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LOFT TECHNICAL REPORT LTR 132-3
RE&C INTERNAL REPORT RE-A-78-151
MARCH 26, 1979

LOFT CIS ANALYSIS
4"-IW-179-AB INSIDE CONTAINMENT PENETRATION S-5B

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DEPARTMENT OF ENERGY

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

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LOFT TECHNICAL REPORT LTR 132-3

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RESEARCH, ENGINEERING AND CONSTRUCTION REPORT ENGINEERING ANALYSIS DIVISION

APPLIED MECHANICS BRANCH

LOFT CIS ANALYSIS

4"-IW-179-AB INSIDE CONTAINMENT PENETRATION S-5B

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AUTHOR

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LOFT TECHNICAL REPORT
LOFT PROGRAM

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		Mgr.

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RSB Mgr.

ABSTRACT

A stress analysis was performed on the 4"-IW-179-AB piping system inside containment penetration S-5B. Deadweight, thermal expansion, and seismic loads were considered. The results indicate that this piping will meet ASME Section III, Class 2 requirements.

DISPOSITION OF RECOMMENDATIONS

No disposition required.

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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 4"-IW-179-AB inside containment penetration S-5B.

*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 P-1 specification^[2]. The design specification is to be issued at a later date.

III. PIPING SYSTEM DESCRIPTION

The Service Water System (IW) supplies water for (1) cooling heat exchangers, (2) the softened and demineralized water system, (3) the pump seals to prevent the outleakage of fluids, (4) HV equipment, and (5) various washing and flushing operations.

The purposes of this analysis were to (1) determine the loads imposed on the containment penetration and (2) assure containment isolation integrity. As a result, not all of the main piping system or branch piping may have been analyzed due to its negligible effect on the two primary purposes of this analysis.

1. STRUCTURAL DESCRIPTION

Figure 1 is a computer 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)	4.500	2.375
Thickness (inches)	0.237	0.154
Weight (lbs/inch)	1.358	0.426
Material	ASTM A120	ASTM A120
E_{cold} (10^6 psi)	27.90	27.90
S (100°F) (psi)	10800	10800
S_y (psi)	43000	43000
α (10^{-6} in./in.°F)	6.13	6.13

LOFT CIS ANALYSIS - 4, -14-179-AB, INSIDE
NUPIPE MATHEMATICAL MODEL

Figure 1. Piping System Computer Model Plot

The expansion coefficients and thermal conductivities of the materials 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

Design Pressure: 150 psi

Design Temperature: 100°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(s) given below:

Class 2 - All Piping

Operating Pressure: 120 psi

Operating Temperature: 70°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

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>
V1795-LT	20 lbs.	4'
V1798-LT	20	4'
V6480-CY	10 lbs	0

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	4.500	10800	0.111	0.237
150	2.375	10800	0.096	0.154

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 were no Level D service conditions specified for this piping.

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>
Rod*	S1-X	-22 lbs.	-7	58	115	250
	S1-Y	99	-1	43	85	
	S1-Z	- 8	-1	46	92	
Rod*	S2-X	4	2	22	43	250
	S2-Y	76	0	23	47	
	S2-Z	0	4	16	32	
Rod*	S3-X	1	-4	12	25	180
	S3-Y	23	0	10	20	
	S3-Z	3	-6	19	37	
Rod	S4-Y	74	-1	49	97	180
Rod*	S5-X	-1	2	60	119	400
	S5-Y	137	0	62	125	
	S5-Z	0	5	49	98	
Rod*	S6-X	0	4	17	35	250
	S6-Y	36	0	16	32	
	S6-Z	1	-7	64	129	

* The short length of these rods (4"-6") gives the restraint some support in the horizontal direction. A stiffness of 1500 lb/in was input in the horizontal plane, transverse to the axis of the pipe.

VIII. SPECIAL CONSIDERATIONS

No special considerations had to be taken into account for this piping.

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. Line Designation Tables, ANC-Specification P-1, Revision 2, January 17, 1973.
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 personnel during April, 1978.

APPENDIX A
BASIC DATA, INPUT PARAMETERS

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PROGRAM CONTROL CARD

CARDTYPE	NCHECK	DAMP	CODE	GLOB	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	TLOAD	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-COMO	AMULT	BMULT	CCODE	SAVE	CYCLE	TITLE
MCDFLER	4	3 AND 1	.5	0.0	0.0	1.0	0.0	ONE 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

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*** INPUT DATA ***								
CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
XSECTN	0	1	.450E+01	.237E+00	.163E+02	.279E+02	.150E+03	0.
XSECTN	0	2	.238E+01	.154E+00	.511E+01	.279E+02	.150E+03	0.
XSECTN	0	3	.132E+01	.133E+00	.205E+01	.279E+02	.150E+03	0.
OPVAL	1	1	.279E+02	.120E+02	0.	0.	.120E+03	0.
CHECK MAGNITUDE OF ENTRIES ON ABOVE OPVAL CARD ***								
ANCHOR	0	5	0.	0.	0.	.100E+01	0.	0.
MASSPT	0	5	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	5	10	0.	0.	.125E+01	.100E+01	.100E+01	0.
MASSPT	0	10	.100E+01	.100E+01	.100E+01	0.	0.	0.
RLN	10	15	0.	0.	.125E+01	.100E+01	.100E+01	0.
MASSPT	0	15	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	15	20	0.	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	20	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	20	25	0.	.150E+01	0.	.100E+01	.100E+01	0.
MASSPT	0	25	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	25	30	0.	.150E+01	0.	.100E+01	.100E+01	0.
MASSPT	0	30	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	30	35	.120E+02	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	35	.100E+01	.100E+01	.100E+01	0.	0.	0.
VALVE	35	40	0.	.710E+00	-.710E+00	.100E+01	.100E+01	0.
MASSPT	0	40	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	40	45	0.	.710E+00	-.710E+00	.100E+01	.100E+01	0.
MASSPT	0	45	.100E+01	.100E+01	.100E+01	0.	0.	0.
RLN	45	50	0.	.600E-01	-.600E-01	.100E+01	.100E+01	0.
MASSPT	0	50	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	50	55	.333E+00	0.	0.	.100E+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	55	.100E+01	.100E+01	.100E+01	0.	0.	0.
REDUCER	55	60	.333E+00	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	60	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	60	65	.200E+01	0.	.600E+01	.200E+01	.100E+01	0.
MASSPT	0	65	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	65	70	.199E+01	0.	.180E+00	.200E+01	.100E+01	0.
MASSPT	0	70	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	70	75	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	75	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	75	80	0.	.920E+00	0.	.200E+01	.100E+01	0.
MASSPT	0	80	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	80	85	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	85	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	85	90	.198E+01	0.	.310E+00	.200E+01	.100E+01	0.
MASSPT	0	90	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	90	95	.195E+01	0.	.420E+00	.200E+01	.100E+01	0.
MASSPT	0	95	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	95	100	.192E+01	0.	.540E+00	.200E+01	.100E+01	0.
MASSPT	0	100	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	100	105	.189E+01	0.	.660E+00	.200E+01	.100E+01	0.
MASSPT	0	105	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	105	110	.184E+01	0.	.770E+00	.200E+01	.100E+01	0.
MASSPT	0	110	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	110	115	.179E+01	0.	.890E+00	.200E+01	.100E+01	0.
MASSPT	0	115	.100E+01	.100E+01	.100E+01	0.	0.	0.

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*** INPUT DATA ***

CAROTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
RUN	115	120	.174E+01	0.	.990E+00	.200E+01	.100E+01	0.
MASSPT	0	120	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	120	125	.221E+01	0.	.148E+01	.200E+01	.100E+01	0.
RESTRAINT	0	125	.750E+03	.200E+05	.140E+04	0.	0.	0.
MASSPT	0	125	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	125	130	.700E+00	0.	.720E+00	.200E+01	.100E+01	0.
MASSPT	0	130	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	130	135	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	135	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	135	140	0.	.158E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	140	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	140	145	0.	.158E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	145	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	145	150	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	150	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	150	155	.154E+01	0.	.127E+01	.200E+01	.100E+01	0.
MASSPT	0	155	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	155	160	.147E+01	0.	.137E+01	.200E+01	.100E+01	0.
MASSPT	0	160	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	160	165	.166E+01	0.	.176E+01	.200E+01	.100E+01	0.
MASSPT	0	165	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	165	170	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	170	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	170	175	0.	-.200E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	175	.100E+01	.100E+01	.100E+01	0.	0.	0.

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1 - PAGE 6

LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM & UPSET, S-58

*** INPUT DATA ***								
CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
RUN	175	180	0.	-.225E+01	0.	.200E+01	.100E+01	0.
MASSPT	0	180	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	180	185	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	185	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	185	190	.157E+01	0.	.195E+01	.200E+01	.100E+01	0.
RESTRAINT	0	190	.750E+03	.200E+05	.140E+04	0.	0.	0.
MASSPT	0	190	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	190	195	.115E+01	0.	.164E+01	.200E+01	.100E+01	0.
MASSPT	0	195	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	195	198	.104E+01	0.	.170E+01	.200E+01	.100E+01	0.
VALVE	198	200	.250E+00	0.	0.	.200E+01	.100E+01	0.
CWEIGHT	0	200	0.	.200E+02	0.	0.	0.	0.
MASSPT	0	200	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	200	205	.940E+00	0.	.177E+01	.200E+01	.100E+01	0.
MASSPT	0	205	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	205	210	.830E+00	0.	.182E+01	.200E+01	.100E+01	0.
RESTRAINT	0	210	.825E+03	.200E+05	.128E+04	0.	0.	0.
MASSPT	0	210	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	50	215	-.333E+00	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	215	.100E+01	.100E+01	.100E+01	0.	0.	0.
TEE	50	45	0.	0.	0.	0.	0.	0.
REDUCER	215	225	-.333E+00	0.	0.	.100E+01	.100E+01	0.
MASSPT	0	225	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	225	230	-.200E+01	0.	.600E-01	.200E+01	.100E+01	0.
MASSPT	0	230	.100E+01	.100E+01	.100E+01	0.	0.	0.

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 LOFT CIS ANALYSIS - 4" -1A-179-AB, INSIDE, NORM & UPSET, S-5B

*** INPUT DATA ***								
CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
RUN	230	235	-.199E+01	0.	.180E+00	.200E+01	.100E+01	0.
MASSPT	0	235	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	235	240	-.198E+01	0.	.310E+00	.200E+01	.100E+01	0.
MASSPT	0	240	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	240	245	-.130E+01	0.	.270E+00	.200E+01	.100E+01	0.
RESTRAINT	0	245	0.	.200E+05	0.	0.	0.	0.
MASSPT	0	245	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	245	250	-.218E+01	0.	.570E+00	.200E+01	.100E+01	0.
MASSPT	0	250	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	250	255	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	255	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	255	260	0.	.133E+01	-.133E+01	.200E+01	.100E+01	0.
MASSPT	0	260	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	260	265	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	265	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	265	270	-.190E+01	0.	.640E+00	.200E+01	.100E+01	0.
MASSPT	0	270	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	270	275	-.185E+01	0.	.750E+00	.200E+01	.100E+01	0.
MASSPT	0	275	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	275	280	-.210E+01	0.	.101E+01	.200E+01	.100E+01	0.
MASSPT	0	280	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	280	285	-.500E+00	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	285	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	285	290	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	290	.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 - 4" -1K-179-AB, INSIDE, NORM & UPSET, S-5B

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*** INPUT DATA ***

CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
RUN	290	295	0.	-.133E+01	.133E+01	.200E+01	.100E+01	0.
MASSPT	0	295	.100E+01	.100E+01	.100E+01	0.	0.	0.
ELBOW	295	300	0.	0.	0.	.200E+01	.100E+01	0.
MASSPT	0	300	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	300	305	-.174E+01	0.	.990E+00	.200E+01	.100E+01	0.
MASSPT	0	305	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	305	310	-.167E+01	0.	.109E+01	.200E+01	.100E+01	0.
MASSPT	0	310	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	310	315	-.160E+01	0.	.119E+01	.200E+01	.100E+01	0.
MASSPT	0	315	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	315	320	-.153E+01	0.	.129E+01	.200E+01	.100E+01	0.
RESTRAINT	0	320	.140E+04	.200E+05	.700E+03	0.	0.	0.
RUN	320	325	-.145E+01	0.	.138E+01	.200E+01	.100E+01	0.
MASSPT	0	325	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	325	330	-.137E+01	0.	.147E+01	.200E+01	.100E+01	0.
MASSPT	0	330	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	330	335	-.127E+01	0.	.155E+01	.200E+01	.100E+01	0.
MASSPT	0	335	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	335	340	-.117E+01	0.	.161E+01	.200E+01	.100E+01	0.
MASSPT	0	340	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	340	345	-.107E+01	0.	.169E+01	.200E+01	.100E+01	0.
MASSPT	0	345	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	345	350	-.970E+00	0.	.175E+01	.200E+01	.100E+01	0.
MASSPT	0	350	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	350	355	-.860E+00	0.	.179E+01	.200E+01	.100E+01	0.

