

REVISION A

TECHNICAL REPORT
PEI-TR-83-16
APRIL 27, 1983

REVISION A

SEISMIC QUALIFICATION ANALYSIS OF
CLOW 4-INCH WAFER STOP VALVE
JOB NUMBER 82-2053-01(N)
ITEM NO. 1.5
4"-HBB-BF-MO-57-161
4"-HBB-BF-MO-57-163

BY
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PREPARED FOR
BECHTEL POWER CORPORATION
FOR
PHILADELPHIA ELECTRIC LIMERICK PLANT
IN ACCORDANCE WITH BECHTEL SPECIFICATION NUMBER 8031-P-144, REVISION 1

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Westmont, Illinois

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REVISIONS

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A	5/17/83	^{NAD} NAD	JFJ RPP	JK	Page iv - Change "Input" to "Analysis" and "Frequency" to "Modal" Page 8 - Change "350°F" to "340°F". Page 15 - Change "350°F" to "340°F". Page 28 - Delete Drawing No. D-0700. Appendices Title Page - Change "Input" to "Analysis" and "Frequency" to "Modal". Page B19 - Add "4 inch" to title. Page B43 - Add "4 inch" to title. Page B45 - Add "4 inch" to title.

CERTIFICATION OF CONFORMANCE

This is to certify that the Clow 4-inch Wafer Stop Valve described in Patel Engineers' Technical Report PEI-TR-83-16 has been evaluated to determine its compliance with Bechtel Power Corporation Specification 8031-P-144, Revision 1 as described herein. The information contained in this report is the result of complete and carefully conducted analyses and to the best of my knowledge is true and correct in all respects.

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ABSTRACT

A seismic qualification analysis was conducted to verify the structural integrity of the Clow 4-Inch Wafer Stop Valve, Job Number 82-2053-01(N), for Bechtel Power Corporation for use in Philadelphia Electric Limerick Nuclear Plant. A finite element model was developed to simulate valve components. The model was subjected to static seismic accelerations plus normal operating load environments and were shown to conform to the ASME Section III - 1980 Edition through and including Summer 1981 Addenda as described in Bechtel Power Corporation Specification Number 8031-P-144, Revision 1.

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1.0 INTRODUCTORY SUMMARY

1.0 Introduction

This report presents the results of seismic qualification analysis of a 4-inch diameter stop valve for the Limerick Nuclear Plant. The analysis was performed for the Clow Corporation, Westmont, Illinois, in accordance with Bechtel Power Corporation Specification 8031-P-144, Revision 1.

Complete details of valve geometry, structural components, and assemblies are given in the engineering drawings of Reference 1.

The basic approach taken for this seismic qualification analysis was:

- o Utilize finite element techniques to formulate a mathematical model of the valve;
- o Calculate valve fundamental natural frequency;
- o Apply the static analysis method to determine stresses, forces and deflections for operating and seismic loading conditions; and
- o Calculate resultant stresses against appropriate allowable stresses.

The ANSYS finite element computer program developed by Swanson Analysis Systems, Inc., Houston, PA, was used to develop a mathematical model and to determine frequencies, stresses, forces, and displacements. ANSYS computations were performed on the Control Data Cybernet System. This public domain program has had sufficient history of use to justify its applicability and validity.

1.2 Summary of Results

A frequency analysis of the valve system yielded a fundamental natural frequency of 87 Hz for the valve assembly. Table 1 represents participation factors for a few key frequencies.

Application of the operational loads and the seismic design environment specifications of Section 3.0 gave the stress ratios contained in Table 2.

Table 1.
Modal Participation Factors
for
Clow 4-Inch Wafer Valve Assembly

ITEM	NODE NO.	FREQUENCY (HZ)	PARTICIPATION FACTORS		
			X	Y	Z
Valve Assembly	1	87	0.038	-0.239	1.075
	2	130	0.898	-0.632	-0.168
	3	372	0.644	0.916	0.204

Table 2.
Stress Ratios for Clow 4-Inch
Wafer Stop Valve
4.5 g Seismic Condition

LOCATION	STRESS RATIO (S TOTAL/S ALLOWABLE)
Valve Body	0.24
Disc	0.19
Drive Shaft	0.81
Adapter Plate	0.11
5/8-11 UNC Operator to Adapter Plate Bolts	0.04
3/4-10 UNC Valve Body to Adapter Bolts	0.08
Cover Plate	0.19
3/8-16 UNC Cover Plate Bolts	0.003

Full descriptions of all stress calculations are given in Section 7.0.

Total deflections of the major valve components due to the applications of the specified seismic acceleration environments and operating loads are given in Table 3.

Table 3.

Maximum Deflection

LOCATION	DEFLECTION IN GLOBAL COORDINATE DIRECTION*		
	X(IN)	Y(IN)	Z(IN)
Operator C.G.	0.002	0.002	0.007
Valve Body	0.002	0.002	0.004
Adapter Plate	0.001	0.004	0.004
Disc	0.00007	0.0001	0.0001

*Refer to Figure 1 for definition of coordinate directions.

Descriptions of all deflection calculations are given in Section 8.0

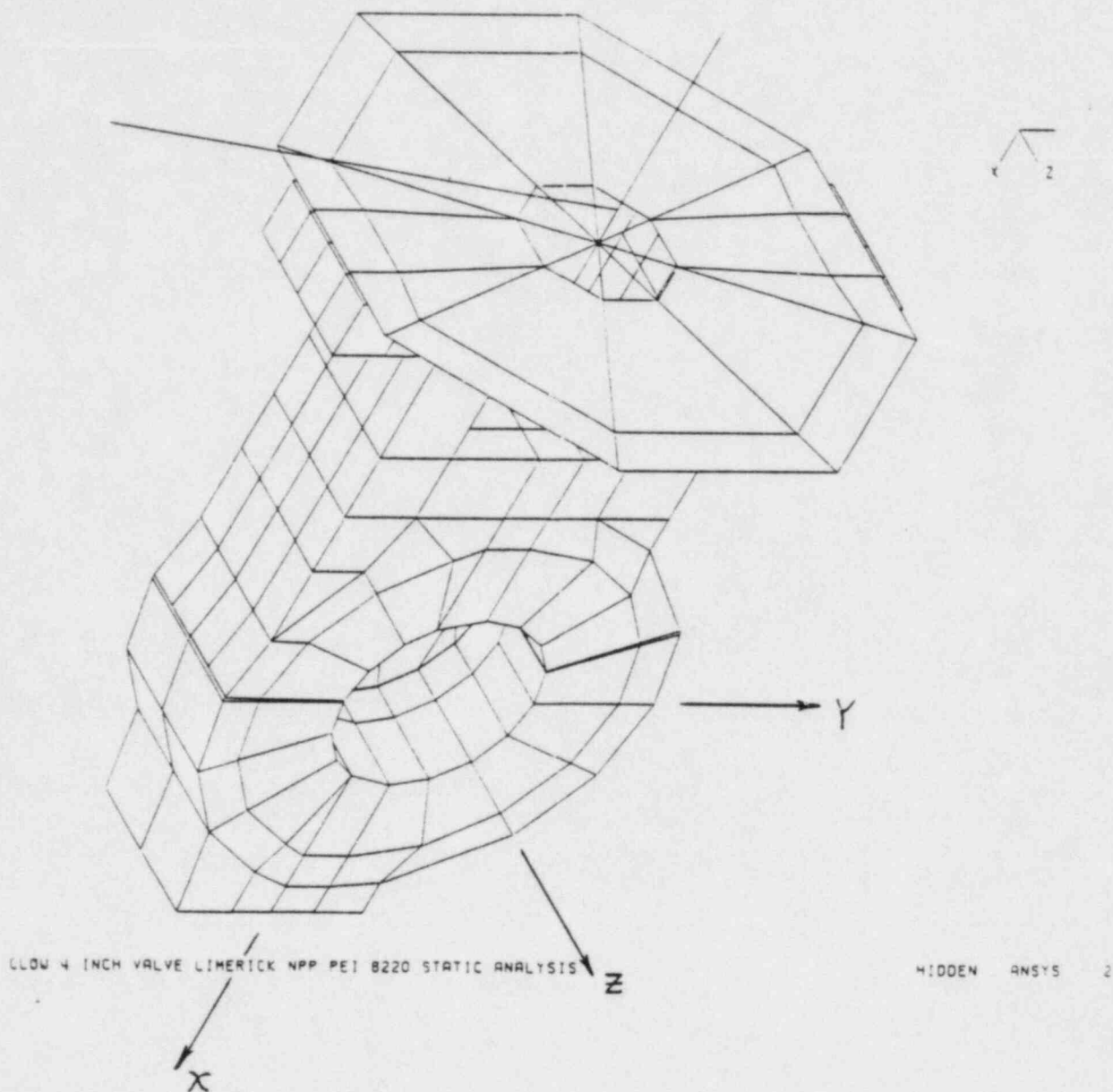


Figure 1.

Clow 4-Inch Wafer
Stop Valve

1.3 Conclusions

The conclusions drawn from this seismic qualification analysis of the Clow 4-Inch Stop Valve Assemblies are as follows:

- 1) The valve's major components, as analyzed, do not exceed ASME allowable stress values as described in Bechtel Specification 8031-P-144, Revision 1.
- 2) A check of critical area deflections was made and showed that the valve's deflections will not prevent it from performing its specified functions.

1.4 Limitations

The analysis was performed on the structural drawings of Reference 1, the operator definitions of Reference 2, and the design environment specifications of Reference 3. The applicability of the results is subject to the following limitations:

- 1) The results do not apply to design, materials, and environments not contained or identified in the above references.
- 2) Neither pipe structures nor operator structure are included in the qualification analysis.
- 3) The results do not apply for structural changes or alterations not identified in this report.

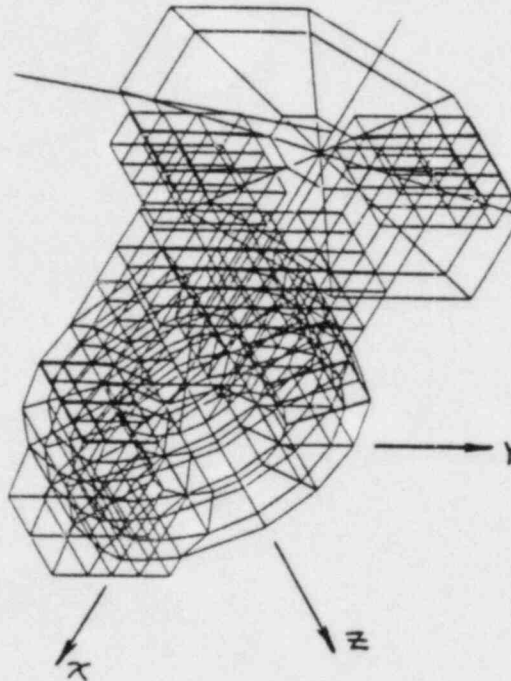
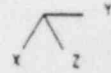
2.0 DESCRIPTION OF 4-INCH STOP VALVE JOB NUMBER 82-2053-01(N)

The valve has a 4-inch nominal diameter and is configured as shown in Figure 1. An internal disc is actuated by a drive shaft which extends through the valve body and adapter plate section into a Limitorque SMB-00-10-H1BC. A sealing gland is located in the operator end of the valve body, thus making the adapter section and operator non-pressure boundary components.

Full structural descriptions of all valve components are given in the complete set of structural drawings of Reference 1. Bettis and Limitorque operator inertial definitions are given in Reference 2.

Figure 2 presents mass and center of gravity information for the subject operator/valve assembly. The valve (without operator) data were generated by the ANSYS Computer program from the mass information of all elements in the mathematical model. The data for the valve with operator were generated using the finite element model used to determine loads, stresses, and deflections.

NOTE: XY ORIGIN AT CENTER OF DISC
Z ORIGIN AT BACK FACE



CLOW 4 INCH VALVE LIMERICK NPP PEI 0220 STATIC ANALYSIS

GEOMETRY ANSYS 1

COMPONENT	ACTUAL WEIGHT (LB)	MODEL WEIGHT (LB)	CENTROID		
			X (IN)	Y (IN)	Z (IN)
Valve	118	115	-4.6532	-0.614	1.468
Operator	460	460	-10.538	-10.51	-0.55
Valve & Operator	578	575	-9.359	-8.527	-0.146

Figure 2.

ANSYS Calculated Mass
And
Centroid Information

3.0 DESIGN ENVIRONMENT SPECIFICATION

3.1 Seismic Environments

<u>Loading Conditions</u>	<u>Horizontal</u>	<u>Vertical</u>
Specified Seismic Loading	4.5 g	4.5 g

3.2 Operational Environments

The operational environments for the subject Stop Valve are defined in References 1 and 3 and are summarized below:

- o Design pressure = 285 psig
- o Differential pressures = 65 psig
- o Design temperature = 340°F
- o Seating torque = 2,112 in.-lb

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Reference 3 notes that the temperature is uniform and thermal gradients are negligible.

4.0 TECHNICAL APPROACH

4.1 General

The technical approach was formulated to provide a high technology analytical solution to the seismic qualification of the subject valve. The analytical methods identified herein were selected to insure compliance of the qualification program with controlling documents such as Bechtel Specification Number 8031-P-144, Revision 1, IEEE 344-1975, and industry guidelines and standards as represented by NRC Regulatory Guides.

A finite element analytical approach was selected to develop a mathematical representation of the valve. The ANSYS Engineering Analysis System, as developed by Swanson Analysis System, Inc., was used to define the finite element mathematical model and to calculate results including stresses, forces and deflections. A brief summary of the analytical approaches for these various types of analyses follows.

4.2 Finite Element Representation

The structural problem is defined in terms of geometric node point location, structural finite elements that connect the node points, and nodal masses that describe the inertia characteristics of the structure. The ANSYS computer program then used this finite element representation as follows:

- o The stiffness matrix of the complete structure $[K]$ is synthesized from the stiffness of the element $[k]$. This is accomplished through the coordinate transformation $[\beta]$ into (global) coordinates. The general equation for this stiffness relationship is

$$[K] = [\beta]^T [k] [\beta]$$

- o The mass matrix $[M]$ of the complete structure is formed from the elemental consistent mass matrices and the input lumped mass values.

4.3 Modal Analysis

The modal equation

$$([K] - \omega_i^2 [M]) \langle \phi_i \rangle = 0$$

where

$[K]$ = the reduced stiffness matrix of the structure

$[M]$ = the reduced mass matrix of the structure

ω_i = the eigenvalue of mode i

$\langle \phi_i \rangle$ = the eigenvector of mode i

is solved for the eigenvalues ω_i and the eigenvectors $\langle \phi_i \rangle$ of the system. The eigenvectors calculated by the ANSYS program are orthonormal; that is, they are normalized such that the generalized mass for each mode equals unity,

$$\langle \phi_i^T \rangle [M] \langle \phi_i \rangle = \text{Gen. Mass.} = 1$$

Once the modal solutions are obtained in terms of the dynamic degrees of freedom, the eigenvectors can be expanded to the full set of displacement degrees of freedom, if desired.

4.4 Static Analysis

For a static seismic analysis, accelerations, n_i , are applied to the mass matrix $[M]$ to form an inertia loading matrix $\langle F \rangle$ for each seismic or gravity condition:

$$\langle F \rangle = n_i [M] \text{ where } n_i \text{ is the acceleration constant.}$$

The static equilibrium equation

$$\langle F \rangle = [K] \langle d \rangle$$

is solved to obtain the displacement $\langle d \rangle$. From these displacements, the forces and stresses within each structural element can be calculated. Each of the three coordinate directions is evaluated separately and the results superimposed on a Square Root of the Sum of the Square (SRSS) basis with the operational conditions added by absolute sum:

$$\sigma_T = \sqrt{\sum \sigma^2} \text{ static} + \left| \sigma_{\text{gravity}} \right| + \left| \sigma_{\text{operational}} \right|$$

where,

σ_T	=	total elemental stress
σ_{static}	=	elemental stress due to static seismic acceleration
$\sigma_{gravity}$	=	elemental stress due to dead weight or gravity
$\sigma_{operational}$	=	elemental stress due to operational loads.

4.5 Stress Analysis

Stress values for all structural elements in the mathematical model are determined independently for each seismic excitation direction, for dead weight, and for each operational load. Each of these types of load constitutes an individual load case. All load cases are summed as defined in Section 4.4 to achieve a conservative definition of the total stress on each element of the mathematical model.

The model has been developed to be representative of all components of the valve, therefore, it is capable of reproducing stress levels in all components and at all interfaces with high accuracy.

The particular load cases for the subject valve are defined by the design environments of Section 3.0 and are as follow:

- o Load Case 1 - Design pressure, 285 psig and 65 psig differential pressure across disc;
- o Load Case 2 - Seating torque 2,112 in.-lb;
- o Load Case 3 - Static x-direction seismic acceleration;
- o Load Case 4 - Static y-direction seismic acceleration;

- o Load Case 5 - Static z-direction seismic acceleration;
- o Load Case 6 - Gravitational acceleration.

Total stresses resulting from the above load cases are compared with allowable stress values. ASME allowables, S, are taken from ASME Section III Tables I-7.1 through I-7.3, at the design temperature. The allowable stresses for the dynamic design condition were taken to be the "S" values, for conservatism. Bolt stresses were evaluated to the criteria in ASME, Section III, Appendix XVII, subsubarticle 2460.

<u>LOADING COMBINATIONS</u>	<u>STRESS LIMIT FOR STRUCTURAL COMPONENTS</u>	<u>STRESS LIMIT FOR BOLTING</u>
Seismic condition loads, and design loads	"S"	$f_t^2/F_{tb}^2 + f_v^2/F_{vb}^2 \leq 1$

S	=	ASME Allowable Stress at Design Temperature
f_t	=	Tensile Stress
F_{tb}	=	Allowable Tensile Stress
f_v	=	Shear Stress
F_{vb}	=	Allowable Shear Stress

Maximum stresses resulting from the seismic and operational loads are compared with the ASME allowable stresses. This comparison is presented in the form of a stress ratio as:

$$\text{Stress Ratio} = \frac{\text{Maximum Stress}}{\text{Allowable Stress}}$$

Stress ratio values which are less than 1.0 indicate acceptable stress levels which are within satisfactory ASME design limits for stress allowables.

5.0 DESCRIPTION OF MATHEMATICAL MODEL

The ANSYS structural mathematical model of the subject valve was formed with finite elements available in this computer program. The following element types were used:

- o Three dimensional elastic beam element - a uniaxial element with tension-compression, torsion, two-plane bending capabilities, and six degrees of freedom at each node.
- o Elastic flat quadrilateral shell element - a shell element with both bending and membrane capabilities, in-plane and normal loads permitted, normal pressure loading available, six degrees of freedom per node.
- o Generalized mass element - a point mass element having up to six degrees of freedom, concentrated mass and rotary inertias available, coupled mass or diagonal matrix permitted.
- o 3-D Isoparametric solid - element used for three-dimensional modeling of solid structure, eight nodal points define the element with three translational degrees of freedom per node, pressure loading is available.
- o Spring-Damper - massless spring element with longitudinal or torsional capability in one, two, or three dimensional applications.
- o 10 Node Isoparametric thick shell - element used for three-dimensional modeling of solid structure, ten nodal points define the element with three translational degrees of freedom per node, pressure loading is available.

A mathematical model was developed using the above finite elements. This model was formulated so as to provide adequate definitions of valve interfaces such as shaft penetrations of the valve body, adapter to valve body, disc to seat ring, and drive shaft bearing points. Each structural component of the valve was modeled in sufficient detail to allow accurate computer calculation of the stress levels in the components due to dynamic and operating load environments.

The ANSYS finite element model of the assembly consisted of:

- o 458 nodes
- o 176 isoparametric solids
- o 8 isoparametric thick shells
- o 41 beam elements
- o 40 quadrilateral shells
- o 2 springs
- o 1 concentrated mass

These elements were described in several local coordinate systems to facilitate the description of the various major components. Each was referenced to the global coordinate system so that all final outputs could be expressed in a common system.

The resulting detailed finite element model of the stop valve is shown in Figure 2. This figure illustrates the complexity of the model and its attention to detail in the critical areas of the valve. Note specifically the increased modeling detail in the neck area where the largest bending stresses would be produced.

The wafer valve body was represented with 184 three dimensional solid elements which reproduces the flexibility of the body at all of its intersections with other valve components. The nodal picture of the valve body is shown in Appendix A. The body was developed with two levels of elements through its thickness, except in the neck area where there are four levels, so as to provide a more accurate stress resolution in the valve body.

Inside the valve body opening, the seat ring was modeled using beam elements with proper section properties to simulate its inertial characteristics. Pressed against the seat ring is the disc, which was modeled using 14 quadrilateral shell elements.

The effects of seating the disc against the ring was accomplished by using coupled nodal displacements. This mathematically "coupled" selected nodes on the seat ring to selected nodes on the disc. Any displacement in one node of the coupled set was limited by the resistance to displacement of the other node in the set.

The disc ears were modeled as shell elements, but the shaft to disc torque was transmitted by use of spring elements with stiffness properties several times that of the shaft.

The operator adapter plate was modeled with plate elements as was the disc. This approach yields excellent membrane and bending data.

The shaft was modeled with beam elements with properties that provide proper load carrying characteristics of the shaft. The shaft penetrates the valve body in the plane between the two middle section thicknesses of the body. Bearing forces are transmitted to the valve body at bearing locations by use of coupled nodes. The shaft is restrained axially by coupling the lower end shaft node to a valve body node. This simulates the presence of the annular key and dowel pin.

The operator was modeled with a lumped mass element at its center of gravity and very stiff beam elements from the mass to the operator adapter plate simulated the rigid operator body and housing.

The shaft and operator section was modeled such that disc loads would not be transmitted through the shaft to the operator, as verified in previous testing performed for Clow.

A definition of node point numbering systems, coordinate systems, components, and general math model development data is given in Appendix A. For a more detailed definition and understanding of this complex and sophisticated model, attention should be given to this Appendix.

The weights of all valve components were generated by ANSYS using consistent mass formulations. The operator mass was simulated with a translational lumped mass at its center of gravity.

The physical properties of the various materials in the valve were taken from ASME Section III Appendix I, Table I-6.0, for a design temperature of 340°F.

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6.0 RESULTS OF VALVE FREQUENCY ANALYSIS

A modal analysis as described in Section 4.3 and using the model of Section 5.0 was performed. The lowest fundamental frequency of the valve assembly was found to be 87 Hz. The motion of these modes are characterized by a bending motion occurring in the neck section. No friction coupling between the adapter plate and valve body was taken into account. The operator loads were transmitted to the valve body only at bolting locations.

Participation factors for a few key resonances are given in Table 1. These participation factors are calculated for each excitation direction and indicate participation or activity of each mode in that direction. For a static analytical approach, as in this case, the participation factors serve only to provide insight into the character of the modes.

