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LOFT TECHNICAL REPORT LTR 114-104

RE&C INTERNAL REPORT RE-A-78-172

DECEMBER 11, 1978

LOFT CIS ANALYSIS 1"-PCC-76-A
INSIDE CONTAINMENT PENETRATION S-1A

M. E. Nitzel

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DEPARTMENT OF ENERGY

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Organization: Applied Mechanics Branch

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**LOFT TECHNICAL REPORT
LOFT PROGRAM**

FORM EG&G-229
(Rev 12-78)

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PSE for P&B Mgr. Seismic P&CSB Mgr. RSB Mgr.
review

ABSTRACT

This report describes the stress analysis performed on the 1"-PCC-76-A piping system inside containment penetration S-1A. Deadweight, thermal expansion, and seismic loads were considered. Results of this analysis show that the subject piping system will meet ASME Boiler and Pressure Vessel Code, Section III, Class 2 requirements provided that supports S8 and S9 are installed as recommended.

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I. SCOPE

This document constitutes the stress report required by Subarticle NCA-3350 of the ASME Boiler and Pressure Vessel Code, Section III, "Nuclear Power Plant Components", 1977 through Winter 1977 Addenda*. The piping system analyzed, to be installed as part of the "Loss-of-Fluid-Test" (LOFT) Reactor, was the 1"-PCC-76-A and associated piping inside containment penetration S-1A.

II. INTRODUCTION

The piping system was analyzed according to the procedures specified in Subsection NC-3600 of the Code and found acceptable. The governing conditions, engineering assumptions, and analytical techniques used in completing the analysis are described in the following pages. All loading conditions and design data used in performing the analysis were obtained from LOFT line designation tables.^[2] A Design Specification is to be issued in the future.

III. PIPING SYSTEM DESCRIPTION

The Primary Component Cooling (PCC) system provides the chemically treated water compatible with the materials of the primary system components to minimize corrosion and deposition. The system is provided with multiple flow paths, each sized for the maximum flow and heat removal requirements.

The purposes of this analysis were to (1) determine the loads imposed on the containment penetration and (2) assure containment isolation integrity. Thus, this analysis included sufficient portions of the connecting pipe lines 3"-PCC-1-A, 4"-PCC-1-A, and 4"-PCC-23-A to account for their effects on the 1"-PCC-76-A line.

1. STRUCTURAL DESCRIPTION

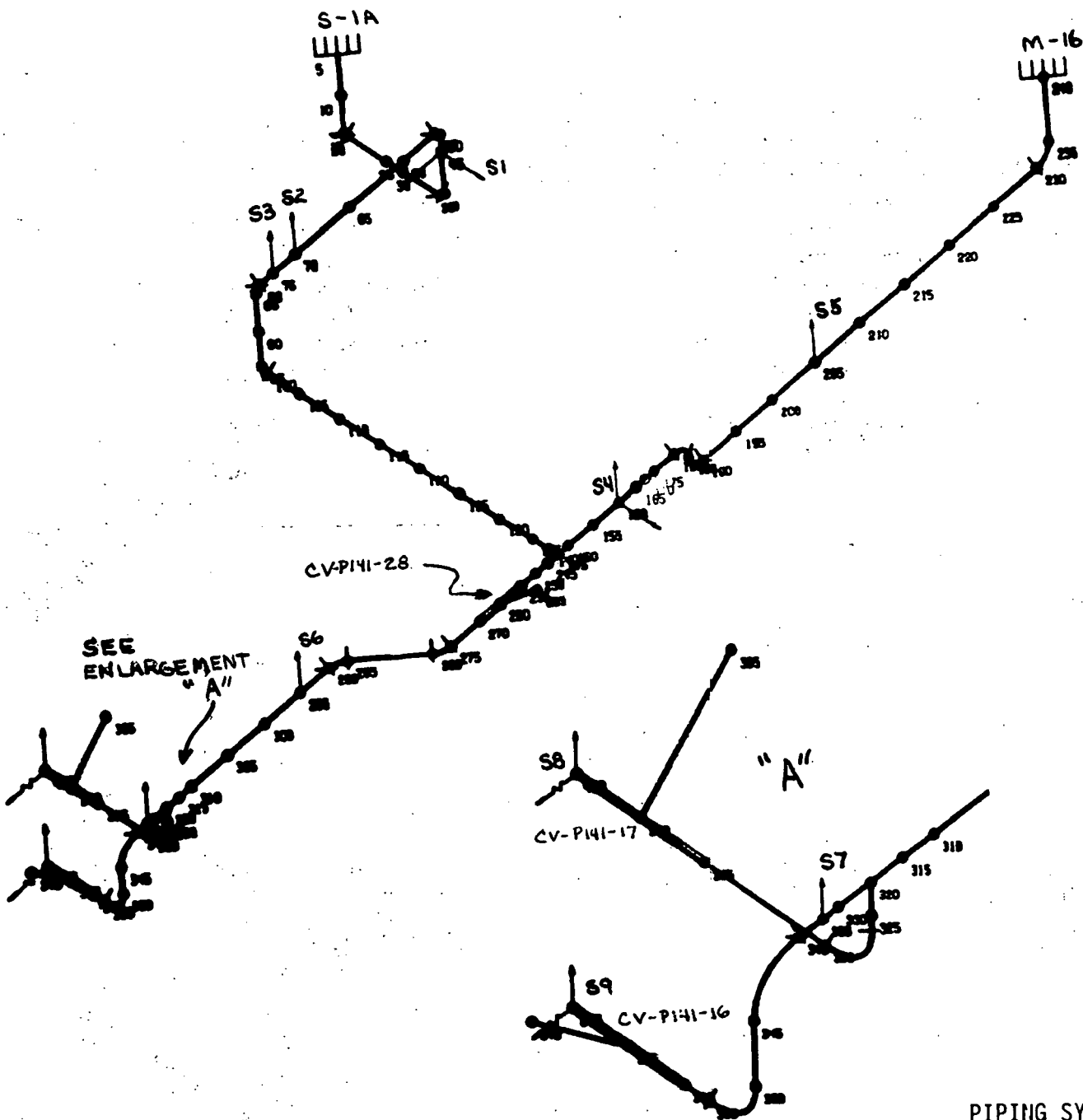
Figure 1 is an isometric plot of the Class 2 piping system analyzed in this report. The data points and elements are identified on the plot and a listing of the geometric data used in performing the system's structural analysis appears in Appendix A.

2. MATERIAL AND GEOMETRIC DATA

The piping has the following design parameters:

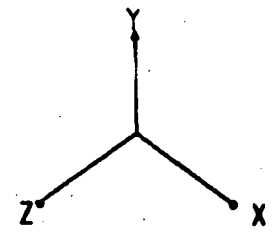
O.D. (inches)	1.315	3.500	4.500
Thickness (inches)	0.133	0.216	0.237
Weight (lbs/inch)	2.053	10.780	16.29
Material	A120 C.S.	A120 C.S.	A120 C.S.
E_{cold} (10^6 psi)	27.9	27.9	27.9

LOFT CIS ANALYSIS - 1, -PCC-76-A.S-1A,INS
 NUPIPE MATHEMATICAL MODEL



LEGEND

- / - NODE LOCATION
- - MASSPOINT LOCATION
- ←--- - SPRING HANGER
- - SNUGGER
- ↑ - RIGID SUPPORT
- ┌--- - ANCHOR
- *--- - ELASTO JOINT
- ┌--- - FLEXIBLE ANCHOR
- ┌--- - VALVE



ROTATION ABOUT Y-AXIS = 45.4020.
 X-Z PLANE TILT = 45.4020.
 See Reference 4

FIGURE 1
 PIPING SYSTEM COMPUTER MODEL PLOT

S (400°F) (psi)	9800	9800	9800
S _Y (psi)	28670	28670	28670
α (10 ⁻⁶ in./in.°F)	6.82	6.82	6.82

The expansion coefficients and thermal conductivities of SA-120, carbon steel are defined in Tables I-4.0 and I-5.0 of the Code.

IV. DESIGN AND SERVICE CONDITIONS

Listed in the following sections are the various design and service conditions used in analyzing the piping. This information was obtained from the line designation tables.

1. DESIGN CONDITIONS

Class 2 - All Piping

Design Pressure - 110 psi

Design Temperature - 365°F

2. LEVEL A SERVICE CONDITIONS

Level A service conditions, dealing mainly with the stress range due to thermal expansion, are based on the operating temperature given below:

Class 2 - All Piping

Operating Pressure - 100

Operating Temperature - 80

3. LEVEL B SERVICE CONDITIONS

The only Level B service condition resulting in significant dynamic loads for the piping system is the Operating Basis Earthquake (OBE).

4. LEVEL C SERVICE CONDITIONS

The only significant Level C service conditions which affects the piping system is the Safe Shutdown Earthquake (SSE).

5. LEVEL D SERVICE CONDITIONS

The SSE plus Loss-of-Coolant Accident (LOCA) response envelopes all other Level D service responses for LOFT and will be used as the basis for Level D service conditions analysis.

6. TEST CONDITIONS

Cold Hydrostatic Test - Design Pressure x 1.25

Cold Leakage Test - Design Pressure Only

Hot Leakage Test - Design Pressure and Level A Service Temperature

V. PIPING SYSTEM STRUCTURAL ANALYSIS

The piping system was analyzed for the various structural loads described in Section IV using the computer code NUPIPE-II, developed by Nuclear Services Corporation. This computer program is described in Appendix B. All limiting assumptions made in performing the analysis are listed in the following subsections.

1. WEIGHT ANALYSIS

An analysis for normal weight loading was performed for the system; the piping uniform weights used are listed in Section III.2 of this report. The weights and C.G.'s of the valves and operators are given in Table I. The results of the weight analysis are contained in Appendix C of this report.

2. THERMAL EXPANSION ANALYSIS

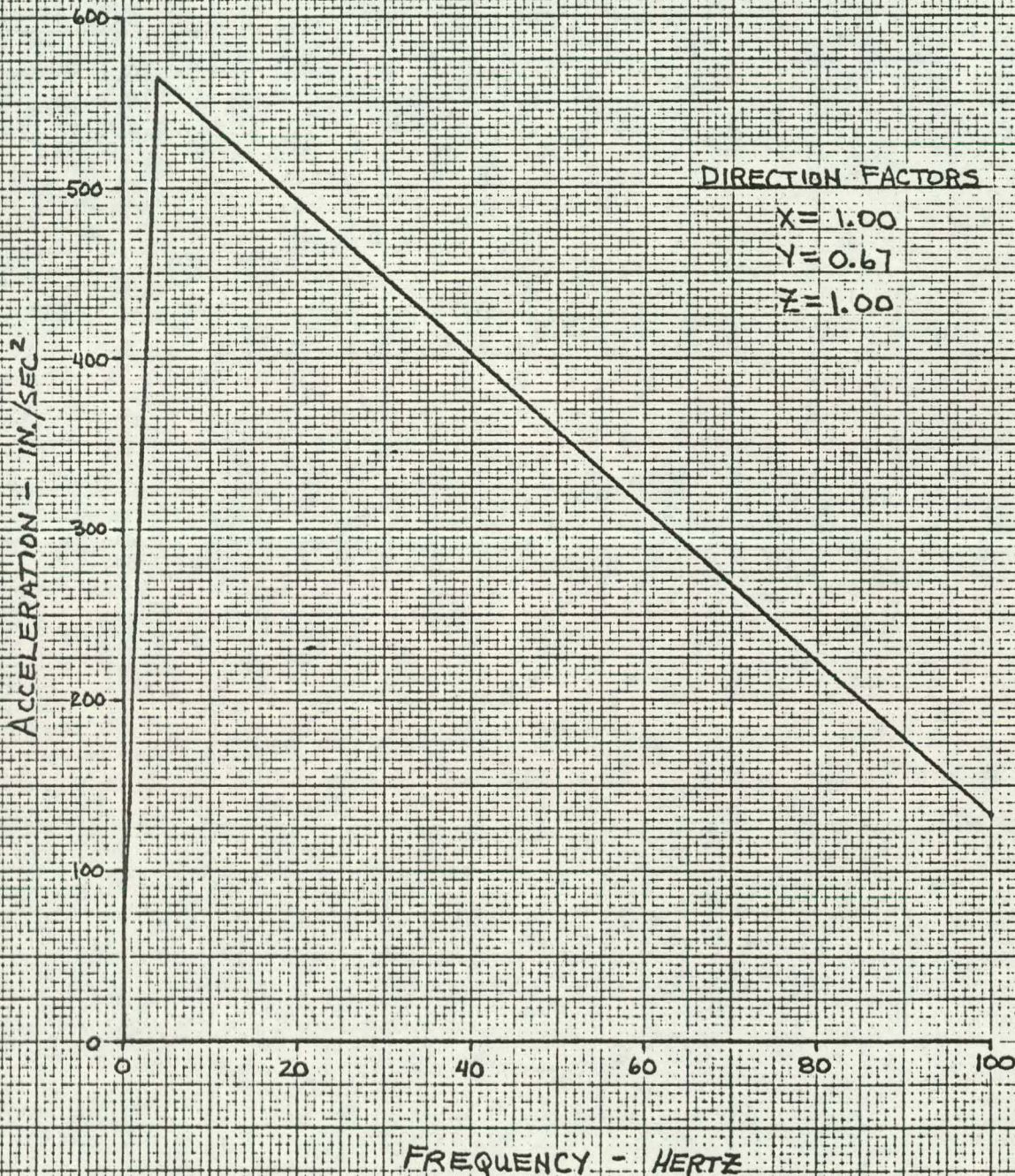
The piping system addressed in this report was analyzed for the steady-state temperature conditions as outlined in Section IV.2. The results of this analysis are contained in Appendix D.

3. SEISMIC ANALYSIS

The piping system was analyzed for the effects of the Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE). For this analysis, OBE is to be considered one-half the magnitude of the SSE. The SSE response spectra is shown in Figure 2. This response spectra, multiplied by conservative directional intensity factors, was applied in

FIGURE 2
SSE - SEISMIC RESPONSE SPECTRA ENVELOPE

1% DAMPING



46 1323

K&E 10 X TO 1/2 INCH 7 X 10 INCHES KEUFEL & ESSER CO. MADE IN U.S.A.

TABLE I.
Piping System Valve Design Weights
And Centers of Gravity

<u>Valve</u>	<u>Flooded Weight</u>	<u>(Distance from C.G. axis of Pipe)</u>
CV-P141-17	100 lb.	14.1 in.
CV-P141-16	100 lb.	14.1 in.
CV-P141-28	100 lb.	14.1 in.

all three directions simultaneously. Any seismic differential anchor movement effects present on the piping were taken into account. The results of the seismic analyses are contained in Appendix E.

VI. ASME BOILER AND PRESSURE VESSEL CODE, SECTION III, STRESS ANALYSIS

A stress analysis of the Class 2 piping addressed in this report, per rules of Subsection NC-3600 of the Code, was performed using the results obtained from the analyses described in Section V of this report.

1. MINIMUM THICKNESS CHECK

The Code requires verification that the piping minimum wall thickness is satisfactory. The thickness was checked against Equation (1) of NC-3641.1:

$$t_M = \frac{P D_o}{2 (S + P_y)} + A$$

where t_M = Minimum required wall thickness

P = Internal design pressure

D_o = Outside diameter

S = Allowable stress

$y = .4$ or $\frac{d}{d+D_o}$ if $D_o/t_M < 6$ (per Code)

A = Corrosion allowance (.08).

Results of this calculation are contained in Table II.

TABLE II.

MINIMUM THICKNESS PARAMETERS

<u>Pressure (psi)</u>	<u>O. D. (inches)</u>	<u>S (psi)</u>	<u>t_M (inches)</u>	<u>t_{actual} (inches)</u>
110	1.315	9800	0.087	0.133
110	3.500	9800	0.100	0.216
110	4.500	9800	0.105	0.237

Since the actual thicknesses are all greater than the t_M calculated, the system meets the requirements of NC-3641.1.

2. DESIGN, LEVEL A, AND LEVEL B SERVICE CONDITIONS STRESS ANALYSIS

The loading conditions, defined as Design, Level A, and Level B in Section IV.1, 2, and 3, were used in performing a stress analysis of the piping system per the rules given in Subsection NC-3650 of the Code. The computer program NUPIPE-II was used for this analysis. The results of Equations (8), (9), (10), and (11) are detailed in Appendix F. Test conditions are encompassed by this stress analysis.

3. LEVEL C SERVICE CONDITIONS STRESS ANALYSIS

The only loading which was postulated as a Level C service condition is the SSE. NC-3611.2 (c) requires that Equation (9) of NC-3652.2 be satisfied with an allowable of $1.8 S_h$. These results, as calculated using NUPIPE-II, are contained in Appendix G.

