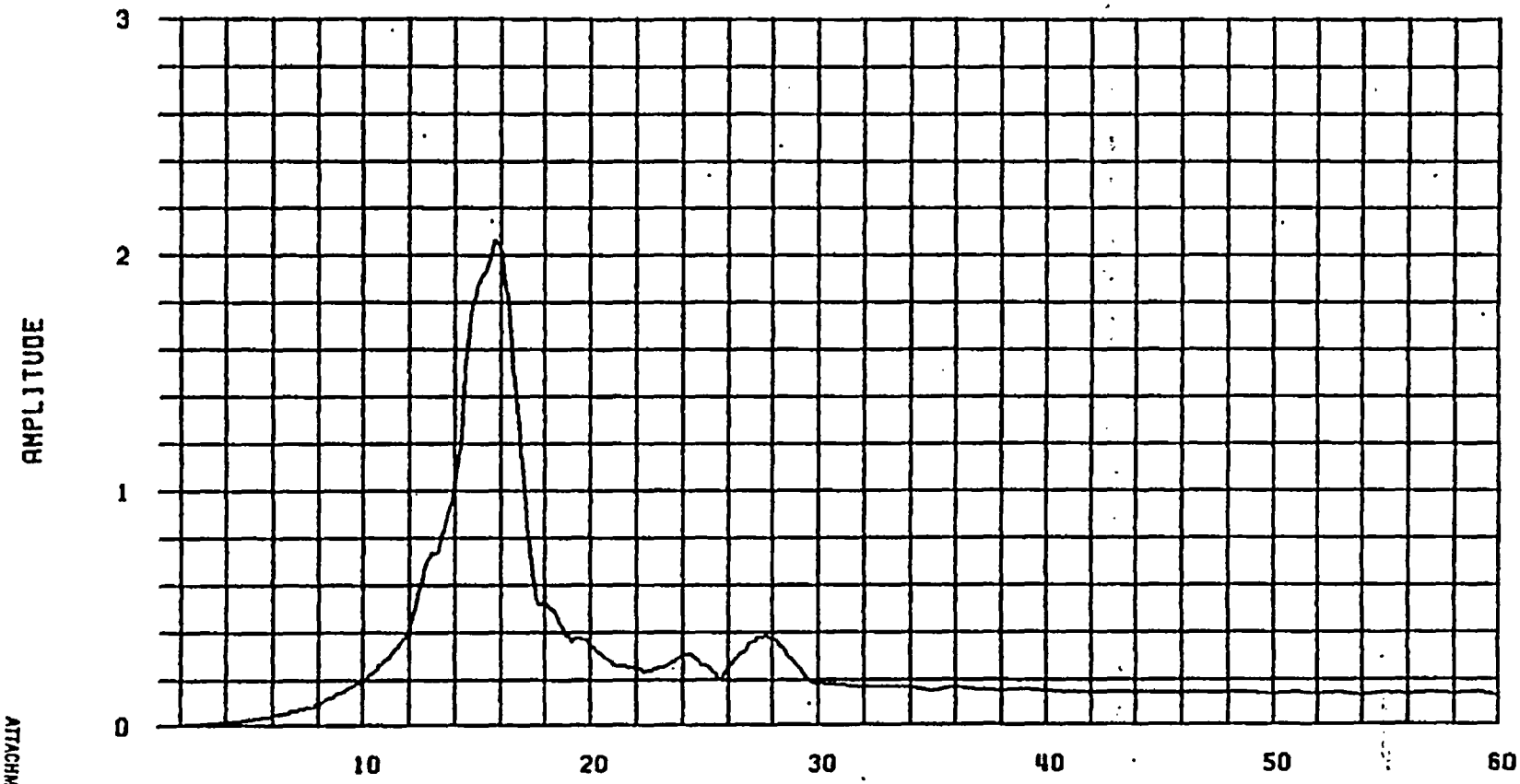

FIGURE 16

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Y-TRAN LC = 1

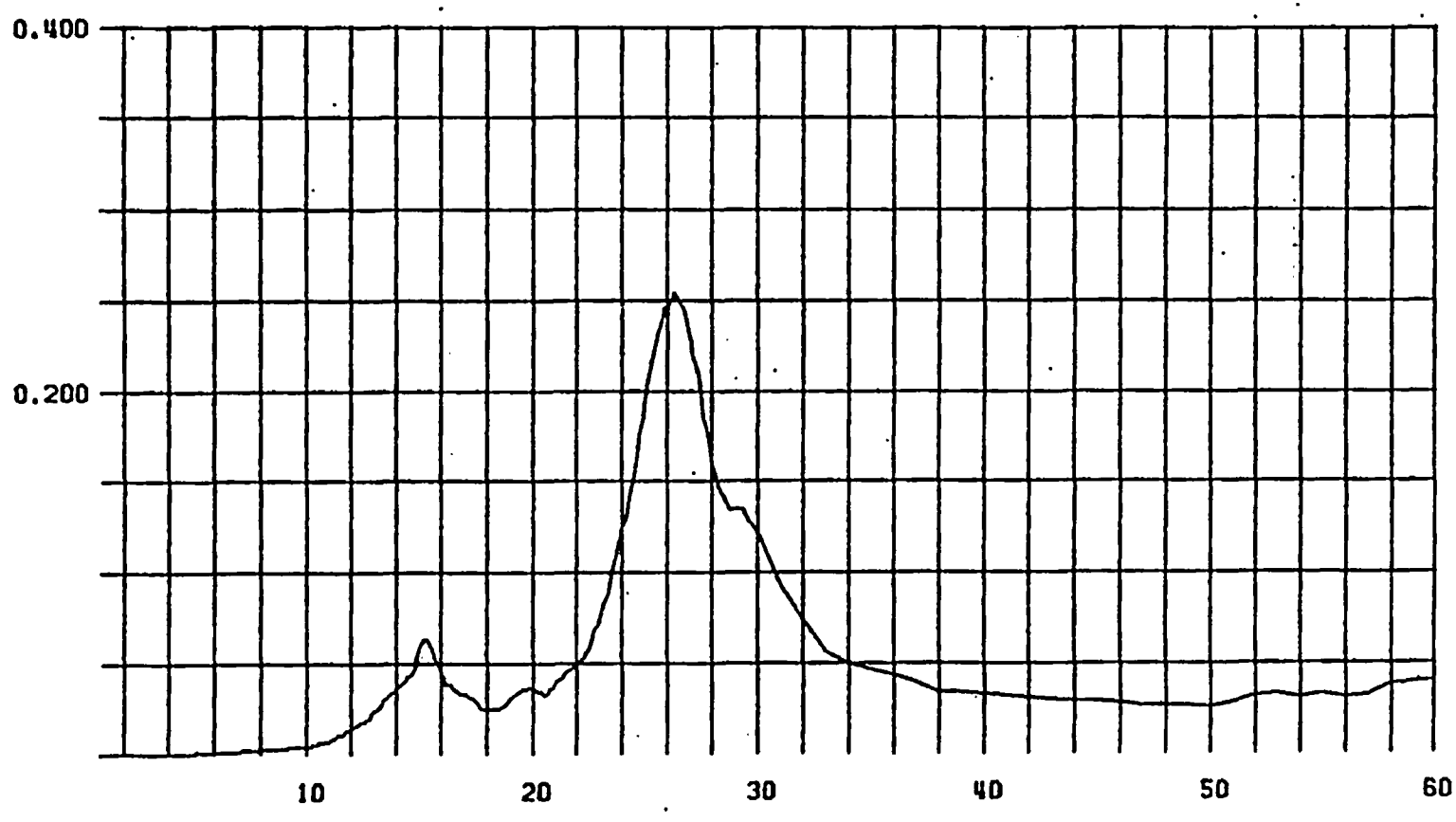

FIGURE 17

LEGEND

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AAQC 88/06/09 17.27.09

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Z-TRAN LC = 1

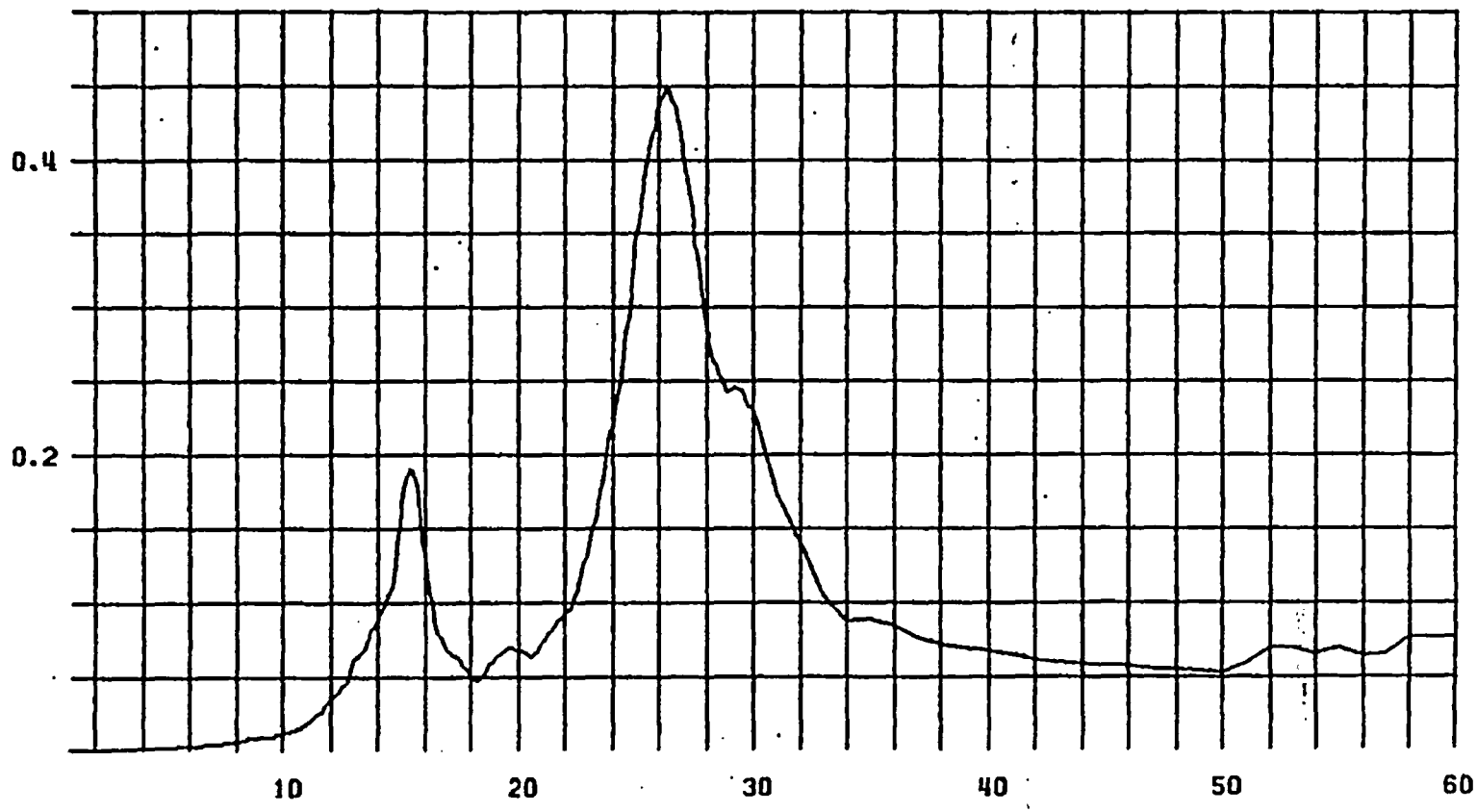

FIGURE 18

LEGEND

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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JOB NAME = AAQJ DATE = 88/06/09 CHARGE = F3395JT

PROJECT = *311*XPS080502

OPTICOM

CQI

(19 pages total)