Total frequency analysis for both valve assemblies are given in the appropriate section of Appendix D which lists pertinent ANSYS print-outs.

7.0 RESULTS OF VALVE STRESS ANALYSIS

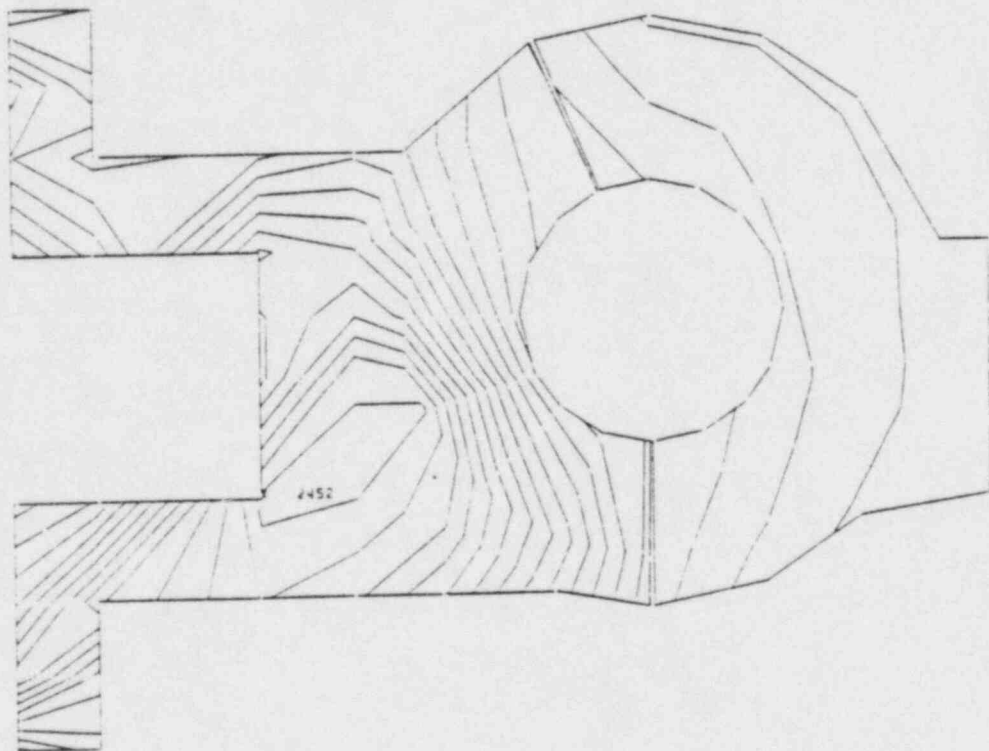
The mathematical model of Section 5.0 was subjected to the following load cases:

- o Load Case 1: Internal valve pressure of 285 psig with a differential disc pressure of 65 psig
- o Load Case 2: Seating torque applied to shaft 2,112 in.-lb
- o Load Case 3: X direction dynamic acceleration 1.0 g
- o Load Case 4: Y direction dynamic acceleration 1.0 g
- o Load Case 5: Z direction dynamic acceleration 1.0 g

The results from these five individually calculated load cases were conservatively summed as shown in Section 4.4; i.e., dynamic load stresses were combined by SRSS and then combined with gravitational and operational stresses by absolute summation. This was achieved by using ANSYS post-processing subroutine POST27 which allows multiplication by scale factors, summations of several load cases by SRSS, absolute sum, or algebraic sum methods. Proper scale factors were used to bring the g values of load cases 3 through 5 to design environment levels (see Section 3.0) before loads were combined.

POST27 also is a powerful tool to scan information. By setting an upper boundary stress limit, the program will scan all stress data and flag stresses over the threshold value. This data printout is given in Appendix E. Static analysis input and typical stress printout are given in Appendix C.

By use of ANSYS POST23, principal stresses were calculated at nodal points throughout the sections modeled with solid elements (valve body). Nodal displacements and stress data compiled by POST23 are given in Appendix F. Along with calculating nodal stresses, POST23 also plots section views to show areas of maximum stress. Figures 3 through 8 show maximum stress plots with lines of constant stress for the valve body for the dynamic plus operational loading conditions.

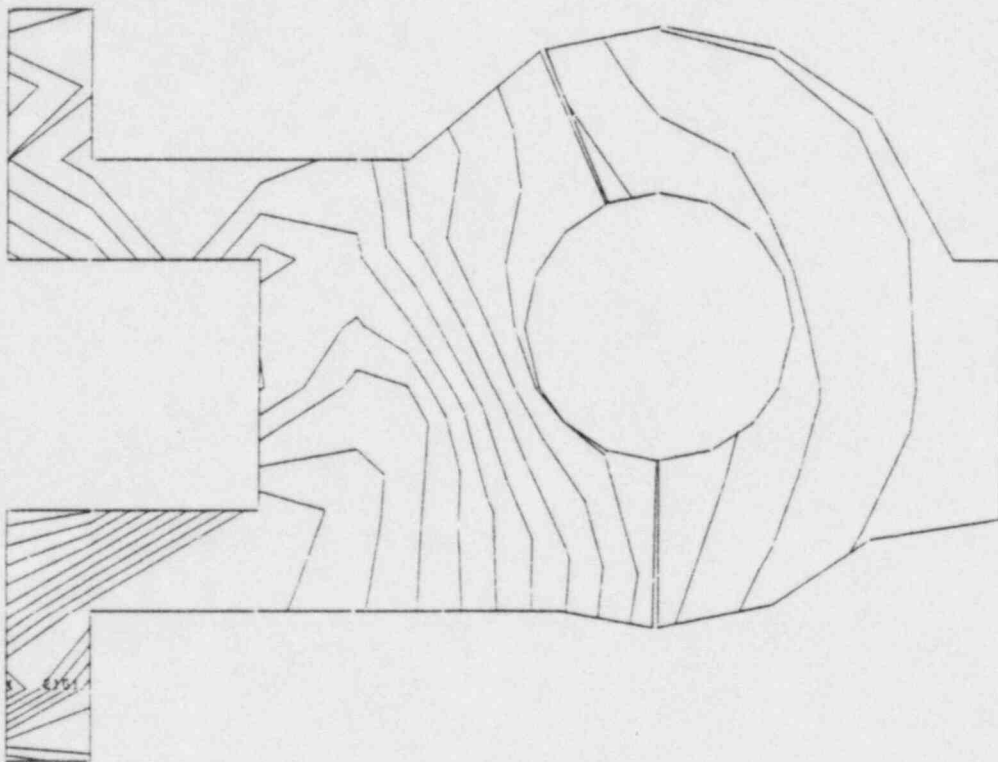


VALVE BODY SECTION CUT Z=0.375 4 INCH VALVE

SMAX ANSIS

Figure 3.

Valve Body
Max Stress Plot
z = 0.375 Section Cut



VALVE BODY SECTION CUT Z=1.125 4 INCH VALVE

SMAX ANSIS 7

Figure 4.
Valve Body
Max Stress Plot
z = 1.125 Section Cut

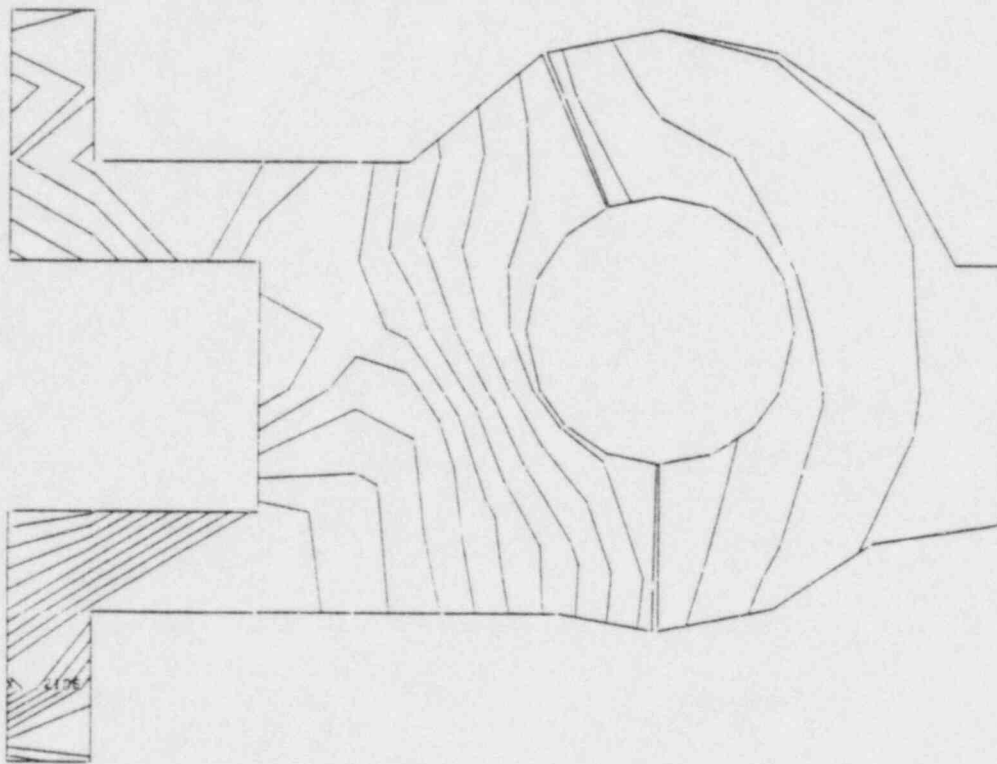
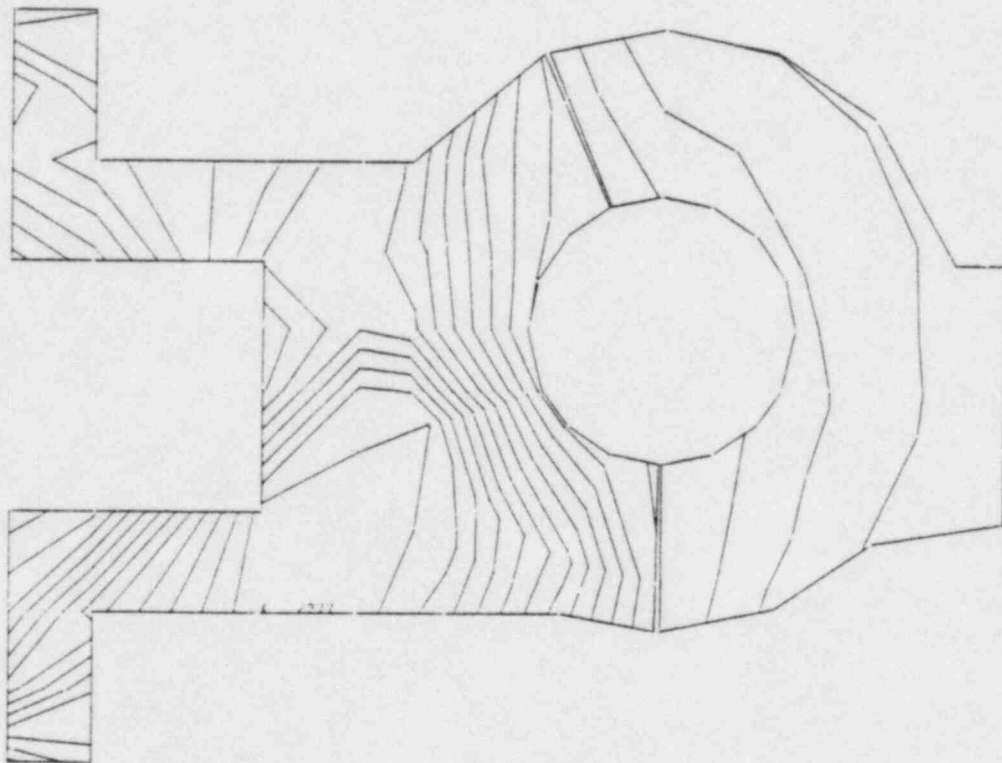


Figure 5.

Valve Body
Max Stress Plot
z = 1.875 Section Cut

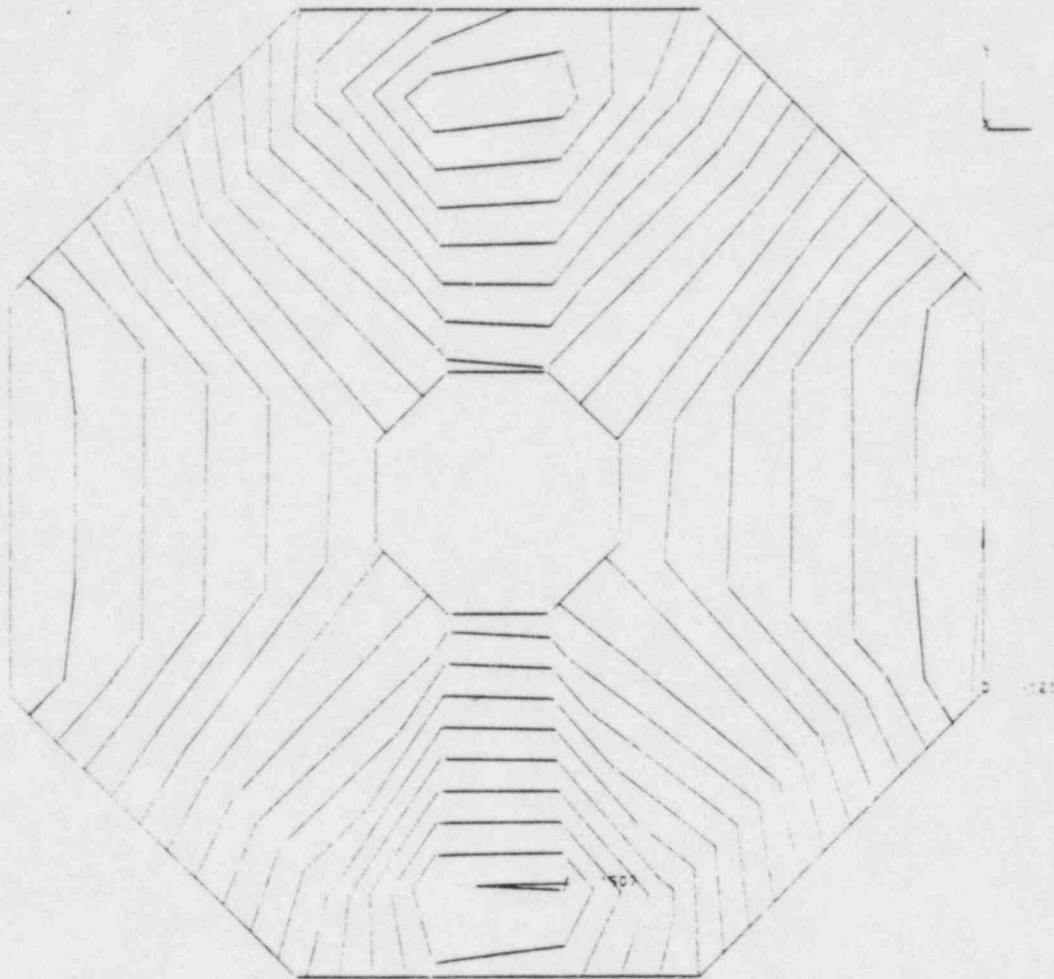


VALVE BODY SECTION CUT Z=2.625 4 INCH VALVE

SMAX ANSYS 7

Figure 6.

Valve Body
Max Stress Plot
z = 2.625 Section Cut

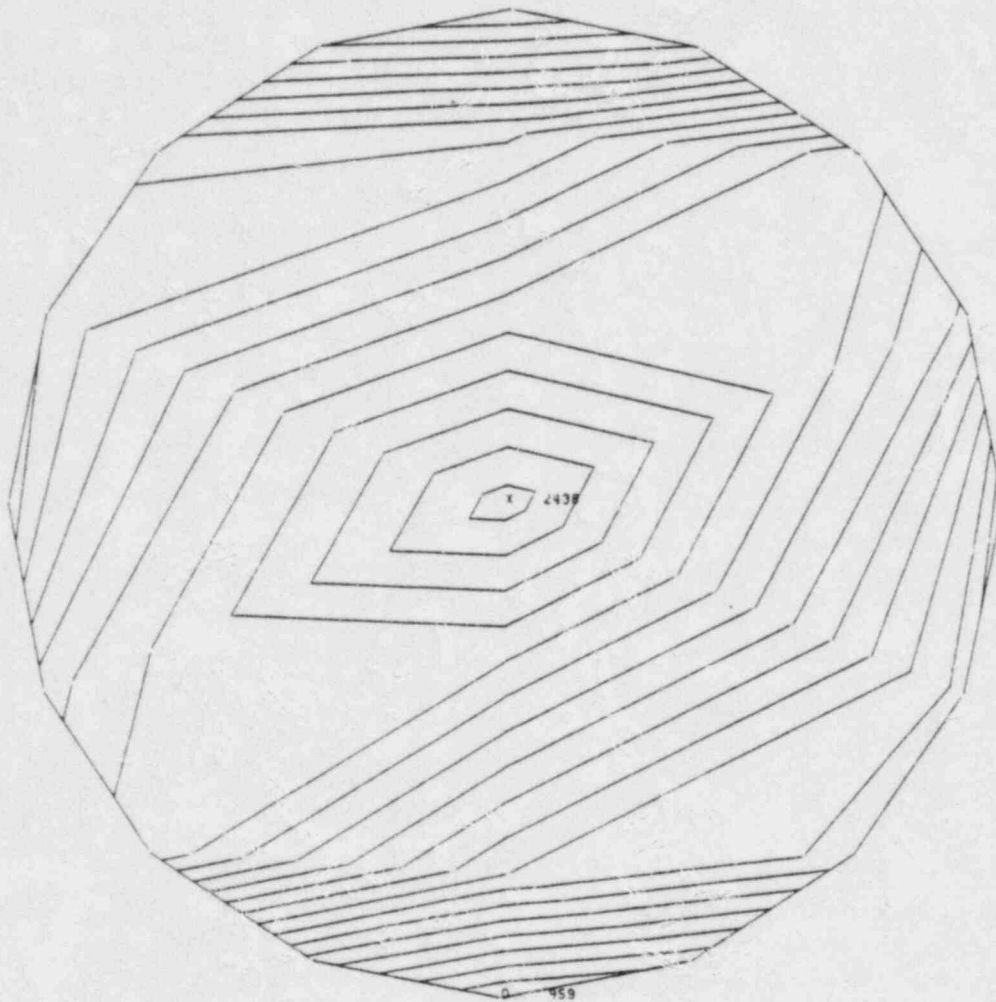


CLOW 4 INCH VALVE 4.50 LOAD COMBINATION PLUS OPERATING

EMXT ANSYS 4

Figure 7.

Adapter Plate
Max Stress Plot



CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

SMXT ANSYS

Figure 8.

Disc
Max Stress Plot

These figures also show maximum stress plots for the disc and adapter plate for the loading condition. These plots were made using ANSYS POST25, the same type post-processing routine as POST23 except that it calculates displacements and principal stresses for nodes on plate elements. The data compiled by POST25 are given in Appendix G.

The maximum stress values for other valve components, such as drive shaft and adapter plate bolting, are detailed in Appendix B. The maximum stressed element was flagged by POST27 and a detailed stress analysis is contained in this Appendix.

The maximum stresses for all valve components were compared to the allowable stress values of Section 4.5. Table 4 gives the maximum stress in all sections of the valve due to the dynamic loading condition and operational loads. This table also lists ASME allowable stress values for each material.

The maximum stress values for the isoparametric elements (valve body) and the quadrilateral shell elements (disc and adapter plate) were calculated for each corresponding node. This stress value includes both membrane and bending stress. For conservatism, this value was compared to only the ASME "S" allowable stress. The stress levels were found to be well within the allowed limits.

The drive shaft stresses were also compared with their allowables and found to be within their limits.

Cover plate stresses were also compared with the ASME "S" allowable stress values. This resulted in a stress ratio well within range. The stress value calculated for the cover plate bolting was also compared to its "S" value and was found acceptable. These calculations can be found in Appendix B.

Table 5 lists the load reactions at the support points. For better understanding of nodal locations refer to valve body section of Appendix A. The forces shown in these tables represent the net reaction at nodes where bolts are located. The two flanges which sandwich the valve body must provide a restraining force distribution to the valve body as indicated in the reaction table. Full reaction results are found in Appendix E.

The section modulus and area at the plane normal to the flow passage through the region at the valve body crotch is greater than 110 percent of that for the piping connected to the valve body inlet and outlet nozzles. Also, the allowable stress for the valve body material is greater than the allowable stress of the connected piping material. It is assumed the mating pipe is SA106 GR.B with a schedule 40 wall. The detailed calculations are listed in Appendix B.

Table 4.

Summary of Allowable Stresses

LOCATION	MATERIAL	ALLOWABLE STRESS (psi) (PER ASME SECTION III, TABLES I-7.1 THROUGH I-7.3)	STRESS VALUE (psi)	ELEMENT	STRESS RATIO
Valve Body	SA 516 GR. 70	17500	4109	61	0.24
Disc	SA 516 GR. 70	17500	3309	191	0.19
Drive Shaft	SA 516 Type 630 H-1045	34550	2802 _v	202	0.81
Operator Adapter Plate	SA 516 GR. 70	17500	1847	212	0.11
Adapter Plate Bolts	SA 193 GR. B7	25000	9284 _σ _N 6198 _T	N/A	0.08*
Operator/Adapter Bolts	SR 193 GR. B7	25000	5616 _σ _N 4871 _T	N/A	0.04*
Cover Plate	SA 516 GR. 70	(1.5)(17500) =26250	3258	N/A	0.19
Cover Plate Bolts	SA 193 GR. B7	25000	3286 _σ _N 18 _T	N/A	0.003*

*Per ASME, Section III, Appendix XVII, Subsubarticle 2460.

Table 5.
Net Reaction Forces at
Boundary Nodes

NODE	FX(LB) SHEAR	FY(LB) SHEAR	FZ(LB) NORMAL
17	72	67	44
19	211	119	99
21	449	264	346
122	463	1268	637
125	2168	2987	1980
127	1561	431	544
12	488	94	253
14	243	77	117
91	91	68	54
93	239	128	139
95	614	250	377
326	1027	1030	729
329	2293	2570	1958
331	1663	412	622
86	521	86	263
88	242	77	114

8.0 DEFLECTIONS OF MAJOR COMPONENTS

Maximum deflections of major valve components resulting from the application of all dynamic loading conditions plus operating environments are found in the appropriate sections of the Appendices. The body displacements are found in Appendix F, disc and adapter plate displacements in Appendix G. The remaining component displacements were checked by summation of individual displacements due to the application of the load cases listed in Section 4.5 and found in Appendix E.

The operator center of gravity experiences the largest displacement in the pipe axis direction. The values given in Table 3 of Section 1.2 give the maximum deflections in the global coordinate system. These values indicate that the valve's deflections will not prevent it from performing its specified function.

