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LOFT TECHNICAL REPORT 125-6

RE&C INTERNAL REPORT RE-A-78-063

OCTOBER 30, 1978

LOFT CIS ANALYSIS 8"-WW-172-AB INSIDE PENETRATION S-7A

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IDAHO NATIONAL ENGINEERING LABORATORY

DEPARTMENT OF ENERGY

IDAHO OPERATIONS OFFICE UNDER CONTRACT EY-76-C-07-1570

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The line analysed herein will be listed in the master Containment Isolation System technical report, LTR 128-5. This master LTR will be released after the completion of the 56 subtier LTRs. This master LTR will list all the CIS lines, P&ID drawings, and the seismic analysis LTRs.

The modifications listed in this LTR will be completed in FY-79 when funding is available. The funding for all CIS Analysis modifications will be part of a CCB/CCF action after the completion of all LOFT CIS analyses.

SWR no. 51870 will cover recommendations of this LTR.

RESEARCH, ENGINEERING AND CONSTRUCTION REPORT ENGINEERING ANALYSIS DIVISION

APPLIED MECHANICS BRANCH

LOFT CIS ANALYSIS 8"-WW-172-AB

INSIDE PENETRATION S-7A

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LOFT TECHNICAL REPORT
LOFT PROGRAM

FORM EG&G-229
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PSE <i>ECG</i> RSB Mgr.	PSE	PSB Mgr. Seismic P&CSB Mgr. Review

ABSTRACT

Line 8"-WW-172-AB and related piping inside the LOFT containment and connected to penetration S-7A was analyzed to ASME Code, Subsection NC (Class 2) criteria. This piping is part of the Containment Isolation System. The model considered the piping from the containment I.D. inward through the second isolation valve. The analysis shows overstressed areas at the first, fourth, and fifth elbows from the penetration during the Safe Shutdown Earthquake. This stress may be relieved so that the line will meet Class 2 requirements if two restraints, described herein, are added to the system.

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LOFT CIS ANALYSIS 8"-WW-172-AB
INSIDE PENETRATION S-7A

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 8"-WW-172-AB line inside the containment vessel. The line was analyzed as part of the Containment Isolation System.

*Hereafter referred to as the Code^[1].

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 the design specification^[2].

III. PIPING SYSTEM DESCRIPTION

The piping system being analyzed is inside LOFT containment penetration S-7A. A 4' long, 8" dia. line with a blind flanged end is welded to the penetration. A 4" dia. line branches off the 8" line and passes through an isolation valve and a flow restrictor before branching into two lines, each of which pass through an isolation valve. The branch line models come to an end 3' past the isolation valves, although the actual lines continue on. These ends are assumed supported in the translational directions. Six vertical hangers are used to support the line, which is insulated over its entire length.

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)	8.625	4.50
Thickness (inches)	.322	.237
Weight (lbs/inch)	55.62	19.58
Material	A 106 Gr. B	A-53
E_{cold} (10^6 psi)	27.9	27.9
S (100°F) (psi)	15,000	12,000
S_y (psi)	35,000	35,000
α (10^{-6} in./in. °F)	6.13	6.13

LOFT CIS ANALYSIS - 8 -MM-172-AB (INSIDE NUPIPE MATHEMATICAL MODEL

••LEGEND••

- / - NODE LOCATION
- - MASSPOINT LOCATION
- ← - SPRING HANGER
- - SLIDER
- ↑ - RIGID SUPPORT
- ⌋ - ANCHOR
- ≡ - ELASTO JOINT
- ⌋ - FLEXIBLE ANCHOR
- ⌋ - VALVE

ROTATION ABOUT Y-AXIS : 45.4DEG.
X-Z PLANE TILT : 45.4DEG.

See Reference 4

The expansion coefficients and thermal conductivities of SA-106,
Gr. B 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 design specification.

1. DESIGN CONDITIONS

An internal pressure of 150 psig and a uniform temperature of 200°F were used in this model.

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(s) given below:

Entire Model: 100°F

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 condition 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(s).

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 ANALYSES

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 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.

FIGURE 2
SSE - SEISMIC RESPONSE SPECTRA ENVELOPE
1% DAMPING

46 1323

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>
V-2535-GT	310 lb (est.)	0
CV-P-141-7		
Body	120 lb (est.)	0
Operator	210 lb (est.)	17 inches
CV-P-141-33		
Body	120 lb (est.)	0
Operator	210 lb (est.)	17 inches

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>
150	8.625	15,000	.12	.322
150	4.50	12,000	.11	.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

Not applicable.

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.

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>
Vertical rod type hanger	20	612 lb	8 lb	165 lb	330 lb	1430 lb
Vertical rod type hanger	70	382 lb	1 lb	73 lb	145 lb	1430 lb
Vertical rod type hanger	105	575 lb	4 lb	134 lb	267 lb	1430 lb
Vertical rod type hanger	140	320 lb	-5 lb	125 lb	250 lb	1430 lb
Vertical rod type hanger	160	329 lb	4 lb	57 lb	113 lb	1430 lb
Vertical rod type hanger	365	91 lb	7 lb	95 lb	191 lb	1430 lb
Vertical rod type hanger	390	73 lb	-18 lb	105 lb	210 lb	1430 lb
Vertical rod type hanger	165	77 lb	1 lb	102 lb	204 lb	1430 lb
Vertical rod type hanger	195	403 lb	-6 lb	100 lb	200 lb	1430 lb
Vertical rod type hanger	220	278 lb	8 lb	62 lb	123 lb	1430 lb
Vertical rod type hanger	425	109 lb	-12 lb	75 lb	150 lb	1430 lb
Horizontal (Recommended Addition to System)	42	6 lb	13 lb	310 lb	620 lb	T.B.D.
Horizontal (Recommended Addition to System)	180	18 lb	29 lb	451 lb	902 lb	T.B.D.

VIII. SPECIAL CONSIDERATIONS

With the current design of the analyzed piping system, there are overstressed regions at the first, fourth, and fifth elbows from the penetration during the Safe Shutdown Earthquake. It is recommended that two restraints be added to the system so that it will meet Class 2 requirements. The two restraints are:

1. A horizontal restraint in the Z (North-South) direction to be located on the 4" line at the point 1.5 feet past the third elbow from penetration S-7A (Node 42).

2. A horizontal restraint in the X (East-West) direction to be located on the main 4" line, between the first and second elbows, which are past the first branch point of that line (Node 180).

IX. CONCLUSIONS

The piping system addressed in this report was analyzed for the loads and operating conditions given in the design specification using the techniques described herein. All stresses have been found to be within limits established by Section III of the ASME Boiler and Pressure Vessel Code.

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. Specification ANC-P-1, "Line Designation Tables", January 17, 1973.
3. American Institute of Steel Construction, Manual of Steel Construction, Seventh Edition, pp 5-6 to 5-24, 1973.
4. Mathematical Model is based on a field isometric drawn in February, 1978.

APPENDIX A
BASIC DATA, INPUT PARAMETERS

04/14/78

NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LEFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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PROGRAM CONTROL CARD

CARDTYPE	NCHECK	DAMP	CODE	GLOB	DYN	THEATA	INTOUT	STORE
CONTROL	0	C	2.	C.	1.	0.0000	C.	0.

CARDTYPE	NPR	NPIPS	UNITS	EIGSAV
CONTROL	10	C	ENGLISH	C

FLEXIBILITY ANALYSIS CONTROL CARDS

CARDTYPE	NCASE	MODE	TLGAD	CMODE	CFREC	SPEC	SAVE	CYCLE	TITLE
FLEXAN	1	1	3.	C.	C.	C.00	1.	0.	DEADWEIGHT
FLEXAN	2	1	2.	C.	C.	C.00	1.	0.	THERMAL EXPANSION PLUS ANCHOR MOVEMENT
FLEXAN	3	1	11.	30.	50.	1.00	1.	0.	SSE RESPONSE SPECTRUM - 1% DAMPING

CASE COMBINATION CONTROL CARDS

CARDTYPE	NCASE	CASES-CGMD	AMULT	BMULT	CCODE	SAVE	CYCLE	TITLE
MCFLEX	4	3 AND 1	.5	C.C	C.C	1.0	C.C	CBE RESPONSE SPECTRUM - ONE-HALF SSE

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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
.250	1.460	.250	.973	.250	1.460
.800	.637	.800	.425	.800	.637
1.400	.342	1.400	.228	1.400	.342
2.200	.217	2.200	.145	2.200	.217
3.000	.186	3.000	.124	3.000	.186
10.000	.186	10.000	.124	10.000	.186

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LEFT CIS ANALYSIS - 8N-WH-172-AB (INSIDE) S-7A

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      *** INPUT DATA ***
CARDTYPE  11      12      DELTA(1)  DELTA(2)  DELTA(3)  DELTA(4)  DELTA(5)  DELTA(6)
XSECTN      0      1      .863E+01  .322E+00  .556E+02  .279E+02  .150E+03  0.
XSECTN      0      2      .450E+01  .237E+00  .196E+02  .279E+02  .150E+03  0.
CPVAL      1      1      .279E+02  .230E+02  0.      0.      .100E+03  0.
CHECK MAGNITUDE OF ENTRIES ON ABOVE CPVAL CARD ****
ANCHER      0      1      0.      0.      0.      0.      0.      0.
FGRUN      1      5      -.254E+01  0.      0.      .100E+01  .100E+01  0.
MASSPT      0      5      .100E+01  .100E+01  .100E+01  0.      0.      0.
TEE      5      10      0.      0.      0.      0.      0.      0.
FGRUN      5      10      0.      0.      -.110E+01  .200E+01  -.100E+01  0.
MASSPT      0      10      .100E+01  .100E+01  .100E+01  0.      0.      0.
ELEC      10      15      0.      0.      0.      .200E+01  .100E+01  0.
MASSPT      0      15      .100E+01  .100E+01  .100E+01  0.      0.      0.
FGRUN      15      20      -.242E+01  0.      0.      .200E+01  .100E+01  0.
MASSPT      0      20      .100E+01  .100E+01  .100E+01  0.      0.      0.
RESTRAINT  0      20      0.      .100E+01  0.      0.      0.      0.
FGRUN      20      25      -.433E+01  0.      0.      .200E+01  .100E+01  0.
MASSPT      0      25      .100E+01  .100E+01  .100E+01  0.      0.      0.
ELEC      25      30      0.      0.      0.      .200E+01  .100E+01  0.
MASSPT      0      30      .100E+01  .100E+01  .100E+01  0.      0.      0.
FGRUN      30      35      0.      -.125E+01  0.      .200E+01  .100E+01  0.
MASSPT      0      35      .100E+01  .100E+01  .100E+01  0.      0.      0.
ELEC      35      40      0.      0.      0.      .200E+01  .100E+01  0.
MASSPT      0      40      .100E+01  .100E+01  .100E+01  0.      0.      0.
EPLA      40      42      -.150E+01  0.      0.      .200E+01  .100E+01  0.
MASSPT      0      42      .100E+01  .100E+01  .100E+01  0.      0.      0.
RESTRAINT  0      42      0.      0.      .100E+01  0.      0.      0.

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LGFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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CARDTYPE	*** INPUT DATA ***							
	11	12	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
FORUN	42	45	-.233E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	45	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBCN	45	50	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	50	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	50	55	0.	0.	-.425E+01	.200E+01	.100E+01	0.
MASSPT	0	55	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	55	60	0.	0.	-.425E+01	.200E+01	.100E+01	0.
MASSPT	0	60	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBCN	60	65	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	65	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	65	70	-.183E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	70	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	70	0.	.100E+01	0.	0.	0.	0.
FORUN	70	80	-.496E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	80	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	80	85	-.496E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	85	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	85	90	-.580E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	90	.100E+01	.100E+01	.100E+01	0.	0.	0.
CHEIGHT	0	90	0.	.300E+02	0.	0.	0.	0.
VALVE	90	100	-.580E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	100	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	100	103	-.263E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	103	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	103	105	-.263E+01	0.	0.	.200E+01	.100E+01	0.

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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		*** INPLI DATA ***						
CARDTYPE	II	12	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
MASSPT	0	105	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	105	0.	.100E+06	0.	0.	0.	0.
FGRUN	105	110	-.830E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	110	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBCW	110	112	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	112	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	112	113	-.100E+01	.100E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	113	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBCW	113	115	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	115	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	115	120	-.350E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	120	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	120	0.	.500E+02	0.	0.	0.	0.
FGRUN	120	125	-.325E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	125	.100E+01	.100E+01	.100E+01	0.	0.	0.
TEE	125	130	0.	0.	0.	0.	0.	0.
FGRUN	125	130	0.	.100E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	130	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBCW	130	135	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	135	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	135	140	0.	0.	.442E+01	.200E+01	.100E+01	0.
MASSPT	0	140	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	140	0.	.100E+06	0.	0.	0.	0.
FGRUN	140	143	0.	0.	.283E+01	.200E+01	.100E+01	0.
MASSPT	0	143	.100E+01	.100E+01	.100E+01	0.	0.	0.

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LEFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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CARDTYPE	*** INPLT DATA ***							
	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
VALVE	143	145	0.	0.	.500E+00	.200E+01	.100E+01	0.
MASSPT	0	145	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	145	0.	.100E+03	0.	0.	0.	0.
RUN	145	150	-.100E+01	.100E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	150	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	150	0.	.200E+03	0.	0.	0.	0.
VALVE	145	155	0.	0.	.500E+00	.200E+01	.100E+01	0.
MASSPT	0	155	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	155	160	0.	0.	.300E+01	.200E+01	.100E+01	0.
MASSPT	0	160	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	160	0.	.100E+06	0.	0.	0.	0.
FGRUN	160	365	0.	0.	.600E+01	.200E+01	.100E+01	0.
MASSPT	0	365	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	365	0.	.100E+06	0.	0.	0.	0.
FGRUN	265	370	0.	0.	.530E+00	.200E+01	.100E+01	0.
MASSPT	0	370	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	370	375	0.	0.	.500E+00	.200E+01	.100E+01	0.
MASSPT	0	375	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	375	0.	.100E+03	0.	0.	0.	0.
VALVE	375	380	0.	0.	.500E+00	.200E+01	.100E+01	0.
MASSPT	0	380	.100E+01	.100E+01	.100E+01	0.	0.	0.
FGRUN	380	385	0.	0.	.750E+00	.200E+01	.100E+01	0.
MASSPT	0	385	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	385	390	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	390	.100E+01	.100E+01	.100E+01	0.	0.	0.