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR X-TRAN LC = 1

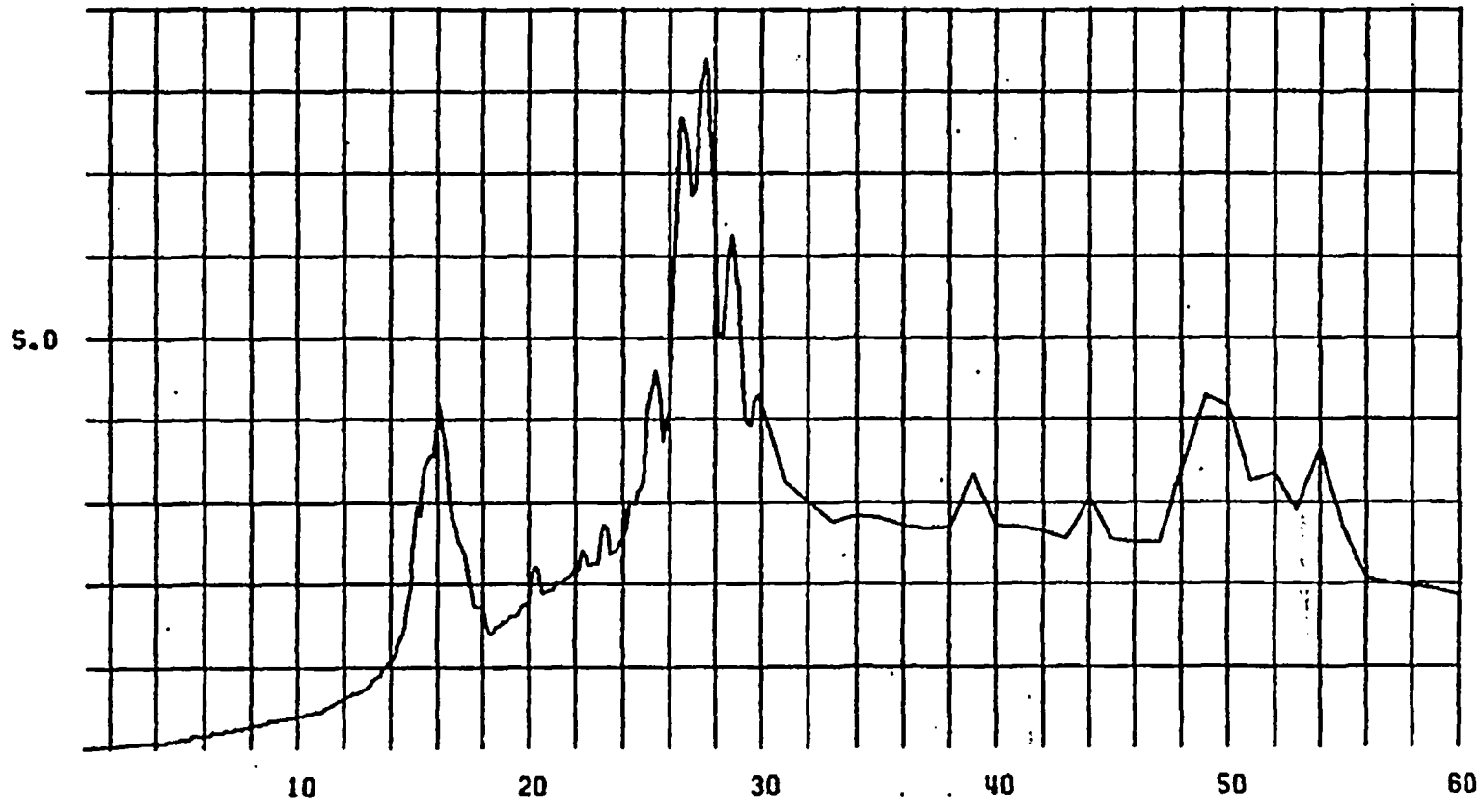

FIGURE 1

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Y-TRAN LC = 1

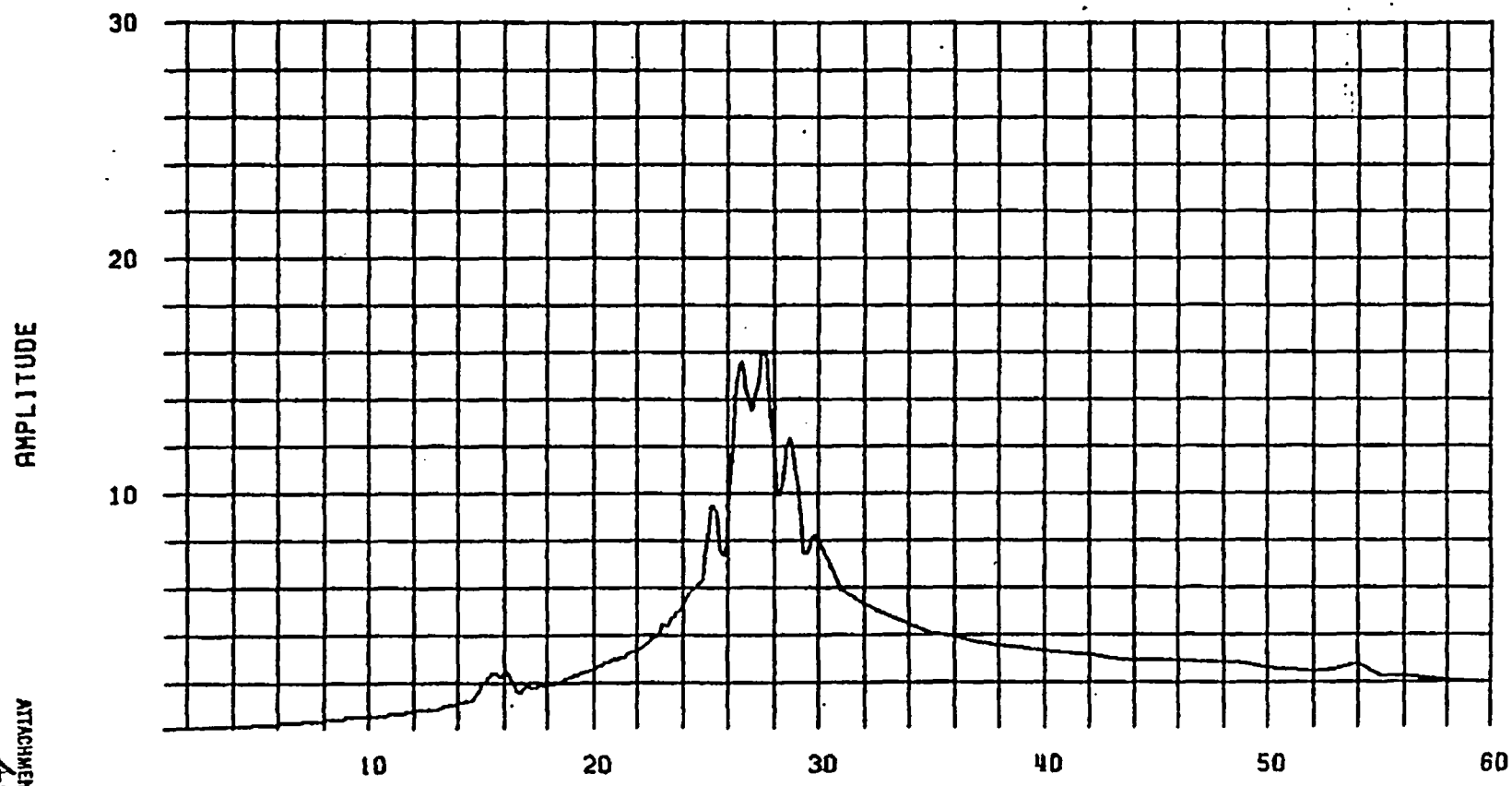

FIGURE 2

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Z-TRAN LC = 1

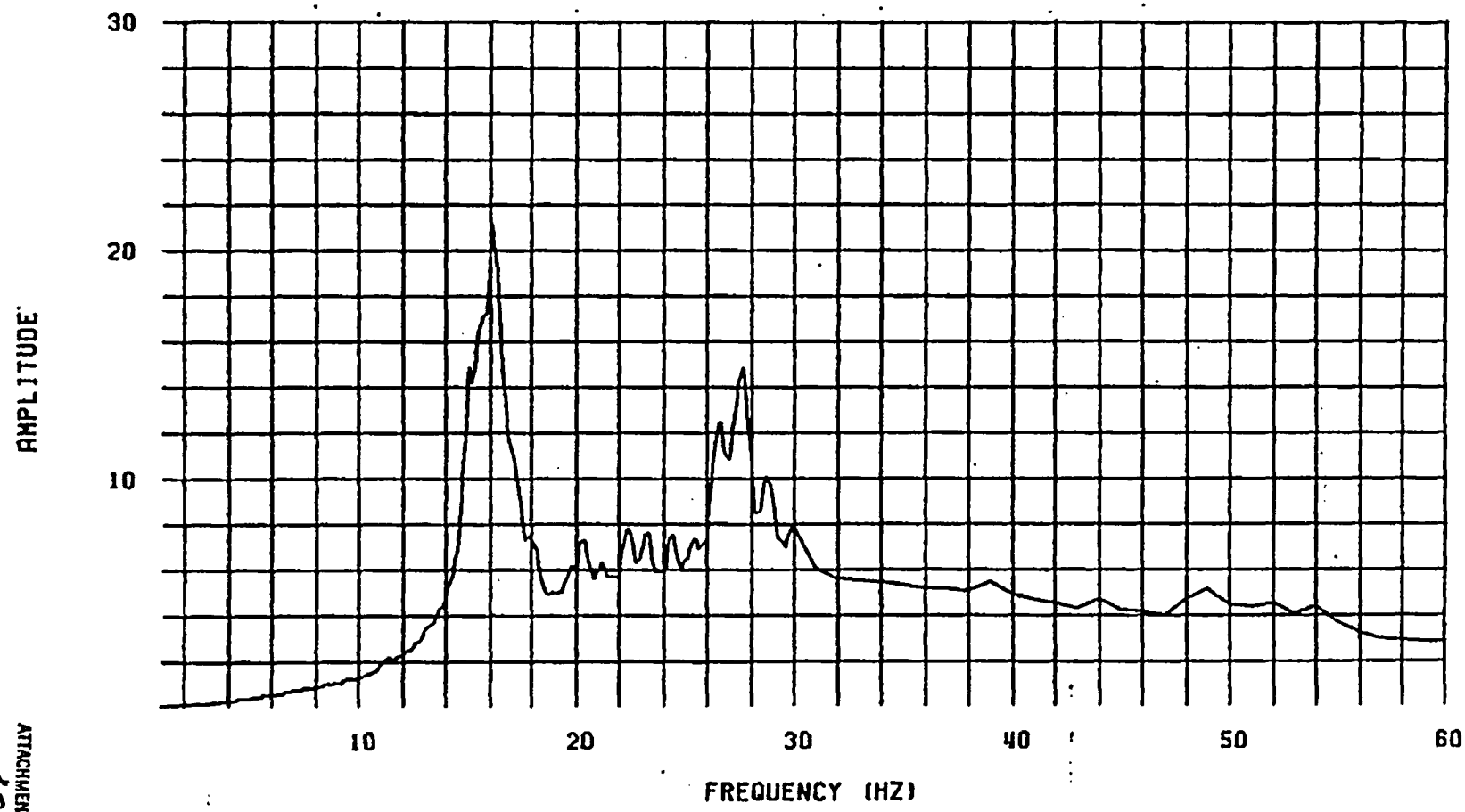

FIGURE 3

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR X-TRAN LC = 1

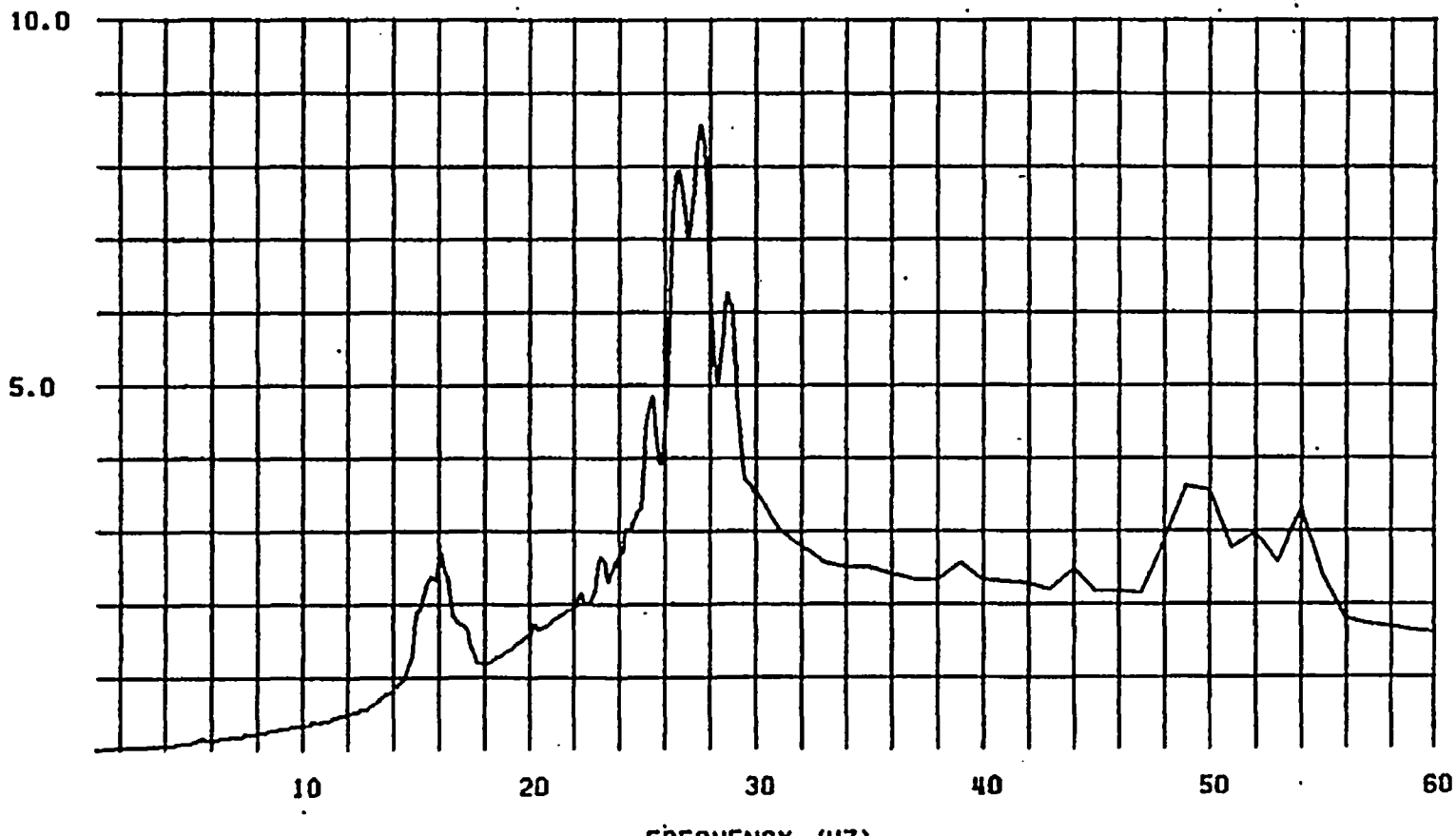

FIGURE 4

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Y-TRAN LC = 1

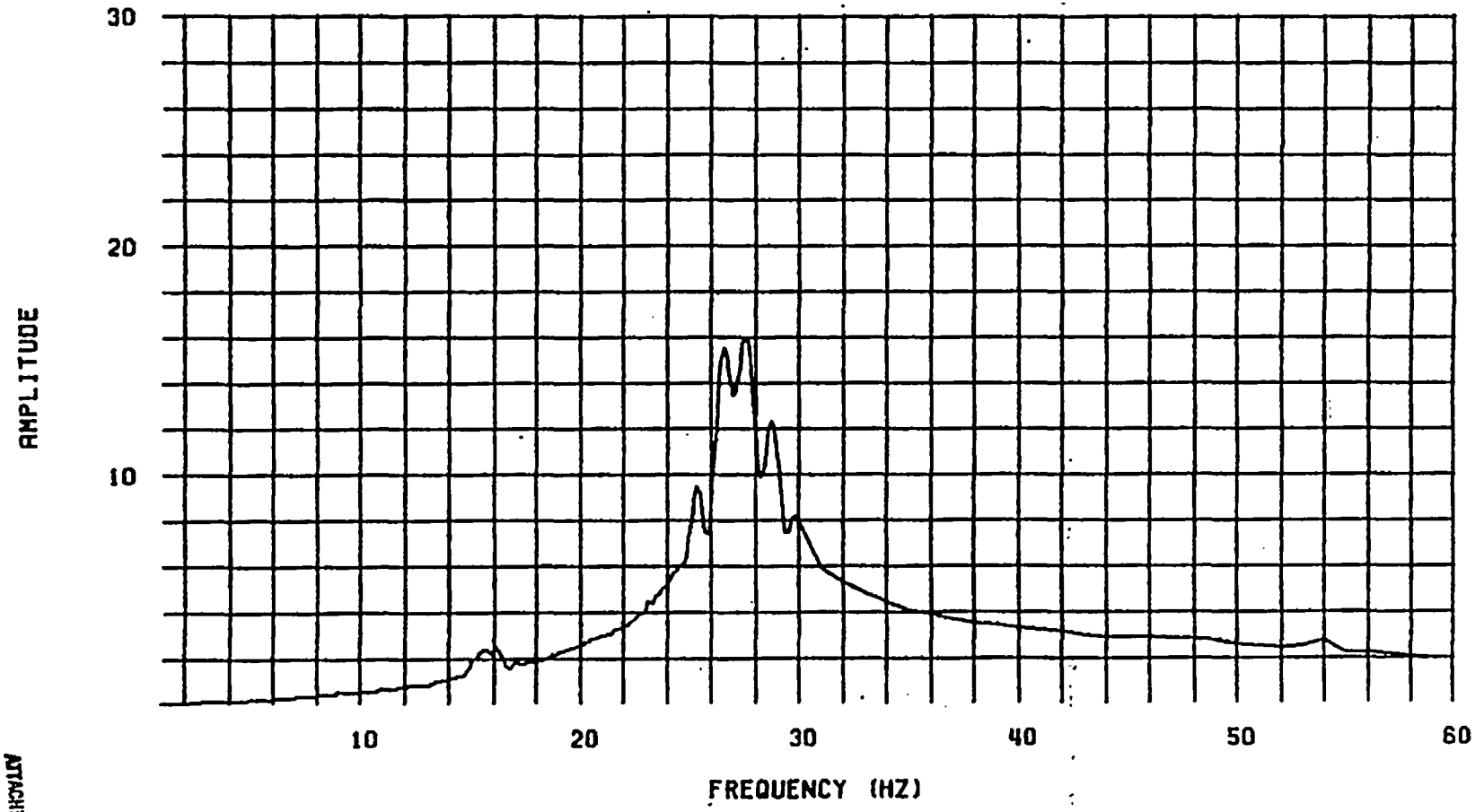

FIGURE 5

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Z-TRAN LC = 1

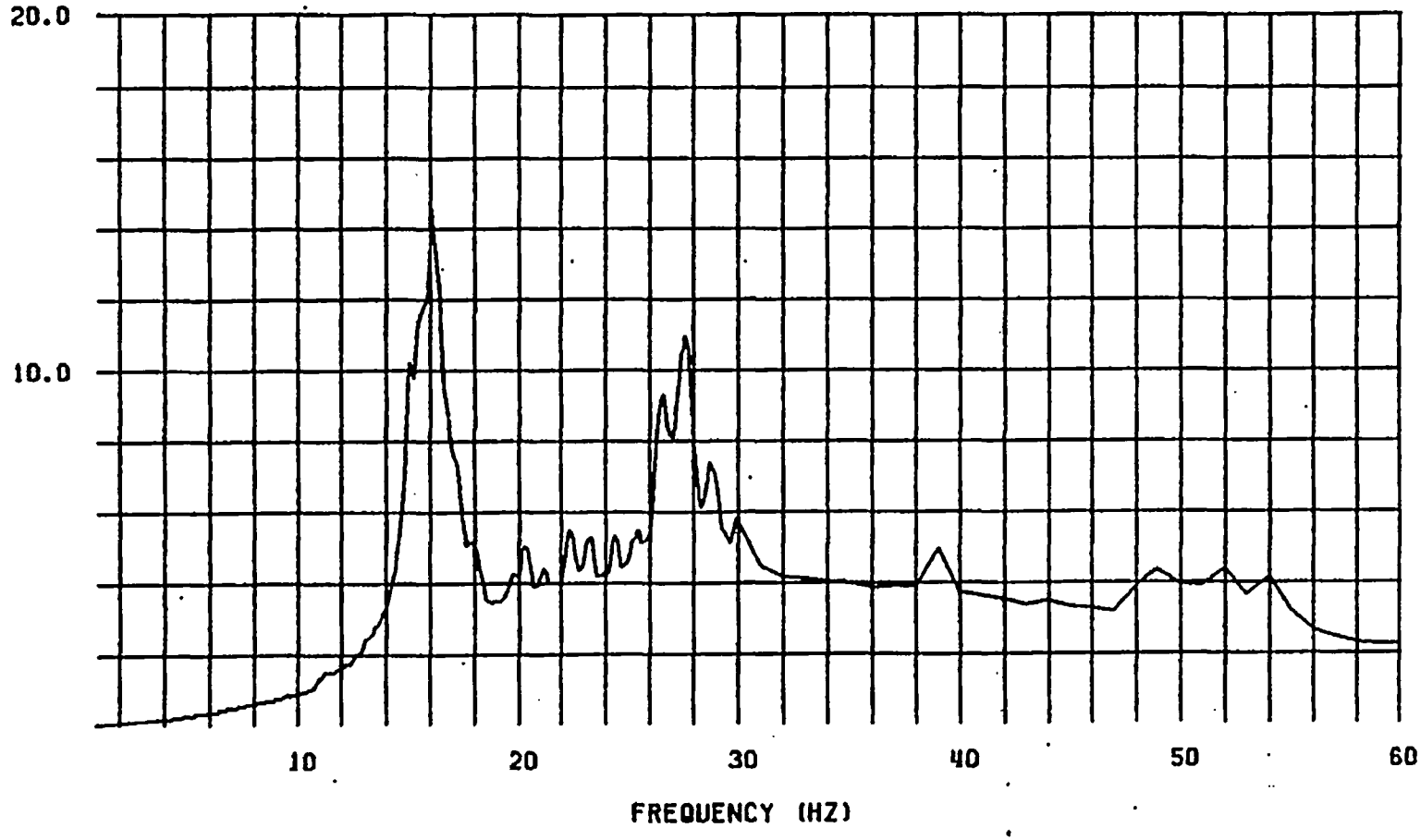

FIGURE 6

LEGEND

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR X-TRAN LC = 1

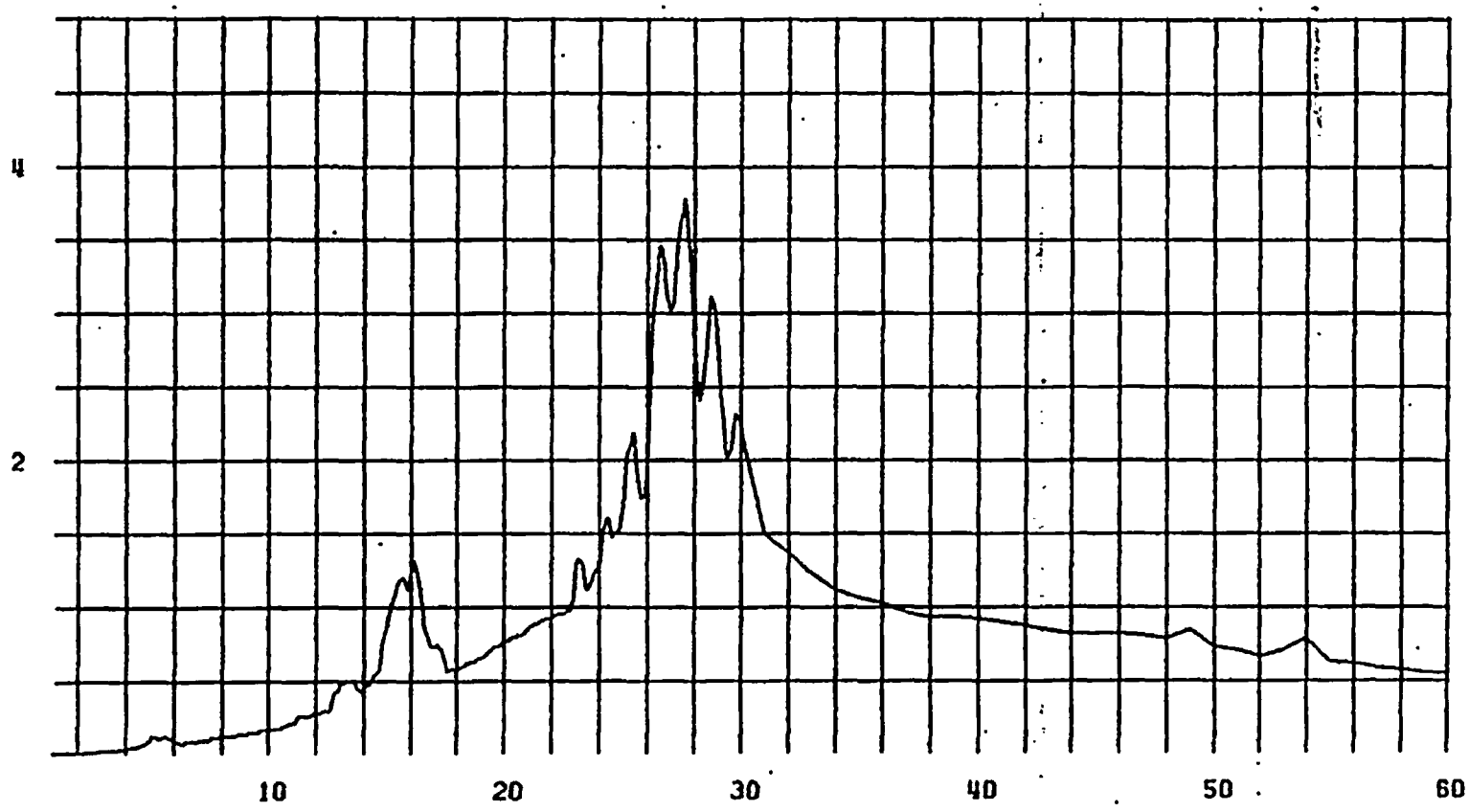

FIGURE 7

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Y-TRAN LC = 1

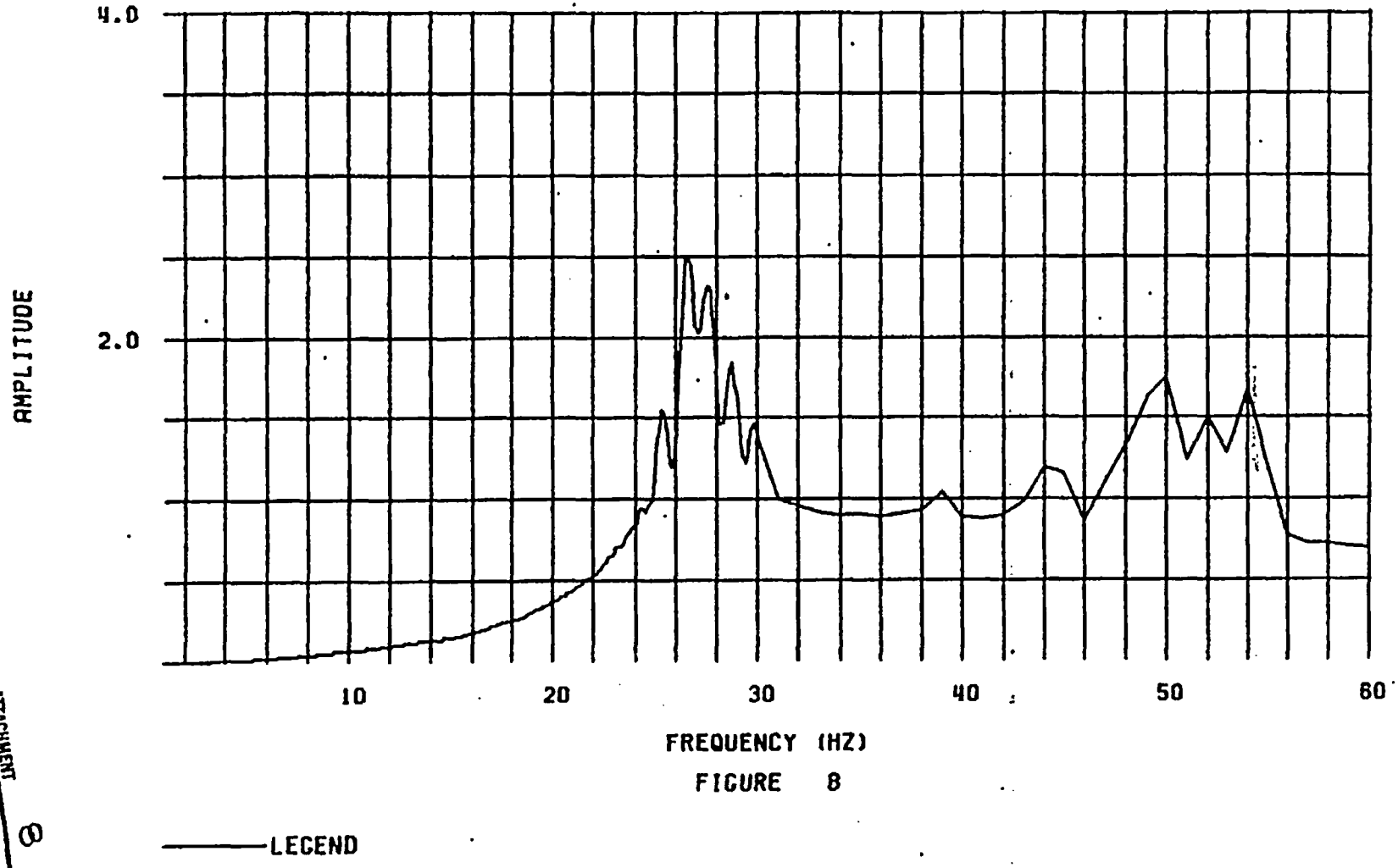

FIGURE 8

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Z-TRAN LC = 1

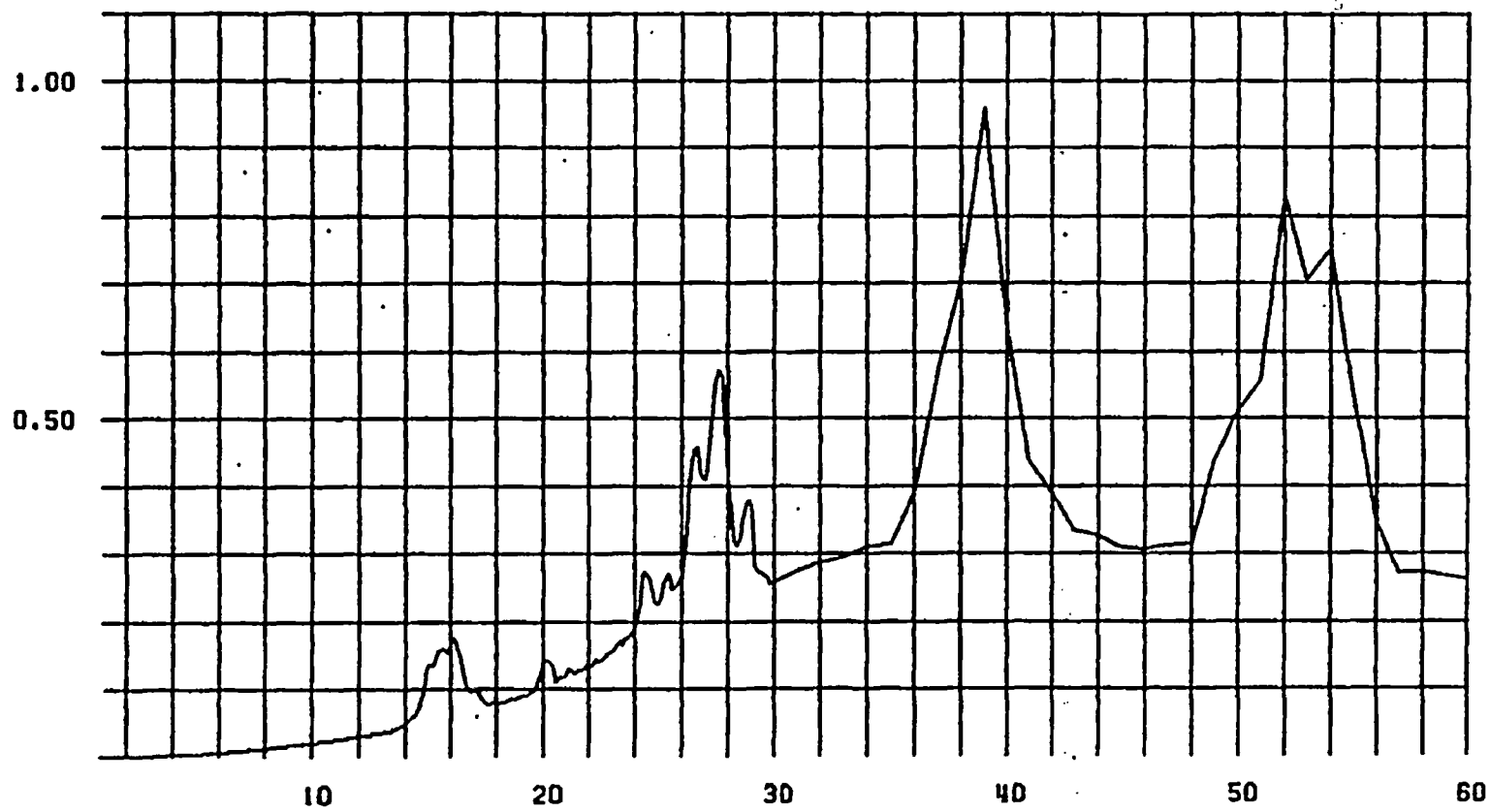

FIGURE 9

LEGEND

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USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 X-TRAN LC = 1

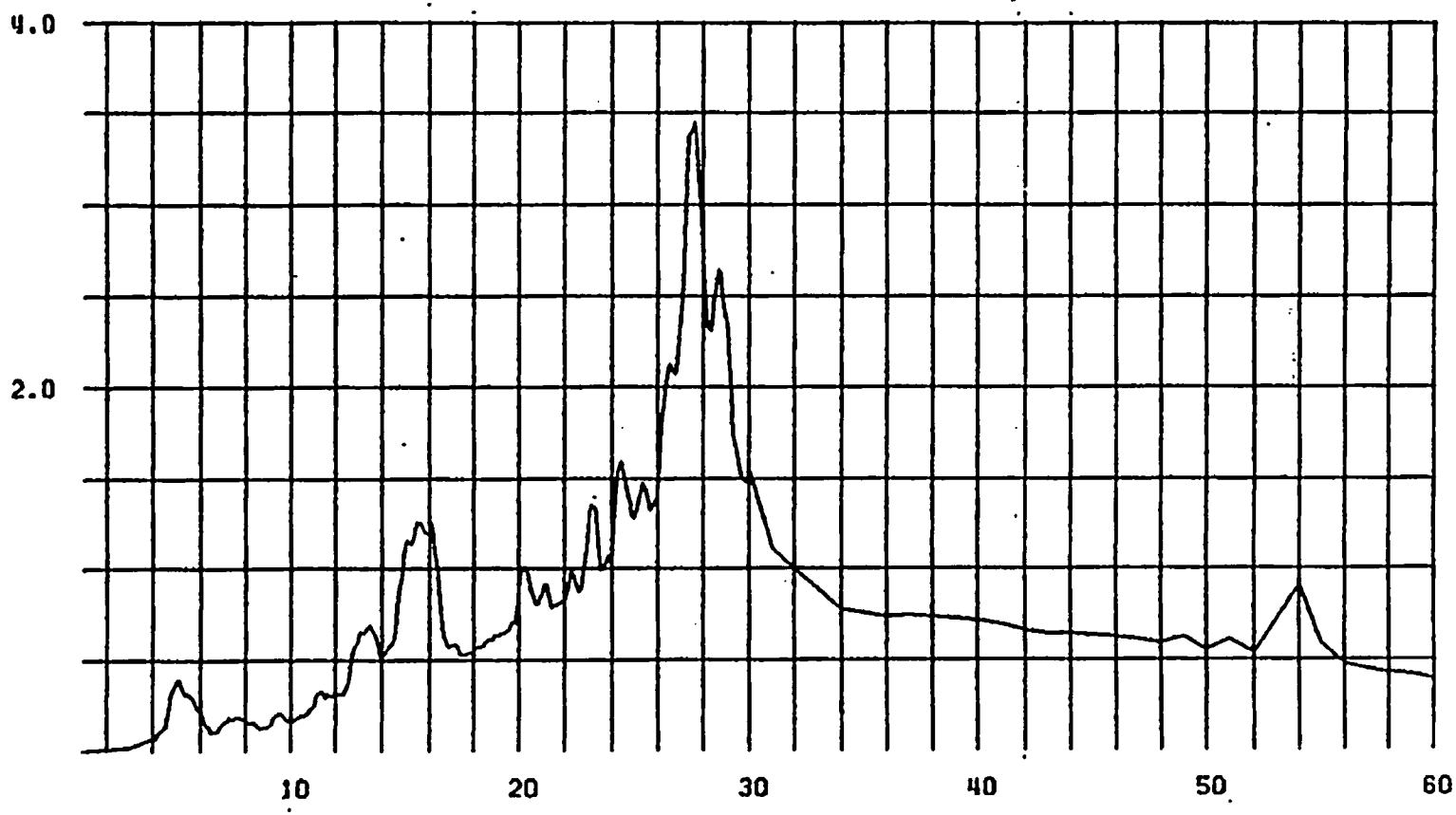

FIGURE 10

LEGEND

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CALC. NO. C-0031/7IRD

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 Y-TRAN LC = 1

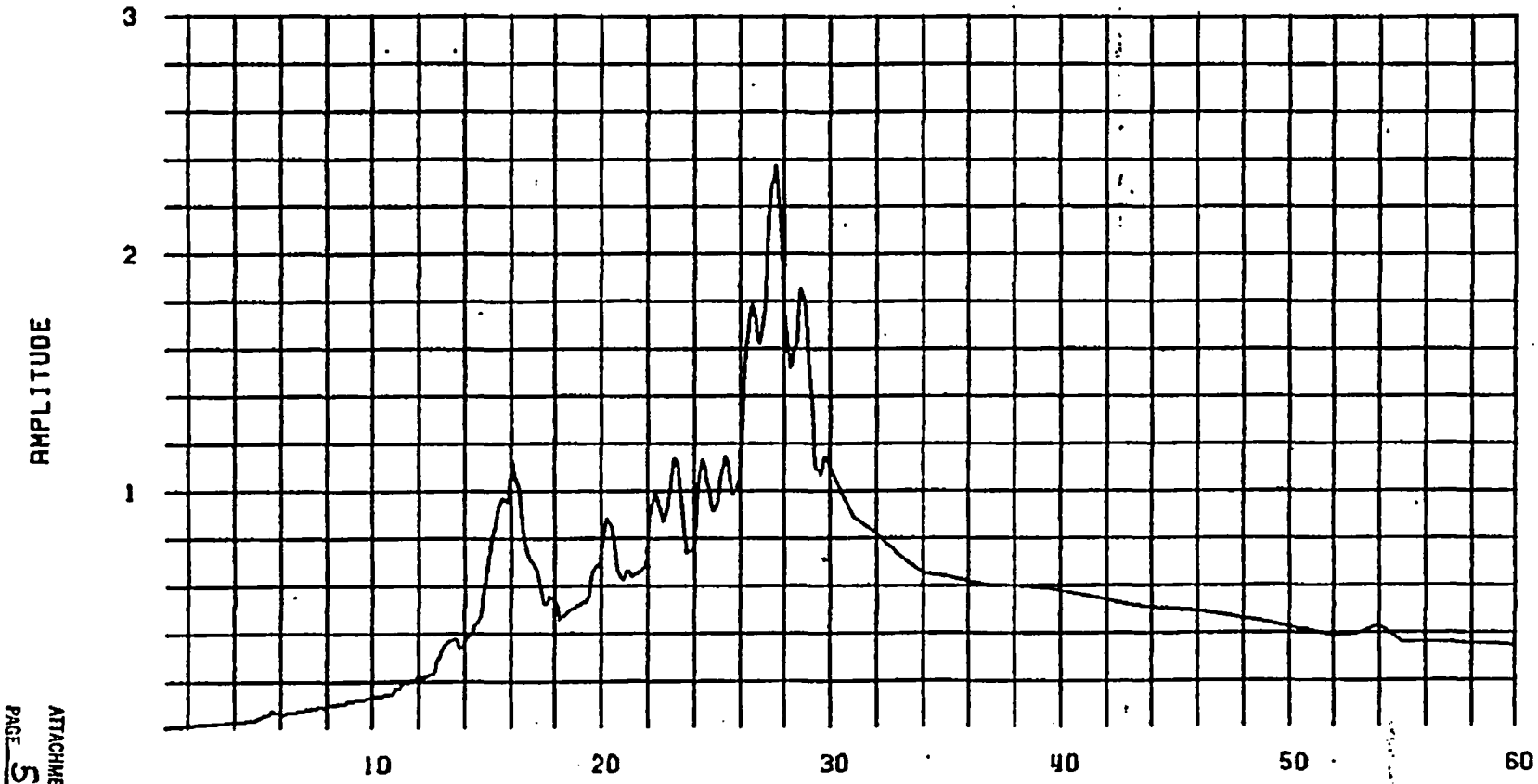

FIGURE 11

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 Z-TRAN LC = 1

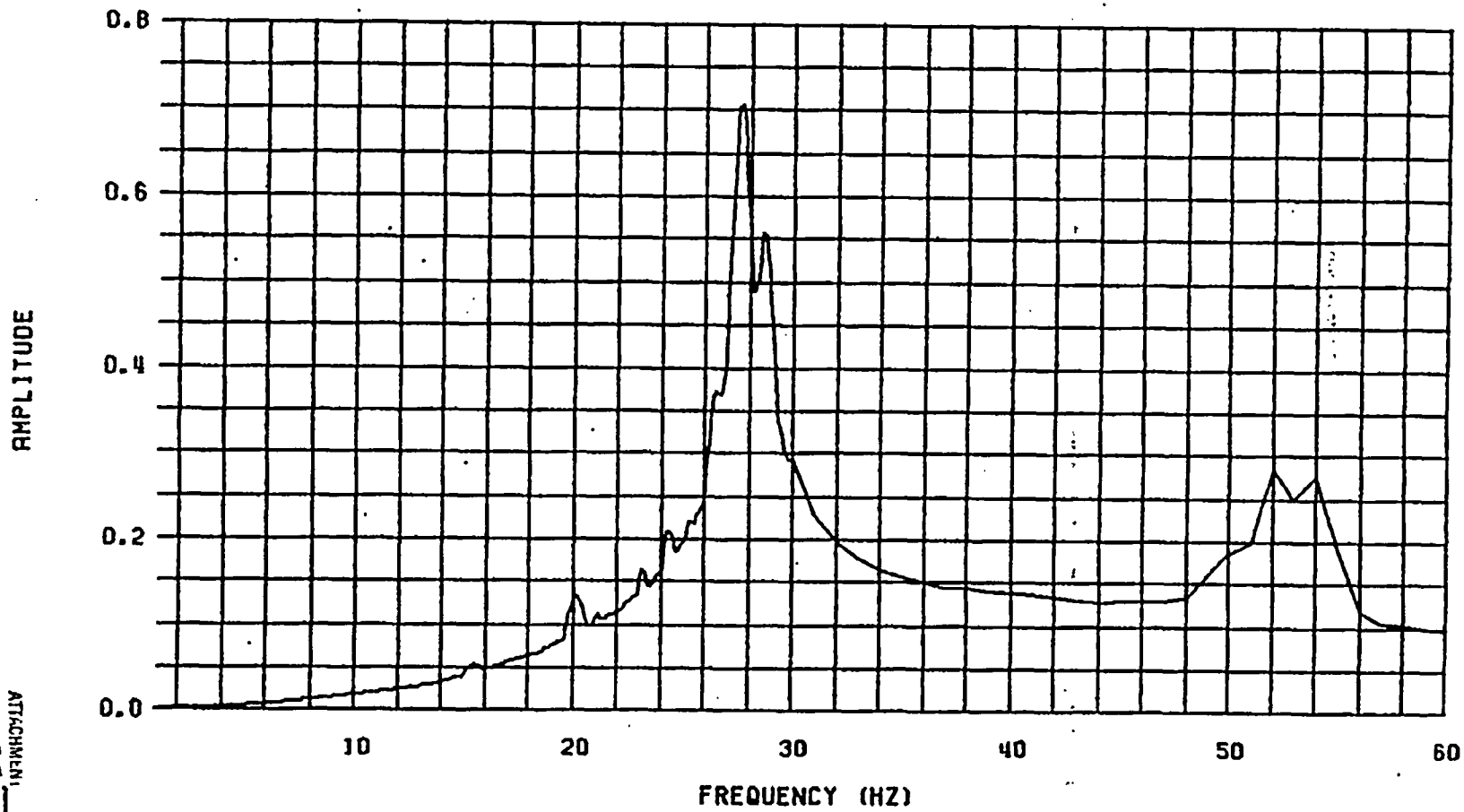

FIGURE 12

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 X-TRAN LC = 1

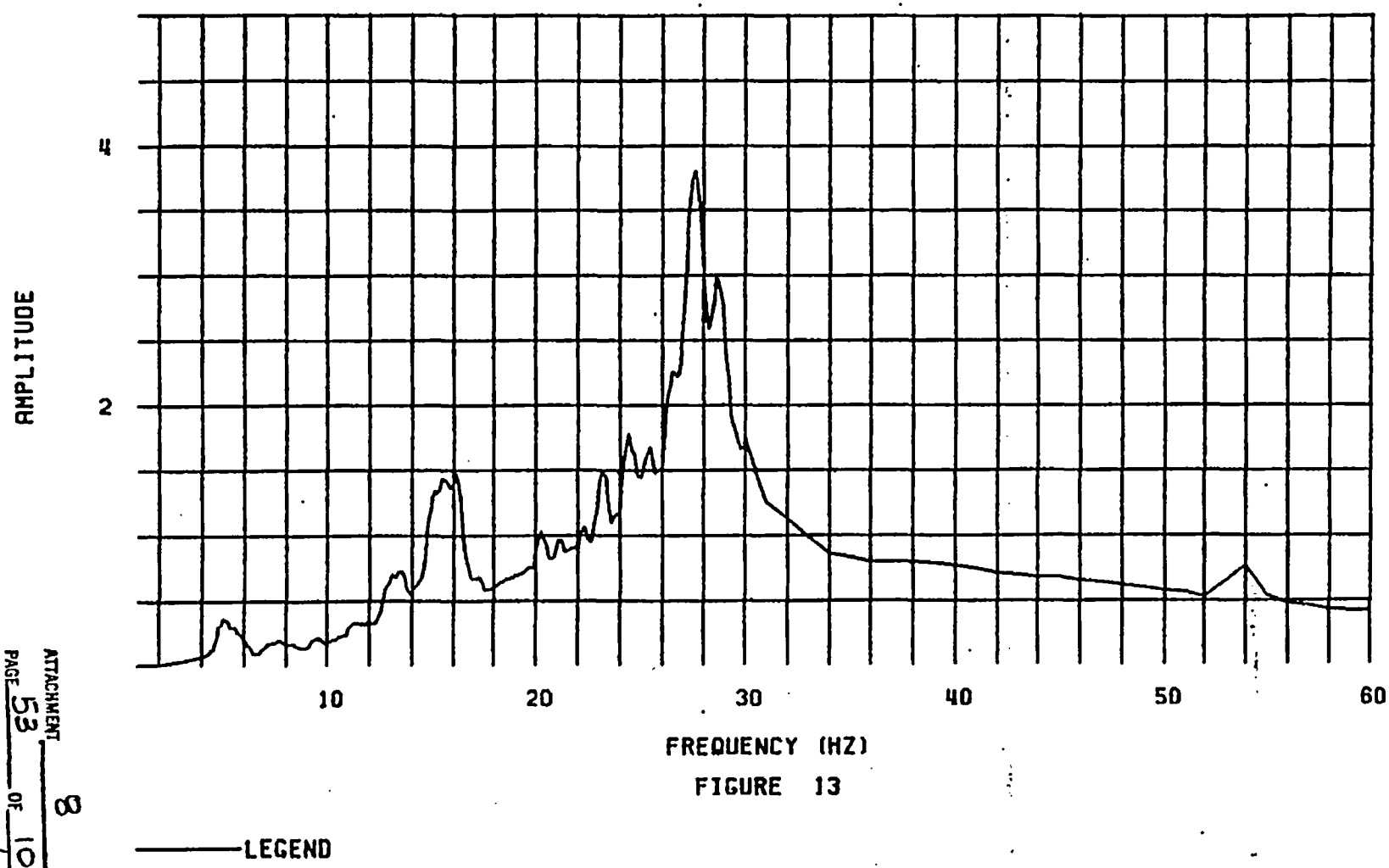

FIGURE 13

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 Y-TRAN LC = 1

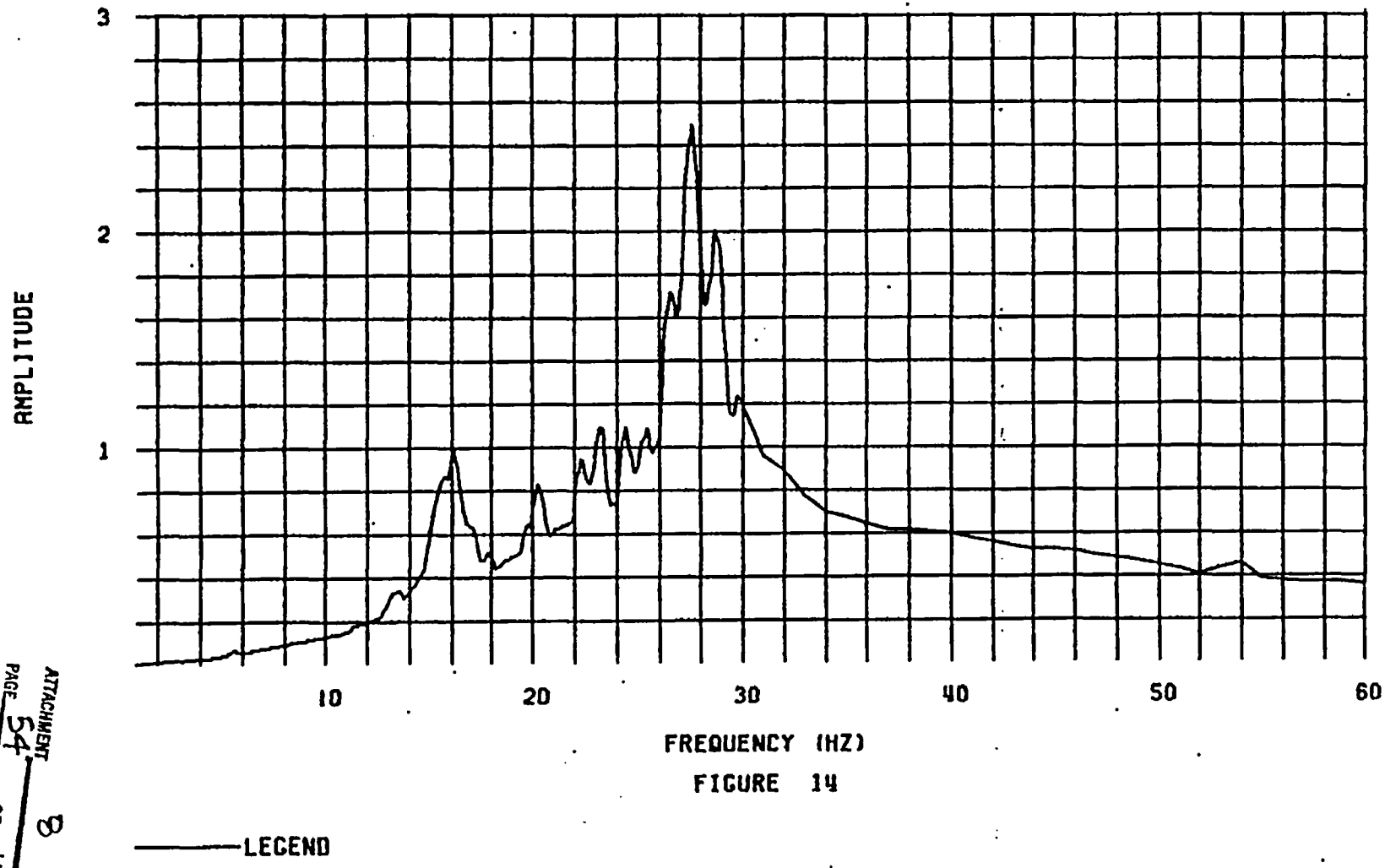

FIGURE 14

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 Z-TRAN LC = 1

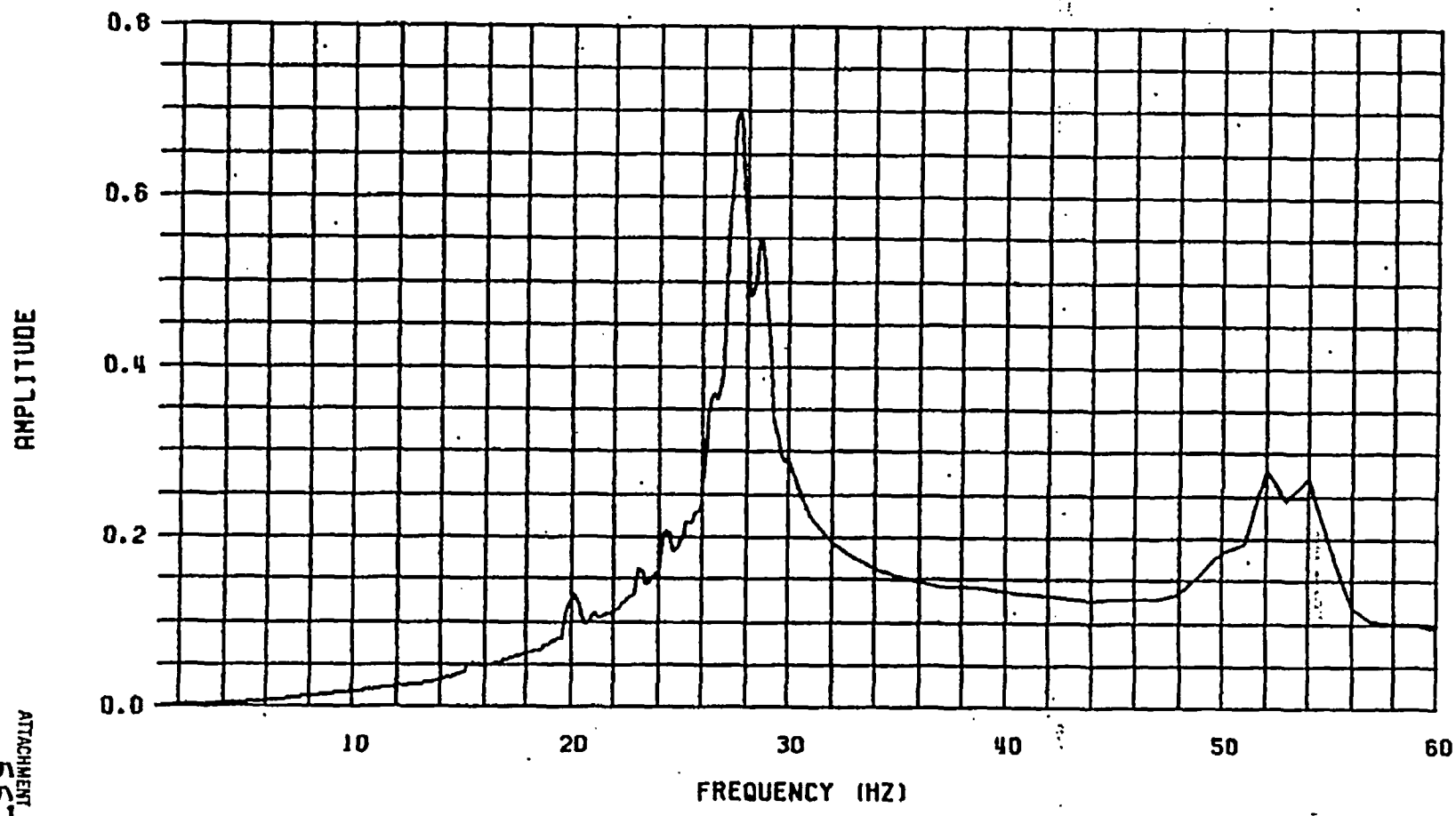

FIGURE 15

LEGEND

ARQJ 88/06/09 17.31.25

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CØI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP X-TRAN LC = 1