4. LEVEL D SERVICE CONDITIONS STRESS ANALYSIS

There was no Level D service condition specified for this pipe system.

VII. COMPONENT SUPPORT ANALYSIS

Any component supports designed and built by EG&G Idaho, Inc. have been analyzed in accordance with the AISC Manual of Steel Construction^[3]. The analysis of these component supports would be contained in Appendix I. All component supports which have been supplied by a commercial manufacturer carry loads which are less than the manufacturer's stated load capacity. A summary of sustained loads on all piping supports is contained in Table III.

Supports S8 and S9 were added to provide necessary seismic restraint.

TABLE III
LOADS ON PIPING SUPPORTS

<u>Support Type</u>	<u>Support No.</u>	<u>Deadweight</u>	<u>Thermal</u>	<u>OBE</u>	<u>SSE</u>	<u>Rated Load</u>
U-Bolt	S1-X	-11.	-1.	12.	24.	485.
	S1-Z	- 1.	-1.	8.	15.	485.
ROD ⁺	S2-Y	31.	-1.	21.	43.	240.
ROD ⁺	S3-Y	-10.	1.	21.	42.	240
U-Bolt	S4-X	- 3.	-16.	84.	168.	1220.
	S4-Y	202.	- 8.	53.	107.	1220.
ROD ⁺	S5-Y	50.	12.	61	122.	440.
ROD ⁺	S6-Y	265.	-12.	51.	101.	440.
ROD ⁺	S7-Y	299.	0.	108.	215.	705.
RIGID*	S8-X	13.	13.	92.	184.	1000.
	S8-Y	94.	10.	48.	98.	1000.
	S8-Z	14.	-23.	41.	81.	1000.
RIGID*	S9-X	-11.	1.	126.	252.	1000.
	S9-Y	74.	1.	58.	106.	1000.
	S9-Z	-17.	-18.	55.	111.	1000.

NOTE:

1. All loads are in pounds.
2. S1-X indicates that this is the load in the global X direction on support S1.
3. * indicates support to be added.
4. + indicates that equivalent restraint should be provided for both up and down movement.

VIII. SPECIAL CONDITIONS

There were no special considerations made for this analysis.

IX. CONCLUSIONS

The piping system addressed in this report was analyzed for the loads and operating conditions given in Reference 2 using the techniques described herein. All stresses will be within limits established by Section III of the ASME Code provided that the following recommendations are implemented:

1. Supports S8 and S9 should be installed as close as possible to valves CV-P141-17 and CV-P141-16, respectively. These supports were modeled using the properties of 4" schedule 40 pipe. Other cross sections could be used provided that directional stiffnesses are at least equal to those used in the model; however, the 4" schedule 40 pipe is recommended.
2. Equivalent support in both the up and down (+Y and -Y) directions should be assured for supports S2, S3, S5, S6, and S7.
3. A minimum diameter of 5/8 inch is required for the rod in support S7.
4. A minimum diameter of 1/2 inch should be used on supports S5 and S6.
5. The Applied Mechanics Branch should be contacted for review of final support drawings.

X. REFERENCES

1. American Society of Mechanical Engineers, ASME Boiler & Pressure Vessel Code, Section III, Division 1, "Nuclear Power Plant Components", Subsection NC, 1977 Edition, Winter 1977 Addenda.
2. Aerojet Nuclear Company, "Line Designation Tables", Specification D-1, Rev. 2, March 27, 1974.
3. American Institute of Steel Construction, Manual of Steel Construction, Seventh Edition, pp 5-6 to 5-24, 1973.
4. Computer Plot Based on Sketches Made at LOFT By Applied Mechanics Branch Personnel During March, 1978.

APPENDIX A
BASIC DATA, INPUT PARAMETERS

PROGRAM CONTROL CARD

CARDTYPE	NCHECK	DAMP	CODE	GLBB	DYN	THEATA	INTOUT	STGRE
CONTROL	0	0	2.	0.	0.	0.0000	0.	0.
CARDTYPE	NPR	NPIPS	UNITS	EIGSAV				
CONTROL	10	0	ENGLISH	0				

FLEXIBILITY ANALYSIS CONTROL CARDS

CARDTYPE	NCASE	MODE	TLDAD	CMODE	CFREQ	SPEC	SAVE	CYCLE	TITLE
FLEXAN	1	1	3.	0.	0.	0.00	1.	0.	DEADWEIGHT
FLEXAN	2	1	2.	0.	0.	0.00	1.	0.	THERMAL EXPANSION PLUS ANCHOR MOVEMENTS
FLEXAN	3	1	11.	30.	50.	1.00	1.	0.	SSE RESPONSE SPECTRUM - 1% DAMPING

CASE COMBINATION CONTROL CARDS

CARDTYPE	NCASE	CASES-COMD	ANULT	BRULT	CCODE	SAVE	CYCLE	TITLE
MODFLEX	4	3 AND 1	.5	0.0	0.0	1.0	0.0	0.5E RESPONSE SPECTRUM - ONE-HALF SSE

SEISMIC RESPONSE SPECTRA - SET 1

X-EARTHQUAKE		Y-EARTHQUAKE		Z-EARTHQUAKE	
PERIOD (SEC)	ACCELERATION (G)	PERIOD (SEC)	ACCELERATION (G)	PERIOD (SEC)	ACCELERATION (G)
0.000	.342	0.000	.228	0.000	.342
.010	.342	.010	.228	.010	.342
.200	.342	.200	.228	.200	1.400
.400	.342	.400	.228	.400	.800
1.400	.342	1.400	.228	1.400	.342
2.200	.217	2.200	.145	2.200	.217
3.000	.166	3.000	.124	3.000	.166
10.000	.124	10.000	.124	10.000	.166

A2

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CARDTYPE	I1	I2	*** INPUT DATA ***					
			DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
XSECTN	C	1	.132E+01	.133E+00	.205E+01	.279E+02	.110E+03	0.
XSECTN	C	2	.450E+01	.237E+00	.163E+02	.279E+02	.110E+03	0.
XSECTN	C	3	.350E+01	.216E+00	.106E+02	.279E+02	.110E+03	0.
XSECTN	C	4	.400E+01	.226E+00	.163E+02	.279E+02	.110E+03	0.
XSECTN	C	5	.163E+01	.317E+00	.113E+02	.279E+02	.110E+03	0.
XSECTN	C	6	.366E+01	.403E+00	.466E+02	.279E+02	.110E+03	0.
XSECTN	C	7	.126E+02	.405E+00	.102E+03	.279E+02	.110E+03	0.
CPVAL	1	1	.279E+02	.700E-03	0.	0.	.100E+03	0.
CHECK MAGNITUDE OF ENTRIES ON ABOVE CPVAL CARD ****								
ANCHOR	C	5	0.	0.	0.	0.	0.	0.
FGRUN	5	10	.710E+00	0.	.710E+00	.100E+01	.100E+01	0.
MASSPT	C	10	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	10	15	.700E+00	0.	.700E+00	.100E+01	.100E+01	0.
MASSPT	C	15	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	15	20	.150E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	C	20	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	20	25	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	C	25	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	25	30	.417E+00	0.	0.	.500E+01	.100E+01	0.
MASSPT	C	30	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	30	35	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	C	35	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	35	40	.150E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	C	40	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	40	45	0.	.117E+01	0.	.100E+01	.100E+01	0.
MASSPT	C	45	.100E+01	.100E+01	.100E+01	0.	0.	0.

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CARDTYPE	*** INPUT DATA ***						DELTA(5)	DELTA(6)
	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)		
RESTRAINT	0	45	.200E+05	0.	.200E+05	0.	0.	0.
FGRUN	45	50	0.	.580E+00	0.	.100E+01	.100E+01	0.
MASSPT	0	50	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	50	55	.150E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	55	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	55	60	0.	0.	.100E+01	.100E+01	.100E+01	0.
MASSPT	0	60	.100E+01	.100E+01	.100E+01	0.	0.	0.
RLN	60	65	0.	0.	.150E+01	.100E+01	.100E+01	0.
MASSPT	0	65	.100E+01	.100E+01	.100E+01	0.	0.	0.
RLN	65	70	0.	0.	.150E+01	.100E+01	.100E+01	0.
RESTRAINT	0	70	0.	.200E+05	0.	0.	0.	0.
MASSPT	0	70	.100E+01	.100E+01	.100E+01	0.	0.	0.
RLN	70	75	0.	0.	.617E+00	.100E+01	.100E+01	0.
RESTRAINT	0	75	0.	.200E+05	0.	0.	0.	0.
MASSPT	0	75	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	75	80	0.	0.	.500E+00	.100E+01	.100E+01	0.
MASSPT	0	80	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	80	85	.150E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	85	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	85	90	0.	-.110E+01	0.	.100E+01	.100E+01	0.
MASSPT	0	90	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	90	95	0.	-.100E+01	0.	.100E+01	.100E+01	0.
MASSPT	0	95	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	95	100	.150E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	100	.100E+01	.100E+01	.100E+01	0.	0.	0.

*** INPUT DATA ***

CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
FGRUN	100	105	.920E+00	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	105	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	105	110	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	110	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	110	115	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	115	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	115	120	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	120	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	120	125	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	125	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	125	130	.100E+01	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	130	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	130	135	.830E+00	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	135	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	135	140	.417E+00	0.	0.	.500E+01	.100E+01	0.
MASSPT	0	140	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	140	145	.210E+00	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	145	.100E+01	.100E+01	.100E+01	0.	0.	0.
TEE	145	140	0.	0.	0.	0.	0.	0.
FGRUN	145	150	0.	0.	-.283E+00	.300E+01	.100E+01	0.
MASSPT	0	150	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	150	155	0.	0.	-.700E+00	.300E+01	.100E+01	0.
MASSPT	0	155	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	155	160	0.	0.	-.700E+00	.300E+01	.100E+01	0.
RESTRAINT	0	160	.200E+05	.200E+05	0.	0.	0.	0.

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CARCTYPE	*** INPUT DATA ***							
	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
MASSPT	C	160	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	160	165	0.	0.	-.500E+00	.300E+01	.100E+01	0.
MASSPT	C	165	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	165	170	0.	0.	-.250E+00	.600E+01	.100E+01	0.
MASSPT	C	170	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	170	175	0.	0.	-.250E+00	.600E+01	.100E+01	0.
MASSPT	C	175	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	175	180	0.	0.	-.920E+00	.300E+01	.100E+01	0.
MASSPT	C	180	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	180	185	.450E+01	0.	0.	.300E+01	.100E+01	0.
MASSPT	C	185	.100E+01	.100E+01	.100E+01	0.	0.	0.
DUNNY	185	190	0.	-.375E+00	0.	.300E+01	.100E+01	0.
DUNNY	190	185	0.	-.375E+00	0.	.300E+01	.100E+01	0.
ELBOW	185	190	.450E+01	0.	0.	.300E+01	.100E+01	0.
MASSPT	C	190	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	190	195	0.	0.	-.130E+01	.300E+01	.100E+01	0.
MASSPT	C	195	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	195	200	0.	0.	-.100E+01	.300E+01	.100E+01	0.
MASSPT	C	200	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	200	205	0.	0.	-.120E+01	.300E+01	.100E+01	0.
RESTRAINT	C	205	0.	.200E+05	0.	0.	0.	0.
MASSPT	C	205	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	205	210	0.	0.	-.125E+01	.300E+01	.100E+01	0.
MASSPT	C	210	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	210	215	0.	0.	-.125E+01	.300E+01	.100E+01	0.

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CARDTYPE	*** INPUT DATA ***							
	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
MASSPT	0	215	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	215	220	0.	0.	-.125E+01	.300E+01	.100E+01	0.
MASSPT	0	220	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	220	225	0.	0.	-.125E+01	.300E+01	.100E+01	0.
MASSPT	0	225	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	225	230	0.	0.	-.158E+01	.300E+01	.100E+01	0.
MASSPT	0	230	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	230	235	.450E+01	0.	0.	.300E+01	.100E+01	0.
MASSPT	0	235	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	235	240	0.	.200E+01	0.	.300E+01	.100E+01	0.
MASSPT	0	240	.100E+01	.100E+01	.100E+01	0.	0.	0.
ANCHOR	0	240	0.	0.	0.	0.	0.	0.
FGRUN	145	245	0.	0.	.258E+00	.300E+01	.100E+01	0.
MASSPT	0	245	.100E+01	.100E+01	.100E+01	0.	0.	0.
REDUCER	245	250	0.	0.	.333E+00	.400E+01	.100E+01	0.
MASSPT	0	250	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	250	255	0.	0.	.400E+00	.200E+01	.100E+01	0.
MASSPT	0	255	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	255	260	0.	0.	.580E+00	.200E+01	.100E+01	0.
MASSPT	0	260	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	260	265	.100E+01	.100E+01	0.	.200E+01	.100E+01	0.
CWEIGHT	0	265	0.	.100E+03	0.	0.	0.	0.
MASSPT	0	265	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	250	270	0.	0.	.580E+00	.200E+01	.100E+01	0.
MASSPT	0	270	.100E+01	.100E+01	.100E+01	0.	0.	0.

CARDTYPE	*** INPUT DATA ***						DELTA(5)	DELTA(6)
	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)		
FGRUN	270	275	0.	0.	.100E+01	.200E+01	.100E+01	0.
MASSPT	0	275	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	275	280	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	280	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	280	285	-.141E+01	0.	.141E+01	.200E+01	.100E+01	0.
MASSPT	0	285	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	285	290	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	290	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	290	295	0.	0.	.100E+01	.200E+01	.100E+01	0.
RESTRAINT	0	295	0.	.200E+05	0.	0.	0.	0.
MASSPT	0	295	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	295	300	0.	0.	.100E+01	.200E+01	.100E+01	0.
MASSPT	0	300	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	300	305	0.	0.	.100E+01	.700E+01	.100E+01	0.
MASSPT	0	305	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	305	310	0.	0.	.100E+01	.700E+01	.100E+01	0.
MASSPT	0	310	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	310	315	0.	0.	.333E+00	.200E+01	.100E+01	0.
MASSPT	0	315	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	315	320	0.	0.	.344E+00	.200E+01	.100E+01	0.
MASSPT	0	320	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	320	325	0.	-.344E+00	0.	.200E+01	.100E+01	0.
MASSPT	0	325	.100E+01	.100E+01	.100E+01	0.	0.	0.
TEE	320	325	0.	0.	0.	0.	0.	0.
FGRUN	320	330	0.	0.	.344E+00	.200E+01	.100E+01	0.

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		*** INPUT DATA ***						
CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
MASSPT	0	330	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	330	335	0.	0.	.166E+00	.200E+01	.100E+01	0.
MASSPT	0	335	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	335	0.	.200E+05	0.	0.	0.	0.
FGRUN	335	340	0.	0.	.750E+00	.200E+01	.100E+01	0.
MASSPT	0	340	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	340	345	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	345	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	345	350	0.	-.167E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	350	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	350	355	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	355	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	355	360	-.750E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	360	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	360	365	-.580E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	365	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	365	370	0.	.100E+01	.100E+01	.200E+01	.100E+01	0.
MASSPT	0	370	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	370	0.	.100E+03	0.	0.	0.	0.
VALVE	365	375	-.580E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	375	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	375	.547E+04	.184E+07	.547E+04	0.	0.	0.
FGRUN	325	326	0.	-.650E+00	0.	.200E+01	.100E+01	0.
ELBOW	326	360	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	380	.100E+01	.100E+01	.100E+01	0.	0.	0.

CARDTYPE	*** INPUT DATA ***											
	11	12	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)	DELTA(7)	DELTA(8)	DELTA(9)	DELTA(10)
FGRUN	380	385	-.175E+01	0.	0.	.200E+01	.100E+01	0.	0.	0.	0.	0.
MASSPT	0	385	.100E+01	.100E+01	.100E+01	0.	0.	0.	0.	0.	0.	0.
VALVE	385	390	-.667E+00	0.	0.	.200E+01	.100E+01	0.	0.	0.	0.	0.
MASSPT	0	390	.100E+01	.100E+01	.100E+01	0.	0.	0.	0.	0.	0.	0.
RUN	390	395	0.	.100E+01	-.100E+01	.200E+01	.100E+01	0.	0.	0.	0.	0.
MASSPT	0	395	.100E+01	.100E+01	.100E+01	0.	0.	0.	0.	0.	0.	0.
CWEIGHT	0	395	0.	.100E+03	0.	0.	0.	0.	0.	0.	0.	0.
VALVE	390	400	-.667E+00	0.	0.	.200E+01	.100E+01	0.	0.	0.	0.	0.
MASSPT	0	400	.100E+01	.100E+01	.100E+01	0.	0.	0.	0.	0.	0.	0.
RESTRAINT	0	400	.547E+04	.184E+07	.547E+04	0.	0.	0.	0.	0.	0.	0.
STRESS7	0	0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9CASES		1	0	0	0	0	0	0	0	0	0	0
10CASES		2	0	0	0	0	0	0	0	0	0	0
CKNODES		0	0	0	0	0	0	0	0	0	0	0
ALLODNE		0	0	0	0	0	0	0	0	0	0	0

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APPENDIX B
COMPUTER PROGRAM DESCRIPTION

The NUPIPE-II computer program performs linear elastic analysis of three-dimensional piping systems subject to thermal, deadweight, seismic, and other static and dynamic loads. The NUPIPE-II program is also designed to perform stress and fatigue analyses in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Nuclear Power Plant Components, 1974 Edition through the Summer 1975 Addenda; and the ANSI B31.1 Code, 1967 and Summer 1973 versions. Piping systems of more than one classification can be analysed.