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-BW-172-AB (INSIDE) 5-7A

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			*** INPUT DATA ***					
CARDTYPE	11	12	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
RESTRAINT	0	390	0.	.100E+06	0.	0.	0.	0.
FORUM	390	390	-.224E+01	0.	.224E+01	.200E+01	.100E+01	0.
MASSPT	0	395	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELEM	395	400	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	400	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUM	400	405	0.	-.198E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	405	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELEM	405	410	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	410	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUM	410	415	0.	0.	-.150E+01	.200E+01	.100E+01	0.
ANCHOR	0	415	0.	0.	0.	0.	0.	0.
FORUM	125	165	-.117E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	165	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	165	0.	.100E+06	0.	0.	0.	0.
FORUM	165	170	-.225E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	170	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELEM	170	180	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	180	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	180	.100E+06	0.	0.	0.	0.	0.
DUMMY	170	180	0.	.100E+01	0.	.200E+01	.100E+01	0.
DUMMY	180	190	0.	.100E+01	0.	.200E+01	.100E+01	0.
ELEM	180	190	.600E+01	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	190	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUM	190	195	0.	0.	.442E+01	.200E+01	.100E+01	0.
MASSPT	0	195	.100E+01	.100E+01	.100E+01	0.	0.	0.

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-14-172-48 (INSIDE) S-7A

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		*** INPUT DATA ***						
CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
RESTRAINT	0	195	0.	.100E+06	0.	0.	0.	0.
FORUN	195	200	0.	0.	.263E+01	.200E+01	.100E+01	0.
PASSPT	0	200	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	200	205	0.	0.	.500E+00	.200E+01	.100E+01	0.
PASSPT	0	205	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	205	0.	.100E+03	0.	0.	0.	0.
FORUN	205	210	.100E+01	.100E+01	0.	.200E+01	.100E+01	0.
PASSPT	0	210	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	210	0.	.200E+03	0.	0.	0.	0.
VALVE	205	215	0.	0.	.500E+00	.200E+01	.100E+01	0.
PASSPT	0	215	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	215	220	0.	0.	.300E+01	.200E+01	.100E+01	0.
PASSPT	0	220	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	220	0.	.100E+06	0.	0.	0.	0.
FORUN	220	425	0.	0.	.600E+01	.200E+01	.100E+01	0.
PASSPT	0	425	.100E+01	.100E+01	.100E+01	0.	0.	0.
RESTRAINT	0	425	0.	.100E+06	0.	0.	0.	0.
FORUN	425	430	0.	0.	.300E+01	.200E+01	.100E+01	0.
PASSPT	0	430	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	430	435	0.	0.	.500E+00	.200E+01	.100E+01	0.
PASSPT	0	435	.100E+01	.100E+01	.100E+01	0.	0.	0.
CWEIGHT	0	435	0.	.100E+03	0.	0.	0.	0.
VALVE	435	440	0.	0.	.500E+00	.200E+01	.100E+01	0.
PASSPT	0	440	.100E+01	.100E+01	.100E+01	0.	0.	0.
FORUN	440	445	0.	0.	.830E+00	.200E+01	.100E+01	0.

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NUPIPE-IIP - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LEFT GIS ANALYSIS - 8"-14-172-AE (INSIDE) 5-7A

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		*** INPUT DATA ***							
CARDTYPE	11	12	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)	
MASSPT	0	445	.100E+01	.100E+01	.100E+01	0.	0.	0.	
ELBOW	445	450	0.	0.	0.	.200E+01	.100E+01	0.	
MASSPT	0	450	.100E+01	.100E+01	.100E+01	0.	0.	0.	
FCBLN	450	455	-.125E+01	0.	0.	.200E+01	.100E+01	0.	
MASSPT	0	455	.100E+01	.100E+01	.100E+01	0.	0.	0.	
ELBOW	455	460	0.	0.	0.	.200E+01	.100E+01	0.	
MASSPT	0	460	.100E+01	.100E+01	.100E+01	0.	0.	0.	
FCBLN	460	465	0.	-.150E+01	0.	.200E+01	.100E+01	0.	
MASSPT	0	465	.100E+01	.100E+01	.100E+01	0.	0.	0.	
ELBOW	465	470	0.	0.	0.	.200E+01	.100E+01	0.	
MASSPT	0	470	.100E+01	.100E+01	.100E+01	0.	0.	0.	
FCBLN	470	475	0.	0.	-.167E+01	.200E+01	.100E+01	0.	
ANCHOR	0	475	0.	0.	0.	0.	0.	0.	
FCBLN	5	225	-.154E+01	0.	0.	.100E+01	.100E+01	0.	
MASSPT	0	225	.100E+01	.100E+01	.100E+01	0.	0.	0.	
WEIGHT	0	225	0.	.900E+02	0.	0.	0.	0.	
STRESS7	0	0	0.	0.	0.	0.	0.	0.	
SCASES	0	1	0	3	0	0	0	0	0
LOCASES	0	0	0	0	0	0	0	0	0
CANODES	0	0	0	0	0	0	0	0	0
ALLCNS	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 analyzed.

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.

APPENDIX C
WEIGHT ANALYSIS RESULTS

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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SUPPORT REACTIONS FOR LOAD CASE NO. 1

DEADWEIGHT

NODE	TYPE	REACTION (LBS OR IN-LBS)	DIRECTION
1	FORCE	16.	X C C C R D
1	FORCE	-12.	Y C C C R D
1	FORCE	-1.	Z C C C R D
1	FORCE	-6547.	X C C C R D
1	FORCE	-1822.	Y C C C R D
1	FORCE	-6860.	Z C C C R D
2	FORCE	612.	Y C C C R D
2	FORCE	6.	Z C C C R D
7	FORCE	333.	Y C C C R D
7	FORCE	379.	Y C C C R D
10	FORCE	320.	Y C C C R D
14	FORCE	324.	Y C C C R D
16	FORCE	91.	Y C C C R D
33	FORCE	73.	Y C C C R D
41	FORCE	2.	X C C C R D
41	FORCE	12.	Y C C C R D
41	FORCE	-116.	Z C C C R D
41	FORCE	-1455.	X C C C R D
41	FORCE	220.	Y C C C R D
41	FORCE	-201.	Z C C C R D
105	FORCE	77.	Y C C C R D
180	FORCE	-18.	X C C C R D
220	FORCE	403.	Y C C C R D
220	FORCE	278.	Y C C C R D
220	FORCE	104.	Y C C C R D
42	FORCE	-6.	X C C C R D
42	FORCE	198.	Y C C C R D
42	FORCE	11.	Z C C C R D
42	FORCE	-2931.	X C C C R D
42	FORCE	-86.	Y C C C R D
42	FORCE	444.	Z C C C R D

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LOFT CIS ANALYSIS - 8" MW-172-AB (INSIDE) S-7A

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	1	16.	-12.	-1.	-6547.	-822.	-660.	-.000	.000	.000	.0000	.0000	.0000
	5	-16.	153.	1.	6547.	799.	3174.	-.000	-.000	.000	.0001	.0000	.0000
FGRUN	5	16.	-329.	-1.	-6547.	-799.	-719.	-.000	-.000	.000	.0001	.0000	.0000
	10	-16.	340.	1.	4137.	681.	719.	-.000	.002	.000	.0003	.0000	.0001
ELBCW	10	16.	-340.	-1.	-4137.	-681.	-719.	-.000	.002	.000	.0003	.0000	.0001
	15	-16.	356.	1.	2048.	578.	2808.	-.001	.005	.001	.0007	.0002	.0002
FGRUN	15	16.	-356.	-1.	-2048.	-578.	-2808.	-.001	.005	.001	.0007	.0002	.0002
	20	-16.	393.	1.	2048.	560.	11441.	-.001	-.006	.006	.0010	.0003	.0010
FGRUN	20	16.	-218.	-1.	-2048.	-560.	-11441.	-.001	-.006	.006	.0010	.0003	.0010
	25	-16.	143.	1.	2048.	526.	3129.	-.001	-.097	.021	.0016	.0004	.0026
ELBCW	25	16.	-143.	-1.	-2048.	-526.	-3129.	-.001	.097	.021	.0016	.0004	.0026
	30	-16.	128.	1.	2053.	521.	2413.	.018	-.115	.012	.0019	.0003	.0033
FGRUN	30	16.	-128.	-1.	-2053.	-521.	-2413.	.018	-.115	.012	.0019	.0003	.0033
	35	-16.	123.	1.	2055.	521.	2462.	.028	-.115	.007	.0019	.0003	.0033
ELBCW	35	16.	-123.	-1.	-2055.	-521.	-2462.	.028	-.115	.007	.0019	.0003	.0033
	40	-16.	108.	1.	2059.	508.	1868.	.045	-.137	-.004	.0022	.0003	.0039
FGRUN	40	16.	-108.	-1.	-2059.	-508.	-1868.	.045	-.137	-.004	.0022	.0003	.0039
	42	-16.	88.	5.	2059.	627.	693.	.049	-.184	-.000	.0024	.0003	.0040
FGRUN	42	16.	-88.	-5.	-2059.	-627.	-693.	.049	-.184	-.000	.0024	.0003	.0040
	45	-16.	52.	5.	2059.	627.	-849.	.049	-.271	.008	.0027	.0004	.0040
ELBCW	45	16.	-52.	-5.	-2059.	-627.	849.	.049	-.271	.008	.0027	.0004	.0040
	50	-16.	37.	5.	2327.	561.	-1116.	.046	-.277	.011	.0031	.0005	.0037
FGRUN	50	16.	-37.	-5.	-2327.	-561.	1116.	.046	-.277	.011	.0031	.0005	.0037
	55	-16.	37.	5.	2336.	-177.	-1116.	.020	-.128	.011	.0036	.0005	.0034
FGRUN	55	16.	-37.	-5.	-2336.	177.	1116.	.020	-.128	.011	.0036	.0005	.0034
	60	-16.	110.	5.	-959.	-914.	-1116.	-.005	.040	.011	.0037	.0005	.0030
ELBCW	60	16.	-110.	-5.	959.	914.	1116.	-.005	.040	.011	.0037	.0005	.0030
	65	-16.	125.	5.	-1665.	-980.	-411.	-.007	.044	.013	.0038	.0002	.0030

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LGFT CIS ANALYSIS - 3"-WW-172-AB (INSIDE) S-7A

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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	65	-16.	-125.	-5.	-1665.	980.	411.	-.007	-.044	.013	.0036	.0002	.0030
	70	-16.	151.	-5.	-1665.	-893.	1797.	-.007	-.004	.018	.0034	.0002	.0031
FGRUN	70	16.	230.	-5.	-1665.	893.	-1797.	-.007	-.004	.016	.0034	.0002	.0031
	80	-16.	-133.	-5.	-1665.	-571.	-9031.	-.007	-.170	.018	.0028	-.0001	.0020
FGRUN	80	16.	133.	-5.	-1665.	571.	9031.	-.007	-.170	.018	.0028	-.0001	.0020
	85	-16.	-26.	-5.	-1665.	-248.	-14079.	-.007	-.195	.011	.0021	-.0002	-.0014
VALVE	85	16.	26.	-5.	-1665.	248.	14079.	-.007	-.195	.011	.0021	-.0002	-.0014
	90	-16.	-25.	-5.	-1665.	-211.	-14292.	-.007	-.184	.010	.0021	-.0002	-.0016
VALVE	90	16.	-275.	-5.	-1665.	211.	14292.	-.007	-.184	.010	.0021	-.0002	-.0016
	100	-16.	266.	-5.	-1665.	-173.	-12338.	-.007	-.172	.008	.0021	-.0002	-.0017
FGRUN	100	16.	-286.	-5.	-1665.	173.	12338.	-.007	-.172	.008	.0021	-.0002	-.0017
	103	-16.	338.	-5.	-1665.	-2.	-2484.	-.007	-.095	.002	.0018	-.0002	-.0029
FGRUN	103	16.	-338.	-5.	-1665.	2.	2484.	-.007	-.095	.002	.0018	-.0002	-.0029
	105	-16.	389.	-5.	-1665.	169.	8994.	-.007	-.006	-.004	.0014	-.0002	-.0024
FGRUN	105	16.	-186.	-5.	-1665.	-169.	-8994.	-.007	-.006	-.004	.0014	-.0002	-.0024
	110	-16.	-173.	-5.	-1665.	210.	7652.	-.007	.011	-.005	.0013	-.0002	-.0021
ELBOW	110	16.	173.	-5.	-1665.	-210.	-7652.	-.007	.011	-.005	.0013	-.0002	-.0021
	112	-16.	-166.	-5.	-1655.	233.	6904.	-.005	.018	-.004	.0013	-.0002	-.0012
FGRUN	112	16.	166.	-5.	-1655.	-233.	-6904.	-.005	.018	-.004	.0013	-.0002	-.0012
	113	-16.	-146.	-5.	-1609.	279.	5442.	-.004	.026	-.005	.0011	-.0002	-.0003
ELBOW	113	16.	146.	-5.	-1609.	-279.	-5442.	.004	.026	.005	.0011	-.0002	-.0003
	115	-16.	-138.	-5.	-1600.	302.	4810.	.005	.028	.006	.0011	-.0002	-.0002
FGRUN	115	16.	138.	-5.	-1600.	-302.	-4810.	.005	.028	.006	.0011	-.0002	-.0002
	120	-16.	-74.	-5.	-1600.	516.	614.	.005	.022	.000	.0007	-.0001	.0003
FGRUN	120	16.	24.	-5.	-1600.	-516.	-614.	.005	.022	.000	.0007	-.0001	.0003
	125	-16.	40.	-5.	-1600.	727.	921.	.005	.006	-.002	.0003	-.0000	.0005
FGRUN	125	2.	13.	16.	653.	-200.	-1243.	.005	.006	-.002	.0003	-.0000	.0005
	130	-2.	-3.	-16.	-554.	200.	1254.	.002	.006	-.000	.0003	-.0000	.0005
ELBOW	130	2.	3.	16.	554.	-200.	-1254.	.002	.006	-.000	.0003	-.0000	.0005
	135	-2.	12.	-16.	-427.	190.	1264.	-.002	.005	.001	.0001	-.0000	.0007
FGRUN	135	2.	-12.	-16.	427.	-190.	-1264.	-.002	.005	.001	.0001	-.0000	.0007
	140	-2.	89.	-16.	1961.	109.	1264.	-.002	-.003	.001	.0003	-.0000	.0011