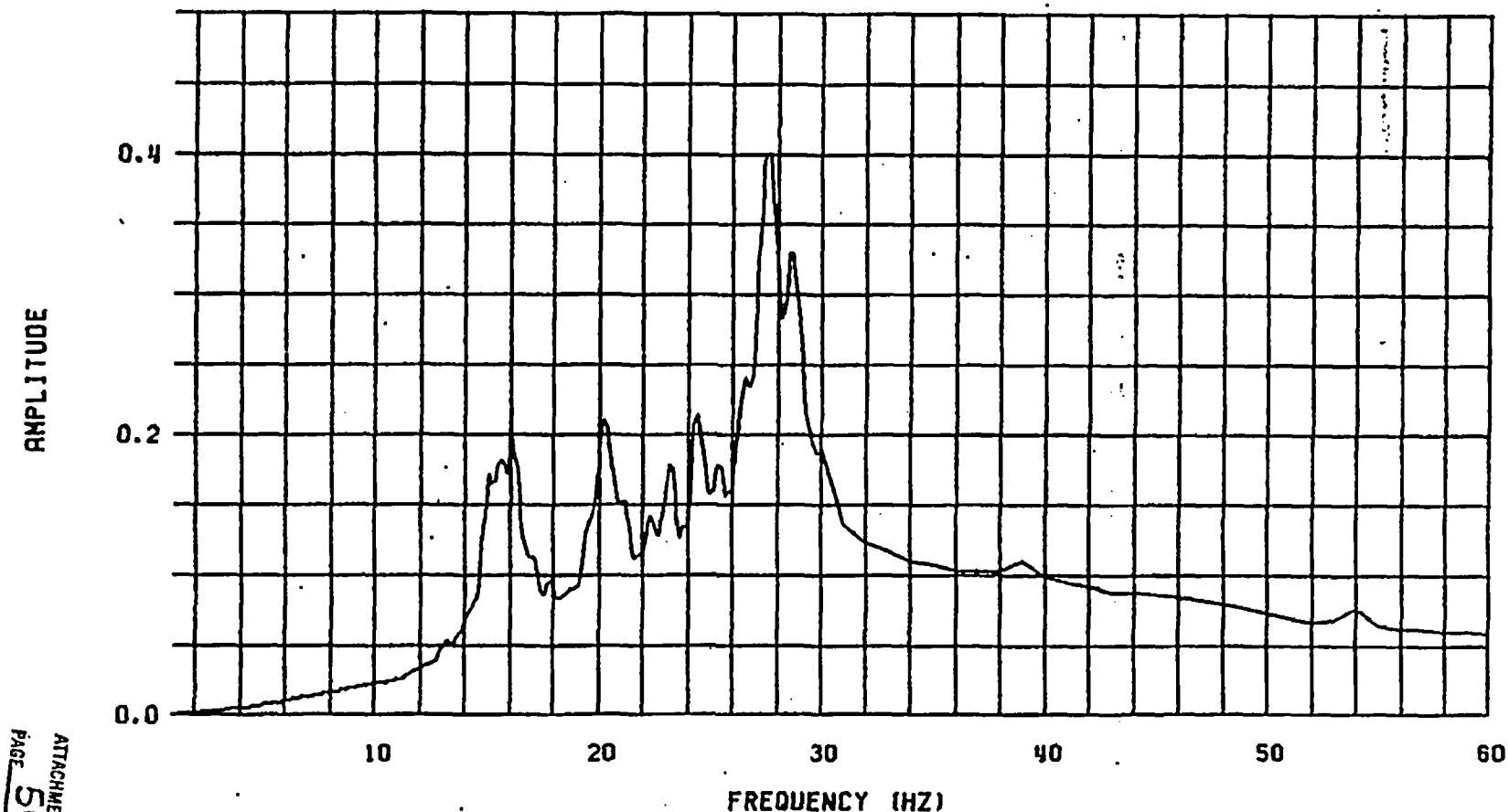

FIGURE 16

LEGEND

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Y-TRAN LC = 1

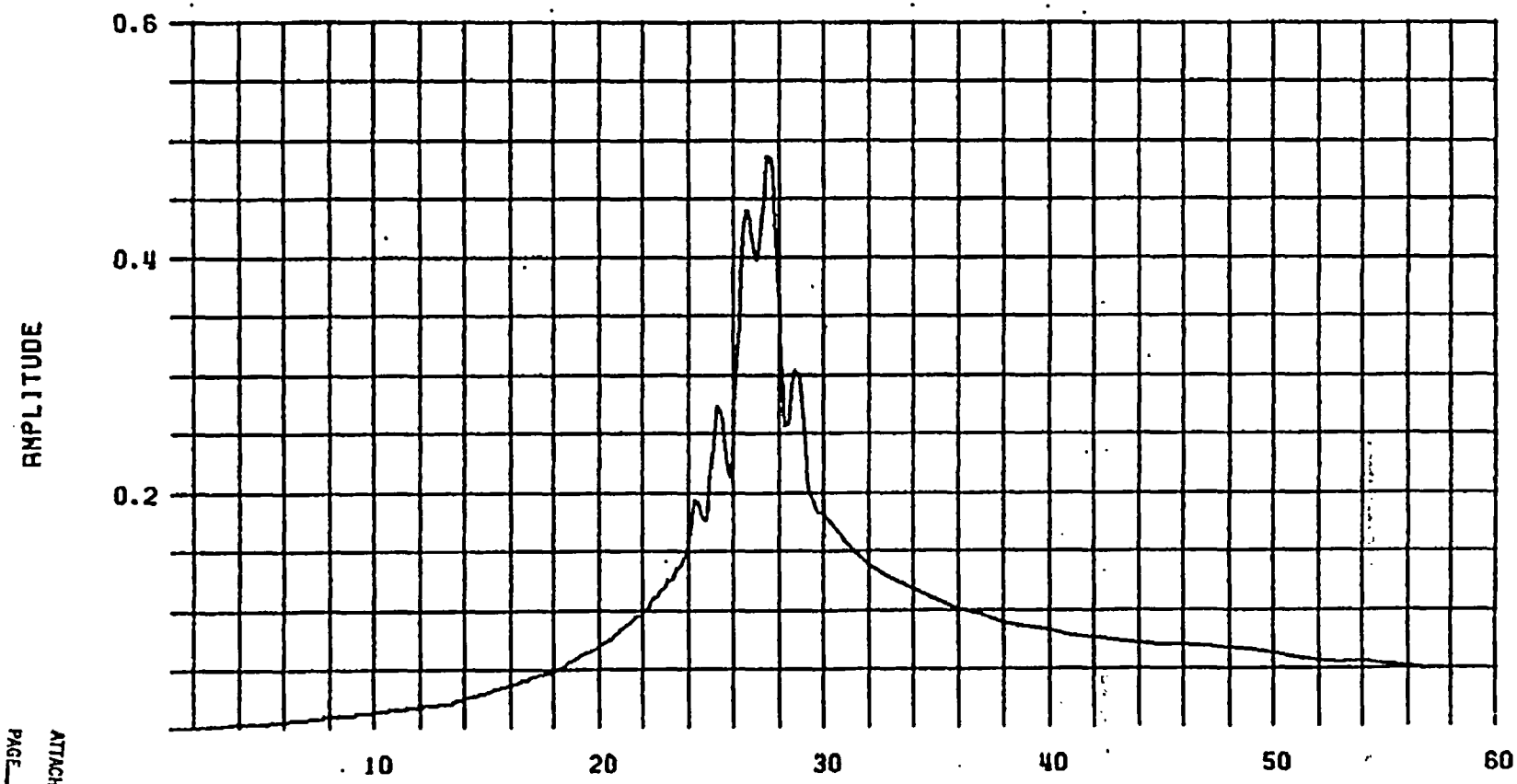

FIGURE 17

LEGEND

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RADJ 88/06/09 17.31.25

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Z-TRAN LC = 1

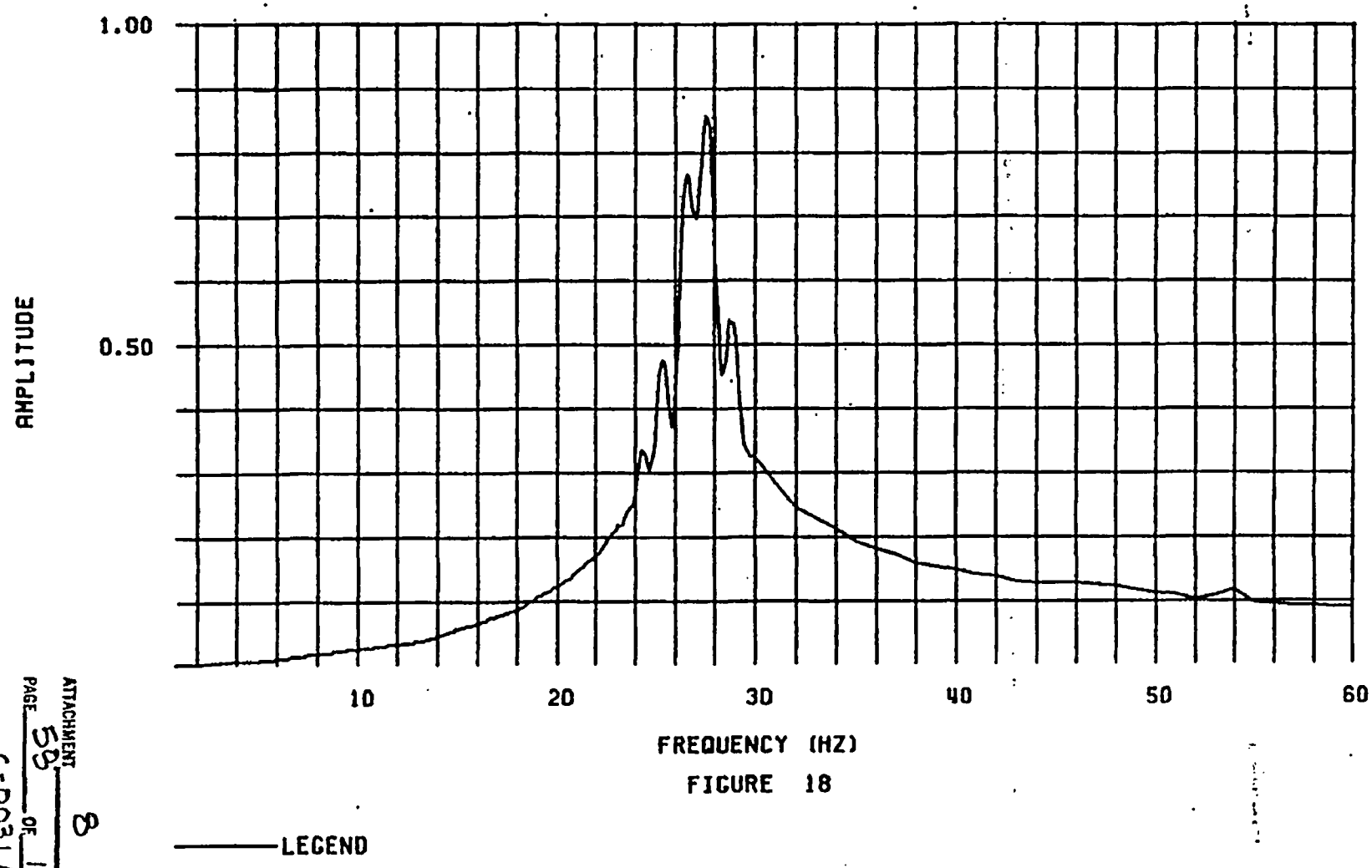

FIGURE 18

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JOB NAME = AAQO DATE = 88/06/09 CHARGE = F3395JT

PROJECT = *311*XPS080502

OPTICOM

CHUG I

(19 pages Total)

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR X-TRAN LC = 1

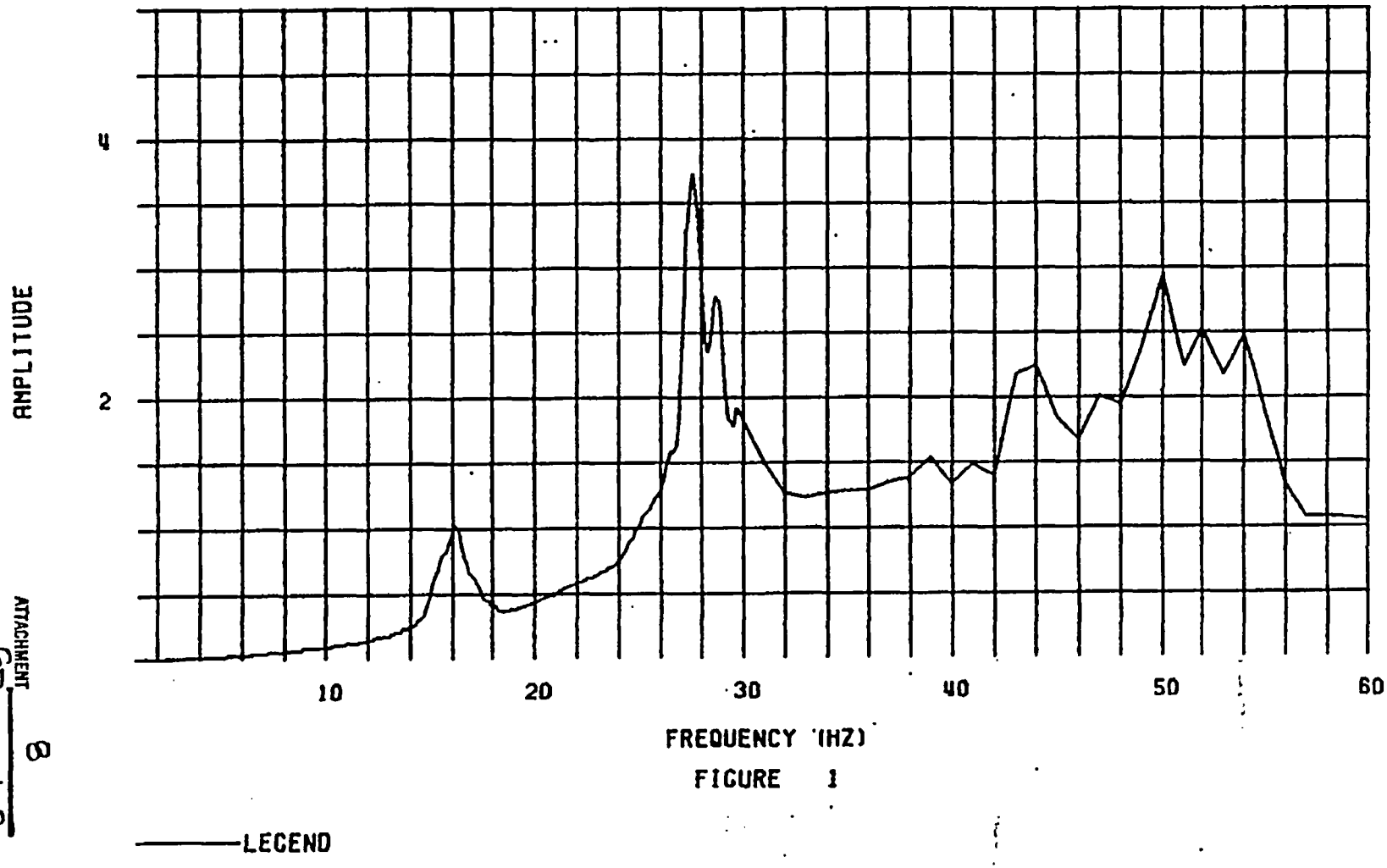

FIGURE 1

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL. RESPONSE SPECTRUM AT NODE 26BR Y-TRAN LC = 1