NUPIPE-II utilizes the finite element method of analysis with special features incorporated to accommodate specific requirements of piping system analysis. In accordance with the finite element method, the continuous piping is mathematically idealized as an assembly of elastic structural members connecting discrete nodal points. Nodal points are placed in such a manner as to isolate particular types of piping elements, such as straight runs of pipe, elbows, valves, etc., for which force-deformation characteristics can be categorized. Nodal points are also placed at all discontinuities, such as piping supports, concentrated weights, branch lines, and changes in cross-section. System loads such as weights, equivalent thermal forces, and earthquake inertia forces are applied at the nodal points. For the deadweight and dynamic time-history and response spectra analyses, distributed weight properties of the piping as well as concentrated weights, such as valves, pumps, or snubbers, can be considered. A lumped mass model of the piping system is used for all dynamic analyses. Both translational and rotational degrees-of-freedom may be considered.

For further information concerning NUPIPE-II capabilities or analytical procedures, contact Applied Mechanics Branch.

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APPENDIX C
WEIGHT ANALYSIS RESULTS

SUPPORT REACTIONS FOR LOAD CASE NO. 1

DEADWEIGHT

NODE	TYPE	REACTION (LBS OR IN-LBS)	DIRECTION
5	F	11.	X CGORD
5	F	15.	Y CGORD
5	F	1.	Z CGORD
5	F	-153.	X CGORD
5	F	23.	Y CGORD
5	F	-71.	Z CGORD
4	F	-11.	X CGORD
4	F	-1.	Z CGORD
70	F	31.	Y CGORD
75	F	-13.	X CGORD
75	F	19.	Y CGORD
75	F	202.	X CGORD
75	F	50.	Y CGORD
75	F	1.	X CGORD
75	F	58.	Y CGORD
75	F	4.	Z CGORD
75	F	-33.	X CGORD
75	F	39.	Y CGORD
75	F	430.	Z CGORD
75	F	263.	Y CGORD
75	F	99.	Y CGORD
75	F	13.	X CGORD
75	F	9.	Y CGORD
75	F	-14.	Z CGORD
75	F	-11.	X CGORD
75	F	-74.	Y CGORD
75	F	-17.	Z CGORD

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LOFT CIS ANALYSIS - 14" PUC-76-A, S-1A, INSIDE, NORM. & UPSET

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 1

DEADWEIGHT

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	5 10	11. -11.	15. -13.	1. -1.	-153. 34.	128. -45.	271. -151.	-.000 -.002	-.000 -.007	-.000 .002	.0000 .0004	-.0000 -.0004	-.0000 -.0011
FGRUN	10 15	11. -11.	13. -11.	1. -1.	-34. -62.	45. 33.	151. -55.	-.002 -.006	-.007 -.022	.002 .006	.0004 .0002	-.0004 -.0005	-.0011 -.0017
ELBOW	15 20	11. -11.	11. -11.	1. -1.	62. -57.	-33. 37.	55. -44.	-.006 -.006	-.022 -.023	.006 .006	.0002 .0002	-.0005 -.0004	-.0017 -.0017
FGRUN	20 25	11. -11.	11. -9.	1. -1.	57. -67.	-37. 28.	44. 74.	-.006 -.006	-.023 -.044	.006 .010	-.0002 -.0002	-.0004 -.0002	-.0017 -.0017
FGRUN	25 30	11. -11.	9. -4.	1. -1.	67. -57.	-25. 24.	-74. 106.	-.006 -.006	-.044 -.053	.010 .011	-.0002 -.0003	-.0002 -.0002	-.0017 -.0016
FGRUN	30 35	11. -11.	4. -2.	1. -1.	67. -67.	-24. 15.	-106. 141.	-.006 -.006	-.053 -.068	.011 .013	-.0003 -.0003	-.0002 -.0001	-.0016 -.0010
ELBOW	35 40	11. -11.	2. -2.	1. -1.	67. -66.	-15. 14.	-141. 128.	-.006 -.006	-.068 -.069	.013 .013	-.0007 -.0008	-.0001 -.0001	-.0010 -.0007
FGRUN	40 45	11. -11.	2. 0.	1. -1.	66. -56.	-14. 14.	-128. -4.	-.006 .001	-.069 -.069	.013 .000	-.0008 -.0011	-.0001 -.0000	-.0007 -.0003
FGRUN	45 50	0. 0.	0. 1.	0. 0.	56. -59.	-14. 14.	4. -1.	.001 .002	-.069 -.069	.000 -.007	-.0011 -.0015	.0000 .0001	-.0003 -.0003
ELBOW	50 55	0. 0.	1. 2.	0. 0.	59. -57.	-14. 14.	1. -1.	.002 .003	-.069 -.067	-.007 -.009	-.0013 -.0014	.0001 .0001	-.0003 -.0004
FGRUN	55 60	0. 0.	2. 3.	0. 0.	57. -30.	-14. 9.	1. -1.	.003 .004	-.067 -.051	-.009 -.009	-.0014 -.0016	.0001 .0001	-.0004 -.0004
RUN	60 65	0. 0.	3. 7.	0. 0.	30. 61.	-9. 1.	1. -1.	.004 .007	-.051 -.021	-.009 -.009	-.0016 -.0015	.0001 .0002	-.0004 -.0004
RUN	65 70	0. 0.	7. 10.	0. 0.	61. 207.	-1. -7.	1. -1.	.007 .010	-.021 -.002	-.009 -.009	-.0015 -.0005	.0002 .0001	-.0004 -.0004
RUN	70 75	0. 0.	21. -20.	0. 0.	-207. 56.	7. -10.	1. -1.	.010 .011	-.002 -.000	-.009 -.009	-.0005 -.0001	.0001 .0001	-.0004 -.0004

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	75	-0.	10.	-0.	-56.	15.	-1.	.011	.000	-.009	-.0001	.0001	-.0004
	80	0.	-9.	0.	15.	-12.	-1.	.012	.001	-.009	-.0001	.0001	-.0004
ELBOW	80	-0.	9.	-0.	-15.	12.	1.	.012	.001	-.009	-.0001	.0001	-.0004
	85	0.	-9.	0.	2.	-13.	-1.	.011	.001	-.008	-.0000	.0001	-.0004
FGRUN	85	-0.	9.	-0.	-2.	13.	1.	.011	.001	-.008	-.0000	.0001	-.0004
	90	0.	-7.	0.	7.	-13.	-6.	.007	.001	-.006	-.0000	.0000	-.0004
FGRUN	90	-0.	7.	-0.	-7.	13.	6.	.007	.001	-.008	-.0000	.0000	-.0004
	95	0.	-5.	0.	11.	-13.	-11.	.002	.001	-.008	.0000	-.0001	-.0004
ELBOW	95	-0.	2.	-0.	-11.	13.	11.	.002	.001	-.008	.0000	-.0001	-.0004
	100	0.	-4.	0.	12.	-12.	-5.	.002	.000	-.008	.0000	-.0001	-.0005
FGRUN	100	-0.	4.	-0.	-12.	12.	5.	.002	.000	-.008	.0000	-.0001	-.0005
	105	0.	-3.	0.	12.	-9.	28.	.002	-.004	-.007	.0001	-.0001	-.0004
RUN	105	-0.	3.	-0.	-12.	9.	-28.	.002	-.004	-.007	.0001	-.0001	-.0004
	110	0.	-1.	0.	12.	-3.	48.	.002	-.008	-.005	.0002	-.0002	-.0002
RUN	110	-0.	1.	-0.	-12.	3.	-48.	.002	-.008	-.005	.0002	-.0002	-.0002
	115	0.	1.	0.	12.	1.	43.	.002	-.009	-.003	.0002	-.0002	.0000
RUN	115	-0.	-1.	-0.	-12.	-1.	-43.	.002	-.009	-.003	.0002	-.0002	.0000
	120	0.	3.	0.	12.	6.	14.	.002	-.008	-.002	.0002	-.0001	.0001
RUN	120	-0.	-3.	-0.	-12.	-6.	-14.	.002	-.008	-.002	.0002	-.0001	.0001
	125	0.	6.	0.	12.	11.	-40.	.002	-.007	-.000	.0004	-.0001	.0001
RLN	125	-0.	-6.	-0.	-12.	-11.	40.	.002	-.007	-.000	.0004	-.0001	.0001
	130	0.	8.	0.	12.	16.	-119.	.002	-.008	.001	.0005	-.0000	-.0005
FGRUN	130	-0.	8.	-0.	-12.	-16.	119.	.002	-.008	.001	.0005	-.0000	-.0005
	135	0.	-9.	0.	12.	20.	-203.	.002	-.014	.001	.0005	.0000	-.0010
FGRUN	135	-0.	9.	-0.	-12.	-20.	203.	.002	-.014	.001	.0005	.0000	-.0010
	140	0.	14.	0.	12.	22.	-261.	.002	-.019	.000	.0005	.0001	-.0011
FGRUN	140	-0.	-14.	-0.	-12.	-22.	261.	.002	-.019	.000	.0005	.0001	-.0011
	145	0.	14.	0.	12.	23.	-299.	.002	-.022	.000	.0006	.0001	-.0014
FGRUN	145	-0.	-14.	-0.	-12.	-23.	299.	.002	-.022	.000	.0006	.0001	-.0014
	150	-2.	-118.	-4.	-1071.	50.	-435.	.002	-.022	.000	.0006	.0001	-.0014
	150	-2.	121.	4.	866.	-56.	435.	.001	-.020	.000	.0006	.0001	-.0014
FGRUN	150	-2.	-121.	-4.	-866.	56.	-435.	.001	-.020	.000	.0006	.0001	-.0014
	155	-2.	126.	4.	-378.	-71.	435.	.001	-.015	.000	.0006	.0001	-.0013

MEMBER	END	FA	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
			FY	FZ	MX	MY	MZ	GX	GY	DZ	RX	RY	RZ	
RUN	155 150	2. -2.	-128. 138.	-4. 4.	373. -1486.	71. -86.	-435. 435.	.001 .000	-.015 -.010	.000 .000	.0006 .0005	.0001 .0001	-.0013 -.0013	
FGRUN	160 185	-1. 1.	67. -81.	-4. 4.	-1486. -1102.	36. -83.	-435. 435.	-.000 -.000	-.010 -.007	.000 .000	.0005 .0004	.0001 .0001	-.0013 -.0012	
FGRUN	165 170	-1. 1.	61. -50.	-4. 4.	1102. -936.	80. -73.	-435. 435.	-.000 -.000	-.007 -.006	.000 .000	.0004 .0004	.0001 .0001	-.0012 -.0012	
FGRUN	170 175	-1. 1.	50. -38.	-4. 4.	936. -804.	78. -75.	-435. 435.	-.000 -.001	-.006 -.005	.000 .000	.0004 .0004	.0001 .0001	-.0012 -.0012	
FGRUN	175 180	-1. 1.	38. -32.	-4. 4.	804. -576.	75. -58.	-425. 435.	-.001 -.001	-.005 -.003	.000 .000	.0004 .0003	.0001 .0000	-.0012 -.0012	
ELBOW	180 185	-1. 1.	32. -25.	-4. 4.	576. -430.	53. -64.	-435. 431.	-.001 -.000	-.003 -.001	.000 -.001	.0003 .0002	-.0000 -.0000	-.0012 -.0011	
ELBOW	185 190	-1. 1.	26. -19.	-4. 4.	430. -313.	54. -59.	-431. 426.	-.006 -.010	-.001 -.001	-.001 -.001	.0002 .0000	-.0000 -.0001	-.0011 -.0009	
FGRUN	190 195	-1. 1.	19. -9.	-4. 4.	313. -154.	59. -49.	-426. 426.	-.010 -.010	-.001 -.001	-.001 -.001	-.0000 -.0000	-.0001 -.0001	-.0009 -.0009	
RUN	195 200	-1. 1.	9. 1.	-4. 4.	154. -107.	49. -37.	-426. 426.	-.010 -.009	-.001 -.002	-.001 -.001	-.0000 -.0000	-.0001 -.0001	-.0009 -.0008	
RUN	200 205	-1. 1.	1. 14.	-4. 4.	107. -221.	37. -23.	-426. 426.	-.009 -.000	-.002 -.002	-.001 -.001	-.0000 -.0001	-.0001 -.0001	-.0008 -.0007	
RUN	205 210	-1. 1.	35. -22.	-4. 4.	221. 206.	23. -8.	-426. 426.	-.000 -.007	-.002 -.004	-.001 -.001	-.0001 -.0001	-.0001 -.0001	-.0007 -.0008	
RUN	210 215	-1. 1.	22. -8.	-4. 4.	-206. 431.	8. 6.	-426. 426.	-.007 -.005	-.004 -.004	-.001 -.001	-.0001 -.0000	-.0001 -.0001	-.0008 -.0008	
RUN	215 220	-1. 1.	8. 5.	-4. 4.	-431. 454.	6. 21.	-426. 426.	-.005 -.004	-.004 -.004	-.001 -.001	-.0000 -.0001	-.0001 -.0001	-.0008 -.0004	
RUN	220 225	-1. 1.	5. 19.	-4. 4.	-454. 275.	-21. 35.	-426. 426.	-.004 -.003	-.004 -.003	-.001 -.001	.0001 .0001	-.0001 -.0001	-.0004 -.0003	
FGRUN	225 230	-1. 1.	-19. 32.	-4. 4.	-275. -89.	-35. 49.	-426. 426.	-.003 -.002	-.003 -.001	-.001 -.001	.0001 .0001	-.0001 -.0001	-.0003 -.0002	
ELBOW	230 235	-1. 1.	-32. 36.	-4. 4.	89. -261.	-49. 54.	-426. 431.	-.002 -.001	-.001 -.000	-.001 -.001	.0001 .0001	-.0001 -.0000	-.0002 -.0001	

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	235	-1.	-38.	-4.	261.	-54.	-431.	-.001	-.000	-.001	.0001	-.0000	-.0001
	240	1.	56.	4.	-231.	54.	430.	-.000	-.000	-.000	.0000	-.0000	-.0000
FGRUN	145	-2.	103.	3.	1059.	-73.	734.	.002	-.022	.000	.0036	.0001	-.0014
	245	2.	-103.	-3.	-1410.	68.	-734.	.002	-.024	.000	.0005	.0001	-.0015
REDUCE	245	-2.	100.	3.	1410.	-66.	734.	.002	-.024	.000	.0005	.0001	-.0015
	250	2.	-94.	-3.	-1797.	57.	-734.	.002	-.026	.000	.0005	.0001	-.0015
FGRUN	250	-2.	94.	3.	1797.	-57.	734.	.002	-.026	.000	.0005	.0001	-.0015
	255	2.	-87.	-3.	-2232.	46.	-734.	.003	-.028	.000	.0004	.0001	-.0015
VALVE	255	-2.	87.	3.	2232.	-46.	734.	.003	-.028	.000	.0004	.0001	-.0015
	250	2.	-78.	-3.	-2807.	31.	-734.	.003	-.031	.000	.0004	.0001	-.0015
RUN	260	0.	123.	0.	0.	0.	1338.	.003	-.031	.000	.0004	.0001	-.0015
	265	-0.	-100.	-0.	-0.	-0.	-0.	.022	-.050	.004	.0004	.0001	-.0015
VALVE	260	-2.	45.	3.	2607.	-31.	604.	.003	-.031	.000	.0004	.0001	-.0015
	270	2.	-55.	-3.	-2459.	15.	604.	.004	-.034	.000	.0004	.0001	-.0015
FGRUN	270	-2.	55.	3.	2459.	-15.	604.	.004	-.034	.000	.0004	.0001	-.0015
	275	2.	-63.	-3.	-1878.	-6.	604.	.005	-.036	.000	.0003	.0001	-.0015
ELBOW	275	-2.	63.	3.	1878.	6.	604.	.005	-.036	.000	.0003	.0001	-.0015
	280	2.	-74.	-3.	-1578.	-9.	729.	.005	-.034	.000	.0001	.0001	-.0015
FGRUN	280	-2.	74.	3.	1578.	9.	729.	.005	-.034	.000	.0001	.0001	-.0015
	285	2.	-100.	-3.	-415.	4.	1892.	.006	-.016	.001	-.0000	.0001	-.0013
ELBOW	285	-2.	100.	3.	415.	-4.	1892.	.006	-.016	.001	-.0000	.0001	-.0013
	290	2.	-108.	-3.	-22.	0.	2073.	.006	-.013	.002	-.0000	.0001	-.0012
FGRUN	290	-2.	108.	3.	22.	-0.	2073.	.006	-.013	.002	-.0000	.0001	-.0012
	295	2.	-119.	-3.	1092.	-21.	2073.	.007	-.013	.002	-.0000	.0001	-.0011
FGRUN	295	-2.	119.	3.	-1092.	21.	2073.	.007	-.013	.002	-.0000	.0001	-.0011
	300	2.	-129.	-3.	-558.	-48.	2073.	.008	-.014	.002	-.0000	.0001	-.0010
FGRUN	300	-2.	129.	3.	558.	48.	2073.	.008	-.014	.002	-.0000	.0001	-.0010
	305	2.	-27.	-3.	-1496.	-74.	2073.	.009	-.014	.002	-.0000	.0001	-.0010
FGRUN	305	-2.	27.	3.	1496.	74.	2073.	.009	-.014	.002	-.0000	.0001	-.0010
	310	2.	-75.	-3.	-1207.	-101.	2073.	.010	-.015	.002	-.0000	.0001	-.0009
FGRUN	310	-2.	75.	3.	1207.	101.	2073.	.010	-.015	.002	-.0000	.0001	-.0009
	315	2.	-81.	-3.	-895.	-110.	2073.	.010	-.015	.002	-.0000	.0001	-.0009
FGRUN	315	-2.	81.	3.	895.	110.	2073.	.010	-.015	.002	-.0000	.0001	-.0009