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NUPIPE-11M - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM & UPSET, S-58

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*** INPUT DATA ***

CARDTYPE	I1	I2	DELTA(1)	DELTA(2)	DELTA(3)	DELTA(4)	DELTA(5)	DELTA(6)
MASSPT	0	355	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	355	360	-.740E+00	0.	.186E+01	.200E+01	.100E+01	0.
RESTRAINT	0	360	.143E+04	.200E+05	.500E+03	0.	0.	0.
RUN	335	370	0.	.500E+00	0.	.300E+01	.100E+01	0.
MASSPT	0	370	.100E+01	.100E+01	.100E+01	0.	0.	0.
TEE	335	370	0.	0.	0.	0.	0.	0.
ELBOW	370	375	0.	0.	0.	.300E+01	.100E+01	0.
MASSPT	0	375	.100E+01	.100E+01	.100E+01	0.	0.	0.
RUN	375	380	0.	0.	-.500E+00	.300E+01	.100E+01	0.
CWEIGHT	0	380	0.	.300E+02	0.	0.	0.	0.
STRESS7	0	0	0.	0.	0.	0.	0.	0.
PCASES		0	1	0	4	0	0	0
LOCASES		0	2	0	0	0	0	0
CANODES		0	0	0	0	0	0	0
ALLDONE		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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LOFT CIS ANALYSIS - 4# -1K-179-AB, INSIDE, NORM & UPSET, S-5B

SUPPORT REACTIONS FOR LOAD CASE NO. 1

DEADWEIGHT

NODE	TYPE	REACTION (LBS OR IN-LBS)	DIRECTION
5	FORCE	19.	X COORD
5	FORCE	210.	Y COORD
5	FORCE	5.	Z COORD
5	MOMENT	-2921.	X COORD
5	MOMENT	62.	Y COORD
5	MOMENT	1313.	Z COORD
125	FORCE	-22.	X COORD
125	FORCE	99.	Y COORD
125	FORCE	-8.	Z COORD
190	FORCE	4.	X COORD
190	FORCE	76.	Y COORD
190	FORCE	-0.	Z COORD
210	FORCE	1.	X COORD
210	FORCE	23.	Y COORD
210	FORCE	3.	Z COORD
240	FORCE	74.	Y COORD
320	FORCE	-1.	X COORD
320	FORCE	-37.	Y COORD
320	FORCE	-0.	Z COORD
350	FORCE	-0.	X COORD
350	FORCE	36.	Y COORD
350	FORCE	1.	Z COORD

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LCFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-5B

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
RUN	5	19.	210.	5.	-2921.	62.	1313.	-.000	-.000	-.000	.0000	-.0000	-.0000
	10	-19.	-190.	-5.	-83.	219.	-1313.	.000	-.001	-.000	.0001	.0000	-.0001
RUN	10	19.	190.	5.	83.	-219.	1313.	.000	-.001	-.000	.0001	.0000	-.0001
	15	-19.	-178.	-5.	-1738.	368.	-1313.	.000	-.002	-.000	.0001	.0000	-.0002
ELBOW	15	19.	178.	5.	1738.	-388.	1313.	.000	-.002	-.000	.0001	.0000	-.0002
	20	-19.	-165.	-5.	-2736.	501.	-1426.	.003	-.001	-.002	-.0005	.0002	-.0004
RUN	20	19.	165.	5.	2736.	-501.	1426.	.003	-.001	-.002	-.0005	.0002	-.0004
	25	-19.	-149.	-5.	-2674.	501.	-1651.	.008	-.001	-.009	-.0007	.0002	-.0005
RUN	25	19.	149.	5.	2674.	-501.	1651.	.008	-.001	-.009	-.0007	.0002	-.0005
	30	-19.	-131.	-5.	-2606.	501.	-1896.	.016	-.002	-.019	-.0009	.0002	-.0006
ELBOW	30	19.	131.	5.	2606.	-501.	1896.	.016	-.002	-.019	-.0009	.0002	-.0006
	35	-19.	-118.	-5.	-2124.	435.	-2055.	.021	-.005	-.027	-.0012	.0003	-.0009
VALVE	35	19.	118.	5.	2124.	-435.	2055.	.021	-.005	-.027	-.0012	.0003	-.0009
	40	-19.	-109.	-5.	-1530.	341.	-2149.	.025	-.011	-.033	-.0012	.0003	-.0010
RUN	40	19.	109.	5.	1530.	-341.	2149.	.025	-.011	-.033	-.0012	.0003	-.0009
	45	-19.	-92.	-5.	-630.	181.	-2309.	.030	-.021	-.044	-.0012	.0003	-.0010
RUN	45	19.	92.	5.	630.	-181.	2309.	.030	-.021	-.044	-.0012	.0003	-.0010
	50	-19.	-91.	-5.	-560.	168.	-2322.	.031	-.022	-.045	-.0012	.0003	-.0011
RUN	50	17.	71.	6.	50.	-174.	2943.	.031	-.022	-.045	-.0012	.0003	-.0011
	55	-17.	-66.	-6.	-50.	152.	-2669.	.031	-.027	-.046	-.0012	.0003	-.0011
REDUCE	55	17.	66.	6.	50.	-152.	2669.	.031	-.027	-.046	-.0012	.0003	-.0011
	60	-17.	-60.	-6.	-50.	130.	-2418.	.031	-.031	-.047	-.0012	.0003	-.0012
RUN	60	17.	60.	6.	50.	-130.	2418.	.031	-.031	-.047	-.0012	.0003	-.0012
	65	-17.	-50.	-6.	-90.	10.	-1094.	.031	-.089	-.055	-.0014	.0004	-.0034
RUN	65	17.	50.	6.	90.	-10.	1094.	.031	-.089	-.055	-.0014	.0004	-.0034
	70	-17.	-41.	-6.	-176.	-72.	-142.	.032	-.157	-.063	-.0016	.0004	-.0041
ELBOW	70	17.	41.	6.	176.	-72.	142.	.032	-.157	-.063	-.0016	.0004	-.0041
	75	-17.	-39.	-6.	-170.	-84.	-74.	.045	-.179	-.069	-.0017	.0003	-.0042

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 LOFT CIS ANALYSIS - 4" -1A-179-AB, INSIDE, NORM & UPSET, S-5B

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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	75	17.	39.	6.	170.	84.	74.	.045	-.179	-.069	-.0017	.0003	-.0042
	80	-17.	-37.	-6.	-142.	-84.	-161.	.066	-.179	-.072	-.0017	.0003	-.0042
ELBOW	80	17.	37.	6.	142.	84.	161.	.066	-.179	-.078	-.0017	.0003	-.0042
	85	-17.	-35.	-6.	-143.	-92.	-107.	.079	-.191	-.084	-.0018	.0003	-.0044
RUN	85	17.	35.	6.	143.	92.	107.	.079	-.191	-.084	-.0018	.0003	-.0044
	90	-17.	-26.	-6.	-242.	-151.	527.	.080	-.275	-.089	-.0021	.0002	-.0042
RUN	90	17.	26.	6.	242.	151.	527.	.080	-.275	-.089	-.0021	.0002	-.0042
	95	-17.	-16.	-6.	-347.	-192.	1016.	.080	-.351	-.090	-.0025	-.0001	-.0032
RUN	95	17.	16.	6.	347.	192.	-1016.	.080	-.351	-.090	-.0025	-.0001	-.0032
	100	-17.	-6.	-6.	-416.	-207.	1262.	.079	-.390	-.086	-.0030	-.0003	-.0017
RUN	100	17.	6.	6.	416.	207.	-1262.	.079	-.390	-.086	-.0030	-.0003	-.0017
	105	-17.	5.	-6.	-420.	-195.	1273.	.075	-.385	-.076	-.0035	-.0006	-.0001
RUN	105	17.	-5.	6.	420.	195.	-1273.	.075	-.385	-.076	-.0035	-.0006	-.0001
	110	-17.	15.	-6.	-330.	-157.	1059.	.069	-.336	-.060	-.0040	-.0008	.0014
RUN	110	17.	-15.	6.	330.	157.	-1059.	.069	-.336	-.060	-.0040	-.0008	.0014
	115	-17.	25.	-6.	-118.	-90.	631.	.059	-.248	-.041	-.0042	-.0010	.0025
RUN	115	17.	-25.	6.	118.	90.	-631.	.059	-.248	-.041	-.0042	-.0010	.0025
	120	-17.	35.	-6.	240.	1.	1.	.047	-.140	-.020	-.0041	-.0010	.0030
RUN	120	17.	-35.	6.	-240.	-1.	-1.	.047	-.140	-.020	-.0041	-.0010	.0030
	125	-17.	49.	-6.	987.	163.	-1114.	.030	-.005	.006	-.0029	-.0009	.0021
RUN	125	-5.	50.	-2.	-987.	-163.	1114.	.030	-.005	.006	-.0029	-.0009	.0021
	130	5.	-45.	2.	676.	147.	-812.	.024	.024	.011	-.0025	-.0008	.0016
ELBOW	130	-5.	46.	-2.	-676.	-147.	812.	.024	.024	.011	-.0025	-.0008	.0016
	135	5.	-44.	2.	572.	141.	-703.	.020	.032	.006	-.0019	-.0007	.0008
RUN	135	-5.	44.	-2.	-572.	-141.	703.	.020	.032	.006	-.0019	-.0007	.0008
	140	5.	-37.	2.	532.	141.	-623.	.012	.032	-.019	-.0014	-.0005	.0002
RUN	140	-5.	37.	-2.	-532.	-141.	623.	.012	.032	-.019	-.0014	-.0005	.0002
	145	5.	-30.	2.	492.	141.	-544.	.013	.032	-.036	-.0009	-.0004	-.0003
ELBOW	145	-5.	30.	-2.	-492.	-141.	544.	.013	.032	-.036	-.0009	-.0004	-.0003
	150	5.	-28.	2.	429.	137.	-461.	.014	.031	-.039	-.0005	-.0003	-.0009
RUN	150	-5.	28.	-2.	-429.	-137.	461.	.014	.031	-.039	-.0005	-.0003	-.0009
	155	5.	-20.	2.	109.	112.	-74.	.011	.017	-.036	-.0002	-.0001	-.0012

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 LOFT C15 ANALYSIS - 4" -1K-179-AB, INSIDE, NORM & UPSET, 1-58

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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	-5.	20.	-2.	-109.	-112.	74.	.011	.017	-.036	-.0002	-.0001	-.0012
	160	5.	-9.	2.	-127.	74.	180.	.010	-.001	-.035	-.0002	-.0000	-.0011
RUN	160	-5.	9.	-2.	127.	-74.	-180.	.010	-.001	-.035	-.0002	-.0000	-.0011
	165	5.	2.	2.	-197.	25.	246.	.011	-.014	-.036	-.0004	-.0001	-.0008
ELBOW	165	-5.	-2.	-2.	197.	-25.	-246.	.011	-.014	-.036	-.0004	.0001	-.0008
	170	5.	4.	2.	-184.	19.	225.	.009	-.014	-.034	-.0006	.0001	-.0006
RUN	170	-5.	-4.	-2.	184.	-19.	-225.	-.009	-.014	-.034	-.0006	.0001	-.0006
	175	5.	13.	2.	-131.	19.	121.	-.000	-.014	-.020	-.0008	.0001	-.0004
RUN	175	-5.	-13.	-2.	131.	-19.	-121.	-.000	-.014	-.020	-.0008	.0001	-.0004
	180	5.	23.	2.	-72.	19.	2.	-.008	-.014	.000	-.0009	.0001	-.0003
ELBOW	180	-5.	-23.	-2.	72.	-19.	-2.	-.008	-.014	.000	-.0009	.0001	-.0003
	185	5.	25.	2.	-8.	12.	-58.	-.008	-.013	.003	-.0009	.0001	-.0003
RUN	185	-5.	-25.	-2.	8.	-12.	58.	-.008	-.013	.003	-.0009	.0001	-.0003
	190	5.	37.	2.	640.	-50.	-580.	-.005	-.004	.000	-.0005	.0001	-.0008
RUN	190	-1.	40.	-3.	-640.	50.	580.	-.005	-.004	.000	-.0005	.0001	-.0008
	195	1.	-29.	3.	-39.	-33.	-104.	-.003	-.014	-.001	-.0001	.0001	-.0012
RUN	195	-1.	29.	-3.	39.	33.	104.	-.003	-.014	-.001	-.0001	.0001	-.0012
	198	1.	-19.	3.	-534.	-20.	199.	-.002	-.024	-.002	-.0005	.0000	-.0012
VALVE	198	-1.	19.	-3.	534.	20.	-199.	-.002	-.024	-.002	-.0005	.0000	-.0012
	200	1.	-15.	3.	-534.	-12.	255.	-.002	-.028	-.002	-.0006	.0000	-.0012
RUN	200	-1.	-2.	-3.	534.	12.	-255.	-.002	-.028	-.002	-.0006	.0000	-.0012
	205	1.	12.	3.	-381.	-4.	174.	-.002	-.021	-.002	-.0011	.0000	-.0009
RUN	205	-1.	-12.	-3.	381.	4.	-174.	-.002	-.021	-.002	-.0011	.0000	-.0009
	210	1.	23.	3.	-0.	-0.	0.	-.001	-.001	-.002	-.0014	.0000	-.0008
RUN	50	1.	20.	-0.	510.	7.	-620.	.031	-.022	-.045	-.0012	.0003	-.0011
	215	-1.	-14.	0.	-510.	-8.	552.	.031	-.018	-.043	-.0013	.0003	-.0010
REDUCE	215	1.	14.	-0.	510.	8.	-552.	.031	-.018	-.043	-.0013	.0003	-.0010
	225	-1.	-9.	0.	-510.	-10.	506.	.031	-.014	-.042	-.0013	.0003	-.0010
RUN	225	1.	9.	-0.	510.	10.	-506.	.031	-.014	-.042	-.0013	.0003	-.0010
	230	-1.	1.	0.	-513.	-16.	415.	.031	.005	-.035	-.0021	.0003	-.0004
RUN	230	1.	-1.	-0.	513.	16.	-415.	.031	.005	-.035	-.0021	.0003	-.0004
	235	-1.	12.	0.	-499.	-21.	568.	.032	.013	-.029	-.0030	.0003	-.0002

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 LCFT CIG ANALYSIS - 4" -1K-179-AB, INSIDE, NORM & UPSET, S-5B