9.0 REFERENCES

1. Clow Engineered Products Division data transmitted included the following items:

<u>Drawing Number</u>	<u>Title</u>
D-0701	4" Lug Stop Valve Assembly
B-3930B	Machining 4" Wafer Valve
B-3929A	4" Disc and Seal Assembly
B-3926	Disc and Ear Assembly (4")
B-3920	Lugged Body Plate
B-3959	Seat Ring
B-3958	Dis.
B-3927	Single Disc Ear
B-3967	Cover Plate
B-3925	Drive Shaft
B-3928A	Operator Adapter Plate (Limitorque)

2. General operator definition: Limitorque Valve Controls drawing 02-441-0565-2 with center of gravity report 1737.
3. Telecon; Allen Davidson, PEI, to Jim Krueger, Clow Corporation, discussing operational loads and thermal gradients, C.G. information for operators with accessories furnished.
4. Bechtel Power Corporation Design Specification 8031-P-144, Revision 1 dated 6/29/82 "Design Specification for Butterfly Valves for Nuclear Service for the Limerick Generating Station Units 1 and 2 Philadelphia Electric Company".

APPENDICES

APPENDIX A	MATHEMATICAL MODEL	
APPENDIX B	APPENDIX OF CALCULATIONS	
APPENDIX C	ANSYS STATIC ANALYSIS	A
APPENDIX D	ANSYS MODAL ANALYSIS	A
APPENDIX E	ANSYS POST 27 LOAD COMBINATIONS	
APPENDIX F	ANSYS POST 23 VALVE BODY NODAL STRESS AND NODAL DISPLACEMENT DATA	
APPENDIX G	ANSYS POST 25 VALVE DISC AND ADAPTER PLATE NODAL STRESSES AND DISPLACEMENTS	

These Appendices have been prepared by N. Allen Davidson
N. A. Davidson

Approved by Robert Parker
Robert Parker

APPENDIX A
MATHEMATICAL MODEL

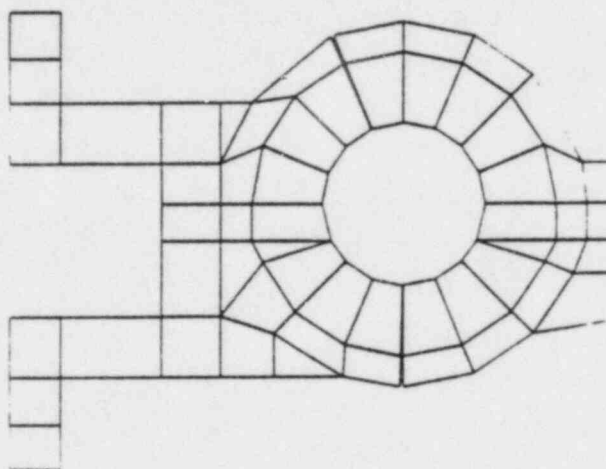
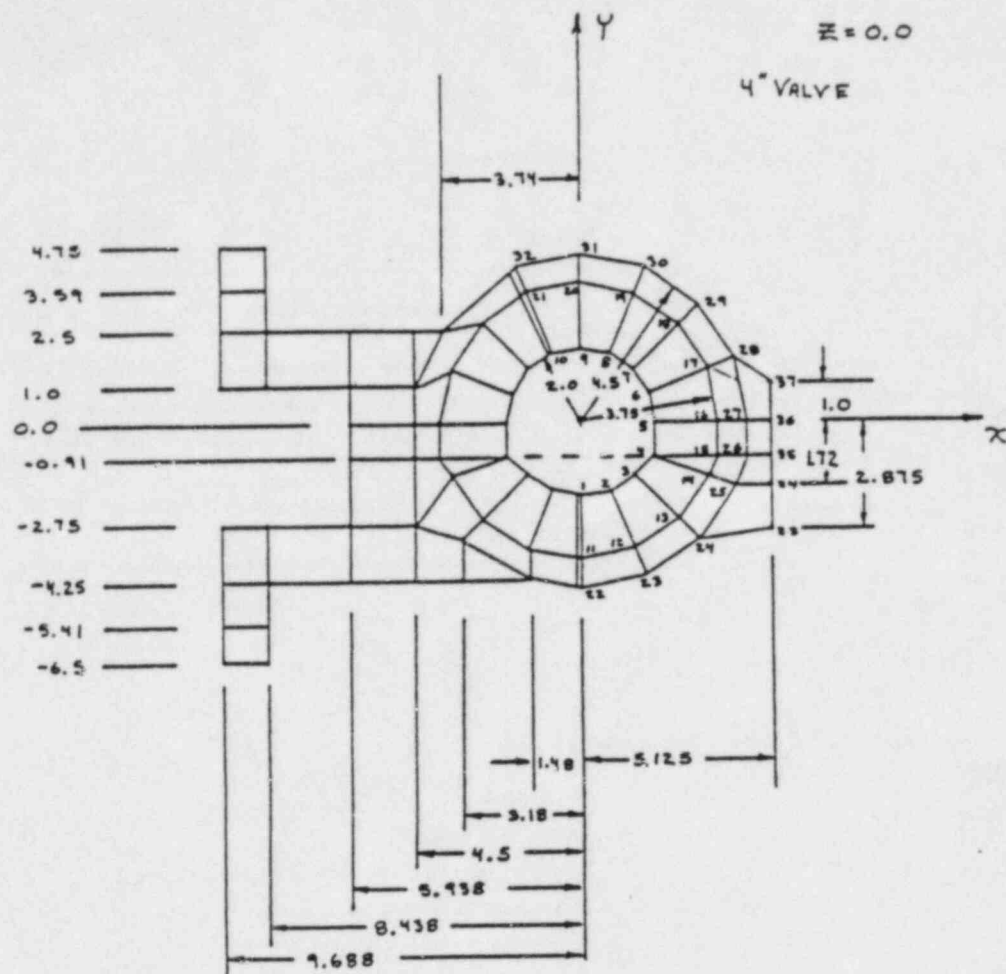
ANSYS MODEL CODING INFORMATION FOR ELEMENT DATA

COMPONENT	ELEMENT TYPE	MATERIAL	I TYPE	I TABLE
Valve Body	3-D Solid	1	1	1
Neck Transition Element	10 Node Solid	1	2	2
Disc	Shell	1	3	3
Shaft	3-D Beam	2	4	4
Adapter Plate	Shell	5	5	5
Disc Ears	Shell	1	6	6
Body to Plate Bolts	3-D Beam	1	8	8
Seat Ring	3-D Beam	3	9	9
Massless Rigid Links	3-D Beam	4	10	10
Torque Spring	Spring	1	11	11
Operator Center of Gravity	Translational Mass	1	12	12

patel engineers

huntsville, alabama

AI



-15.0 -13.0 -11.0 -9.0 -7.0 -4.9 -2.9 -.9 1.1 3.1 5.1
 1/4 INCH VALVE INTERPRETATION 1/4 INCH VALVE
 MODAL ANALYSIS
 1/4 INCH VALVE

FIGURE A1. LOWER PLANE OF VALVE BODY NODES
 AND ANSYS INTERPRETATION

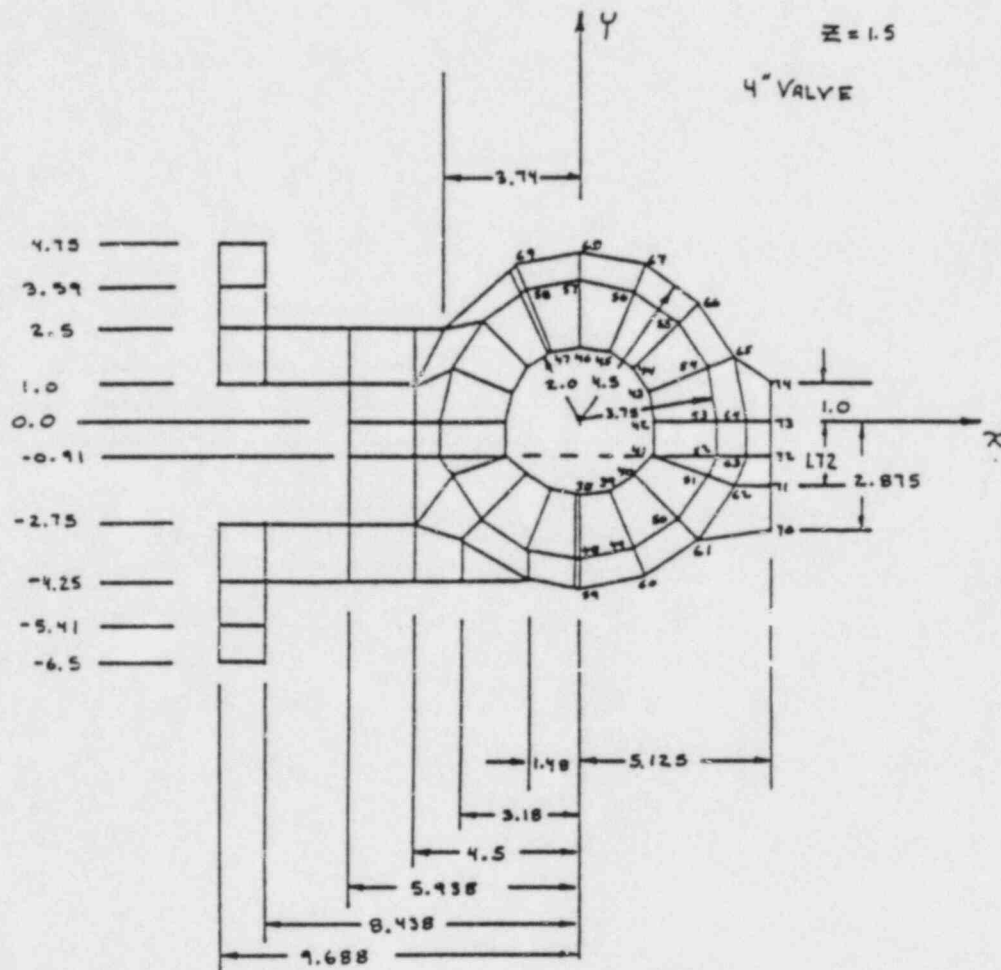


FIGURE A2. MIDDLE PLANE VALVE BODY NODES

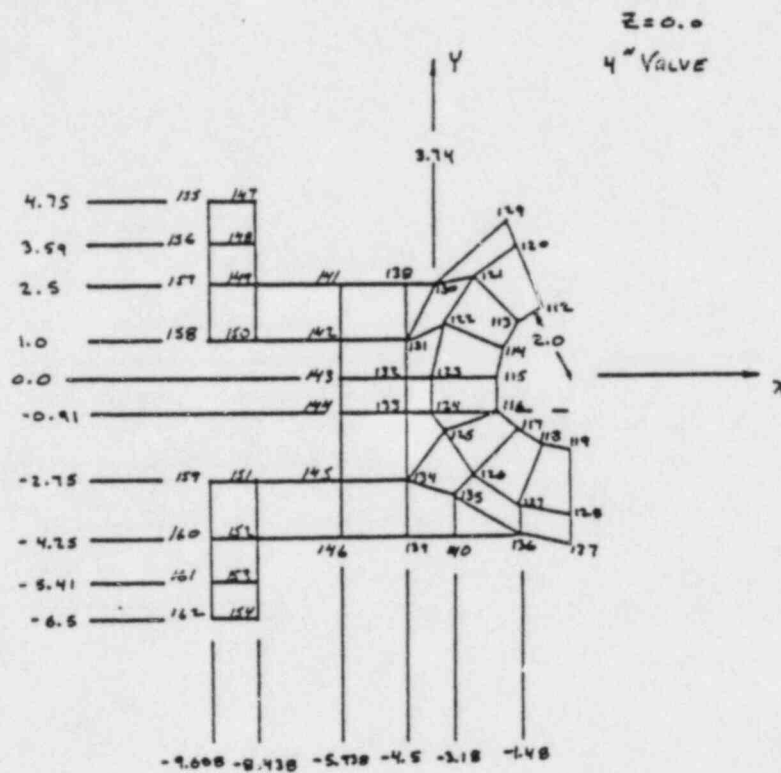
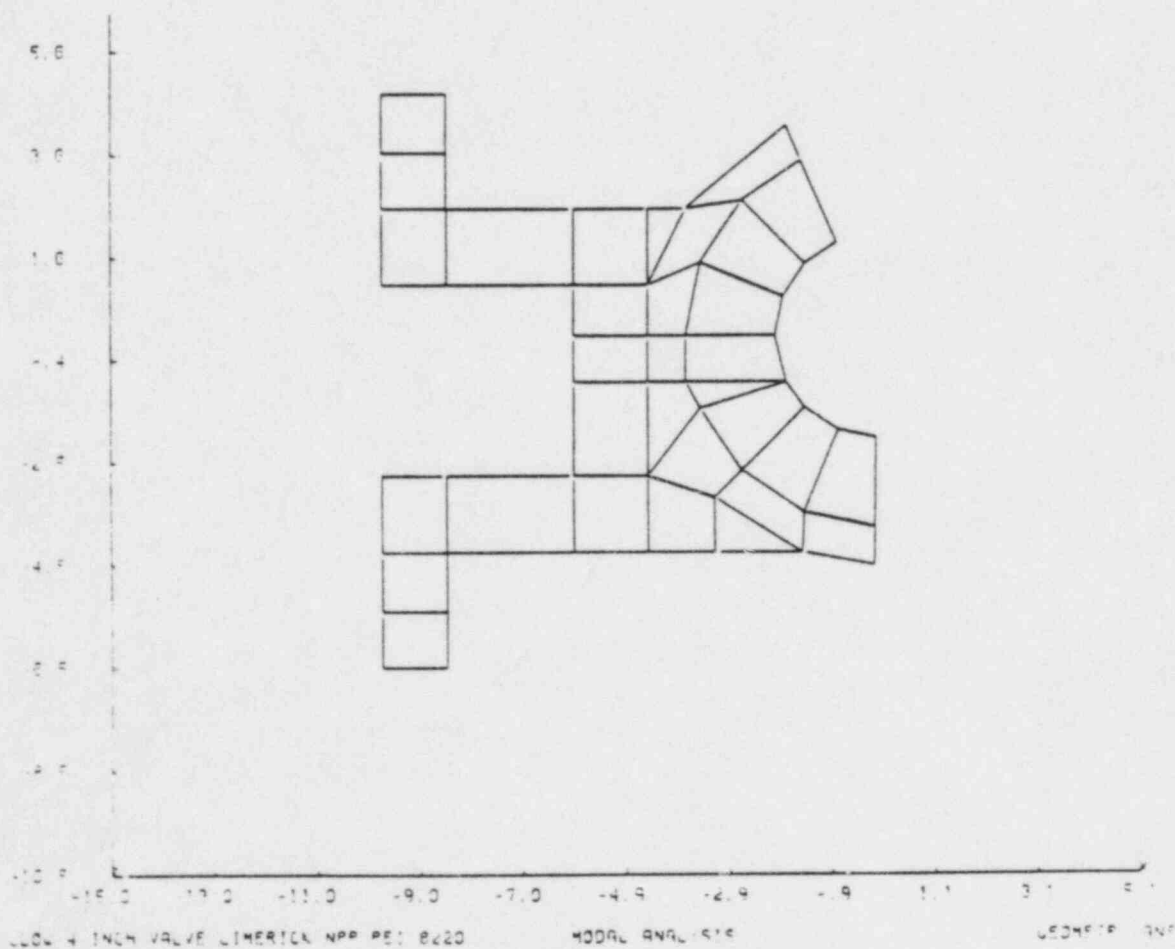


FIGURE A4. LOWER VALVE BODY NECK SECTION



A7

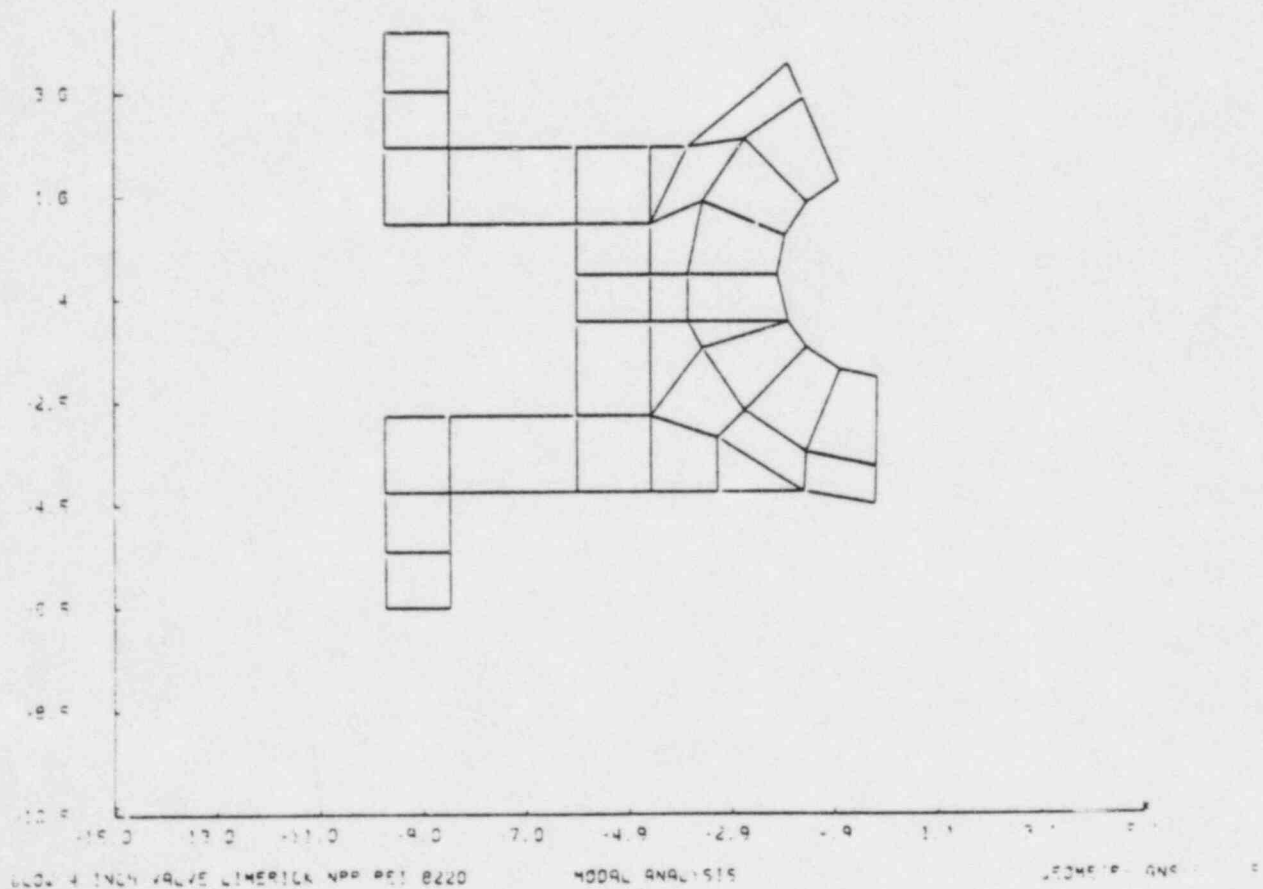
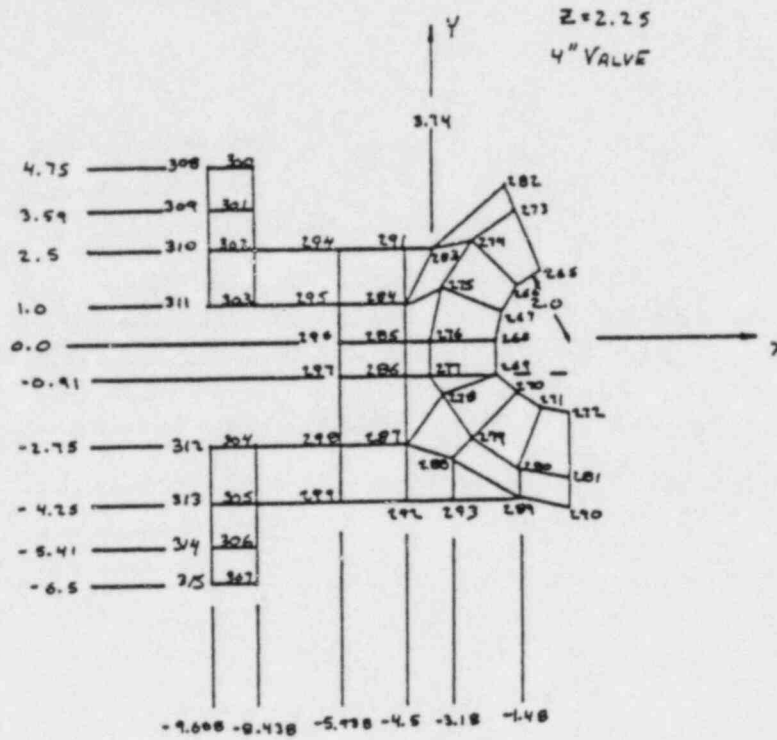