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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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	140	-2.	231.	16.	-1961.	-109.	-1264.	-.002	-.003	.001	-.0003	.0000	.0011
	143	2.	-175.	-16.	-4928.	51.	1264.	-.002	-.013	.001	-.0001	.0000	.0014
VALVE	143	-2.	175.	16.	4928.	-51.	-1264.	-.002	-.013	.001	.0001	.0000	.0014
	145	2.	-165.	-16.	-5949.	41.	1264.	-.002	-.014	.001	.0000	.0000	.0014
PLN	145	0.	228.	0.	0.	0.	-2566.	-.002	-.014	.001	.0000	.0000	.0014
	150	-0.	-200.	0.	0.	0.	0.	-.019	-.031	.002	.0000	.0000	.0015
VALVE	145	-2.	-162.	16.	5949.	-41.	1302.	-.002	-.014	.001	-.0000	.0000	.0014
	155	2.	172.	-16.	-4946.	31.	-1302.	-.001	-.013	.001	-.0000	.0000	.0014
FGRUN	155	-2.	-172.	16.	4946.	-31.	1302.	-.001	-.013	.001	-.0000	.0000	.0014
	160	2.	231.	-16.	2309.	-31.	-1302.	-.000	-.003	.001	-.0003	.0000	.0011
FGRUN	160	-2.	98.	16.	-2309.	31.	1302.	-.000	-.003	.001	-.0003	.0000	.0011
	365	2.	19.	-16.	-517.	-153.	-1302.	.001	-.001	.001	-.0000	-.0000	.0005
FGRUN	365	-2.	71.	16.	517.	153.	1302.	.001	-.001	.001	-.0000	-.0000	.0005
	370	2.	-55.	-16.	-1146.	-171.	-1302.	.000	-.001	.001	-.0000	-.0000	.0004
VALVE	370	-2.	55.	16.	1146.	171.	1302.	.000	-.001	.001	-.0000	-.0000	.0004
	375	2.	-45.	-16.	-1448.	-181.	-1302.	.000	-.001	.001	-.0000	-.0000	.0004
VALVE	375	-2.	-55.	16.	1448.	181.	1302.	.000	-.001	.001	-.0000	-.0000	.0004
	380	2.	65.	-16.	-1090.	-191.	-1302.	.000	-.001	.001	-.0000	-.0000	.0003
FGRUN	380	-2.	-65.	16.	1090.	191.	1302.	.000	-.001	.001	-.0000	-.0000	.0003
	385	2.	75.	-16.	-635.	-202.	-1302.	.000	-.001	.001	-.0001	-.0000	.0003
ELBOW	385	-2.	-75.	16.	635.	202.	1302.	.000	-.001	.001	-.0001	-.0000	.0003
	390	2.	83.	-16.	-300.	-160.	-1163.	.000	-.001	.001	-.0001	-.0000	.0002
FGRUN	390	-2.	-10.	16.	300.	160.	1163.	.000	-.001	.001	-.0001	-.0000	.0002
	395	2.	58.	-16.	415.	127.	-449.	-.001	-.001	-.000	-.0001	-.0001	.0001
ELBOW	395	-2.	-58.	16.	-415.	-127.	449.	-.001	-.001	-.000	-.0001	-.0001	.0001
	400	2.	74.	-16.	596.	150.	-179.	-.001	-.001	.000	-.0000	-.0001	.0001
FGRUN	400	-2.	-74.	16.	-596.	-150.	179.	-.001	-.001	.000	-.0000	-.0001	.0001
	405	2.	85.	-16.	482.	190.	-191.	-.000	-.001	.000	-.0000	-.0001	.0001
ELBOW	405	-2.	-85.	16.	-482.	-190.	191.	-.000	-.001	.000	-.0000	-.0001	.0001
	410	2.	100.	-16.	-173.	200.	-201.	-.000	-.000	.000	-.0000	-.0000	.0000
FGRUN	410	-2.	-100.	16.	173.	-200.	201.	-.000	-.000	.000	-.0000	-.0000	.0000
	415	2.	120.	-16.	-1496.	220.	-201.	-.000	-.000	.000	-.0000	-.0000	.0000

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 9W-WW-172-AB (INSIDE) S-7A

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MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	CX	CY	CZ	RX	RY	RZ
FGRUN	125	-18.	-52.	-11.	947.	-527.	322.	.005	-.006	-.002	.0003	.0000	.0005
	165	-18.	75.	11.	-947.	373.	575.	.005	-.001	-.001	.0002	.0000	.0005
FGRUN	165	18.	2.	-11.	947.	-373.	-575.	.005	-.001	-.001	.0002	.0000	.0005
	170	-18.	33.	11.	-947.	141.	901.	.005	-.012	.000	.0001	.0001	.0006
ELBOW	170	18.	-33.	-11.	947.	-141.	-901.	.005	-.012	.000	-.0001	.0001	.0006
	180	-18.	48.	11.	-1013.	75.	1034.	.000	-.016	.000	-.0001	.0000	.0006
ELBOW	180	0.	-48.	-11.	1013.	-75.	-1034.	.000	-.016	.000	-.0001	.0000	.0006
	190	-0.	63.	11.	-745.	75.	1034.	-.005	-.015	-.001	-.0003	-.0000	.0010
FGRUN	190	0.	-63.	-11.	745.	-75.	-1034.	-.005	-.015	-.001	-.0003	-.0000	.0010
	195	-0.	140.	11.	-4043.	76.	1034.	-.006	-.004	-.001	.0001	-.0000	.0013
FGRUN	195	0.	-263.	-11.	-4043.	-76.	-1034.	-.006	-.004	-.001	.0001	-.0000	.0013
	200	-0.	-207.	11.	-3940.	77.	1034.	-.005	-.011	-.001	.0001	.0000	.0015
VALVE	200	0.	207.	-11.	3940.	-77.	-1034.	-.005	-.011	-.001	.0001	.0000	.0015
	205	-0.	-198.	11.	-5155.	77.	1034.	-.005	-.011	-.001	.0000	.0000	.0015
RUN	205	-0.	228.	-0.	0.	-0.	-2566.	-.005	-.011	-.001	.0000	.0000	.0015
	210	0.	-200.	0.	0.	0.	0.	-.023	-.031	-.000	.0000	.0000	.0015
VALVE	205	0.	-130.	-11.	5155.	-77.	1532.	-.005	-.011	-.001	-.0000	.0000	.0015
	215	-0.	140.	11.	-4345.	77.	-1532.	-.005	-.011	-.001	-.0000	.0000	.0015
FGRUN	215	0.	-140.	-11.	4345.	-77.	1532.	-.005	-.011	-.001	-.0000	.0000	.0015
	220	-0.	199.	11.	-1750.	78.	-1532.	-.005	-.003	-.001	-.0002	.0000	.0012
FGRUN	220	0.	80.	-11.	-1750.	-78.	1532.	-.005	-.003	-.001	-.0002	.0000	.0012
	425	-0.	38.	11.	242.	79.	-1532.	-.002	-.001	-.001	.0001	.0001	.0004
FGRUN	425	0.	-71.	-11.	-242.	-79.	1532.	-.002	-.001	-.001	.0001	.0001	.0004
	430	-0.	-12.	11.	-1253.	79.	-1532.	.001	-.004	-.001	.0000	.0001	.0001
VALVE	430	0.	12.	-11.	1253.	-79.	1532.	.001	-.004	-.001	.0000	.0001	.0001
	435	-0.	-2.	11.	-1296.	80.	-1532.	.001	-.004	-.001	.0000	.0001	.0001
VALVE	435	0.	-98.	-11.	1296.	-80.	1532.	.001	-.004	-.001	.0000	.0001	.0001
	440	-0.	107.	11.	-681.	80.	-1532.	.002	-.004	-.001	-.0000	.0001	.0000
FGRUN	440	0.	-107.	-11.	681.	-80.	1532.	.002	-.004	-.001	-.0000	.0001	.0001
	445	-0.	114.	11.	-243.	80.	-1532.	.002	-.004	-.001	-.0000	.0001	.0000
ELBOW	445	0.	-114.	-11.	243.	-80.	1532.	.002	-.004	-.001	-.0000	.0001	.0000
	450	-0.	129.	11.	-486.	14.	-803.	.002	-.003	-.000	-.0001	.0001	-.0002

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LEFT CIS ANALYSIS - 8"-BW-172-AB (INSIDE) S-7A

MEMBER	END	FX	FORCES (LBS)		MX	MOMENTS (IN-LBS)		DEFLECTIONS (IN)			ROTATIONS (RAD)		
			FY	FZ		MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	450	C.	-129.	-11.	-486.	-14.	803.	.002	-.003	-.000	-.0001	.0001	-.0002
	455	-C.	134.	11.	486.	-19.	-407.	.002	-.003	.000	-.0001	.0001	-.0002
ELBOW	455	C.	-134.	-11.	-486.	19.	407.	.002	-.003	.000	-.0001	.0001	-.0002
	460	-C.	150.	11.	553.	-85.	444.	.001	-.002	.001	.0000	.0000	-.0001
FGRUN	460	C.	-150.	-11.	-553.	85.	-444.	.001	-.002	.001	.0000	.0000	-.0001
	465	-C.	159.	11.	619.	-85.	444.	.001	-.002	.001	.0000	.0000	-.0001
ELBOW	465	C.	-159.	-11.	-619.	85.	-444.	.001	-.002	.001	.0000	.0000	-.0001
	470	-C.	175.	11.	-317.	-86.	444.	.000	-.001	-.000	.0001	.0000	-.0000
FGRUN	470	C.	-175.	-11.	-317.	86.	-444.	.000	-.001	-.000	.0001	.0000	-.0000
	475	-C.	198.	11.	-2931.	-86.	444.	.000	-.000	-.000	.0000	.0000	-.0000
FGRUN	5	C.	176.	-0.	-0.	-0.	-2455.	-.000	-.000	.000	.0001	.0000	.0000
	225	-C.	-90.	0.	0.	-0.	-0.	-.000	-.001	.000	.0001	.0000	.0000

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 LCFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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SUPPORT REACTIONS FOR LOAD CASE NO. 2
 THERMAL EXPANSION PLUS ANCHOR MOVEMENTS

NODE	TYPE	REACTION (LBS OR IN-LBS)	DIRECTION
1	FOR	-27.	X CCGRO
1	FOR	-9.	Y CCGRO
1	FOR	-16.	Z CCGRO
1	FOR	-35.	X CCGRO
1	FOR	-6.	Y CCGRO
1	FOR	-31.	Z CCGRO
20	FOR	8.	Y CCGRO
42	FOR	13.	Z CCGRO
70	FOR	1.	Y CCGRO
105	FOR	4.	Y CCGRO
140	FOR	-5.	Y CCGRO
175	FOR	4.	Y CCGRO
210	FOR	7.	Y CCGRO
245	FOR	-15.	Y CCGRO
280	FOR	-2.	X CCGRO
315	FOR	-12.	Y CCGRO
350	FOR	10.	Y CCGRO
385	FOR	10.	Z CCGRO
420	FOR	4.	X CCGRO
455	FOR	-5.	Y CCGRO
490	FOR	20.	Z CCGRO
525	FOR	1.	Y CCGRO
560	FOR	29.	X CCGRO
595	FOR	-6.	Y CCGRO
630	FOR	8.	Y CCGRO
665	FOR	-12.	Y CCGRO
700	FOR	-10.	X CCGRO
735	FOR	-7.	Y CCGRO
770	FOR	-4.	Z CCGRO
805	FOR	-75.	X CCGRO
840	FOR	44.	Y CCGRO
875	FOR	88.	Z CCGRO

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LOFT CIS ANALYSIS - 6"-WB-172-AB (INSIDE) S-7A