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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
RUN	235	1.	-12.	-0.	499.	21.	-568.	.032	.013	-.029	-.0030	.0003	.0002
	240	-1.	22.	0.	-437.	-24.	963.	.033	.010	-.023	-.0038	.0002	.0012
RUN	240	1.	-22.	-0.	437.	24.	-963.	.033	.010	-.023	-.0038	.0002	.0012
	245	-1.	29.	0.	-355.	-24.	1356.	.033	-.004	-.020	-.0043	.0002	.0023
RUN	245	1.	45.	-0.	355.	24.	-1356.	.033	-.004	-.020	-.0043	.0002	.0023
	250	-1.	-35.	0.	-594.	-23.	443.	.034	-.043	-.016	-.0051	.0002	.0034
ELBOW	250	1.	35.	-0.	594.	23.	-443.	.034	-.043	-.016	-.0051	.0002	.0034
	255	-1.	-33.	0.	-539.	-26.	321.	.025	-.064	-.029	-.0056	.0001	.0039
RUN	255	1.	33.	-0.	539.	26.	-321.	.025	-.064	-.029	-.0056	.0001	.0039
	260	-1.	-27.	0.	-222.	-42.	306.	-.019	-.127	-.092	-.0059	.0000	.0042
ELBOW	260	1.	27.	-0.	222.	42.	-306.	-.019	-.127	-.092	-.0059	.0000	.0042
	265	-1.	-24.	0.	-186.	-45.	211.	-.031	-.151	-.108	-.0061	-.0000	.0045
RUN	265	1.	24.	-0.	186.	45.	-211.	-.031	-.151	-.108	-.0061	-.0000	.0045
	270	-1.	-16.	0.	-315.	-42.	-172.	-.031	-.198	-.109	-.0065	-.0001	.0046
RUN	270	1.	16.	-0.	315.	42.	172.	-.031	-.198	-.109	-.0065	-.0001	.0046
	275	-1.	-9.	0.	-410.	-37.	-405.	-.032	-.236	-.111	-.0070	-.0001	.0042
RUN	275	1.	9.	-0.	410.	37.	405.	-.032	-.236	-.111	-.0070	-.0001	.0042
	280	-1.	7.	0.	-403.	-28.	-391.	-.034	-.246	-.115	-.0077	-.0002	.0037
RUN	280	1.	-7.	-0.	403.	28.	391.	-.034	-.246	-.115	-.0077	-.0002	.0037
	285	-1.	8.	0.	-403.	-29.	-370.	-.034	-.256	-.115	-.0078	-.0002	.0035
ELBOW	285	1.	-8.	-0.	403.	29.	370.	-.034	-.256	-.115	-.0078	-.0002	.0035
	290	-1.	10.	0.	-384.	-27.	-340.	-.027	-.250	-.099	-.0081	-.0002	.0032
RUN	290	1.	-10.	-0.	384.	27.	340.	-.027	-.250	-.099	-.0081	-.0002	.0032
	295	-1.	17.	0.	-212.	-9.	-323.	-.008	-.147	-.064	-.0084	-.0002	.0028
ELBOW	295	1.	-17.	-0.	212.	9.	323.	-.008	-.147	-.064	-.0084	-.0002	.0028
	300	-1.	19.	0.	-167.	-6.	-288.	.011	-.131	.016	-.0086	-.0002	.0026
RUN	300	1.	-19.	-0.	167.	6.	288.	.011	-.131	.016	-.0086	-.0002	.0026
	305	-1.	28.	0.	-88.	3.	159.	.009	-.085	.012	-.0087	-.0002	.0026
RUN	305	1.	-28.	-0.	88.	-3.	-159.	.009	-.085	.012	-.0087	-.0002	.0026
	310	-1.	38.	0.	-522.	15.	825.	.006	-.030	.007	-.0083	-.0002	.0032
RUN	310	1.	-38.	-0.	522.	-15.	-825.	.006	-.030	.007	-.0083	-.0002	.0032
	315	-1.	49.	0.	-1142.	29.	1659.	.003	-.007	.003	-.0072	-.0002	.0048

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LOFT CIS ANALYSIS - 4" 1W-179-AB, INSIDE, NORM & UPSET, S-58

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	315	1.	-49.	-0.	-1142.	-29.	-1659.	.003	.007	.003	-.0072	-.0002	.0048
	320	-1.	59.	0.	1972.	45.	2643.	.001	-.007	.001	-.0053	-.0001	.0076
RUN	320	0.	78.	-1.	-1972.	-45.	-2643.	.001	-.007	.001	-.0053	-.0001	.0076
	325	-0.	-68.	1.	765.	36.	1375.	-.001	-.093	-.001	-.0036	-.0001	.0103
RUN	325	0.	68.	-1.	-765.	-36.	-1375.	-.001	-.093	-.001	-.0036	-.0001	.0103
	330	-0.	-58.	1.	-340.	27.	-344.	-.002	-.214	-.002	-.0035	-.0000	.0115
RUN	330	0.	58.	-1.	340.	-27.	-344.	-.002	-.214	-.002	-.0035	-.0000	.0115
	335	-0.	-47.	1.	-1315.	20.	-454.	-.002	-.318	-.003	-.0047	-.0000	.0116
RUN	335	0.	15.	-1.	1132.	-20.	454.	-.002	-.318	-.003	-.0047	-.0000	.0116
	340	-0.	-5.	1.	-1330.	14.	-598.	-.002	-.372	-.003	-.0063	.0000	.0110
RUN	340	0.	5.	-1.	1330.	-14.	598.	-.002	-.372	-.003	-.0063	.0000	.0110
	345	-0.	5.	1.	-1332.	9.	-599.	-.002	-.363	-.002	-.0081	.0000	.0103
RUN	345	0.	-5.	-1.	1332.	-9.	599.	-.002	-.363	-.002	-.0081	.0000	.0103
	350	-0.	15.	1.	-1118.	5.	-481.	-.002	-.293	-.002	-.0097	.0000	.0097
RUN	350	0.	-15.	-1.	1118.	-5.	481.	-.002	-.293	-.002	-.0097	.0000	.0097
	355	-0.	25.	1.	-681.	2.	-271.	-.001	-.169	-.002	-.0108	.0000	.0092
RUN	355	0.	-25.	-1.	681.	-2.	271.	-.001	-.169	-.002	-.0108	.0000	.0092
	360	-0.	35.	1.	-0.	0.	-0.	.000	-.002	-.001	-.0113	.0000	.0090
RUN	365	0.	32.	-0.	182.	-0.	-0.	-.002	-.318	-.003	-.0047	-.0000	.0116
	370	-0.	-31.	0.	-182.	0.	0.	-.002	-.318	-.003	-.0047	-.0000	.0116
ELBOW	370	0.	31.	-0.	183.	-0.	-0.	-.002	-.318	-.003	-.0047	-.0000	.0116
	375	-0.	-31.	0.	-137.	0.	0.	-.002	-.326	-.003	-.0055	-.0000	.0116
RUN	375	0.	31.	-0.	137.	-0.	-0.	-.002	-.326	-.003	-.0055	-.0000	.0116
	380	-0.	-30.	0.	0.	0.	0.	-.002	-.351	-.003	-.0056	-.0000	.0116

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APPENDIX D
THERMAL EXPANSION ANALYSIS RESULTS

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LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE , NORM & UPSET, S-5B

SUPPORT REACTIONS FOR LOAD CASE NO. 2

THERMAL EXPANSION PLUS ANCHOR MOVEMENTS

NODE	TYPE	REACTION (LBS OR IN-LBS)	DIRECTION
5	FIXED	3.	X COORD
5	FIXED	2.	Y COORD
5	FIXED	6.	Z COORD
5	MOMENT	335.	X COORD
5	MOMENT	51.	Y COORD
5	MOMENT	-168.	Z COORD
12	FIXED	-7.	X COORD
12	FIXED	-1.	Y COORD
12	FIXED	-1.	Z COORD
12	FIXED	2.	X COORD
12	FIXED	0.	Y COORD
12	FIXED	4.	Z COORD
21	FIXED	-4.	X COORD
21	FIXED	0.	Y COORD
21	FIXED	-6.	Z COORD
24	FIXED	-1.	Y COORD
24	FIXED	2.	X COORD
32	FIXED	0.	Y COORD
32	FIXED	5.	Z COORD
32	FIXED	4.	X COORD
32	FIXED	-0.	Y COORD
32	FIXED	-7.	Z COORD

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LGFT CIS ANALYSIS - 4" -1X-179-AS, INSIDE , NORM 6 UPSET, S-5B

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 2

THERMAL EXPANSION PLUS ANCHOR MOVEMENTS

MEMBER	END	FORCES (LBS)			MX	MOMENTS (IN-LBS)		MZ	DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ		MY	DX		DY	DZ	RX	RY	RZ	
RUN	5													
	10	3.	2.	6.	335.	51.	-168.	-0.000	-0.000	-0.000	-0.0000	-0.0000	0.0000	
		-3.	-2.	-6.	-357.	-7.	168.	-0.000	0.000	0.001	-0.0000	-0.0000	0.0000	
RUN	10													
	15	3.	2.	6.	357.	7.	-168.	-0.000	0.000	0.001	-0.0000	-0.0000	0.0000	
		-3.	-2.	-6.	-371.	20.	168.	-0.000	0.000	0.002	-0.0000	-0.0000	0.0000	
ELBOW	15													
	20	3.	2.	6.	371.	-20.	-168.	-0.000	0.000	0.002	-0.0000	-0.0000	0.0000	
		-3.	-2.	-6.	-345.	38.	151.	-0.000	0.002	0.002	-0.0001	-0.0000	0.0000	
RUN	20													
	25	3.	2.	6.	345.	-38.	-151.	-0.000	0.002	0.002	-0.0001	-0.0000	0.0000	
		-3.	-2.	-6.	-276.	38.	115.	-0.001	0.003	0.001	-0.0001	-0.0000	0.0001	
RUN	25													
	30	3.	2.	6.	276.	-38.	-115.	-0.001	0.003	0.001	-0.0001	-0.0000	0.0001	
		-3.	-2.	-6.	-200.	38.	76.	-0.002	0.004	-0.001	-0.0002	-0.0000	0.0001	
ELBOW	30													
	35	3.	2.	6.	200.	-38.	-76.	-0.002	0.004	-0.001	-0.0002	-0.0000	0.0001	
		-3.	-2.	-6.	-146.	27.	51.	-0.002	0.004	-0.003	-0.0002	-0.0000	0.0001	
VALVE	35													
	40	3.	2.	6.	146.	-27.	-51.	-0.002	0.004	-0.003	-0.0002	-0.0000	0.0001	
		-3.	-2.	-6.	-110.	12.	36.	-0.003	0.004	-0.005	-0.0002	-0.0000	0.0001	
RUN	40													
	45	3.	2.	6.	110.	-12.	-36.	-0.003	0.004	-0.005	-0.0002	-0.0000	0.0001	
		-3.	-2.	-6.	-46.	13.	11.	-0.003	0.003	-0.007	-0.0002	-0.0000	0.0001	
RUN	45													
	50	3.	2.	6.	46.	-13.	-11.	-0.003	0.003	-0.007	-0.0002	-0.0000	0.0001	
		-3.	-2.	-6.	-43.	15.	9.	-0.003	0.003	-0.007	-0.0002	-0.0000	0.0001	
RUN	50													
	55	9.	1.	3.	29.	-172.	15.	-0.003	0.003	-0.007	-0.0002	-0.0000	0.0001	
		-9.	-1.	-3.	-29.	158.	-13.	-0.003	0.003	-0.007	-0.0002	-0.0000	0.0001	
REDUCE	55													
	60	9.	1.	3.	29.	-158.	13.	-0.003	0.003	-0.007	-0.0002	-0.0000	0.0001	
		-9.	-1.	-3.	-29.	145.	-10.	-0.003	0.004	-0.007	-0.0002	-0.0000	0.0001	
RUN	60													
	65	9.	1.	3.	29.	-145.	10.	-0.003	0.004	-0.007	-0.0002	-0.0000	0.0001	
		-9.	-1.	-3.	-29.	71.	5.	-0.000	0.005	-0.009	-0.0002	-0.0001	0.0001	
RUN	65													
	70	9.	1.	3.	29.	-71.	-5.	-0.000	0.005	-0.009	-0.0002	-0.0001	0.0001	
		-9.	-1.	-3.	-31.	18.	18.	0.002	0.007	-0.013	-0.0003	-0.0002	0.0001	
ELBOW	70													
	75	9.	1.	3.	31.	-18.	-18.	0.002	0.007	-0.013	-0.0003	-0.0002	0.0001	
		-9.	-1.	-3.	-21.	11.	-7.	0.002	0.008	-0.014	-0.0003	-0.0002	0.0001	

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LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM 6 UPSET, S-5B

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	75	9.	1.	3.	21.	-11.	7.	.002	.008	-.014	-.0003	.0002	-.0001
	80	-9.	-1.	-3.	-4.	11.	-53.	.002	.009	-.016	-.0003	.0002	.0001
ELBOW	80	9.	1.	3.	4.	-11.	53.	.002	.009	-.016	-.0003	.0002	.0001
	85	-9.	-1.	-3.	6.	5.	-78.	.002	.009	-.018	-.0003	.0002	.0000
RUN	85	9.	1.	3.	-6.	-5.	78.	.002	.009	-.018	-.0003	.0002	-.0000
	90	-9.	-1.	-3.	4.	-35.	-65.	.005	.009	-.022	-.0003	.0002	-.0001
RUN	90	9.	1.	3.	-4.	35.	65.	.005	.009	-.022	-.0003	.0002	-.0001
	95	-9.	-1.	-3.	1.	-68.	-50.	.008	.008	-.026	-.0003	.0001	-.0001
RUN	95	9.	1.	3.	-1.	68.	50.	.008	.008	-.026	-.0003	.0001	-.0001
	100	-9.	-1.	-3.	-3.	-86.	-35.	.011	.006	-.027	-.0003	.0000	-.0002
RUN	100	9.	1.	3.	3.	86.	35.	.011	.006	-.027	-.0003	.0000	-.0002
	105	-9.	-1.	-3.	-8.	-91.	-21.	.013	.004	-.026	-.0003	-.0001	-.0002
RUN	105	9.	1.	3.	8.	91.	21.	.013	.004	-.026	-.0003	-.0001	-.0002
	110	-9.	-1.	-3.	-14.	-81.	-7.	.014	.001	-.022	-.0003	-.0002	-.0003
RUN	110	9.	1.	3.	14.	81.	7.	.014	.001	-.022	-.0003	-.0002	-.0003
	115	-9.	-1.	-3.	-21.	-56.	6.	.014	-.001	-.017	-.0004	-.0003	-.0003
RUN	115	9.	1.	3.	21.	56.	-6.	.014	-.001	-.017	-.0004	-.0003	-.0003
	120	-9.	-1.	-3.	-28.	-19.	19.	.013	-.002	-.009	-.0004	-.0003	-.0003
RUN	120	9.	1.	3.	28.	19.	-19.	.013	-.002	-.009	-.0004	-.0003	-.0003
	125	-9.	-1.	-3.	-40.	53.	36.	.010	.000	.001	-.0005	-.0003	-.0002
RUN	125	2.	-0.	2.	40.	-53.	-36.	.010	.000	.001	-.0005	-.0003	-.0002
	130	-2.	0.	-2.	-36.	49.	33.	.009	.002	.003	-.0005	-.0003	-.0002
ELBOW	130	2.	-0.	2.	36.	-49.	-33.	.009	.002	.003	-.0005	-.0003	-.0002
	135	-2.	0.	-2.	-29.	48.	27.	.009	.003	.002	-.0005	-.0002	-.0002
RUN	135	2.	-0.	2.	29.	-48.	-27.	.009	.003	.002	-.0005	-.0002	-.0002
	140	-2.	0.	-2.	8.	48.	1.	.011	.005	-.006	-.0005	-.0002	-.0002
RUN	140	2.	-0.	2.	-8.	-48.	-1.	.011	.005	-.006	-.0005	-.0002	-.0002
	145	-2.	0.	-2.	45.	48.	-26.	.014	.006	-.015	-.0005	-.0001	-.0002
ELBOW	145	2.	-0.	2.	-45.	-48.	26.	.014	.006	-.015	-.0005	-.0001	-.0002
	150	-2.	0.	-2.	53.	45.	-32.	.015	.007	-.016	-.0005	-.0001	-.0002
RUN	150	2.	-0.	2.	-53.	-45.	32.	.015	.007	-.016	-.0005	-.0001	-.0002
	155	-2.	0.	-2.	59.	31.	-40.	.015	.009	-.014	-.0004	-.0000	-.0002