FIGURE A7. 4th LEVEL VALVE BODY NECK SECTION
AB

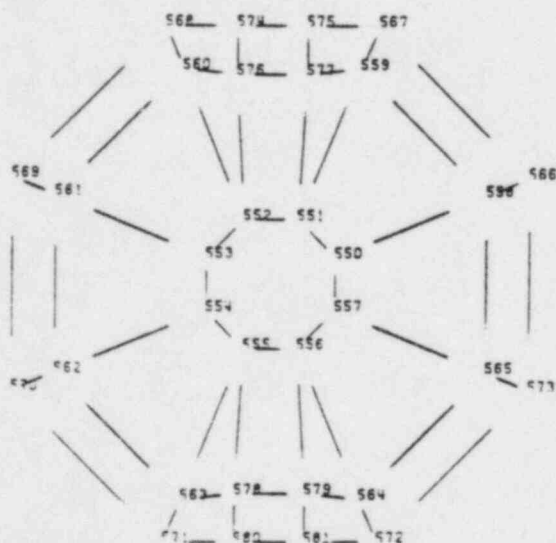
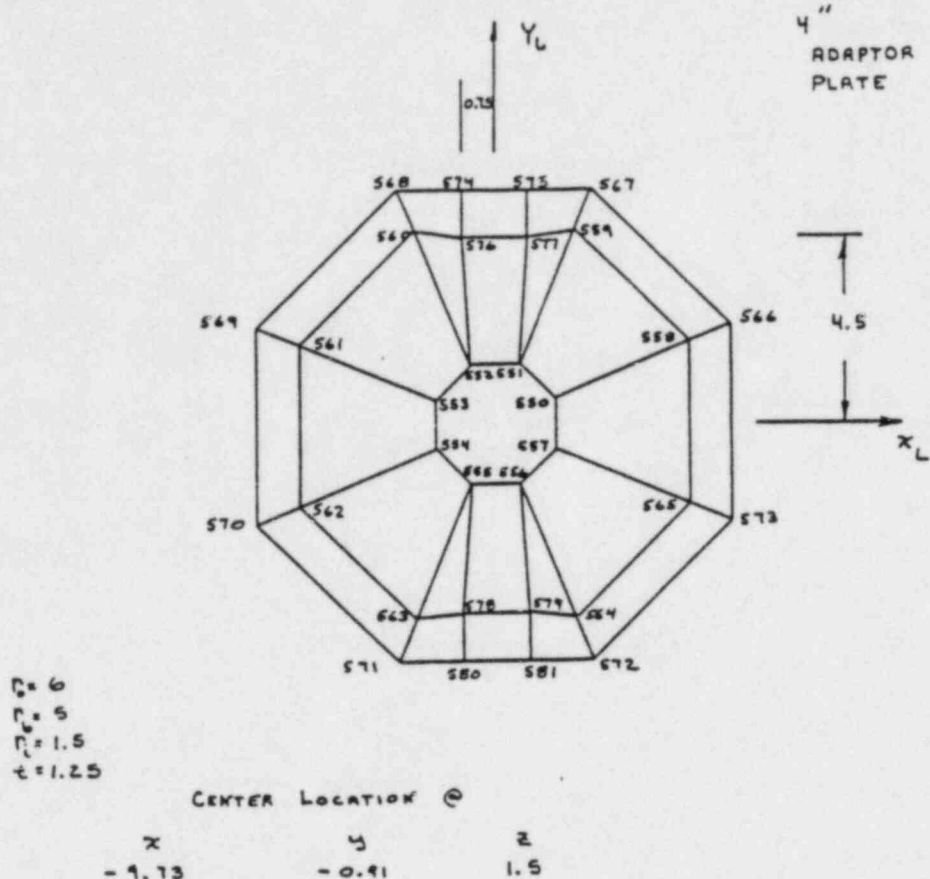


FIGURE A9. OPERATOR ADAPTER PLATE NODES AND ANSYS INTERPRETATION

A10

530

531 532 533 534 535 536 537 538 539

LOW 4 INCH VALVE LIMERICK NPP PEI 0220

MODAL ANALYSIS

GEOMETRY: ANS 8 10

FIGURE A11. DRIVE SHAFT PLOT

A12

APPENDIX B
APPENDIX OF CALCULATIONS

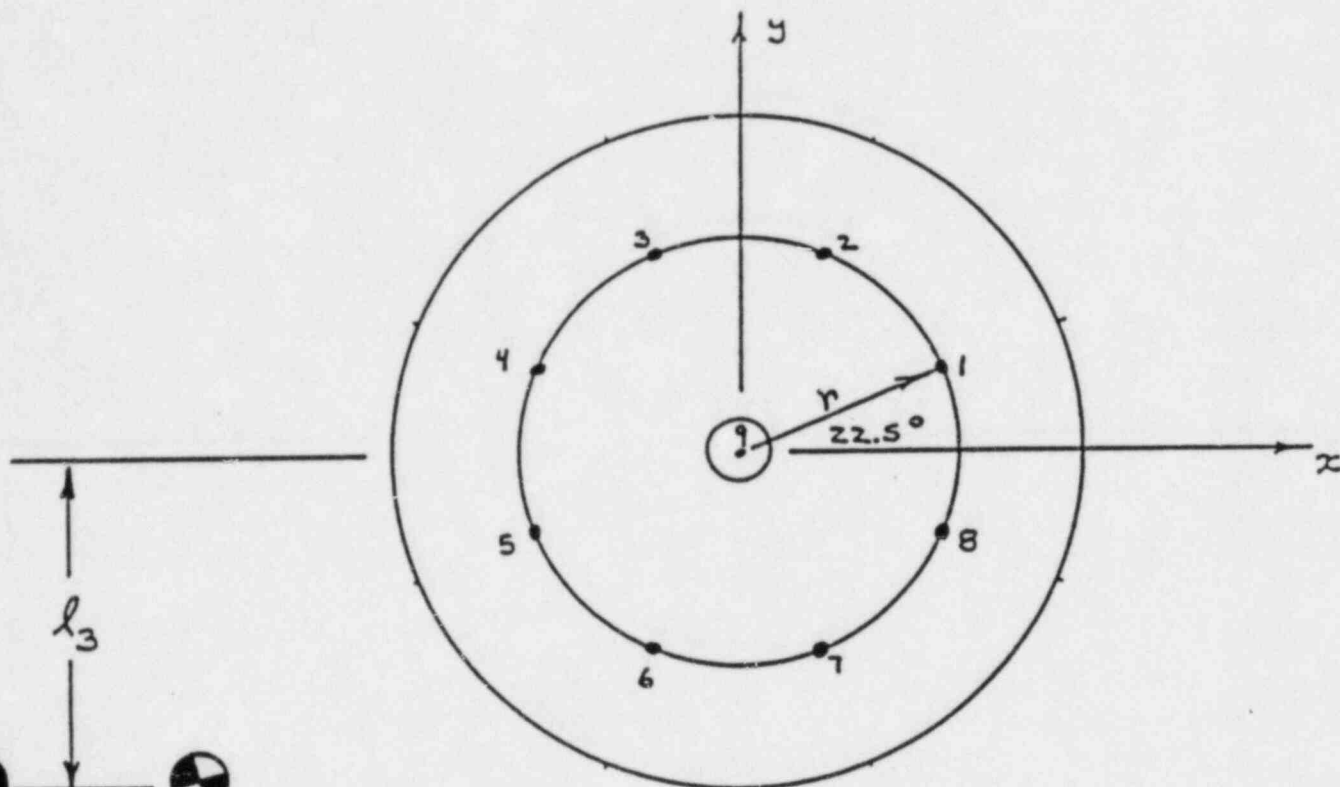
OPERATOR/ADAPTER PLATE
BOLTING CALCULATIONS

patel engineers
huntsville, alabama

B-1

Title 4"

OPER/ADAPTER PLATE BOLTS SUB NO. 8220

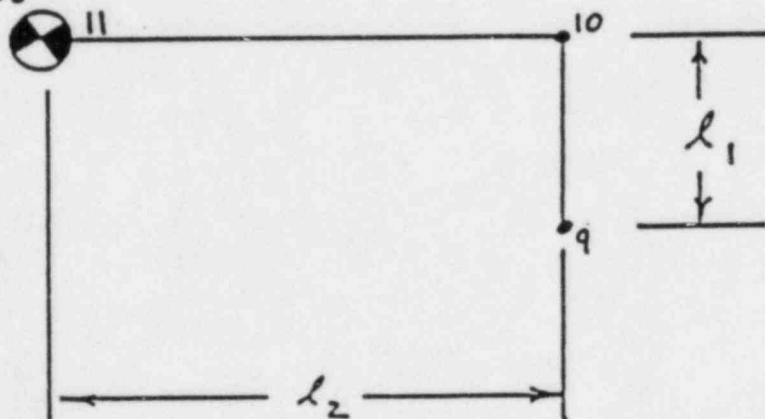
By MAADate 4/27/83Ckd by RPDate 28 Apr 83

$$r_{\text{BOLT}} = 5.0 \text{ in.}$$

$$l_1 = 0.4 \text{ in.}$$

$$l_2 = 2.05 \text{ in.}$$

$$l_3 = 9.6 \text{ in.}$$



Analysis performed
by use of ANSYS
computer code which
follows:

Title 4" OPER/ADAPTER PLATE BOLTS Job No. 8220

By 77219 Date 4/27/83 Ckd by RP Date 28 Apr 83

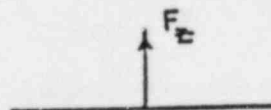
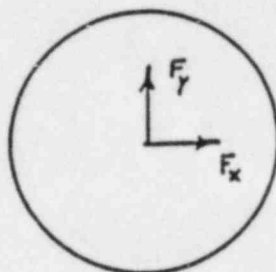
OPERATOR Wt = 460 lb.

TORQUE = 2112 in.-lb.

BOLT SIZE 5/8 - 11 UNC

AREA = 0.2256 in².

SA 193 Gr. A7



MAX BOLT R_{XX}

NODE 6

$$F_x = \underline{1013} \text{ lb}$$

$$F_y = \underline{426} \text{ lb}$$

$$F_z = \underline{1267} \text{ lb}$$

$$\sigma_{Norm} = \frac{F_z}{AREA} = \underline{5616} \text{ psi}$$

$$\tau = \frac{\sqrt{F_x^2 + F_y^2}}{AREA} = \underline{4871} \text{ psi}$$

ASME SECTION III, APPENDIX XIII, SUBSUBARTICLE 2460.
"DESIGN REQUIREMENTS FOR BOLTED JOINTS"

a) TENSILE ONLY

F_{tb} = ALLOW TENSILE STRESS

S_u = ULTIMATE TENSILE STRESS

$$F_{tb} = S_u/2 = 125000/2 = 62500 \text{ psi}$$

$$\sigma_N / F_{tb} = 5616 / 62500 = \underline{0.09}$$

b) SHEAR ONLY

$$F_{vb} = 0.62 S_u/3 = 25833 \text{ psi}$$

$$\tau / F_{vb} = 4871 / 25833 = \underline{0.19}$$

Title 4" OPER/ADAPTER PLATE BOLTS Job No. 8220
By 798 Date 4/27/83 Ckd by RP Date 28 Apr 83

c) COMBINED TENSION + SHEAR

$$\sigma_K^2 / F_{tL}^2 + \tau^2 / F_{vL}^2 \leq 1$$

$$5616^2 / 62500^2 + 4871^2 / 25833^2 = \underline{0.04}$$

***** ANSYS INPUT DATA LISTING (TAPE18) *****

```

1  4  INCH OPERATOR ADAPTER PLATE MOUNTING ANALYSIS LIMERICK
2  DAVIUSON
3      1  1      27
4  350      350
5  1  4  1
6  2  21  2
7  -1
8  100      10000      10000      100      100      10000
9  1.1905
10 -1
11  1  9      1  1  1
12  2  9      1  1  1
13  3  9      1  1  1
14  4  9      1  1  1
15  5  9      1  1  1
16  6  9      1  1  1
17  7  9      1  1  1
18  8  9      1  1  1
19  10 9      1  1  1
20  10 11     1  1  1
21  11     0  2  2
22 -1
23  0  1 3  0.0      0.0      0.0
24  1  3  5.0      22.5      0.0
25  8  3 1  5.0      337.5      0.0
26  9      0.0      0.0      0.0
27  10     0.0      0.0      -0.4
28  11     -2.05     -9.6      -0.4
29 -1
30 EX 1      29.9E6
31 ALPX 1     6.5E-6
32 DENS 1     0.0
33 NUXY 1     0.3
34 -1
35 /TITLE      TORQUE 2112 IN LB
36 1  2
37
38 1  UX  0.0      UY  UZ
39 2  UX  0.0      UY  UZ
40 3  UX  0.0      UY  UZ
41 4  UX  0.0      UY  UZ
42 5  UX  0.0      UY  UZ
43 6  UX  0.0      UY  UZ
44 7  UX  0.0      UY  UZ
45 8  UX  0.0      UY  UZ
46 -1
47 9  M7 -2112
48 -1
49 -1
50 /TITLE      X DIRECTION
      A  A  A  A  A  A  A  A  A  A  A  A  A  A

```

***** ABSYS INPUT DATA LISTING (Table) *****

51	-2	6	12	18	24	30	36	42	48	54	60	66	72	78
52		V	V	V	V	V	V	V	V	V	V	V	V	V
53	-1													
54	9													
55	-1													
56	-1													
57	/TITLE													
58	-2													
59														
60	-1													
61	-1													
62	-1													
63	/TITLE													
64	-2													
65														
66	-1													
67	-1													
68	-1													
69	END													
70	OPTION1													
71	ALGEBH12													
72	SHSS 12													
73	SHSS 12													
74	ABSOLU12													
75	PSIR 1													
76	ABSOLU12													
77	PRINT													
78	POPT													
79	PFILE 10													
80	FINISH													

4 INCH OPERATOR ADAPTER PLATE BOLTING ANALYSIS LIMERICK

11.0761 83/ 4/27 CP= 2.475

THE ANSYS PROGRAM IS IN A STATE OF CONTINUOUS DEVELOPMENT, MODIFICATION, AND CHECKING. NEITHER SWANSON ANALYSIS SYSTEMS, INC. NOR THE CORPORATION SUPPLYING THE COMPUTER FACILITIES FOR THIS ANALYSIS ASSUME ANY RESPONSIBILITY FOR THE VALIDITY, ACCURACY, OR APPLICABILITY OF ANY RESULTS OBTAINED FROM THE ANSYS SYSTEM. THE USER MUST VERIFY HIS OWN RESULTS.

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***** ANALYST = DAVIDSON

***** ANALYSIS OPTIONS (CARDS C1 AND C2) *****

	VALUE	VARIABLE NAME	COLUMNS
ANALYSIS TYPE	0	KAN	5-7
ELEMENT CONSTANT TABLE	1	KT8	11-12
REACTION FORCE KEY	1	KRF	15-16
POST-RUN PROCESS KEY	27	KYPOST	27-28
REFERENCE TEMPERATURE	350.00	THEF	1-12
UNIFORM TEMPERATURE	350.00	TUNIF	13-24
CORE SIZE REQUESTED (OCTAL) . .	00200000		
LCM SIZE REQUESTED (OCTAL) . .	00147770		
BLOCKED BINARY FILE NAMES . .	TAPE3	TAPE2 TAPE11 TAPE4 TAPE10 TAPE12	
BLOCK SIZES	580	580 1160 580 580 580	

***** ELEMENT TYPES (CARD D) *****

TYPE	STIF	DESCRIPTION	KEYSUB	OPTIONS	NJ	INOTPR
			1H 1A 1	2B 2A 2		
1	4	ELASTIC BEAM, 3-D	0 0 0	0 0 1	0	0
2	21	GENERAL MASS	0 0 2	0 0 0	0	0

***** TABLE OF ELEMENT REAL CONSTANTS (CARD D2) *****

NO.								
1	100.00	10000.	10000.	100.00	100.00	0.	0.	10000.
2	1.1905							

4 INCH OPERATOR ADAPTER PLATE BULGING ANALYSIS LIMERICK

11.0364 83/ 4/27 CP= 2.679

***** ELEMENT DEFINITIONS (CARD E) *****

ELEMENT	NODES	MAY	TYPE	CLASS	ELEMENT REAL CONSTANTS				
					AREA	IZ IP	IY SHR7	THKZ SHR7	THKY SHRY
1	1 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
2	2 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
3	3 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
4	4 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
5	5 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
6	6 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
7	7 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
8	8 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
9	10 4	1	1	0	100.	.100E+05	.100E+05	100.	0.
10	10 11	1	1	0	100.	.100E+05	.100E+05	100.	0.
11	11	1	2	0	1.19				

OCTAL STORAGE REQUIREMENTS FOR ELEMENT INPUT CP= 2.981
 CORE= 00143722 MEMORY= 00000026 TOTAL= 00143750 MEMORY AVAILABLE= 00147770
 MAXIMUM NODE NUMBER FOR AVAILABLE AUXILIARY MEMORY SIZE= 26520

NUMBER OF ELEMENTS = 11 MAXIMUM NODE NUMBER USED = 11

*** ELEMENT STIFFNESS FORMULATION TIME ESTIMATE (CDC 6600) ***

TYPE	STIF	NUMBER	TIME (EACH)	TIME (ALL)
1	4	10	.0849	.849
2	21	1	.0053	.005
TOTAL TIME =			.854 SECONDS.	

ANYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 6/11 CYR0176 JUNE 1, 1979
 SPANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304
 4 INCH OPERATOR ADAPTER PLATE BOLTING ANALYSIS LIMEHICK 11.0367 83/ 4/27 Co= 3.033

***** NODE DEFINITIONS (CARD F) *****

NODE	LOCATION		ROTATION (DEGREES)			
	X (OR M)	Y (OR THETA)	Z (OR PHI)	THX (OR HT)	THY (TZ OR TP)	THZ (RT OR RP)
COORDINATE SYSTEM 3	TYPE 1	CENTER LOCATION	0.000	0.000	0.000	0.00 0.00 0.00
1	5.0000	22.500	0.	0.	0.	COORD. SYSTEM 3
1	4.6194	1.9134	0.	0.	0.	COORD. SYSTEM 3
2	5.0000	67.500	0.	0.	0.	COORD. SYSTEM 3
2	1.9134	4.6194	0.	0.	0.	COORD. SYSTEM 3
3	5.0000	112.50	0.	0.	0.	COORD. SYSTEM 3
3	-1.9134	4.6194	0.	0.	0.	COORD. SYSTEM 3
4	5.0000	157.50	0.	0.	0.	COORD. SYSTEM 3
4	-4.6194	1.9134	0.	0.	0.	COORD. SYSTEM 3
5	5.0000	202.50	0.	0.	0.	COORD. SYSTEM 3
5	-4.6194	-1.9134	0.	0.	0.	COORD. SYSTEM 3
6	5.0000	247.50	0.	0.	0.	COORD. SYSTEM 3
6	-1.9134	-4.6194	0.	0.	0.	COORD. SYSTEM 3
7	5.0000	292.50	0.	0.	0.	COORD. SYSTEM 3
7	1.9134	-4.6194	0.	0.	0.	COORD. SYSTEM 3
8	5.0000	337.50	0.	0.	0.	COORD. SYSTEM 3
8	4.6194	-1.9134	0.	0.	0.	COORD. SYSTEM 3
9	0.	0.	0.	0.	0.	COORD. SYSTEM 3
10	0.	0.	-40000	0.	0.	COORD. SYSTEM 3
11	-2.0500	-9.6000	-40000	0.	0.	COORD. SYSTEM 3

XMIN= -4.619 XMAX= 4.619 YMIN= -9.600 YMAX= 4.619 ZMIN= -.4000 ZMAX= 0.

ACTUAL STORAGE REQUIREMENTS FOR NODE INPUT
 CORE= 00141732 MEMORY= 00000102 TOTAL= 00142034 MEMORY AVAILABLE= 00147770
 MAXIMUM NODE NUMBER FOR AVAILABLE AUXILIARY MEMORY SIZE= 8873

MODEL GEOMETRY WRITTEN ON FILE TAPE 3

PROBLEM DATA WRITTEN ON FILE TAPE 7

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR0176 JUNE 1 1979
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

1 INCH OPERATOR ADAPTER PLATE BOLTING ANALYSIS LIMERICK

11.0367 R3/ 4/27 CP= 3.266

***** MATERIAL PROPERTIES (CARD 8) *****

MATERIAL 1

E = .299000E+08
ALPX = .650000E-05
DENS = 0.
NUXY = .300000

DCTAL STORAGE REQUIREMENTS FOR M THROUGH K CARD DATA INPUT CP= 3.347
CORE= 00141770 MEMORY= 1000000 TOTAL= 00141770 MEMORY AVAILABLE= 00147770

NEW TITLE= TORQUE 2112 IN LB

TORQUE 2112 IN LH

11.0369 83/ 4/27 CP= 3.451

LOAD STEP NUMBER = 1

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	1	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . .	0. .	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NUPRNT	70-72 (CARD M)

***** SPECIFIED DISPLACEMENTS (CARD N) *****

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
1	0.	0.	0.			
2	0.	0.	0.			
3	0.	0.	0.			
4	0.	0.	0.			
5	0.	0.	0.			
6	0.	0.	0.			
7	0.	0.	0.			
8	0.	0.	0.			

***** SPECIFIED FORCES (CARD O) *****

NO.	NODE	DIRECTION	VALUE
1	4	MZ	-2112.00

***** LOAD SUMMARY - 24 DISPLACEMENTS 1 FORCES 0 PRESSURES *****

LOCAL STORAGE REQUIREMENTS FOR L THROUGH P CARD DATA INPUT CP= 3.716
 CORE= 00142074 MEMORY= 00000000 TOTAL= 00142074 MEMORY AVAILABLE= 00147770

MAXIMUM STIFFNESS = .560625E+14 AT ELEMENT 9
 MINIMUM STIFFNESS = .121836E+12 AT ELEMENT 10

LOCAL STORAGE REQUIREMENTS FOR ELEMENT FORMULATION CP= 4.129
 CORE= 00142074 MEMORY= 00000000 TOTAL= 00142074 MEMORY AVAILABLE= 00147770

X DIRECTION

11.0375 R3/ 4/27 CP= 4.851

LOAD STEP NUMBER = 2

***** LOAD STEP OPTIONS (CARD L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY	2	NPRINT	10-12
TIME AT END OF LOAD STEP.	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY	2	NUPRNT	76-72 (CARD M)

COORDINATE ACCELERATIONS 386.40 0. 0.

*** LOADING CHANGES ***

***** SPECIFIED FORCES (CARD O) *****

NO.	NODE	DIRECTION	VALUE
1	9	MZ	0.

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 5.322
 COHE= 00142072 MEMORY= 00000103 TOTAL= 00142175 MEMORY AVAILABLE= 00147770

TIME AT START OF BACK SUBSTITUTION CP= 5.331 STEP= 2 ITERATION= 1

*** STEP 2 ITER 1 COMPLETE. TIME= 9. KDIS= -2 KTEMP= 0 CUM. ITER.= 2

NEW TITLE= Y DIRECTION

B-12

Y DIRECTION

11.0378 R3/ 4/27 CP= 5.667

LOAD STEP NUMBER = 3

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NDPRNT	70-72 (CARD M)
COORDINATE ACCELERATIONS	0.	386.40	0.

*** LOADING CHANGES ***

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 6.124
 CORE= 00142072 MEMORY= 00000103 TOTAL= 00142175 MEMORY AVAILABLE= 00147770

CD TIME AT START OF BACK SUBSTITUTION CP= 6.133 STEP= 3 ITERATION= 1
 W *** STEP 3 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CUM. ITER.= 3
 NEW TITLE= 7 DIRECTION

Z DIRECTION

11.0383 R3/ 4/27 CP= 6.467

LOAD STEP NUMBER = 4

***** LOAD STEP OPTIONS (CAPDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NDRPT	70-72 (CARD M)

COORDINATE ACCELERATIONS 0. 0. 386.40

*** LOADING CHANGES ***

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 6.920
 CORE= 00142072 MEMORY= 00000103 TOTAL= 00142175 MEMORY AVAILABLE= 00147770

0.4 TIME AT START OF BACK SUBSTITUTION CP= 6.930 STEP= 4 ITERATION= 1

*** STEP 4 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CUM. ITER.= 4

7 DIRECTION

11.03R6 83/ 4/27 CP= 7.277

***** GENERAL POST DATA PROCESSOR (POST27) *****

*** POST27 OPERATION DEFINITIONS

OPTIONS CHOSEN ARE- KNOD= 1 KELM= 1 KRFH= 1

SUMMATION TYPE IS ALGE

INPUT FILES ARE * TAPE= 12 L.S.= 2 ITER= 1 FACTOR= 1.0000
 TAPE= 0 L.S.= 1 ITER= 0 FACTOR= 1.0000
 OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 11 NUMBER OF ELEMENTS= 11

BEGIN ALGE SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	2	1		0	1	0		10	1	1	NODAL
12	2	1		0	1	0		10	1	1	ELEMENT
12	2	1		0	1	0		10	1	1	REACT.FORC.