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
FORUN	1 5	-27.	-9.	-18.	-25.	-675.	319.	.000	.000	.000	-.0000	.0000	-.0000
		27.	9.	18.	-25.	121.	-45.	-.006	.000	.000	-.0000	.0000	-.0000
FORUN	5 10	-27.	-9.	-18.	-25.	-121.	45.	-.006	.000	.000	-.0000	.0000	-.0000
		27.	9.	18.	-90.	318.	-45.	-.006	.000	-.001	-.0000	.0000	-.0000
ELBOW	10 15	-27.	-9.	-18.	-90.	-318.	45.	-.006	.000	-.001	-.0000	.0000	-.0000
		27.	9.	18.	-144.	373.	10.	-.007	.000	-.002	-.0000	.0001	-.0000
FORUN	15 20	-27.	-9.	-18.	-144.	-373.	-10.	-.007	.000	-.002	-.0000	.0001	-.0000
		27.	9.	18.	-144.	-46.	217.	-.012	-.000	.001	-.0000	.0001	-.0000
FORUN	20 25	-27.	-1.	-18.	-144.	46.	-217.	-.012	-.000	.001	-.0000	.0001	-.0000
		27.	1.	18.	-144.	-883.	275.	-.021	-.002	.005	-.0001	.0000	.0001
ELBOW	25 30	-27.	-1.	-18.	-144.	883.	-275.	-.021	-.002	.005	-.0001	.0000	.0001
		27.	1.	18.	-35.	-993.	118.	-.021	-.004	.005	-.0000	-.0001	.0001
FORUN	30 35	-27.	-1.	-18.	-35.	-993.	-118.	-.021	-.004	.005	-.0000	-.0001	.0001
		27.	1.	18.	20.	-993.	36.	-.021	-.004	.005	-.0000	-.0001	.0001
ELBOW	35 40	-27.	-1.	-18.	-20.	-993.	-36.	-.021	-.004	.005	-.0000	-.0001	.0001
		27.	1.	18.	129.	-1102.	-121.	-.021	-.006	.004	-.0000	-.0003	.0001
FORUN	40 42	-27.	-1.	-18.	-129.	-1102.	121.	-.021	-.006	.004	-.0000	-.0003	.0001
		27.	1.	18.	129.	-1321.	-106.	-.023	-.007	-.000	.0000	-.0004	.0001
FORUN	42 45	-27.	-1.	-5.	-129.	-1321.	106.	-.023	-.007	-.000	.0000	-.0004	.0001
		27.	1.	5.	129.	-1439.	-78.	-.028	-.009	-.010	.0001	-.0005	.0001
ELBOW	45 50	-27.	-1.	-5.	-129.	-1439.	78.	-.028	-.009	-.010	.0001	-.0005	.0001
		27.	1.	5.	122.	-1308.	-71.	-.024	-.009	-.015	.0001	-.0009	.0001
FORUN	50 55	-27.	-1.	-5.	-122.	-1308.	71.	-.024	-.009	-.015	.0001	-.0009	.0001
		27.	1.	5.	65.	-76.	-71.	.019	-.005	-.024	.0001	-.0010	.0001
FORUN	55 60	-27.	-1.	-5.	-65.	-76.	-71.	.019	-.005	-.024	.0001	-.0010	.0001
		27.	1.	5.	9.	1156.	71.	.064	-.000	-.032	.0001	-.0009	.0000
ELBOW	60 65	-27.	-1.	-5.	-9.	-1156.	71.	.064	-.000	-.032	.0001	-.0009	.0000
		27.	1.	5.	1.	1288.	-63.	.068	-.000	-.038	.0001	-.0006	.0000

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 LOFT CIS ANALYSIS - E"-WW-172-AB (INSIDE) S-7A

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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	65	-27.	-1.	-5.	-1.	-1288.	-63.	.068	-.000	-.038	.0001	-.0006	.0000
	70	27.	1.	5.	1.	1201.	-43.	.064	-.000	-.046	.0001	-.0005	.0000
FGRUN	70	-27.	-0.	-5.	-1.	-1201.	43.	.064	-.000	-.046	.0001	-.0005	.0000
	80	27.	0.	5.	1.	879.	-36.	.053	-.001	-.066	.0001	-.0002	.0000
FGRUN	80	-27.	-0.	-5.	-1.	-879.	36.	.053	-.001	-.066	.0001	-.0002	.0000
	85	27.	0.	5.	1.	557.	-28.	.042	-.001	-.071	.0001	-.0000	.0000
VALVE	85	-27.	-0.	-5.	-1.	-557.	28.	.042	-.001	-.071	.0001	.0000	-.0000
	90	27.	0.	5.	1.	520.	-27.	.040	-.001	-.071	.0001	.0000	-.0000
VALVE	90	-27.	-0.	-5.	-1.	-520.	27.	.040	-.001	-.071	.0001	.0000	-.0000
	100	27.	0.	5.	1.	482.	-26.	.039	-.001	-.070	.0001	.0000	-.0000
FGRUN	100	-27.	-0.	-5.	-1.	-482.	26.	.039	-.001	-.070	.0001	.0000	-.0000
	103	27.	0.	5.	1.	311.	-22.	.033	-.000	-.068	.0001	.0001	-.0000
FGRUN	103	-27.	-0.	-5.	-1.	-311.	22.	.033	-.000	-.068	.0001	.0001	-.0000
	105	27.	0.	5.	1.	140.	-19.	.027	-.000	-.065	.0001	.0001	-.0000
FGRUN	105	-27.	-4.	-5.	-1.	-140.	19.	.027	-.000	-.065	.0001	.0001	-.0000
	110	27.	4.	5.	1.	100.	-50.	.026	.000	-.064	.0001	.0001	-.0000
ELBOW	110	-27.	-4.	-5.	-1.	-100.	50.	.026	.000	-.064	.0001	.0001	-.0000
	112	27.	4.	5.	-8.	77.	-20.	.025	.000	-.063	.0001	.0001	-.0000
FGRUN	112	-27.	-4.	-5.	8.	-77.	20.	.025	.000	-.063	.0001	.0001	-.0000
	113	27.	4.	5.	-54.	31.	176.	.023	.002	-.060	.0001	.0001	-.0000
ELBOW	113	-27.	-4.	-5.	54.	-31.	-176.	.023	.002	-.060	.0001	.0001	-.0000
	115	27.	4.	5.	-64.	8.	206.	.022	.003	-.060	.0001	.0001	-.0000
FGRUN	115	-27.	-4.	-5.	64.	-8.	-206.	.022	.003	-.060	.0001	.0001	-.0000
	120	27.	4.	5.	-64.	-206.	37.	.015	.002	-.054	.0001	.0001	-.0000
FGRUN	120	-27.	-4.	-5.	64.	206.	-37.	.015	.002	-.054	.0001	.0001	-.0000
	125	27.	4.	5.	-64.	-417.	-130.	.007	.000	-.050	.0001	.0001	-.0000
FGRUN	125	-2.	2.	-10.	-10.	204.	59.	.007	.000	-.050	.0001	.0001	-.0000
	130	2.	-2.	10.	48.	-204.	-68.	.007	.001	-.049	.0001	.0001	-.0000
ELBOW	130	-2.	2.	-10.	48.	204.	68.	.007	.001	-.049	.0001	.0001	-.0000
	135	2.	-2.	10.	-118.	-195.	-77.	.007	.002	-.048	.0001	.0000	-.0000
FGRUN	135	-2.	2.	-10.	118.	195.	77.	.007	.002	-.048	.0001	.0000	-.0000
	140	2.	-2.	10.	-207.	-124.	-77.	.008	.000	-.039	.0000	-.0000	.0000

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1

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LCFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	PZ
FGRUN	140	-2.	-3.	-10.	-207.	124.	77.	.008	-.000	-.036	-.0000	-.0000	-.0000
	143	-2.	-3.	-10.	-102.	-73.	-77.	.008	-.000	-.032	-.0000	-.0000	-.0000
VALVE	143	-2.	-3.	-10.	102.	73.	77.	.008	-.000	-.032	-.0000	-.0000	-.0000
	145	-2.	-3.	-10.	-83.	-64.	-77.	.008	-.000	-.031	-.0000	-.0000	-.0000
RUN	145	-0.	-0.	-0.	-0.	-0.	-0.	.008	-.000	-.031	-.0000	-.0000	-.0000
	150	0.	0.	0.	-0.	-0.	-0.	.006	.002	-.031	-.0000	-.0000	-.0000
VALVE	145	-2.	-3.	-10.	83.	64.	77.	.008	-.000	-.031	-.0000	-.0000	-.0000
	155	-2.	-3.	-10.	-65.	-55.	-77.	.008	-.000	-.030	-.0000	-.0000	-.0000
FGRUN	155	-2.	-3.	-10.	65.	55.	77.	.008	-.000	-.030	-.0000	-.0000	-.0000
	160	-2.	-3.	-10.	46.	-1.	-77.	.007	-.000	-.023	-.0000	-.0000	-.0000
FGRUN	160	-2.	-1.	-10.	-46.	1.	77.	.007	-.000	-.023	-.0000	-.0000	-.0000
	365	-2.	-1.	-10.	-4.	107.	-77.	.005	-.000	-.009	.0000	-.0000	-.0001
FGRUN	365	-2.	8.	-10.	4.	-107.	77.	.005	-.000	-.009	.0000	-.0000	-.0001
	370	-2.	-8.	-10.	-79.	122.	-77.	.005	-.000	-.007	.0000	-.0000	-.0001
VALVE	370	-2.	-8.	-10.	79.	-122.	77.	.005	-.000	-.007	-.0000	-.0000	-.0001
	375	-2.	-8.	-10.	-124.	131.	-77.	.005	-.000	-.006	-.0000	-.0000	-.0001
VALVE	375	-2.	-8.	-10.	124.	-131.	77.	.005	-.000	-.006	-.0000	.0000	-.0001
	380	-2.	-8.	-10.	-170.	140.	-77.	.005	-.000	-.005	-.0000	.0000	-.0001
FGRUN	380	-2.	8.	-10.	170.	-140.	77.	.005	-.000	-.005	-.0000	.0000	-.0001
	385	-2.	-8.	-10.	-219.	150.	-77.	.005	-.000	-.004	-.0000	.0000	-.0001
ELBOW	385	-2.	-8.	-10.	219.	-150.	77.	.005	-.000	-.004	-.0000	.0000	-.0001
	390	-2.	-8.	-10.	-251.	139.	-50.	.005	.000	-.003	-.0000	.0000	-.0001
FGRUN	390	-2.	-10.	-10.	251.	-139.	50.	.005	.000	-.003	-.0000	.0000	-.0001
	395	-2.	10.	10.	-32.	-33.	129.	.002	.003	.002	-.0001	.0000	-.0001
ELBOW	395	-2.	-10.	-10.	32.	33.	-129.	.002	.003	.002	-.0001	.0000	-.0001
	400	-2.	10.	10.	71.	-68.	182.	.001	.003	.003	-.0000	.0000	-.0001
FGRUN	400	-2.	-10.	-10.	-71.	68.	-182.	.001	.003	.003	-.0000	.0000	-.0001
	405	-2.	10.	10.	139.	-68.	193.	.000	.001	.003	-.0000	.0000	-.0001
ELBOW	405	-2.	-10.	-10.	-139.	68.	-193.	.000	.001	.003	-.0000	.0000	-.0001
	410	-2.	10.	10.	139.	-77.	202.	.000	.000	.002	-.0000	.0000	-.0000
FGRUN	410	-2.	-10.	-10.	-135.	77.	-202.	.000	-.000	-.002	-.0000	.0000	-.0000
	415	-2.	10.	10.	9.	-99.	202.	.000	-.000	-.000	-.0000	.0000	-.0000

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LEFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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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	125	-29.	-2.	-4.	74.	213.	-71.	.007	-.000	-.050	.0001	.0001	.0000
	165	29.	-2.	-4.	-74.	-152.	-104.	.005	-.000	-.049	.0001	.0001	.0000
FGRUN	165	-29.	-3.	-4.	74.	152.	104.	.005	-.000	-.049	.0001	.0001	.0000
	170	29.	-3.	-4.	-74.	-61.	-169.	.001	-.000	-.048	.0001	.0000	.0000
ELBOW	170	-29.	-3.	-4.	74.	61.	169.	.001	-.000	-.048	.0001	.0000	.0000
	180	29.	-3.	-4.	-74.	-35.	-15.	-.000	.001	-.047	.0001	.0000	-.0000
ELBOW	180	0.	-3.	-4.	48.	35.	15.	-.000	.001	-.047	.0001	.0000	-.0000
	190	-0.	-3.	-4.	-41.	-34.	-15.	.000	.002	-.046	.0000	.0000	-.0000
FGRUN	190	0.	-3.	-4.	41.	34.	15.	.000	.002	-.046	.0000	.0000	-.0000
	195	-0.	-3.	-4.	-187.	-32.	-15.	.001	.000	-.037	.0000	.0000	-.0000
FGRUN	195	0.	-3.	-4.	187.	32.	15.	.001	-.000	-.037	.0000	.0000	-.0000
	200	-0.	-3.	-4.	-187.	-30.	-15.	.002	-.000	-.036	.0000	.0000	-.0000
VALVE	200	0.	-3.	-4.	73.	30.	15.	.002	-.000	-.030	.0000	.0000	-.0000
	205	-0.	-3.	-4.	-53.	-29.	-15.	.002	-.000	-.029	.0000	.0000	-.0000
RUN	205	0.	-0.	-0.	0.	0.	-0.	.002	-.000	-.029	.0000	.0000	-.0000
	210	0.	-0.	-0.	-0.	-0.	-0.	.000	.003	-.029	.0000	.0000	-.0000
VALVE	205	0.	-3.	-4.	53.	29.	15.	.002	-.000	-.029	.0000	.0000	-.0000
	215	-0.	-3.	-4.	-53.	-29.	-15.	.002	-.000	-.028	.0000	.0000	-.0000
FGRUN	215	0.	-3.	-4.	33.	29.	15.	.002	-.000	-.028	.0000	.0000	-.0000
	220	-0.	-3.	-4.	87.	-27.	-15.	.003	-.000	-.021	.0000	.0000	-.0000
FGRUN	220	0.	-5.	-4.	-57.	27.	15.	.003	-.000	-.021	.0000	.0000	-.0000
	425	-0.	-5.	-4.	-259.	-23.	-15.	.003	.000	-.007	.0000	.0000	-.0000
FGRUN	425	0.	-7.	-4.	259.	23.	15.	.003	.000	-.007	.0000	.0000	-.0000
	430	-0.	-7.	-4.	-14.	-21.	-15.	.003	.002	-.001	.0001	.0000	-.0000
VALVE	430	0.	-7.	-4.	14.	21.	15.	.003	.002	-.001	.0001	.0000	-.0000
	435	-0.	-7.	-4.	-14.	-20.	-15.	.003	.002	-.001	.0001	.0000	-.0000
VALVE	435	0.	-7.	-4.	-27.	20.	15.	.003	.002	.001	.0001	.0000	-.0000
	440	-0.	-7.	-4.	68.	-20.	-15.	.003	.002	.002	.0001	.0000	-.0000
FGRUN	440	0.	-7.	-4.	-68.	20.	15.	.003	.002	.002	.0001	.0000	-.0000
	445	-0.	-7.	-4.	95.	-20.	-15.	.003	.003	.003	.0001	.0000	-.0000
ELBOW	445	0.	-7.	-4.	-95.	20.	15.	.003	.003	.003	.0001	.0000	-.0000
	450	-0.	-7.	-4.	136.	6.	26.	.002	.003	.004	.0000	.0000	-.0000