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	315 325	-2. 2.	-81. 85.	3. -3.	895. -257.	110. -119.	-2073. 2073.	.010 .011	-.015 -.015	.002 .002	.0000 .0000	.0001 .0001	-.0009 -.0003
FGRUN	320 325	11. -11.	112. -100.	17. -17.	1132. -1203.	635. -635.	-1640. 1644.	.011 .007	-.015 -.015	.002 .002	-.0000 -.0000	.0001 .0001	-.0008 -.0003
FGRUN	320 330	-13. 13.	-198. 204.	-14. 14.	-582. 1411.	-516. 462.	-433. 433.	.011 .011	-.015 -.015	.002 .002	.0000 .0000	.0001 .0001	-.0008 -.0003
FGRUN	330 335	-13. 13.	-204. 207.	-14. 14.	-1411. 1620.	-462. 437.	-433. 435.	.011 .011	-.015 -.015	.002 .002	.0000 .0000	.0001 .0001	-.0008 -.0003
FGRUN	335 340	-13. 13.	92. -83.	-14. 14.	-1820. 1949.	-437. 398.	-433. 433.	.011 .012	-.015 -.015	.002 .002	.0000 .0000	.0001 .0001	-.0008 -.0003
ELBOW	340 345	-13. 13.	88. -75.	-14. 14.	-1545. 1142.	-398. 320.	-433. 355.	.012 .008	-.015 -.016	-.002 -.000	.0001 .0004	.0001 .0002	-.0008 -.0007
FGRUN	345 350	-13. 13.	75. -65.	-14. 14.	-1142. 1254.	-320. 320.	-355. 251.	.008 .002	-.016 -.016	-.000 -.003	.0004 .0004	.0002 .0002	-.0007 -.0007
ELBOW	350 355	-13. 13.	65. -52.	-14. 14.	-1254. 1338.	-320. 236.	-251. -175.	.002 -.002	-.016 -.012	-.003 -.005	.0004 .0006	.0002 .0002	-.0007 -.0007
FGRUN	355 360	-13. 13.	52. -48.	-14. 14.	-1338. 1338.	-236. 195.	175. -324.	-.002 -.002	-.012 -.010	-.005 -.005	.0006 .0006	.0002 .0002	-.0007 -.0007
VALVE	360 365	-13. 13.	48. -36.	-14. 14.	-1338. 1338.	-195. 97.	324. -623.	-.002 -.002	-.010 -.005	-.005 -.004	.0006 .0007	.0002 .0002	-.0007 -.0007
RUN	365 370	0. 0.	123. -100.	0. -0.	-1338. 0.	0. 0.	0. -0.	-.002 .008	-.005 -.015	-.004 .005	.0007 .0007	.0002 .0002	-.0007 -.0007
VALVE	375 375	-13. 13.	85. 94.	-14. 14.	0. 0.	-97. 0.	623. -0.	-.002 -.002	-.005 -.000	-.004 -.003	.0007 .0007	.0002 .0002	-.0007 -.0007
FGRUN	325 326	11. -11.	106. -104.	17. -17.	1203. -1235.	635. -635.	-1684. 1704.	.007 .006	-.015 -.015	.002 .002	-.0000 -.0000	.0001 .0001	-.0008 -.0003
ELBOW	326 330	11. -11.	104. -91.	17. -17.	1235. -1338.	635. -532.	-1704. 1164.	.006 .002	-.015 -.012	.002 .003	-.0000 -.0002	.0001 .0000	-.0008 -.0004
FGRUN	330 335	11. -11.	91. -71.	17. -17.	1338. -1338.	532. -275.	-1164. -28.	.002 .002	-.012 -.006	.003 .003	-.0002 -.0003	.0000 .0000	-.0004 -.0004
VALVE	335 390	11. -11.	71. -60.	17. -17.	1338. -1338.	275. -137.	28. -550.	.002 .002	-.006 -.003	.003 .003	-.0003 -.0003	.0000 .0000	-.0004 -.0004

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NUPIPE-11M - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LOFT CIS ANALYSIS - 1"-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	390	0.	123.	-3.	1338.	0.	0.	.002	-.003	-.003	-.0003	.0000	-.0004
	395	-0.	-100.	0.	-0.	-0.	-0.	.006	-.008	-.002	-.0004	.0000	-.0004
VALVE	390	11.	-53.	17.	0.	137.	550.	.002	-.003	.003	-.0003	.0000	-.0004
	400	-11.	74.	-17.	-0.	-0.	-0.	.002	-.000	.003	-.0003	.0000	-.0004

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APPENDIX D
THERMAL EXPANSION ANALYSIS RESULTS

LOFT CIS ANALYSIS - 1"-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 2

THERMAL EXPANSION PLUS ANCHOR MOVEMENTS

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	5	1.	0.	0.	-5.	5.	-0.	-0.000	-0.000	-0.000	0.0000	-0.0000	0.0000
	10	-1.	-0.	-0.	5.	2.	3.	0.000	-0.000	0.001	0.0000	-0.0000	0.0000
FGRUN	10	1.	0.	0.	-3.	-2.	-3.	0.000	-0.000	0.001	0.0000	-0.0000	0.0000
	15	-1.	-0.	-0.	0.	8.	5.	0.001	-0.000	0.001	0.0000	0.0000	0.0000
ELBOW	15	1.	0.	0.	-0.	-3.	-5.	0.001	-0.000	0.001	0.0000	0.0000	0.0000
	20	-1.	-0.	-0.	0.	8.	5.	0.001	-0.000	0.001	0.0000	0.0000	0.0000
FGRUN	20	1.	0.	0.	-0.	-8.	-5.	0.001	-0.000	0.001	0.0000	0.0000	0.0000
	25	-1.	-0.	-0.	0.	3.	9.	0.002	0.001	0.000	0.0000	0.0001	0.0001
FGRUN	25	1.	0.	0.	-0.	-3.	-9.	0.002	0.001	0.000	0.0000	0.0001	0.0001
	30	-1.	-0.	-0.	0.	1.	10.	0.002	0.001	0.000	0.0000	0.0001	0.0001
FGRUN	30	1.	0.	0.	-0.	-1.	-10.	0.002	0.001	-0.000	0.0000	0.0001	0.0001
	35	-1.	-0.	-0.	0.	-3.	-14.	0.003	0.002	-0.000	0.0000	0.0001	0.0001
ELBOW	35	1.	0.	0.	-0.	3.	-14.	0.003	0.002	-0.000	0.0000	0.0001	0.0001
	40	-1.	-0.	-0.	0.	-4.	12.	0.002	0.002	-0.001	0.0000	0.0000	0.0002
FGRUN	40	1.	0.	0.	-1.	4.	-12.	0.002	0.002	-0.001	0.0000	0.0000	0.0002
	45	-1.	-0.	-0.	0.	-4.	-3.	0.000	0.003	0.000	0.0001	0.0000	0.0002
FGRUN	45	0.	0.	0.	-6.	-4.	3.	-0.000	0.003	0.000	0.0001	0.0000	0.0002
	50	-0.	-0.	-0.	3.	-4.	-3.	-0.001	0.003	0.000	0.0001	0.0000	0.0002
ELBOW	50	0.	0.	0.	-5.	4.	3.	-0.001	0.003	0.000	0.0001	0.0000	0.0002
	55	-0.	-0.	-0.	4.	-4.	-2.	-0.001	0.003	0.001	0.0001	0.0000	0.0002
FGRUN	55	0.	0.	0.	-4.	4.	3.	-0.001	0.003	0.001	0.0001	-0.0000	0.0002
	60	-0.	-0.	-0.	1.	-3.	-3.	-0.001	0.003	0.001	0.0001	-0.0000	0.0002
RUN	60	0.	0.	0.	-1.	3.	3.	-0.001	0.003	0.001	0.0001	-0.0000	0.0002
	65	-0.	-0.	-0.	-4.	-3.	-3.	-0.002	0.001	0.002	0.0001	-0.0000	0.0001
RUN	65	0.	0.	0.	4.	3.	3.	-0.002	0.001	0.002	0.0001	-0.0000	0.0001
	70	-0.	-0.	-0.	-10.	-3.	-3.	-0.003	0.000	0.003	0.0000	-0.0001	0.0001
RUN	70	0.	1.	0.	-5.	-2.	-3.	-0.003	-0.000	0.004	0.0000	-0.0001	0.0001

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	79 80	0. -0.	0. -0.	-0. 0.	5. -5.	2. -2.	3. -3.	-.003 -.003	-.000 -.000	.004 .004	-.0000 -.0000	-.0001 -.0001	.0001 .0001
ELBOW	80 85	0. -0.	0. -0.	-0. 0.	5. -4.	2. -2.	3. -3.	-.003 -.003	-.000 -.000	.004 .004	-.0000 -.0000	-.0001 -.0001	.0001 .0001
FGRUN	85 90	0. -0.	0. -0.	-0. 0.	4. -2.	2. -2.	3. -3.	-.003 -.002	-.000 -.001	.004 .004	-.0000 -.0000	-.0001 -.0001	.0001 .0001
FGRUN	90 95	0. -0.	0. -0.	-0. 0.	2. 0.	2. -2.	3. -2.	-.002 -.002	-.001 -.001	.004 .005	-.0000 -.0000	-.0001 -.0001	.0001 .0001
ELBOW	95 100	0. -0.	0. -0.	-0. 0.	0. 1.	2. -2.	2. -2.	-.002 -.001	-.001 -.001	.005 .005	-.0000 -.0000	-.0001 -.0001	.0001 .0001
FGRUN	100 105	0. -0.	0. -0.	-0. 0.	-1. 1.	2. 0.	2. -2.	-.001 -.001	-.001 -.001	.005 .006	-.0000 -.0000	-.0001 -.0001	.0001 .0000
RUN	105 110	0. -0.	0. -0.	-0. 0.	-1. 1.	-0. 3.	2. -2.	-.001 -.000	-.001 -.000	.006 .007	-.0000 -.0000	-.0001 -.0001	.0000 .0000
RUN	110 115	0. -0.	0. -0.	-0. 0.	-1. 1.	-3. 5.	2. -2.	-.000 .001	-.000 -.000	.007 .008	-.0000 -.0000	-.0001 -.0001	.0000 .0000
RLN	115 120	0. -0.	0. -0.	-0. 0.	-1. 1.	-5. 8.	2. -2.	.001 .001	-.000 .000	.008 .009	-.0000 -.0000	-.0001 -.0000	.0000 .0000
RUN	120 125	0. -0.	0. -0.	-0. 0.	-1. 1.	-8. 10.	2. -1.	.001 .002	.000 .000	.009 .009	-.0000 -.0000	-.0000 -.0000	.0000 .0000
RUN	125 130	0. -0.	0. -0.	-0. 0.	-1. 1.	-10. 13.	1. -1.	.002 .003	.000 .000	.009 .009	-.0000 -.0000	-.0000 -.0001	.0000 .0000
FGRUN	130 135	0. -0.	0. -0.	-0. 0.	-1. 1.	-13. 15.	1. -1.	.003 .003	.000 .000	.009 .008	-.0000 -.0000	.0001 .0001	-.0000 -.0000
FGRUN	135 140	0. -0.	0. -0.	-0. 0.	-1. 1.	-15. 16.	1. -1.	.003 .003	.000 .000	.008 .008	-.0000 -.0000	.0001 .0001	-.0000 -.0000
FGRUN	140 145	0. -0.	0. -0.	-0. 0.	-1. 1.	-16. 17.	1. -1.	.003 .004	.000 .000	.008 .007	-.0000 -.0000	.0001 .0001	-.0000 -.0000
FGRUN	145 150	14. -14.	0. -0.	-41. 41.	8. -7.	-115. 86.	-1. 1.	.004 .003	.000 .000	.007 .007	-.0000 -.0000	.0001 .0001	-.0000 -.0000
FGRUN	150 155	14. -14.	0. -0.	-41. 41.	7. -6.	-66. -55.	-1. 1.	.003 .002	.000 .000	.007 .007	-.0000 -.0000	.0001 .0001	-.0000 -.0000

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	155	14.	0.	-41.	6.	55.	-1.	.002	.000	.007	-.0000	.0001	-.0000
	160	-14.	-0.	41.	-5.	-175.	1.	.001	.000	.006	-.0000	.0001	-.0000
FGRUN	160	-2.	-8.	-41.	5.	175.	-1.	.001	.000	.006	-.0000	.0001	-.0000
	165	2.	8.	41.	-5.	-166.	1.	.000	.000	.006	-.0000	.0001	-.0000
FGRUN	165	-2.	-8.	-41.	51.	166.	-1.	.000	.000	.006	-.0000	.0001	-.0000
	170	2.	8.	41.	-73.	-161.	1.	-.000	.000	.006	-.0000	.0001	-.0000
FGRUN	170	-2.	-8.	-41.	73.	161.	-1.	-.000	.000	.006	-.0000	.0001	-.0000
	175	2.	8.	41.	-90.	-156.	1.	-.001	.000	.006	-.0000	.0001	-.0000
FGRUN	175	-2.	-8.	-41.	96.	156.	-1.	-.001	.000	.006	-.0000	.0001	-.0000
	180	2.	8.	41.	-146.	-146.	1.	-.001	.000	.005	-.0000	.0001	-.0000
ELBOW	180	-2.	-8.	-41.	146.	146.	-1.	-.001	-.000	.005	-.0000	.0001	-.0000
	185	2.	8.	41.	6.	-139.	-6.	-.002	-.000	.005	-.0001	.0001	-.0000
ELBOW	185	-2.	-8.	-41.	-6.	-139.	6.	-.002	-.000	.005	-.0001	.0001	-.0000
	190	2.	8.	41.	159.	-132.	-13.	-.002	-.001	.005	-.0000	.0000	-.0000
FGRUN	190	-2.	-8.	-41.	-159.	132.	13.	-.002	-.001	.005	-.0000	.0000	-.0000
	195	2.	8.	41.	74.	-115.	-13.	-.002	-.001	.005	-.0000	.0000	-.0000
RUN	195	-2.	-8.	-41.	-74.	115.	13.	-.002	-.001	.005	-.0000	.0000	-.0000
	200	2.	8.	41.	-17.	-96.	-13.	-.002	-.001	.004	-.0000	.0000	-.0000
D F RUN	200	-2.	-8.	-41.	17.	96.	13.	-.002	-.001	.004	-.0000	.0000	-.0000
	205	2.	8.	41.	-126.	-74.	-13.	-.002	-.001	.003	-.0000	-.0000	-.0000
RUN	205	-2.	-4.	-41.	126.	74.	13.	-.002	-.001	.003	-.0000	-.0000	-.0000
	210	2.	-4.	41.	-59.	-50.	-13.	-.002	-.001	.002	-.0000	-.0000	-.0000
RLN	210	-2.	-4.	-41.	59.	50.	13.	-.002	-.001	.002	-.0000	-.0000	-.0000
	215	2.	-4.	41.	-7.	-27.	-13.	-.002	-.001	.001	-.0000	-.0000	-.0000
RLN	215	-2.	-4.	-41.	7.	27.	13.	-.002	-.001	.001	-.0000	-.0000	-.0000
	220	2.	-4.	41.	73.	-3.	-13.	-.001	-.002	.000	-.0000	-.0000	-.0000
RLN	220	-2.	-4.	-41.	-73.	3.	13.	-.001	-.002	.000	-.0000	-.0000	-.0000
	225	2.	-4.	41.	140.	20.	-13.	-.001	-.002	-.000	-.0000	-.0000	-.0000
FGRUN	225	-2.	-4.	-41.	-140.	-20.	13.	-.001	-.002	-.000	-.0000	-.0000	-.0000
	230	2.	-4.	41.	204.	43.	-13.	-.000	-.002	-.001	-.0000	-.0000	-.0000
ELBOW	230	-2.	-4.	-41.	-204.	-43.	13.	-.000	-.002	-.001	-.0000	-.0000	-.0000
	235	2.	-4.	41.	37.	50.	-6.	-.000	-.001	-.001	-.0000	-.0000	-.0000