SUMMATION TYPE IS SRSS

INPUT FILES ARE * TAPE= 12 L.S.= 3 ITER= 1 FACTOR= 4.5000
 TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 4.5000
 OUTPUT FILE IS * TAPE= 11 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 11 NUMBER OF ELEMENTS= 11

BEGIN SRSS SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	3	1		10	1	1		11	1	1	NODAL
12	3	1		10	1	1		11	1	1	ELEMENT
12	3	1		10	1	1		11	1	1	REACT.FORC.

SUMMATION TYPE IS SHSS

INPUT FILES ARE * TAPE= 12 L.S.= 4 ITER= 1 FACTOR= 4.5000
 TAPE= 11 L.S.= 1 ITER= 1 FACTOR= 1.0000
 OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 11 NUMBER OF ELEMENTS= 11

BEGIN SHSS SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	4	1		11	1	1		10	1	1	NODAL
12	4	1		11	1	1		10	1	1	ELEMENT
12	4	1		11	1	1		10	1	1	REACT.FORC.

END OF FILE ON TAPE12

END OF FILE ENCOUNTERED ON TAPE12

SUMMATION TYPE IS AHSO

INPUT FILES ARE * TAPE= 12 L.S.= 1 ITER= 1 FACTOR= 1.0000
 TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 1.0000
 OUTPUT FILE IS * TAPE= 11 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 11 NUMBER OF ELEMENTS= 11

BEGIN ABSO SUMMATION FOR -
TAPE LSTP ITER AND TAPE LSTP ITER ON TAPE LSTP ITER DATA TYPE
12 1 1 10 1 1 11 1 1 NODAL
12 1 1 10 1 1 11 1 1 ELEMENT
12 1 1 10 1 1 11 1 1 REACT.FORC.

CALCULATE PRINCIPAL STRESSES FOR THIS OPERATION

SUMMATION TYPE IS ABSO
INPUT FILES ARE * TAPE= 12 L.S.= 3 ITER= 1 FACTOR= 1.0000
TAPE= 11 L.S.= 1 ITER= 1 FACTOR= 1.0000
OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 11 NUMBER OF ELEMENTS= 11

BEGIN ABSO SUMMATION FOR -
TAPE LSTP ITER AND TAPE LSTP ITER ON TAPE LSTP ITER DATA TYPE
12 3 1 11 1 1 10 1 1 NODAL
12 3 1 11 1 1 10 1 1 ELEMENT
12 3 1 11 1 1 10 1 1 REACT.FORC.

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYPR176 JUNE 1, 1979
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

Z DIRECTION

11.0389 83/ 4/27 CP= 7.886

*** POST27 PRINT SECTION

PRINT OPTIONS ARE- KNOU= 0 KEST= 0 KFFW= 0 KRFW= 1

PRINT TAPE NO. = 10 L.S.= 1 ITER= 0

***** REACTION FORCES *****

LOAD STEP= 1 ITERATION= 1

NODE	LABEL	FORCE
1	FX	188.675
1	FY	557.197
1	FZ	323.723
2	FX	134.134
2	FY	106.792
2	FZ	750.084
3	FX	361.846
3	FY	201.109
3	FZ	588.013
4	FX	277.210
4	FY	757.651
4	FZ	88.7877
5	FX	416.701
5	FY	961.520
5	FZ	839.572
6	FX	1013.42
6	FY	426.322
6	FZ	1267.12
7	FX	935.818
7	FY	384.987
7	FZ	1104.82
8	FX	361.049
8	FY	809.081
8	FZ	448.420

END OF FILE ON TAPE10

END OF FILE ENCOUNTERED ON TAPE 10

PLOT DATA (IF ANY) WRITTEN ON FILE TAPE21

***** PROBLEM COMPLETED ***** CP = 8.005

END OF INPUT ENCOUNTERED ON FILE TAPE10

ENTER /NOTES CARD AFTER FINISH CARD (UP AT ANY CARD-A LEVEL)
FOR DETAILED NOTES ON FEATURES, CHANGES, HELP, ETC.

***** RUN COMPLETED ***** CP = 8.017

BODY TO ADAPTER PLATE
BOLTING CALCULATIONS

patel engineers
huntsville, alabama

B-18

Title BODY TO ADAPTER PLATE BOLTS 4" Job No. 8220 A
 By MAO Date 4/27/83 Ckd by 3P Date 28 Apr 83

FORCE VALUES TAKEN FROM ANSYS REACTION FORCE DATA FROM
 OPERATER ADAPTER PLATE ANALYSIS PRINTOUT WHICH FOLLOWS:

WORST POSSIBLE REACTION FORCES

$$\begin{aligned} F_x &= \underline{1826} \text{ lb HORIZ (SHEAR)} \\ F_y &= \underline{975} \text{ lb HORIZ (SHEAR)} \\ F_z &= \underline{3101} \text{ lb VERT (NORMAL)} \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{RESULTANT SHEAR} = \sqrt{F_x^2 + F_y^2} = \underline{2070} \text{ lb}$$

BOLTS ARE SA 193 GR B7 3/4 - 10 UNC
 ASME "S" = 25000 psi AREA = 0.334 in²

$$\begin{aligned} \sigma_N &= F_z / \text{AREA} = 9284 \text{ psi} \\ \tau &= \sqrt{F_x^2 + F_y^2} / \text{AREA} = 6198 \text{ psi} \end{aligned}$$

EVALUATE PER ASME, SECT. III, APPENDIX XVII, SUBSUB ARTICLE 2460.

$$\begin{aligned} \text{a) } \sigma_N / F_{tb} &= 9284 / 62500 = \underline{0.15} \\ \text{b) } \tau / F_{vb} &= 6198 / 25833 = \underline{0.24} \\ \text{c) } \sigma_N^2 / F_{tb}^2 + \tau^2 / F_{vb}^2 &= \underline{0.08} \leq 1.0 \end{aligned}$$

$$F_{tb} = \text{allow tensile stress} = S_{ULTIMATE} / 2 = 125000 / 2 = 62500 \text{ psi}$$

$$F_{vb} = \text{allow shear stress} = 0.62 S_{ULTIMATE} / 3 = 25833 \text{ psi}$$

***** ANSYS INPUT DATA LISTING (TAPE16) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
1	LIMITORQUE OPERATOR PLATE ANALYSIS												
2	DAVIDSON												
3		1	1		27								
4	.350		.350										
5	5	6.3											
6	10	4	1										
7	12	21	2										
8	-1												
9	1												
10	1												
11	1												
12	1												
13	1.25												
14	1												
15	1												
16	1												
17	1												
18	100	10000	10000	100	100					10000			
19	1												
20	1.1905												
21	-1												
22	557	565	558	550				5	5	5			
23	550	558	559	551				5	5	5			
24	551	559	577	577				5	5	5			
25	551	577	576	552				5	5	5			
26	552	576	568	560				5	5	5			
27	552	560	561	553				5	5	5			
28	553	561	562	554				5	5	5			
29	554	562	563	555				5	5	5			
30	555	563	578	578				5	5	5			
31	555	578	579	556				5	5	5			
32	556	579	564	564				5	5	5			
33	556	564	565	557				5	5	5			
34	565	573	566	558				5	5	5			
35	558	566	567	559				5	5	5			
36	559	567	575	577				5	5	5			
37	577	575	574	576				5	5	5			
38	576	574	568	560				5	5	5			
39	560	568	569	561				5	5	5			
40	561	569	570	562				5	5	5			
41	562	570	571	563				5	5	5			
42	563	571	580	578				5	5	5			
43	578	580	581	579				5	5	5			
44	579	581	572	564				5	5	5			
45	564	572	573	565				5	5	5			
46	558	590						4	10	10			
47	559	590						4	10	10			
48	560	590						4	10	10			
49	561	590						4	10	10			
50	562	590						4	10	10			

A A A A A A A A A A A A A A

ANSYS INPUT DATA LISTING (170618)

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[illegible]

LIMITORQUE OPERATOR PLATE ANALYSIS CLOW 4 INCH VALVE 16.H222 R3/ 4/27 CP= 2.579

THE ANSYS PROGRAM IS IN A STATE OF CONTINUOUS DEVELOPMENT, MODIFICATION, AND CHECKING. NEITHER SWANSON ANALYSIS SYSTEMS, INC. NOR THE CORPORATION SUPPLYING THE COMPUTER FACILITIES FOR THIS ANALYSIS ASSUME ANY RESPONSIBILITY FOR THE VALIDITY, ACCURACY, OR APPLICABILITY OF ANY RESULTS OBTAINED FROM THE ANSYS SYSTEM. THE USER MUST VERIFY HIS OWN RESULTS.

SWANSON ANALYSIS SYSTEMS, INC. IS ENDEAVORING TO MAKE THE ANSYS PROGRAM AS COMPLETE, ACCURATE, AND EASY TO USE AS POSSIBLE. SUGGESTIONS AND COMMENTS ARE WELCOMED. ANY ERRORS ENCOUNTERED IN EITHER THE DOCUMENTATION OR THE RESULTS SHOULD BE IMMEDIATELY BROUGHT TO OUR ATTENTION.

***** ANALYST = DAVIDSON

***** ANALYSIS OPTIONS (CARDS C1 AND C2) *****

CP
C2

	VALUE	VARIABLE NAME	COLUMNS
ANALYSIS TYPE	0	KAN	5-7
ELEMENT CONSTANT TABLE . . .	1	KTB	11-12
REACTION FORCE KEY	1	KRF	15-16
POST-RUN PROCESS KEY	27	KYPOST	27-28
REFERENCE TEMPERATURE	350.00	TREF	1-12
UNIFORM TEMPERATURE	350.00	TUNIF	13-24
CORE SIZE REQUESTED (OCTAL) .	00200000		
LCM SIZE REQUESTED (OCTAL) .	00147770		
BLOCKED BINARY FILE NAMES . .	TAPE3	TAPE2 TAPE11 TAPE4 TAPE10 TAPE12	
BLOCK SIZES	500	500 1160 500 500 500	

***** ELEMENT TYPES (CARD D) *****

TYPE	STIF	DESCRIPTION	KEYSUB OPTIONS	NJ	INOPER
			1b 1A 1 2b 2A 2		
5	63	QUAD. FLAT SHELL	0 0 0 0 0 0	0	0
10	4	ELASTIC BEAM, 3-D	0 0 0 0 0 1	0	0
12	21	GENERAL MASS	0 0 2 0 0 0	0	0

***** TABLE OF ELEMENT REAL CONSTANTS (CARD D2) *****

NO.

1 1.0000

2	1.0000
3	1.0000
4	1.0000
5	1.2500
6	1.0000
7	1.0000
8	1.0000
9	1.0000
10	100.00
11	1.0000
12	1.1905

10000.	10000.	100.00	100.00	0.	0.	10000.
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LIMITORQUE OPERATOR PLATE ANALYSIS

CLOW 4 INCH VALVE

16.8225 83/ 4/21 CP= 2.923

***** ELEMENT DEFINITIONS (CARD E) *****

ELEMENT		NODES			MAT	TYPE	CLASS	ELEMENT REAL CONSTANTS					
								THK1	THK2	THK3	THK4	STIF	
1	557	565	556	550	5	5	0	1.25	1.25	1.25	1.25	0.	
2	550	558	559	551	5	5	0	1.25	1.25	1.25	1.25	0.	
3	551	554	577	577	5	5	0	1.25	1.25	1.25	1.25	0.	
4	551	577	576	552	5	5	0	1.25	1.25	1.25	1.25	0.	
5	552	576	560	560	5	5	0	1.25	1.25	1.25	1.25	0.	
6	552	560	561	553	5	5	0	1.25	1.25	1.25	1.25	0.	
7	553	561	562	554	5	5	0	1.25	1.25	1.25	1.25	0.	
8	554	562	563	555	5	5	0	1.25	1.25	1.25	1.25	0.	
9	555	563	578	578	5	5	0	1.25	1.25	1.25	1.25	0.	
10	555	578	579	556	5	5	0	1.25	1.25	1.25	1.25	0.	
11	556	579	564	564	5	5	0	1.25	1.25	1.25	1.25	0.	
12	556	564	565	557	5	5	0	1.25	1.25	1.25	1.25	0.	
13	565	573	566	558	5	5	0	1.25	1.25	1.25	1.25	0.	
14	558	565	567	559	5	5	0	1.25	1.25	1.25	1.25	0.	
15	559	567	575	577	5	5	0	1.25	1.25	1.25	1.25	0.	
16	577	575	574	576	5	5	0	1.25	1.25	1.25	1.25	0.	
17	576	574	568	560	5	5	0	1.25	1.25	1.25	1.25	0.	
18	560	568	569	561	5	5	0	1.25	1.25	1.25	1.25	0.	
19	561	569	570	562	5	5	0	1.25	1.25	1.25	1.25	0.	
20	562	570	571	563	5	5	0	1.25	1.25	1.25	1.25	0.	
21	563	571	580	578	5	5	0	1.25	1.25	1.25	1.25	0.	
22	578	580	581	579	5	5	0	1.25	1.25	1.25	1.25	0.	
23	579	581	572	564	5	5	0	1.25	1.25	1.25	1.25	0.	
24	564	572	573	565	5	5	0	1.25	1.25	1.25	1.25	0.	
								AREA	17	19	THKZ		
25	558	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
									IP	SHR7	SHR9	THKY	THET
26	559	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
27	560	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
28	561	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
29	562	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
30	563	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
31	564	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
32	565	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
33	591	590			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
34	600	591			4	10	0	100.	.100E+05	.100E+05	100.	100.	0.
								0.	.100E+05	0.	0.		
								MASS					
35	600				1	12	0	1.19					

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DETAILED STORAGE REQUIREMENTS FOR ELEMENT FORM
CONE = 00144042 MEMORY = 00002260 TOTAL = 00146322 MEMORY AVAILABLE = 00147770
MAXIMUM NODE NUMBER FOR AVAILABLE AUXILIARY MEMORY SIZE = 26620

NUMBER OF ELEMENTS = 35 MAXIMUM NODE NUMBER USED = 600

*** ELEMENT STIFFNESS FORMULATION TIME ESTIMATE (CDC 6600) ***

TYPE	STIF	NUMBER	TIME (EACH)	TIME (ALL)
5	63	24	.3394	8.146
10	4	10	.0849	.849
12	21	1	.0053	.005
TOTAL TIME =			9.000 SECONDS.	

ANALYSIS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR0176 JUNE 1-1979
 SAMSUNG ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

LIMITORQUE OPERATOR PLATE ANALYSIS CLOW 4 INCH VALVE 1A.M225 R3/ 4/27 CP= 3.M77

***** NONF DEFINITIONS (CARD F) *****

GROUP	LOCATION			ROTATION (DEGREES)			
	X (OR R)	Y (OR THETA)	Z (OR PHI)	TMXY (OR R1)	THYZ (OR TP)	THYZ (OR RP)	
COORDINATE SYSTEM 6	TYPE 0	CENTER LOCATION		0.000	0.000	0.000	0.00 0.00 0.00
COORDINATE SYSTEM 7	TYPE 0	CENTER LOCATION		0.000	0.000	0.000	0.00 0.00 0.00
550	1.5000	22.500	0.	0.	0.	0.	COORD. SYSTEM 6
550	1.3858	.57403	0.	0.	0.	0.	COORD. SYSTEM 6
551	1.5000	67.500	0.	0.	0.	0.	COORD. SYSTEM 6
551	.57403	1.3858	0.	0.	0.	0.	COORD. SYSTEM 6
552	1.5000	112.50	0.	0.	0.	0.	COORD. SYSTEM 6
552	-.57403	1.3858	0.	0.	0.	0.	COORD. SYSTEM 6
553	1.5000	157.50	0.	0.	0.	0.	COORD. SYSTEM 6
553	-1.3858	.57403	0.	0.	0.	0.	COORD. SYSTEM 6
554	1.5000	202.50	0.	0.	0.	0.	COORD. SYSTEM 6
554	-1.3858	-.57403	0.	0.	0.	0.	COORD. SYSTEM 6
555	1.5000	247.50	0.	0.	0.	0.	COORD. SYSTEM 6
555	-.57403	-1.3858	0.	0.	0.	0.	COORD. SYSTEM 6
556	1.5000	292.50	0.	0.	0.	0.	COORD. SYSTEM 6
556	.57403	-1.3858	0.	0.	0.	0.	COORD. SYSTEM 6
557	1.5000	337.50	0.	0.	0.	0.	COORD. SYSTEM 6
557	-1.3858	-.57403	0.	0.	0.	0.	COORD. SYSTEM 6
558	5.0000	22.500	0.	0.	0.	0.	COORD. SYSTEM 6
558	4.6194	1.9134	0.	0.	0.	0.	COORD. SYSTEM 6
559	5.0000	67.500	0.	0.	0.	0.	COORD. SYSTEM 6
559	1.9134	4.6194	0.	0.	0.	0.	COORD. SYSTEM 6
560	5.0000	112.50	0.	0.	0.	0.	COORD. SYSTEM 6
560	-1.9134	4.6194	0.	0.	0.	0.	COORD. SYSTEM 6
561	5.0000	157.50	0.	0.	0.	0.	COORD. SYSTEM 6
561	-4.6194	1.9134	0.	0.	0.	0.	COORD. SYSTEM 6
562	5.0000	202.50	0.	0.	0.	0.	COORD. SYSTEM 6
562	-4.6194	-1.9134	0.	0.	0.	0.	COORD. SYSTEM 6
563	5.0000	247.50	0.	0.	0.	0.	COORD. SYSTEM 6
563	-1.9134	-4.6194	0.	0.	0.	0.	COORD. SYSTEM 6
564	5.0000	292.50	0.	0.	0.	0.	COORD. SYSTEM 6
564	1.9134	-4.6194	0.	0.	0.	0.	COORD. SYSTEM 6
565	5.0000	337.50	0.	0.	0.	0.	COORD. SYSTEM 6
565	4.6194	-1.9134	0.	0.	0.	0.	COORD. SYSTEM 6
566	5.0000	22.500	0.	0.	0.	0.	COORD. SYSTEM 6
566	5.5433	2.2961	0.	0.	0.	0.	COORD. SYSTEM 6
567	5.0000	67.500	0.	0.	0.	0.	COORD. SYSTEM 6
567	2.2961	5.5433	0.	0.	0.	0.	COORD. SYSTEM 6
568	5.0000	112.50	0.	0.	0.	0.	COORD. SYSTEM 6
568	-2.2961	5.5433	0.	0.	0.	0.	COORD. SYSTEM 6
569	5.0000	157.50	0.	0.	0.	0.	COORD. SYSTEM 6
569	-5.5433	2.2961	0.	0.	0.	0.	COORD. SYSTEM 6
570	5.0000	202.50	0.	0.	0.	0.	COORD. SYSTEM 6

570	-5.5433	-2.2961	0.	0.	0.	COORD. SYSTEM 6
571	5.0000	247.50	0.	0.	0.	COORD. SYSTEM 6
572	-2.2961	-5.5433	0.	0.	0.	COORD. SYSTEM 6
573	5.0000	242.50	0.	0.	0.	COORD. SYSTEM 6
574	-2.2961	-5.5433	0.	0.	0.	COORD. SYSTEM 7
575	5.0000	317.50	0.	0.	0.	COORD. SYSTEM 7
576	-2.2961	-5.5433	0.	0.	0.	COORD. SYSTEM 7
577	5.0000	5.5430	0.	0.	0.	COORD. SYSTEM 7
578	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
579	5.0000	5.5430	0.	0.	0.	COORD. SYSTEM 7
580	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
581	5.0000	4.5000	0.	0.	0.	COORD. SYSTEM 7
582	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
583	5.0000	4.5000	0.	0.	0.	COORD. SYSTEM 7
584	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
585	5.0000	4.5000	0.	0.	0.	COORD. SYSTEM 7
586	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
587	5.0000	4.5000	0.	0.	0.	COORD. SYSTEM 7
588	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
589	5.0000	4.5000	0.	0.	0.	COORD. SYSTEM 7
590	-2.2961	-5.5430	0.	0.	0.	COORD. SYSTEM 7
591	5.0000	4.5000	0.	0.	0.	COORD. SYSTEM 7
600	-2.0500	-9.6000	-4.0000	-4.0000	0.	COORD. SYSTEM 7

ZMAX = 0.

ZMIN = -4.000

YMAX = 5.543

YMIN = -9.600

XMAX = 5.543

XMIN = -5.543

ACTUAL STORAGE REQUIREMENTS FOR NODE INPUT
 CODE = 00141732 MEMORY = 00007020 TOTAL = 00150752 MEMORY AVAILABLE = 00147770
 MAXIMUM NODE NUMBER FOR AVAILABLE AUXILIARY MEMORY SIZE = 8873

MODEL GEOMETRY WRITTEN ON FILE TAPE 3

PROBLEM DATA WRITTEN ON FILE TAPE 7

APSYS - ENGINEERING ANALYSIS SYSTEM REVISION 1 UPDATE 67L1 CYR0176 JUNE 1, 1979
STRASSER ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

LIMITORQUE OPERATOR PLATE ANALYSIS

CLOW 4 INCH VALVE

16.8228 R3/ 4/27 CP= 4.526

***** MATERIAL PROPERTIES (CARD M) *****

MATERIAL 4

EX = .299000E+08
ALPX = .650000E-05
DENS = 0.
NUXY = .300000

MATERIAL 5

EX = .299000E+08
ALPX = .650000E-05
DENS = .813000E-03
NUXY = .300000

OCTAL STORAGE REQUIREMENTS FOR M THROUGH K CARD DATA INPUT CP= 4.668
CORE= 00142110 MEMORY= 00000000 TOTAL= 00142110 MEMORY AVAILABLE= 00147770

NEW TITLE= ORQUE 2112 IN LB

ORIGI 2112 IN LD

16.8228 R3/ 4/27 CP= 4.791

LOAD STEP NUMBER = 1

***** LOAD STEP OPTIONS (CARD L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	1	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY	2	NPRINT	10-12
TIME AT END OF LOAD STEP.	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY	2	NUPRNT	70-72 (CARD M)

***** SPECIFIED DISPLACEMENTS (CARD N) *****

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
576	0.	0.	0.			
577	0.	0.	0.			
578	0.	0.	0.			
579	0.	0.	0.			