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 LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM & UPSET, S-5B

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	2.	-0.	2.	-59.	-31.	40.	.015	.009	-.014	-.0004	-.0000	-.0002
	160	-2.	0.	-2.	67.	18.	-49.	.017	.011	-.012	-.0003	-.0000	-.0003
RLN	160	2.	-0.	2.	-67.	-18.	49.	.017	.011	-.012	-.0003	-.0000	-.0003
	165	-2.	0.	-2.	77.	8.	-58.	.018	.010	-.010	-.0002	-.0000	-.0004
ELBCW	165	2.	-0.	2.	-77.	-8.	58.	.018	.010	-.010	-.0002	.0000	-.0004
	170	-2.	0.	-2.	71.	7.	-54.	.017	.009	-.009	-.0001	.0000	-.0004
RLN	170	2.	-0.	2.	-71.	-7.	54.	.017	.009	-.009	-.0001	.0000	-.0004
	175	-2.	0.	-2.	23.	7.	-19.	.008	.007	-.007	-.0001	.0000	-.0005
RLN	175	2.	-0.	2.	-23.	-7.	19.	.008	.007	-.007	-.0001	.0000	-.0005
	180	-2.	0.	-2.	33.	7.	21.	-.004	.005	-.004	-.0001	.0000	-.0005
ELBCW	180	2.	-0.	2.	33.	-7.	-21.	-.004	.005	-.004	-.0001	.0000	-.0005
	185	-2.	0.	-2.	-38.	7.	25.	-.005	.004	-.004	-.0001	.0000	-.0004
RUN	185	2.	-0.	2.	38.	-7.	-25.	-.005	.004	-.004	-.0001	.0000	-.0004
	190	-2.	0.	-2.	-28.	3.	17.	-.002	-.000	-.003	-.0002	.0000	-.0004
RUN	190	4.	-0.	6.	28.	-3.	-17.	-.002	-.000	-.003	-.0002	.0000	-.0004
	195	-4.	0.	-6.	-21.	-9.	12.	-.000	-.002	-.001	-.0002	.0000	-.0004
RUN	195	4.	-0.	6.	21.	9.	-12.	-.000	-.002	-.001	-.0002	.0000	-.0004
	198	-4.	0.	-6.	-14.	-10.	8.	.002	-.002	.000	-.0002	.0000	-.0004
VALVE	198	4.	-0.	6.	14.	10.	-8.	.002	-.002	.000	-.0002	.0000	-.0004
	200	-4.	0.	-6.	-14.	-27.	7.	.002	-.003	.000	-.0002	.0000	-.0004
RUN	200	4.	-0.	6.	14.	27.	-7.	.002	-.003	.000	-.0002	.0000	-.0004
	205	-4.	0.	-6.	-7.	-19.	3.	.003	-.002	.002	-.0003	-.0000	-.0004
RLN	205	4.	-0.	6.	7.	19.	-3.	.003	-.002	.002	-.0003	-.0000	-.0004
	210	-4.	0.	-6.	-0.	0.	0.	.004	-.000	.005	-.0003	-.0000	-.0004
RUN	50	-6.	-1.	-2.	-14.	-187.	-24.	-.003	.003	-.007	-.0002	-.0000	.0001
	215	6.	1.	2.	14.	177.	21.	-.004	.003	-.007	-.0002	-.0000	.0001
REDUCE	215	-6.	-1.	-2.	-14.	-177.	-21.	-.004	.003	-.007	-.0002	-.0000	.0001
	225	6.	1.	2.	14.	167.	17.	-.004	.002	-.007	-.0002	-.0000	.0001
RUN	225	-6.	-1.	-2.	-14.	-167.	-17.	-.004	.002	-.007	-.0002	-.0000	.0001
	230	6.	1.	2.	14.	113.	-4.	-.007	.001	-.010	-.0002	-.0002	.0001
RUN	230	-6.	-1.	-2.	-14.	-113.	-4.	-.007	.001	-.010	-.0002	-.0002	.0001
	235	6.	1.	2.	16.	69.	-24.	-.010	-.001	-.015	-.0002	-.0003	.0001

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-58

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	235	-6.	1.	2.	16.	69.	24.	-.010	-.001	-.015	-.0002	-.0003	.0001
	240	6.	-1.	-2.	-19.	-33.	-45.	-.013	-.001	-.023	-.0003	-.0004	.0000
RUN	240	-6.	1.	2.	19.	33.	45.	-.013	-.001	-.023	-.0003	-.0004	.0000
	245	6.	-1.	-2.	-22.	-15.	-59.	-.016	.000	-.029	-.0003	-.0004	-.0000
RUN	245	-6.	-0.	2.	22.	15.	59.	-.016	.000	-.029	-.0003	-.0004	-.0000
	250	6.	0.	-2.	-20.	4.	-50.	-.021	.003	-.037	-.0003	-.0004	-.0001
ELBOW	250	-6.	-0.	2.	20.	-4.	50.	-.021	.003	-.037	-.0003	-.0004	-.0001
	255	6.	0.	-2.	-14.	22.	-34.	-.020	.003	-.039	-.0003	-.0004	-.0001
RUN	255	-6.	-0.	2.	14.	-22.	34.	-.020	.003	-.039	-.0003	-.0004	-.0001
	260	6.	0.	-2.	8.	87.	32.	-.014	.001	-.044	-.0003	-.0003	-.0001
ELBOW	260	-6.	-0.	2.	8.	-87.	-32.	-.014	.001	-.044	-.0003	-.0003	-.0001
	265	6.	0.	-2.	14.	105.	49.	-.014	.001	-.046	-.0003	-.0002	-.0001
RUN	265	-6.	-0.	2.	-14.	-105.	-49.	-.014	.001	-.046	-.0003	-.0002	-.0001
	270	6.	0.	-2.	16.	112.	56.	-.017	.004	-.049	-.0003	-.0001	-.0000
RUN	270	-6.	-0.	2.	-16.	-112.	-56.	-.017	.004	-.049	-.0003	-.0001	-.0000
	275	6.	0.	-2.	19.	112.	64.	-.020	.006	-.049	-.0003	.0000	.0001
RUN	275	-6.	-0.	2.	-19.	-112.	-64.	-.020	.006	-.049	-.0003	.0000	.0001
	280	6.	0.	-2.	24.	99.	73.	-.021	.006	-.045	-.0002	.0002	.0002
RUN	280	-6.	-0.	2.	-24.	-99.	-73.	-.021	.006	-.045	-.0002	.0002	.0002
	285	6.	0.	-2.	24.	106.	74.	-.021	.006	-.044	-.0002	.0002	.0002
ELBOW	285	-6.	-0.	2.	-24.	-106.	-74.	-.021	.006	-.044	-.0002	.0002	.0002
	290	6.	0.	-2.	19.	101.	63.	-.020	.005	-.043	-.0002	.0003	.0003
RUN	290	-6.	-0.	2.	-19.	-101.	-63.	-.020	.005	-.043	-.0002	.0003	.0003
	295	6.	0.	-2.	-6.	26.	-12.	-.013	.007	-.039	-.0002	.0004	.0003
ELBOW	295	-6.	-0.	2.	6.	-26.	12.	-.013	.007	-.039	-.0002	.0004	.0003
	300	6.	0.	-2.	-9.	15.	-21.	-.011	.007	-.038	-.0002	.0004	.0003
RUN	300	-6.	-0.	2.	9.	-15.	21.	-.011	.007	-.038	-.0002	.0004	.0003
	305	6.	0.	-2.	-5.	-5.	-14.	-.009	.004	-.029	-.0002	.0004	.0003
RUN	305	-6.	-0.	2.	5.	5.	14.	-.009	.004	-.029	-.0002	.0004	.0003
	310	6.	0.	-2.	-0.	-35.	-6.	-.006	.002	-.020	-.0002	.0004	.0002
RUN	310	-6.	-0.	2.	0.	35.	6.	-.006	.002	-.020	-.0002	.0004	.0002
	315	6.	0.	-2.	5.	-75.	1.	-.003	.001	-.013	-.0002	.0003	.0002

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 LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM & UPSET, S-5B

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	315	-6:	-0:	-2:	-5:	75:	-1:	-.003	.001	-.013	-.0002	.0003	.0002
	320	-6:	-0:	-2:	11:	-125:	-7:	-.001	-.000	-.007	-.0002	.0002	.0002
RUN	320	-4:	-0:	-7:	-11:	125:	-7:	-.001	-.000	-.007	-.0002	.0002	.0002
	325	-4:	-0:	-7:	10:	-68:	6:	-.002	-.001	-.003	-.0002	.0000	.0002
RUN	325	-4:	-0:	-7:	-10:	68:	-6:	-.002	-.001	-.003	-.0002	.0000	.0002
	330	-4:	-0:	-7:	8:	-23:	5:	-.003	-.001	-.001	-.0002	.0000	.0003
RUN	330	-4:	-0:	-7:	-8:	23:	-5:	-.003	-.001	-.001	-.0002	.0000	.0003
	335	-4:	-0:	-7:	7:	11:	4:	-.005	-.002	-.000	-.0002	.0000	.0003
RUN	335	-4:	-0:	-7:	-7:	-11:	-4:	-.005	-.002	.000	-.0002	.0000	.0003
	340	-4:	-0:	-7:	6:	32:	3:	-.007	-.002	.002	-.0002	.0000	.0003
RUN	340	-4:	-0:	-7:	-6:	42:	-3:	-.007	-.002	.002	-.0002	.0000	.0003
	345	-4:	-0:	-7:	4:	-32:	2:	-.008	-.002	.004	-.0002	.0001	.0003
RUN	345	-4:	-0:	-7:	-4:	-42:	-2:	-.008	-.002	.004	-.0002	.0001	.0003
	350	-4:	-0:	-7:	3:	40:	1:	-.007	-.002	.007	-.0002	.0001	.0003
RUN	350	-4:	-0:	-7:	-3:	-40:	-1:	-.007	-.002	.007	-.0002	.0001	.0003
	355	-4:	-0:	-7:	2:	27:	1:	-.005	-.001	.011	-.0002	.0001	.0003
RUN	355	-4:	-0:	-7:	-2:	-27:	-1:	-.005	-.001	.011	-.0002	.0001	.0003
	360	-4:	-0:	-7:	0:	-0:	0:	-.003	-.000	.014	-.0002	.0002	.0003
RUN	365	-0:	-0:	-0:	-0:	-0:	-0:	-.005	-.002	-.000	-.0002	.0000	.0003
	370	-0:	-0:	-0:	-0:	0:	0:	-.006	-.001	-.001	-.0002	.0000	.0003
ELBOW	370	-0:	-0:	-0:	0:	-0:	-0:	-.006	-.001	-.001	-.0002	.0000	.0003
	375	-0:	-0:	-0:	0:	0:	0:	-.007	-.002	-.001	-.0002	.0000	.0003
RUN	375	-0:	-0:	-0:	0:	0:	-0:	-.007	-.002	-.001	-.0002	.0000	.0003
	380	-0:	-0:	-0:	0:	0:	0:	-.007	-.002	-.002	-.0002	.0000	.0003

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APPENDIX E
SEISMIC ANALYSES RESULTS

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 LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE , NORM & UPSET, S-5B

SUPPORT REACTIONS FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING
 COMBINED RESULT FOR MODE 1 THRU 30 BY RMS SUMMATION - SPECTRA SET = 1

MODE	TYPE	REACTIONS (LBS OR IN-LBS)	DIRECTION
5	FACE	162.	X COORD
5	FACE	75.	Y COORD
5	FACE	103.	Z COORD
5	MOMENT	5589.	X COORD
5	MOMENT	4597.	Y COORD
5	MOMENT	6139.	Z COORD
125	FACE	115.	X COORD
125	FACE	85.	Y COORD
125	FACE	92.	Z COORD
190	FACE	43.	X COORD
190	FACE	47.	Y COORD
190	FACE	32.	Z COORD
210	FACE	25.	X COORD
210	FACE	20.	Y COORD
210	FACE	37.	Z COORD
245	FACE	97.	Y COORD
320	FACE	119.	X COORD
320	FACE	125.	Y COORD
320	FACE	98.	Z COORD
360	FACE	39.	X COORD
360	FACE	32.	Y COORD
360	FACE	129.	Z COORD