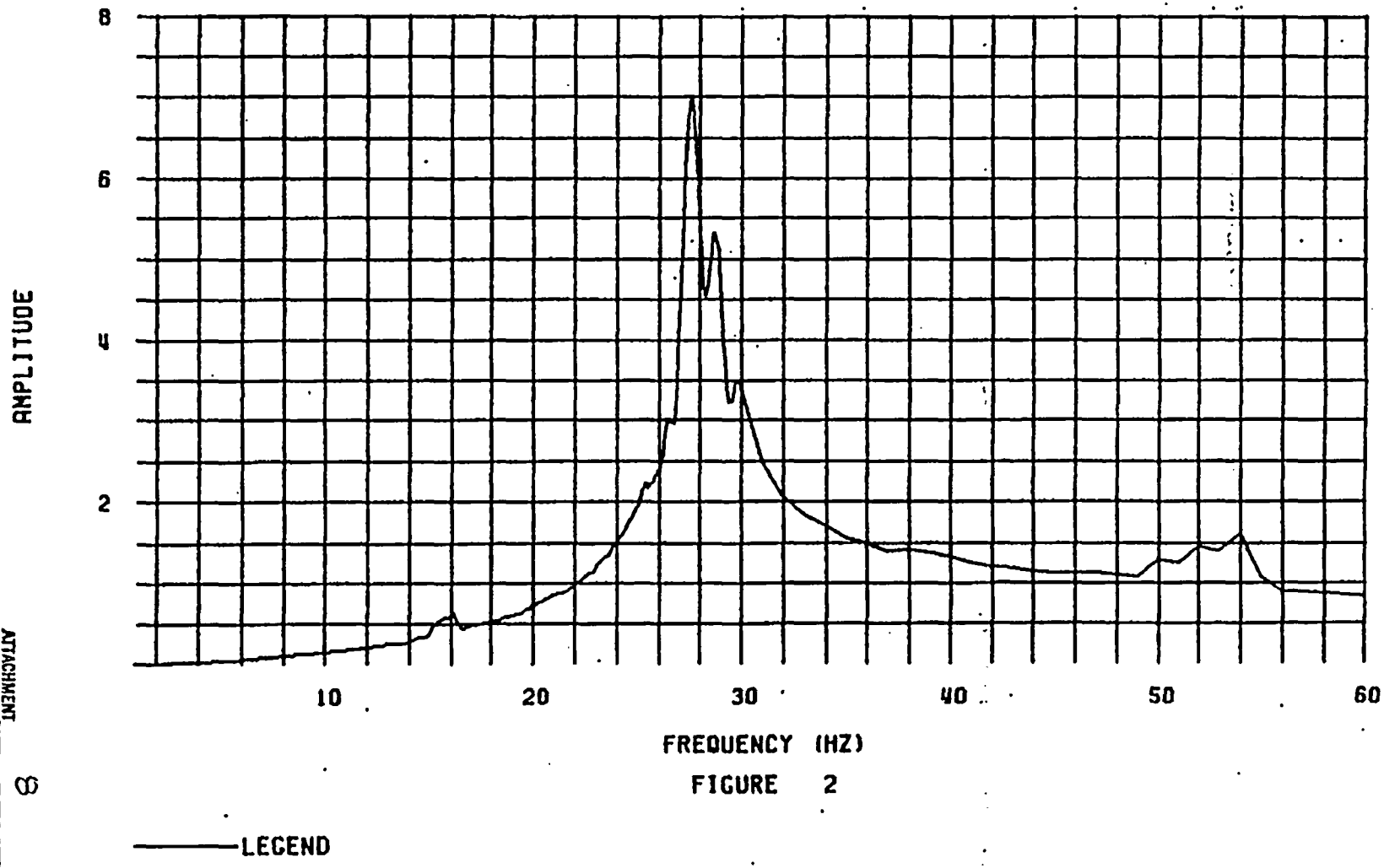

FIGURE 2

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CALC. NO. C-0031/TIRD

AAQO 88/06/09 17.37.00

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Z-TRAN LC = 1

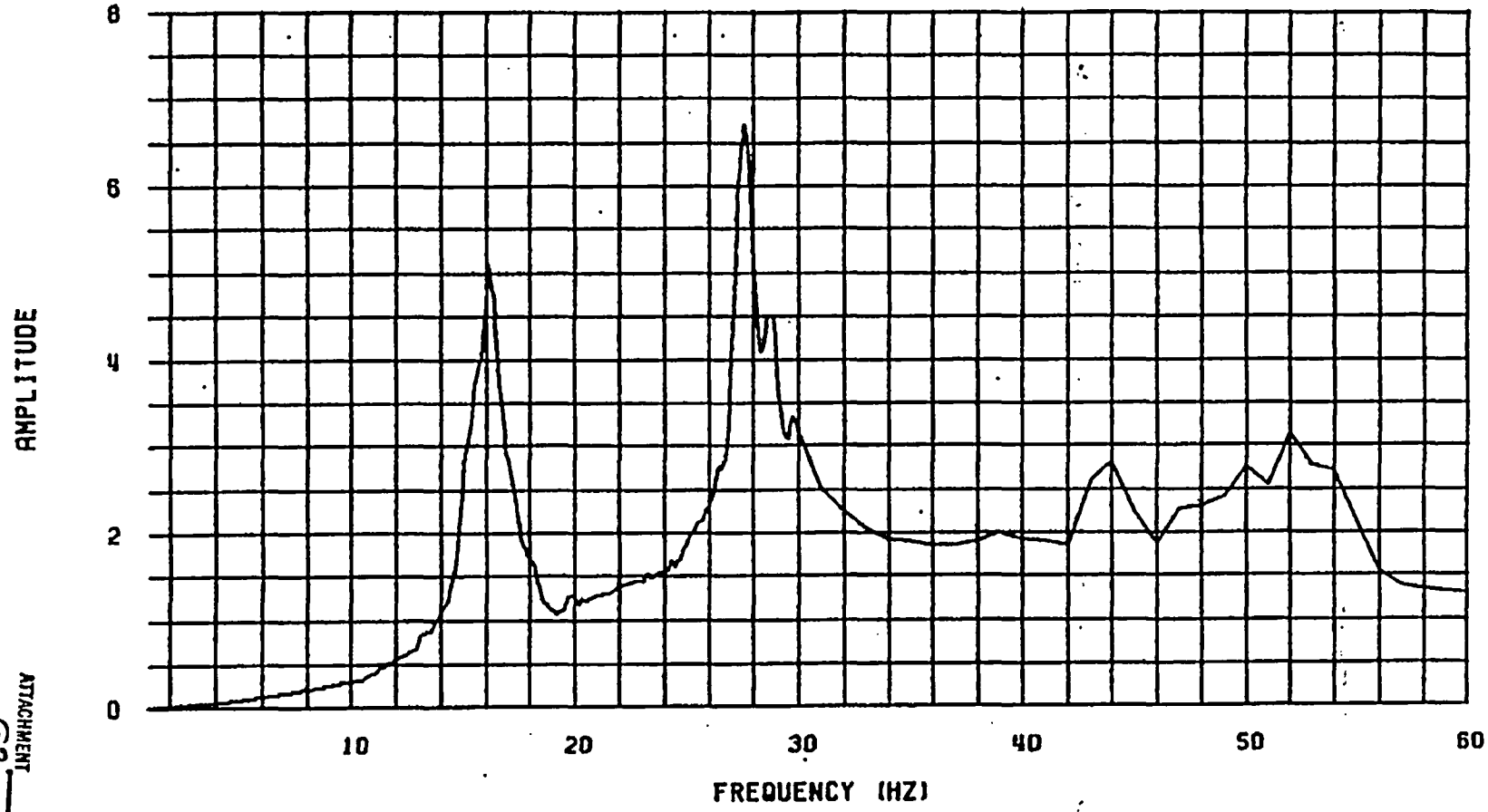

FIGURE 3

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR X-TRAN LC = 1

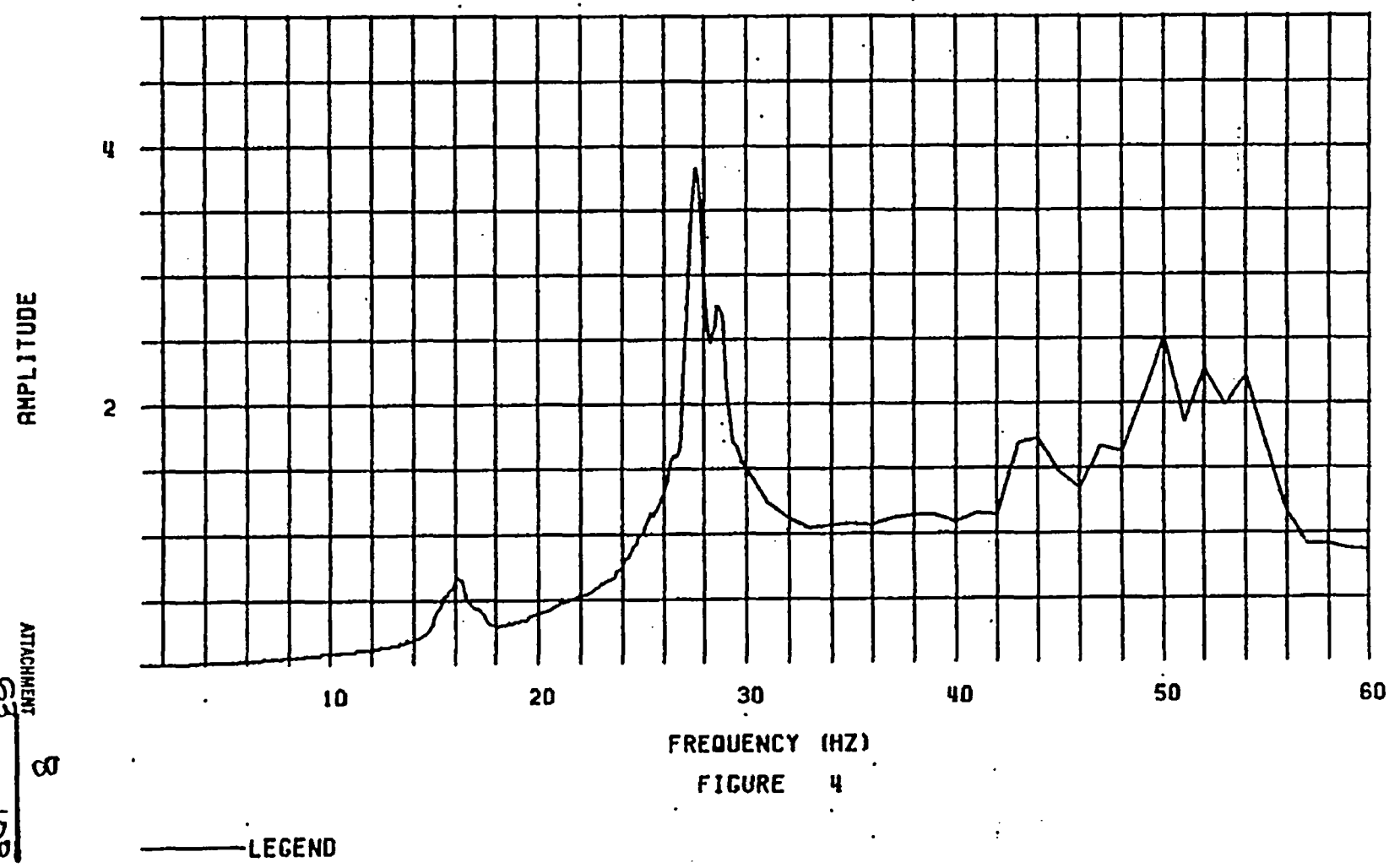

FIGURE 4

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AAQ6 88/06/09 17.37.00

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Y-TRAN LC = 1

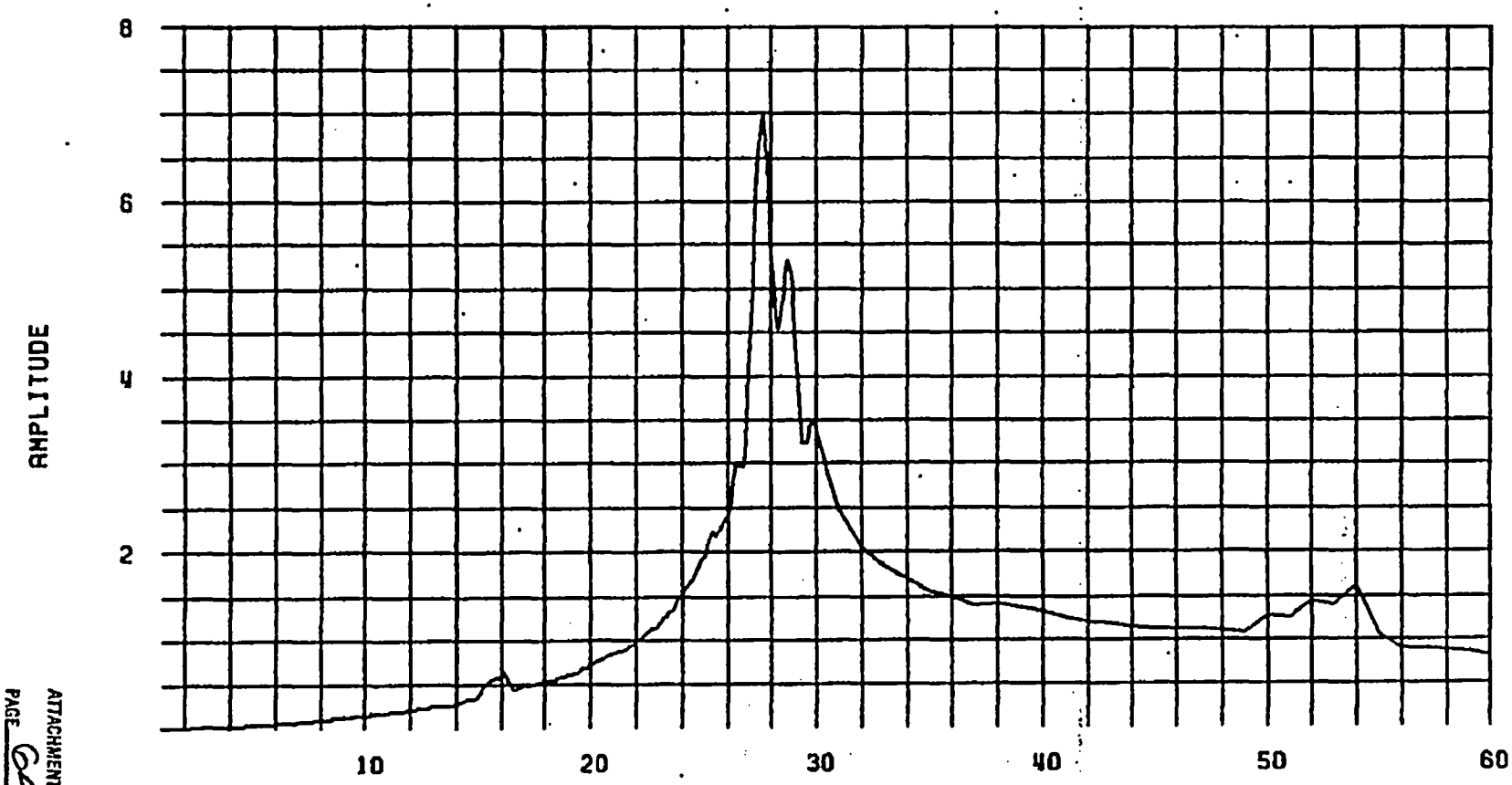

FIGURE 5

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Z-TRAN LC = 1

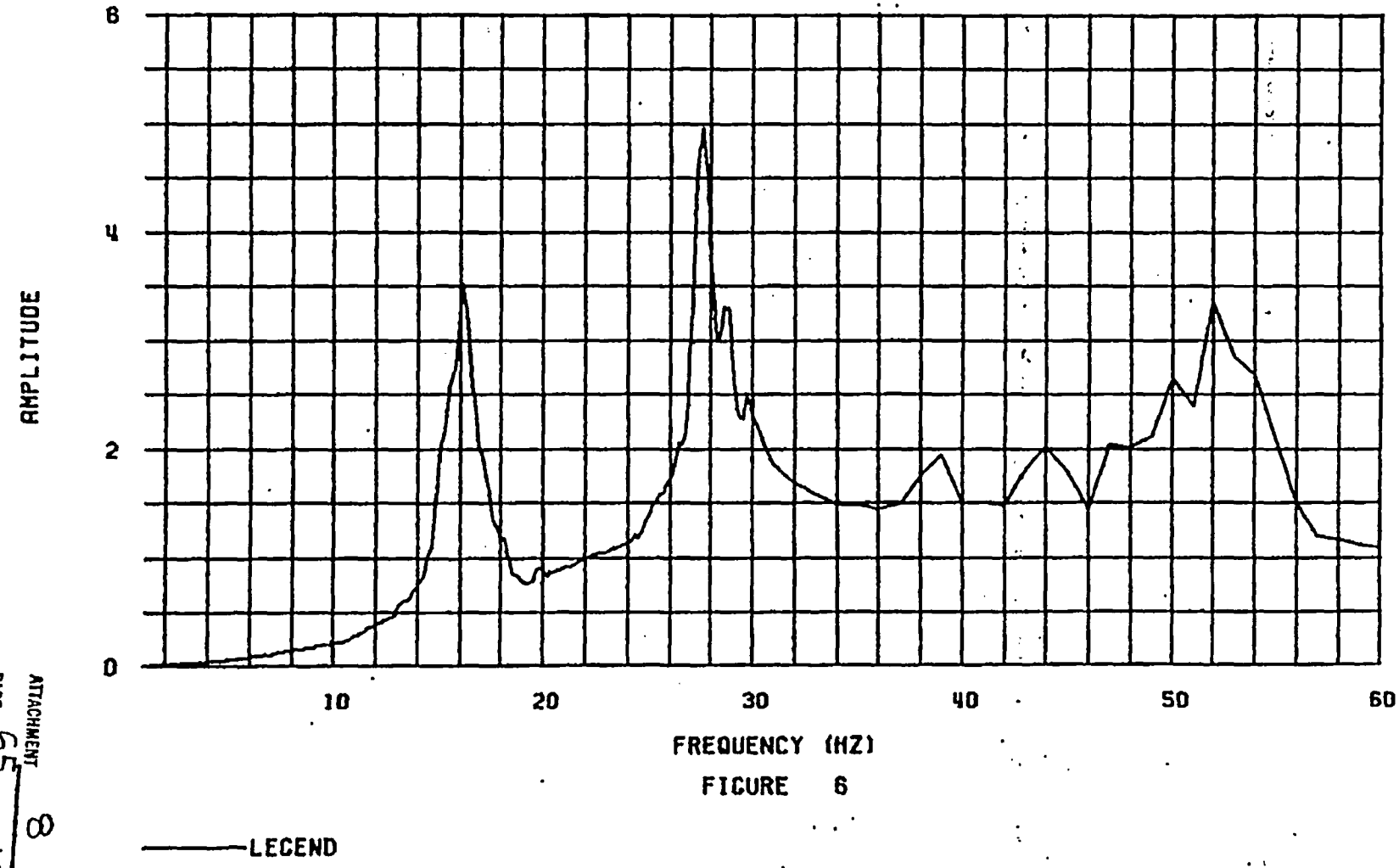

FIGURE 6

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AAQB 88/06/09 17.37.00

HOPE CREEK NUCLEAR GEN. STATION UNIT-1; P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 548R X-TRAN LC = 1

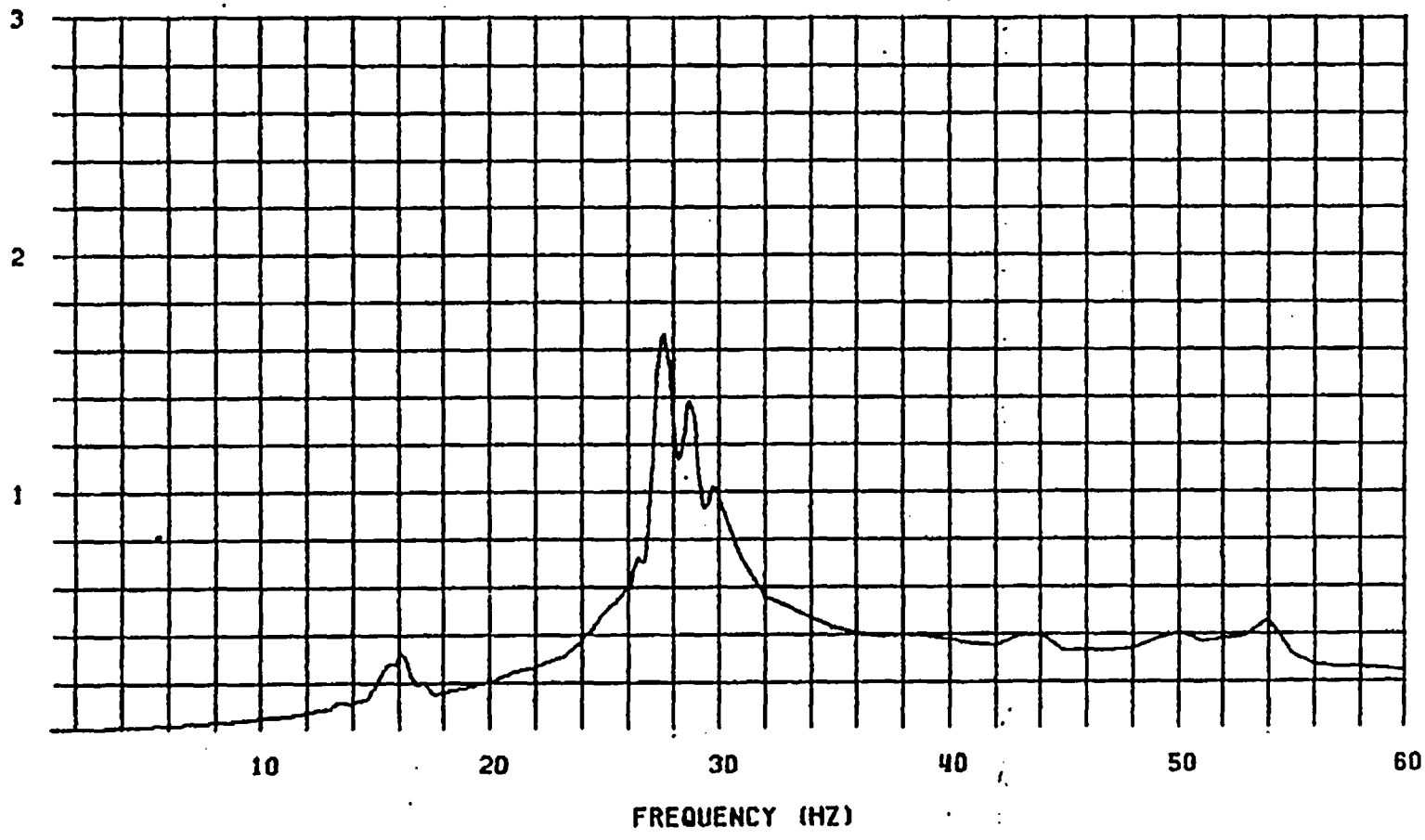

FIGURE 7

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Y-TRAN LC = 1

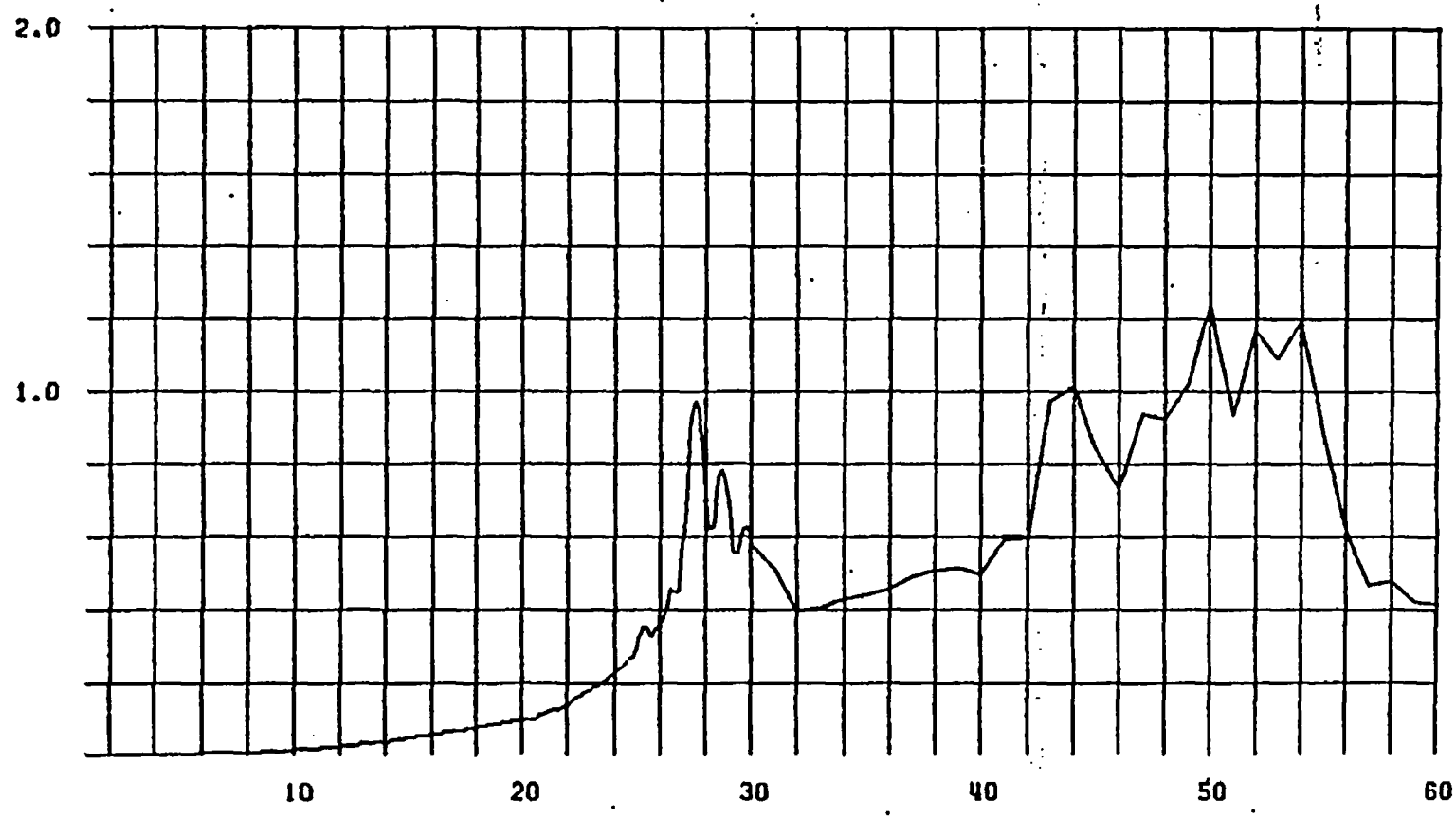

FIGURE 8

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Z-TRAN LC = 1

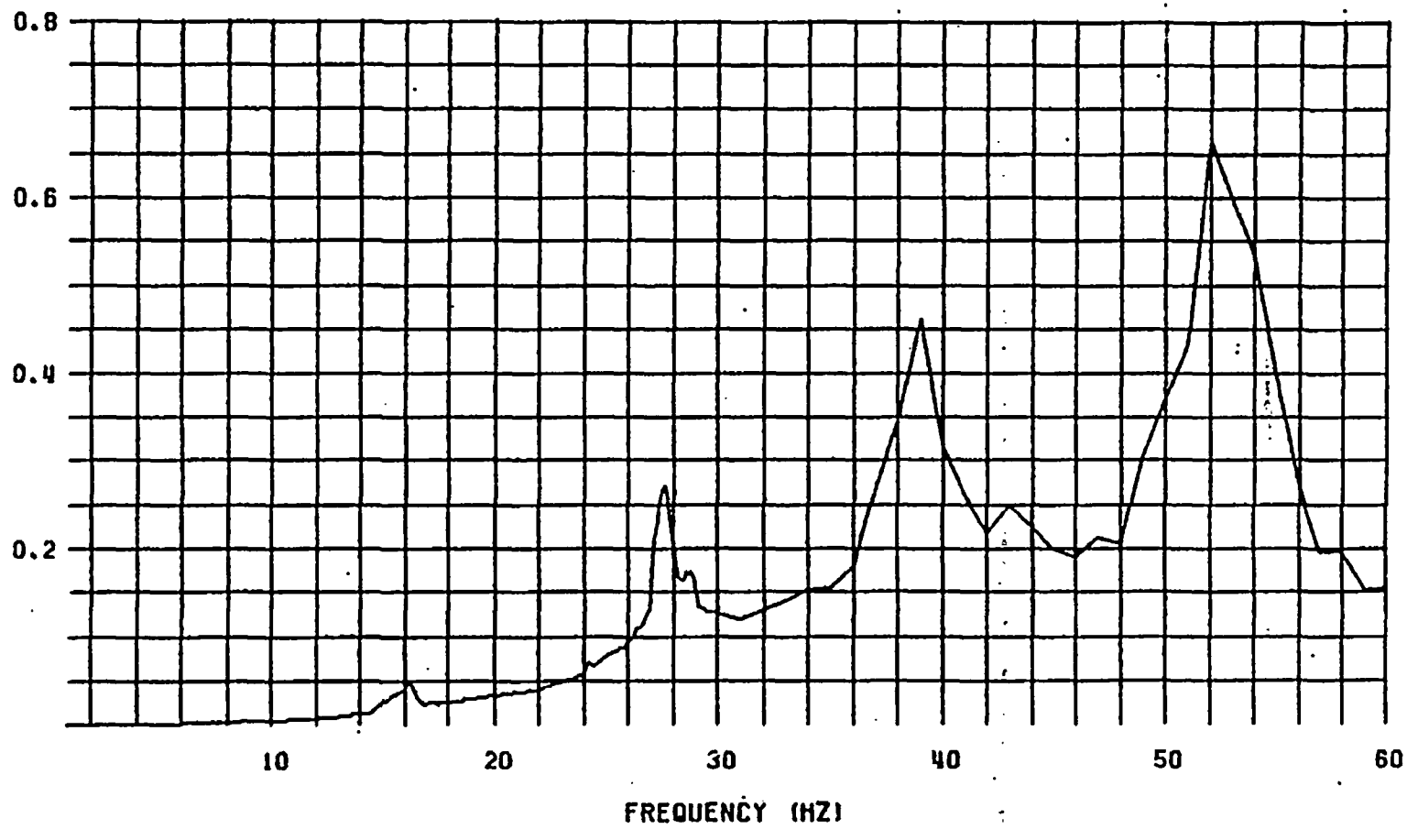

FIGURE 9

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 X-TRAN LC = 1

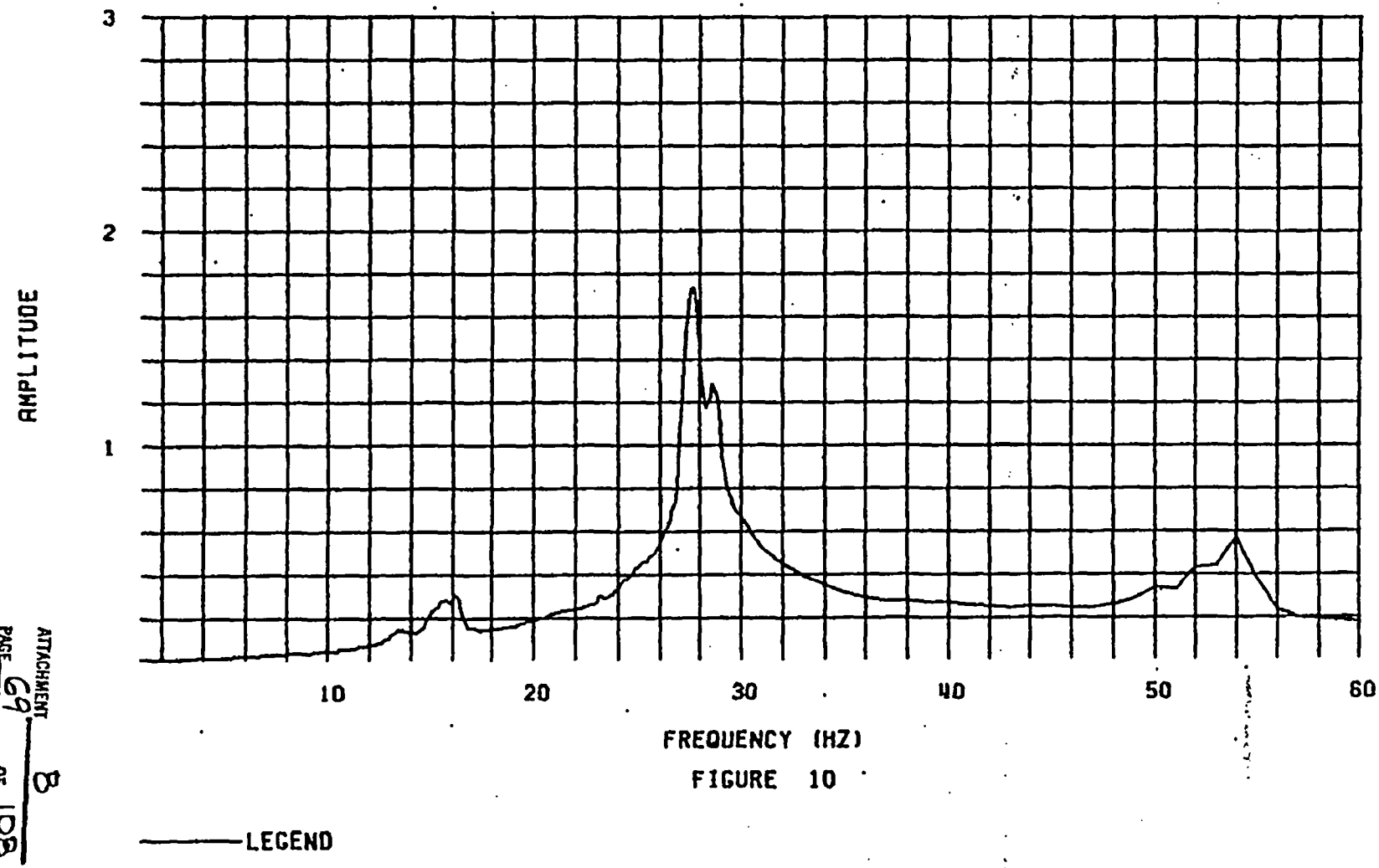

FIGURE 10

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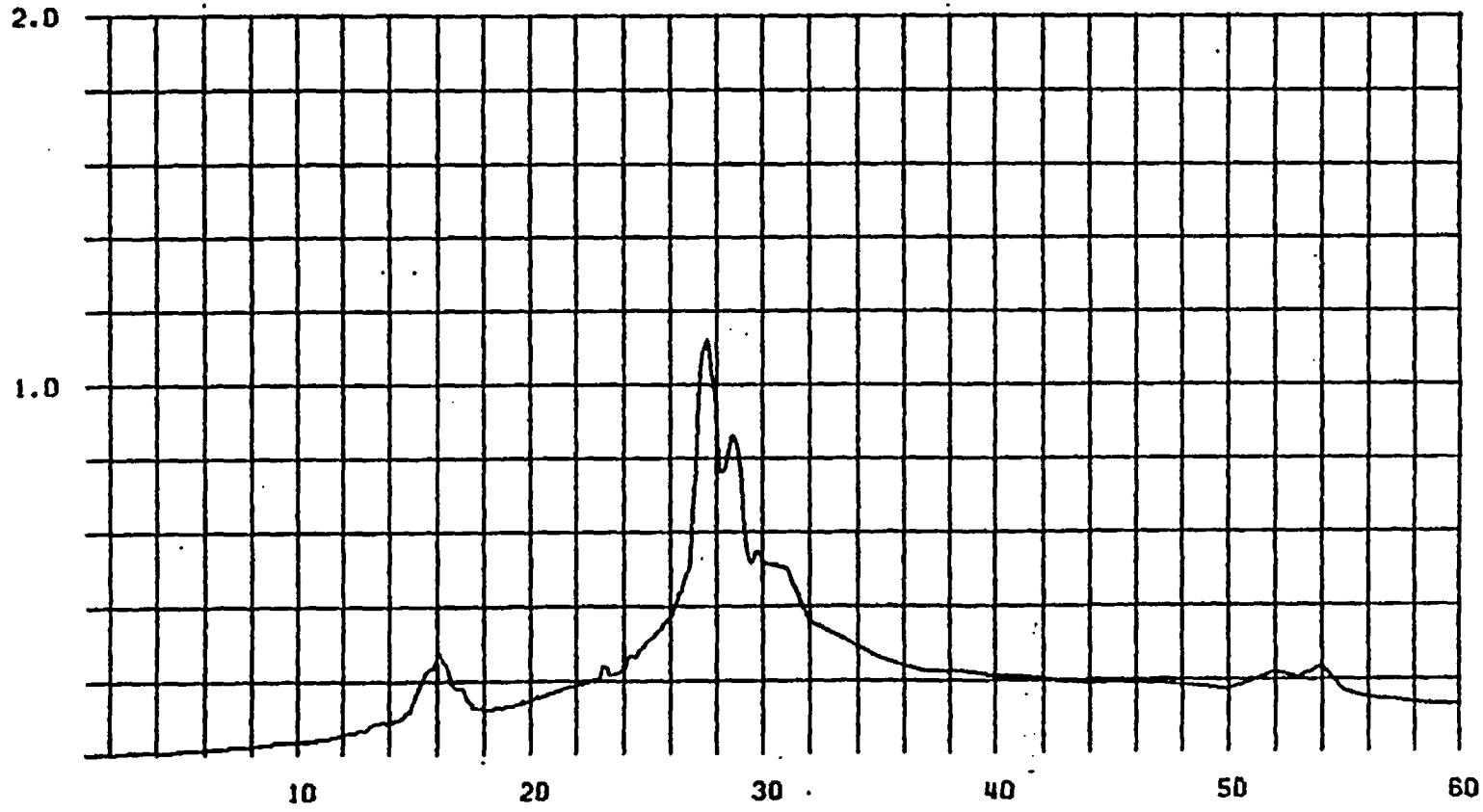
HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 Y-TRAN LC = 1



FREQUENCY (HZ)