***** SPECIFIED FORCES (CARD O) *****

NO.	NODE	DIRECTION	VALUE
1	590	MZ	-2112.00

***** LOAD SUMMARY - 12 DISPLACEMENTS 1 FORCES 0 PRESSURES *****

OCTAL STORAGE REQUIREMENTS FOR L THROUGH P CARD DATA INPUT CP= 5.092
 COME= 00142150 MEMORY= 00000000 TOTAL= 00142150 MEMORY AVAILABLE= 00147770

MAXIMUM STIFFNESS = .560625E+14 AT ELEMENT 33
 MINIMUM STIFFNESS = .484742E+08 AT ELEMENT 4

OCTAL STORAGE REQUIREMENTS FOR ELEMENT FORMULATION CP= 15.643
 COME= 00142150 MEMORY= 00000000 TOTAL= 00142150 MEMORY AVAILABLE= 00147770

*** ELEMENT STIFFNESS FORMULATION TIMES
 TYPE NUMBER STIF TOTAL CP AVF CP

5	24	63	10.131	.422
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X DIRECTION

16.4264 83/ 4/27 CP= 22.640

LOAD STEP NUMBER = 2

***** LOAD STEP OPTIONS (CARD 1 AND 4) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KUIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP . . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NUPRNT	70-72 (CARD M)
COORDINATE ACCELERATIONS	386.40	0.	0.

*** LOADING CHANGES ***

***** SPECIFIED FORCES (CARD 0) *****

NO.	NODE	DIRECTION	VALUE
1	590	M7	0.

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 27.935
 CORE= 00142146 MEMORY= 00007021 TOTAL= 00151167 MEMORY AVAILABLE= 00147770

TIME AT START OF BACK SUBSTITUTION CP= 27.944 STEP= 2 ITERATION= 1

*** STEP 2 ITER 1 COMPLETE. TIME= 0. KUIS= -2 KTEMP= 0 CUM. ITFP.= 2

NEW TITLE= DIRECTION

DIRECTION 16.8306 83/ 4/27 CP= 30.501

LOAD STEP NUMBER = 1

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY	2	NPRINT	10-12
TIME AT END OF LOAD STEP.	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY	2	NPRINT	70-72 (CARD M)

COORDINATE ACCELERATIONS 0. 386.40 0.

*** LOADING CHANGES ***

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 35.775
 CORE= 00142146 MEMORY= 00007021 TOTAL= 00151167 MEMORY AVAILABLE= 00147770

TIME AT START OF BACK SUBSTITUTION CP= 35.765 STEP= 3 ITERATION= 1

*** STEP 3 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CUM. ITER.= 3

NEW TITLE= DIRECTION

0-32

DIRECTION

16.8347 R3/ 4/27 CP= 38.337

LOAD STEP NUMBER = 4

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NUPRNT	70-72 (CARD M)

COORDINATE ACCELERATIONS 0. 0. 386.40

*** LOADING CHANGES ***

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 43.861
 CORE= 00142146 MEMORY= 00007021 TOTAL= 00151167 MEMORY AVAILABLE= 00147770

TIME AT START OF BACK SUBSTITUTION CP= 43.870 STEP= 4 ITERATION= 1

*** STEP 4 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CHM. ITER.= 4

DIRECTION

16.8389 R3/ 4/27 CP= 46.444

***** GENERAL POST DATA PROCESSOR (POST7) *****

*** POST7 OPERATION DEFINITIONS

OPTIONS CHOSEN ARE- KNOD= 1 KELM= 1 KRFH= 1

SUMMATION TYPE IS ALGE

INPUT FILES ARE * TAPE= 12 L.S.= 2 ITER= 1 FACTOR= 1.0000
 TAPE= 0 L.S.= 1 ITER= 0 FACTOR= 1.0000

OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 35

BEGIN ALGE SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	2	1		0	1	0		10	1	1	NODAL
12	2	1		0	1	0		10	1	1	ELEMENT
12	2	1		0	1	0		10	1	1	REACT.FORC.

SUMMATION TYPE IS SRSS

INPUT FILES ARE * TAPE= 12 L.S.= 3 ITER= 1 FACTOR= 4.5000
 TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 4.5000

OUTPUT FILE IS * TAPE= 11 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 35

BEGIN SRSS SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	3	1		10	1	1		11	1	1	NODAL
12	3	1		10	1	1		11	1	1	ELEMENT
12	3	1		10	1	1		11	1	1	REACT.FORC.

SUMMATION TYPE IS SRSS

INPUT FILES ARE * TAPE= 12 L.S.= 4 ITER= 1 FACTOR= 4.5000
 TAPE= 11 L.S.= 1 ITER= 1 FACTOR= 1.0000

OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 35

BEGIN SRSS SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	4	1		11	1	1		10	1	1	NODAL
12	4	1		11	1	1		10	1	1	ELEMENT
12	4	1		11	1	1		10	1	1	REACT.FORC.

END OF FILE ON TAPE12

END OF FILE ENCOUNTERED ON TAPE12

SUMMATION TYPE IS ABSO

INPUT FILES ARE * TAPE= 12 L.S.= 1 ITER= 1 FACTOR= 1.0000
 TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 1.0000

OUTPUT FILE IS * TAPE= 11 L.S.= 1 ITER= 1

B-34

MAX. TAPE LENGTH= 600 NUMBER OF ELEMENTS= 35

BEGIN ABSO SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA	TYPE
12	1	1	10	1	1	1	11	1	1	1	1	NODAL
12	1	1	10	1	1	1	11	1	1	1	1	ELEMENT
12	1	1	10	1	1	1	11	1	1	1	1	REACT.FORC.

CALCULATE PRINCIPAL STRESSES FOR THIS OPERATION

SUMMATION TYPE IS ABSO

INPUT FILES ARE * TAPE= 12 L.S.= 3 ITER= 1 FACTOR= 1.0000

TAPE= 11 L.S.= 1 ITER= 1 FACTOR= 1.0000

OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 35

BEGIN ABSO SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA	TYPE
12	3	1	11	1	1	1	10	1	1	1	1	NODAL
12	3	1	11	1	1	1	10	1	1	1	1	ELEMENT
12	3	1	11	1	1	1	10	1	1	1	1	REACT.FORC.

ANALYSIS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR176 JUNE 1, 1979
STATISTICAL ANALYSIS SYSTEMS: 77.1. HUNTSVILLE, PENNSYLVANIA 55342 PHONE (412) 746-3304

DIRECTION

16.8406 83/ 4/27 CP= 50.886

*** POST27 PRINT SECTION

PRINT OPTIONS ARE- KNOD= 0 KEST= 0 KEFM= 0 KHR= 1

PRINT TAPE NO. = 10 L.S. = 1 ITEM = 0

***** REACTION FORCES *****

LOAD STEP= 1 STEGATION= 1

NODE	LABEL	FORCE
576	FX	779.306
576	FY	864.682
576	FZ	924.290
577	FX	628.854
577	FY	688.935
577	FZ	1988.98
578	FX	1826.13
578	FY	975.263
578	FZ	3101.14
579	FX	1740.56
579	FY	823.018
579	FZ	384.899

END OF FILE ON TAPE 10

END OF FILE ENCOUNTERED ON TAPE 10

PRINT OPTIONS ARE- KNOD= 0 KEST= 1 KEFM= 1 KHR= 0

SCAN LIST ENTRY NO.= 1

ITYP	ITEM	VALUE	KEY
5	18	.1000E+05	0.

SCAN LIST ENTRY NO.= 2

ITYP	ITEM	VALUE	KEY
5	19	.1000E+05	0.

SCAN LIST ENTRY NO.= 3

ITYP	ITEM	VALUE	KEY
5	20	.1000E+05	0.

SCAN LIST ENTRY NO.= 4

ITYP	ITEM	VALUE	KEY
5	21	.1000E+05	0.

SCAN LIST ENTRY NO.= 5

ITYP	ITEM	VALUE	KEY
5	23	.1000E+05	0.

SCAN LIST ENTRY NO.= 6
 ITYP ITEM VALU T VALU H KEY
 5 24 .1000E+05 0. 0

SCAN LIST ENTRY NO.= 7
 ITYP ITEM VALU T VALU H KEY
 5 25 .1000E+05 0. 0

SCAN LIST ENTRY NO.= 8
 ITYP ITEM VALU T VALU H KEY
 5 26 .1000E+05 0. 0

SCAN LIST ENTRY NO.= 9
 ITYP ITEM VALU T VALU H KEY
 5 27 .1000E+05 0. 0

SCAN LIST ENTRY NO.= 10
 ITYP ITEM VALU T VALU H KEY
 5 28 .1000E+05 0. 0

SCAN LIST ENTRY NO.= 11
 ITYP ITEM VALU T VALU H KEY
 5 29 .1000E+05 0. 0

SCAN LIST ENTRY NO.= 12
 ITYP ITEM VALU T VALU H KEY
 5 31 .1000E+05 0. 0

OUTPUT TAPE NO.= 10 L.S.= 1 ITER= 0

SCAN LIST -
 NO. ITYP ITEM VALU T VALU H KEY OPERATION
 1 5 18 .1000E+05 0. 0 ABSO ON VALUT
 2 5 19 .1000E+05 0. 0 ABSO ON VALUT
 3 5 20 .1000E+05 0. 0 ABSO ON VALUT
 4 5 21 .1000E+05 0. 0 ABSO ON VALUT
 5 5 22 .1000E+05 0. 0 ABSO ON VALUT
 6 5 23 .1000E+05 0. 0 ABSO ON VALUT
 7 5 24 .1000E+05 0. 0 ABSO ON VALUT
 8 5 25 .1000E+05 0. 0 ABSO ON VALUT
 9 5 26 .1000E+05 0. 0 ABSO ON VALUT
 10 5 27 .1000E+05 0. 0 ABSO ON VALUT
 11 5 28 .1000E+05 0. 0 ABSO ON VALUT
 12 5 31 .1000E+05 0. 0 ABSO ON VALUT

***** UPGRADE DATA OUTPUT ***** LUMP STEP= 1 ITERATION= 1

***** MAXIMUMS FOR ALL SCALING VARIABLES *****

SCALE NO. ITYP NO. ITYP MAXIMUM
 1 5 18 5 18 1.00E+05

2	19	918.1985
3	20	931.9480
4	21	926.8800
5	22	798.3933
6	23	100.4575
7	24	348.9670
8	25	753.2058
9	26	989.2444
10	27	488.6115
11	28	437.3786
12	29	937.2600

END OF FILE ON TAPE10
END OF FILE ENCOUNTERED ON TAPE 10

PLOT DATA (IF ANY) WRITTEN ON FILE TAPE21

***** PROBLEM COMPLETED ***** CP = 51.600

END OF INPUT ENCOUNTERED ON FILE TAPE10

ENTER /NOTES CARD AFTER FINISH CARD (OR AT ANY CARD-A LEVEL)
FOR DETAILED NOTES ON FEATURES, CHANGES, HELP, ETC.

***** RUN COMPLETED ***** CP = 51.611
***** ANSYS TWO DIMENSIONAL PLOTS *****
***** END PLOTS *****

REMEMBER:

- YOU ARE RESPONSIBLE FOR SAVING YOUR OWN FILES
- FOR MORE INFORMATION INCLUDE THE FOLLOWING CARD
- EXPLAIN,ANSYS,FILES.
- FOR INFORMATION ON INTERACTIVE EXECUTION
- INCLUDE THE FOLLOWING CARD
- EXPLAIN,ANSYS,INTER.
- CLASS 3 ERROR LIST IS NOW AVAILABLE
- EXPLAIN,ANSYS,EMPODS

DRIVE SHAFT CALCULATIONS

patel engineers
huntsville, alabama

B-39

By NAODate: 4/27/83 Ckd by RSDate 28 Aug 83

FORCE AND STRESS VALUES TAKEN FROM ANSYS POST 27 APP. E

 $\sigma_{\text{ALLOW}} = \text{ASME "S"} = 34550$ SHAFT DIA = 0.74 in $r = \underline{0.37}$ inAREA = 0.43 in² $J = \underline{0.029}$ in⁴ELEMENT 202TORQUE = 2112 in lb $\sigma_{\text{AXIAL}} = \underline{17}$ psi $\sigma_{\text{BEND}} = \underline{1933}$ psi

SHAFT MAT. SAS64 TYPE 630 H-1045

 $\sigma_{\text{NORMAL}} = \sigma_{\text{AXIAL}} + \sigma_{\text{BEND}} = \underline{1950}$ psi

$$\tau_{\text{SEISMIC}} = \frac{\sqrt{F_y^2 + F_z^2}}{\text{AREA}} = \underline{81}$$
 psi

$$F_y = \underline{22}$$
 lb

$$F_z = \underline{27}$$
 lb

$$\tau_{\text{TORQUE}} = T/J = \underline{26946}$$
 psi

$$\tau_{\text{TOTAL}} = \tau_{\text{SEISMIC}} + \tau_{\text{TORQUE}} = \underline{27027}$$
 psi

$$\sigma_p = \sigma_N/2 + \sqrt{(\sigma_N/2)^2 + \tau_{\text{TOTAL}}^2} = \underline{28020}$$
 psi

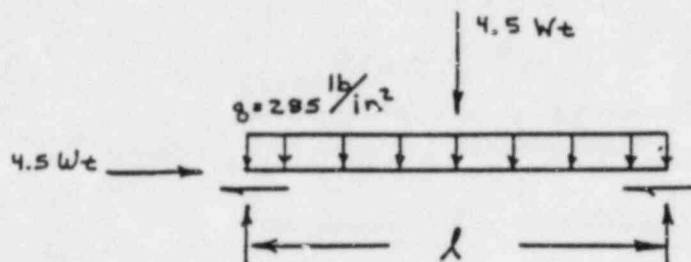
$$\text{COMPARE TO ASME "S": } \sigma_p/S = \underline{0.81}$$

COVER PLATE CALCULATIONS

patel engineers
huntsville, alabama

B-41

Title COVER PLATE CALCS 4" Job No. 8220
 By MAP Date 4/27/83 Ckd by RP Date 28 Apr 83



$l = 2.125$ in
 pressure = 285 psi
 plate radius = 1.0625 in
 area = 3.55 in²
 thick = 0.5625 in
 $Wt = vol \times dens = \underline{0.6}$ lb
 $Mac = SA 516 Gr 70$
 $S = 17500$ psi
 Bolts 4 @ 45° $\frac{3}{8} - 16$ UNC Bolt area = 2.0773 in²
 $Mat SA 193 Gr B7 S = 25000$ psi

① Plate Analysis

assume a 1" Wide x 2.125" Long x 0.5625" Thick strip

$$I = \frac{t^3}{12} = \underline{0.015}$$
 in⁴

$$\text{Pressure Load, } W = \text{Width} \times g = 1 \times 285 = 285 \text{ lb/in}$$

$$\text{Shear Area} = 1 \times t = \underline{0.5625}$$
 in²

$$\text{Max Moment} = \frac{WL^2}{8} + \frac{(4.5Wt)L}{4} = \frac{[285(2.125^2)]}{8} + \frac{[(2.7)(2.125)]}{4} = \underline{163}$$
 in lb

$$\sigma_0 = \frac{Mc}{I} = \frac{(163)(t/2)}{(0.015)} = \underline{3056}$$
 psi

$$\tau_{max} = \left(\frac{3}{2}\right)\left(\frac{V}{A}\right) = 811$$
 psi

$$\sigma_p = \frac{\sigma_0}{2} + \sqrt{\left(\frac{\sigma_0}{2}\right)^2 + \tau^2} = \underline{3258}$$
 psi

Compare to ASME "S" allowable = 17500 psi

$$\text{Stress Ratio} = \frac{\sigma_p}{17500} = \underline{0.19} < 1.0$$

Title COVER PLATE BOLTS 4"

REVISION A

Job No. 8220

A

By MAHDate 4/27/83 Ckd by RPDate 28 Apr 83BOLT ANALYSIS
Seismic: None.

$$(4.5 \text{ Wt})/4 = \underline{1} \text{ lb/bolt} = F_y + F_z$$

$$\tau = \sqrt{F_y^2 + F_z^2} / \text{area}_b = \underline{18} \text{ psi}$$

$$\text{Vert. } (4.5 \text{ Wt})/4 = \underline{1} \text{ lb/bolt} = F_x$$

$$\text{Pressure: } 285 \text{ lb/in}^2 \times \text{area}_{\text{plate}} = \frac{285 \times (3.55)}{4} = \underline{253} \text{ lb/bolt} = F_x$$

$$F_{x\text{TOTAL}} = \underline{254} \text{ lb} \quad \sigma_N = F_{x\text{TOTAL}} / \text{area}_b = \underline{3286} \text{ psi}$$

Evaluate to ASME Sect III, App. XVII, Subarticle 2460.

$$a) \sigma_N / F_{tb} = 3286 / 62500 = \underline{0.05}$$

$$b) \tau / F_{vb} = 18 / 25833 = \underline{\sim}$$

$$c) \sigma_N^2 / F_{tb}^2 + \tau^2 / F_{vb}^2 = \underline{0.003} < 1.0$$

$$F_{tb} = \text{allow tensile stress} = S_u / 2 = 125000 / 2 = 62500 \text{ psi}$$

$$F_{vb} = \text{allow shear stress} = 0.62 S_u / 3 = 25833 \text{ psi}$$

$$S_u = \text{ultimate stress for SA 193 Gr B7} = 125000 \text{ psi}$$

VALVE TO PIPE COMPARISONS

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B-44

Title VALVE TO PIPE COMPARISONS 4"

Job No. 8220

A

By MGD

Date 4/27/83 Ckd by RP

Date 28 Apr 83

VALVE :