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8M-KW-172-AB (INSIDE) S-7A

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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	45C	C.	-7.	4.	-136.	-6.	-26.	.002	.003	.004	-.0000	-.0000	-.0000
	455	-C.	7.	-4.	136.	20.	48.	.001	.003	.004	-.0000	-.0000	-.0000
ELBCH	455	C.	-7.	4.	-136.	-20.	-46.	.001	.003	.004	-.0000	-.0000	-.0000
	45C	-C.	7.	-4.	110.	46.	88.	.000	.002	.004	-.0000	-.0000	-.0000
FGRUN	46C	C.	-7.	4.	-110.	-46.	-88.	.000	.002	.004	-.0000	-.0000	-.0000
	465	-C.	7.	-4.	84.	46.	88.	.000	.001	.004	-.0000	-.0000	-.0000
ELBCH	465	C.	-7.	4.	-84.	-46.	-88.	.000	.001	.004	-.0000	-.0000	-.0000
	47C	-C.	7.	-4.	17.	45.	88.	-.000	-.000	.003	-.0000	-.0000	-.0000
FGRUN	47C	C.	-7.	4.	-17.	-45.	-88.	-.000	-.000	.003	-.0000	-.0000	-.0000
	475	-C.	7.	-4.	-79.	44.	88.	.000	-.000	.000	-.0000	-.0000	-.0000
FGRUN	5	-C.	-0.	-0.	-0.	-0.	0.	-.006	.000	.000	-.0000	.0000	-.0000
	225	C.	0.	0.	0.	0.	0.	-.009	.000	.000	-.0000	.0000	-.0000

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APPENDIX D
THERMAL EXPANSION ANALYSIS RESULTS

APPENDIX E
SEISMIC ANALYSES RESULTS

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1

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LOFT CIS ANALYSIS - 6" WW-172-AB (INSIDE) S-7A

*** PIPING DYNAMIC ANALYSIS ***
- FREE VIBRATION RESULTS -

NO. OF SIGNIFICANT MODES = 29

- MODE ORTHOGONALITY CHECK -

MAX. CM DIAGONAL TERM = .100E+01
MIN. CM DIAGONAL TERM = .100E+01
MAX. CFF DIAGONAL TERM = .754E-12
MIN. CFF DIAGONAL TERM = -.152E-12

MASS PARTICIPATION FACTOR = SUM(M(I)*PHI(I))

MODE	X	Y	Z
1	.2954E+00	.2447E-01	.1470E+01
2	.1346E+01	.2881E-01	.5813E+00
3	.1246E+01	.3501E-01	.5342E+00
4	.1374E-01	.1379E+00	.3038E-01
5	.1519E+00	.1379E+00	.6409E-01
6	.1971E+00	.1379E+00	.1443E+01
7	.3581E+00	.1379E+00	.1285E+01
8	.5540E+00	.4330E+00	.1651E+00
9	.5091E+00	.4113E+00	.1432E+00
10	.6070E-01	.2553E+00	.4275E+00
11	.5340E+00	.8944E-01	.2027E+00
12	.4105E+00	.2033E+00	.4431E+00
13	.1250E+01	.2033E+00	.1284E+00
14	.4545E+00	.2224E+00	.4087E+00
15	.4386E+00	.1000E+01	.1767E+00
16	.2391E+00	.6038E+00	.1326E+00
17	.6464E-02	.4669E+00	.6289E-01
18	.2401E+00	.3422E+00	.6792E-01
19	.4291E+00	.1746E+00	.6919E-01
20	.2469E+00	.3334E+00	.3680E-01
21	.3422E+00	.8088E+00	.7656E+00
22	.2710E+00	.2800E+00	.1036E+00
23	.1755E+00	.4000E+00	.6554E+00
24	.1457E+00	.6988E+00	.4580E-01
25	.2052E+00	.1395E+00	.7156E-01
26	.3757E-01	.7000E+00	.6118E+00
27	.8321E-02	.2471E+00	.4500E+00
28	.2776E+00	.8436E+00	.6074E-01
29	.1795E+00	.3164E+00	.2452E+00

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1

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LEFT CIS ANALYSIS - 88-WW-172-AB (INSIDE) S-7A

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING

COMBINED RESULT FOR MODE 1 THRU 29 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	1	384.	234.	113.	4918.	8115.	6207.	.000	.000	.000	.0000	.0000	.0000
	5	384.	234.	113.	4918.	5322.	1012.	.000	.001	.002	.0001	.0001	.0000
FGRUN	5	384.	230.	71.	4918.	5175.	1021.	.000	.001	.002	.0001	.0001	.0000
	10	384.	230.	71.	2308.	2498.	1021.	.001	.002	.002	.0002	.0002	.0000
ELBOW	10	383.	230.	71.	3308.	2498.	1021.	.001	.002	.002	.0002	.0002	.0000
	15	383.	230.	71.	2032.	735.	2381.	.004	.005	.004	.0006	.0005	.0001
FGRUN	15	383.	230.	68.	2032.	735.	2381.	.004	.005	.004	.0006	.0005	.0001
	20	383.	230.	66.	2032.	1628.	7659.	.004	.003	.015	.0009	.0004	.0007
FGRUN	20	381.	110.	58.	2032.	1628.	7659.	.004	.003	.015	.0009	.0004	.0007
	25	381.	110.	58.	2032.	4118.	4316.	.004	.008	.025	.0015	.0009	.0020
ELBOW	25	380.	51.	60.	2032.	4118.	4316.	.004	.008	.025	.0015	.0009	.0020
	30	380.	51.	60.	1817.	4407.	2432.	.017	.082	.023	.0016	.0009	.0028
FGRUN	30	380.	87.	61.	1817.	4407.	2432.	.017	.082	.023	.0016	.0009	.0028
	35	380.	87.	61.	1730.	4407.	2031.	.026	.082	.024	.0016	.0010	.0028
ELBOW	35	379.	83.	62.	1730.	4407.	2031.	.026	.082	.024	.0016	.0010	.0028
	40	379.	83.	62.	1604.	4689.	2490.	.043	.100	.020	.0017	.0016	.0030
FGRUN	40	378.	77.	62.	1604.	4689.	2490.	.043	.100	.020	.0017	.0016	.0030
	42	378.	77.	62.	1604.	5264.	1860.	.043	.136	.001	.0019	.0019	.0030
FGRUN	42	376.	65.	571.	1604.	5264.	1860.	.043	.136	.001	.0019	.0019	.0030
	45	376.	65.	571.	1604.	7454.	1475.	.043	.202	.044	.0021	.0018	.0030
ELBOW	45	375.	47.	566.	1604.	7454.	1475.	.043	.202	.044	.0021	.0018	.0030
	50	375.	47.	566.	1717.	8634.	1493.	.041	.205	.051	.0024	.0008	.0027
FGRUN	50	373.	37.	557.	1717.	8634.	1493.	.041	.205	.051	.0024	.0008	.0027
	55	373.	37.	557.	1665.	8563.	1443.	.068	.092	.051	.0026	.0007	.0024
FGRUN	55	368.	56.	544.	1665.	8563.	1493.	.068	.092	.051	.0026	.0007	.0024
	60	368.	56.	544.	2462.	24813.	1493.	.028	.032	.051	.0026	.0032	.0022
ELBOW	60	367.	59.	538.	2462.	24813.	1493.	.028	.032	.051	.0026	.0032	.0022
	65	367.	59.	538.	2713.	23799.	1221.	.021	.033	.091	.0024	.0093	.0022
FGRUN	65	368.	61.	535.	2713.	23799.	1221.	.021	.033	.091	.0024	.0093	.0022
	70	368.	61.	535.	2713.	15374.	948.	.021	.001	.250	.0023	.0109	.0021

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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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	70	371.	164.	513.	2713.	15374.	948.	.021	.001	.250	.0023	.0108	.0021
	80	371.	164.	513.	2713.	15494.	6107.	.021	.111	.942	.0021	.0109	.0013
FGRUN	80	378.	62.	399.	2713.	15494.	6107.	.021	.111	.942	.0021	.0109	.0013
	90	378.	62.	399.	2713.	38735.	8814.	.021	.125	1.392	.0024	.0033	.0009
VALVE	85	383.	39.	308.	2713.	38735.	8814.	.021	.125	1.392	.0024	.0033	.0009
	90	383.	39.	308.	2713.	40842.	8941.	.021	.118	1.411	.0024	.0029	.0010
VALVE	90	429.	170.	250.	2713.	40842.	8941.	.021	.118	1.411	.0024	.0029	.0010
	100	429.	170.	250.	2713.	39220.	7785.	.021	.111	1.428	.0024	.0026	.0011
FGRUN	100	436.	187.	302.	2713.	39220.	7785.	.021	.111	1.428	.0024	.0026	.0011
	103	436.	187.	302.	2713.	30321.	2327.	.021	.061	1.407	.0028	.0037	.0019
FGRUN	103	446.	203.	378.	2713.	30321.	2327.	.021	.061	1.407	.0028	.0037	.0019
	105	446.	203.	378.	2713.	19143.	4861.	.020	.003	1.241	.0031	.0073	.0017
FGRUN	105	453.	112.	419.	2713.	19143.	4861.	.020	.003	1.241	.0031	.0073	.0017
	110	453.	112.	419.	2713.	16265.	4554.	.020	.010	1.186	.0032	.0079	.0016
ELBCW	110	455.	112.	432.	2713.	16265.	4554.	.020	.010	1.186	.0032	.0079	.0016
	112	455.	112.	432.	2040.	14610.	4219.	.019	.016	1.145	.0037	.0095	.0012
FGRUN	112	458.	111.	449.	2040.	14610.	4219.	.019	.016	1.145	.0037	.0095	.0012
	113	458.	111.	449.	2339.	11278.	4563.	.015	.025	1.033	.0036	.0103	.0010
ELBCW	113	460.	110.	464.	2339.	11278.	4563.	.015	.025	1.033	.0036	.0103	.0010
	115	460.	110.	464.	3085.	9658.	4765.	.015	.027	.982	.0037	.0112	.0009
FGRUN	115	465.	108.	505.	3085.	9658.	4765.	.015	.027	.982	.0037	.0112	.0009
	120	465.	108.	505.	3085.	13105.	3682.	.015	.031	.541	.0030	.0109	.0004
FGRUN	120	482.	115.	583.	3085.	13105.	3682.	.015	.031	.541	.0030	.0109	.0004
	125	482.	115.	583.	3085.	34406.	5244.	.015	.012	.202	.0022	.0068	.0008
FGRUN	125	493.	205.	1027.	4240.	25580.	7330.	.015	.012	.202	.0022	.0068	.0008
	130	493.	205.	1027.	3744.	25580.	4448.	.015	.012	.191	.0022	.0063	.0009
ELBCW	130	492.	205.	1028.	3744.	25580.	4448.	.015	.012	.191	.0022	.0063	.0009
	135	492.	205.	1028.	6051.	23096.	1814.	.047	.011	.184	.0006	.0055	.0024
FGRUN	135	488.	206.	1030.	6051.	23096.	1814.	.047	.011	.184	.0006	.0055	.0024
	140	488.	206.	1030.	2006.	13578.	1814.	.306	.003	.183	.0003	.0054	.0028
FGRUN	140	437.	91.	1035.	2006.	13578.	1814.	.306	.003	.183	.0003	.0054	.0028
	143	437.	91.	1035.	2432.	22309.	1814.	.446	.006	.183	.0001	.0035	.0031

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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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	143	400.	84.	1037.	2432.	22309.	1814.	.446	.006	.183	.0001	.0035	.C031
	145	400.	84.	1037.	2829.	24232.	1814.	.463	.006	.183	.0001	.0034	.C031
RUN	145	301.	123.	156.	1697.	1697.	4280.	.463	.006	.183	.C001	.C034	.C031
	150	301.	123.	152.	0.	0.	0.	.495	.041	.219	.C001	.C034	.C033
VALVE	145	181.	83.	1088.	2814.	24535.	2617.	.463	.006	.183	.C001	.0034	.C031
	135	181.	83.	1088.	2321.	23887.	2617.	.478	.006	.183	.C001	.C032	.C031
FERUN	155	207.	91.	1095.	2321.	23887.	2617.	.478	.006	.183	.C001	.C032	.C031
	160	207.	91.	1095.	1019.	19182.	2617.	.501	.001	.183	.C001	.C025	.C026
FERUN	160	287.	21.	1117.	1019.	19182.	2617.	.501	.001	.183	.C001	.C025	.C026
	365	287.	21.	1117.	633.	12900.	2617.	.274	.002	.182	.C000	.C050	.C017
FERUN	365	315.	191.	1135.	633.	12900.	2617.	.274	.002	.182	.C000	.C050	.C017
	370	315.	191.	1135.	2230.	14124.	2617.	.228	.002	.182	.C001	.0051	.C016
VALVE	370	320.	191.	1138.	2230.	14124.	2617.	.228	.002	.182	.C001	.C051	.C016
	375	320.	191.	1138.	3351.	15111.	2617.	.199	.002	.182	.C001	.C051	.C016
VALVE	375	362.	191.	1170.	3351.	15111.	2617.	.199	.002	.182	.C001	.C051	.C016
	380	362.	191.	1170.	4485.	16147.	2617.	.171	.002	.182	.C002	.C051	.C016
FERUN	380	366.	191.	1173.	4485.	16147.	2617.	.171	.002	.182	.C002	.C051	.C016
	385	366.	191.	1173.	5721.	17505.	2617.	.141	.002	.182	.C003	.C051	.C016
ELEC	385	369.	191.	1176.	5721.	17505.	2617.	.141	.002	.182	.C003	.C051	.C016
	390	369.	191.	1176.	5527.	16468.	2623.	.120	.002	.174	.C010	.C053	.C013
FERUN	390	376.	227.	1185.	5527.	16468.	2623.	.120	.002	.174	.C010	.C053	.C013
	395	376.	227.	1185.	9602.	10649.	3188.	.014	.008	.073	.C022	.C050	.C012
ELBOW	395	375.	228.	1190.	5602.	10649.	3188.	.014	.008	.073	.C022	.C050	.C012
	400	375.	228.	1190.	3330.	14041.	2701.	.018	.017	.040	.C034	.C033	.C006
FERUN	400	379.	228.	1192.	3330.	14041.	2701.	.018	.017	.040	.C034	.C033	.C006
	405	379.	228.	1192.	5177.	14041.	3107.	.016	.017	.016	.C033	.C027	.C006
ELBOW	405	380.	229.	1192.	13313.	13457.	4785.	.005	.005	.006	.C009	.C008	.C004
	410	380.	229.	1192.	13313.	13457.	4785.	.005	.005	.006	.C009	.C008	.C004
FERUN	410	380.	229.	1192.	13313.	13457.	4785.	.005	.005	.006	.C009	.C008	.C004
	415	380.	229.	1192.	15541.	13426.	4785.	.000	.000	.000	.C000	.C000	.C000
FERUN	125	660.	179.	631.	5920.	26354.	6451.	.015	.012	.202	.C022	.C068	.C008
	165	660.	179.	631.	5920.	20603.	6116.	.014	.002	.132	.C018	.C061	.C009