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-5B

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING

COMBINED RESULT FOR MODE 1 THRU 30 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
RUN	5	162.	75.	103.	5589.	4597.	6139.	.000	.000	.000	.0000	.0000	.0000
	10	162.	75.	103.	5996.	2868.	6139.	.002	.003	.000	.0004	.0003	.0006
RUN	10	162.	75.	103.	5996.	2868.	6139.	.002	.003	.000	.0004	.0003	.0006
	15	162.	75.	103.	6282.	2488.	6139.	.005	.006	.000	.0007	.0004	.0009
ELBOW	15	162.	75.	103.	6282.	2488.	6139.	.005	.008	.000	.0007	.0004	.0009
	20	162.	75.	103.	5902.	2685.	5171.	.016	.016	.010	.0022	.0008	.0018
RUN	20	161.	74.	102.	5902.	2685.	5171.	.016	.016	.010	.0022	.0008	.0018
	25	161.	74.	102.	4763.	2685.	3887.	.039	.016	.039	.0025	.0010	.0020
RUN	25	158.	74.	100.	4763.	2685.	3887.	.039	.016	.039	.0025	.0010	.0020
	30	158.	74.	100.	3622.	2685.	3356.	.066	.016	.074	.0028	.0011	.0022
ELBOW	30	153.	74.	95.	3622.	2685.	3356.	.066	.016	.074	.0028	.0011	.0022
	35	153.	74.	95.	2833.	2538.	3506.	.083	.005	.099	.0032	.0013	.0023
VALVE	35	148.	74.	91.	2833.	2538.	3506.	.083	.005	.099	.0032	.0013	.0023
	40	148.	74.	91.	2324.	2523.	3708.	.093	.011	.115	.0032	.0013	.0024
RUN	40	142.	74.	86.	2324.	2523.	3708.	.093	.011	.115	.0032	.0013	.0024
	45	142.	74.	86.	1804.	2952.	4212.	.109	.039	.143	.0033	.0015	.0025
RUN	45	136.	74.	81.	1804.	2952.	4212.	.109	.039	.143	.0033	.0015	.0025
	50	136.	74.	81.	1788.	3007.	4262.	.111	.041	.146	.0033	.0015	.0025
RUN	50	97.	69.	49.	1389.	2543.	4219.	.111	.041	.146	.0033	.0015	.0025
	55	97.	69.	49.	1389.	2355.	3955.	.111	.048	.147	.0033	.0015	.0025
REDUCE	55	95.	68.	47.	1389.	2355.	3955.	.111	.048	.147	.0033	.0015	.0025
	60	95.	68.	47.	1389.	2177.	3694.	.111	.056	.149	.0033	.0016	.0026
RUN	60	93.	68.	43.	1389.	2177.	3694.	.111	.056	.149	.0033	.0016	.0026
	65	93.	68.	43.	1387.	1180.	2177.	.111	.150	.186	.0048	.0031	.0057
RUN	65	90.	64.	36.	1387.	1180.	2177.	.111	.150	.186	.0048	.0031	.0057
	70	90.	64.	36.	1389.	521.	1027.	.113	.280	.248	.0065	.0037	.0073
ELBOW	70	89.	60.	32.	1389.	521.	1027.	.113	.280	.248	.0065	.0037	.0073
	75	89.	60.	32.	1404.	485.	799.	.127	.301	.269	.0073	.0038	.0080
RUN	75	88.	58.	30.	1404.	485.	799.	.127	.301	.269	.0073	.0038	.0080
	80	88.	58.	30.	1444.	485.	710.	.157	.301	.289	.0077	.0039	.0081

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 LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-58

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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
ELBOW	80	88.	57.	28.	1444.	485.	710.	.157	.301	.289	.0077	.0039	.0081
	85	88.	57.	28.	1473.	466.	782.	.177	.323	.312	.0085	.0038	.0083
RUN	85	86.	53.	23.	1473.	466.	782.	.177	.323	.312	.0085	.0038	.0083
	90	86.	53.	23.	1472.	762.	1207.	.183	.473	.376	.0105	.0036	.0079
RUN	90	83.	41.	17.	1472.	762.	1207.	.183	.473	.376	.0105	.0036	.0079
	95	83.	41.	17.	1482.	1236.	2020.	.192	.608	.434	.0128	.0028	.0066
RUN	95	80.	27.	20.	1482.	1236.	2020.	.192	.608	.434	.0128	.0028	.0066
	100	80.	27.	20.	1477.	1524.	2546.	.198	.680	.461	.0151	.0016	.0054
RUN	100	78.	16.	33.	1477.	1524.	2546.	.198	.680	.461	.0151	.0018	.0054
	105	78.	16.	33.	1406.	1591.	2699.	.196	.674	.448	.0174	.0021	.0059
RUN	105	76.	24.	47.	1406.	1591.	2699.	.196	.674	.448	.0174	.0021	.0059
	110	76.	24.	47.	1234.	1461.	2531.	.182	.588	.396	.0195	.0035	.0084
RUN	110	76.	39.	60.	1234.	1461.	2531.	.182	.588	.396	.0195	.0035	.0084
	115	76.	39.	60.	996.	1227.	2241.	.154	.436	.309	.0213	.0048	.0115
RUN	115	79.	52.	70.	996.	1227.	2241.	.154	.436	.309	.0213	.0048	.0115
	120	79.	52.	70.	945.	1073.	2200.	.130	.247	.200	.0228	.0057	.0145
RUN	120	86.	61.	78.	945.	1073.	2200.	.130	.247	.200	.0228	.0057	.0145
	125	86.	61.	78.	1613.	1307.	2942.	.153	.004	.066	.0242	.0063	.0186
RUN	125	67.	28.	25.	1613.	1307.	2942.	.153	.004	.066	.0242	.0063	.0186
	130	67.	28.	25.	1484.	920.	2867.	.178	.063	.065	.0245	.0064	.0198
ELBOW	130	67.	28.	24.	1484.	920.	2867.	.178	.063	.065	.0245	.0064	.0198
	135	67.	28.	24.	1399.	810.	2657.	.227	.080	.135	.0244	.0069	.0218
RUN	135	65.	29.	23.	1399.	810.	2657.	.227	.080	.135	.0244	.0069	.0218
	140	65.	29.	23.	1206.	810.	1705.	.546	.080	.521	.0247	.0070	.0233
RUN	140	62.	31.	20.	1206.	810.	1705.	.546	.080	.521	.0247	.0070	.0233
	145	62.	31.	20.	1062.	810.	951.	.915	.080	.915	.0249	.0072	.0241
ELBOW	145	58.	32.	18.	1062.	810.	951.	.915	.080	.915	.0249	.0072	.0241
	150	58.	32.	18.	982.	734.	806.	1.001	.076	1.006	.0251	.0076	.0245
RUN	150	54.	33.	17.	982.	734.	806.	1.001	.076	1.006	.0251	.0076	.0245
	155	54.	33.	17.	624.	565.	517.	1.098	.064	1.122	.0256	.0075	.0249
RUN	15	47.	34.	22.	624.	565.	517.	1.098	.064	1.122	.0256	.0075	.0249
	16	47.	34.	22.	448.	813.	677.	1.214	.063	1.244	.0261	.0068	.0253

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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	160	40.	34.	32.	448.	813.	677.	1.214	.063	1.244	.0261	.0068	.0253
	165	40.	34.	32.	840.	941.	1140.	1.330	.040	1.353	.0267	.0056	.0257
ELBOW	165	38.	33.	39.	840.	941.	1140.	1.330	.040	1.353	.0267	.0056	.0257
	170	38.	33.	39.	801.	929.	1129.	1.264	.039	1.263	.0272	.0049	.0261
RUN	170	37.	33.	46.	801.	929.	1129.	1.264	.039	1.283	.0272	.0049	.0261
	175	37.	33.	46.	514.	929.	789.	.713	.039	.711	.0271	.0035	.0267
RUN	175	38.	34.	52.	514.	929.	789.	.713	.039	.711	.0271	.0035	.0267
	180	38.	34.	52.	1599.	929.	1068.	.089	.039	.077	.0259	.0021	.0277
ELBOW	180	40.	35.	53.	1599.	929.	1068.	.089	.039	.077	.0259	.0021	.0277
	185	40.	35.	53.	1720.	870.	1119.	.071	.036	.023	.0243	.0017	.0290
RUN	185	42.	36.	54.	1720.	870.	1119.	.071	.036	.023	.0243	.0017	.0290
	190	42.	36.	54.	1603.	478.	998.	.058	.002	.023	.0220	.0010	.0303
RUN	190	17.	24.	31.	1603.	478.	998.	.058	.002	.023	.0220	.0010	.0303
	195	17.	24.	31.	1203.	401.	702.	.058	.021	.028	.0202	.0006	.0313
RUN	195	15.	23.	31.	1203.	401.	702.	.058	.021	.028	.0202	.0006	.0313
	198	15.	23.	31.	842.	552.	463.	.057	.024	.031	.0190	.0003	.0320
VALVE	198	15.	23.	31.	842.	552.	463.	.057	.024	.031	.0190	.0003	.0320
	200	15.	23.	31.	842.	566.	414.	.057	.106	.031	.0190	.0004	.0320
RUN	200	19.	19.	34.	842.	566.	414.	.057	.106	.031	.0190	.0004	.0320
	205	19.	19.	34.	439.	349.	200.	.047	.073	.029	.0183	.0008	.0323
RUN	205	23.	20.	36.	439.	349.	200.	.047	.073	.029	.0183	.0008	.0323
	210	23.	20.	36.	0.	0.	0.	.030	.001	.029	.0180	.0010	.0324
RUN	50	113.	48.	36.	1255.	2100.	2355.	.111	.041	.146	.0033	.0015	.0025
	215	113.	48.	36.	1255.	1971.	2177.	.111	.036	.144	.0033	.0016	.0025
REDUCE	215	111.	48.	34.	1255.	1971.	2177.	.111	.036	.144	.0033	.0016	.0025
	225	111.	48.	34.	1255.	1850.	2000.	.111	.033	.143	.0033	.0016	.0024
RUN	225	110.	48.	33.	1255.	1850.	2000.	.111	.033	.143	.0033	.0016	.0024
	230	110.	48.	33.	1221.	1137.	1209.	.111	.053	.161	.0043	.0032	.0012
RUN	230	108.	49.	29.	1221.	1137.	1209.	.111	.053	.161	.0043	.0032	.0012
	235	108.	49.	29.	1122.	482.	1575.	.116	.059	.214	.0056	.0040	.0007
RUN	235	106.	50.	22.	1122.	482.	1575.	.116	.059	.214	.0056	.0040	.0007
	240	106.	50.	22.	955.	660.	2066.	.125	.037	.264	.0070	.0038	.0029

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-5B

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	240	105.	50.	15.	955.	660.	2066.	.125	.037	.284	.0070	.0038	.0029
	245	105.	50.	15.	821.	1051.	2517.	.134	.005	.327	.0079	.0031	.0048
RUN	245	104.	56.	10.	821.	1051.	2517.	.134	.005	.327	.0079	.0031	.0048
	250	104.	56.	10.	1102.	1538.	1461.	.145	.098	.379	.0093	.0017	.0072
ELBOW	250	103.	54.	12.	1102.	1538.	1461.	.145	.098	.379	.0093	.0017	.0072
	255	103.	54.	12.	1009.	1421.	1198.	.153	.139	.396	.0100	.0013	.0087
RLN	255	102.	52.	17.	1009.	1421.	1198.	.153	.139	.396	.0100	.0013	.0087
	260	102.	52.	17.	610.	813.	931.	.218	.242	.468	.0106	.0017	.0093
ELBOW	260	101.	49.	22.	610.	813.	931.	.218	.242	.468	.0106	.0017	.0093
	265	101.	49.	22.	624.	715.	785.	.238	.291	.484	.0110	.0021	.0095
RUN	265	99.	44.	29.	624.	715.	785.	.238	.291	.484	.0110	.0021	.0095
	270	99.	44.	29.	730.	624.	789.	.229	.404	.467	.0117	.0027	.0097
RUN	270	96.	31.	41.	730.	624.	789.	.229	.404	.467	.0117	.0027	.0097
	275	96.	31.	41.	906.	439.	1181.	.213	.502	.453	.0128	.0031	.0093
RUN	275	93.	15.	54.	906.	439.	1181.	.213	.502	.453	.0128	.0031	.0093
	280	93.	15.	54.	991.	565.	1361.	.190	.572	.439	.0142	.0030	.0081
RUN	280	92.	13.	62.	991.	565.	1361.	.190	.572	.439	.0142	.0030	.0081
	285	92.	13.	62.	991.	673.	1353.	.190	.595	.437	.0144	.0030	.0080
ELBOW	285	92.	15.	64.	991.	673.	1353.	.190	.595	.437	.0144	.0030	.0080
	290	92.	15.	64.	910.	727.	1279.	.174	.590	.411	.0151	.0025	.0070
RLN	290	91.	23.	69.	910.	727.	1279.	.174	.590	.411	.0151	.0025	.0070
	295	91.	23.	69.	699.	859.	1479.	.116	.440	.289	.0156	.0022	.0063
ELBOW	295	91.	29.	72.	699.	859.	1479.	.116	.440	.289	.0156	.0022	.0063
	300	91.	29.	72.	766.	941.	1532.	.114	.419	.278	.0158	.0023	.0060
RUN	300	91.	36.	77.	766.	941.	1532.	.114	.419	.278	.0158	.0023	.0060
	305	91.	36.	77.	772.	1035.	1308.	.099	.344	.245	.0158	.0023	.0061
RUN	305	92.	47.	83.	772.	1035.	1308.	.099	.344	.245	.0158	.0023	.0061
	310	92.	47.	83.	1043.	1588.	1436.	.080	.229	.201	.0152	.0026	.0070
RUN	310	94.	55.	89.	1043.	1588.	1436.	.080	.229	.201	.0152	.0026	.0070
	315	94.	55.	89.	1648.	2154.	2080.	.062	.107	.161	.0140	.0036	.0085
RUN	315	97.	60.	98.	1648.	2154.	2080.	.062	.107	.161	.0140	.0036	.0085
	320	97.	60.	98.	2464.	2726.	2964.	.065	.006	.141	.0121	.0061	.0113