FIGURE 11

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 91 Z-TRAN LC = 1

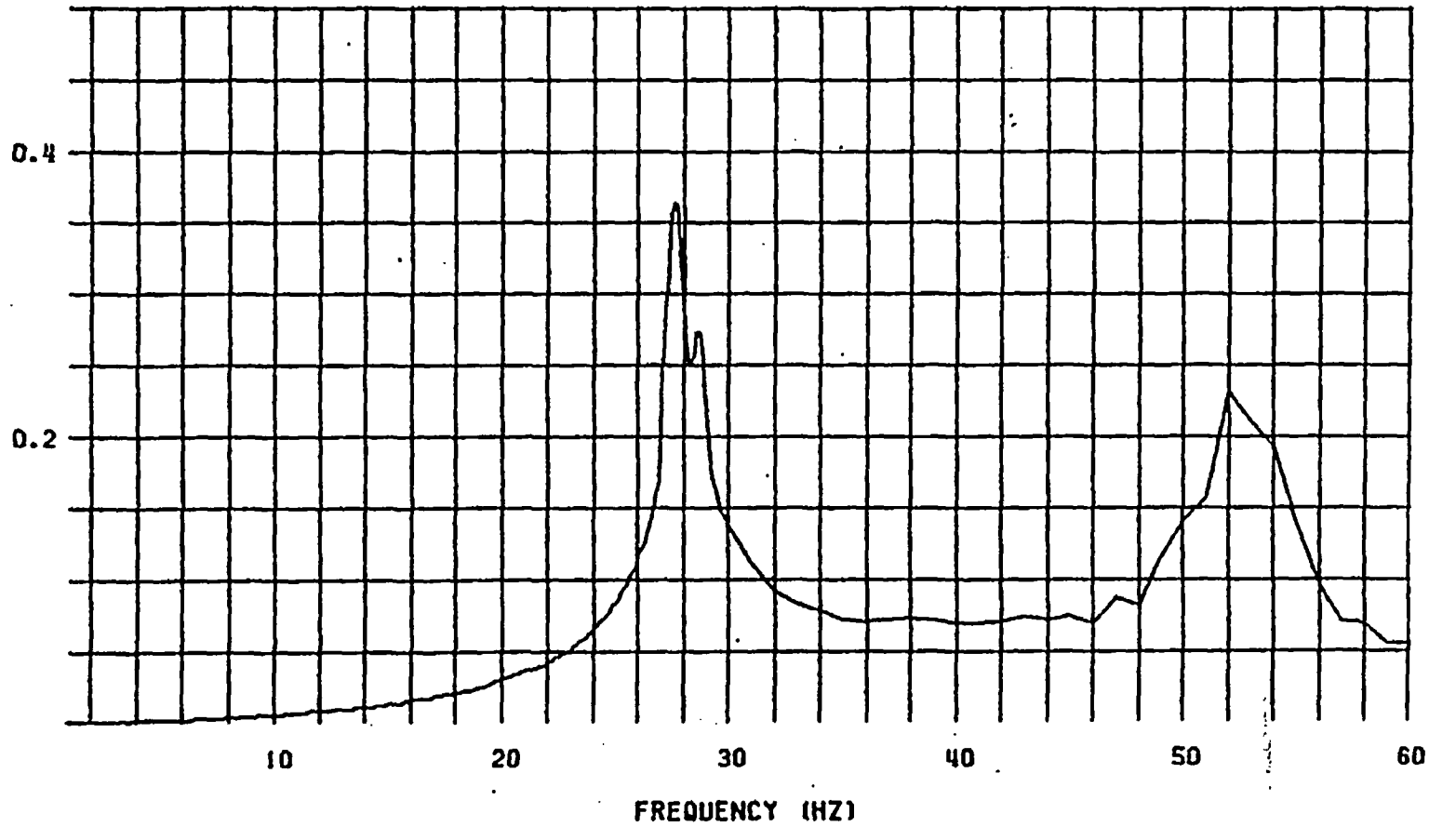

FIGURE 12

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 X-TRAN LC = 1

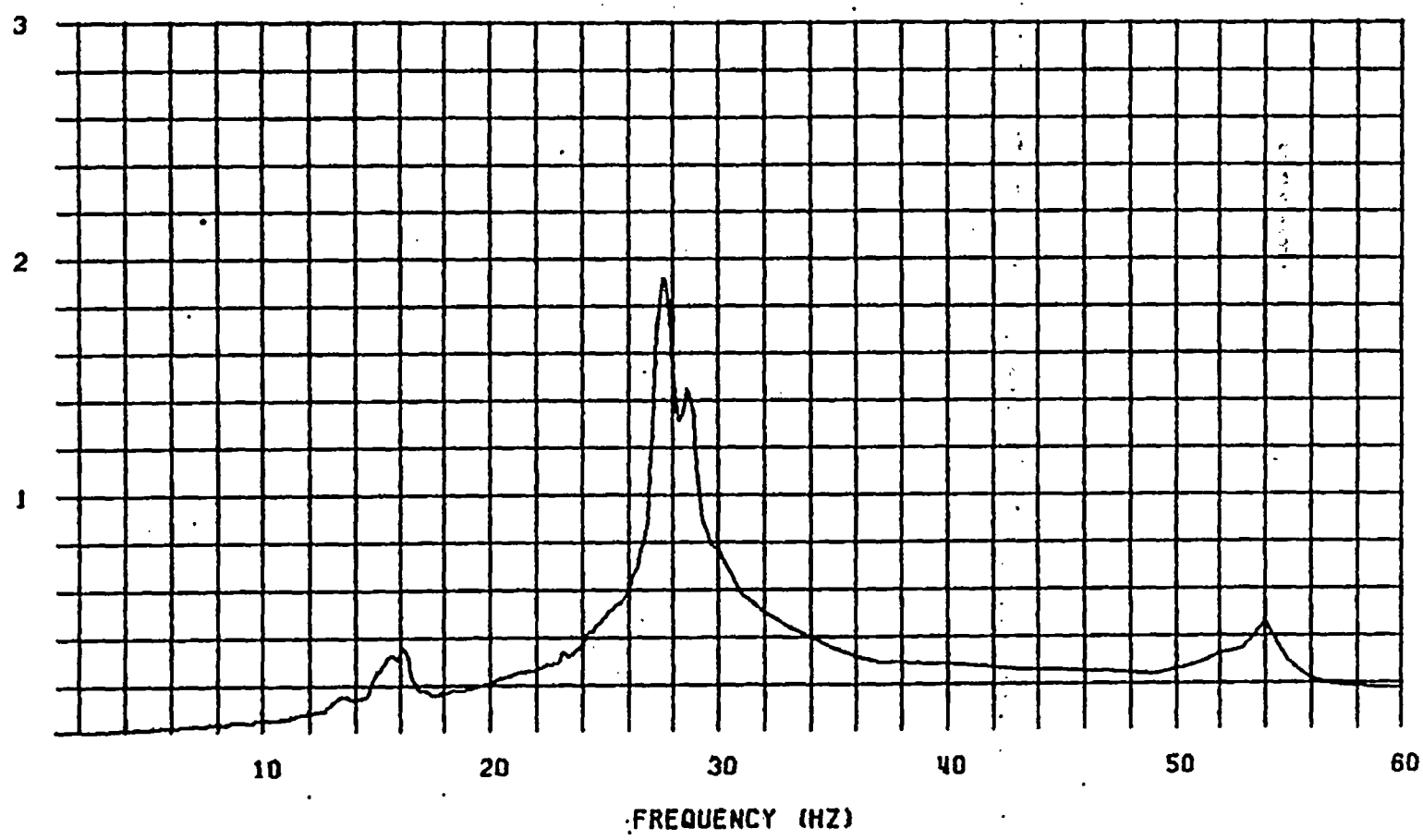

FIGURE 13

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/71R0

AAQ0 88/06/09 17.37.00

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 Y-TRAN LC = 1

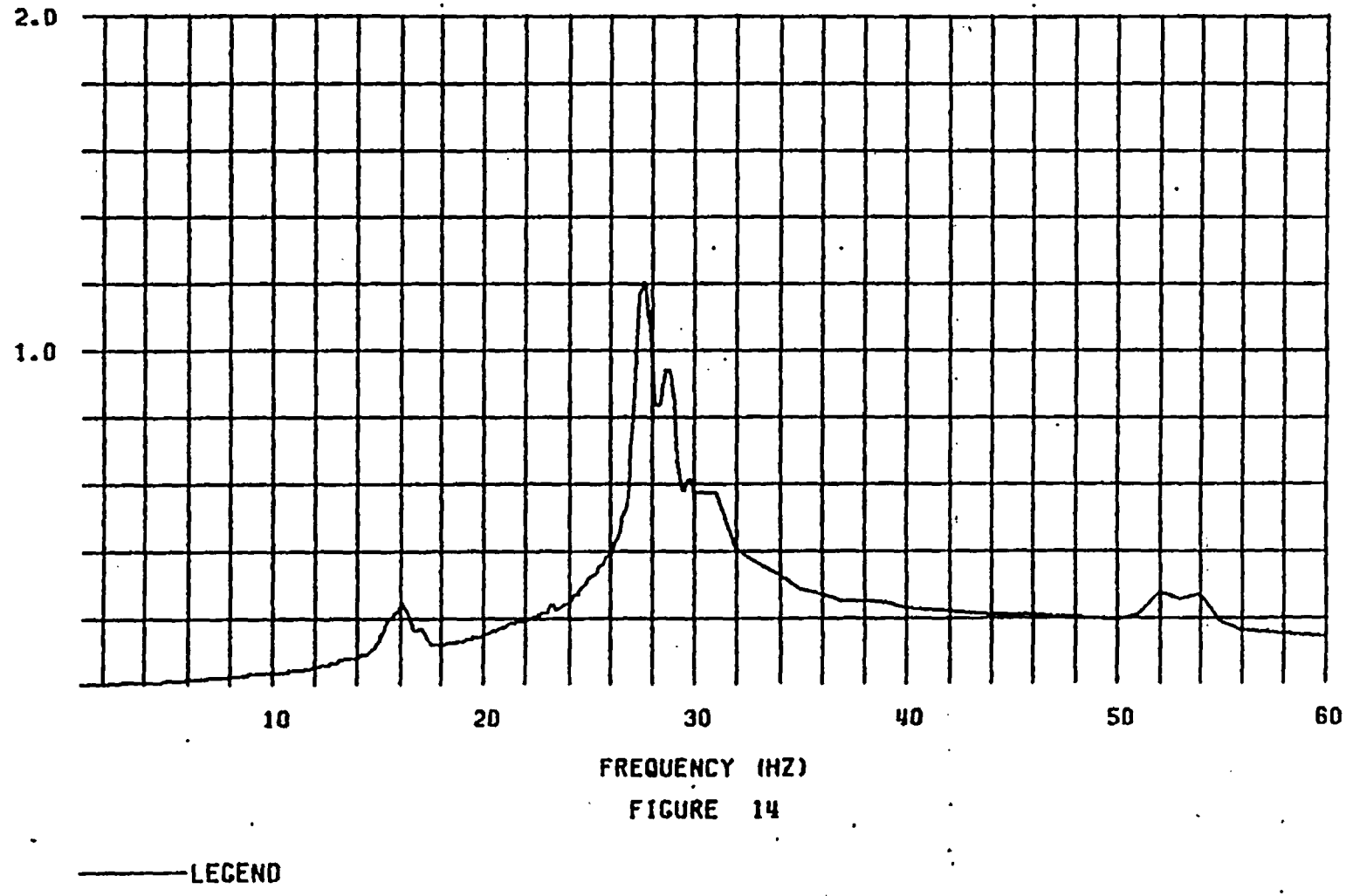

FIGURE 14

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AAQ0 88/06/09 17.37.00

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 92 Z-TRAN LC = 1

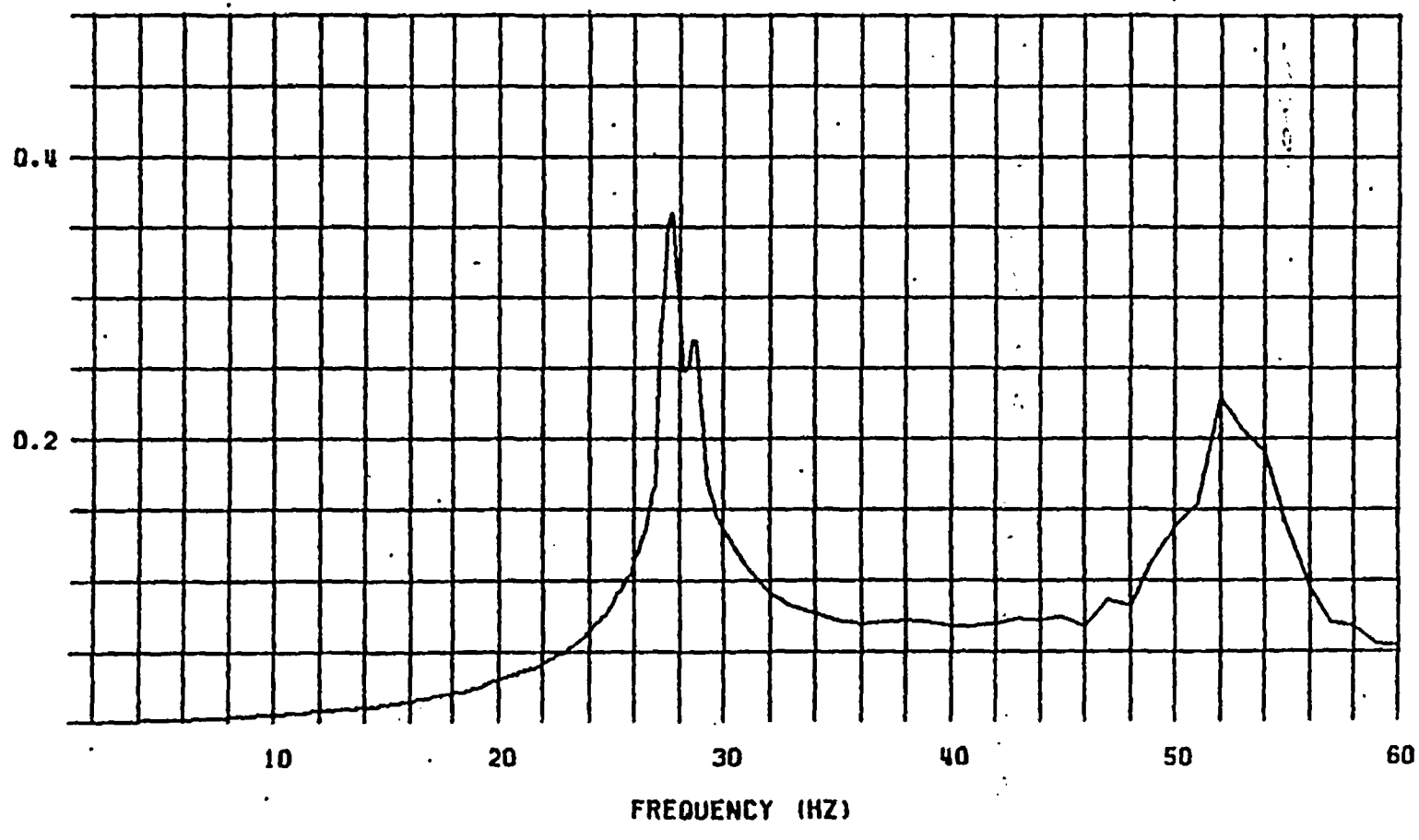

FIGURE 15

LEGEND

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP X-TRAN LC = 1

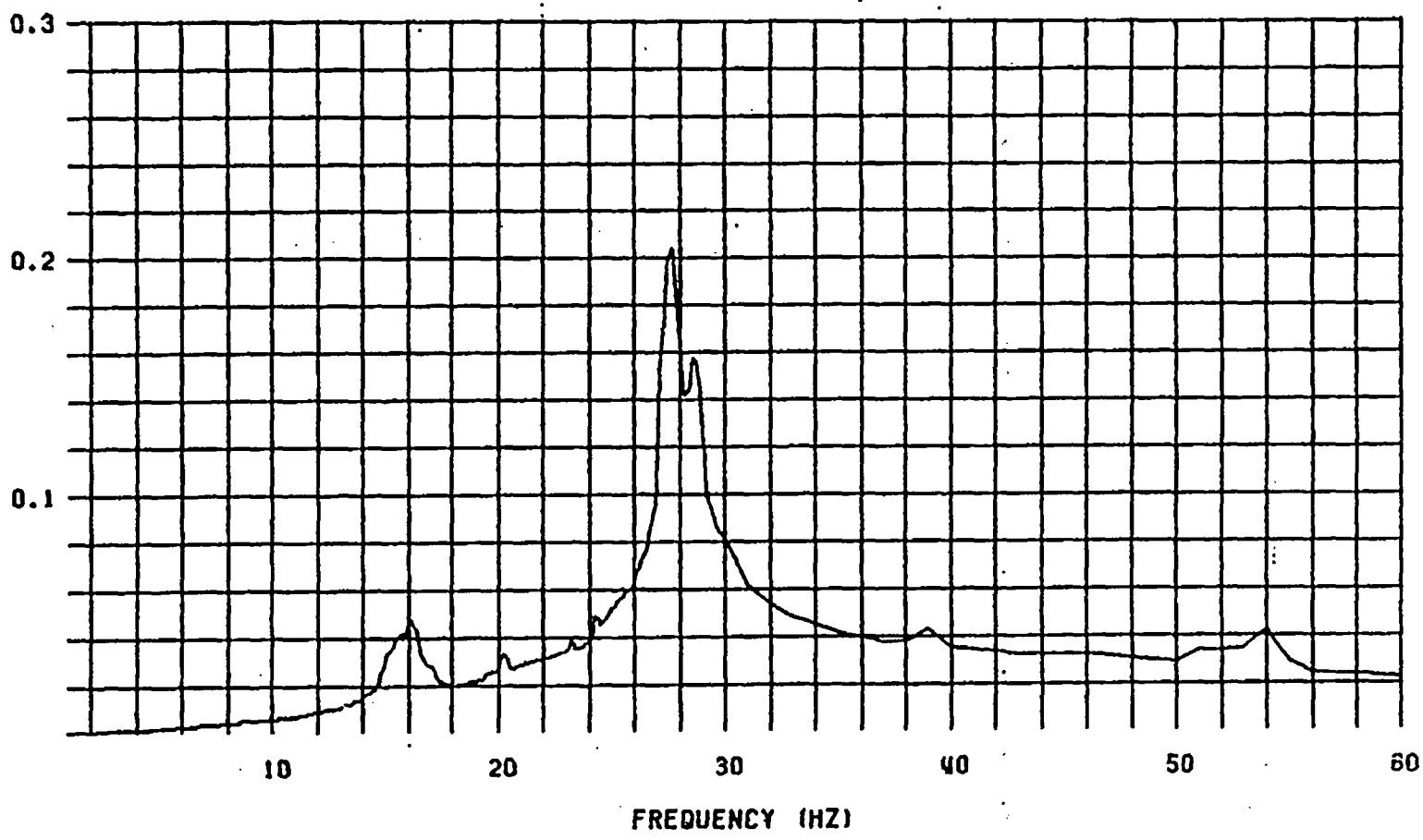

FIGURE 16

LEGEND

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CALC. NO. C-0031/7IR0

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Y-TRAN LC = 1

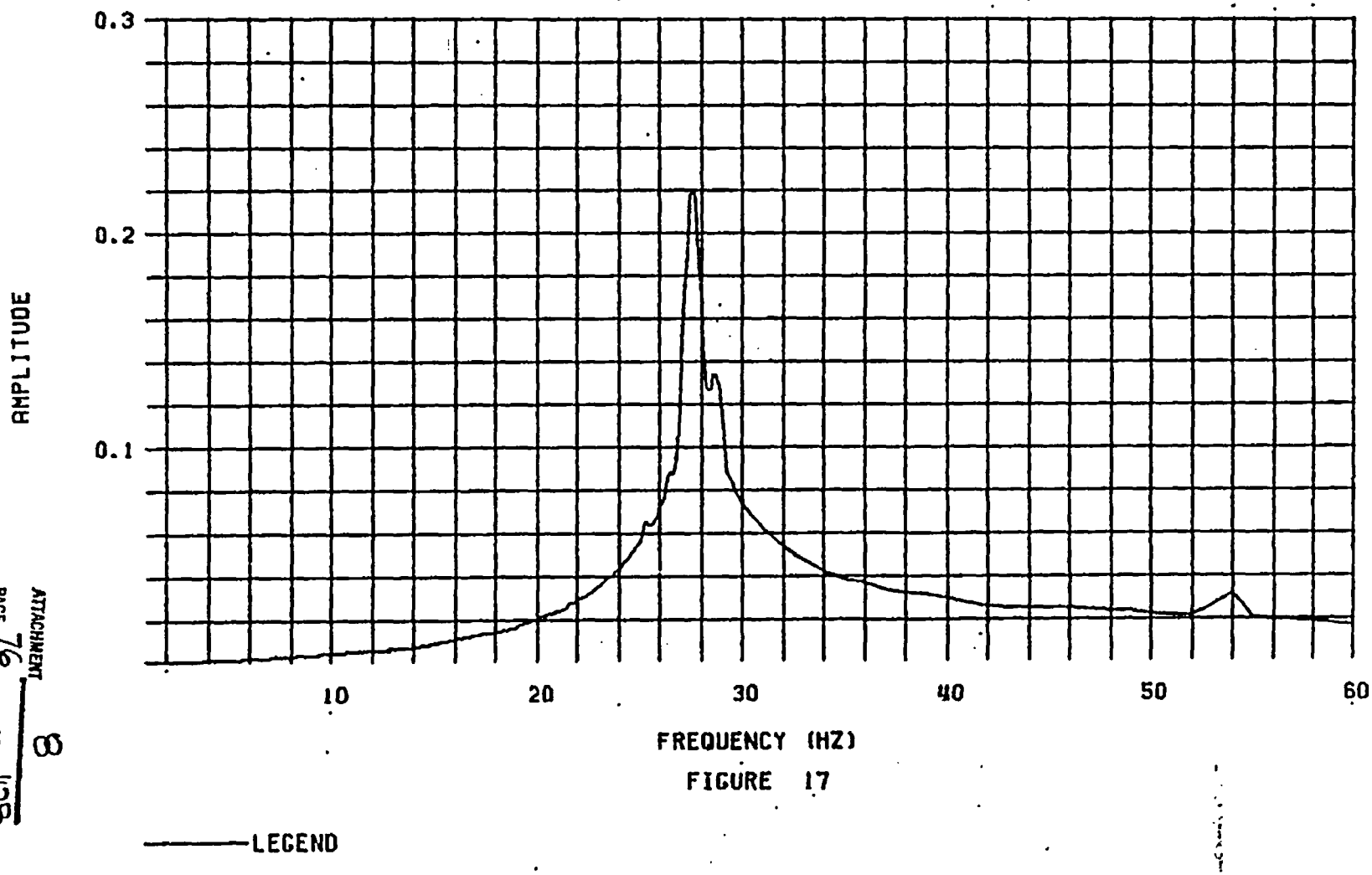

FIGURE 17

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HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Z-TRAN LC = 1

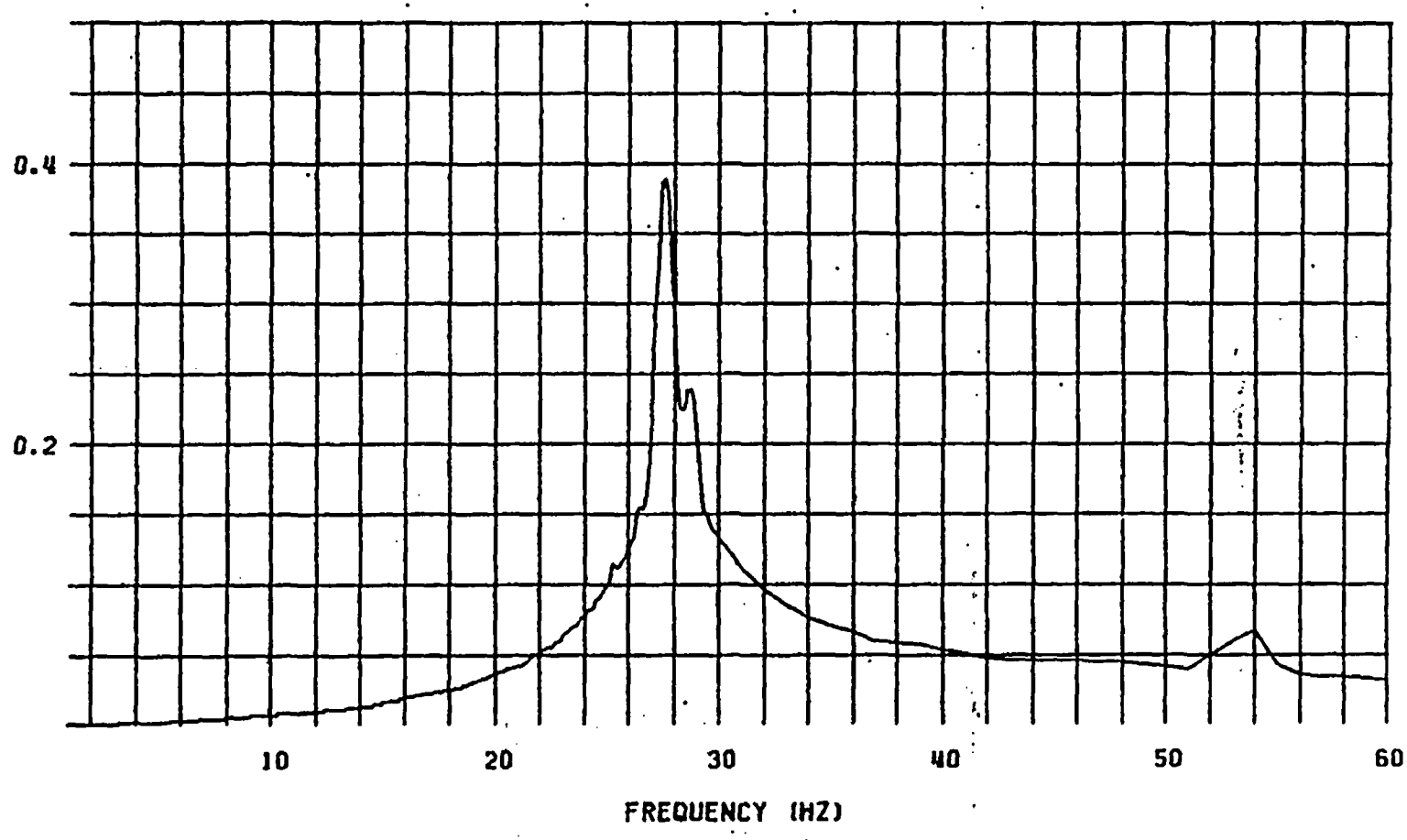

FIGURE 18

LEGEND

ATTACHMENT 8
PAGE 77 OF 108
CALC. NO. C-0031/7IR0

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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JOB NAME = AARK DATE = 88/06/20 CHARGE = F3395JT

PROJECT = *311*XPS080502

OABI (w/ 3% Damping)

Spectra generated for 2%

(Total 19 pages)

OPTICOM

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PRINTED 20041222

AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 26BR X-TRAN LC = 1

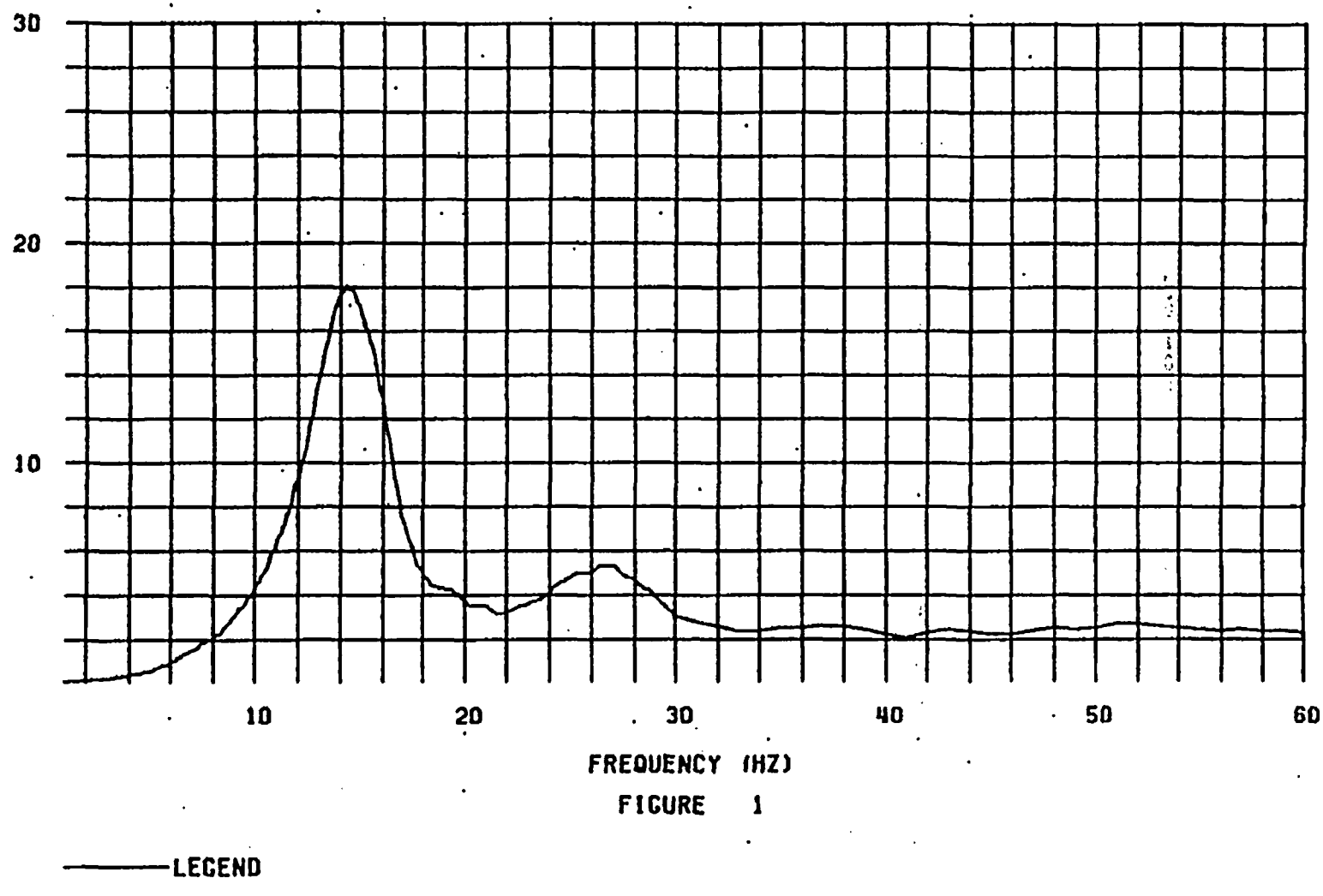

FIGURE 1

LEGEND

ATTACHMENT 8
PAGE 79 OF 108
CALC. NO. C-0031/7IR0

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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RARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Y-TRAN LC = 1

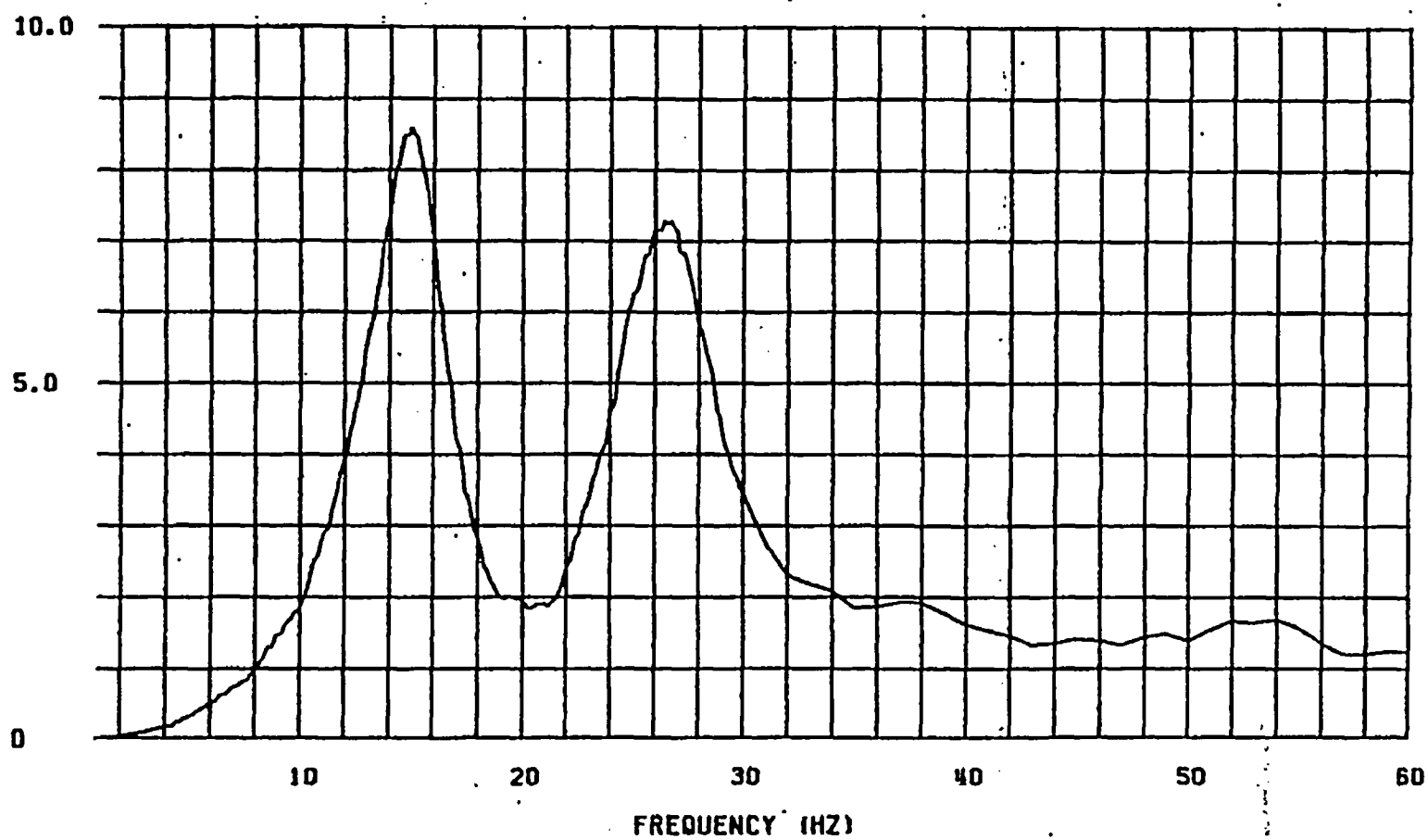

FIGURE 2

LEGEND

ATTACHMENT 8
PAGE 80 OF 108
CALC. NO. C-0031/7IR0

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 26BR Z-TRAN LC = 1

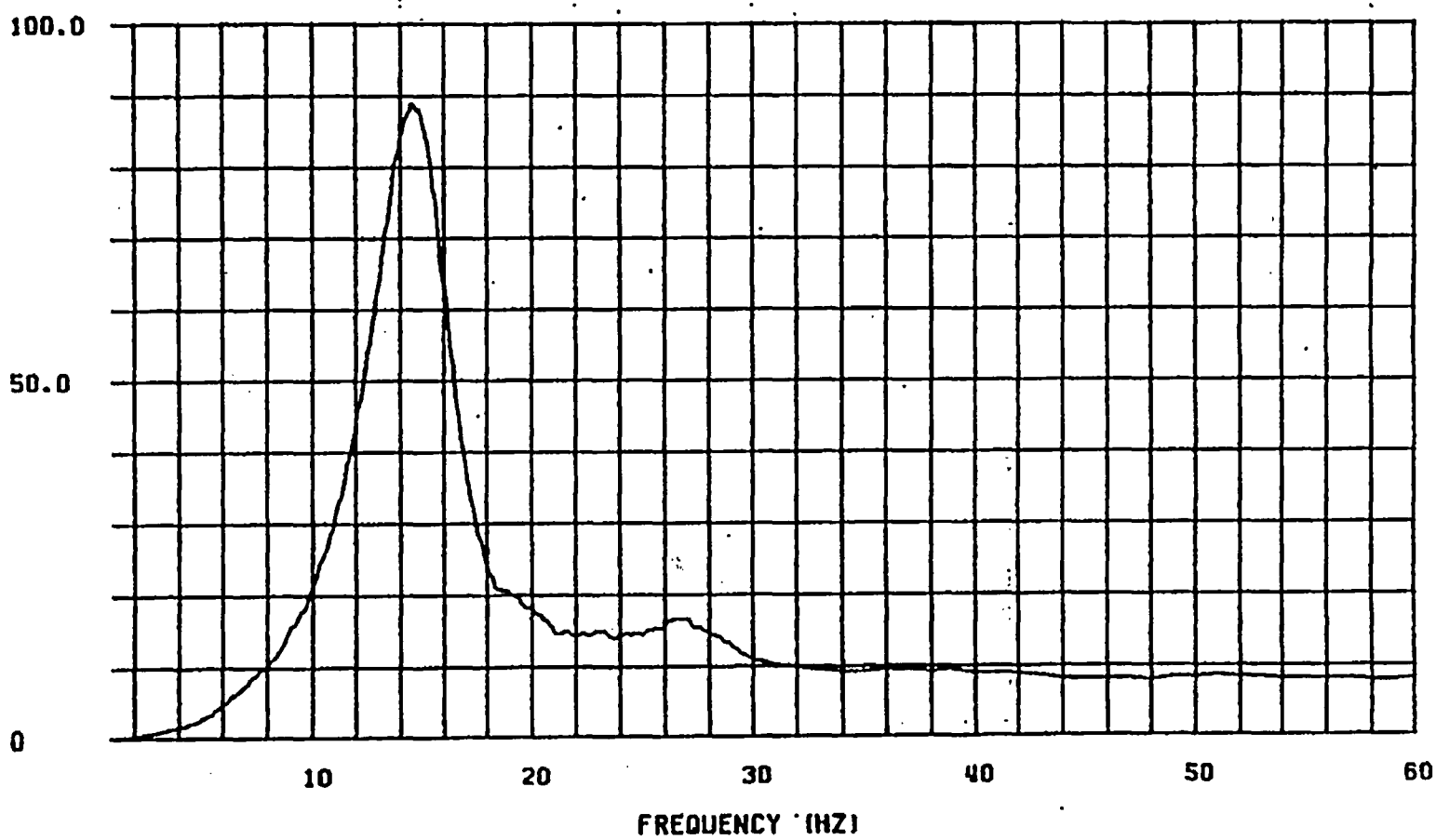

FIGURE 3

LEGEND

ATTACHMENT 8
PAGE 81 OF 108
CALC. NO. C-0031/TIRO

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 27BR X-TRAN LC = 1

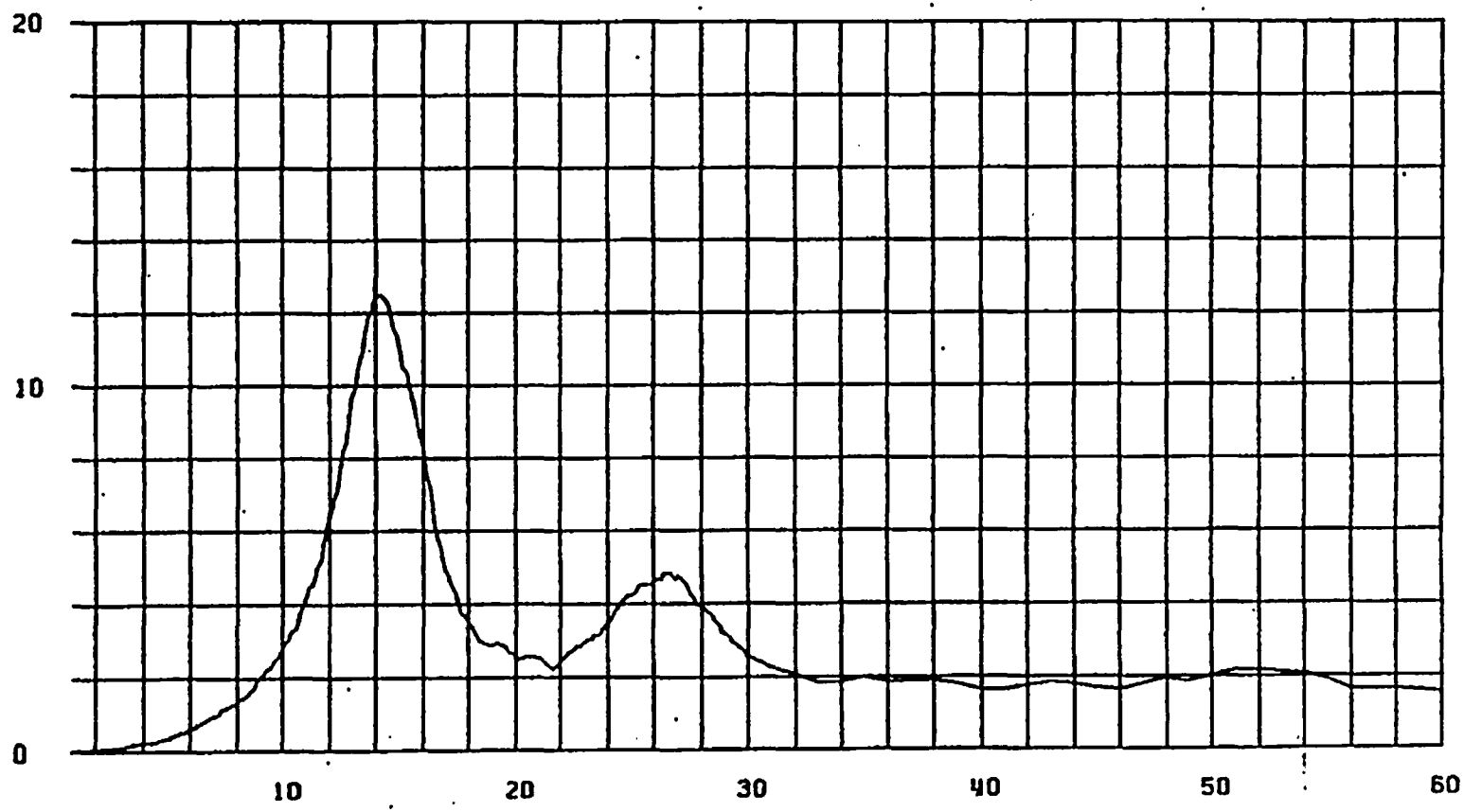

FIGURE 4

LEGEND

ATTACHMENT 8
PAGE 82 OF 108
CALC. NO. C-0031/7IR0

AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Y-TRAN LC = 1

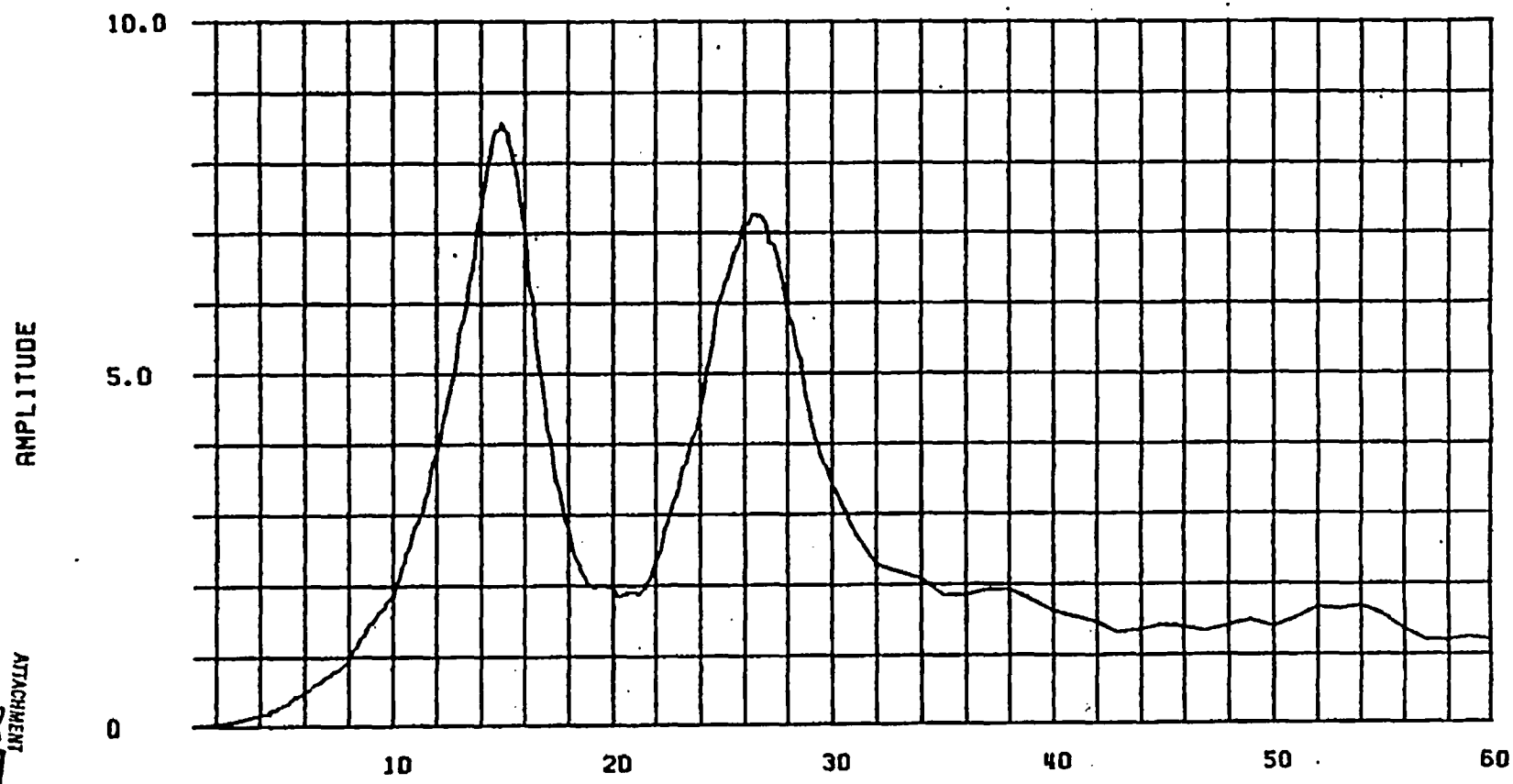

FIGURE 5

LEGEND

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USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
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RARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 27BR Z-TRAN LC = 1