$$r_o = 4.5 \text{ in}$$

$$r_i = 2.0 \text{ in}$$

$$c = 4.5 \text{ in}$$

$$\text{area} = 51 \text{ in}^2$$

$$\sigma_{\text{ALLOW}} = 17500 \text{ psi}$$

$$I = \pi (r_o^4 - r_i^4) / 4 = 309 \text{ in}^4$$

$$S = I/c = 68.7 \text{ in}^3$$

PIPE : SA 106 Gr. B Sch 40

$$S = 3.21 \text{ in}^3$$

$$\text{area} = 3.17 \text{ in}^2$$

$$\sigma_{\text{ALLOW}} = 12000 \text{ psi}$$

$$\text{ALLOW}_{\text{VALVE}} / \text{ALLOW}_{\text{PIPE}} = 146 \%$$

$$\text{AREA}_{\text{VALVE}} / \text{AREA}_{\text{PIPE}} = 1609 \%$$

$$S_{\text{VALVE}} / S_{\text{PIPE}} = 2140 \%$$

APPENDIX C
STATIC ANALYSIS

***** ANSYS INPUT DATA LISTING (TAPE18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
1	CLOSE 4 INCH VALVE LIMERICK NPP PET 8220 STATIC ANALYSIS												
2	DAVIDSON												
3		1	1	1									
4	350		350										1
5	1	45											
6	2	94											
7	3	63											
8	4	4	1										
9	5	63											
10	6	63											
11	7	63											
12	8	4	1										
13	9	4	1										
14	10	4	1										
15	11	14	4										
16	12	21	2										
17	-1												
18	1												
19	1												
20	0.625												
21	0.4301	0.0147	0.0147	0.74	0.74								
22	1.25												
23	1.0												
24	1.0												
25	0.3340	0.0155	0.0155	0.75	0.75								
26	0.375	0.0176	0.0078	0.5	0.75								
27	100	1000	1000	10	10								
28	.216E9												
29	1.1905												
30	-1												
31	1	11	12	2	38	48	49	39	1	1	1	3	
32	4	14	15	15	41	51	52	52	1	1	1		
33	4	15	16	5	41	52	53	42	1	1	1	6	
34	11	22	23	12	48	59	60	49	1	1	1	10	
35	25	24	33	34	62	61	70	71	1	1	1	4	
36	38	48	49	39	75	85	86	76	1	1	1	3	
37	41	51	52	52	78	88	89	89	1	1	1		
38	41	52	53	42	78	89	90	79	1	1	1	6	
39	48	59	60	49	85	96	97	86	1	1	1	10	
40	62	61	70	71	99	98	107	108	1	1	1	4	
41	112	120	121	113	163	171	172	164	1	1	1	4	
42	116	124	125	125	167	175	176	176	1	1	1		
43	116	125	126	117	167	176	177	168	1	1	1	3	
44	120	129	130	121	171	180	181	172	1	1	1	8	
45	130	138	131	131	181	189	182	182	1	1	1		
46	134	139	140	135	185	190	191	186	1	1	1		
47	135	140	136	136	186	191	187	187	1	1	1		
48	138	141	142	131	189	192	193	182	1	1	1		
49	131	142	143	132	182	193	194	183	1	1	1	3	
50	134	145	146	139	185	196	197	190	1	1	1		
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TAPE18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
51	141	149	150	142	192	200	201	193	1	1	1		
52	145	151	152	146	196	202	203	197	1	1	1		
53	147	155	156	148	198	206	207	199	1	1	1	3	
54	151	159	160	152	202	210	211	203	1	1	1	3	
55	163	171	172	164	214	222	223	215	1	1	1	4	
56	167	175	176	176	218	226	227	227	1	1	1		
57	167	175	177	168	218	227	228	219	1	1	1	3	
58	171	180	181	172	222	231	232	223	1	1	1	8	
59	181	189	182	182	232	240	233	233	1	1	1		
60	185	190	191	186	236	241	242	237	1	1	1		
61	186	191	187	147	237	242	238	238	1	1	1		
62	189	192	193	182	240	243	244	233	1	1	1		
63	182	193	194	183	233	244	245	234	1	1	1	3	
64	185	196	197	190	236	247	248	241	1	1	1		
65	192	200	201	193	243	251	252	244	1	1	1		
66	196	202	203	197	247	253	254	248	1	1	1		
67	198	206	207	199	249	257	258	250	1	1	1	3	
68	202	210	211	203	253	261	262	254	1	1	1	3	
69	214	222	223	215	265	273	274	266	1	1	1	4	
70	218	226	227	227	269	277	278	278	1	1	1		
71	218	227	228	219	269	278	279	270	1	1	1	3	
72	222	231	232	223	273	282	283	274	1	1	1	8	
73	232	240	233	233	283	291	284	284	1	1	1		
74	236	241	242	237	287	292	293	288	1	1	1		
75	237	242	238	238	288	293	289	289	1	1	1		
76	240	243	244	233	291	294	295	284	1	1	1		
77	233	244	245	234	284	295	296	285	1	1	1	3	
78	236	247	248	241	287	296	299	292	1	1	1		
79	243	251	252	244	294	302	303	295	1	1	1		
80	247	253	254	248	298	304	305	299	1	1	1		
81	249	257	258	250	300	308	309	301	1	1	1	3	
82	253	261	262	254	304	312	313	305	1	1	1	3	
83	265	273	274	266	316	324	325	317	1	1	1	4	
84	269	277	278	278	320	328	329	329	1	1	1		
85	269	278	279	270	320	329	330	321	1	1	1	3	
86	273	282	283	274	324	333	334	325	1	1	1	8	
87	283	291	284	284	334	342	335	335	1	1	1		
88	287	292	293	288	338	343	344	339	1	1	1		
89	288	293	289	289	339	344	340	340	1	1	1		
90	291	294	295	284	342	345	346	335	1	1	1		
91	284	295	296	285	335	346	347	336	1	1	1	3	
92	287	298	299	292	338	349	350	343	1	1	1		
93	294	302	303	295	345	353	354	346	1	1	1		
94	298	304	305	299	349	355	356	350	1	1	1		
95	300	308	309	301	351	359	360	352	1	1	1	3	
96	304	312	313	305	355	363	364	356	1	1	1	3	
97	214	112	10	67	222	120	21	58	1	2	2		
98	163	171											
99	222	120	21	58	231	129	32	69	1	2	2		
100	171	180											
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TAPE18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
101	239	137	22	59	230	128	11	48	1	2	2		
102	188	179											
103	230	128	11	48	221	119	1	38	1	2	2		
104	179	170											
105	316	214	47	84	324	222	58	95	1	2	2		
106	265	273											
107	324	222	58	95	333	231	69	106	1	2	2		
108	273	282											
109	341	239	59	96	332	230	48	85	1	2	2		
110	290	281											
111	332	230	46	85	323	221	38	75	1	2	2		
112	281	272											
113	515	500	501	517					1	3	3		
114	517	501	502	518					1	3	3		
115	518	502	503	503					1	3	3		
116	518	503	504	504					1	3	3		
117	518	504	505	505					1	3	3		
118	518	505	506	506					1	3	3		
119	518	506	507	517					1	3	3		
120	517	507	508	509					1	3	3		
121	517	509	510	516					1	3	3		
122	516	510	511	511					1	3	3		
123	516	511	512	512					1	3	3		
124	516	512	513	513					1	3	3		
125	516	513	514	514					1	3	3		
126	516	514	515	517					1	3	3		
127	530	531							2	4	4		9
128	557	565	558	550					5	5	5		
129	550	558	559	551					5	5	5		
130	551	559	577	577					5	5	5		
131	551	577	576	552					5	5	5		
132	552	576	560	560					5	5	5		
133	552	560	561	553					5	5	5		
134	553	561	562	554					5	5	5		
135	554	562	563	555					5	5	5		
136	555	563	578	578					5	5	5		
137	555	578	579	556					5	5	5		
138	556	579	564	564					5	5	5		
139	556	564	565	557					5	5	5		
140	565	573	566	558					5	5	5		
141	558	566	567	559					5	5	5		
142	559	567	575	577					5	5	5		
143	577	575	574	576					5	5	5		
144	576	574	568	560					5	5	5		
145	560	568	569	561					5	5	5		
146	561	569	570	562					5	5	5		
147	562	570	571	563					5	5	5		
148	563	571	580	578					5	5	5		
149	578	580	581	579					5	5	5		
150	579	581	572	564					5	5	5		
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TABLE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
151	564	572	573	585									
152	516	517	535	535									
153	535	517	535	535									
154	576	207	518	518									
155	578	212											
156	577	309											
157	579	314											
158	1	2											
159	4	5											
160	10	112											
161	112	113											
162	119	1											
163	558	590											
164	559	590											
165	560	590											
166	561	590											
167	562	590											
168	563	590											
169	564	590											
170	565	590											
171	591	590											
172	600	591											
173	535	517											
174	600												
175	-1												
176	0	1	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
177	1	3	3	2.0	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
178	3	3	1	2.0	315.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
179	4	4	1	1.781	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180	5	3	3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	6	3	3	2.0	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	10	3	1	2.0	112.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	11	3	3	3.75	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	14	3	1	3.75	337.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	15	3	3	3.75	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	16	3	3	3.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
187	17	3	3	3.75	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
188	21	3	1	3.75	112.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
189	22	3	3	4.5	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190	25	3	1	4.5	337.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	26	3	3	4.5	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
192	27	3	3	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
193	28	3	3	4.3875	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
194	29	3	3	4.5	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
195	32	3	1	4.5	112.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
196	33	3	3	5.125	-2.875	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
197	34	3	3	5.125	-1.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198	35	3	3	5.125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199	36	3	3	5.125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200	37	3	3	5.125	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

***** ANSYS INPUT DATA LISTING (TAPE18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
201	38	3	2.0	270.0	1.5								
202	40	3 1	2.0	315.0	1.5								
203	41		1.781	-0.91	1.5								
204	42	3	2.0	0.0	1.5								
205	43	3	2.0	22.5	1.5								
206	47	3 1	2.0	112.5	1.5								
207	48	3	3.75	270.0	1.5								
208	51	3 1	3.75	337.5	1.5								
209	52		3.75	-0.91	1.5								
210	53	3	3.75	0.0	1.5								
211	54	3	3.75	22.5	1.5								
212	58	3 1	3.75	112.5	1.5								
213	59	3	4.5	270.0	1.5								
214	62	3 1	4.5	337.5	1.5								
215	63		4.5	-0.91	1.5								
216	64	3	4.5	0.0	1.5								
217	65		4.3875	1.0	1.5								
218	66	3	4.5	45.0	1.5								
219	69	3 1	4.5	112.5	1.5								
220	70		5.125	-2.875	1.5								
221	71		5.125	-1.72	1.5								
222	72		5.125	-0.91	1.5								
223	73		5.125	0.0	1.5								
224	74		5.125	1.0	1.5								
225	75	3	2.0	270.0	3.0								
226	77	3 1	2.0	315.0	3.0								
227	78		1.781	-0.91	3.0								
228	79	3	2.0	0.0	3.0								
229	80	3	2.0	22.5	3.0								
230	84	3 1	2.0	112.5	3.0								
231	85	3	3.75	270.0	3.0								
232	88	3 1	3.75	337.5	3.0								
233	89		3.75	-0.91	3.0								
234	90	3	3.75	0.0	3.0								
235	91	3	3.75	22.5	3.0								
236	95	3 1	3.75	112.5	3.0								
237	96	3	4.5	270.0	3.0								
238	99	3 1	4.5	337.5	3.0								
239	100		4.5	-0.91	3.0								
240	101	3	4.5	0.0	3.0								
241	102		4.3875	1.0	3.0								
242	103	3	4.5	45.0	3.0								
243	106	3 1	4.5	112.5	3.0								
244	107		5.125	-2.875	3.0								
245	108		5.125	-1.72	3.0								
246	109		5.125	-0.91	3.0								
247	110		5.125	0.0	3.0								
248	111		5.125	1.0	3.0								
249	112	3	2.0	113.5	0.0								
250	113	3	2.0	135.0	0.0								

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***** ANSYS INPUT DATA LISTING (TABLE) *****

	12	18	24	30	36	42	48	54	60	66	72	78
V	V	V	V	V	V	V	V	V	V	V	V	V
251	114	3	2.0	157.5	0.0							
252	115	3	2.0	180.0	0.0							
253	116	3	-1.781	-0.91	0.0							
254	117	3	2.0	225.0	0.0							
255	118	3	2.0	247.5	0.0							
256	119	3	2.0	269.0	0.0							
257	120	3	3.75	113.5	0.0							
258	121	3	3.75	135.0	0.0							
259	122	3	3.75	157.5	0.0							
260	123	3	3.75	180.0	0.0							
261	124	3	-3.75	-0.91	0.0							
262	125	3	3.75	202.5	0.0							
263	126	3	3.75	225.0	0.0							
264	127	3	3.75	247.5	0.0							
265	128	3	3.75	269.0	0.0							
266	129	3	4.5	113.5	0.0							
267	130		-3.74	2.5	0.0							
268	131		-4.5	1.0	0.0							
269	132		-4.5	0.0	0.0							
270	133		-4.5	-0.91	0.0							
271	134		-4.5	-2.75	0.0							
272	135	3	4.5	225.0	0.0							
273	136		-1.48	-4.25	0.0							
274	137	3	4.5	269.0	0.0							
275	138		-4.5	2.5	0.0							
276	139		-4.5	-4.25	0.0							
277	140		-3.18	-4.25	0.0							
278	141		-5.938	2.5	0.0							
279	142		-5.938	1.0	0.0							
280	143		-5.938	0.0	0.0							
281	144		-5.938	-0.91	0.0							
282	145		-5.938	-2.75	0.0							
283	146		-5.938	-4.25	0.0							
284	147		-8.438	4.75	0.0							
285	148		-8.438	3.59	0.0							
286	149		-8.438	2.5	0.0							
287	150		-8.438	1.0	0.0							
288	151		-8.438	-2.75	0.0							
289	152		-8.438	-4.25	0.0							
290	153		-8.438	-5.41	0.0							
291	154		-8.438	-6.5	0.0							
292	155		-9.688	4.75	0.0							
293	156		-9.688	3.59	0.0							
294	157		-9.688	2.5	0.0							
295	158		-9.688	1.0	0.0							
296	159		-9.688	-2.75	0.0							
297	160		-9.688	-4.25	0.0							
298	161		-9.688	-5.41	0.0							
299	162		-9.688	-6.5	0.0							
300	163	3	2.0	113.5	0.75							

***** ANSYS INPUT DATA LISTING (TAPE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
301	164	3	2.0		135.0		0.75						
302	165	3	2.0		157.5		0.75						
303	166	3	2.0		180.0		0.75						
304	167		-1.781		-0.91		0.75						
305	168	3	2.0		225.0		0.75						
306	169	3	2.0		247.5		0.75						
307	170	3	2.0		269.0		0.75						
308	171	3	3.75		113.5		0.75						
309	172	3	3.75		135.0		0.75						
310	173	3	3.75		157.5		0.75						
311	174	3	3.75		180.0		0.75						
312	175		-3.75		-0.91		0.75						
313	176	3	3.75		202.5		0.75						
314	177	3	3.75		225.0		0.75						
315	178	3	3.75		247.5		0.75						
316	179	3	3.75		269.0		0.75						
317	180	3	4.5		113.5		0.75						
318	181		-3.74		2.5		0.75						
319	182		-4.5		1.0		0.75						
320	183		-4.5		0.0		0.75						
321	184		-4.5		-0.91		0.75						
322	185		-4.5		-2.75		0.75						
323	186	3	4.5		225.0		0.75						
324	187		-1.48		-4.25		0.75						
325	188	3	4.5		269.0		0.75						
326	189		-4.5		2.5		0.75						
327	190		-4.5		-4.25		0.75						
328	191		-3.18		-4.25		0.75						
329	192		-5.938		2.5		0.75						
330	193		-5.938		1.0		0.75						
331	194		-5.938		0.0		0.75						
332	195		-5.938		-0.91		0.75						
333	196		-5.938		-2.75		0.75						
334	197		-5.938		-4.25		0.75						
335	198		-8.438		4.75		0.75						
336	199		-8.438		3.59		0.75						
337	200		-8.438		2.5		0.75						
338	201		-8.438		1.0		0.75						
339	202		-8.438		-2.75		0.75						
340	203		-8.438		-4.25		0.75						
341	204		-8.438		-5.41		0.75						
342	205		-8.438		-6.5		0.75						
343	206		-9.688		4.75		0.75						
344	207		-9.688		3.59		0.75						
345	208		-9.688		2.5		0.75						
346	209		-9.688		1.0		0.75						
347	210		-9.688		-2.75		0.75						
348	211		-9.688		-4.25		0.75						
349	212		-9.688		-5.41		0.75						
350	213		-9.688		-6.5		0.75						
		A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TAPE18) *****

	A	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
351	214	3	2.0		113.5		1.5						
352	215	3	2.0		135.0		1.5						
353	216	3	2.0		157.5		1.5						
354	217	3	2.0		180.0		1.5						
355	218		-1.781		-0.91		1.5						
356	219	3	2.0		225.0		1.5						
357	220	3	2.0		247.5		1.5						
358	221	3	2.0		269.0		1.5						
359	222	3	3.75		113.5		1.5						
360	223	3	3.75		135.0		1.5						
361	224	3	3.75		157.5		1.5						
362	225	3	3.75		180.0		1.5						
363	226		-3.75		-0.91		1.5						
364	227	3	3.75		202.5		1.5						
365	228	3	3.75		225.0		1.5						
366	229	3	3.75		247.5		1.5						
367	230	3	3.75		269.0		1.5						
368	231	3	4.5		113.5		1.5						
369	232		-3.74		2.5		1.5						
370	233		-4.5		1.0		1.5						
371	234		-4.5		0.0		1.5						
372	235		-4.5		-0.91		1.5						
373	236		-4.5		-2.75		1.5						
374	237	3	4.5		225.0		1.5						
375	238		-1.48		-4.25		1.5						
376	239	3	4.5		269.0		1.5						
377	240		-4.5		2.5		1.5						
378	241		-4.5		-4.25		1.5						
379	242		-3.18		-4.25		1.5						
380	243		-5.938		2.5		1.5						
381	244		-5.938		1.0		1.5						
382	245		-5.938		0.0		1.5						
383	246		-5.938		-0.91		1.5						
384	247		-5.938		-2.75		1.5						
385	248		-5.938		-4.25		1.5						
386	249		-8.438		4.75		1.5						
387	250		-8.438		3.59		1.5						
388	251		-8.438		2.5		1.5						
389	252		-8.438		1.0		1.5						
390	253		-8.438		-2.75		1.5						
391	254		-8.438		-4.25		1.5						
392	255		-8.438		-5.41		1.5						
393	256		-8.438		-6.5		1.5						
394	257		-9.688		4.75		1.5						
395	258		-9.688		3.59		1.5						
396	259		-9.688		2.5		1.5						
397	260		-9.688		1.0		1.5						
398	261		-9.688		-2.75		1.5						
399	262		-9.688		-4.25		1.5						
400	263		-9.688		-5.41		1.5						

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***** ANSYS INPUT DATA LISTING (TAPE 15) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
401	264		-9.688		-6.5		1.5						
402	265	3	2.0		113.5		2.25						
403	266	3	2.0		135.0		2.25						
404	267	3	2.0		157.5		2.25						
405	268	3	2.0		180.0		2.25						
406	269		-1.781		-0.91		2.25						
407	270	3	2.0		225.0		2.25						
408	271	3	2.0		247.5		2.25						
409	272	3	2.0		269.0		2.25						
410	273	3	3.75		113.5		2.25						
411	274	3	3.75		135.0		2.25						
412	275	3	3.75		157.5		2.25						
413	276	3	3.75		180.0		2.25						
414	277		-3.75		-0.91		2.25						
415	278	3	3.75		202.5		2.25						
416	279	3	3.75		225.0		2.25						
417	280	3	3.75		247.5		2.25						
418	281	3	3.75		269.0		2.25						
419	282	3	4.5		113.5		2.25						
420	283		-3.74		2.5		2.25						
421	284		-4.5		1.0		2.25						
422	285		-4.5		0.0		2.25						
423	286		-4.5		-0.91		2.25						
424	287		-4.5		-2.75		2.25						
425	288	3	4.5		225.0		2.25						
426	289		-1.48		-4.25		2.25						
427	290	3	4.5		269.0		2.25						
428	291		-4.5		2.5		2.25						
429	292		-4.5		-4.25		2.25						
430	293		-3.18		-4.25		2.25						
431	294		-5.938		2.5		2.25						
432	295		-5.938		1.0		2.25						
433	296		-5.938		0.0		2.25						
434	297		-5.938		-0.91		2.25						
435	298		-5.938		-2.75		2.25						
436	299		-5.938		-4.25		2.25						
437	300		-8.438		4.75		2.25						
438	301		-8.438		3.59		2.25						
439	302		-8.438		2.5		2.25						
440	303		-8.438		1.0		2.25						
441	304		-8.438		-2.75		2.25						
442	305		-8.438		-4.25		2.25						
443	306		-8.438		-5.41		2.25						
444	307		-8.438		-6.5		2.25						
445	308		-9.688		4.75		2.25						
446	309		-9.688		3.59		2.25						
447	310		-9.688		2.5		2.25						
448	311		-9.688		1.0		2.25						
449	312		-9.688		-2.75		2.25						
450	313		-9.688		-4.25		2.25						

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***** ANSYS INPUT DATA LISTING (TAPE 11) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
451	314		-9.688		-5.41		2.25						
452	315		-9.688		-6.5		2.25						
453	316	3	2.0		113.5		3.0						
454	317	3	2.0		135.0		3.0						
455	318	3	2.0		157.5		3.0						
456	319	3	2.0		180.0		3.0						
457	320		-1.781		-0.91		3.0						
458	321	3	2.0		225.0		3.0						
459	322	3	2.0		247.5		3.0						
460	323	3	2.0		269.0		3.0						
461	324	3	3.75		113.5		3.0						
462	325	3	3.75		135.0		3.0						
463	326	3	3.75		157.5		3.0						
464	327	3	3.75		180.0		3.0						
465	328		-3.75		-0.91		3.0						
466	329	3	3.75		202.5		3.0						
467	330	3	3.75		225.0		3.0						
468	331	3	3.75		247.5		3.0						
469	332	3	3.75		269.0		3.0						
470	333	3	4.5		113.5		3.0						
471	334		-3.74		2.5		3.0						
472	335		-4.5		1.0		3.0						
473	336		-4.5		0.0		3.0						
474	337		-4.5		-0.91		3.0						
475	338		-4.5		-2.75		3.0						
476	339	3	4.5		225.0		3.0						
477	340		-1.48		-4.25		3.0						
478	341	3	4.5		269.0		3.0						
479	342		-4.5		2.5		3.0						
480	343		-4.5		-4.25		3.0						
481	344		-3.18		-4.25		3.0						
482	345		-5.938		2.5		3.0						
483	346		-5.938		1.0		3.0						
484	347		-5.938		0.0		3.0						
485	348		-5.938		-0.91		3.0						
486	349		-5.938		-2.75		3.0						
487	350		-5.938		-4.25		3.0						
488	351		-8.438		4.75		3.0						
489	352		-8.438		3.59		3.0						
490	353		-8.438		2.5		3.0						
491	354		-8.438		1.0		3.0						
492	355		-8.438		-2.75		3.0						
493	356		-8.438		-4.25		3.0						
494	357		-8.438		-5.41		3.0						
495	358		-8.438		-6.5		3.0						
496	359		-9.688		4.75		3.0						
497	360		-9.688		3.59		3.0						
498	361		-9.688		2.5		3.0						
499	362		-9.688		1.0		3.0						
500	363		-9.688		-2.75		3.0						
		A	A	A	A	A	A	A	A	A	A	A	A

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***** APPS INPUT DATA LISTING (TABLEB) *****
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	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
501	364		-9.684		-9.25	3.0							
502	365		-9.688		-5.41	3.0							
503	366		-9.692		-6.5	3.0							
504	0	1.4	0.0	0.0	0.0	0.75		0.0	0.0	0.0		0.0	
505	0	0.5	0.0	0.0	0.0	0.75		0.0	0.0	0.0		0.0	
506	500	4	2.0	0.0	0.0	0.0							
507	515	4.1	2.0	337.5	0.0	0.0							
508	516	5	0.0	-1.5	0.0	0.0							
509	517	5	0.0	0.0	0.0	0.0							
510	518	5	0.0	1.5	0.0	1.5							
511	530		-15.0		-0.91	1.5							
512	531		-5.938		-0.91	1.5							
513	532		-4.5		-0.91	1.5							
514	533		-3.75		-0.91	1.5							
515	534		-1.781		-0.91	1.5							
516	535		0.0		-0.91	1.5							
517	536		1.781		-0.91	1.5							
518	537		3.75		-0.91	1.5							
519	538		4.5		-0.91	1.5							
520	539		5.125		-0.91	1.5							
521	0	1.6	-9.73		-0.91	1.5		0.0	90.0	90.0	0.0	0.0	
522	0	0.7	-9.73		-0.91	1.5		0.0	90.0	90.0	0.0	0.0	
523	550		1.5		22.5	0.0							
524	557	6.1	1.5		337.5	0.0							
525	558	6	5.0		22.5	0.0							
526	565	6.1	5.0		337.5	0.0							
527	566	6	5.0		22.5	0.0							
528	573	6.1	6.0		337.5	0.0							
529	574	7	-0.75		5.543	0.0							
530	575	7	0.75		5.543	0.0							
531	576	7	-0.75		4.5	0.0							
532	577	7	0.75		4.5	0.0							
533	578	7	-0.75		-4.5	0.0							
534	579	7	0.75		-4.5	0.0							
535	580	7	-0.75		-5.543	0.0							
536	581	7	0.75		-5.543	0.0							
537	590	7	0.0		0.0	0.0							
538	591		-10.538		-0.91	1.5							
539	600		-10.538		-10.51	-0.55							
540	-1												
541	500	5	16	27	36	42	53	65	73	79	90	101	
542	515	4	15	15	26	35	41	52	63	72	83	93	
543	538	539	78	89	100	109	-1						
544	501	6	17	28	37	43	54	65	74	80	91	102	
545	111	-1											
546	514	3	13	24	33	34	25	19	40	50	61	70	
547	71	62	51	77	97	98	1	108	99	88	-1	99	
548	502	7	18	29	44	55	66	81	92	103	-1	104	
549	513	2	12	23	39	49	60	76	86	97	-1	104	
550	503	4	19	30	45	56	67	82	93	104	-1	104	

***** ANSYS INPUT DATA LISTING (TAPE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
551	512	1	11	22	38	40	59	75	85	96	119	128	
552	137	170	179	148	221	230	239	272	291	290	323	332	
553	341	-1											
554	504	9	20	31	46	57	68	83	94	105	-1		
555	511	118	127	136	169	178	187	220	229	238	271	280	
556	289	322	331	340	-1								
557	505	10	21	32	47	58	69	84	95	106	316	324	
558	333	265	273	282	214	222	231	163	171	180	112	120	
559	129	-1											
560	510	117	126	135	140	168	177	186	191	219	228	237	
561	242	270	279	288	293	321	330	339	344	-1			
562	506	113	121	130	164	172	181	215	225	232	266	274	
563	283	317	325	334	-1								
564	509	116	124	125	167	175	176	218	226	227	269	277	
565	278	320	328	329	534	543	-1						
566	507	114	122	165	173	216	224	267	275	318	326	-1	
567	508	115	123	166	174	217	225	268	276	319	327	516	
568	517	518	535	-1									
569	138	131	132	133	134	139	189	182	183	184	185	190	
570	240	233	234	235	236	241	291	284	285	286	287	292	
571	342	335	336	337	338	343	532	-1					
572	141	142	143	144	145	146	192	193	194	195	196	197	
573	243	244	245	246	247	248	294	295	296	297	298	299	
574	345	346	347	348	349	350	531	530	-1				
575	147	148	149	150	151	152	153	154	198	199	200	201	
576	202	203	204	205	249	250	251	252	253	254	255	256	
577	300	301	302	303	304	305	306	307	351	352	353	354	
578	355	356	357	358	-1								
579	155	156	157	158	159	160	161	162	206	207	208	209	
580	210	211	212	213	257	258	259	260	261	262	263	264	
581	308	309	310	311	312	313	314	315	359	360	361	362	
582	363	364	365	366	-1								
583	550	551	552	553	554	555	556	557	558	559	560	561	
584	562	563	564	565	566	567	568	569	570	571	572	573	
585	574	575	576	577	578	579	580	581	590	591	600	-1	
586	-1												
587	EX	1											
588	ALPX	1											
589	DENS	1											
590	NUXY	1											
591	ER	2											
592	ALPX	2											
593	DENS	2											
594	NUXY	2											
595	EX	3											
596	ALPX	3											
597	DENS	3											
598	NUXY	3											
599	EX	4											
600	ALPX	4											