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-58

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	320	122.	72.	26.	2464.	2726.	2964.	.085	.006	.141	.0121	.0061	.0113
	325	122.	72.	26.	1419.	715.	1741.	.195	.118	.229	.0103	.0080	.0140
RUN	325	113.	68.	22.	1419.	715.	1741.	.195	.118	.229	.0103	.0080	.0140
	330	113.	68.	22.	895.	1508.	997.	.331	.252	.350	.0093	.0073	.0155
RUN	330	104.	61.	22.	895.	1508.	997.	.331	.252	.350	.0093	.0073	.0155
	335	104.	61.	22.	1367.	3227.	747.	.442	.367	.439	.0091	.0043	.0157
RLN	335	48.	16.	72.	1307.	3161.	592.	.442	.367	.439	.0091	.0043	.0157
	340	48.	16.	72.	1510.	3071.	692.	.487	.427	.471	.0092	.0005	.0155
RUN	340	36.	10.	86.	1510.	3071.	692.	.487	.427	.471	.0092	.0005	.0155
	345	36.	10.	86.	1498.	2666.	681.	.456	.417	.452	.0106	.0033	.0153
RLN	345	31.	14.	100.	1498.	2666.	681.	.456	.417	.452	.0106	.0033	.0153
	350	31.	14.	100.	1225.	1961.	529.	.353	.336	.398	.0122	.0063	.0151
RUN	350	33.	24.	113.	1225.	1961.	529.	.353	.336	.398	.0122	.0063	.0151
	355	33.	24.	113.	721.	1054.	287.	.196	.194	.327	.0134	.0082	.0149
RUN	355	35.	32.	129.	721.	1054.	287.	.196	.194	.327	.0134	.0082	.0149
	360	35.	32.	129.	0.	0.	0.	.024	.002	.258	.0138	.0089	.0149
RUN	335	49.	35.	48.	290.	70.	289.	.442	.367	.439	.0091	.0043	.0157
	370	49.	35.	48.	81.	70.	70.	.503	.367	.475	.0094	.0042	.0158
ELBOW	370	47.	34.	46.	81.	70.	70.	.503	.367	.475	.0094	.0042	.0158
	375	47.	34.	46.	0.	0.	0.	.518	.377	.488	.0095	.0041	.0159
RUN	375	0.	0.	0.	0.	0.	0.	.518	.377	.488	.0095	.0041	.0159
	380	0.	0.	0.	0.	0.	0.	.500	.407	.488	.0095	.0041	.0159

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-58

SYSTEM ACCELERATION FOR LOAD CASE NO. 3

SSE RESPONSE SPECTRUM - 1% DAMPING

COMBINED RESULT FOR MODE 1 THRU 30 BY RMS SUMMATION

SPECTRA SET = 1

POINT NO.	X-DIRECTION (G)	Y-DIRECTION (G)	Z-DIRECTION (G)
5	.000	.000	.000
10	.013	.017	.000
15	.030	.041	.000
20	.082	.075	.045
25	.209	.075	.169
30	.369	.075	.319
35	.483	.038	.425
40	.562	.050	.490
45	.700	.156	.603
50	.712	.166	.612
55	.712	.177	.620
60	.712	.200	.631
65	.709	.222	.803
70	.703	.931	1.059
75	.713	.991	1.138
80	.739	.991	1.212
85	.759	1.040	1.285
90	.769	1.392	1.466
95	.795	1.752	1.618
100	.832	1.977	1.660
105	.866	2.004	1.586
110	.884	1.811	1.403
115	.879	1.406	1.141
120	.867	.838	.833
125	.895	.023	.514
130	.924	.199	.496
135	.916	.262	.502
140	.944	.262	.767
145	1.165	.262	1.184
150	1.207	.274	1.255
155	1.173	.322	1.245
160	1.198	.437	1.318
165	1.309	.537	1.475
170	1.266	.544	1.417
175	.866	.543	.840
180	.754	.543	.577
185	.756	.499	.575
190	.548	.080	.372
195	.558	.277	.376

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POINT NO.	X-DIRECTION (G)	Y-DIRECTION (G)	Z-DIRECTION (G)
198	.599	.470	.424
200	.599	.498	.427
205	.505	.379	.401
210	.324	.017	.358
215	.712	.169	.607
225	.712	.184	.605
230	.709	.332	.675
235	.705	.335	.848
240	.709	.181	1.075
245	.719	.028	1.212
250	.741	.420	1.375
255	.737	.559	1.374
260	.848	.963	1.455
265	.898	1.138	1.487
270	.888	1.489	1.395
275	.881	1.845	1.320
280	.879	2.126	1.276
285	.879	2.210	1.274
290	.842	2.201	1.186
295	.722	1.711	.953
300	.728	1.643	.960
305	.687	1.346	.867
310	.635	.879	.783
315	.561	.373	.738
320	.502	.031	.737
325	.660	.287	.911
330	.976	.681	1.174
335	1.267	1.066	1.383
340	1.396	1.298	1.463
345	1.332	1.313	1.424
350	1.071	1.069	1.304
355	.644	.641	1.151
360	.182	.009	1.014
370	1.453	1.066	1.461
375	1.502	1.095	1.494
380	1.456	1.193	1.494

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LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM & UPSET, S-5B

SUPPORT REACTIONS FOR LOAD COMBINATION CASE NC. 4

OBE RESPONSE SPECTRUM - ONE-HALF SSE

NODE	TYPE	REACTIONS (LBS OR IN-LBS)	DIRECTION
5	FORCE	81.	X COORD
5	FORCE	37.	Y COORD
5	FORCE	51.	Z COORD
5	MOMENT	2795.	X COORD
5	MOMENT	2298.	Y COORD
5	MOMENT	3069.	Z COORD
125	FORCE	58.	X COORD
125	FORCE	43.	Y COORD
125	FORCE	46.	Z COORD
190	FORCE	22.	X COORD
190	FORCE	23.	Y COORD
190	FORCE	16.	Z COORD
210	FORCE	12.	X COORD
210	FORCE	10.	Y COORD
210	FORCE	19.	Z COORD
245	FORCE	49.	Y COORD
320	FORCE	60.	X COORD
320	FORCE	62.	Y COORD
320	FORCE	49.	Z COORD
360	FORCE	17.	X COORD
360	FORCE	16.	Y COORD
360	FORCE	64.	Z COORD

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-5B

INTERNAL FORCES AND DEFLECTIONS FOR LOAD CASE NO. 4

OBE 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
RUN	5	81.	37.	51.	2795.	2298.	3069.	.000	.000	.000	.0000	.0000	.0000
	10	81.	37.	51.	2996.	1434.	3069.	.001	.002	.000	.0002	.0001	.0003
RUN	10	81.	37.	51.	2998.	1434.	3069.	.001	.002	.000	.0002	.0001	.0003
	15	81.	37.	51.	3141.	1244.	3069.	.003	.004	.000	.0004	.0002	.0005
ELBOW	15	81.	37.	51.	3141.	1244.	3069.	.003	.004	.000	.0004	.0002	.0005
	20	81.	37.	51.	2951.	1343.	2586.	.008	.008	.005	.0011	.0004	.0009
RUN	20	81.	37.	51.	2951.	1343.	2586.	.008	.008	.005	.0011	.0004	.0009
	25	81.	37.	51.	2382.	1343.	1944.	.019	.008	.019	.0013	.0005	.0010
RUN	25	79.	37.	50.	2382.	1343.	1944.	.019	.008	.019	.0013	.0005	.0010
	30	79.	37.	50.	1811.	1343.	1678.	.033	.008	.037	.0014	.0006	.0011
ELBOW	30	76.	37.	48.	1811.	1343.	1678.	.033	.008	.037	.0014	.0006	.0011
	35	76.	37.	48.	1416.	1269.	1753.	.042	.003	.050	.0016	.0006	.0012
VALVE	35	74.	37.	46.	1416.	1269.	1753.	.042	.003	.050	.0016	.0006	.0012
	40	74.	37.	46.	1162.	1262.	1654.	.046	.006	.058	.0016	.0007	.0012
RUN	40	71.	37.	43.	1162.	1262.	1654.	.046	.006	.058	.0016	.0007	.0012
	45	71.	37.	43.	902.	1476.	2106.	.055	.020	.072	.0017	.0008	.0012
RUN	45	68.	37.	41.	902.	1476.	2106.	.055	.020	.072	.0017	.0008	.0012
	50	68.	37.	41.	894.	1504.	2131.	.056	.021	.073	.0017	.0008	.0012
RUN	50	48.	35.	25.	694.	1271.	2109.	.056	.021	.073	.0017	.0008	.0012
	55	48.	35.	25.	694.	1177.	1977.	.056	.024	.074	.0017	.0008	.0013
REDUCE	55	47.	34.	23.	694.	1177.	1977.	.056	.024	.074	.0017	.0008	.0013
	60	47.	34.	23.	694.	1089.	1847.	.056	.028	.074	.0017	.0008	.0013
RUN	60	46.	34.	21.	694.	1089.	1847.	.056	.028	.074	.0017	.0008	.0013
	65	46.	34.	21.	694.	590.	1089.	.056	.075	.093	.0024	.0015	.0029
RUN	65	45.	32.	18.	694.	590.	1089.	.056	.075	.093	.0024	.0015	.0029
	70	45.	32.	18.	694.	261.	513.	.056	.140	.124	.0032	.0019	.0036
ELBOW	70	44.	30.	16.	694.	261.	513.	.056	.140	.124	.0032	.0019	.0036
	75	44.	30.	16.	702.	243.	400.	.064	.151	.134	.0037	.0019	.0040
RUN	75	44.	29.	15.	702.	243.	400.	.064	.151	.134	.0037	.0019	.0040
	80	44.	29.	15.	722.	243.	355.	.078	.151	.145	.0038	.0019	.0041

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LOFT CIS ANALYSIS - 4" -1X-179-AB, INSIDE, NORM & UPSET, S-58

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	44.	28.	14.	722.	243.	355.	.078	.151	.145	.0038	.0019	.0041
	85	44.	28.	14.	737.	233.	391.	.088	.161	.156	.0043	.0019	.0042
RUN	85	43.	26.	11.	737.	233.	391.	.088	.161	.156	.0043	.0019	.0042
	90	43.	26.	11.	736.	381.	604.	.092	.236	.188	.0052	.0018	.0040
RUN	90	42.	21.	9.	736.	381.	604.	.092	.236	.188	.0052	.0018	.0040
	95	42.	21.	9.	741.	618.	1010.	.096	.304	.217	.0064	.0014	.0033
RUN	95	40.	13.	10.	741.	618.	1010.	.096	.304	.217	.0064	.0014	.0033
	100	40.	13.	10.	738.	762.	1273.	.099	.340	.231	.0076	.0009	.0027
RUN	100	39.	8.	16.	738.	762.	1273.	.099	.340	.231	.0076	.0009	.0027
	105	39.	8.	16.	703.	795.	1349.	.098	.337	.224	.0087	.0010	.0030
RUN	105	38.	12.	23.	703.	795.	1349.	.098	.337	.224	.0087	.0010	.0030
	110	38.	12.	23.	617.	730.	1265.	.091	.294	.198	.0098	.0017	.0042
RUN	110	38.	20.	30.	617.	730.	1265.	.091	.294	.198	.0098	.0017	.0042
	115	38.	20.	30.	498.	613.	1121.	.077	.218	.155	.0107	.0024	.0057
RUN	115	40.	26.	35.	498.	613.	1121.	.077	.218	.155	.0107	.0024	.0057
	120	40.	26.	35.	473.	536.	1100.	.065	.123	.100	.0114	.0029	.0073
RUN	120	43.	30.	39.	473.	536.	1100.	.065	.123	.100	.0114	.0029	.0073
	125	43.	30.	39.	806.	653.	1471.	.077	.002	.033	.0121	.0032	.0093
RUN	125	34.	14.	12.	806.	653.	1471.	.077	.002	.033	.0121	.0032	.0093
	130	34.	14.	12.	742.	460.	1434.	.089	.031	.032	.0123	.0032	.0099
ELBOW	130	33.	14.	12.	742.	460.	1434.	.089	.031	.032	.0123	.0032	.0099
	135	33.	14.	12.	699.	405.	1328.	.113	.040	.067	.0122	.0034	.0109
RUN	135	33.	15.	11.	699.	405.	1328.	.113	.040	.067	.0122	.0034	.0109
	140	33.	15.	11.	603.	405.	852.	.273	.040	.260	.0123	.0035	.0117
RUN	140	31.	15.	10.	603.	405.	852.	.273	.040	.260	.0123	.0035	.0117
	145	31.	15.	10.	531.	405.	476.	.458	.040	.458	.0124	.0036	.0121
ELBOW	145	29.	16.	9.	531.	405.	476.	.458	.040	.458	.0124	.0036	.0121
	150	29.	16.	9.	491.	367.	403.	.500	.038	.503	.0126	.0038	.0122
RUN	150	27.	16.	9.	491.	367.	403.	.500	.038	.503	.0126	.0038	.0122
	155	27.	16.	9.	312.	282.	258.	.549	.032	.561	.0128	.0037	.0124
RUN	1	23.	17.	11.	312.	282.	258.	.549	.032	.561	.0128	.0037	.0124
	1	23.	17.	11.	224.	406.	338.	.607	.032	.622	.0131	.0034	.012

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LOFT CIS ANALYSIS - 4" -1W-179-AB, INSIDE, NORM 6 UPSET, S-58