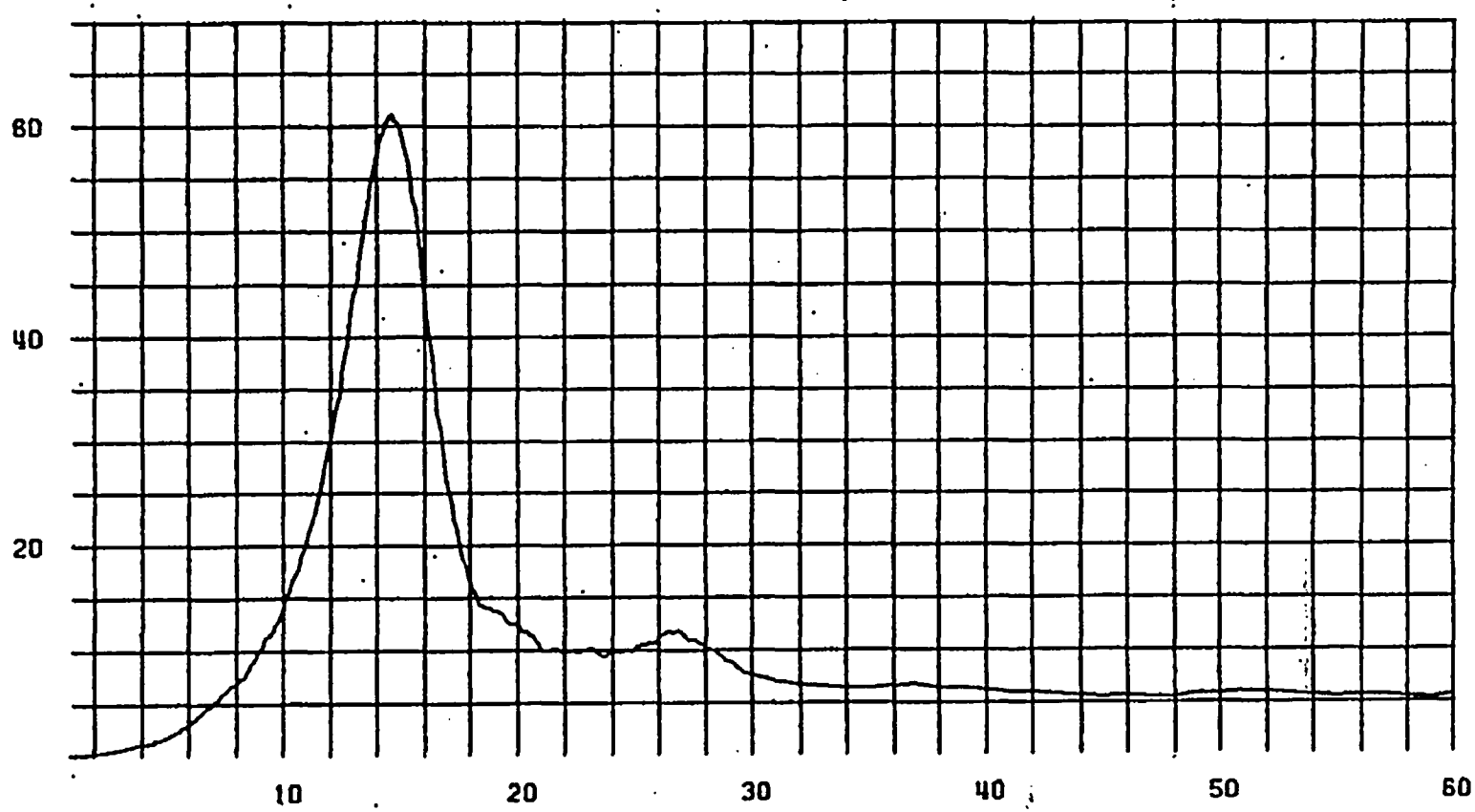

FIGURE 6

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/7IR0

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 54BR X-TRAN LC = 1

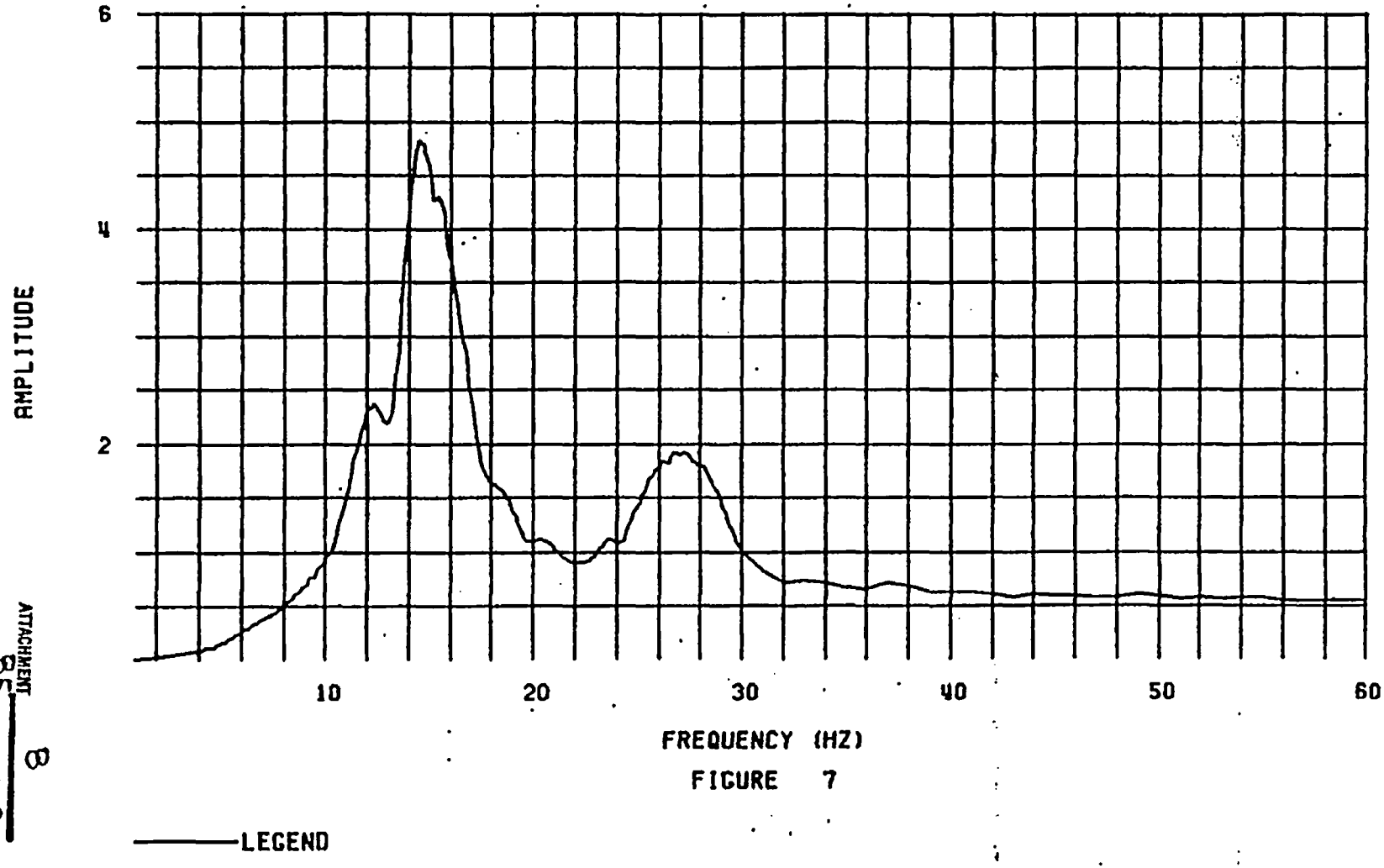

FIGURE 7

ATTACHMENT B
PAGE 85 OF 108
CALC. NO. C-0031/TIRD

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Y-TRAN LC = 1

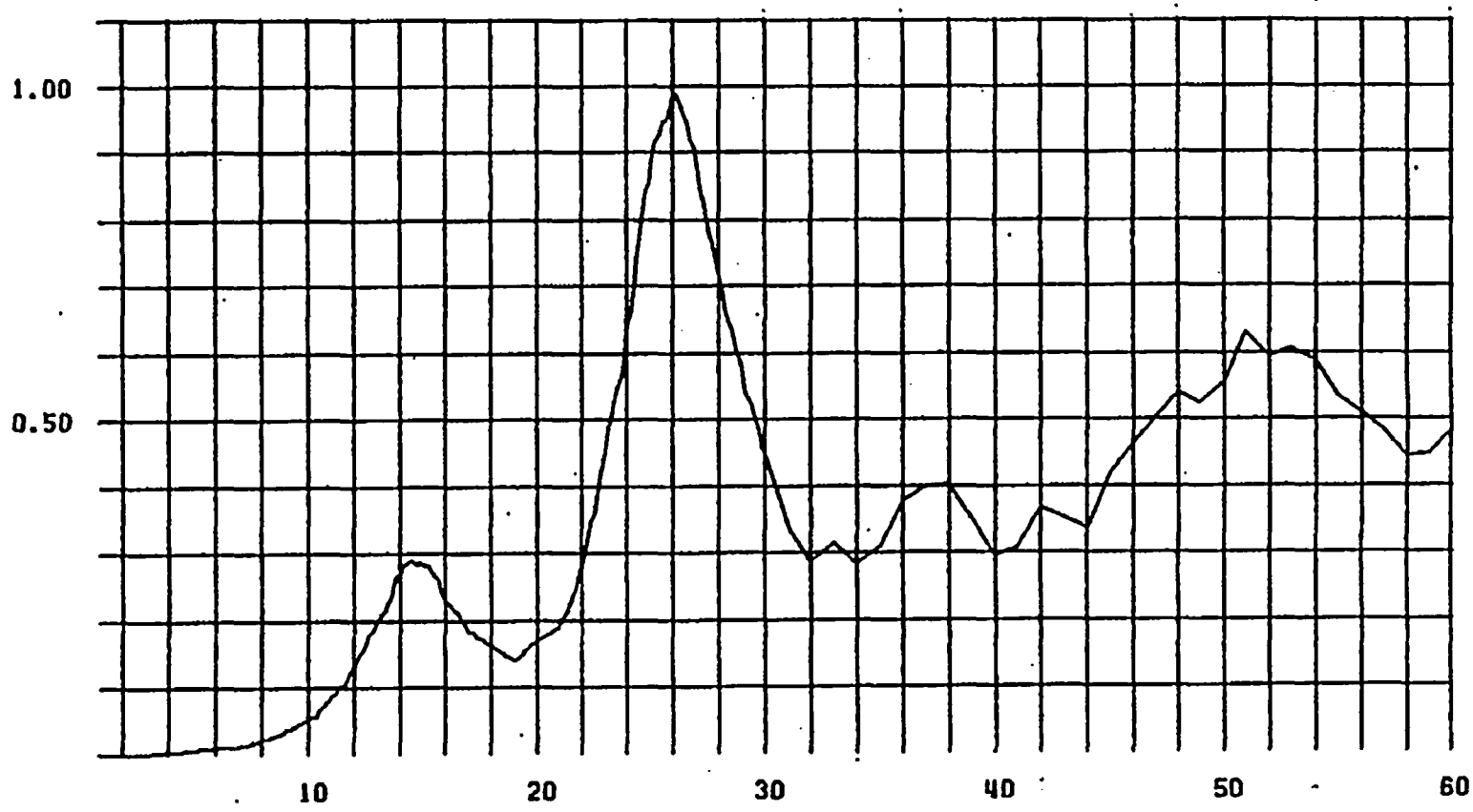

FIGURE 8

LEGEND

ATTACHMENT 8
PAGE 86 OF 108
CALC. NO. C-0031/7IRO

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PRINTED 20041222

AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 54BR Z-TRAN LC = 1

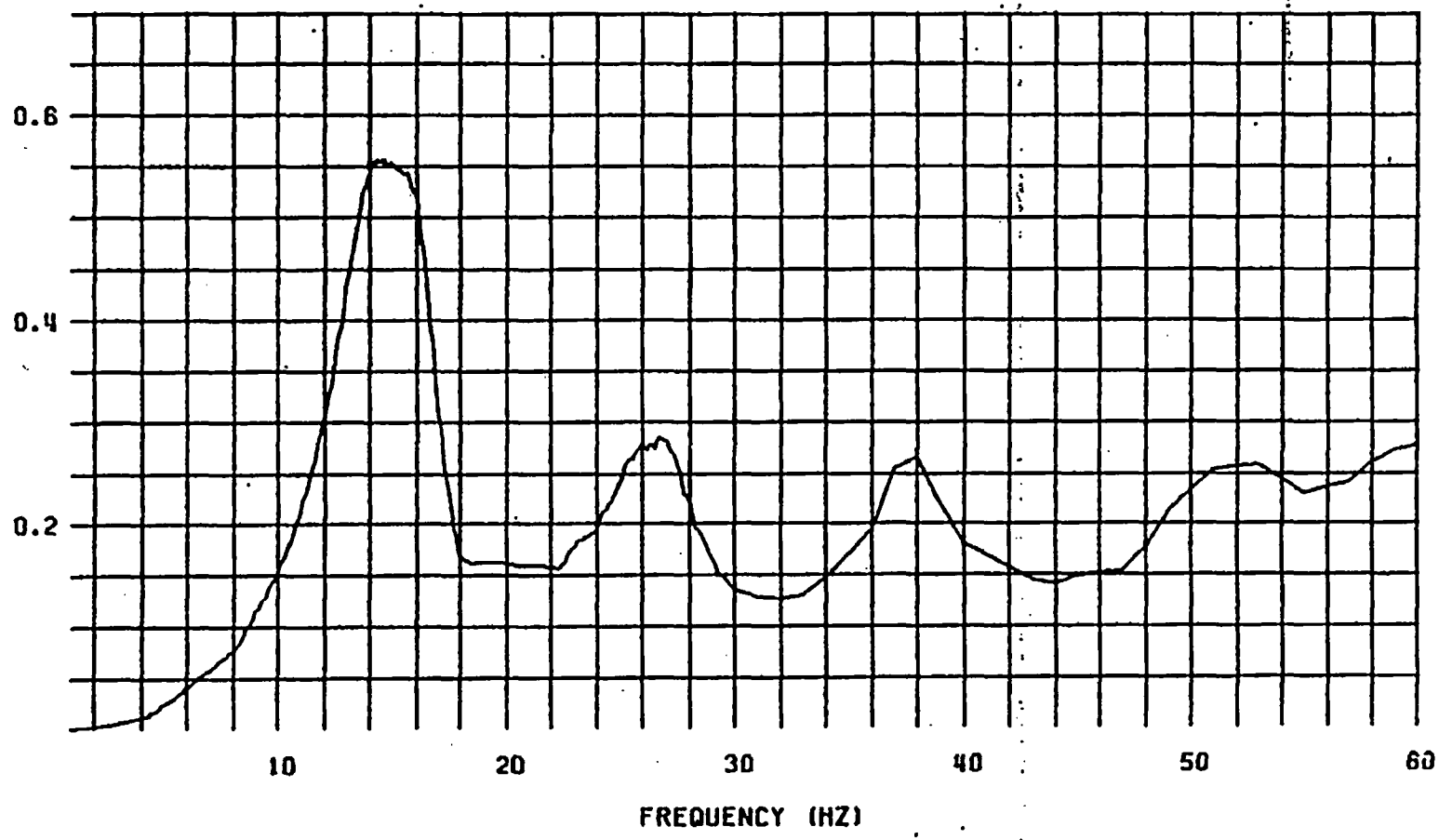

FIGURE 9

LEGEND

ATTACHMENT 8
PAGE 8/ OF 108
CALC. NO. C-0031/TIRO

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 91 X-TRAN LC = 1

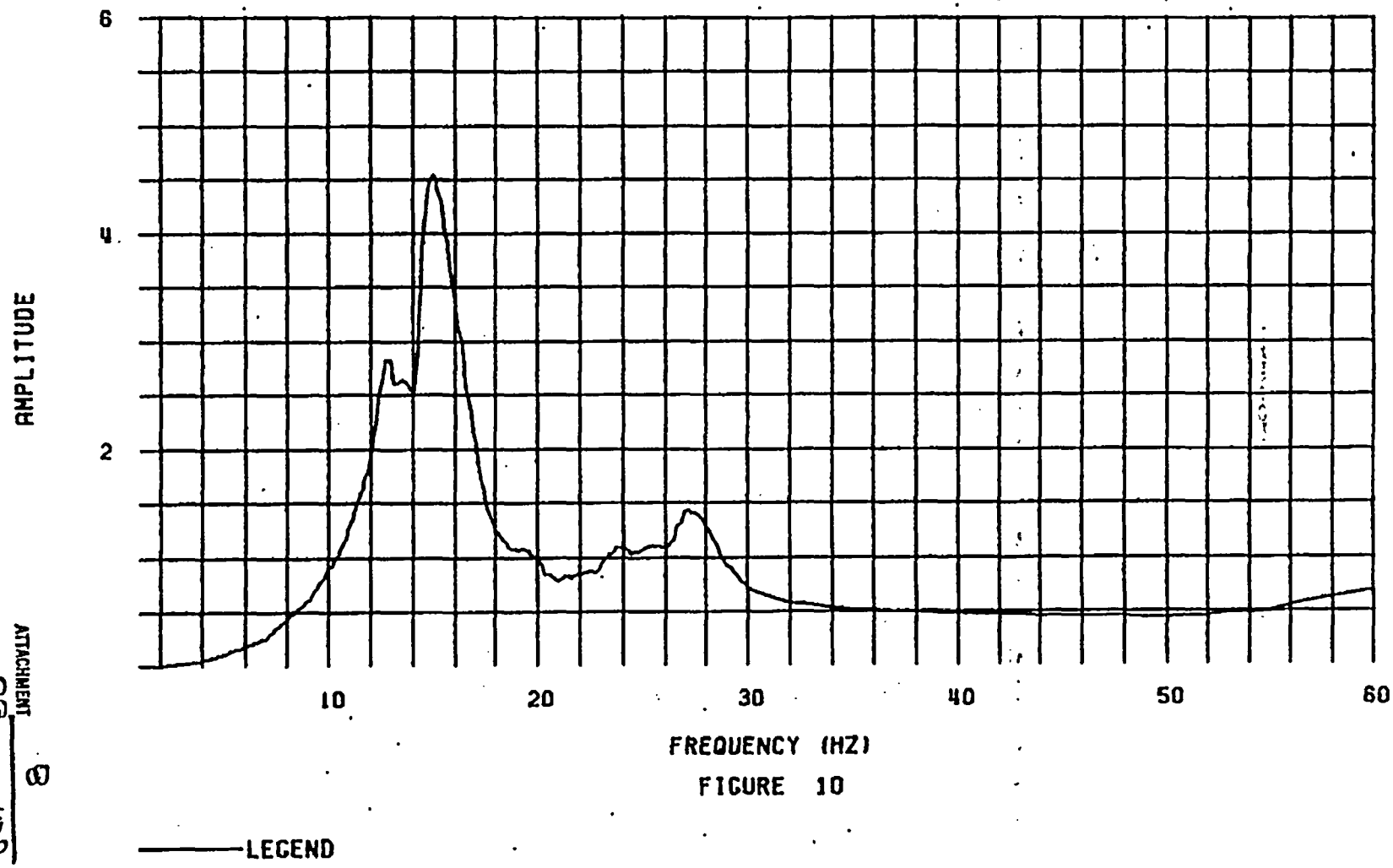

FIGURE 10

ATTACHMENT 8
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CALC. NO. C-0031/TIRO

AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 91 Y-TRAN LC = 1

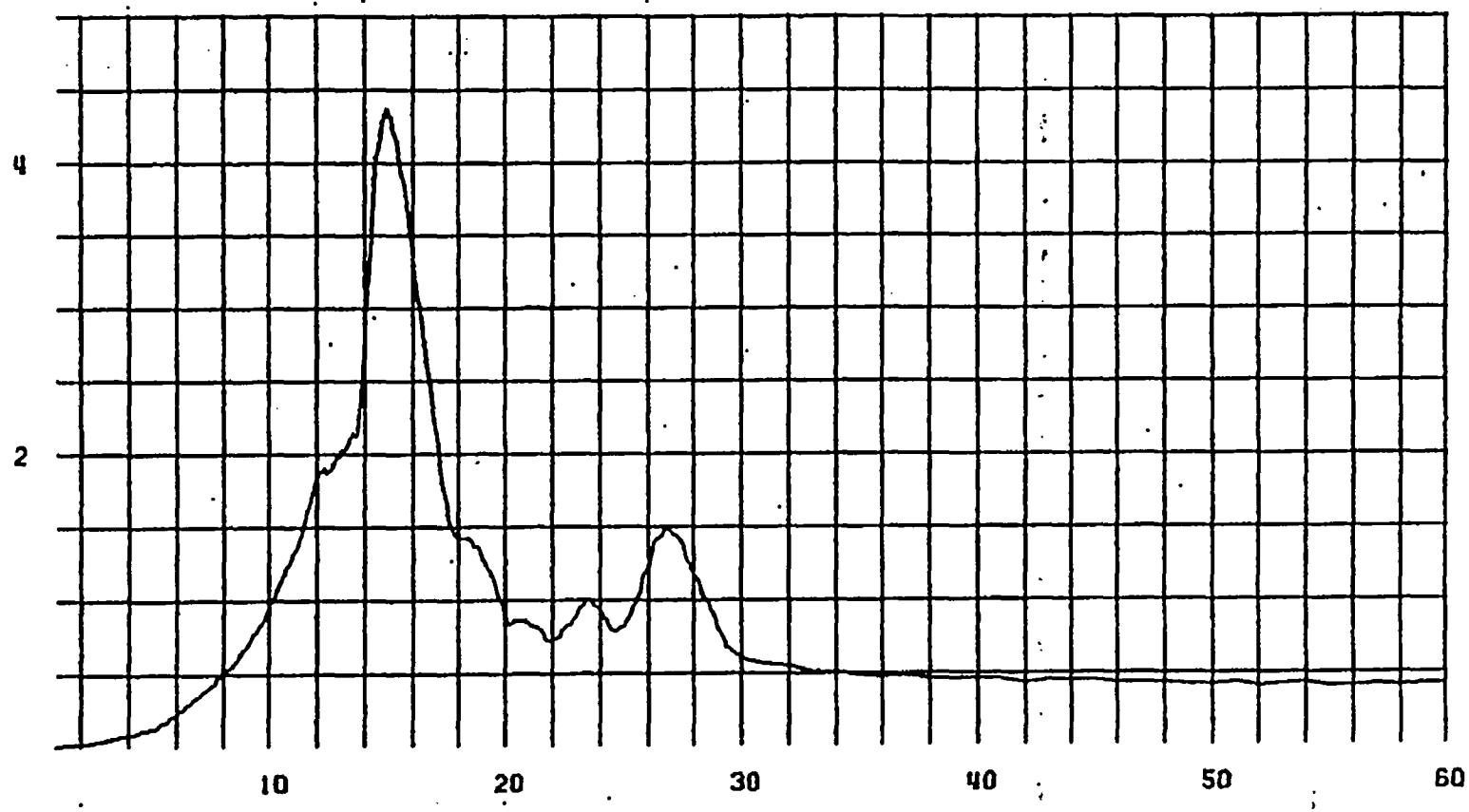

FIGURE 11

LEGEND

AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 91 Z-TRAN LC = 1

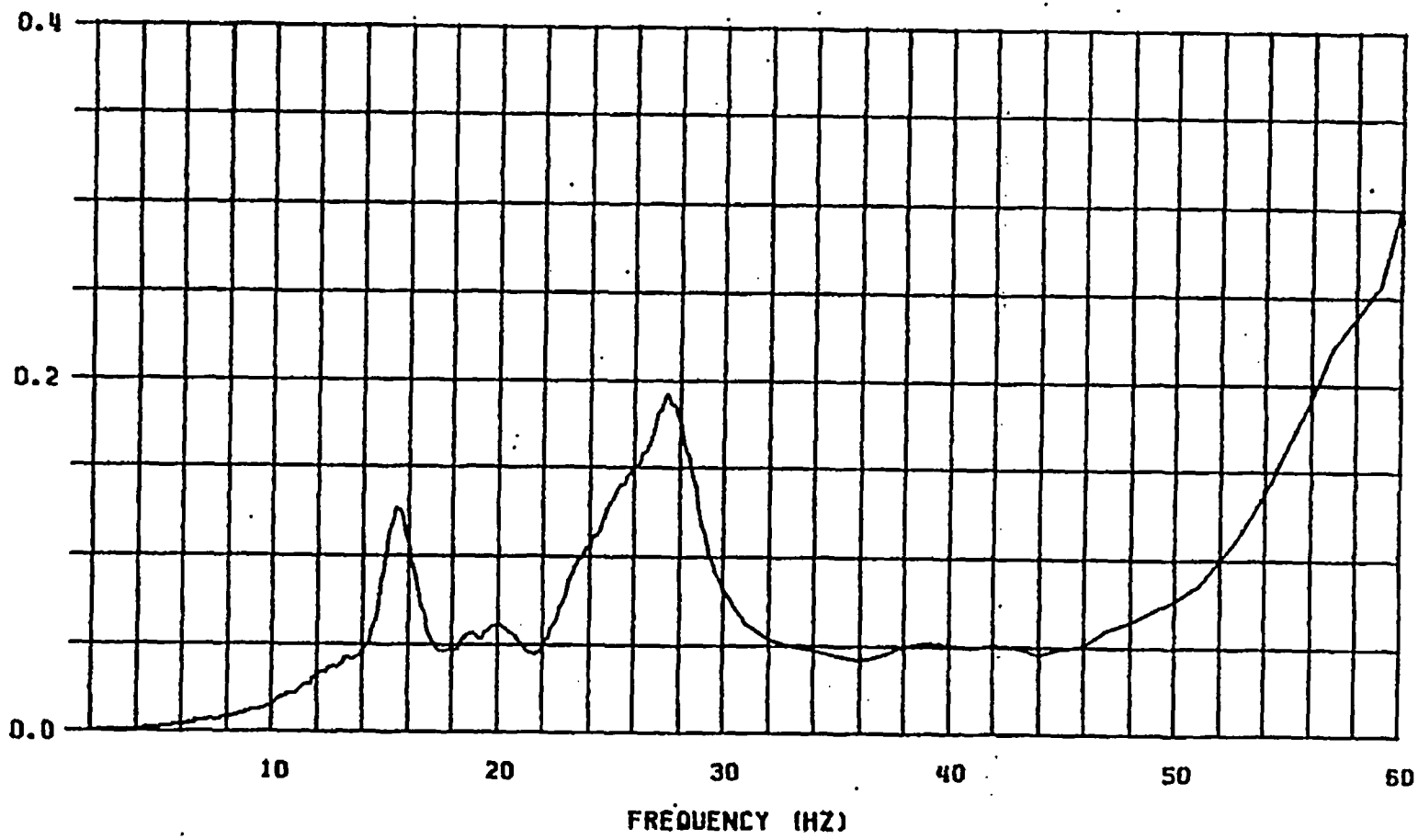

FIGURE 12

LEGEND

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL. RESPONSE SPECTRUM AT NODE 92 X-TRAN LC = 1