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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	165	664.	110.	636.	5920.	20603.	6116.	.014	.002	.132	.0018	.0061	.0009
	170	664.	110.	636.	5920.	17746.	6622.	.014	.022	.108	.0014	.0062	.0014
ELBCW	170	668.	106.	640.	5920.	17746.	6622.	.014	.022	.108	.0014	.0062	.0014
	180	668.	106.	640.	2661.	18703.	6095.	.009	.034	.133	.0009	.0075	.0028
ELBCW	180	607.	105.	643.	2661.	18703.	6098.	.009	.034	.133	.0009	.0075	.0028
	190	607.	105.	643.	2790.	15202.	2758.	.077	.030	.134	.0007	.0097	.0043
FGRUN	190	600.	105.	651.	2790.	15292.	2758.	.077	.030	.134	.0007	.0097	.0043
	195	600.	105.	651.	3433.	15166.	2758.	.551	.002	.133	.0004	.0094	.0050
FGRUN	195	532.	111.	665.	3433.	15166.	2758.	.551	.002	.133	.0004	.0094	.0050
	200	532.	111.	665.	2470.	32568.	2758.	.813	.007	.133	.0001	.0055	.0056
VALVE	200	483.	104.	672.	2470.	32568.	2758.	.813	.007	.133	.0001	.0055	.0056
	205	483.	104.	672.	2776.	35417.	2758.	.844	.007	.133	.0000	.0052	.0056
RLN	205	370.	137.	144.	1729.	1729.	5190.	.844	.007	.133	.0000	.0052	.0056
	210	370.	137.	144.	0.	0.	0.	.909	.007	.192	.0001	.0052	.0058
VALVE	205	102.	89.	736.	3105.	36144.	2712.	.844	.007	.133	.0000	.0052	.0056
	215	102.	89.	786.	2579.	35682.	2712.	.874	.007	.133	.0000	.0048	.0056
FGRUN	215	148.	98.	798.	2579.	35682.	2712.	.874	.007	.133	.0000	.0048	.0056
	220	148.	98.	798.	1110.	31017.	2712.	.936	.001	.133	.0002	.0013	.0050
FGRUN	220	286.	47.	830.	1110.	31017.	2712.	.936	.001	.133	.0002	.0013	.0050
	425	286.	47.	830.	2836.	11593.	2712.	.540	.001	.132	.0003	.0086	.0038
FGRUN	425	372.	136.	862.	2836.	11593.	2712.	.540	.001	.132	.0003	.0086	.0038
	430	372.	136.	862.	5511.	5435.	2712.	.208	.021	.132	.0009	.0094	.0032
VALVE	430	387.	134.	876.	5511.	5435.	2712.	.208	.021	.132	.0009	.0094	.0032
	435	387.	134.	876.	6227.	6882.	2712.	.151	.027	.132	.0010	.0094	.0032
VALVE	435	425.	136.	920.	6227.	6882.	2712.	.151	.027	.132	.0010	.0094	.0032
	440	425.	136.	920.	6967.	8846.	2712.	.095	.032	.132	.0010	.0093	.0032
FGRUN	440	428.	137.	923.	6967.	8846.	2712.	.095	.032	.132	.0010	.0093	.0032
	445	428.	137.	923.	7465.	10289.	2712.	.059	.036	.132	.0011	.0092	.0031
ELBCW	445	430.	139.	928.	7465.	10289.	2712.	.059	.036	.132	.0011	.0092	.0031
	450	430.	139.	928.	8234.	14153.	2705.	.019	.030	.088	.0023	.0066	.0025
FGRUN	450	431.	140.	931.	8234.	14153.	2705.	.019	.030	.088	.0023	.0066	.0025
	455	431.	140.	931.	8234.	15628.	2798.	.019	.023	.070	.0025	.0064	.0025

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 LGFT CIS ANALYSIS - 8M-KW-172-AB (INSIDE) S-7A

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MEMBER	END	FORCES (LBS)			MX	MOMENTS (IN-LBS)		DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ		MY	MZ	DX	DY	DZ	RX	RY	RZ
ELBOW	455	432.	141.	934.	8234.	15628.	2798.	.019	.023	.070	.0025	.0064	.0025
	460	432.	141.	934.	2641.	19478.	5453.	.014	.014	.027	.0024	.0041	.0016
FORUN	460	433.	143.	935.	2641.	19478.	5453.	.014	.014	.027	.0024	.0041	.0016
	465	433.	143.	935.	3007.	19478.	7935.	.016	.014	.012	.0024	.0033	.0014
ELBOW	465	433.	144.	936.	3007.	19478.	7935.	.016	.014	.012	.0024	.0033	.0014
	470	433.	144.	936.	5293.	17230.	10473.	.007	.005	.000	.0007	.0010	.0009
FORUN	470	433.	145.	936.	5293.	17230.	10473.	.007	.005	.000	.0007	.0010	.0009
	475	433.	145.	936.	11299.	12509.	10473.	.000	.000	.000	.0000	.0000	.0000
FORUN	5	0.	9.	39.	0.	72.	157.	.000	.001	.002	.0001	.0001	.0000
	225	0.	9.	39.	0.	0.	0.	.000	.002	.004	.0001	.0001	.0000

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
LEFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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SYSTEM ACCELERATION FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING

COMBINED RESULT FOR MODE 1 THRU 29 BY RMS SUMMATION

SPECTRA SET = 1

POINT NO.	X-DIRECTION (G)	Y-DIRECTION (G)	Z-DIRECTION (G)
1	.000	.000	.000
10	.001	.033	.145
15	.067	.035	.145
20	.144	.048	.220
25	.146	.062	.522
30	.150	.658	.706
35	.205	.759	.510
40	.248	.755	.437
45	.328	.737	.248
50	.328	.715	.014
55	.330	1.000	.529
60	.360	1.026	.640
65	.757	.628	.642
70	.369	.526	.643
75	.378	.409	.629
80	.378	.085	.686
85	.377	.819	1.436
90	.375	.626	1.727
95	.375	.601	1.730
100	.374	.579	1.737
105	.371	.378	1.779
110	.366	.067	1.805
115	.367	.140	1.793
120	.349	.205	1.756
125	.281	.361	1.643
130	.282	.427	1.596
135	.273	.686	1.160
140	.273	.280	.640
145	.247	.280	.624
150	.272	.258	.625
155	.531	.069	.626
160	1.277	.306	.626
165	1.312	.316	.626
170	1.408	.576	.739
175	1.347	.316	.626
180	1.415	.069	.625
185	.953	.015	.623
190	.830	.013	.623
195	.749	.015	.623

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 LCFT CIS ANALYSIS - 8"-WW-172-A8 (INSIDE) S-7A

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POINT NO.	X-DIRECTION (G)	Y-DIRECTION (G)	Z-DIRECTION (G)
338	.657	.000	.623
339	.517	.000	.600
340	.512	.000	.590
341	.512	.000	.580
342	.512	.000	.570
343	.512	.000	.560
344	.512	.000	.550
345	.512	.000	.540
346	.512	.000	.530
347	.512	.000	.520
348	.512	.000	.510
349	.512	.000	.500
350	.512	.000	.490
351	.512	.000	.480
352	.512	.000	.470
353	.512	.000	.460
354	.512	.000	.450
355	.512	.000	.440
356	.512	.000	.430
357	.512	.000	.420
358	.512	.000	.410
359	.512	.000	.400
360	.512	.000	.390
361	.512	.000	.380
362	.512	.000	.370
363	.512	.000	.360
364	.512	.000	.350
365	.512	.000	.340
366	.512	.000	.330
367	.512	.000	.320
368	.512	.000	.310
369	.512	.000	.300
370	.512	.000	.290
371	.512	.000	.280
372	.512	.000	.270
373	.512	.000	.260
374	.512	.000	.250
375	.512	.000	.240
376	.512	.000	.230
377	.512	.000	.220
378	.512	.000	.210
379	.512	.000	.200
380	.512	.000	.190
381	.512	.000	.180
382	.512	.000	.170
383	.512	.000	.160
384	.512	.000	.150
385	.512	.000	.140
386	.512	.000	.130
387	.512	.000	.120
388	.512	.000	.110
389	.512	.000	.100
390	.512	.000	.090
391	.512	.000	.080
392	.512	.000	.070
393	.512	.000	.060
394	.512	.000	.050
395	.512	.000	.040
396	.512	.000	.030
397	.512	.000	.020
398	.512	.000	.010
399	.512	.000	.000
400	.512	.000	.000

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MUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 8"-WW-172-AB (INSIDE) S-7A

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SUPPORT REACTIONS FOR LOAD COMBINATION CASE NO. 4
 CBE RESPONSE SPECTRUM - ONE-HALF SSE

NODE	TYPE	REACTIONS (LBS OR IN-LBS)	DIRECTION
1	FC	192.	X CCCC
1	FC	117.	Y CCCC
1	FC	57.	Z CCCC
1	FC	2459.	X CCCC
1	FC	4058.	Y CCCC
1	FC	3104.	Z CCCC
2	FC	165.	Y CCCC
2	FC	310.	Z CCCC
10	FC	72.	Y CCCC
10	FC	133.	Y CCCC
10	FC	125.	Y CCCC
10	FC	56.	Y CCCC
10	FC	105.	Y CCCC
10	FC	190.	X CCCC
10	FC	115.	Y CCCC
10	FC	556.	Z CCCC
10	FC	7771.	X CCCC
10	FC	4713.	Y CCCC
10	FC	2393.	Z CCCC
10	FC	102.	X CCCC
10	FC	451.	X CCCC
10	FC	100.	Y CCCC
10	FC	61.	Y CCCC
10	FC	75.	Y CCCC
10	FC	216.	X CCCC
10	FC	72.	Y CCCC
10	FC	468.	Z CCCC
10	FC	5649.	X CCCC
10	FC	6254.	Y CCCC
10	FC	5237.	Z CCCC

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LCFT CIS ANALYSIS - BW-WW-172-AB (INSIDE) S-7A

INTERNAL FORCES AND DEFLECTIONS FOR LCAD CASE NO. 4

CBE RESPONSE SPECTRUM - ONE-HALF SSE

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
FGRUN	1	192.	117.	57.	2459.	4058.	3104.	.000	.000	.000	.0000	.0000	.0000
	5	192.	117.	57.	2459.	2661.	506.	.000	.001	.001	.0000	.0001	.0000
FGRUN	5	192.	115.	36.	2459.	2587.	511.	.000	.001	.001	.0000	.0001	.0000
	10	192.	115.	36.	1654.	1249.	511.	.001	.001	.001	.0001	.0001	.0000
ELBOW	10	192.	115.	35.	1654.	1249.	511.	.001	.001	.001	.0001	.0001	.0000
	15	192.	115.	35.	1016.	367.	1191.	.002	.002	.002	.0003	.0002	.0001
FGRUN	15	191.	115.	34.	1016.	367.	1191.	.002	.002	.002	.0003	.0002	.0001
	20	191.	115.	34.	1016.	814.	3830.	.002	.002	.002	.0004	.0002	.0004
FGRUN	20	191.	55.	29.	1016.	814.	3830.	.002	.002	.002	.0004	.0002	.0004
	25	191.	55.	29.	1016.	2059.	2158.	.002	.034	.012	.0007	.0002	.0010
ELBOW	25	190.	45.	30.	1016.	2059.	2158.	.002	.034	.012	.0007	.0002	.0010
	30	190.	45.	30.	909.	2204.	1216.	.009	.041	.011	.0008	.0004	.0014
FGRUN	30	190.	43.	31.	909.	2204.	1216.	.013	.041	.012	.0008	.0005	.0014
	35	190.	43.	31.	865.	2204.	1015.	.013	.041	.012	.0008	.0005	.0014
ELBOW	35	190.	42.	31.	865.	2204.	1015.	.013	.041	.012	.0008	.0005	.0014
	40	190.	42.	31.	802.	2345.	1245.	.022	.050	.016	.0009	.0008	.0015
FGRUN	40	189.	39.	31.	802.	2345.	1245.	.022	.050	.016	.0009	.0008	.0015
	42	189.	39.	31.	802.	2632.	930.	.022	.068	.000	.0009	.0009	.0015
FGRUN	42	188.	33.	286.	802.	2632.	930.	.022	.068	.000	.0009	.0009	.0015
	45	188.	33.	286.	802.	3727.	738.	.022	.101	.022	.0010	.0009	.0015
ELBOW	45	187.	24.	293.	802.	3727.	738.	.022	.101	.022	.0010	.0009	.0015
	50	187.	24.	293.	859.	4317.	747.	.020	.103	.025	.0012	.0004	.0014
FGRUN	50	186.	18.	278.	859.	4317.	747.	.020	.103	.025	.0012	.0004	.0014
	55	186.	18.	278.	832.	4282.	747.	.034	.046	.026	.0013	.0004	.0012
FGRUN	55	184.	28.	272.	832.	4282.	747.	.034	.046	.026	.0013	.0004	.0012
	60	184.	28.	272.	1231.	12406.	747.	.014	.016	.045	.0012	.0047	.0011
ELBOW	60	184.	29.	269.	1231.	12406.	747.	.014	.016	.045	.0012	.0047	.0011
	65	184.	29.	269.	1357.	11899.	611.	.010	.016	.045	.0012	.0047	.0011
FGRUN	65	184.	30.	267.	1357.	11899.	611.	.010	.016	.045	.0012	.0047	.0011
	70	184.	30.	267.	1357.	7687.	474.	.010	.001	.125	.0011	.0054	.0011