LTR 114 104

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	235 240	-2. 2.	4. -4.	-41. 41.	-37. -770.	-50. 50.	6. 24.	-.000 -.000	-.001 .000	-.001 -.000	.0001 .0000	-.0000 -.0000	-.0000 -.0000
FGRUN	145 245	-14. 14.	-0. 0.	41. -41.	-8. 9.	93. -147.	1. -1.	.004 .004	.000 .000	.007 .008	-.0000 -.0000	.0001 .0001	-.0000 -.0000
REDUCE	245 250	-14. 14.	-0. 0.	41. -41.	-9. 9.	147. -205.	1. -1.	.004 .005	.000 .000	.008 .008	-.0000 -.0000	.0001 .0001	-.0000 -.0000
FGRUN	250 255	-14. 14.	-0. 0.	41. -41.	-9. 10.	205. -274.	1. -1.	.005 .005	.000 .001	.008 .008	-.0000 -.0000	.0001 .0001	-.0000 -.0000
VALVE	255 260	-14. 14.	-0. 0.	41. -41.	-10. 10.	274. -373.	1. -1.	.005 .006	.001 .001	.008 .009	-.0000 -.0000	.0001 .0001	-.0000 -.0000
RUN	260 265	0. -0.	0. -0.	0. 0.	0. -0.	0. 0.	-0. 0.	.006 .007	.001 .001	.009 .007	-.0000 -.0000	.0001 .0001	-.0000 -.0000
VALVE	260 270	-14. 14.	-0. 0.	41. -41.	-10. 11.	373. -473.	1. -1.	.006 .007	.001 .001	.009 .009	-.0000 -.0000	.0001 .0001	-.0000 -.0000
FGRUN	270 275	-14. 14.	-0. 0.	41. -41.	-11. 12.	473. -609.	1. -1.	.007 .008	.001 .001	.009 .010	-.0000 -.0000	.0001 .0001	-.0000 -.0000
ELBOW	275 280	-14. 14.	-0. 0.	41. -41.	-12. 12.	609. -598.	1. -1.	.008 .008	.001 .001	.010 .010	-.0000 -.0000	.0001 .0000	-.0000 -.0000
FGRUN	280 285	-14. 14.	-0. 0.	41. -41.	-12. 14.	598. -238.	1. 0.	.008 .007	.001 .001	.010 .010	-.0000 -.0000	-.0000 -.0000	-.0000 -.0000
ELBOW	285 290	-14. 14.	-0. 0.	41. -41.	-14. 14.	238. -226.	-0. 0.	.007 .007	.001 .001	.010 .011	.0000 -.0000	-.0000 -.0001	-.0000 -.0000
FGRUN	290 295	-14. 14.	-0. 0.	41. -41.	-14. 15.	226. -363.	-0. 0.	.007 .006	.001 .001	.011 .011	.0000 -.0000	-.0001 -.0001	-.0000 -.0000
FGRUN	295 300	-14. 14.	-12. 12.	41. -41.	-15. 154.	363. -534.	-0. 0.	.006 .005	.001 .001	.011 .012	.0000 -.0000	-.0001 -.0001	-.0000 -.0000
FGRUN	300 305	-14. 14.	-12. 12.	41. -41.	-154. 294.	534. -706.	-0. 0.	.005 .004	.001 .000	.012 .013	.0000 -.0000	-.0001 -.0001	-.0000 -.0000
FGRUN	305 310	-14. 14.	-12. 12.	41. -41.	-294. 433.	706. -878.	-0. 0.	.004 .003	.000 .000	.013 .013	.0000 -.0000	-.0001 -.0001	-.0000 -.0000
FGRUN	310 315	-14. 14.	-12. 12.	41. -41.	-433. 479.	878. -936.	-0. 0.	.003 .003	.000 .000	.013 .014	.0000 -.0000	-.0001 -.0001	-.0000 -.0000

DS

LTR 114 104

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	315 320	-14. 14.	-12. 12.	-41. -41.	-479. 327.	936. -995.	-0. 0.	.003 .002	.000 .000	.014 .014	.0000 .0000	-.0001 -.0001	-.0000 -.0000
FGRUN	320 325	-1. 1.	-1. 1.	-18. -18.	-214. 145.	659. -659.	33. -37.	.002 .002	.000 -.000	.014 .014	.0000 .0000	-.0001 -.0002	-.0000 -.0000
FGRUN	320 330	-13. 13.	-10. 10.	-23. -23.	-313. 355.	335. -390.	-33. 33.	.002 .001	.000 .000	.014 .014	.0000 .0000	-.0001 -.0001	-.0000 -.0000
FGRUN	330 335	-13. 13.	-10. 10.	-23. -23.	-355. 377.	390. -416.	-33. 33.	.001 .001	-.000 -.000	.014 .014	.0000 .0000	-.0001 -.0001	-.0000 -.0000
FGRUN	335 340	-13. 13.	-10. 10.	-23. -23.	-377. 407.	416. -456.	-33. 33.	.001 .001	-.000 -.000	.014 .014	.0000 .0000	-.0001 -.0002	-.0000 -.0000
ELBOW	340 345	-13. 13.	-10. 10.	-23. -23.	-407. 323.	456. -535.	-33. -47.	.001 -.001	-.000 -.001	.014 .014	.0000 .0001	-.0002 -.0002	-.0000 -.0000
FGRUN	345 350	-13. 13.	-10. 10.	-23. -23.	-323. 145.	535. -535.	-47. -153.	-.001 -.001	-.001 -.001	.014 .013	.0001 .0002	-.0002 -.0003	-.0000 -.0000
ELBOW	350 355	-13. 13.	-10. 10.	-23. -23.	-145. 0.	535. -395.	-153. -171.	-.001 -.001	-.001 -.001	.013 .010	.0002 .0002	-.0003 -.0003	-.0000 -.0001
FGRUN	355 360	-13. 13.	-10. 10.	-23. -23.	-0. 0.	395. -323.	-171. -141.	-.001 -.002	-.001 -.001	.010 .009	.0002 .0002	-.0003 -.0003	-.0001 -.0001
VALVE	360 365	-13. 13.	-10. 10.	-23. -23.	-0. 0.	323. -163.	141. -71.	-.002 -.002	-.001 -.001	.009 .007	.0002 .0002	-.0003 -.0003	-.0001 -.0001
RUN	365 370	0. -0.	0. -0.	0. -0.	-0. -0.	0. -0.	-0. 0.	-.002 -.005	-.001 -.002	.007 .010	.0002 .0002	-.0003 -.0003	-.0001 -.0001
VALVE	365 375	-13. 13.	-10. 10.	-23. -23.	-0. 0.	163. -0.	71. -0.	-.002 -.002	-.001 -.000	.007 .004	.0002 .0002	-.0003 -.0003	-.0001 -.0001
FGRUN	325 326	-1. 1.	-1. 1.	-18. -18.	-145. 107.	659. -659.	37. -39.	.002 .002	-.000 -.000	.014 .014	.0000 .0000	-.0002 -.0002	-.0000 -.0000
ELBOW	326 330	-1. 1.	-1. 1.	-18. -18.	-107. 0.	659. -552.	39. -36.	.002 .002	-.000 -.000	.014 .012	.0000 .0001	-.0002 -.0003	-.0000 -.0000
FGRUN	330 335	-1. 1.	-1. 1.	-18. -18.	-0. -0.	552. -285.	36. -20.	.002 .001	-.000 -.000	.012 .008	.0001 .0001	-.0003 -.0003	-.0000 -.0000
VALVE	335 340	-1. 1.	-1. 1.	-18. -18.	-0. -0.	285. -143.	-20. -10.	.001 .000	-.000 -.000	.008 .006	.0001 .0001	-.0003 -.0003	-.0000 -.0000

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LFR 114 104

06/21/76

NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LOFT CIS ANALYSIS - 1"-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

PAGE 41

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RLN	390	-0.	0.	-0.	0.	0.	0.	.000	-.000	.006	.0001	-.0003	-.0000
	395	0.	-0.	0.	-0.	-0.	-0.	.004	.002	.004	.0001	-.0003	-.0000
VALVE	390	-1.	-1.	-18.	-0.	143.	10.	.000	-.000	.006	.0001	-.0003	-.0000
	400	1.	1.	-18.	0.	-0.	0.	-.000	-.000	.003	.0001	-.0003	-.0000

D7

LTR 114 104

APPENDIX E
SEISMIC ANALYSES RESULTS

SUPPORT REACTIONS FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING
COMBINED RESULT FOR MODE 1 THRU 22 BY RMS SUMMATION

SPECTRA SET = 1

NODE	TYPE	REACTIONS (LBS OR IN-LBS)	DIRECTION
5	FORCE	14.	X COORD
5	FORCE	7.	Y COORD
5	FORCE	4.	Z COORD
5	MOMENT	92.	X COORD
5	MOMENT	197.	Y COORD
5	MOMENT	143.	Z COORD
45	FORCE	24.	X COORD
45	FORCE	15.	Z COORD
75	FORCE	43.	Y COORD
75	FORCE	42.	Y COORD
90	FORCE	166.	X COORD
90	FORCE	107.	Y COORD
90	FORCE	122.	Y COORD
90	FORCE	52.	X COORD
90	FORCE	34.	Y COORD
90	FORCE	474.	Z COORD
90	FORCE	9186.	X COORD
90	FORCE	1149.	Y COORD
90	FORCE	1636.	Z COORD
90	FORCE	101.	Y COORD
90	FORCE	215.	Y COORD
90	FORCE	184.	X COORD
90	FORCE	96.	Y COORD
90	FORCE	61.	Z COORD
90	FORCE	252.	X COORD
90	FORCE	106.	Y COORD
90	FORCE	111.	Z COORD

E1

LTR 114 104

LOFT CIS ANALYSIS - 1"-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING

COMBINED RESULT FOR MODE 1 THRU 22 BY RMS SUMMATION

SPECTRA SET = 1

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	5	14.	7.	4.	92.	197.	143.	.000	.000	.000	.0000	.0000	.0000
	10	14.	7.	4.	47.	55.	84.	.003	.004	.003	.0003	.0006	.0006
FGRUN	10	14.	7.	4.	47.	55.	84.	.003	.004	.003	.0003	.0006	.0006
	15	14.	7.	4.	50.	89.	36.	.006	.012	.006	.0005	.0006	.0009
ELBOW	15	13.	7.	4.	50.	89.	36.	.008	.012	.008	.0005	.0006	.0009
	20	13.	7.	4.	52.	98.	31.	.008	.013	.009	.0005	.0005	.0010
FGRUN	20	13.	6.	3.	52.	98.	31.	.008	.013	.009	.0005	.0005	.0010
	25	13.	6.	3.	52.	131.	58.	.008	.024	.012	.0007	.0004	.0009
FGRUN	25	13.	5.	2.	52.	131.	58.	.008	.024	.012	.0007	.0004	.0009
	30	13.	5.	2.	52.	140.	78.	.008	.028	.013	.0008	.0005	.0009
FGRUN	30	12.	3.	3.	52.	140.	78.	.008	.028	.013	.0008	.0005	.0009
	35	12.	3.	3.	52.	154.	107.	.008	.036	.015	.0010	.0011	.0006
ELBOW	35	12.	2.	4.	52.	154.	107.	.008	.036	.015	.0010	.0011	.0006
	40	12.	2.	4.	48.	156.	117.	.008	.036	.014	.0011	.0014	.0005
FGRUN	40	12.	2.	5.	48.	156.	117.	.008	.036	.014	.0011	.0014	.0005
	45	12.	2.	5.	44.	156.	229.	.001	.036	.001	.0012	.0024	.0011
FGRUN	45	13.	1.	16.	44.	156.	229.	.001	.036	.001	.0012	.0024	.0011
	50	13.	1.	16.	88.	156.	162.	.009	.036	.007	.0012	.0029	.0016
ELBOW	50	12.	1.	15.	88.	156.	162.	.009	.036	.007	.0012	.0029	.0016
	55	12.	1.	15.	104.	137.	144.	.016	.035	.009	.0010	.0032	.0019
FGRUN	55	12.	2.	15.	104.	137.	144.	.016	.035	.009	.0010	.0032	.0019
	60	12.	2.	15.	88.	18.	144.	.051	.027	.009	.0009	.0035	.0027
RUN	60	9.	3.	15.	88.	18.	144.	.051	.027	.009	.0009	.0035	.0027
	65	9.	3.	15.	58.	152.	144.	.112	.014	.009	.0008	.0030	.0041
RUN	65	1.	4.	14.	58.	152.	144.	.112	.014	.009	.0008	.0030	.0041
	70	1.	4.	14.	91.	166.	144.	.156	.002	.009	.0005	.0019	.0055
RUN	70	8.	39.	14.	91.	166.	144.	.156	.002	.009	.0005	.0019	.0055
	75	8.	39.	14.	270.	114.	144.	.169	.002	.009	.0008	.0015	.0060
FGRUN	75	12.	6.	14.	270.	114.	144.	.169	.002	.009	.0008	.0015	.0060
	80	12.	6.	14.	257.	70.	144.	.175	.007	.009	.0013	.0013	.0064

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	UX	UY	UZ	RX	RY	RZ
ELBOW	80	14.	5.	14.	257.	70.	144.	.175	.007	.009	.0013	.0013	.0064
	85	14.	5.	14.	232.	56.	123.	.167	.009	.010	.0020	.0011	.0066
FGRUN	85	19.	5.	13.	232.	56.	123.	.167	.009	.010	.0020	.0011	.0065
	90	19.	5.	13.	75.	56.	100.	.092	.009	.037	.0027	.0010	.0057
FGRUN	90	23.	5.	12.	75.	56.	100.	.092	.009	.037	.0027	.0010	.0067
	95	23.	5.	12.	49.	56.	337.	.043	.009	.066	.0028	.0009	.0056
ELBOW	95	23.	5.	10.	49.	56.	337.	.043	.009	.066	.0028	.0009	.0059
	100	23.	5.	10.	64.	52.	573.	.041	.012	.071	.0027	.0009	.0043
FGRUN	100	23.	5.	8.	64.	52.	373.	.041	.012	.071	.0027	.0009	.0048
	105	23.	5.	8.	64.	73.	383.	.041	.049	.077	.0024	.0009	.0034
RUN	105	24.	4.	5.	64.	73.	383.	.041	.049	.077	.0024	.0009	.0034
	110	24.	4.	5.	64.	125.	375.	.041	.078	.081	.0020	.0008	.0016
RUN	110	25.	5.	3.	64.	125.	375.	.041	.078	.081	.0020	.0008	.0016
	115	25.	5.	3.	64.	136.	327.	.041	.086	.080	.0016	.0009	.0004
RUN	115	25.	5.	4.	64.	135.	327.	.041	.086	.080	.0016	.0009	.0004
	120	25.	5.	4.	64.	117.	233.	.041	.076	.072	.0012	.0012	.0016
RUN	120	26.	12.	7.	64.	117.	233.	.041	.076	.072	.0012	.0012	.0016
	125	26.	12.	7.	64.	99.	126.	.041	.052	.058	.0008	.0015	.0023
RUN	125	27.	15.	9.	64.	99.	126.	.041	.052	.058	.0008	.0015	.0023
	130	27.	15.	9.	64.	149.	156.	.041	.024	.043	.0006	.0015	.0024
FGRUN	130	27.	15.	10.	64.	149.	156.	.041	.024	.043	.0006	.0015	.0024
	135	27.	16.	10.	64.	232.	284.	.041	.006	.031	.0005	.0015	.0020
FGRUN	135	28.	16.	12.	64.	232.	284.	.041	.006	.031	.0005	.0015	.0020
	140	28.	16.	12.	64.	284.	360.	.041	.010	.027	.0005	.0015	.0019
FGRUN	140	29.	16.	13.	64.	284.	360.	.041	.010	.027	.0005	.0015	.0019
	145	29.	16.	13.	64.	315.	400.	.041	.015	.026	.0005	.0016	.0019
FGRUN	145	139.	85.	389.	774.	2137.	520.	.041	.015	.026	.0005	.0016	.0019
	150	139.	85.	389.	511.	1679.	520.	.036	.013	.026	.0005	.0016	.0019
FGRUN	150	152.	87.	392.	511.	1679.	520.	.036	.013	.026	.0005	.0016	.0019
	155	152.	87.	392.	303.	1038.	520.	.022	.009	.026	.0005	.0017	.0019
RUN	155	154.	88.	397.	303.	1038.	520.	.022	.009	.026	.0005	.0017	.0019
	160	154.	88.	397.	1014.	1776.	520.	.008	.005	.026	.0005	.0016	.0018