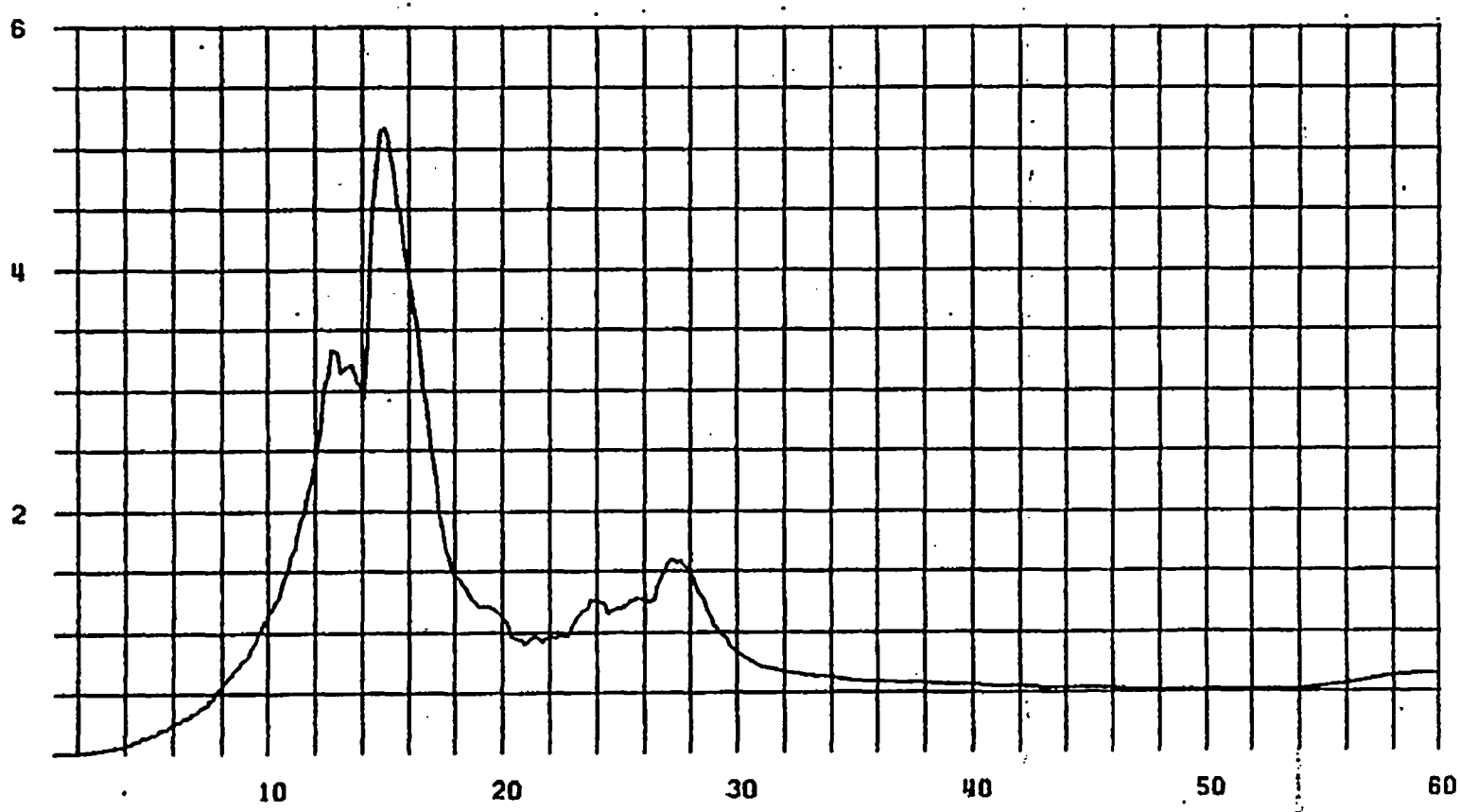

FIGURE 13

LEGEND

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CALC. NO. C-0031/TIRO

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 92 Y-TRAN LC = 1

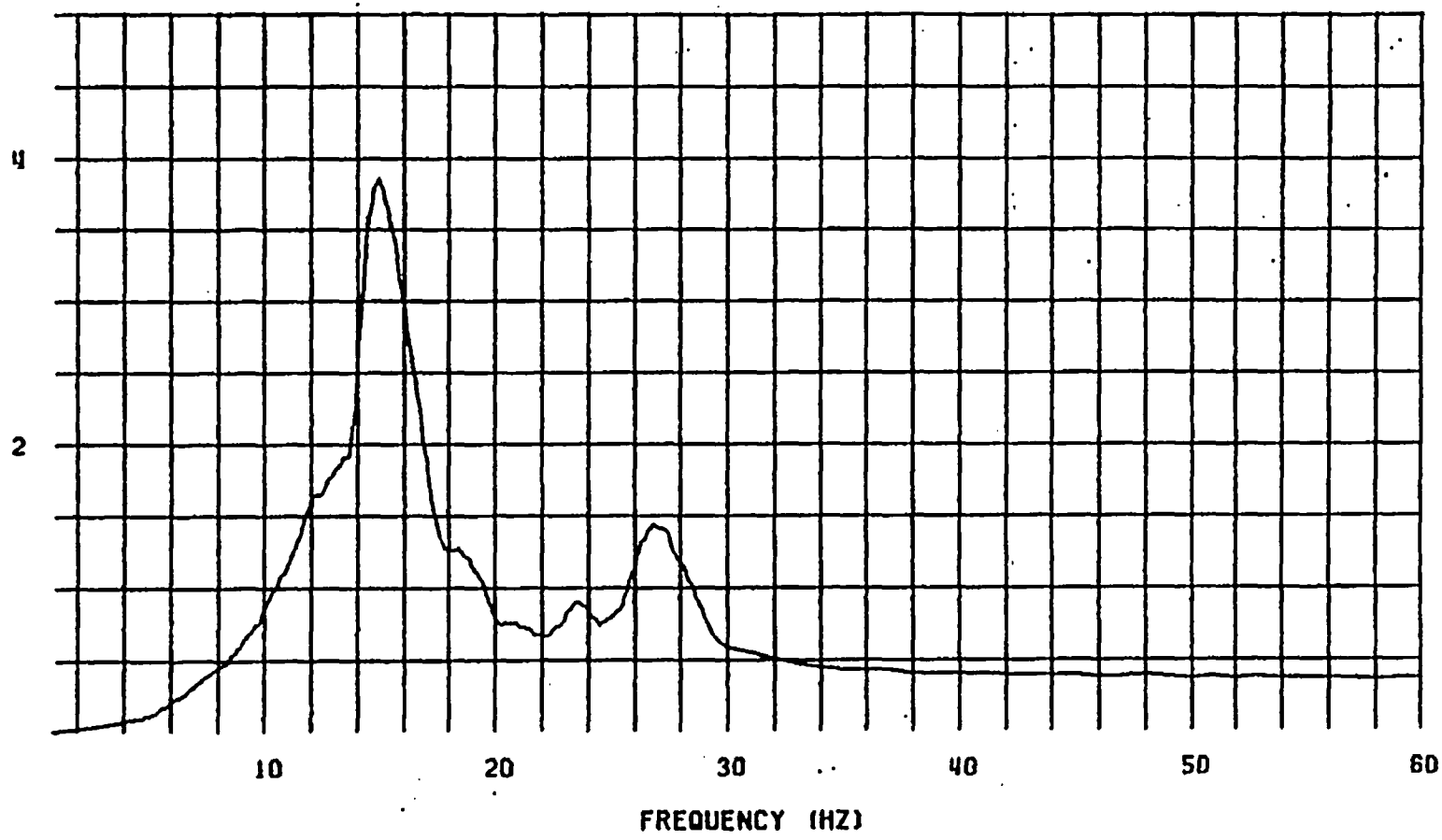

FIGURE 14

LEGEND

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 92 Z-TRAN LC = 1

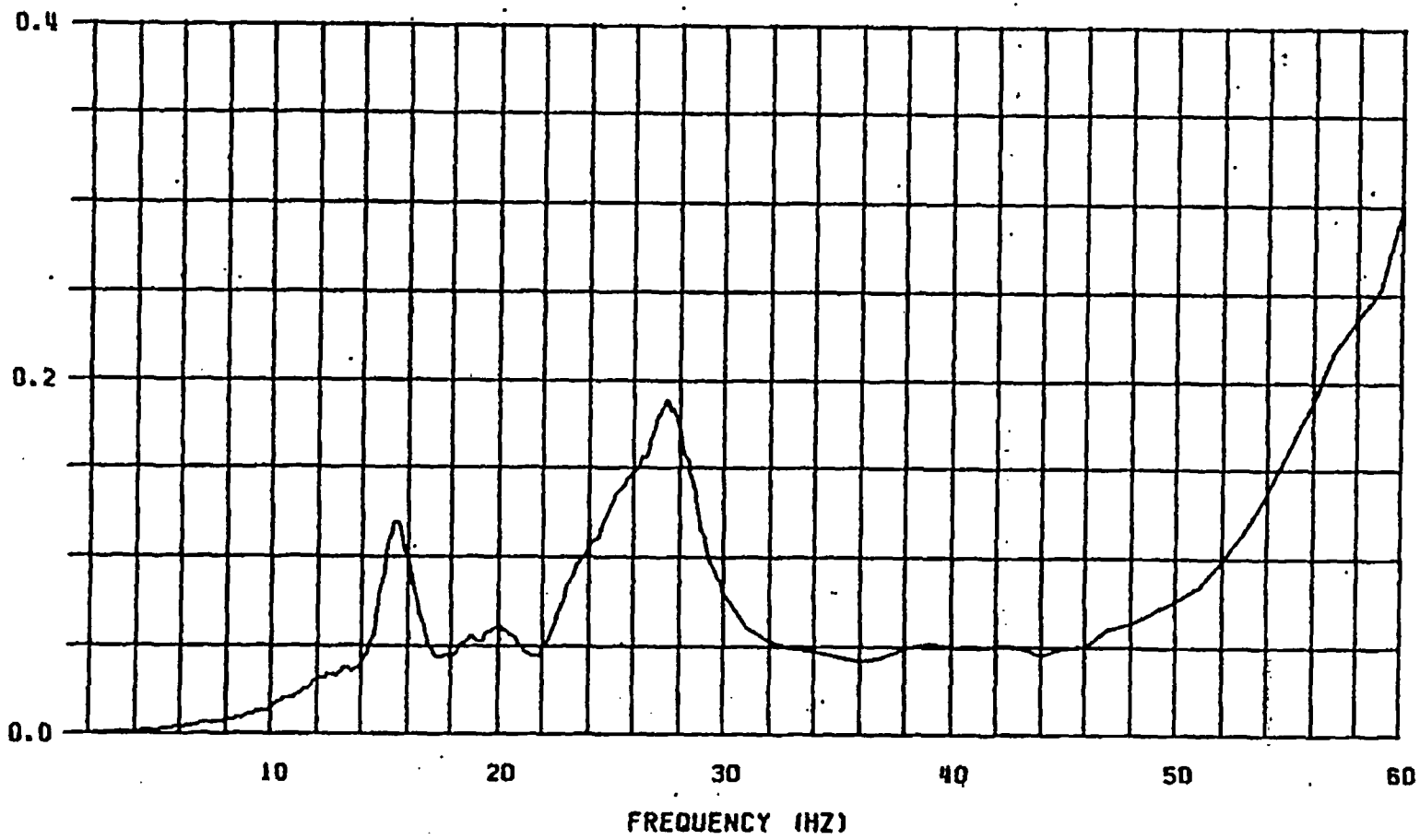

FIGURE 15

LEGEND

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AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 145CP X-TRAN LC = 1

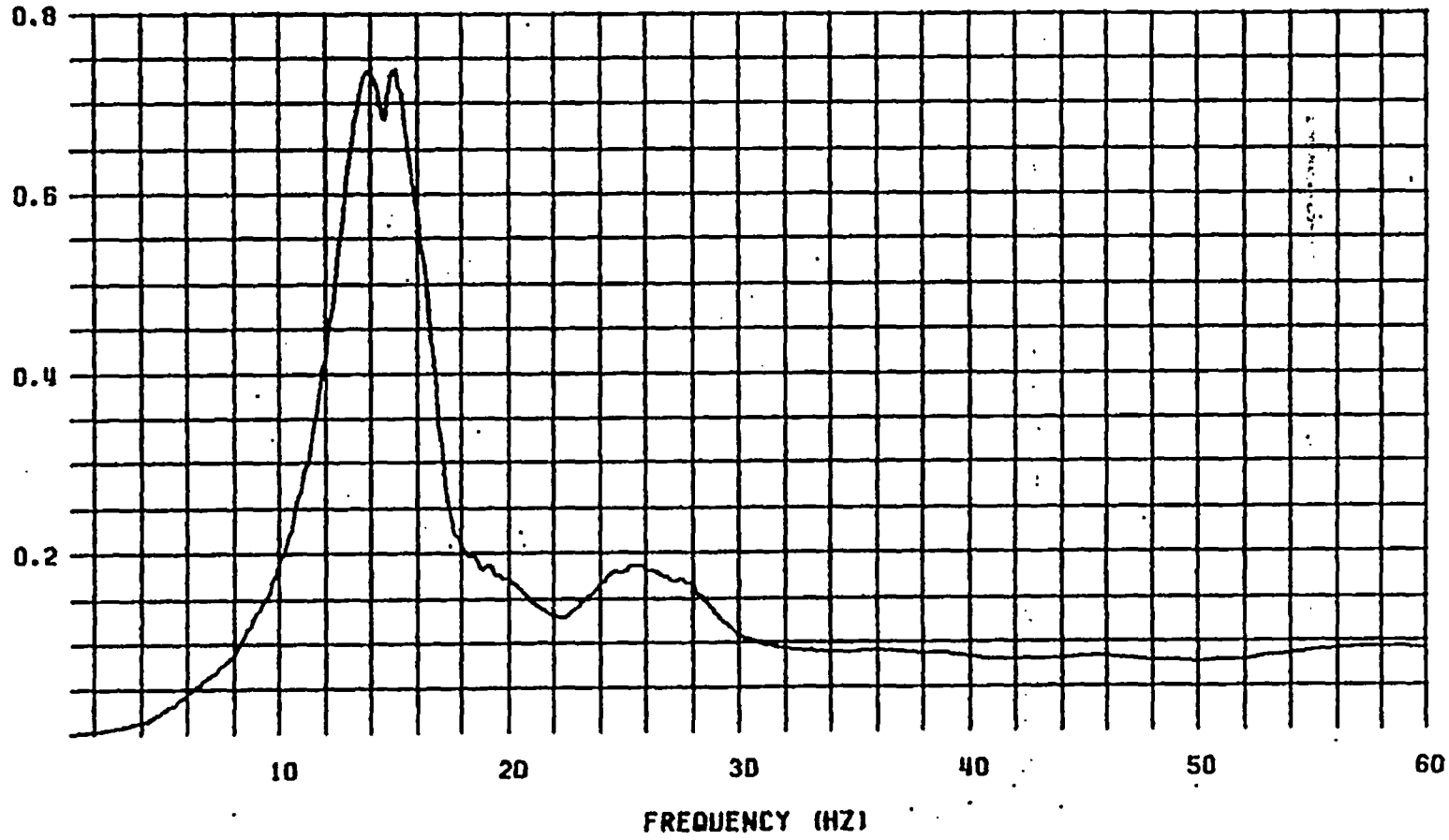

FIGURE 16

LEGEND

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RARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Y-TRAN LC = 1

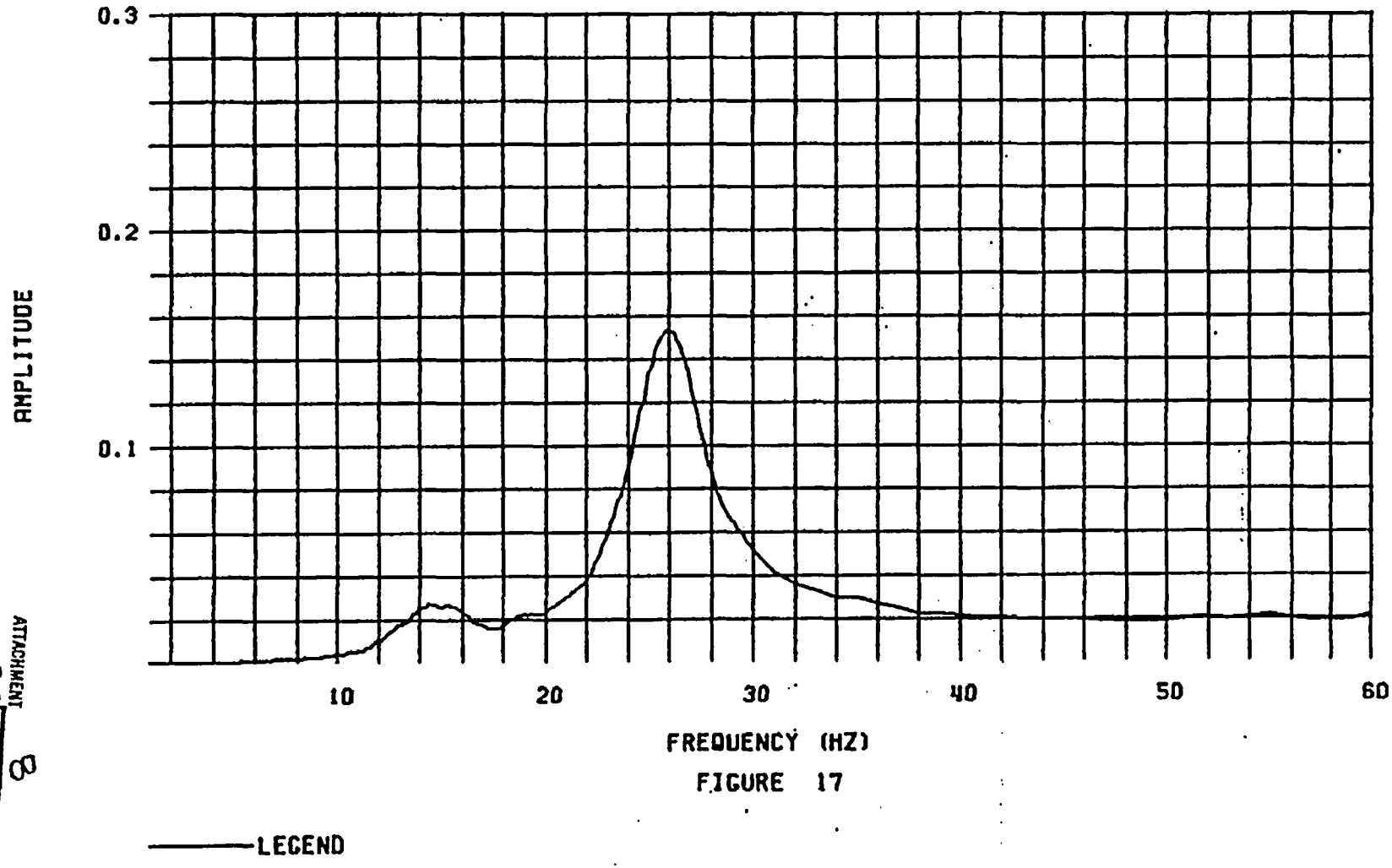

FIGURE 17

ATTACHMENT 8
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CALC. NO. C-0031/TIRD

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PRINTED 20041222

AARK 88/06/20 14.22.20

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G), CASE C3.2 (3%D)
ACCEL RESPONSE SPECTRUM AT NODE 145CP Z-TRAN LC = 1

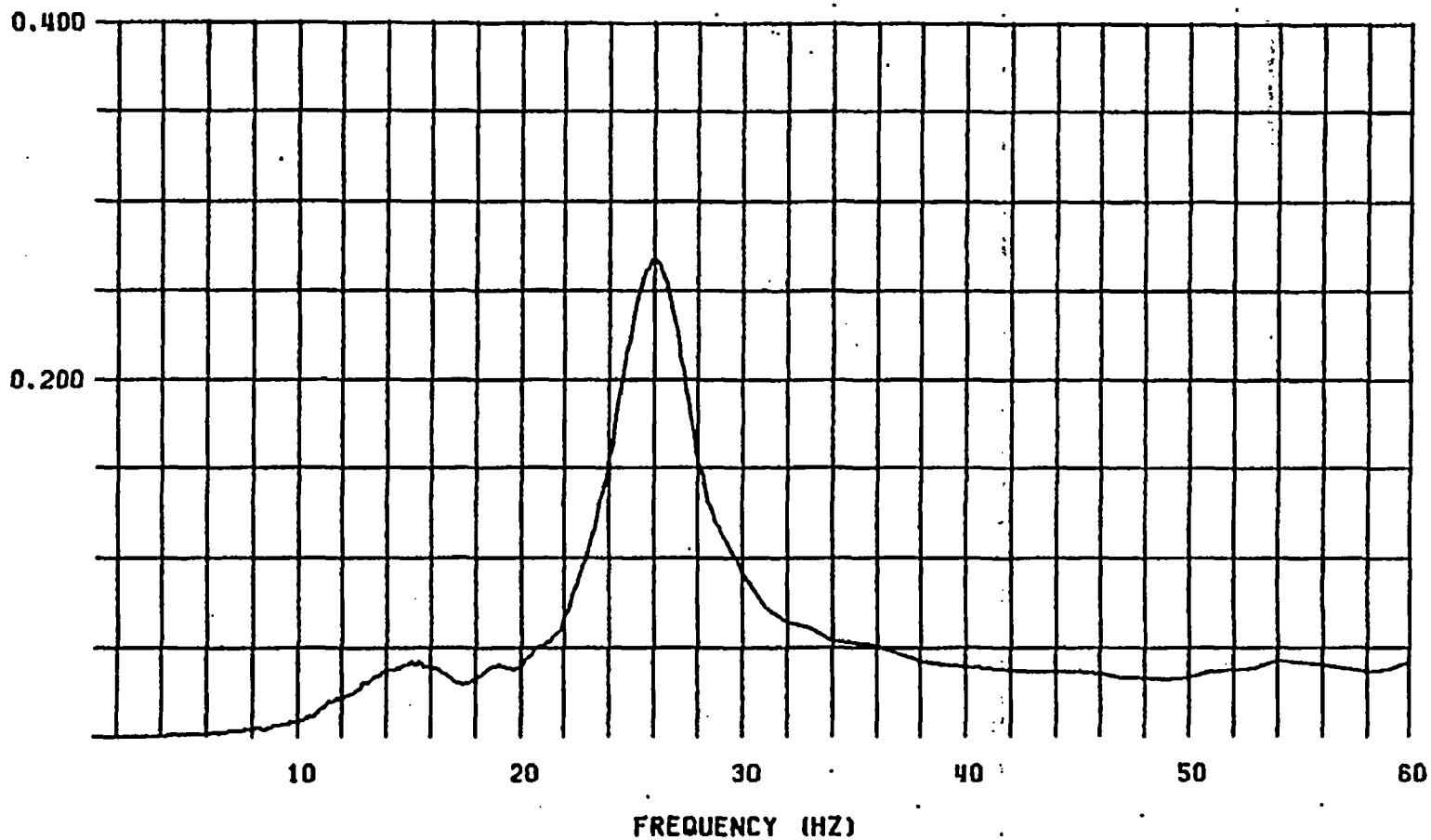

FIGURE 18

LEGEND

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

JOB NAME = ABAV DATE = 88/07/14 CHARGE = F3395JT

PROJECT = *311*XPS080502

OPTICOM

Node P201

QABI 2% T.H. Damping Case C3.2

4 pages.

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABAV 88/07/14 19.23.04

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 X-TRAN LC = 1

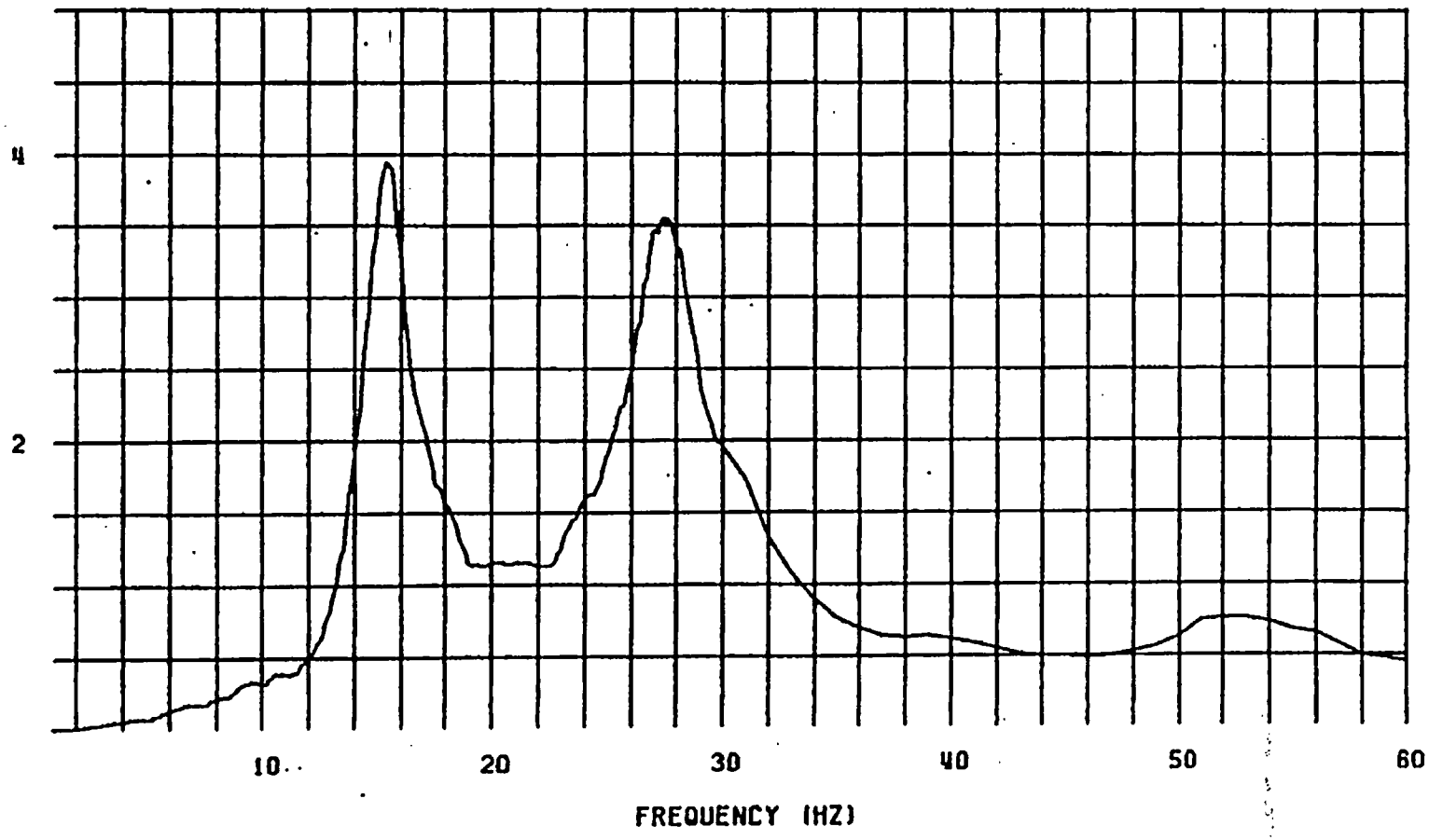

FIGURE 1

LEGEND

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ABAV 88/07/14 19.23.04

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 Y-TRAN LC = 1

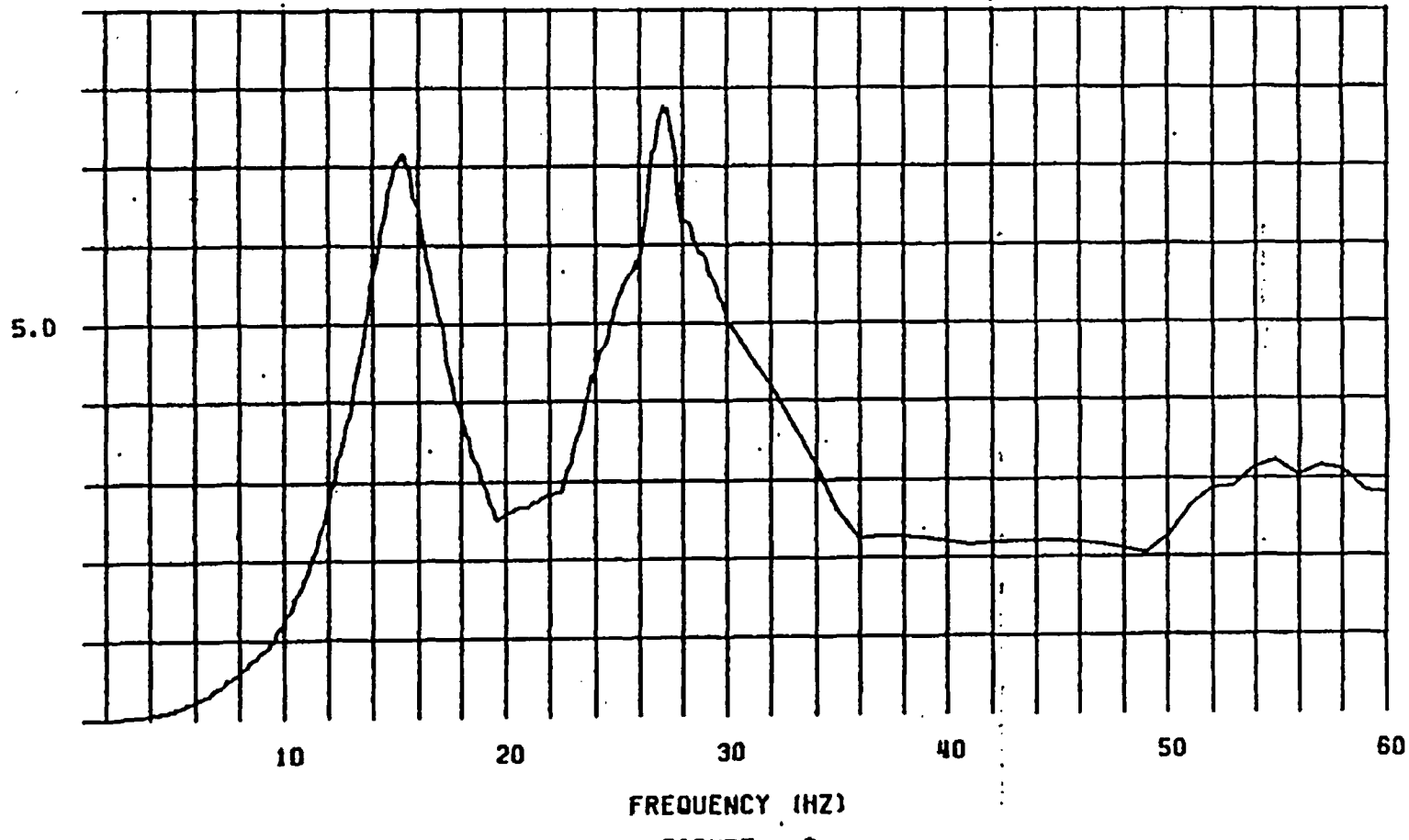

FIGURE 2

LEGEND

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PAGE 99 OF 108
CALC. NO. C-0031/TIR0

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABAV 88/07/14 19.23.04

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
QABI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 Z-TRAN LC = 1

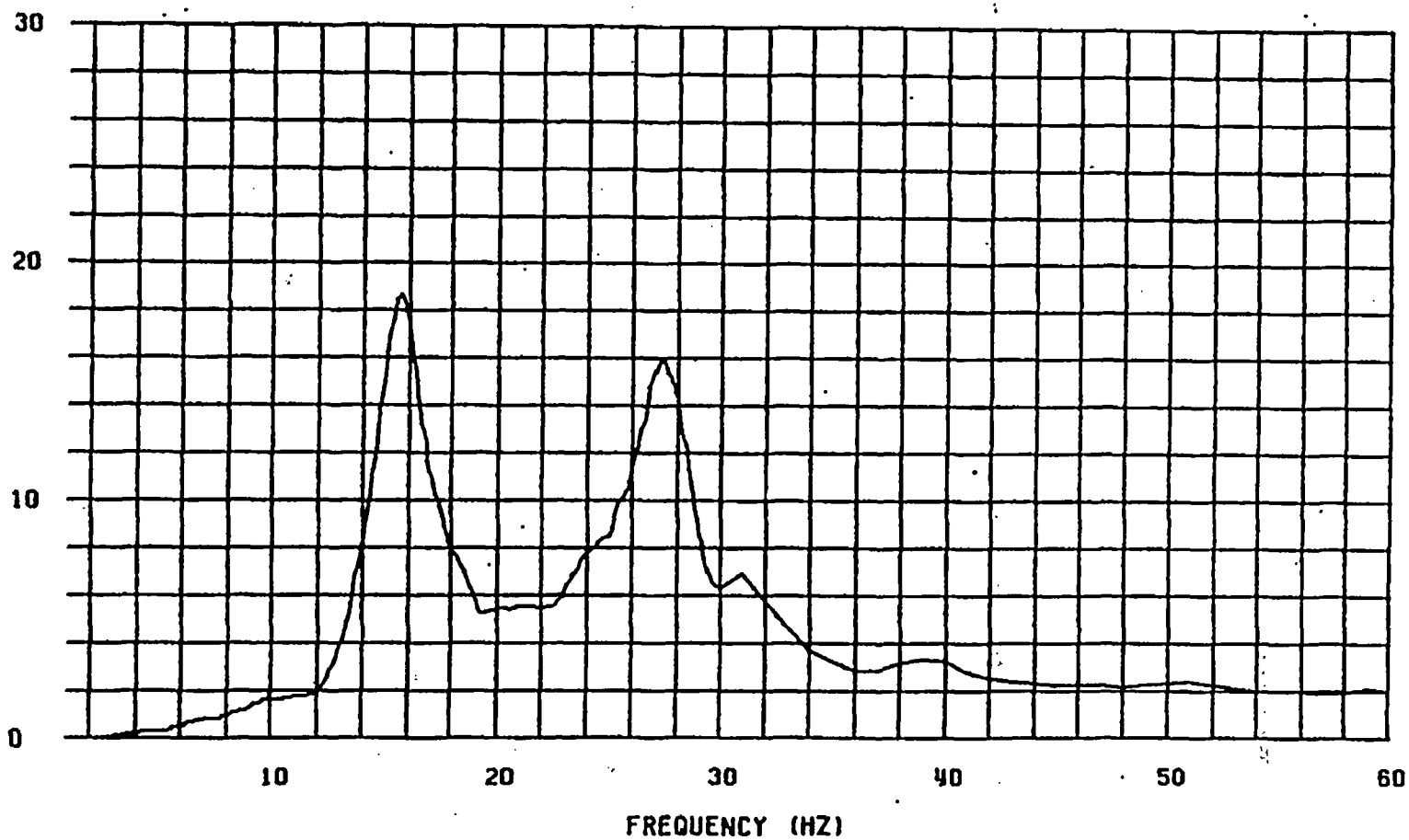

FIGURE 3

LEGEND

ATTACHMENT 8
PAGE 108 OF 108
CALC. NO. C-0031/7IRD

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

JOB NAME = ABAY DATE = 88/07/14 CHARGE = F3395JT

PROJECT = *311*XPS080502

Node P201 CQI (2% J.H. Damping)