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	OX	OY	OZ	RX	RY	RZ
RUN	160	20.	17.	16.	224.	406.	338.	.607	.032	.622	.0131	.0034	.0127
	165	20.	17.	16.	420.	470.	570.	.665	.020	.677	.0134	.0028	.0129
ELBOW	165	19.	17.	20.	420.	470.	570.	.665	.020	.677	.0134	.0028	.0129
	170	19.	17.	20.	400.	465.	565.	.632	.019	.641	.0136	.0024	.0130
RUN	170	18.	17.	23.	400.	465.	565.	.632	.019	.641	.0136	.0024	.0130
	175	18.	17.	23.	257.	465.	394.	.356	.019	.356	.0136	.0018	.0133
RUN	175	19.	17.	26.	257.	465.	394.	.356	.019	.356	.0136	.0018	.0133
	180	19.	17.	26.	800.	465.	534.	.044	.019	.038	.0129	.0011	.0138
ELBOW	180	20.	17.	26.	800.	465.	534.	.044	.019	.038	.0129	.0011	.0138
	185	20.	17.	26.	860.	435.	559.	.035	.018	.011	.0122	.0008	.0145
RUN	185	21.	18.	27.	860.	435.	559.	.035	.018	.011	.0122	.0008	.0145
	190	21.	18.	27.	802.	239.	499.	.029	.001	.011	.0110	.0005	.0151
RUN	190	9.	12.	16.	802.	239.	499.	.029	.001	.011	.0110	.0005	.0151
	195	9.	12.	16.	602.	200.	351.	.029	.010	.014	.0101	.0003	.0156
RUN	195	7.	11.	15.	602.	200.	351.	.029	.010	.014	.0101	.0003	.0156
	198	7.	11.	15.	421.	276.	232.	.029	.012	.015	.0095	.0002	.0160
VALVE	198	7.	11.	15.	421.	276.	232.	.029	.012	.015	.0095	.0002	.0160
	200	7.	11.	15.	421.	283.	207.	.029	.053	.015	.0095	.0002	.0160
RUN	200	10.	10.	17.	421.	283.	207.	.029	.053	.015	.0095	.0002	.0160
	205	10.	10.	17.	219.	174.	100.	.023	.037	.015	.0091	.0004	.0162
RUN	205	12.	10.	18.	219.	174.	100.	.023	.037	.015	.0091	.0004	.0162
	210	12.	10.	18.	0.	0.	0.	.015	.001	.014	.0090	.0005	.0162
RUN	50	56.	24.	18.	627.	1050.	1178.	.056	.021	.073	.0017	.0008	.0012
	215	56.	24.	18.	627.	985.	1089.	.056	.018	.072	.0017	.0008	.0012
REDUCE	215	56.	24.	17.	627.	985.	1089.	.056	.018	.072	.0017	.0008	.0012
	225	56.	24.	17.	627.	925.	1000.	.056	.016	.072	.0017	.0008	.0012
RUN	225	55.	24.	16.	627.	925.	1000.	.056	.016	.072	.0017	.0008	.0012
	230	55.	24.	16.	611.	568.	605.	.056	.026	.081	.0022	.0016	.0006
RUN	230	54.	25.	14.	611.	568.	605.	.056	.026	.081	.0022	.0016	.0006
	235	54.	25.	14.	561.	241.	787.	.058	.030	.107	.0028	.0020	.0003
RUN	235	53.	25.	11.	561.	241.	787.	.058	.030	.107	.0028	.0020	.0003
	240	53.	25.	11.	476.	330.	1033.	.063	.018	.142	.0035	.0019	.0015

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 LDFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-5B

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	240	52.	25.	8.	478.	330.	1033.	.063	.018	.142	.0035	.0019	.0015
	245	52.	25.	8.	410.	526.	1259.	.067	.002	.164	.0039	.0016	.0024
RUN	245	52.	28.	5.	410.	526.	1259.	.067	.002	.164	.0039	.0016	.0024
	250	52.	28.	5.	551.	769.	730.	.072	.049	.189	.0047	.0009	.0036
ELBOW	250	51.	27.	6.	551.	769.	730.	.072	.049	.189	.0047	.0009	.0036
	255	51.	27.	6.	504.	711.	599.	.076	.069	.198	.0050	.0006	.0043
RUN	255	51.	26.	9.	504.	711.	599.	.076	.069	.198	.0050	.0006	.0043
	260	51.	26.	9.	305.	407.	466.	.109	.121	.234	.0053	.0008	.0046
ELBOW	260	50.	24.	11.	305.	407.	466.	.109	.121	.234	.0053	.0008	.0046
	255	50.	24.	11.	312.	357.	392.	.119	.146	.242	.0055	.0011	.0048
RUN	265	49.	22.	15.	312.	357.	392.	.119	.146	.242	.0055	.0011	.0048
	270	49.	22.	15.	365.	312.	394.	.115	.202	.233	.0059	.0013	.0049
RUN	270	48.	16.	20.	365.	312.	394.	.115	.202	.233	.0059	.0013	.0049
	275	48.	16.	20.	453.	219.	591.	.107	.251	.227	.0064	.0016	.0046
RUN	275	47.	7.	27.	453.	219.	591.	.107	.251	.227	.0064	.0016	.0046
	280	47.	7.	27.	495.	282.	680.	.095	.286	.219	.0071	.0015	.0041
RUN	280	46.	7.	31.	495.	282.	680.	.095	.286	.219	.0071	.0015	.0041
	285	46.	7.	31.	495.	337.	677.	.095	.297	.219	.0072	.0015	.0040
ELBOW	285	46.	8.	32.	495.	337.	677.	.095	.297	.219	.0072	.0015	.0040
	290	46.	8.	32.	455.	364.	640.	.087	.295	.205	.0075	.0013	.0035
RUN	290	46.	12.	34.	455.	364.	640.	.087	.295	.205	.0075	.0013	.0035
	295	46.	12.	34.	349.	429.	740.	.058	.220	.144	.0078	.0011	.0032
ELBOW	295	46.	14.	36.	349.	429.	740.	.058	.220	.144	.0078	.0011	.0032
	300	46.	14.	36.	383.	470.	766.	.057	.209	.139	.0079	.0011	.0030
RUN	300	46.	18.	38.	383.	470.	766.	.057	.209	.139	.0079	.0011	.0030
	305	46.	18.	38.	386.	518.	654.	.049	.172	.123	.0079	.0011	.0031
RUN	305	46.	24.	42.	386.	518.	654.	.049	.172	.123	.0079	.0011	.0031
	310	46.	24.	42.	521.	794.	718.	.040	.114	.100	.0076	.0013	.0035
RUN	310	47.	27.	45.	521.	794.	718.	.040	.114	.100	.0076	.0013	.0035
	315	47.	27.	45.	824.	1077.	1040.	.031	.053	.080	.0070	.0018	.0043
RUN	315	49.	30.	49.	824.	1077.	1040.	.031	.053	.080	.0070	.0018	.0043
		49.	30.	49.	1232.	1363.	1482.	.043	.003	.070	.0060	.0031	.0

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 LOFT CIS ANALYSIS - 4" -1W-179-A8, INSIDE, NORM & UPSET, S-5B

MEMBER	END	FORCES (LBS)			MOMENTS (IN-LBS)			DEFLECTIONS (IN)			ROTATIONS (RAD)		
		FX	FY	FZ	MX	MY	MZ	DX	DY	DZ	RX	RY	RZ
RUN	320	61.	36.	13.	1232.	1363.	1482.	.043	.003	.070	.0060	.0031	.0056
	325	61.	36.	13.	710.	357.	871.	.098	.059	.115	.0051	.0040	.0070
RUN	325	57.	34.	11.	710.	357.	871.	.098	.059	.115	.0051	.0040	.0070
	330	57.	34.	11.	448.	754.	498.	.166	.126	.175	.0046	.0037	.0077
RUN	330	52.	31.	11.	448.	754.	498.	.166	.126	.175	.0046	.0037	.0077
	335	52.	31.	11.	684.	1613.	374.	.221	.184	.220	.0045	.0022	.0079
RUN	335	24.	8.	36.	653.	1581.	296.	.221	.184	.220	.0045	.0022	.0079
	340	24.	8.	35.	755.	1536.	346.	.243	.214	.236	.0046	.0003	.0078
RUN	340	18.	5.	43.	755.	1536.	346.	.243	.214	.236	.0046	.0003	.0078
	345	18.	5.	43.	749.	1333.	340.	.228	.208	.226	.0053	.0017	.0077
RUN	345	16.	7.	50.	749.	1333.	340.	.228	.208	.226	.0053	.0017	.0077
	350	16.	7.	50.	613.	981.	265.	.177	.168	.199	.0061	.0031	.0076
RUN	350	16.	12.	57.	613.	981.	265.	.177	.168	.199	.0061	.0031	.0076
	355	16.	12.	57.	361.	527.	143.	.098	.097	.163	.0067	.0041	.0075
RUN	355	17.	16.	64.	361.	527.	143.	.098	.097	.163	.0067	.0041	.0075
	360	17.	16.	64.	0.	0.	0.	.012	.001	.129	.0069	.0044	.0074
RUN	335	24.	18.	24.	145.	35.	144.	.221	.184	.220	.0045	.0022	.0079
	370	24.	18.	24.	40.	35.	35.	.252	.184	.238	.0047	.0021	.0079
ELBOW	370	23.	17.	23.	40.	35.	35.	.252	.184	.238	.0047	.0021	.0079
	375	23.	17.	23.	0.	0.	0.	.259	.188	.244	.0047	.0021	.0080
RUN	375	0.	0.	0.	0.	0.	0.	.259	.188	.244	.0047	.0021	.0080
	380	0.	0.	0.	0.	0.	0.	.250	.203	.244	.0047	.0021	.0080

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

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LDFT CIS ANALYSIS - 4" -1W-179-A8, INSIDE, NORM & UPSET, S-58

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)
RUN	5	1.000	1659.	3062.	112.	1771.
	10	1.000	1106.	2444.	117.	1223.
RUN	10	1.000	1106.	2444.	117.	1223.
	15	1.000	1366.	2716.	120.	1487.
ELBOW	15	1.953	1670.	3547.	235.	1906.
	20	1.953	2066.	3861.	218.	2284.
RUN	20	1.000	1636.	2862.	112.	1748.
	25	1.000	1653.	2644.	89.	1742.
RUN	25	1.000	1653.	2644.	89.	1742.
	30	1.000	1676.	2507.	64.	1740.
ELBOW	30	1.230	1676.	2507.	79.	1755.
	35	1.230	1595.	2360.	57.	1652.
RUN	40	1.000	1498.	2245.	34.	1533.
	45	1.000	1422.	2227.	15.	1437.
RUN	45	1.000	1422.	2227.	15.	1437.
	50	1.450	1482.	2368.	20.	1502.
RUN	50	1.450	1660.	2482.	75.	1735.
	55	1.000	1503.	2213.	48.	1550.
REDUCE	55	2.000	1698.	2964.	95.	1993.
	60	2.000	1786.	2785.	88.	1873.
RUN	60	1.000	4620.	8380.	247.	4868.
	65	1.000	2411.	4779.	129.	2540.
RUN	65	1.000	2411.	4779.	129.	2540.
	70	1.000	975.	2480.	67.	1042.
ELBOW	70	1.738	1095.	3057.	116.	1211.
	75	1.738	1023.	2857.	71.	1093.
RUN	75	1.000	920.	2327.	41.	960.
	80	1.000	965.	2367.	90.	1055.

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 LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-58

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)
ELBOW	80	1.738	1082.	2909.	156.	1238.
	85	1.738	1016.	2899.	227.	1243.
RUN	85	1.000	914.	2359.	131.	1045.
	90	1.000	1579.	3290.	123.	1702.
RUN	90	1.000	1579.	3290.	123.	1702.
	95	1.000	2399.	4730.	141.	2540.
RUN	95	1.000	2399.	4730.	141.	2540.
	100	1.000	2824.	5589.	156.	2980.
RUN	100	1.000	2824.	5589.	156.	2980.
	105	1.000	2840.	5705.	156.	2996.
RUN	105	1.000	2840.	5705.	156.	2996.
	110	1.000	2448.	5095.	138.	2586.
RUN	110	1.000	2448.	5095.	138.	2586.
	115	1.000	1660.	3948.	101.	1761.
RUN	115	1.000	1660.	3948.	101.	1761.
	120	1.000	981.	3170.	66.	1046.
RUN	120	1.000	981.	3170.	66.	1046.
	125	1.000	3078.	6083.	126.	3204.
RUN	125	1.000	3078.	6083.	126.	3204.
	130	1.000	2359.	5159.	116.	2475.
ELBOW	130	1.738	2899.	6548.	202.	3101.
	135	1.738	2573.	5954.	180.	2753.
RUN	135	1.000	2109.	4704.	104.	2213.
	140	1.000	1967.	3836.	81.	2049.
RUN	140	1.000	1967.	3836.	81.	2049.
	145	1.000	1827.	3194.	118.	1945.
ELBOW	145	1.738	2205.	3987.	205.	2410.
	150	1.738	1981.	3577.	223.	2205.

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LOFT CIS ANALYSIS - 4" -IW-179-A3, INSIDE, NORM & UPSET, S-58

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)
RUN	150	1.000	1655.	2879.	129.	1784.
	155	1.000	868.	1692.	130.	998.
RUN	155	1.000	868.	1692.	130.	998.
	160	1.000	968.	1926.	142.	1110.
RUN	160	1.000	968.	1926.	142.	1110.
	165	1.000	1107.	2526.	161.	1268.
ELBOW	165	1.738	1267.	3116.	279.	1547.
	170	1.738	1213.	3026.	259.	1472.
RUN	170	1.000	1066.	2457.	149.	1214.
	175	1.000	880.	1983.	50.	930.
RUN	175	1.000	880.	1983.	50.	930.
	180	1.000	703.	2485.	66.	769.
ELBOW	180	1.738	741.	3063.	115.	856.
	185	1.738	709.	3132.	135.	844.
RUN	185	1.000	679.	2538.	78.	757.
	190	1.000	2023.	3648.	55.	2078.
RUN	190	1.000	2023.	3648.	55.	2078.
	195	1.000	772.	1981.	44.	816.
RUN	195	1.000	772.	1981.	44.	816.
	198	1.000	1531.	2455.	32.	1563.
RUN	200	1.000	1567.	2481.	53.	1620.
	205	1.000	1278.	1775.	34.	1312.
RUN	205	1.000	1278.	1775.	34.	1312.
	210	1.000	580.	580.	0.	580.
RUN	50	1.450	970.	1516.	81.	1051.
	215	1.000	934.	1406.	53.	987.
REDUCE	215	2.000	1045.	1753.	106.	1151.
	225	2.000	1030.	1695.	100.	1130.