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	160	47.	73.	400.	1014.	1776.	520.	.008	.005	.026	.0005	.0016	.0016
	165	47.	73.	400.	1064.	1678.	520.	.005	.003	.026	.0004	.0015	.0018
FGRUN	165	46.	72.	405.	1034.	1678.	520.	.005	.003	.026	.0004	.0015	.0018
	170	45.	72.	405.	1138.	1643.	520.	.008	.003	.026	.0004	.0015	.0018
FGRUN	170	43.	71.	412.	1138.	1643.	520.	.008	.003	.026	.0004	.0015	.0018
	175	43.	71.	412.	1201.	1616.	520.	.012	.002	.026	.0004	.0015	.0018
FGRUN	175	41.	71.	417.	1201.	1616.	520.	.012	.002	.026	.0004	.0015	.0018
	180	41.	71.	417.	1417.	1580.	520.	.021	.003	.026	.0004	.0014	.0017
ELBOW	180	39.	71.	421.	1417.	1580.	520.	.021	.003	.026	.0004	.0014	.0017
	185	39.	71.	421.	1519.	1585.	474.	.033	.005	.026	.0007	.0010	.0015
ELBOW	185	36.	71.	424.	1519.	1585.	474.	.033	.005	.023	.0007	.0010	.0015
	190	36.	71.	424.	1813.	1602.	493.	.042	.006	.020	.0002	.0006	.0013
FGRUN	190	31.	72.	427.	1813.	1602.	493.	.042	.006	.020	.0002	.0006	.0013
	195	31.	72.	427.	1017.	1649.	493.	.047	.007	.020	.0001	.0004	.0012
RUN	195	24.	73.	432.	1017.	1649.	493.	.047	.007	.020	.0001	.0004	.0012
	200	24.	73.	432.	140.	1675.	493.	.050	.007	.020	.0001	.0002	.0011
RUN	200	18.	75.	437.	140.	1675.	493.	.050	.007	.020	.0001	.0002	.0011
	205	18.	75.	437.	948.	1612.	493.	.050	.006	.019	.0001	.0002	.0010
RUN	205	19.	45.	443.	948.	1612.	493.	.050	.006	.019	.0001	.0002	.0010
	210	19.	45.	443.	297.	1398.	493.	.046	.007	.019	.0001	.0004	.0009
RUN	210	27.	43.	449.	297.	1398.	493.	.046	.007	.019	.0001	.0004	.0009
	215	27.	43.	449.	415.	1021.	493.	.038	.010	.019	.0001	.0003	.0008
RUN	215	37.	40.	455.	415.	1021.	493.	.038	.010	.019	.0001	.0003	.0008
	220	37.	40.	455.	995.	504.	493.	.028	.011	.019	.0000	.0003	.0007
RUN	220	44.	37.	461.	995.	504.	493.	.028	.011	.019	.0000	.0003	.0007
	225	44.	37.	461.	1540.	273.	493.	.017	.009	.019	.0002	.0007	.0006
FGRUN	225	49.	35.	466.	1540.	273.	493.	.017	.009	.019	.0002	.0007	.0006
	230	49.	35.	466.	2031.	925.	493.	.007	.004	.019	.0005	.0005	.0005
ELBOW	230	51.	34.	470.	2031.	925.	493.	.007	.004	.019	.0005	.0005	.0005
	235	51.	34.	470.	82.	1149.	679.	.003	.000	.015	.0011	.0003	.0003
FGRUN	235	52.	34.	474.	82.	1149.	679.	.003	.000	.015	.0011	.0003	.0003
	240	52.	34.	474.	9186.	1149.	1636.	.000	.000	.000	.0000	.0000	.0000

FE

LTR 114 104

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	145	142.	86.	377.	771.	2100.	605.	.041	.015	.026	.0005	.0016	.0019
	245	142.	88.	377.	1068.	2521.	605.	.046	.017.	.028	.0005	.0015	.0020
REDUCE	245	139.	87.	374.	1068.	2521.	605.	.046	.017	.026	.0005	.0015	.0020
	250	139.	87.	374.	1409.	3023.	605.	.052	.019	.026	.0004	.0014	.0020
FGRUN	250	135.	84.	371.	1409.	3023.	605.	.052	.019	.026	.0004	.0014	.0020
	255	135.	84.	371.	1609.	3628.	605.	.059	.021	.026	.0004	.0014	.0020
VALVE	255	130.	81.	366.	1809.	3628.	605.	.059	.021	.026	.0004	.0014	.0020
	260	130.	81.	366.	2370.	4489.	605.	.068	.023	.026	.0004	.0013	.0020
RUN	260	116.	98.	75.	900.	900.	2442.	.066	.023	.026	.0004	.0013	.0020
	265	116.	98.	75.	C.	0.	0.	.089	.048	.028	.0004	.0013	.0021
VALVE	260	26.	44.	291.	2064.	4624.	2071.	.066	.023	.026	.0004	.0013	.0020
	270	26.	44.	291.	1855.	4595.	2071.	.077	.026	.026	.0004	.0013	.0020
FGRUN	270	28.	49.	285.	1855.	4595.	2071.	.077	.026	.026	.0004	.0013	.0020
	275	26.	49.	285.	1545.	4474.	2071.	.089	.029	.026	.0003	.0011	.0019
ELBOW	275	32.	53.	280.	1545.	4474.	2071.	.089	.029	.026	.0003	.0011	.0019
	280	32.	53.	280.	1387.	4502.	2130.	.092	.027	.027	.0002	.0008	.0016
FGRUN	280	43.	60.	271.	1387.	4502.	2130.	.092	.027	.027	.0002	.0008	.0016
	285	43.	60.	271.	796.	5430.	2702.	.097	.007	.033	.0002	.0005	.0015
ELBOW	285	55.	61.	260.	796.	5430.	2702.	.097	.007	.033	.0002	.0005	.0015
	290	55.	61.	260.	616.	5597.	2782.	.097	.005	.034	.0002	.0007	.0014
FGRUN	290	62.	62.	253.	616.	5597.	2782.	.097	.005	.034	.0002	.0007	.0014
	295	62.	62.	253.	628.	5184.	2782.	.091	.005	.034	.0002	.0009	.0013
FGRUN	295	73.	61.	243.	628.	5184.	2782.	.091	.005	.034	.0002	.0009	.0013
	300	73.	61.	243.	999.	4530.	2782.	.081	.005	.034	.0002	.0011	.0011
FGRUN	300	112.	52.	202.	999.	4530.	2782.	.081	.005	.034	.0002	.0011	.0011
	305	112.	52.	202.	1607.	3415.	2782.	.070	.007	.034	.0002	.0011	.0011
FGRUN	305	177.	48.	135.	1607.	3415.	2782.	.070	.007	.034	.0002	.0011	.0011
	310	177.	48.	135.	2134.	2062.	2782.	.061	.008	.034	.0002	.0011	.0011
FGRUN	310	207.	53.	104.	2134.	2062.	2782.	.061	.008	.034	.0002	.0011	.0011
	315	207.	53.	104.	2313.	1865.	2782.	.058	.009	.034	.0002	.0011	.0011
FGRUN	315	210.	53.	101.	2313.	1865.	2782.	.058	.009	.034	.0002	.0011	.0011
	320	210.	53.	101.	2502.	2092.	2782.	.055	.010	.034	.0003	.0011	.0010

ES

LTR 114 104

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		Fx	Fy	Fz	Mx	My	Mz	Dx	Dy	Dz	Rx	Ry	Rz
FGRUN	320	142.	104.	58.	1217.	2049.	1762.	.055	.010	.034	.0003	.0011	.0010
	325	142.	104.	58.	1109.	2049.	2178.	.051	.010	.034	.0003	.0010	.0010
FGRUN	320	78.	115.	49.	1459.	1307.	1208.	.055	.010	.034	.0003	.0011	.0010
	330	78.	115.	49.	1720.	1166.	1208.	.052	.010	.034	.0003	.0011	.0010
FGRUN	330	79.	115.	47.	1720.	1166.	1208.	.052	.010	.034	.0003	.0011	.0010
	335	79.	115.	47.	1275.	1124.	1208.	.051	.011	.034	.0003	.0011	.0010
FGRUN	335	81.	104.	45.	1275.	1124.	1208.	.051	.011	.034	.0003	.0011	.0010
	340	81.	104.	45.	1694.	1102.	1208.	.049	.012	.034	.0003	.0011	.0010
ELBOW	340	84.	102.	40.	1694.	1102.	1208.	.049	.012	.034	.0003	.0011	.0010
	345	84.	102.	40.	1581.	1223.	1247.	.043	.014	.033	.0007	.0011	.0009
FGRUN	345	89.	100.	35.	1381.	1223.	1247.	.043	.014	.033	.0007	.0011	.0009
	350	89.	100.	35.	1280.	1223.	1570.	.037	.014	.031	.0007	.0011	.0009
ELBOW	350	92.	98.	33.	1280.	1223.	1570.	.037	.014	.031	.0007	.0011	.0009
	355	92.	98.	33.	1235.	1180.	1611.	.034	.010	.025	.0009	.0010	.0006
FGRUN	355	95.	97.	32.	1235.	1180.	1611.	.034	.010	.025	.0009	.0010	.0006
	360	95.	97.	32.	1235.	1157.	1483.	.034	.008	.022	.0009	.0010	.0006
VALVE	360	96.	96.	33.	1235.	1157.	1483.	.034	.008	.022	.0009	.0010	.0006
	365	96.	96.	33.	1235.	1107.	1387.	.034	.004	.017	.0009	.0010	.0005
RUN	365	111.	58.	66.	1235.	1337.	1337.	.034	.004	.017	.0009	.0010	.0006
	370	111.	58.	66.	0.	0.	0.	.044	.015	.023	.0010	.0010	.0006
VALVE	365	181.	98.	79.	0.	550.	681.	.034	.004	.017	.0009	.0010	.0006
	375	181.	98.	79.	0.	0.	0.	.034	.000	.015	.0009	.0010	.0006
FGRUN	325	144.	103.	57.	1109.	2049.	2178.	.051	.010	.034	.0003	.0010	.0010
	320	144.	103.	57.	1071.	2049.	2391.	.050	.010	.033	.0003	.0010	.0010
ELBOW	326	144.	103.	57.	1071.	2049.	2391.	.050	.010	.033	.0003	.0010	.0010
	380	144.	103.	57.	1012.	1834.	2349.	.046	.007	.029	.0005	.0008	.0003
FGRUN	380	156.	101.	55.	1012.	1834.	2549.	.046	.007	.029	.0005	.0008	.0003
	385	156.	101.	55.	1012.	1417.	1179.	.046	.003	.022	.0006	.0008	.0002
VALVE	385	164.	101.	56.	1012.	1417.	1179.	.046	.003	.022	.0006	.0008	.0002
	390	164.	101.	56.	1012.	1314.	689.	.046	.002	.020	.0006	.0008	.0002
RUN	390	82.	30.	66.	1012.	987.	987.	.046	.002	.020	.0006	.0008	.0002
	395	82.	30.	66.	0.	0.	0.	.036	.007	.024	.0007	.0008	.0002

06/21/76

NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LOFT CIS ANALYSIS - 1st-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

PAGE 247

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
VALVE	350	249.	106.	108.	0.	866.	848.	.046	.002	.020	.0006	.0005	.0002
	400	249.	106.	108.	0.	0.	0.	.046	.000	.020	.0006	.0008	.0002

E7

LTR 114 104

SUPPORT REACTIONS FOR LOAD COMBINATION CASE NO. 4

DBE RESPONSE SPECTRUM - ONE-HALF SSE

NODE	TYPE	REACTIONS (LBS OR IN-LBS)	DIRECTION
5	FORCE	7.	X CGRD
5	FORCE	4.	Y CGRD
5	FORCE	2.	Z CGRD
5	MOMENT	46.	X CGRD
5	MOMENT	98.	Y CGRD
5	MOMENT	71.	Z CGRD
45	FORCE	12.	X CGRD
45	FORCE	8.	Z CGRD
70	FORCE	21.	Y CGRD
75	FORCE	21.	Y CGRD
1600	FORCE	84.	X CGRD
1600	FORCE	53.	Y CGRD
200	FORCE	61.	Y CGRD
240	FORCE	26.	X CGRD
240	FORCE	17.	Y CGRD
2400	FORCE	237.	Z CGRD
2400	MOMENT	4593.	X CGRD
2400	MOMENT	575.	Y CGRD
2400	MOMENT	818.	Z CGRD
295	FORCE	51.	Y CGRD
335	FORCE	108.	Y CGRD
375	FORCE	92.	X CGRD
375	FORCE	49.	Y CGRD
375	FORCE	41.	Z CGRD
400	FORCE	126.	X CGRD
400	FORCE	53.	Y CGRD
400	FORCE	55.	Z CGRD

E 8

LFR 114 104

LOFT CIS ANALYSIS - 1"-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 4

DBE RESPONSE SPECTRUM - ONE-HALF SSC

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	5	7.	4.	2.	46.	95.	71.	.000	.000	.000	.0000	.0000	.0000
	10	7.	4.	2.	23.	27.	42.	.002	.002	.002	.0002	.0003	.0003
FGRUN	10	7.	3.	2.	23.	27.	42.	.002	.002	.002	.0002	.0003	.0003
	15	7.	3.	2.	25.	45.	18.	.004	.006	.004	.0003	.0003	.0005
ELBCW	15	7.	3.	2.	25.	45.	18.	.004	.006	.004	.0003	.0003	.0005
	20	7.	3.	2.	26.	49.	16.	.004	.006	.004	.0003	.0002	.0005
FGRUN	20	7.	3.	2.	26.	49.	16.	.004	.006	.004	.0003	.0002	.0005
	25	7.	3.	2.	26.	65.	29.	.004	.012	.006	.0004	.0002	.0005
FGRUN	25	6.	2.	1.	26.	65.	29.	.004	.012	.005	.0004	.0002	.0005
	30	6.	2.	1.	26.	70.	39.	.004	.014	.006	.0004	.0002	.0004
FGRUN	30	6.	1.	2.	26.	70.	39.	.004	.014	.006	.0004	.0002	.0004
	35	6.	1.	2.	26.	77.	53.	.004	.018	.006	.0005	.0005	.0003
ELBCW	35	6.	1.	2.	26.	77.	53.	.004	.018	.006	.0005	.0005	.0003
	40	6.	1.	2.	24.	78.	58.	.004	.016	.007	.0005	.0007	.0003
FGRUN	40	6.	1.	2.	24.	78.	58.	.004	.016	.007	.0005	.0007	.0003
	45	6.	1.	2.	23.	78.	115.	.001	.018	.000	.0006	.0012	.0006
FGRUN	45	6.	1.	8.	23.	78.	115.	.001	.016	.000	.0006	.0012	.0006
	50	6.	1.	8.	43.	78.	81.	.004	.016	.003	.0006	.0014	.0008
ELBCW	50	6.	1.	8.	43.	78.	81.	.004	.018	.003	.0006	.0014	.0008
	55	6.	1.	8.	52.	69.	72.	.008	.018	.004	.0005	.0016	.0010
FGRUN	55	6.	1.	8.	52.	69.	72.	.008	.016	.004	.0005	.0016	.0010
	60	6.	1.	8.	44.	9.	72.	.026	.013	.004	.0005	.0018	.0014
RUN	60	5.	2.	7.	44.	9.	72.	.026	.013	.004	.0005	.0018	.0014
	65	5.	2.	7.	26.	76.	72.	.056	.007	.004	.0004	.0015	.0020
RUN	65	1.	2.	7.	26.	76.	72.	.056	.007	.004	.0004	.0015	.0020
	70	1.	2.	7.	46.	83.	72.	.078	.001	.004	.0003	.0009	.0027
RUN	70	4.	20.	7.	46.	83.	72.	.078	.001	.004	.0003	.0009	.0027
	75	4.	20.	7.	135.	57.	72.	.084	.001	.004	.0004	.0007	.0030
FGRUN	75	6.	3.	7.	135.	57.	72.	.084	.001	.004	.0004	.0007	.0030
	80	6.	3.	7.	128.	35.	72.	.087	.003	.004	.0007	.0007	.0032