Total 4 pages

OPTICOM

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABAY 88/07/14 19.22.21

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C01 ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 X-TRAN LC = 1

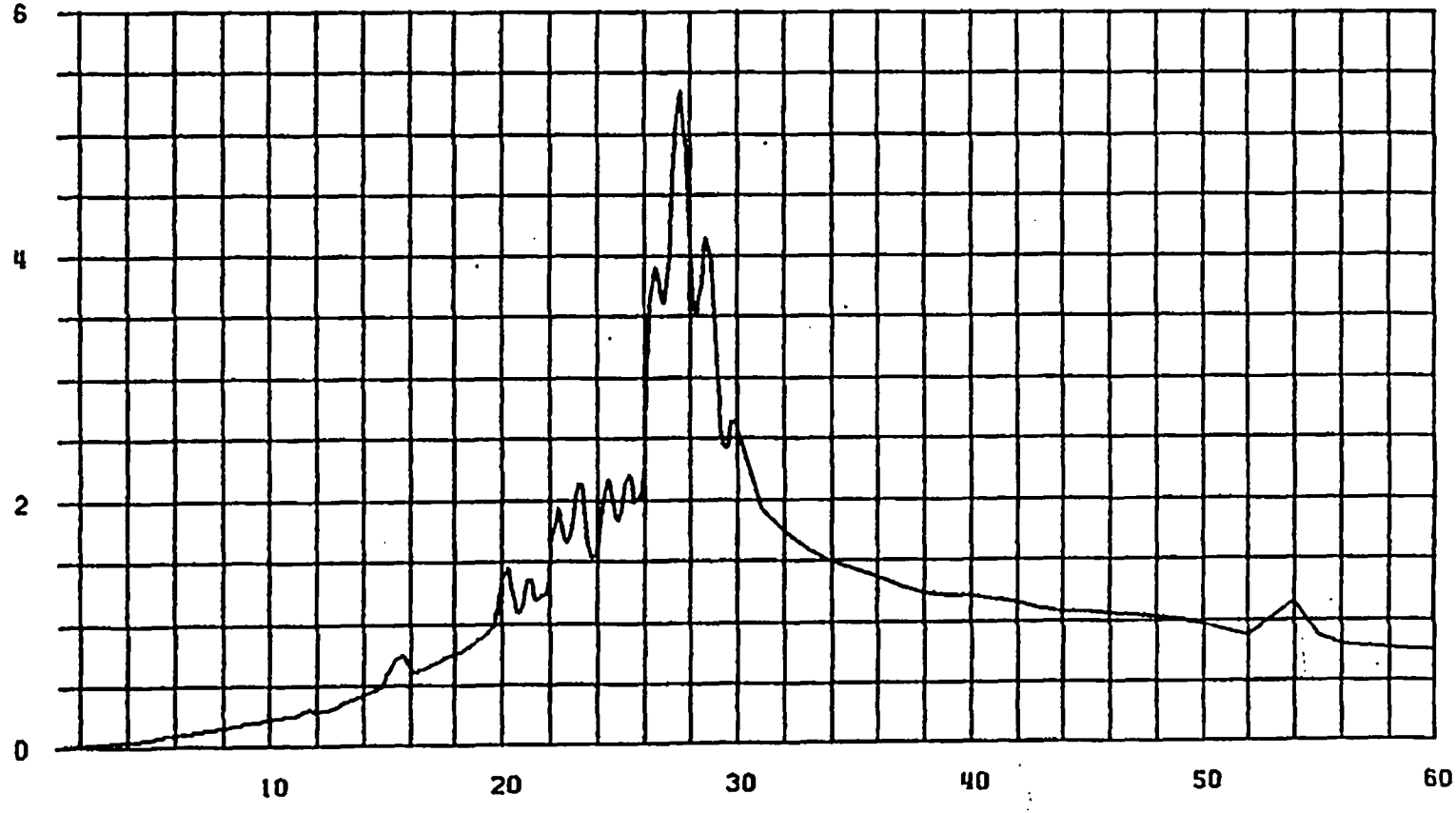

FIGURE 1

LEGEND

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CALC. NO. C-0031/TIRO

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABAY 88/07/14 19.22.21

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
COI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 Y-TRAN LC = 1

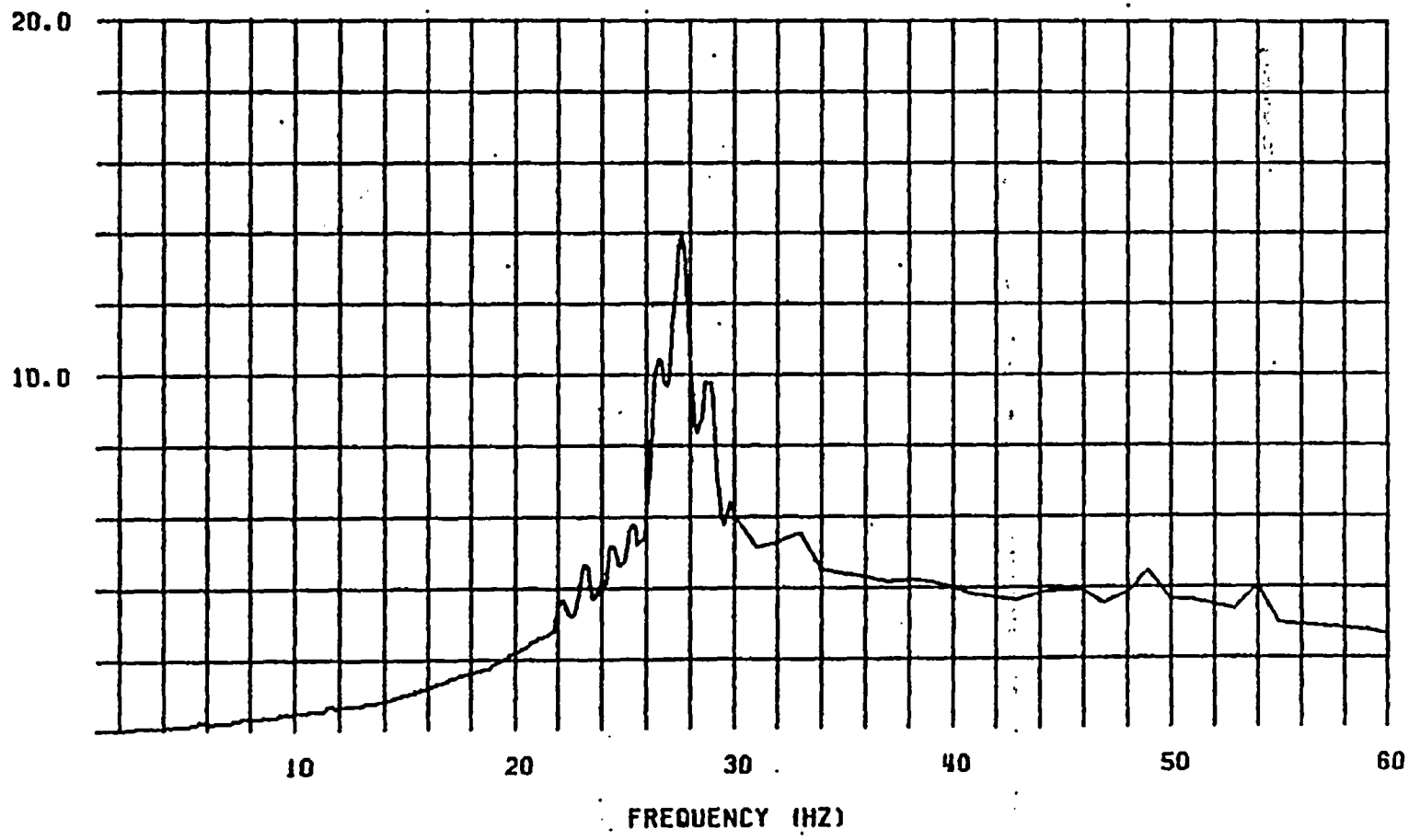

FIGURE 2

LEGEND

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ABAY 88/07/14 19.22.21

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
C0I ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 Z-TRAN LC = 1

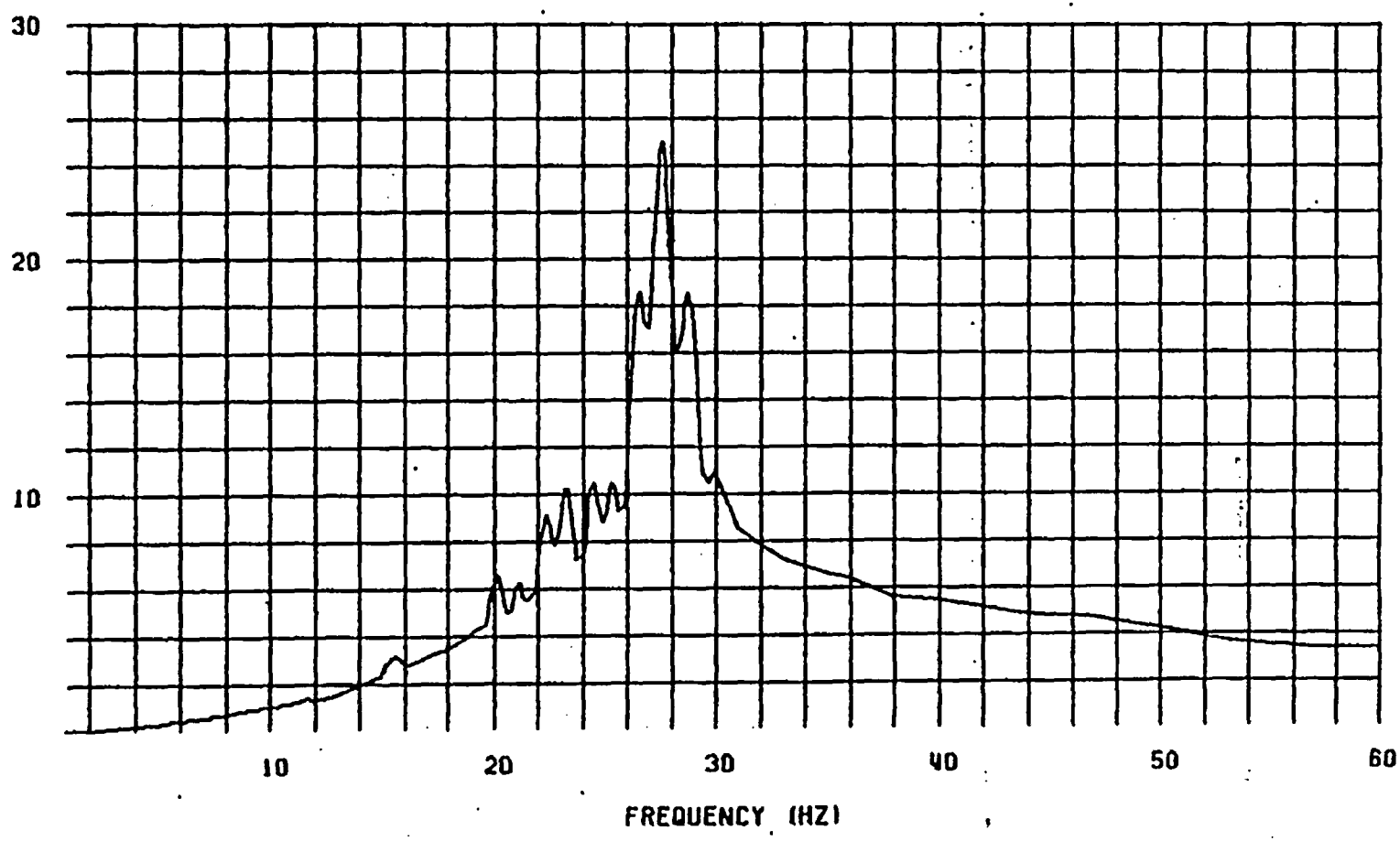

FIGURE. 3

LEGEND

ATTACHMENT B
PAGE 104 OF 108
CALC. NO. C-0031/TIRO

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

JOB NAME = ABBB DATE = 88/07/14 CHARGE = F3395JT

PROJECT = *311*XPS080502

Node P201 (HUGI R/S
(2% T.H. Damping)
Total 4 pages

OPTICOM

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABBB 88/07/14 19.24.34

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 X-TRAN LC = 1

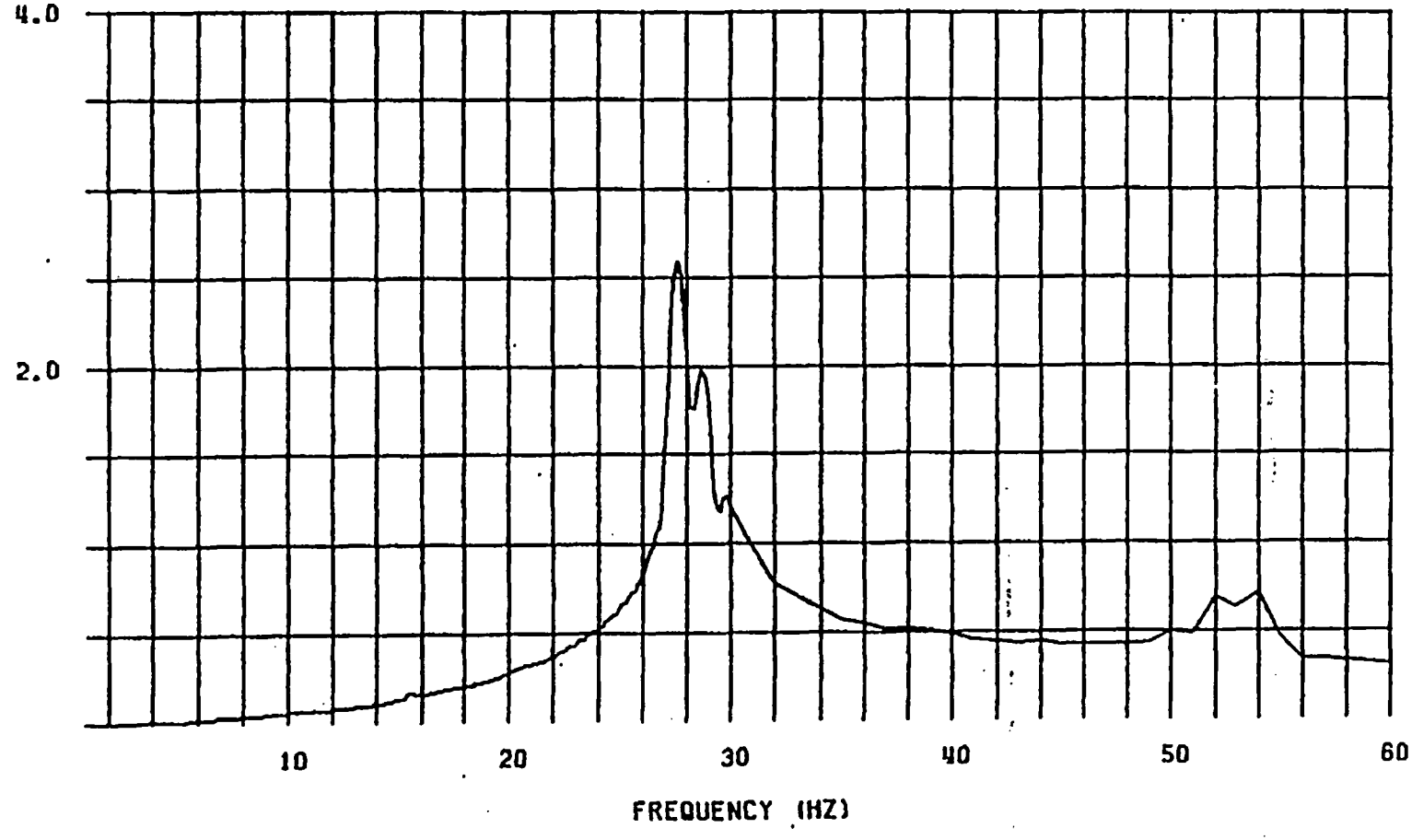

FIGURE 1

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/TIR0

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABBB 88/07/14 19.24.34

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 Y-TRAN LC = 1

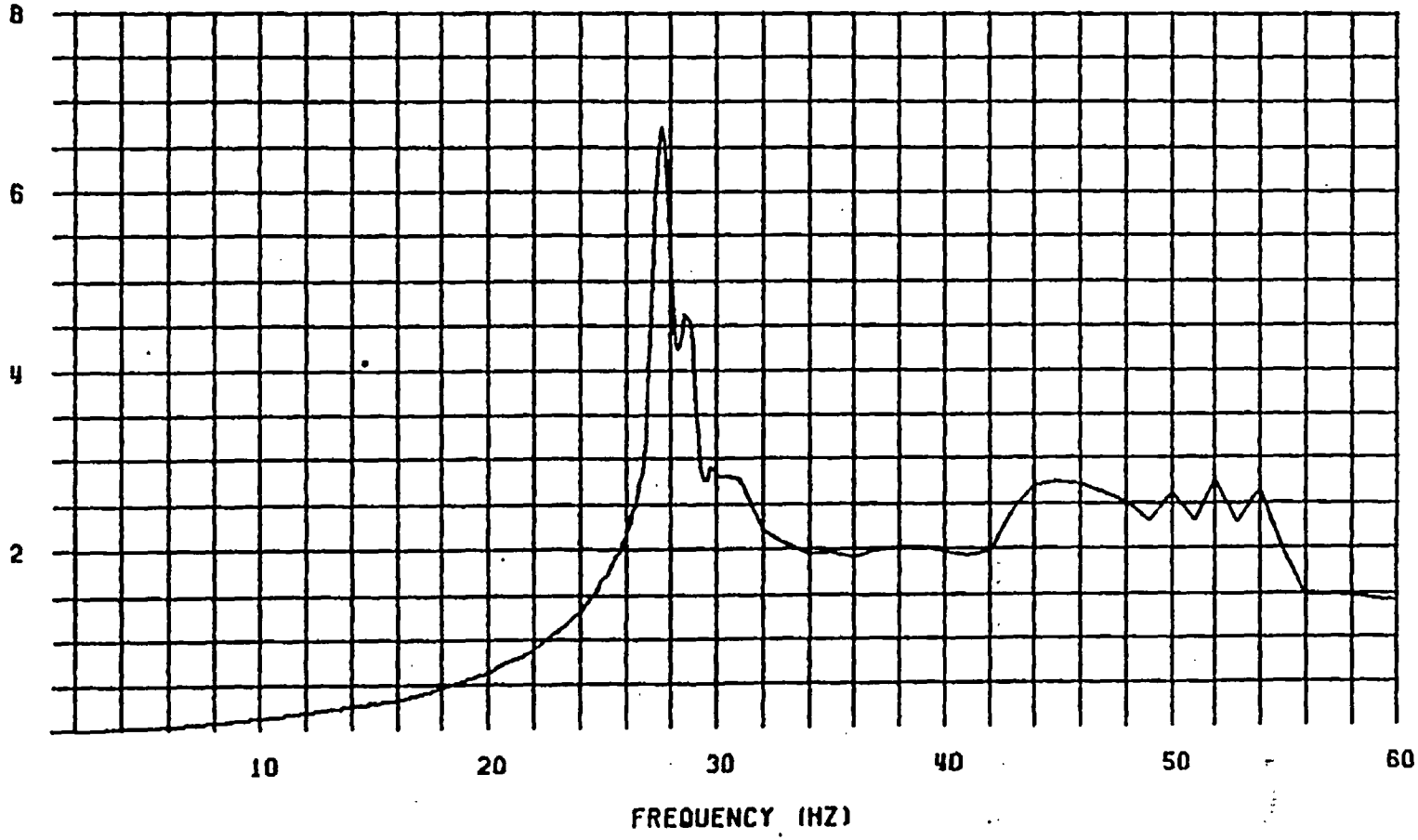

FIGURE 2

LEGEND

ATTACHMENT 8
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CALC. NO. C-0031/TIRO

USER RESPONSIBLE FOR VERIFYING REVISION, STATUS AND CHANGES
PRINTED 20041222

ABBB 88/07/14 19.24.34

HOPE CREEK NUCLEAR GEN. STATION UNIT-1, P201
CHUGI ACCELERATION SPECTRUM (HZ,G)
ACCEL RESPONSE SPECTRUM AT NODE P201 Z-TRAN LC = 1

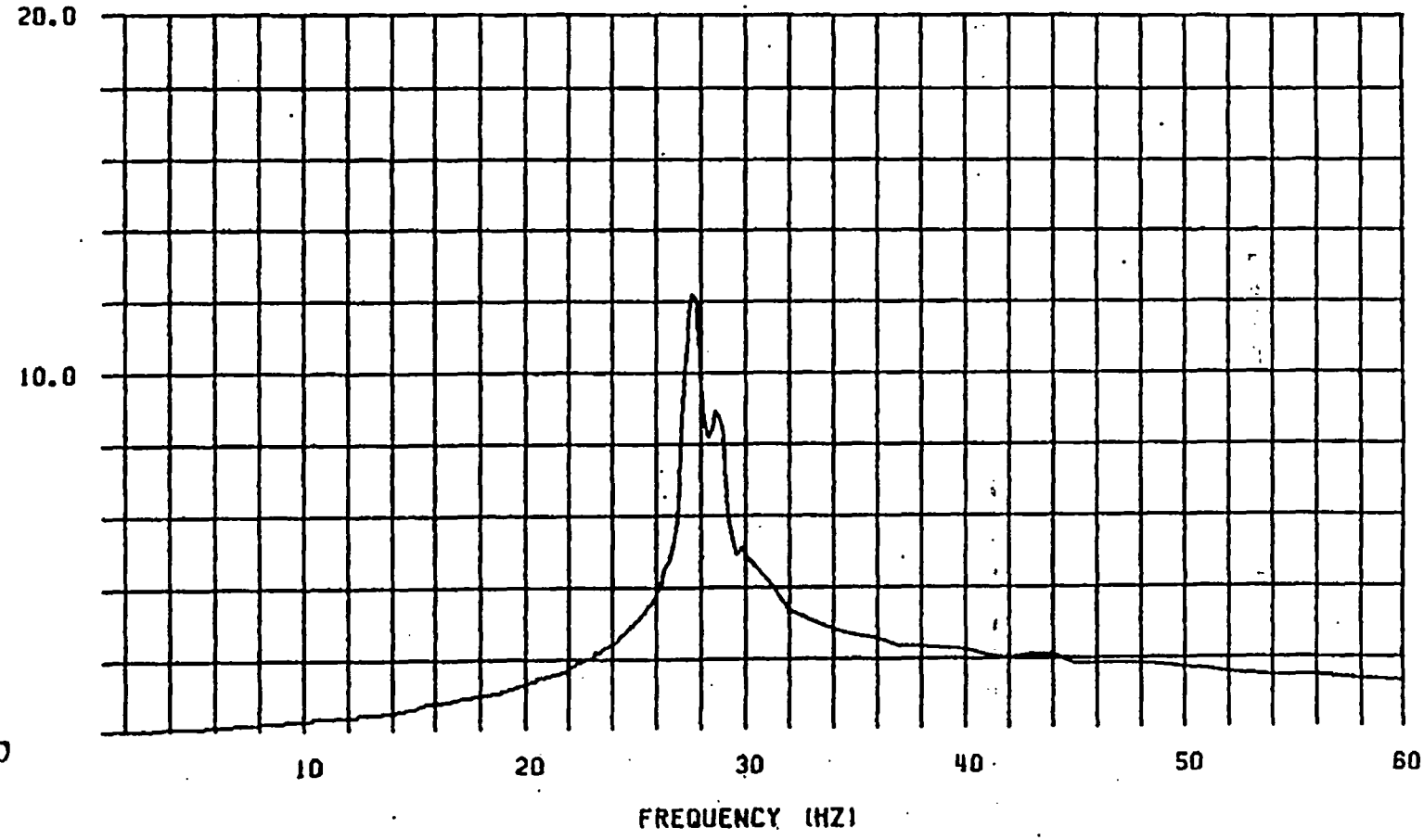


FIGURE 3

LEGEND

SHT. 1 OF 1

FORM NC.DE-AP.ZZ-0010-1

CERTIFICATION FOR DESIGN VERIFICATION

Reference No. C-0031/7IRO

SUMMARY STATEMENT

This calculation is acceptable. Pipe Stress analysis is performed utilizing verified [redacted] computer program. The verification process consists of reviewing support loads to assure that they are reasonable. The method of analysis is consistent with Hope Creek UFSAR. The documentation generated complies with E&PB manual requirements. The verifier is independant of the originators design.

The undersigned hereby certifies that the design verification for the subject document has been completed, the questions from the generic checklist have been reviewed and addressed as appropriate, and all comments have been adequately incorporated.

J. GORGA	9/1/93
Design Verifier Assigned By	Signature of Design Verifier / Date
J. GORGA	Philip M. Stahl 7/29/94
Design Verifier Assigned By	Signature of Design Verifier / Date
Design Verifier Assigned By	Signature of Design Verifier / Date
Design Verifier Assigned By	Signature of Design Verifier / Date

ATTACHMENT 9
PAGE 1 OF 1
CALC. NO. C-0031/7IRO.

Page 1 of 1

Orig. Philip M. Stashak 9/2/93 CALC # C-31

INTERFERENCE WALKDOWN

Any potential interferences documented during construction were rewalked and reevaluated for new Snubber Reduction Program displacements. In addition, any other potential interferences were documented on Interference Resolution Forms and evaluated for the new displacements. No Interferences exist due to the piping displacements. The following pages of this Attachment document the evaluation of the potential interferences.

IRF# -NEW-

ATTACHMENT 2

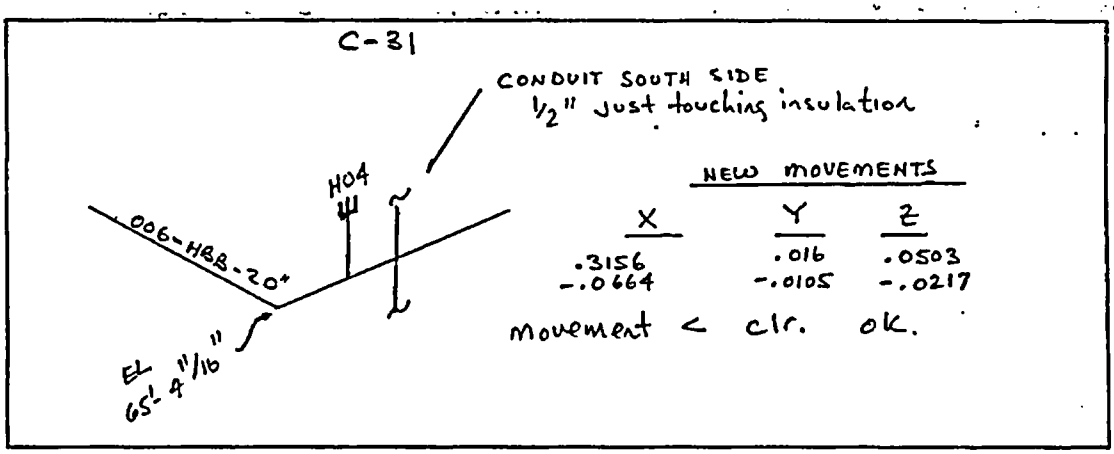
INTERFERENCE RESOLUTION FORM

Pkg 8

TO: -N/A-
FROM: -N/A-
DATE: -N/A-

ISOMETRIC# 1-P-FD-01 REV# 22
ROOM # (HPCI) REACTOR BLDG 54'

SKETCH



RESOLUTION: No interference exists. movement

F.E. SIGNATURE Philip M. Stachak DATE 5/6/93

REWORK COMPLETED _____ DATE _____

CONCURRENCE BY (IC) _____ DATE _____

REWORK REQUIRED: ☐ YES ☐ NO

IRF# -NEW-

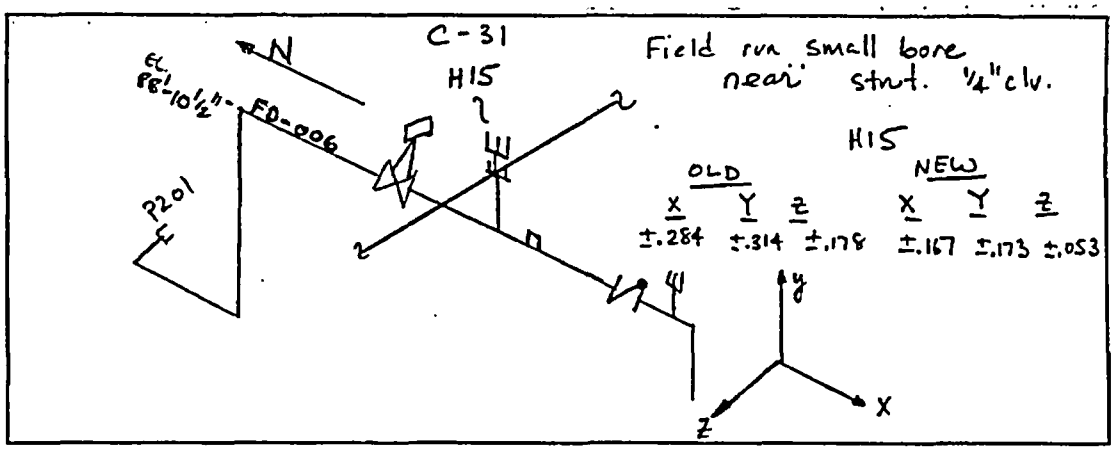
ATTACHMENT 2

INTERFERENCE RESOLUTION FORM

Pkg. 8

TO: -N/A- ISOMETRIC# 1-P-FD-C1 REV# 22
FROM: -N/A- ROOM # TORUS
DATE: -N/A-

SKETCH



RESOLUTION:

OLD movements larger than new movements.
¼" clearance is acceptable.

F.E. SIGNATURE Philip M. Starkey DATE 5/6/93

REWORK COMPLETED _____ DATE _____

CONCURRENCE BY (IC) _____ DATE _____

REWORK REQUIRED: ☐ YES ☒ NO

IRF# -NEW-

ATTACHMENT 2

CALC. NO. C-31/7TRØ

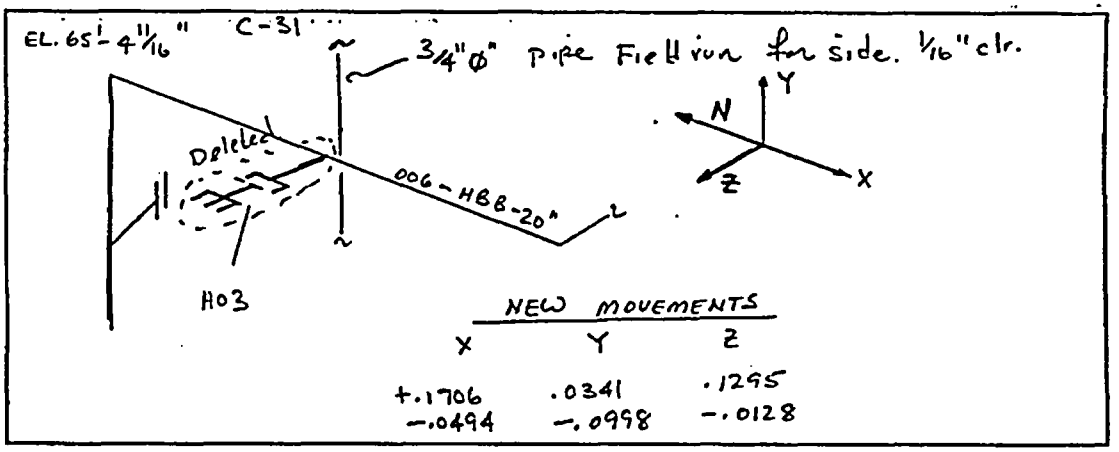
INTERFERENCE RESOLUTION FORM

pkg. 8

TO: -N/A-
FROM: -N/A-
DATE: -N/A-

ISOMETRIC# 1-P-FD-01 REV# 22
ROOM # (HPCI) REACTOR BLDG 54'

SKETCH



NEW MOVEMENTS

X	Y	Z
+.1706	.0341	.1295
-.0494	-.0998	-.0128

RESOLUTION:

Clearance greater than movement. OK.

F.E. SIGNATURE Philip M. Stachel DATE 5/6/93

REWORK COMPLETED _____ DATE _____

CONCURRENCE BY (IC) _____ DATE _____

REWORK REQUIRED: ☐ YES ☒ NO