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 LOFT CIS ANALYSIS - 8"-44-172-AB (INSIDE) S-7A

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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	70	185.	52.	256.	1357.	7687.	474.	.010	.001	.125	.0011	.0054	.0011
	80	185.	52.	256.	1357.	7747.	3054.	.010	.055	.471	.0011	.0055	.0006
FGRUN	80	189.	31.	199.	1357.	7747.	3054.	.010	.055	.471	.0011	.0055	.0006
	85	189.	31.	199.	1357.	19367.	4407.	.010	.062	.696	.0012	.0017	.0005
VALVE	85	191.	19.	154.	1357.	19367.	4407.	.010	.062	.696	.0012	.0017	.0005
	90	191.	19.	154.	1357.	20421.	4470.	.010	.059	.706	.0012	.0015	.0005
VALVE	90	215.	85.	125.	1357.	20421.	4470.	.010	.059	.706	.0012	.0015	.0005
	100	215.	85.	125.	1357.	19610.	3893.	.010	.055	.714	.0012	.0013	.0006
FGRUN	100	218.	54.	151.	1357.	19610.	3893.	.010	.055	.714	.0012	.0013	.0006
	103	218.	54.	151.	1357.	15161.	1163.	.010	.031	.703	.0014	.0019	.0009
FGRUN	103	223.	101.	189.	1357.	15161.	1163.	.010	.031	.703	.0014	.0019	.0009
	105	223.	101.	189.	1357.	9572.	2431.	.010	.001	.620	.0016	.0036	.0008
FGRUN	105	227.	56.	210.	1357.	9572.	2431.	.010	.001	.620	.0016	.0036	.0008
	110	227.	56.	210.	1357.	8132.	2277.	.010	.005	.593	.0016	.0039	.0008
ELBOW	110	228.	56.	216.	1357.	8132.	2277.	.010	.005	.593	.0016	.0039	.0008
	112	228.	56.	216.	1020.	7305.	2109.	.009	.008	.572	.0019	.0047	.0006
FGRUN	112	229.	55.	224.	1020.	7305.	2109.	.009	.008	.572	.0019	.0047	.0006
	113	229.	55.	224.	1169.	5639.	2281.	.007	.012	.517	.0018	.0051	.0005
ELBOW	113	230.	55.	232.	1169.	5639.	2281.	.007	.012	.517	.0018	.0051	.0005
	115	230.	55.	232.	1542.	4829.	2383.	.007	.014	.491	.0019	.0056	.0002
FGRUN	115	233.	54.	253.	1542.	4829.	2383.	.007	.014	.491	.0019	.0056	.0002
	120	233.	54.	253.	1542.	6552.	1841.	.007	.015	.270	.0015	.0054	.0002
FGRUN	120	241.	58.	291.	1542.	6552.	1841.	.007	.015	.270	.0015	.0054	.0002
	125	241.	58.	291.	1542.	17203.	2622.	.007	.006	.101	.0011	.0034	.0004
FGRUN	125	246.	102.	514.	2120.	12790.	3665.	.007	.006	.101	.0011	.0034	.0004
	130	246.	102.	514.	1872.	12790.	2224.	.008	.006	.096	.0011	.0031	.0004
ELBOW	130	246.	102.	514.	1872.	12790.	2224.	.008	.006	.096	.0011	.0031	.0004
	135	246.	102.	514.	4026.	11548.	907.	.024	.006	.092	.0003	.0028	.0012
FGRUN	135	244.	103.	515.	4026.	11548.	907.	.024	.006	.092	.0003	.0028	.0012
	140	244.	103.	515.	1003.	6789.	907.	.153	.001	.092	.0001	.0027	.0014
FGRUN	140	219.	45.	517.	1003.	6789.	907.	.153	.001	.092	.0001	.0027	.0014
	143	219.	45.	517.	1216.	11154.	907.	.223	.003	.092	.0000	.0018	.0016

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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	143	200.	42.	519.	1216.	11154.	907.	.223	.003	.092	.0000	.0018	.0016
	145	200.	42.	519.	1415.	12116.	907.	.231	.003	.092	.0000	.0017	.0016
RLN	145	151.	62.	79.	948.	948.	2140.	.231	.003	.092	.0000	.0017	.0016
	150	151.	62.	79.	0.	0.	0.	.248	.021	.109	.0001	.0017	.0016
VALVE	145	91.	41.	544.	1407.	12268.	1308.	.231	.003	.092	.0000	.0017	.0016
	155	91.	41.	544.	1161.	11944.	1308.	.235	.003	.092	.0000	.0016	.0016
FGRUN	155	103.	45.	548.	1161.	11944.	1308.	.235	.003	.092	.0000	.0016	.0016
	160	103.	45.	548.	510.	9591.	1308.	.250	.001	.091	.0001	.0012	.0013
FGRUN	160	144.	10.	558.	510.	9591.	1308.	.250	.001	.091	.0001	.0012	.0013
	365	144.	10.	558.	316.	6450.	1308.	.137	.001	.091	.0000	.0025	.0009
FGRUN	365	157.	56.	567.	316.	6450.	1308.	.137	.001	.091	.0000	.0025	.0009
	370	157.	56.	567.	1115.	7062.	1308.	.114	.001	.091	.0000	.0025	.0008
VALVE	370	160.	56.	569.	1115.	7062.	1308.	.114	.001	.091	.0000	.0025	.0008
	375	160.	56.	569.	1676.	7555.	1308.	.100	.001	.091	.0001	.0025	.0008
VALVE	375	161.	55.	585.	1676.	7555.	1308.	.100	.001	.091	.0001	.0025	.0008
	380	161.	55.	585.	2242.	8073.	1308.	.086	.001	.091	.0001	.0025	.0008
FGRUN	380	183.	55.	587.	2242.	8073.	1308.	.085	.001	.091	.0001	.0025	.0008
	385	183.	55.	587.	2860.	8753.	1308.	.071	.001	.091	.0002	.0025	.0008
ELBOW	385	184.	55.	588.	2860.	8753.	1308.	.071	.001	.091	.0002	.0025	.0008
	390	184.	55.	588.	3264.	8234.	1312.	.060	.001	.087	.0005	.0027	.0007
FGRUN	390	188.	114.	592.	3264.	8234.	1312.	.060	.001	.087	.0005	.0027	.0007
	395	188.	114.	592.	4801.	5324.	1594.	.007	.004	.036	.0011	.0025	.0006
ELBOW	395	189.	114.	595.	4801.	5324.	1594.	.007	.004	.036	.0011	.0025	.0006
	400	189.	114.	595.	1665.	7021.	1351.	.009	.009	.020	.0017	.0017	.0003
FGRUN	400	190.	114.	596.	1665.	7021.	1351.	.009	.009	.020	.0017	.0017	.0003
	405	190.	114.	596.	2588.	7021.	1553.	.008	.009	.008	.0017	.0013	.0003
ELBOW	405	190.	114.	596.	6657.	6729.	2393.	.002	.003	.000	.0004	.0004	.0002
	410	190.	115.	596.	6657.	6729.	2393.	.002	.003	.000	.0004	.0004	.0002
FGRUN	410	190.	115.	596.	7771.	6713.	2393.	.000	.000	.000	.0000	.0000	.0000
	415	190.	115.	596.	7771.	6713.	2393.	.000	.000	.000	.0000	.0000	.0000
FGRUN	125	230.	89.	315.	2960.	13177.	3225.	.007	.006	.101	.0011	.0034	.0004
	165	230.	89.	315.	2960.	10302.	3058.	.007	.001	.066	.0006	.0031	.0004

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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	165	332.	55.	318.	2960.	10302.	3058.	.007	.001	.066	.0009	.0031	.0004
	170	332.	55.	318.	2960.	8873.	3311.	.007	.011	.054	.0007	.0031	.0007
ELBOW	170	334.	53.	320.	2960.	8873.	3311.	.007	.011	.054	.0007	.0031	.0007
	180	334.	53.	320.	1430.	9351.	3049.	.005	.017	.066	.0004	.0036	.0014
ELBOW	180	303.	53.	321.	1430.	9351.	3049.	.005	.017	.066	.0004	.0036	.0014
	190	303.	53.	321.	1395.	7641.	1379.	.038	.015	.067	.0004	.0042	.0022
FGRUN	190	300.	55.	326.	1395.	7641.	1379.	.038	.015	.067	.0004	.0042	.0022
	195	300.	55.	326.	1717.	7583.	1379.	.276	.001	.067	.0002	.0047	.0025
FGRUN	195	266.	55.	333.	1717.	7583.	1379.	.276	.001	.067	.0002	.0047	.0025
	200	266.	55.	333.	1225.	16284.	1379.	.406	.003	.067	.0000	.0027	.0025
VALVE	200	242.	52.	336.	1235.	16284.	1379.	.406	.003	.067	.0000	.0027	.0028
	205	242.	52.	336.	1389.	17709.	1379.	.422	.003	.067	.0000	.0026	.0028
FLN	205	185.	69.	72.	865.	865.	2595.	.422	.003	.067	.0000	.0026	.0028
	210	185.	69.	72.	0.	0.	0.	.455	.033	.096	.0001	.0026	.0029
VALVE	205	51.	44.	393.	1553.	18072.	1356.	.422	.003	.067	.0000	.0026	.0028
	215	51.	44.	393.	1290.	17841.	1356.	.437	.003	.067	.0000	.0024	.0029
FGRUN	215	74.	49.	399.	1290.	17841.	1356.	.437	.003	.067	.0000	.0024	.0028
	220	74.	49.	399.	555.	15508.	1356.	.466	.001	.066	.0001	.0007	.0025
FGRUN	220	143.	24.	415.	555.	15508.	1356.	.466	.001	.066	.0001	.0007	.0025
	425	143.	24.	415.	1418.	5796.	1356.	.270	.001	.066	.0002	.0043	.0019
FGRUN	425	186.	66.	431.	1418.	5796.	1356.	.270	.001	.066	.0002	.0043	.0019
	430	186.	66.	431.	2756.	2717.	1356.	.104	.011	.066	.0005	.0047	.0016
VALVE	430	193.	67.	438.	2756.	2717.	1356.	.104	.011	.066	.0005	.0047	.0016
	435	193.	67.	438.	3114.	3441.	1356.	.076	.013	.066	.0005	.0047	.0016
VALVE	435	213.	68.	460.	3114.	3441.	1356.	.076	.013	.066	.0005	.0047	.0016
	440	213.	68.	460.	3483.	4423.	1356.	.048	.016	.066	.0005	.0047	.0016
FGRUN	440	214.	69.	462.	3483.	4423.	1356.	.048	.016	.066	.0005	.0047	.0016
	445	214.	69.	462.	3732.	5145.	1356.	.030	.018	.066	.0006	.0046	.0016
ELBOW	445	215.	69.	464.	3732.	5145.	1356.	.030	.018	.066	.0006	.0046	.0016
	450	215.	69.	464.	4117.	7077.	1353.	.009	.015	.044	.0012	.0033	.0012
FGRUN	450	215.	70.	465.	4117.	7077.	1353.	.009	.015	.044	.0012	.0033	.0012
	455	215.	70.	465.	4117.	7814.	1399.	.009	.012	.035	.0012	.0032	.0012

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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
ELBCW	455	216.	71.	467.	4117.	7814.	1359.	.005	.012	.035	.0012	.0032	.0012
	460	216.	71.	467.	1320.	9739.	2726.	.007	.007	.013	.0012	.0020	.0008
FERUN	460	216.	71.	468.	1320.	9739.	2726.	.007	.007	.013	.0012	.0020	.0008
	465	216.	71.	468.	1503.	9739.	3967.	.008	.007	.006	.0012	.0017	.0007
ELBCW	465	216.	72.	458.	1503.	9739.	3967.	.008	.007	.006	.0012	.0017	.0007
	470	216.	72.	468.	4697.	8615.	5237.	.003	.003	.000	.0004	.0005	.0005
FERUN	470	216.	72.	458.	4697.	8615.	5237.	.003	.003	.000	.0004	.0005	.0005
	475	216.	72.	468.	5649.	6254.	5237.	.000	.000	.000	.0000	.0000	.0000
FERLA	5	0.	4.	20.	0.	361.	79.	.000	.001	.001	.0000	.0001	.0000
	225	0.	4.	20.	0.	0.	0.	.000	.001	.002	.0000	.0001	.0000

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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)
FGFON	1	1.000	1365.	1710.	43.	1428.
	5	1.844	1585.	1875.	14.	1599.
FGFON	5	1.844	2708.	3753.	53.	2761.
	10	1.000	1970.	2601.	99.	2068.
ELECW	10	1.953	2554.	3479.	193.	2747.
	15	1.953	2238.	2934.	231.	2469.
FGFON	15	1.000	1754.	2229.	118.	1872.
	20	1.000	4152.	5348.	78.	4220.
FGFON	20	1.000	4152.	5348.	78.	4220.
	25	1.000	1828.	2760.	277.	2105.
ELECW	25	1.953	2347.	3712.	541.	2888.
	30	1.953	2102.	3261.	578.	2680.
FGFON	30	1.000	1661.	2452.	296.	1957.
	35	1.000	1673.	2434.	294.	1960.
ELECW	35	1.953	2119.	3234.	574.	2693.
	40	1.953	1937.	3138.	644.	2581.
FGFON	40	1.000	1548.	2368.	330.	1878.
	42	1.000	1372.	2230.	393.	1765.
FGFON	42	1.000	1372.	2230.	393.	1765.
	45	1.000	1396.	2544.	428.	1824.
ELECW	45	1.953	1714.	3356.	836.	2550.
	50	1.953	1856.	3789.	759.	2615.
FGFON	50	1.000	1493.	2813.	389.	1882.
	55	1.000	1479.	2787.	36.	1515.
FGFON	55	1.000	1479.	2787.	36.	1515.
	60	1.000	1224.	4916.	342.	1567.
ELECW	60	1.953	1462.	6871.	669.	2131.
	65	1.953	1567.	6760.	744.	2312.