LTR 114 104

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
ELBOW	80	7.	3.	7.	128.	35.	72.	.087	.005	.004	.0007	.0007	.0032
	85	7.	3.	7.	116.	28.	61.	.083	.005	.005	.0010	.0006	.0033
FGRUN	85	9.	3.	7.	116.	28.	61.	.083	.005	.005	.0010	.0006	.0033
	90	9.	3.	7.	37.	28.	50.	.046	.005	.019	.0014	.0005	.0034
FGRUN	90	11.	3.	6.	37.	28.	50.	.046	.005	.019	.0014	.0005	.0034
	95	11.	3.	6.	25.	28.	169.	.021	.005	.033	.0014	.0005	.0029
ELBOW	95	12.	3.	5.	25.	28.	169.	.021	.005	.033	.0014	.0005	.0029
	100	12.	3.	5.	32.	26.	187.	.021	.006	.036	.0013	.0005	.0024
FGRUN	100	12.	3.	4.	32.	26.	187.	.021	.006	.036	.0013	.0005	.0024
	105	12.	3.	4.	32.	37.	191.	.021	.024	.039	.0012	.0004	.0017
RUN	105	12.	2.	3.	32.	37.	191.	.021	.024	.039	.0012	.0004	.0017
	110	12.	2.	3.	32.	63.	188.	.021	.039	.041	.0010	.0004	.0006
RUN	110	12.	3.	1.	32.	63.	188.	.021	.039	.041	.0010	.0004	.0006
	115	12.	3.	1.	32.	69.	163.	.021	.043	.040	.0008	.0004	.0002
RUN	115	13.	4.	2.	32.	69.	163.	.021	.043	.040	.0008	.0004	.0002
	120	13.	4.	2.	32.	59.	116.	.021	.038	.036	.0006	.0006	.0006
RUN	120	13.	6.	3.	32.	59.	116.	.021	.038	.036	.0006	.0007	.0008
	125	13.	6.	3.	32.	50.	63.	.021	.026	.029	.0004	.0007	.0012
RUN	125	13.	7.	4.	32.	50.	63.	.021	.026	.029	.0004	.0007	.0012
	130	13.	7.	4.	32.	74.	78.	.021	.012	.022	.0003	.0007	.0012
FGRUN	130	14.	8.	5.	32.	74.	78.	.021	.012	.022	.0003	.0007	.0012
	135	14.	8.	5.	32.	116.	142.	.021	.003	.016	.0002	.0007	.0010
FGRUN	135	14.	8.	6.	32.	116.	142.	.021	.003	.016	.0002	.0008	.0010
	140	14.	8.	6.	32.	142.	150.	.021	.005	.014	.0002	.0008	.0010
FGRUN	140	15.	8.	7.	32.	142.	180.	.021	.005	.014	.0002	.0008	.0010
	145	15.	8.	7.	32.	157.	200.	.021	.008	.013	.0003	.0008	.0010
FGRUN	145	80.	43.	195.	387.	1069.	260.	.021	.008	.013	.0003	.0008	.0010
	150	80.	43.	195.	256.	640.	260.	.018	.007	.013	.0003	.0008	.0010
FGRUN	150	81.	43.	196.	256.	840.	260.	.018	.007	.013	.0003	.0008	.0010
	155	81.	43.	196.	152.	519.	260.	.011	.004	.013	.0003	.0008	.0009
RUN	155	82.	44.	198.	152.	519.	260.	.011	.004	.013	.0003	.0008	.0009
	160	82.	44.	198.	507.	888.	260.	.004	.003	.013	.0002	.0008	.0009

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LTR 114 104

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	160 165	24. 24.	37. 37.	200. 200.	507. 542.	888. 839.	260. 260.	.004 .003	.003 .002	.013 .013	.0002 .0002	.0005 .0005	.0009 .0009
FGRUN	165 170	23. 23.	36. 36.	203. 203.	542. 569.	839. 821.	260. 260.	.003 .004	.002 .001	.013 .013	.0002 .0002	.0005 .0005	.0009 .0009
FGRUN	170 175	21. 21.	36. 36.	206. 206.	569. 600.	821. 808.	260. 260.	.004 .006	.001 .001	.013 .013	.0002 .0002	.0008 .0007	.0009 .0009
FGRUN	175 180	20. 20.	35. 35.	209. 209.	600. 708.	808. 790.	260. 260.	.006 .011	.001 .002	.013 .013	.0002 .0002	.0007 .0007	.0009 .0009
ELBOW	180 185	19. 19.	35. 35.	210. 210.	708. 259.	790. 793.	260. 237.	.011 .016	.002 .003	.013 .011	.0002 .0004	.0007 .0005	.0009 .0008
ELBOW	185 190	18. 18.	35. 35.	212. 212.	259. 906.	793. 801.	237. 246.	.016 .021	.003 .003	.011 .010	.0004 .0001	.0005 .0003	.0008 .0007
FGRUN	190 195	15. 15.	36. 36.	214. 214.	906. 509.	801. 825.	246. 246.	.021 .024	.003 .004	.010 .010	.0001 .0001	.0003 .0002	.0007 .0006
RUN	195 200	12. 12.	37. 37.	216. 216.	509. 70.	825. 837.	246. 246.	.024 .025	.004 .003	.010 .010	.0001 .0001	.0002 .0001	.0006 .0006
RUN	200 205	9. 9.	36. 38.	219. 219.	70. 474.	837. 806.	246. 246.	.025 .025	.003 .003	.010 .010	.0001 .0001	.0001 .0001	.0006 .0006
RUN	205 210	9. 9.	23. 23.	222. 222.	474. 149.	806. 699.	246. 246.	.025 .023	.003 .004	.010 .010	.0001 .0001	.0001 .0002	.0006 .0005
RUN	210 215	14. 14.	21. 21.	224. 224.	149. 208.	699. 511.	246. 246.	.023 .019	.004 .005	.010 .010	.0001 .0001	.0002 .0003	.0006 .0004
RUN	215 220	18. 18.	20. 20.	227. 227.	208. 497.	511. 252.	246. 246.	.019 .014	.005 .005	.010 .010	.0001 .0000	.0003 .0004	.0004 .0004
RUN	220 225	22. 22.	18. 18.	230. 230.	497. 770.	252. 137.	246. 246.	.014 .009	.005 .004	.010 .010	.0000 .0001	.0004 .0004	.0004 .0003
FGRUN	225 230	25. 25.	17. 17.	233. 233.	770. 1016.	137. 463.	246. 246.	.009 .003	.004 .002	.010 .009	.0001 .0003	.0004 .0003	.0003 .0002
ELBOW	230 235	25. 25.	17. 17.	233. 235.	1016. 41.	463. 575.	246. 340.	.003 .002	.002 .000	.009 .007	.0003 .0005	.0003 .0002	.0002 .0001
FGRUN	235 240	26. 26.	17. 17.	237. 237.	41. 4593.	575. 575.	340. 818.	.002 .000	.000 .000	.007 .000	.0005 .0000	.0002 .0000	.0001 .0000

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	145	71.	44.	189.	386.	1050.	302.	.021	.006	.013	.0003	.0008	.0010
	245	71.	44.	189.	334.	1261.	302.	.023	.008	.013	.0002	.0006	.0010
REDUCE	245	70.	43.	187.	534.	1261.	302.	.023	.008	.013	.0002	.0008	.0010
	250	70.	43.	187.	734.	1512.	302.	.026	.009	.013	.0002	.0007	.0010
FGRUN	250	68.	42.	185.	704.	1512.	302.	.026	.009	.013	.0002	.0007	.0010
	255	68.	42.	185.	905.	1814.	302.	.029	.010	.013	.0002	.0007	.0010
VALVE	255	65.	40.	183.	905.	1814.	302.	.029	.010	.013	.0002	.0007	.0010
	260	65.	40.	183.	1185.	2245.	302.	.034	.012	.013	.0002	.0007	.0010
RUN	260	58.	49.	37.	450.	450.	1221.	.034	.012	.013	.0002	.0007	.0010
	265	58.	49.	37.	0.	0.	0.	.044	.024	.014	.0002	.0007	.0011
VALVE	260	13.	22.	146.	1032.	2312.	1035.	.034	.012	.013	.0002	.0007	.0010
	270	13.	22.	146.	927.	2297.	1035.	.039	.013	.013	.0002	.0006	.0010
FGRUN	270	14.	24.	143.	927.	2297.	1035.	.039	.013	.013	.0002	.0006	.0010
	275	14.	24.	143.	773.	2237.	1035.	.044	.014	.013	.0001	.0006	.0009
ELBOW	275	16.	26.	140.	773.	2237.	1035.	.044	.014	.013	.0001	.0006	.0009
	260	16.	26.	140.	693.	2251.	1065.	.046	.015	.013	.0001	.0004	.0009
FGRUN	260	21.	30.	135.	693.	2251.	1065.	.046	.013	.013	.0001	.0004	.0009
	265	21.	30.	135.	398.	2715.	1351.	.049	.004	.017	.0001	.0003	.0006
ELBOW	265	27.	31.	130.	398.	2715.	1351.	.049	.004	.017	.0001	.0003	.0006
	290	27.	31.	130.	308.	2798.	1391.	.048	.003	.017	.0001	.0004	.0007
FGRUN	290	31.	31.	127.	308.	2798.	1391.	.048	.003	.017	.0001	.0004	.0007
	295	31.	31.	127.	314.	2592.	1391.	.046	.003	.017	.0001	.0004	.0006
FGRUN	295	36.	30.	121.	314.	2592.	1391.	.046	.003	.017	.0001	.0004	.0006
	300	36.	30.	121.	500.	2265.	1391.	.041	.003	.017	.0001	.0006	.0006
FGRUN	300	56.	26.	101.	500.	2265.	1391.	.041	.003	.017	.0001	.0006	.0006
	305	56.	26.	101.	803.	1708.	1391.	.035	.003	.017	.0001	.0006	.0006
FGRUN	305	88.	24.	67.	803.	1708.	1391.	.035	.003	.017	.0001	.0006	.0006
	310	88.	24.	67.	1067.	1001.	1391.	.030	.004	.017	.0001	.0006	.0006
FGRUN	310	103.	26.	52.	1067.	1001.	1391.	.030	.004	.017	.0001	.0006	.0006
	315	103.	26.	52.	1156.	932.	1391.	.029	.004	.017	.0001	.0006	.0005
FGRUN	315	105.	27.	51.	1156.	932.	1391.	.029	.004	.017	.0001	.0006	.0005
	320	105.	27.	51.	1251.	1046.	1391.	.027	.005	.017	.0001	.0005	.0005

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	320	71.	52.	29.	609.	1024.	881.	.027	.005	.017	.0001	.0005	.0005
	325	71.	52.	29.	555.	1024.	1089.	.026	.005	.017	.0001	.0005	.0005
FGRUN	320	39.	57.	25.	729.	653.	604.	.027	.005	.017	.0001	.0005	.0005
	330	39.	57.	25.	860.	583.	604.	.026	.005	.017	.0002	.0006	.0005
FGRUN	330	40.	58.	23.	860.	583.	604.	.026	.005	.017	.0002	.0006	.0005
	335	40.	58.	23.	937.	562.	604.	.025	.005	.017	.0002	.0006	.0005
FGRUN	335	40.	52.	22.	937.	562.	604.	.025	.005	.017	.0002	.0006	.0005
	340	40.	52.	22.	847.	551.	604.	.025	.006	.017	.0002	.0006	.0005
ELBOW	340	42.	51.	20.	847.	551.	604.	.025	.006	.017	.0002	.0006	.0005
	345	42.	51.	20.	691.	611.	623.	.021	.007	.016	.0003	.0005	.0005
FGRUN	345	44.	50.	17.	691.	611.	623.	.021	.007	.016	.0003	.0005	.0005
	350	44.	50.	17.	640.	611.	785.	.019	.007	.016	.0004	.0005	.0004
ELBOW	350	46.	49.	16.	640.	611.	785.	.019	.007	.016	.0004	.0005	.0004
	355	46.	49.	16.	618.	590.	805.	.017	.005	.012	.0004	.0005	.0003
FGRUN	355	47.	46.	16.	618.	590.	805.	.017	.005	.012	.0004	.0005	.0005
	360	47.	46.	16.	618.	579.	741.	.017	.004	.011	.0005	.0005	.0003
VALVE	360	48.	46.	16.	618.	579.	741.	.017	.004	.011	.0005	.0005	.0003
	365	48.	46.	16.	618.	554.	693.	.017	.002	.009	.0005	.0005	.0003
RUN	365	56.	29.	33.	618.	668.	668.	.017	.002	.009	.0005	.0005	.0003
	370	56.	29.	33.	0.	0.	0.	.022	.008	.011	.0005	.0005	.0003
VALVE	365	91.	49.	40.	0.	275.	341.	.017	.002	.009	.0005	.0005	.0003
	375	91.	49.	40.	0.	0.	0.	.017	.000	.007	.0005	.0005	.0003
FGRUN	325	72.	52.	28.	555.	1024.	1089.	.026	.005	.017	.0001	.0005	.0005
	326	72.	52.	28.	535.	1024.	1196.	.025	.005	.017	.0001	.0005	.0005
ELBOW	326	72.	52.	28.	535.	1024.	1196.	.025	.005	.017	.0001	.0005	.0005
	360	72.	52.	28.	506.	917.	1274.	.023	.003	.015	.0003	.0004	.0002
FGRUN	380	78.	51.	27.	506.	917.	1274.	.023	.003	.015	.0003	.0004	.0002
	385	78.	51.	27.	506.	708.	589.	.023	.002	.011	.0003	.0004	.0001
VALVE	385	82.	51.	28.	506.	708.	589.	.023	.002	.011	.0003	.0004	.0001
	390	82.	51.	28.	506.	657.	344.	.023	.001	.010	.0003	.0004	.0001
RUN	390	41.	15.	33.	506.	494.	494.	.023	.001	.010	.0003	.0004	.0001
	395	41.	15.	33.	0.	0.	0.	.028	.004	.012	.0003	.0004	.0001

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LOFT CIS ANALYSIS - 1"-PCC-76-A,S-1A,INSIDE,NORM. & UPSET

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
VALVE	390	124.	53.	54.	0.	433.	424.	.023	.001	.010	.0003	.0004	.0001
	400	124.	53.	54.	0.	0.	0.	.023	.000	.010	.0003	.0004	.0001

FIM

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APPENDIX F
DESIGN, LEVEL A, AND LEVEL B SERVICE
CONDITIONS STRESS ANALYSIS RESULTS

ASME SECTION III CLASS 2 OR ANSI B31.1.3 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	5	1.000	2577.	3467.	49.	2626.
	10	1.500	1377.	1757.	29.	1407.
FGRUN	10	1.000	1377.	1757.	29.	1407.
	15	1.000	866.	1257.	67.	953.
ELBOW	15	1.308	886.	1257.	88.	974.
	20	1.308	876.	1270.	90.	965.
FGRUN	20	1.000	876.	1270.	69.	944.
	25	1.000	982.	1503.	66.	1048.
FGRUN	25	1.000	363.	560.	22.	406.
	30	1.000	440.	636.	25.	465.
FGRUN	30	1.000	1149.	1726.	72.	1221.
	35	1.000	1349.	2013.	97.	1445.
ELBOW	35	1.308	1349.	2013.	126.	1475.
	40	1.308	1266.	1954.	116.	1382.
FGRUN	40	1.000	1266.	1954.	89.	1355.
	45	1.000	671.	1634.	52.	723.
FGRUN	45	1.000	671.	1634.	52.	723.
	50	1.000	685.	1509.	47.	731.
ELBOW	50	1.308	665.	1509.	61.	746.
	55	1.308	673.	1442.	56.	729.
FGRUN	55	1.000	673.	1442.	43.	716.
	60	1.000	465.	1065.	32.	517.
RUN	60	1.000	465.	1065.	32.	517.
	65	1.000	689.	1432.	42.	731.
RUN	65	1.000	689.	1432.	42.	731.
	70	1.000	1689.	2504.	72.	1762.
RUN	70	1.000	1689.	2504.	72.	1762.
	75	1.000	665.	1763.	41.	706.