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LOFT CIS ANALYSIS - 4" -14-179-AB, INSIDE, NORM & UPSET, S-5B

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)
RUN	225	1.000	1778.	4280.	282.	2059.
	230	1.000	1680.	3399.	191.	1871.
RUN	230	1.000	1680.	3399.	191.	1871.
	235	1.000	1841.	3504.	124.	1965.
RUN	235	1.000	1841.	3504.	124.	1965.
	240	1.000	2345.	4322.	99.	2444.
RUN	240	1.000	2345.	4322.	99.	2444.
	245	1.000	2919.	5295.	108.	3026.
RUN	245	1.000	2919.	5295.	108.	3026.
	250	1.000	1817.	3811.	91.	1907.
ELBOW	250	1.738	2192.	4791.	158.	2349.
	255	1.738	1945.	4244.	124.	2069.
RUN	255	1.000	1627.	3391.	71.	1699.
	260	1.000	1214.	2364.	156.	1370.
ELBOW	260	1.738	1407.	2905.	270.	1677.
	265	1.738	1199.	2538.	338.	1538.
RUN	265	1.000	1055.	2082.	195.	1250.
	270	1.000	1183.	2220.	211.	1394.
RUN	270	1.000	1183.	2220.	211.	1394.
	275	1.000	1543.	2838.	217.	1760.
RUN	275	1.000	1543.	2838.	217.	1760.
	280	1.000	1518.	2999.	210.	1727.
RUN	280	1.000	1518.	2999.	210.	1727.
	285	1.000	1493.	3001.	220.	1714.
ELBOW	285	1.738	1770.	3735.	383.	2153.
	290	1.738	1696.	3577.	349.	2045.
RUN	290	1.000	1436.	2880.	201.	1637.
	295	1.000	1225.	2766.	49.	1273.

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LOFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE, NORM & UPSET, S-58

ASME SECTION III CLASS 2 OR ANSI B31.1.B 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)
ELBOW	295	1.738	1420.	3429.	85.	1505.
	300	1.738	1304.	3429.	78.	1382.
RUN	300	1.000	1135.	2766.	45.	1180.
	305	1.000	863.	2416.	25.	908.
RUN	305	1.000	883.	2416.	25.	908.
	310	1.000	2209.	4196.	60.	2269.
RUN	310	1.000	2209.	4196.	60.	2269.
	315	1.000	3940.	6792.	126.	4066.
RUN	315	1.000	3940.	6792.	126.	4066.
	320	1.000	6083.	10021.	209.	6292.
RUN	320	1.000	6083.	10021.	209.	6292.
	325	1.000	3205.	5171.	115.	3320.
RUN	325	1.000	3205.	5171.	115.	3320.
	330	1.000	1389.	3072.	41.	1430.
RUN	330	1.000	1389.	3072.	41.	1430.
	335	1.253	2902.	5891.	28.	2930.
RUN	335	1.253	2902.	5891.	28.	2930.
	340	1.000	3014.	5927.	55.	3069.
RUN	340	1.000	3014.	5927.	55.	3069.
	345	1.000	3016.	5630.	70.	3087.
RUN	345	1.000	3016.	5630.	70.	3087.
	350	1.000	2611.	4590.	67.	2678.
RUN	350	1.000	2611.	4590.	67.	2678.
	355	1.000	1803.	2895.	45.	1848.
RUN	355	1.000	1803.	2895.	45.	1848.
	360	1.000	580.	580.	0.	580.
RUN	360	1.000	580.	580.	0.	580.
	370	1.000	1617.	2050.	0.	1617.
RUN	370	1.000	1617.	2050.	0.	1617.

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LOFT CIS ANALYSIS - 4" -1A-179-A3, INSIDE, NORM & UPSET, S-5B

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)
EL80W	370	1.315	1617.	2050.	0.	1617.
	375	1.315	1301.	1301.	0.	1301.
RUN	375	1.000	1301.	1301.	0.	1301.
	380	1.000	372.	372.	0.	372.

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APPENDIX G
LEVEL C SERVICE CONDITIONS
STRESS ANALYSIS RESULTS

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NUPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LUFT CIS ANALYSIS - 4" -IW-179-AB, INSIDE , NORM & UPSET, S-5c

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ASME SECTION III CLASS 2 OR ANS: B31.1.5 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	2	1.000	1059.	4464.	0.	1059.
	10	1.000	1106.	3781.	0.	1106.
RUN	10	1.000	1106.	3781.	0.	1106.
	15	1.000	1306.	4065.	0.	1306.
ELBOW	15	1.953	1070.	5623.	0.	1070.
	20	1.953	2066.	5657.	0.	2066.
RUN	20	1.000	1036.	4088.	0.	1036.
	25	1.000	1653.	3636.	0.	1653.
RUN	25	1.000	1653.	3636.	0.	1653.
	30	1.000	1676.	3336.	0.	1676.
ELBOW	30	1.230	1676.	3336.	0.	1676.
	35	1.230	1595.	3124.	0.	1595.
RUN	40	1.000	1498.	2972.	0.	1498.
	45	1.000	1422.	3033.	0.	1422.
RUN	45	1.000	1422.	3033.	0.	1422.
	50	1.453	1482.	3254.	0.	1482.
RUN	50	1.453	1060.	3305.	0.	1060.
	55	1.000	1503.	2924.	0.	1503.
REDUCE	55	2.000	1896.	4030.	0.	1896.
	60	2.000	1786.	3784.	0.	1786.
RUN	60	1.000	4020.	12141.	0.	4020.
	65	1.000	2411.	7147.	0.	2411.
RUN	65	1.000	2411.	7147.	0.	2411.
	70	1.000	975.	3965.	0.	975.
ELBOW	70	1.738	1095.	5110.	0.	1095.
	75	1.738	1023.	4691.	0.	1023.
RUN	75	1.000	920.	3735.	0.	920.
	80	1.000	965.	3769.	0.	965.

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 LUFT CIS ANALYSIS - 4" -IH-179-AB, INSIDE, NORM & UPSET, S-5b

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ASME SECTION III CLASS 2 OR ANSI B31.1-B 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)
ELBOW	80	1.738	1882.	4786.		1882.
	85	1.738	1816.	4786.	0.	1816.
RUN	85	1.000	914.	3804.	0.	914.
	90	1.000	1579.	5081.	0.	1579.
RUN	90	1.000	1579.	5081.	0.	1579.
	95	1.000	2399.	7061.	0.	2399.
RUN	95	1.000	2399.	7061.	0.	2399.
	100	1.000	2824.	8355.	0.	2824.
RUN	100	1.000	2824.	8355.	0.	2824.
	105	1.000	2840.	8570.	0.	2840.
RUN	105	1.000	2448.	7741.	0.	2448.
	110	1.000	2448.	7741.	0.	2448.
RUN	110	1.000	2448.	7741.	0.	2448.
	115	1.000	1660.	6236.	0.	1660.
RUN	115	1.000	1660.	6236.	0.	1660.
	120	1.000	981.	5359.	0.	981.
RUN	120	1.000	981.	5359.	0.	981.
	125	1.000	3078.	9087.	0.	3078.
RUN	125	1.000	2359.	7985.	0.	2359.
	130	1.000	2359.	7985.	0.	2359.
ELBOW	130	1.738	2899.	10198.	0.	2899.
	135	1.738	2573.	9335.	0.	2573.
RUN	135	1.000	2109.	7298.	0.	2109.
	140	1.000	1987.	5704.	0.	1987.
RUN	140	1.000	1987.	5704.	0.	1987.
	145	1.000	1827.	4562.	0.	1827.
ELBOW	145	1.738	2205.	5770.	0.	2205.
	150	1.738	1981.	5172.	0.	1981.

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NOPIPE-IIM - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 4" -IN-179-AB, INSIDE, NORM & UPSLT, S-58

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

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS EQU. (PSI)	OCCASIONAL STRESS EQU. (PSI)	EXPANSION STRESS EQU. (PSI)	SUSTAINED PLUS EXPANSION STRESS EQU. (PSI)
RUN	150	1.000	1655.	4103.	0.	1655.
	155	1.000	868.	2518.	0.	868.
RUN	155	1.000	868.	2518.	0.	868.
	160	1.000	988.	2804.	0.	988.
RUN	160	1.000	988.	2804.	0.	988.
	165	1.000	1107.	3444.	0.	1107.
ELBOW	165	1.738	1267.	4964.	0.	1267.
	170	1.738	1213.	4624.	0.	1213.
RUN	170	1.000	1066.	3648.	0.	1066.
	175	1.000	880.	3086.	0.	880.
RUN	175	1.000	880.	3086.	0.	880.
	180	1.000	703.	4207.	0.	703.
ELBOW	180	1.738	741.	5385.	0.	741.
	185	1.738	709.	5535.	0.	709.
RUN	185	1.000	679.	4398.	0.	679.
	190	1.000	2023.	5272.	0.	2023.
RUN	190	1.000	2023.	5272.	0.	2023.
	195	1.000	772.	3191.	0.	772.
RUN	195	1.000	772.	3191.	0.	772.
	196	1.000	1531.	3301.	0.	1531.
RUN	200	1.000	1567.	3396.	0.	1567.
	205	1.000	1278.	2271.	0.	1278.
RUN	205	1.000	1278.	2271.	0.	1278.
	210	1.000	580.	580.	0.	580.
RUN	210	1.000	934.	1976.	0.	934.
	215	1.000	934.	1976.	0.	934.
REDUCE	215	2.000	1045.	2461.	0.	1045.
	225	2.000	1038.	2361.	0.	1038.

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NOPIPE-IIR - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LUFT CIS ANALYSIS - 4" -1a-179-A6, INSIDE, NORM & UPSET, S-5a

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

MEMBER	NODE	STRESS INTENSIFY FACTOR	SUSTAINED STRESS SC.8 (PSI)	OCCASIONAL STRESS SC.9 (PSI)	EXPANSION STRESS SC.10 (PSI)	SUSTAINED PLUS EXPANSION STRESS SC.11 (PSI)
RUN	235	1.000	1778.	6788.	0.	1778.
	230	1.000	1680.	5118.	0.	1680.
RUN	230	1.000	1680.	5118.	0.	1680.
	235	1.000	1641.	5100.	0.	1641.
RUN	235	1.000	1641.	5180.	0.	1641.
	240	1.000	2345.	6300.	0.	2345.
RUN	240	1.000	2345.	6300.	0.	2345.
	245	1.000	2919.	7672.	0.	2919.
RUN	245	1.000	2919.	7672.	0.	2919.
	250	1.000	1817.	5805.	0.	1817.
ELBOW	250	1.738	2192.	7391.	0.	2192.
	255	1.738	1945.	6543.	0.	1945.
RUN	255	1.000	1627.	5104.	0.	1627.
	260	1.000	1214.	3514.	0.	1214.
ELBOW	260	1.738	1407.	4464.	0.	1407.
	265	1.738	1199.	3877.	0.	1199.
RUN	265	1.000	1055.	3111.	0.	1055.
	270	1.000	1103.	3257.	0.	1103.
RUN	270	1.000	1103.	3257.	0.	1103.
	275	1.000	1543.	4133.	0.	1543.
RUN	275	1.000	1543.	4133.	0.	1543.
	280	1.000	1518.	4401.	0.	1518.
RUN	280	1.000	1518.	4401.	0.	1518.
	285	1.000	1493.	4509.	0.	1493.
ELBOW	285	1.738	1770.	5700.	0.	1770.
	290	1.738	1696.	5459.	0.	1696.
RUN	290	1.000	1436.	4323.	0.	1436.
	295	1.000	1225.	4307.	0.	1225.

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HUPIPE-III - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LEFT CIS ANALYSIS - 4" - IN-179-AB, INSIDE, NORM & UPSET, S-5B

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

MEMBER	NODE	STRESS INTENSIF FACTOR	SUSTAINED STRESS EL. 10 (PSI)	OCCASIONAL STRESS EL. 10 (PSI)	EXPANSION STRESS EL. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EL. 10 (PSI)
ELBOW	295	1.736	1420.	5438.	0.	1420.
	300	1.736	1304.	5555.	0.	1304.
RUN	300	1.000	1135.	4090.	0.	1135.
	305	1.000	883.	3750.	0.	883.
RUN	305	1.000	883.	3750.	0.	883.
	310	1.000	2209.	6102.	0.	2209.
RUN	310	1.000	2209.	6102.	0.	2209.
	315	1.000	3940.	9643.	0.	3940.
RUN	315	1.000	3940.	9643.	0.	3940.
	320	1.000	6083.	13960.	0.	6083.
RUN	320	1.000	6083.	13960.	0.	6083.
	325	1.000	3205.	7138.	0.	3205.
RUN	325	1.000	3205.	7138.	0.	3205.
	330	1.000	1389.	4755.	0.	1389.
RUN	330	1.000	1389.	4755.	0.	1389.
	335	1.253	2902.	8080.	0.	2902.
RUN	335	1.253	2015.	6407.	0.	2015.
	340	1.000	3014.	8040.	0.	3014.
RUN	340	1.000	3014.	8040.	0.	3014.
	345	1.000	3016.	8243.	0.	3016.
RUN	345	1.000	3016.	8243.	0.	3016.
	350	1.000	2611.	6570.	0.	2611.
RUN	350	1.000	2611.	6570.	0.	2611.
	355	1.000	1503.	3980.	0.	1503.
RUN	355	1.000	1003.	3980.	0.	1003.
	360	1.000	580.	580.	0.	580.
RUN	365	1.000	1447.	3583.	0.	1447.
	370	1.000	1617.	2464.	0.	1617.

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NOPIPE-11H - NUCLEAR SERVICES CORPORATION PIPING ANALYSIS PROGRAM - VERSION 1.1
 LOFT CIS ANALYSIS - 4" -IN-179-AB, INSIDE, NORM & UPSIT, 3-5B

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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. 7 (PSI)	EXPANSION STRESS EQ. 10 (PSI)	SUSTAINED PLUS EXPANSION STRESS EQ. 11 (PSI)
ELBOW	370	1.315	1617.	2484.	0.	1617.
	375	1.315	1301.	1301.	0.	1301.
RUN	375	1.000	1301.	1301.	0.	1301.
	369	1.000	372.	372.	0.	372.

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APPENDIX H
LEVEL D SERVICE CONDITIONS
STRESS ANALYSIS RESULTS

Level D service conditions do not apply to this line.

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APPENDIX I
COMPONENT SUPPORT ANALYSIS RESULTS

This system contains no supports which require analysis.