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ASME SECTION III CLASS 2 CP ANSI B31.1.B STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EC.8 (PSI)	OCCASIONAL STRESS EC.9 (PSI)	EXPANSION STRESS EC.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EC.11 (PSI)
FGFUA	65	1.000	1256.	4641.	381.	1677.
	70	1.000	1483.	3755.	355.	1838.
FGFLA	70	1.000	1463.	3755.	355.	1838.
	80	1.000	3432.	5626.	260.	3692.
FGFUA	80	1.000	3432.	5626.	260.	3692.
	85	1.000	4904.	10789.	165.	5069.
FGFLA	100	1.000	4393.	10335.	143.	4535.
	103	1.000	1596.	6109.	92.	1688.
FGFUA	103	1.000	1596.	6109.	92.	1688.
	105	1.000	3416.	6363.	42.	3458.
	110	1.000	3028.	5556.	33.	3061.
ELBGA	110	1.953	4104.	7508.	65.	4169.
	112	1.953	3788.	7110.	46.	3834.
FGFLA	112	1.000	2812.	5080.	24.	2836.
	113	1.000	2392.	4223.	55.	2447.
ELECA	113	1.953	3173.	5855.	108.	3280.
	115	1.953	2911.	5357.	124.	3035.
FGFLA	115	1.000	2213.	3869.	64.	2277.
	120	1.000	1241.	3204.	85.	1306.
FGFLA	120	1.000	1241.	3204.	85.	1306.
	125	1.450	1350.	6966.	189.	1539.
FGFLA	125	1.450	1168.	5499.	91.	1259.
	130	1.000	1122.	4555.	65.	1187.
ELECA	130	1.953	1312.	6592.	127.	1439.
	135	1.953	1296.	6605.	139.	1435.
FGFLA	135	1.000	1110.	4726.	71.	1182.
	140	1.000	1402.	3446.	75.	1477.

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ASME SECTION III CLASS 2 OR ANSI B31.1-B STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EC.8 (PSI)	OCCASIONAL STRESS EC.9 (PSI)	EXPANSION STRESS EC.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EC.11 (PSI)
FGRUN	140	1.000	1402.	3449.	75.	1477.
	143	1.000	2216.	5544.	44.	2259.
RUN	145	1.000	1471.	2217.	0.	1471.
	150	1.000	712.	712.	0.	712.
FGRUN	155	1.000	2224.	5752.	34.	2258.
	160	1.000	1496.	4361.	27.	1522.
FGRUN	160	1.000	1496.	4361.	27.	1522.
	365	1.000	1129.	3076.	39.	1168.
FGRUN	365	1.000	1129.	3076.	39.	1168.
	370	1.000	1227.	3376.	49.	1276.
FGRUN	380	1.000	1217.	3724.	69.	1286.
	365	1.000	1144.	3694.	82.	1226.
ELBCA	385	1.953	1345.	5373.	159.	1505.
	390	1.953	1238.	5115.	173.	1412.
FGRUN	390	1.000	1071.	3716.	89.	1160.
	395	1.000	897.	3058.	40.	937.
ELBCA	395	1.953	982.	4163.	79.	1061.
	400	1.953	994.	4173.	120.	1113.
FGRUN	400	1.000	904.	3074.	61.	966.
	405	1.000	875.	3134.	73.	948.
ELBCA	405	1.953	951.	4260.	143.	1094.
	410	1.953	856.	5083.	147.	1003.
FGRUN	410	1.000	810.	3696.	75.	885.
	415	1.000	1163.	4280.	66.	1229.
FGRUN	125	1.450	1075.	5539.	101.	1177.
	165	1.000	1057.	4353.	59.	1116.
FGRUN	165	1.000	1057.	4353.	59.	1116.
	170	1.000	1101.	4034.	58.	1158.

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ASME SECTION III CLASS 2 CR ANSI B31.1-B STRESS SUMMARY

MEMBER	NCDE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EC.6 (PSI)	OCCASIONAL STRESS EC.6 (PSI)	EXPANSION STRESS EO.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EC.11 (PSI)
ELBCW	170	1.953	1281.	5578.	112.	1394.
	180	1.953	1340.	5644.	35.	1375.
ELBCW	180	1.953	1240.	5644.	35.	1375.
	190	1.953	1265.	4661.	32.	1297.
FGRUN	190	1.000	1089.	3421.	16.	1106.
	195	1.000	1946.	4280.	56.	2002.
FGRUN	195	1.000	1946.	4280.	56.	2002.
	200	1.000	1916.	6761.	24.	1940.
RLN	205	1.000	1471.	2319.	0.	1471.
	210	1.000	712.	712.	0.	712.
FGRUN	215	1.000	2074.	7377.	14.	2088.
	220	1.000	1400.	6005.	27.	1427.
FGRUN	220	1.000	1400.	6005.	27.	1427.
	425	1.000	1171.	2960.	77.	1248.
FGRUN	425	1.000	1171.	2960.	77.	1248.
	430	1.000	1296.	2510.	9.	1306.
FGRUN	440	1.000	1208.	2960.	22.	1230.
	445	1.000	1171.	3062.	29.	1200.
ELECW	445	1.953	1285.	4159.	57.	1442.
	450	1.953	1118.	4712.	80.	1199.
FGPLN	450	1.000	990.	3443.	41.	1031.
	455	1.000	900.	3543.	43.	943.
ELECW	455	1.953	987.	4859.	84.	1071.
	460	1.953	1021.	5428.	85.	1107.
FGRUN	460	1.000	923.	3938.	44.	967.
	465	1.000	939.	4079.	38.	977.
ELBCW	465	1.953	1044.	5644.	75.	1119.
	470	1.953	951.	5767.	58.	1009.

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

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ASPE SECTION III CLASS 2 CR ANSI B31.1.8 STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EC.8 (PSI)	OCCASIONAL STRESS EC.9 (PSI)	EXPANSION STRESS EC.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EC.11 (PSI)
FORUN	470	1.000	875.	4163.	30.	905.
	475	1.000	1589.	4522.	37.	1626.
FORUN	5	1.844	1199.	1228.	0.	1199.
	225	1.000	1004.	1004.	0.	1004.

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APPENDIX G
LEVEL C SERVICE CONDITIONS
STRESS ANALYSIS RESULTS

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ASPE SECTION III CLASS 2 CR ANSI B31.1-B STRESS SUMMARY

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EC. 8 (PSI)	OCCASIONAL STRESS EC. 9 (PSI)	EXPANSION STRESS EC. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EC. 11 (PSI)
FGRUN	1	1.000	1385.	2035.	0.	1385.
	5	1.844	1585.	2165.	0.	1585.
FGRUN	5	1.844	2708.	4878.	0.	2708.
	10	1.000	1970.	3232.	0.	1970.
ELBOW	10	1.953	2554.	4403.	0.	2554.
	15	1.953	2238.	3630.	0.	2238.
FGRUN	15	1.000	1754.	2704.	0.	1754.
	20	1.000	4152.	6543.	0.	4152.
FGRUN	20	1.000	4152.	6543.	0.	4152.
	25	1.000	1828.	3651.	0.	1828.
ELBOW	25	1.953	2347.	5076.	0.	2347.
	30	1.953	2102.	4420.	0.	2102.
FGRUN	30	1.000	1661.	3243.	0.	1661.
	35	1.000	1673.	3155.	0.	1673.
ELBOW	35	1.953	2119.	4350.	0.	2119.
	40	1.953	1937.	4338.	0.	1937.
FGRUN	40	1.000	1548.	3188.	0.	1548.
	42	1.000	1372.	3069.	0.	1372.
FGRUN	42	1.000	1372.	3089.	0.	1372.
	45	1.000	1396.	3652.	0.	1396.
ELBOW	45	1.953	1714.	5077.	0.	1714.
	50	1.953	1656.	5722.	0.	1656.
FGRUN	50	1.000	1493.	4132.	0.	1493.
	55	1.000	1479.	4056.	0.	1479.
FGRUN	55	1.000	1479.	4056.	0.	1479.
	60	1.000	1224.	8808.	0.	1224.
ELBOW	60	1.953	1462.	12279.	0.	1462.
	65	1.953	1567.	11953.	0.	1567.

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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	65	1.000	1256.	8386.	0.	1256.
	70	1.000	1483.	6106.	0.	1483.
FGRUN	70	1.000	1483.	6106.	0.	1483.
	80	1.000	3432.	8420.	0.	3432.
FGRUN	80	1.000	3432.	8420.	0.	3432.
	85	1.000	4904.	16674.	0.	4904.
FGRUN	100	1.000	4393.	16240.	0.	4393.
	103	1.000	1596.	10622.	0.	1596.
FGRUN	103	1.000	1596.	10622.	0.	1596.
	105	1.000	3416.	9310.	0.	3416.
FGRUN	105	1.000	3416.	9310.	0.	3416.
	110	1.000	3028.	8085.	0.	3028.
ELBCK	110	1.953	4104.	11512.	0.	4104.
	112	1.953	3788.	10432.	0.	3788.
FGRUN	112	1.000	2812.	7348.	0.	2812.
	113	1.000	2392.	6054.	0.	2392.
ELBCK	113	1.953	3173.	8537.	0.	3173.
	115	1.953	2911.	7782.	0.	2911.
FGRUN	115	1.000	2213.	5525.	0.	2213.
	120	1.000	1241.	5367.	0.	1241.
FGRUN	120	1.000	1241.	5367.	0.	1241.
	125	1.450	1350.	12582.	0.	1350.
FGRUN	125	1.450	1168.	9830.	0.	1168.
	130	1.000	1122.	8876.	0.	1122.
ELBCK	130	1.953	1312.	12571.	0.	1312.
	125	1.953	1296.	11916.	0.	1296.
FGRUN	135	1.000	1110.	8361.	0.	1110.
	140	1.000	1402.	5495.	0.	1402.

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

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EC. 8 (PSI)	OCCASIONAL STRESS EC. 9 (PSI)	EXPANSION STRESS EC. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EC. 11 (PSI)
FGRUN	140	1.000	1402.	5455.	0.	1402.
	143	1.000	2216.	8872.	0.	2216.
RUN	145	1.000	1471.	2964.	0.	1471.
	150	1.000	712.	712.	0.	712.
FGRUN	155	1.000	2224.	9361.	0.	2224.
	160	1.000	1496.	7227.	0.	1496.
FGRUN	160	1.000	1496.	7227.	0.	1496.
	365	1.000	1129.	5024.	0.	1129.
FGRUN	365	1.000	1129.	5024.	0.	1129.
	370	1.000	1227.	5525.	0.	1227.
FGRUN	380	1.000	1217.	6231.	0.	1217.
	385	1.000	1144.	6643.	0.	1144.
ELBOW	385	1.953	1345.	9400.	0.	1345.
	390	1.953	1238.	8493.	0.	1238.
FGRUN	390	1.000	1071.	6365.	0.	1071.
	395	1.000	897.	5239.	0.	897.
ELBOW	395	1.953	982.	7343.	0.	982.
	400	1.953	994.	7351.	0.	994.
FGRUN	400	1.000	904.	5244.	0.	904.
	405	1.000	875.	5393.	0.	875.
ELBOW	405	1.953	951.	7569.	0.	951.
	410	1.953	856.	9311.	0.	856.
FGRUN	410	1.000	810.	6582.	0.	810.
	415	1.000	1163.	7397.	0.	1163.
FGRUN	125	1.450	1075.	10003.	0.	1075.
	165	1.000	1057.	7648.	0.	1057.
FGRUN	165	1.000	1057.	7648.	0.	1057.
	170	1.000	1101.	6967.	0.	1101.

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ASME SECTION III CLASS 2 OR ANSI B31.1-B 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)
ELBOW	170	1.953	1281.	9875.	0.	1281.
	180	1.953	1340.	9948.	0.	1340.
ELBOW	180	1.953	1340.	9948.	0.	1340.
	190	1.953	1265.	8057.	0.	1265.
PERUN	190	1.000	1089.	5753.	0.	1089.
	195	1.000	1446.	6614.	0.	1446.
PERUN	195	1.000	1446.	6614.	0.	1446.
	200	1.000	1916.	11806.	0.	1916.
FLN	205	1.000	1471.	3167.	0.	1471.
	210	1.000	712.	712.	0.	712.
PERUN	215	1.000	2074.	12680.	0.	2074.
	220	1.000	1400.	10610.	0.	1400.
PERUN	220	1.000	1400.	10610.	0.	1400.
	425	1.000	1171.	4789.	0.	1171.
PERUN	425	1.000	1171.	4789.	0.	1171.
	430	1.000	1298.	3722.	0.	1298.
PERUN	440	1.000	1208.	4632.	0.	1208.
	445	1.000	1171.	5014.	0.	1171.
ELBOW	445	1.953	1385.	7013.	0.	1385.
	450	1.953	1118.	8305.	0.	1118.
PERUN	450	1.000	990.	5696.	0.	990.
	455	1.000	900.	6167.	0.	900.
ELBOW	455	1.953	987.	8732.	0.	987.
	460	1.953	1021.	9814.	0.	1021.
PERUN	460	1.000	923.	6953.	0.	923.
	465	1.000	939.	7219.	0.	939.
ELBOW	465	1.953	1044.	10244.	0.	1044.
	470	1.953	951.	10584.	0.	951.

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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)
FCRLN	470	1.000	875.	7451.	0.	875.
	475	1.000	1589.	7455.	0.	1589.
FCRLN	5	1.844	1199.	1258.	0.	1199.
	225	1.000	1004.	1004.	0.	1004.

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APPENDIX H
LEVEL D SERVICE CONDITIONS
STRESS ANALYSIS RESULTS

Level D Service conditions ARE
NOT applicable to this stress
ANALYSIS

APPENDIX I
COMPONENT SUPPORT ANALYSIS RESULTS

All supports ARE LOAD RATED by
MANUFACTURER.