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ASME SECTION III CLASS 2 OR ANSI B31.1.2 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	75	1.000	665.	1783.	41.	706.
	80	1.000	401.	1437.	41.	442.
ELBOW	80	1.308	401.	1437.	54.	455.
	85	1.208	359.	1279.	51.	411.
FGRUN	85	1.000	359.	1279.	39.	399.
	90	1.000	379.	849.	27.	406.
FGRUN	90	1.000	379.	849.	27.	406.
	95	1.000	409.	1591.	23.	431.
ELBOW	95	1.308	409.	1591.	30.	438.
	100	1.308	391.	1700.	28.	419.
FGRUN	100	1.000	391.	1700.	21.	412.
	105	1.000	490.	1842.	16.	506.
2 RUN	105	1.000	490.	1842.	16.	506.
	110	1.000	613.	1985.	23.	636.
2 RUN	110	1.000	613.	1985.	23.	636.
	115	1.000	580.	1814.	38.	619.
2 RUN	115	1.000	580.	1814.	38.	619.
	120	1.000	404.	1322.	55.	459.
2 RUN	120	1.000	404.	1322.	55.	459.
	125	1.000	568.	1160.	72.	640.
2 RUN	125	1.000	568.	1160.	72.	640.
	130	1.000	1093.	1867.	89.	1187.
FGRUN	130	1.000	1093.	1867.	89.	1187.
	135	1.000	1672.	2947.	104.	1775.
FGRUN	135	1.000	1672.	2947.	104.	1775.
	140	1.000	618.	1052.	35.	653.
FGRUN	140	1.000	618.	1052.	35.	653.
	145	1.296	2070.	3658.	111.	2182.
FGRUN	145	1.296	2070.	3658.	111.	2182.
			1856.	3213.	115.	1971.

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ASME SECTION III CLASS 2 OR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EQ.6 (PSI)	OCCASIONAL STRESS EQ.9 (PSI)	EXPANSION STRESS EQ.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ.11 (PSI)
FGRUN	145	1.296	1078.	1715.	81.	1159.
	150	1.000	862.	1382.	36.	918.
FGRUN	150	1.000	862.	1382.	36.	918.
	155	1.000	763.	1091.	30.	793.
RUN	155	1.000	763.	1091.	30.	793.
	160	1.000	1293.	1670.	96.	1389.
FGRUN	160	1.000	1293.	1670.	96.	1389.
	165	1.000	1095.	1659.	95.	1189.
FGRUN	165	1.000	1095.	1659.	95.	1189.
	170	1.000	576.	847.	45.	622.
	170	1.000	535.	807.	46.	583.
FGRUN	170	1.000	535.	807.	46.	583.
	175	1.000	505.	778.	46.	554.
FGRUN	175	1.000	505.	778.	46.	554.
	180	1.000	947.	1515.	100.	1048.
	180	1.000	842.	1439.	113.	955.
ELBDW	180	1.777	974.	1770.	201.	1175.
	185	1.777	892.	1523.	135.	1027.
ELBDW	185	1.777	892.	1523.	135.	1027.
	190	1.777	834.	1733.	201.	1034.
FGRUN	190	1.000	737.	1411.	113.	850.
	195	1.000	695.	1241.	75.	770.
RUN	195	1.000	695.	1241.	75.	770.
	200	1.000	687.	1165.	54.	741.
RUN	200	1.000	687.	1165.	54.	741.
	205	1.000	709.	1237.	80.	789.
RUN	205	1.000	709.	1237.	80.	789.
	210	1.000	705.	1118.	43.	748.
RUN	210	1.000	705.	1118.	43.	748.
	215	1.000	777.	1107.	17.	794.

ASME SECTION III CLASS 2 OR ANSI B31.1.6 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ. 9 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
RUN	215	1.000	777.	1107.	17.	794.
	220	1.000	786.	1120.	41.	827.
RUN	220	1.000	786.	1120.	41.	827.
	225	1.000	724.	1172.	77.	801.
FGRUN	225	1.000	724.	1172.	77.	801.
	230	1.000	685.	1310.	114.	799.
ELBOW	230	1.777	765.	1598.	202.	968.
	235	1.777	815.	1302.	61.	876.
FGRUN	235	1.000	723.	1088.	34.	757.
	240	1.000	752.	3322.	422.	1174.
FGRUN	145	1.296	1151.	1784.	70.	1221.
	245	1.000	1315.	2081.	81.	1396.
F	REDUCE	2.000	1431.	2262.	117.	1547.
	250	2.000	1639.	2644.	162.	1801.
F	FGRUN	250	1098.	1597.	61.	1157.
	255	1.000	1217.	1823.	81.	1298.
RLN	260	1.000	918.	1325.	0.	918.
	265	1.000	522.	522.	0.	522.
FGRUN	270	1.000	1271.	2065.	140.	1411.
	275	1.000	1105.	1869.	180.	1286.
ELBOW	275	1.953	1377.	2495.	352.	1728.
	280	1.953	1275.	2394.	345.	1620.
FGRUN	280	1.000	1036.	1800.	177.	1213.
	285	1.000	1095.	1999.	70.	1165.
ELBOW	285	1.953	1361.	2685.	138.	1498.
	290	1.953	1428.	2780.	131.	1551.
FGRUN	290	1.000	1135.	2063.	67.	1202.
	295	1.000	1215.	2089.	107.	1322.

ASME SECTION III CLASS 2 OR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	295	1.000	1215.	2089.	107.	1322.
	300	1.000	1157.	1956.	164.	1321.
FGRUN	300	1.000	908.	963.	11.	919.
	305	1.000	916.	964.	16.	932.
FGRUN	305	1.000	916.	964.	16.	932.
	310	1.000	913.	955.	20.	933.
FGRUN	310	1.000	1232.	1629.	289.	1521.
	315	1.000	1190.	1792.	311.	1501.
FGRUN	315	1.000	1190.	1792.	311.	1501.
	320	1.450	1213.	1902.	483.	1695.
FGRUN	320	1.450	1195.	1671.	297.	1492.
	325	1.000	1162.	1634.	200.	1362.
FGRUN	320	1.450	808.	1178.	197.	1005.
	330	1.000	979.	1335.	156.	1136.
FGRUN	330	1.000	979.	1335.	156.	1136.
	335	1.000	1090.	1459.	166.	1256.
FGRUN	335	1.000	1090.	1459.	166.	1256.
	340	1.000	1012.	1360.	181.	1193.
ELBOW	340	1.953	1240.	1749.	354.	1593.
	345	1.953	1058.	1540.	364.	1422.
FGRUN	345	1.000	888.	1217.	186.	1074.
	350	1.000	912.	1262.	170.	1062.
ELBOW	350	1.953	1093.	1606.	332.	1425.
	355	1.953	1115.	1624.	249.	1364.
FGRUN	355	1.000	927.	1274.	127.	1055.
	360	1.000	933.	1266.	105.	1038.
RUN	365	1.000	918.	1252.	0.	918.
	370	1.000	522.	522.	0.	522.

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ASME SECTION III CLASS 2 OR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	325	1.000	1162.	1634.	200.	1362.
	326	1.000	1172.	1664.	196.	1370.
ELBOW	326	1.953	1474.	2194.	386.	1660.
	380	1.953	1330.	2044.	320.	1649.
FGRUN	380	1.000	1073.	1561.	164.	1237.
	385	1.000	926.	1237.	85.	1011.
RLN	390	1.000	918.	1173.	0.	918.
	395	1.000	522.	522.	0.	522.

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APPENDIX G
LEVEL C SERVICE CONDITIONS
STRESS ANALYSIS RESULTS

ASME SECTION III CLASS 2 OR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	5	1.000	2577.	4357.	0.	2577.
	10	1.000	1377.	2136.	0.	1377.
FGRUN	10	1.000	1377.	2136.	0.	1377.
	15	1.000	886.	1628.	0.	886.
ELBOW	15	1.308	886.	1628.	0.	886.
	20	1.308	876.	1664.	0.	876.
FGRUN	20	1.000	876.	1554.	0.	876.
	25	1.000	982.	2023.	0.	982.
FGRUN	25	1.000	383.	733.	0.	383.
	30	1.000	440.	833.	0.	440.
FGRUN	30	1.000	1149.	2302.	0.	1149.
	35	1.000	1349.	2673.	0.	1349.
ELBOW	35	1.308	1349.	2673.	0.	1349.
	40	1.308	1266.	2642.	0.	1266.
FGRUN	40	1.000	1266.	2542.	0.	1266.
	45	1.000	671.	2597.	0.	671.
FGRUN	45	1.000	671.	2597.	0.	671.
	50	1.000	685.	2334.	0.	685.
ELBOW	50	1.308	685.	2334.	0.	685.
	55	1.308	673.	2211.	0.	673.
FGRUN	55	1.000	673.	2211.	0.	673.
	60	1.000	485.	1545.	0.	485.
RUN	60	1.000	485.	1645.	0.	485.
	65	1.000	689.	2175.	0.	689.
RUN	65	1.000	689.	2175.	0.	689.
	70	1.000	1689.	3319.	0.	1689.
RUN	70	1.000	1689.	3319.	0.	1689.
	75	1.000	665.	2901.	0.	665.

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ASME SECTION III CLASS 2 OR ANSI 831.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	73	1.000	665.	2901.	0.	665.
	80	1.000	401.	2473.	0.	401.
ELBOW	80	1.308	401.	2473.	0.	401.
	83	1.308	359.	2199.	0.	359.
FGRUN	85	1.000	359.	2199.	0.	359.
	90	1.000	379.	1319.	0.	379.
FGRUN	90	1.000	379.	1319.	0.	379.
	95	1.000	409.	2774.	0.	409.
ELBOW	95	1.308	409.	2774.	0.	409.
	100	1.308	391.	3009.	0.	391.
FGRUN	100	1.000	391.	3009.	0.	391.
	105	1.000	490.	3195.	0.	490.
RUN	105	1.000	490.	3195.	0.	490.
	110	1.000	613.	3358.	0.	613.
RUN	110	1.000	613.	3358.	0.	613.
	115	1.000	580.	3048.	0.	580.
RUN	115	1.000	580.	3048.	0.	580.
	120	1.000	404.	2241.	0.	404.
RUN	120	1.000	404.	2241.	0.	404.
	125	1.000	568.	1751.	0.	568.
RUN	125	1.000	568.	1751.	0.	568.
	130	1.000	1098.	2636.	0.	1098.
FGRUN	130	1.000	1098.	2636.	0.	1098.
	135	1.000	1672.	4223.	0.	1672.
FGRUN	135	1.000	1672.	4223.	0.	1672.
	140	1.000	618.	1487.	0.	618.
FGRUN	140	1.000	754.	1835.	0.	754.
	145	1.000	2070.	5245.	0.	2070.
FGRUN	145	1.296	1856.	4569.	0.	1856.

ASME SECTION III CLASS 2 OR ANSI 331.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EQ.8 (PSI)	OCCASIONAL STRESS EQ.9 (PSI)	EXPANSION STRESS EQ.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ.11 (PSI)
FGRUN	145	1.296	1078.	2352.	0.	1078.
	150	1.000	882.	1882.	0.	882.
FGRUN	150	1.000	882.	1882.	0.	882.
	155	1.000	763.	1419.	0.	763.
RUN	155	1.000	763.	1419.	0.	763.
	163	1.000	1293.	2447.	0.	1293.
FGRUN	163	1.000	1293.	2447.	0.	1293.
	165	1.000	1095.	2223.	0.	1095.
FGRUN	165	1.000	1095.	2223.	0.	1095.
	170	1.000	576.	1118.	0.	576.
	170	1.000	536.	1078.	0.	536.
FGRUN	170	1.000	536.	1078.	0.	536.
	175	1.000	505.	1051.	0.	505.
FGRUN	175	1.000	947.	2084.	0.	947.
	180	1.000	842.	2036.	0.	842.
ELBOW	180	1.777	974.	2566.	0.	974.
	185	1.777	892.	2155.	0.	892.
ELBOW	185	1.777	892.	2155.	0.	892.
	190	1.777	834.	2632.	0.	834.
FGRUN	190	1.000	737.	2086.	0.	737.
	195	1.000	695.	1783.	0.	695.
RUN	195	1.000	695.	1783.	0.	695.
	200	1.000	687.	1644.	0.	687.
RUN	200	1.000	687.	1644.	0.	687.
	205	1.000	709.	1766.	0.	709.
RUN	205	1.000	709.	1766.	0.	709.
	210	1.000	705.	1531.	0.	705.
RUN	210	1.000	705.	1531.	0.	705.
	215	1.000	777.	1437.	0.	777.

ASME SECTION III CLASS 2 OR ANSI 331.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
RUN	215	1.000	777.	1437.	0.	777.
	220	1.000	766.	1453.	0.	766.
RUN	220	1.000	786.	1453.	0.	786.
	225	1.000	724.	1620.	0.	724.
FGRUN	225	1.000	724.	1620.	0.	724.
	230	1.000	685.	1935.	0.	685.
ELBOW	230	1.777	765.	2431.	0.	765.
	235	1.777	815.	1789.	0.	815.
FGRUN	235	1.000	723.	1454.	0.	723.
	240	1.000	752.	5891.	0.	752.
FGRUN	145	1.296	1151.	2418.	0.	1151.
	245	1.000	1315.	2848.	0.	1315.
REDUCE	245	2.000	1431.	3094.	0.	1431.
	250	2.000	1639.	3650.	0.	1639.
FGRUN	250	1.000	1096.	2098.	0.	1096.
	255	1.000	1217.	2429.	0.	1217.
RUN	260	1.000	918.	1732.	0.	918.
	265	1.000	522.	522.	0.	522.
FGRUN	270	1.000	1271.	2858.	0.	1271.
	275	1.000	1105.	2633.	0.	1105.
ELBOW	275	1.953	1377.	3614.	0.	1377.
	280	1.953	1275.	3514.	0.	1275.
FGRUN	280	1.000	1036.	2564.	0.	1036.
	285	1.000	1095.	2903.	0.	1095.
ELBOW	285	1.953	1361.	4010.	0.	1361.
	290	1.953	1420.	4139.	0.	1420.
FGRUN	290	1.000	1135.	2992.	0.	1135.
	295	1.000	1215.	2964.	0.	1215.

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ASME SECTION III CLASS 2 OR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQ.9 (PSI)	OCCASIONAL STRESS EQ.9 (PSI)	EXPANSION STRESS EQ.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ.11 (PSI)
FGRUN	295	1.000	1215.	2964.	0.	1215.
	300	1.000	1157.	2756.	0.	1157.
FGRUN	300	1.000	908.	1019.	0.	908.
	305	1.000	916.	1013.	0.	916.
FGRUN	305	1.000	916.	1013.	0.	916.
	310	1.000	913.	996.	0.	913.
FGRUN	310	1.000	1232.	2426.	0.	1232.
	315	1.000	1190.	2394.	0.	1190.
FGRUN	315	1.000	1190.	2394.	0.	1190.
	320	1.450	1213.	2591.	0.	1213.
FGRUN	320	1.450	1195.	2147.	0.	1195.
	325	1.000	1162.	2105.	0.	1162.
FGRUN	320	1.450	808.	1548.	0.	808.
	330	1.000	979.	1690.	0.	979.
FGRUN	330	1.000	979.	1690.	0.	979.
	335	1.000	1090.	1828.	0.	1090.
FGRUN	335	1.000	1090.	1828.	0.	1090.
	340	1.000	1090.	1828.	0.	1090.
	340	1.953	1240.	2259.	0.	1240.
	345	1.953	1058.	2023.	0.	1058.
FGRUN	345	1.000	888.	1546.	0.	888.
	350	1.000	912.	1612.	0.	912.
ELBOW	350	1.953	1093.	2118.	0.	1093.
	355	1.953	1115.	2132.	0.	1115.
FGRUN	355	1.000	927.	1621.	0.	927.
	360	1.000	933.	1598.	0.	933.
FGRUN	365	1.000	918.	1585.	0.	918.
	370	1.000	522.	522.	0.	522.

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ASME SECTION III CLASS 2 OR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EQ. 8 (PSI)	OCCASIONAL STRESS EQ. 9 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
FGRUN	325	1.000	1162.	2105.	0.	1162.
	326	1.000	1172.	2155.	0.	1172.
ELBOW	326	1.953	1474.	2915.	0.	1474.
	380	1.953	1330.	2753.	0.	1330.
FGRUN	380	1.000	1073.	2048.	0.	1073.
	395	1.000	926.	1548.	0.	926.
RUN	390	1.000	918.	1428.	0.	918.
	395	1.000	522.	522.	0.	522.

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APPENDIX H
LEVEL D SERVICE CONDITIONS
STRESS ANALYSIS RESULTS

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There are no Level D service conditions applicable to this system.

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APPENDIX I
COMPONENT SUPPORT ANALYSIS RESULTS

Piping supports S8 and S9, which are required by this report, will undergo complete analysis when their design is finalized.

Other supports on this system are standard vendor items and do not require analysis.