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***** ANSYS INPUT DATA LISTING (TAPE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
601	DENS	4	0.0										
602	NUXY	4	0.3										
603	EX	5	2.9.9E6										
604	ALPX	5	6.5E-6										
605	DENS	5	0.000813										
606	NUXY	5	0.3										
607	-1												
608	UZ	2	500	5									
609	UZ	2	501	6									
610	UZ	2	502	7									
611	UZ	2	503	8									
612	UZ	2	504	9									
613	UZ	2	505	10									
614	UZ	2	506	113									
615	UZ	2	507	114									
616	UZ	2	508	115									
617	UZ	2	509	116									
618	UZ	2	510	117									
619	UZ	2	511	118									
620	UZ	2	512	1									
621	UZ	2	513	2									
622	UZ	2	514	3									
623	UZ	2	515	4									
624	UY	2	533	226									
625	UZ	2	533	226									
626	UY	2	534	218									
627	UZ	2	534	218									
628	UY	2	536	41									
629	UZ	2	536	41									
630	UY	2	537	52									
631	UZ	2	537	52									
632	UX	2	539	72									
633	UX	2	576	207									
634	UY	2	576	207									
635	UZ	2	576	207									
636	UX	2	577	309									
637	UY	2	577	309									
638	UZ	2	577	309									
639	UX	2	578	212									
640	UY	2	578	212									
641	UZ	2	578	212									
642	UX	2	579	314									
643	UY	2	579	314									
644	UZ	2	579	314									
645	-1												
646	/TITLE		INTERNAL PRESSURE LOAD										
647	1	2											
648													
649	17	UZ	0.0										
650	19	UZ	0.0										

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***** ANSYS INPUT DATA LISTING (TAPE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
651	21	UZ	0.0										
652	122	UZ	0.0										
653	125	UZ	0.0										
654	127	UZ	0.0										
655	12	UZ	0.0										
656	14	UZ	0.0										
657	91	UZ	0.0										
658	93	UZ	0.0										
659	95	UZ	0.0										
660	326	UZ	0.0										
661	329	UZ	0.0										
662	331	UZ	0.0										
663	86	UZ	0.0										
664	88	UZ	0.0										
665	68	UX	0.0										
666	59	UX	0.0										
667	73	UY	0.0										
668	234	UY	0.0										
669	-1												
670	-1												
671	1	5	285			3							
672	5	5	285			10							
673	25	5	285			27							
674	29	5	285			34							
675	49	5	285			52							
676	54	5	285			56							
677	81	5	285			84							
678	86	5	285			88							
679	113	5	285			116							
680	118	5	285			120							
681	145	5	285			148							
682	150	5	285			152							
683	183	1	285										
684	184	1	285										
685	187	1	285										
686	180	1	285										
687	165	1	-65			198							
688	-1												
689	/TITLE		TORQUE 2112 IN LH										
690	1	2											
691													
692	17	UX	0.0			1	1	1					
693	19	UX	0.0			UY		UZ					
694	21	UX	0.0			UY		UZ					
695	122	UX	0.0			UY		UZ					
696	125	UX	0.0			UY		UZ					
697	127	UX	0.0			UY		UZ					
698	12	UX	0.0			UY		UZ					
699	14	UX	0.0			UY		UZ					
700	91	UX	0.0			UY		UZ					

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***** ANSYS INPUT DATA LISTING (PAGE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
701	93	UX	0.0						UY	UZ			
702	95	UX	0.0						UY	UZ			
703	325	UX	0.0						UY	UZ			
704	329	UX	0.0						UY	UZ			
705	331	UX	0.0						UY	UZ			
706	86	UX	0.0						UY	UZ			
707	88	UX	0.0						UY	UZ			
708	-1												
709	530	MX	-2112										
710	600	MX	2112										
711	-1												
712	-1												
713	/TITLE		X DIRECTION ACCEL										
714	-2	2		386.4									
715							1	1	1				
716	-1												
717	530	MX	0.0										
718	600	MX	0.0										
719	-1												
720	-1												
721	/TITLE		Y DIRECTION ACCEL										
722	-2	2			386.4								
723							1	1	1				
724	-1												
725	-1												
726	-1												
727	/TITLE		Z DIRECTION ACCEL										
728	-2	2				386.4							
729							1	1	1				
730	-1												
731	-1												
732	-1												
733	END												
734	FINISH												

CLOW 4 INCH VALVE LIMERICK NPP PFI H270 STATIC ANALYSIS

19.3642 R3/ 4/26 CP= 4.985

THE ANSYS PROGRAM IS IN A STATE OF CONTINUOUS DEVELOPMENT, MODIFICATION, AND CHECKING. NEITHER SWANSON ANALYSIS SYSTEMS, INC. NOR THE CORPORATION SUPPLYING THE COMPUTER FACILITIES FOR THIS ANALYSIS ASSUME ANY RESPONSIBILITY FOR THE VALIDITY, ACCURACY, OR APPLICABILITY OF ANY RESULTS OBTAINED FROM THE ANSYS SYSTEM. THE USER MUST VERIFY HIS OWN RESULTS.

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***** ANALYST = DAVIDSON

***** ANALYSIS OPTIONS (CARDS C1 AND C2) *****

	VALUE	VARIABLE NAME	COLUMNS
ANALYSIS TYPE	0	KAN	5-7
COUPLED DEGREES OF FREEDOM KEY	1	KCDF	10
ELEMENT CONSTANT TABLE	1	KTH	11-12
REACTION FORCE KEY	1	KRF	15-16
REFERENCE TEMPERATURE	350.00	TREF	1-12
UNIFORM TEMPERATURE	350.00	TUNIF	13-24
ELEMENT REORDERING KEY	1	KORDER	77-78
COPE SIZE REQUESTED (OCTAL) . .	00200000		
LCM SIZE REQUESTED (OCTAL) . .	00147770		
LOCKED BINARY FILE NAMES . . .	TAPE3	TAPE2 TAPE11 TAPE4 TAPE10 TAPE12	
LOCK SIZES	500	500 1150 500 500 500	

***** ELEMENT TYPES (CARD D) *****

TYPE	STIF	DESCRIPTION	KEYSUM OPTIONS						NJ	INOTPR
			1B	1A	1	2B	2A	2		
1	45	ISOPAR, SOLID	0	0	0	0	0	0	0	0
2	94	16 NODE ISOPAR, SHELL	0	0	0	0	0	0	0	0
3	63	QUAD, FLAT SHELL	0	0	0	0	0	0	0	0
4	4	ELASTIC BEAM, 3-D	0	0	0	0	0	1	0	0
5	63	QUAD, FLAT SHELL	0	0	0	0	0	0	0	0
6	63	QUAD, FLAT SHELL	0	0	0	0	0	0	0	0
7	63	QUAD, FLAT SHELL	0	0	0	0	0	0	0	0
8	4	ELASTIC BEAM, 3-D	0	0	0	0	0	1	0	0
9	4	ELASTIC BEAM, 3-D	0	0	0	0	0	1	0	0

NO.	4	ELASTIC HEAD, 3-0	0	0	0	0	0	0	0
11	14	SPRINGER-DIAMETER	0	0	0	0	0	0	0
12	21	SPRINGER MASS	0	0	2	0	0	0	0

***** TABLE OF ELEMENT HEAD CONSTANTS (CAQD 02) *****

1	1.0000
2	1.0000
3	.62500
4	.33010
5	1.2500
6	1.0000
7	1.0000
8	.33400
9	.37500
10	100.00
11	.21600E+09
12	1.1505

-1.700E-01	-1.700E-01	.74000
.15500E-01	.15500E-01	.75000
.17600E-01	.74000E-02	.75000
1000.0	1000.0	10.000

ANALYSIS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 6ZL1 CYPRITE JUNE 1, 1979
 SADDON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3104

CLW 4 INCH VALVE LINEPACK NEW PEI 9270 STATIC ANALYSIS 19.3642 R3/ 4/26 CP= 5.478

***** ELEMENT DEFINITIONS (CARD E) *****

ELEMENT	NODES	CLASS	MAT	TYPE	CLASS	ELEMENT	NEAR	CONSTANTS	
1	1 12	2	34	48	49	39	1	1	0
2	12 13	3	39	49	50	40	1	1	0
3	13 14	4	40	50	51	41	1	1	0
4	14 15	5	41	51	52	42	1	1	0
5	15 16	6	42	52	53	43	1	1	0
6	16 17	7	43	53	54	44	1	1	0
7	17 18	8	44	54	55	45	1	1	0
8	18 19	9	45	55	56	46	1	1	0
9	19 20	10	46	56	57	47	1	1	0
10	20 21	11	47	57	58	48	1	1	0
11	21 22	12	48	58	59	49	1	1	0
12	22 23	13	49	59	60	50	1	1	0
13	23 24	14	50	60	61	51	1	1	0
14	24 25	15	51	61	62	52	1	1	0
15	25 26	16	52	62	63	53	1	1	0
16	26 27	17	53	63	64	54	1	1	0
17	27 28	18	54	64	65	55	1	1	0
18	28 29	19	55	65	66	56	1	1	0
19	29 30	20	56	66	67	57	1	1	0
20	30 31	21	57	67	68	58	1	1	0
21	31 32	22	58	68	69	59	1	1	0
22	32 33	23	59	69	70	60	1	1	0
23	33 34	24	60	70	71	61	1	1	0
24	34 35	25	61	71	72	62	1	1	0
25	35 36	26	62	72	73	63	1	1	0
26	36 37	27	63	73	74	64	1	1	0
27	37 38	28	64	74	75	65	1	1	0
28	38 39	29	65	75	76	66	1	1	0
29	39 40	30	66	76	77	67	1	1	0
30	40 41	31	67	77	78	68	1	1	0
31	41 42	32	68	78	79	69	1	1	0
32	42 43	33	69	79	80	70	1	1	0
33	43 44	34	70	80	81	71	1	1	0
34	44 45	35	71	81	82	72	1	1	0
35	45 46	36	72	82	83	73	1	1	0
36	46 47	37	73	83	84	74	1	1	0
37	47 48	38	74	84	85	75	1	1	0
38	48 49	39	75	85	86	76	1	1	0
39	49 50	40	76	86	87	77	1	1	0
40	50 51	41	77	87	88	78	1	1	0
41	51 52	42	78	88	89	79	1	1	0
42	52 53	43	79	89	90	80	1	1	0
43	53 54	44	80	90	91	81	1	1	0
44	54 55	45	81	91	92	82	1	1	0
45	55 56	46	82	92	93	83	1	1	0
46	56 57	47	83	93	94	84	1	1	0
47	57 58	48	84	94	95	85	1	1	0
48	58 59	49	85	95	96	86	1	1	0
49	59 60	50	86	96	97	87	1	1	0
50	60 61	51	87	97	98	88	1	1	0
51	61 62	52	88	98	99	89	1	1	0
52	62 63	53	89	99	100	90	1	1	0
53	63 64	54	90	100	101	91	1	1	0
54	64 65	55	91	101	102	92	1	1	0
55	65 66	56	92	102	103	93	1	1	0
56	66 67	57	93	103	104	94	1	1	0
57	67 68	58	94	104	105	95	1	1	0
58	68 69	59	95	105	106	96	1	1	0
59	69 70	60	96	106	107	97	1	1	0
60	70 71	61	97	107	108	98	1	1	0
61	71 72	62	98	108	109	99	1	1	0
62	72 73	63	99	109	110	100	1	1	0
63	73 74	64	100	110	111	101	1	1	0
64	74 75	65	101	111	112	102	1	1	0
65	75 76	66	102	112	113	103	1	1	0
66	76 77	67	103	113	114	104	1	1	0
67	77 78	68	104	114	115	105	1	1	0
68	78 79	69	105	115	116	106	1	1	0
69	79 80	70	106	116	117	107	1	1	0
70	80 81	71	107	117	118	108	1	1	0
71	81 82	72	108	118	119	109	1	1	0
72	82 83	73	109	119	120	110	1	1	0
73	83 84	74	110	120	121	111	1	1	0
74	84 85	75	111	121	122	112	1	1	0
75	85 86	76	112	122	123	113	1	1	0
76	86 87	77	113	123	124	114	1	1	0
77	87 88	78	114	124	125	115	1	1	0
78	88 89	79	115	125	126	116	1	1	0
79	89 90	80	116	126	127	117	1	1	0
80	90 91	81	117	127	128	118	1	1	0
81	91 92	82	118	128	129	119	1	1	0
82	92 93	83	119	129	130	120	1	1	0
83	93 94	84	120	130	131	121	1	1	0
84	94 95	85	121	131	132	122	1	1	0
85	95 96	86	122	132	133	123	1	1	0
86	96 97	87	123	133	134	124	1	1	0
87	97 98	88	124	134	135	125	1	1	0
88	98 99	89	125	135	136	126	1	1	0
89	99 100	90	126	136	137	127	1	1	0
90	100 101	91	127	137	138	128	1	1	0
91	101 102	92	128	138	139	129	1	1	0
92	102 103	93	129	139	140	130	1	1	0
93	103 104	94	130	140	141	131	1	1	0
94	104 105	95	131	141	142	132	1	1	0
95	105 106	96	132	142	143	133	1	1	0
96	106 107	97	133	143	144	134	1	1	0
97	107 108	98	134	144	145	135	1	1	0
98	108 109	99	135	145	146	136	1	1	0
99	109 110	100	136	146	147	137	1	1	0
100	110 111	101	137	147	148	138	1	1	0
101	111 112	102	138	148	149	139	1	1	0
102	112 113	103	139	149	150	140	1	1	0
103	113 114	104	140	150	151	141	1	1	0
104	114 115	105	141	151	152	142	1	1	0
105	115 116	106	142	152	153	143	1	1	0
106	116 117	107	143	153	154	144	1	1	0
107	117 118	108	144	154	155	145	1	1	0
108	118 119	109	145	155	156	146	1	1	0
109	119 120	110	146	156	157	147	1	1	0
110	120 121	111	147	157	158	148	1	1	0
111	121 122	112	148	158	159	149	1	1	0
112	122 123	113	149	159	160	150	1	1	0
113	123 124	114	150	160	161	151	1	1	0
114	124 125	115	151	161	162	152	1	1	0
115	125 126	116	152	162	163	153	1	1	0
116	126 127	117	153	163	164	154	1	1	0
117	127 128	118	154	164	165	155	1	1	0
118	128 129	119	155	165	166	156	1	1	0
119	129 130	120	156	166	167	157	1	1	0
120	130 131	121	157	167	168	158	1	1	0
121	131 132	122	158	168	169	159	1	1	0
122	132 133	123	159	169	170	160	1	1	0
123	133 134	124	160	170	171	161	1	1	0
124	134 135	125	161	171	172	162	1	1	0
125	135 136	126	162	172	173	163	1	1	0
126	136 137	127	163	173	174	164	1	1	0
127	137 138	128	164	174	175	165	1	1	0
128	138 139	129	165	175	176	166	1	1	0
129	139 140	130	166	176	177	167	1	1	0
130	140 141	131	167	177	178	168	1	1	0
131	141 142	132	168	178	179	169	1	1	0
132	142 143	133	169	179	180	170	1	1	0
133	143 144	134	170	180	181	171	1	1	0
134	144 145	135	171	181	182	172	1	1	0
135	145 146	136	172	182	183	173	1	1	0
136	146 147	137	173	183	184	174	1	1	0
137	147 148	138	174	184	185	175	1	1	0
138	148 149	139	175	185	186	176	1	1	0
139	149 150	140	176	186	187	177	1	1	0
140	150 151	141	177	187	188	178	1	1	0
141	151 152	142	178	188	189	179	1	1	0
142	152 153	143	179	189	190	180	1	1	0
143	153 154	144	180	190	191	181	1	1	0
144	154 155	145	181	191	192	182	1	1	0
145	155 156	146	182	192	193	183	1	1	0
146	156 157	147	183	193	194	184	1	1	0
147	157 158	148	184	194	195	185	1	1	0
148	158 159	149	185	195	196	186	1	1	0
149	159 160	150	186	196	197	187	1	1	0
150	160 161	151	187	197	198	188	1	1	0
151	161 162	152	188	198	199	189	1		

51	114	127	124	115	165	173	174	186	1	1	0
52	115	123	124	116	166	174	175	167	1	1	0
53	116	124	125	117	167	176	177	168	1	1	0
54	116	125	126	117	167	176	177	168	1	1	0
55	117	126	127	118	168	177	178	169	1	1	0
56	118	127	128	119	169	178	179	170	1	1	0
57	120	129	130	121	175	180	181	172	1	1	0
58	121	130	131	122	172	181	182	173	1	1	0
59	122	131	132	123	173	182	183	174	1	1	0
60	123	132	133	124	174	183	184	175	1	1	0
61	124	133	134	125	175	184	185	176	1	1	0
62	125	134	135	126	176	185	186	177	1	1	0
63	126	135	136	127	177	186	187	178	1	1	0
64	127	136	137	128	178	187	188	179	1	1	0
65	130	138	131	131	181	189	182	182	1	1	0
66	134	139	140	135	185	190	191	186	1	1	0
67	135	140	141	136	186	191	187	187	1	1	0
68	136	141	142	137	187	192	193	188	1	1	0
69	137	142	143	138	188	193	194	189	1	1	0
70	132	143	144	133	183	194	195	184	1	1	0
71	131	144	145	134	184	195	196	185	1	1	0
72	134	145	146	139	189	196	197	190	1	1	0
73	141	149	150	142	192	200	201	193	1	1	0
74	145	151	152	146	196	202	203	197	1	1	0
75	147	155	156	148	198	206	207	199	1	1	0
76	148	156	157	149	199	207	208	200	1	1	0
77	149	157	158	150	200	208	209	201	1	1	0
78	151	159	160	152	202	210	211	203	1	1	0
79	152	160	161	153	203	211	212	204	1	1	0
80	153	161	162	154	204	212	213	205	1	1	0
81	163	171	172	164	214	222	223	215	1	1	0
82	164	172	173	165	215	223	224	216	1	1	0
83	165	173	174	166	216	224	225	217	1	1	0
84	166	174	175	167	217	225	226	218	1	1	0
85	167	175	176	168	218	226	227	219	1	1	0
86	167	176	177	168	218	227	228	219	1	1	0
87	168	177	178	169	219	228	229	220	1	1	0
88	169	178	179	170	220	229	230	221	1	1	0
89	171	180	181	172	222	231	232	223	1	1	0
90	172	181	182	173	223	232	233	224	1	1	0
91	173	182	183	174	224	233	234	225	1	1	0
92	174	183	184	175	225	234	235	226	1	1	0
93	175	184	185	176	226	235	236	227	1	1	0
94	176	185	186	177	227	236	237	228	1	1	0
95	177	186	187	178	228	237	238	229	1	1	0
96	178	187	188	179	229	238	239	230	1	1	0
97	181	189	192	182	232	240	233	231	1	1	0
98	185	190	191	186	236	241	242	237	1	1	0
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100	189	192	193	182	240	243	244	233	1	1	0
101	182	193	194	183	241	245	246	234	1	1	0
102	183	194	195	184	242	247	248	235	1	1	0
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104	185	196	197	186	244	249	250	237	1	1	0
105	182	200	201	193	243	251	252	244	1	1	0
106	196	202	203	197	247	253	254	248	1	1	0
107	198	206	207	199	249	257	258	250	1	1	0
108	199	207	208	200	250	258	259	251	1	1	0
109	200	208	209	201	251	259	260	252	1	1	0
110	202	210	211	203	253	261	262	254	1	1	0
111	203	211	212	204	254	262	263	255	1	1	0

112	204	212	221	230	239	248	257	266	275	284	293	302	311	320	329	338	347	356	365	374	383	392	401	410	419	428	437	446	455	464	473	482	491	500	509	518	527	536	545	554	563	572	581	590	599	608	617	626	635	644	653	662	671	680	689	698	707	716	725	734	743	752	761	770	779	788	797	806	815	824	833	842	851	860	869	878	887	896	905	914	923	932	941	950	959	968	977	986	995	1004	1013	1022	1031	1040	1049	1058	1067	1076	1085	1094	1103	1112	1121	1130	1139	1148	1157	1166	1175	1184	1193	1202	1211	1220	1229	1238	1247	1256	1265	1274	1283	1292	1301	1310	1319	1328	1337	1346	1355	1364	1373	1382	1391	1400	1409	1418	1427	1436	1445	1454	1463	1472	1481	1490	1499	1508	1517	1526	1535	1544	1553	1562	1571	1580	1589	1598	1607	1616	1625	1634	1643	1652	1661	1670	1679	1688	1697	1706	1715	1724	1733	1742	1751	1760	1769	1778	1787	1796	1805	1814	1823	1832	1841	1850	1859	1868	1877	1886	1895	1904	1913	1922	1931	1940	1949	1958	1967	1976	1985	1994	2003	2012	2021	2030	2039	2048	2057	2066	2075	2084	2093	2102	2111	2120	2129	2138	2147	2156	2165	2174	2183	2192	2201	2210	2219	2228	2237	2246	2255	2264	2273	2282	2291	2300	2309	2318	2327	2336	2345	2354	2363	2372	2381	2390	2399	2408	2417	2426	2435	2444	2453	2462	2471	2480	2489	2498	2507	2516	2525	2534	2543	2552	2561	2570	2579	2588	2597	2606	2615	2624	2633	2642	2651	2660	2669	2678	2687	2696	2705	2714	2723	2732	2741	2750	2759	2768	2777	2786	2795	2804	2813	2822	2831	2840	2849	2858	2867	2876	2885	2894	2903	2912	2921	2930	2939	2948	2957	2966	2975	2984	2993	3002	3011	3020	3029	3038	3047	3056	3065	3074	3083	3092	3101	3110	3119	3128	3137	3146	3155	3164	3173	3182	3191	3200	3209	3218	3227	3236	3245	3254	3263	3272	3281	3290	3299	3308	3317	3326	3335	3344	3353	3362	3371	3380	3389	3398	3407	3416	3425	3434	3443	3452	3461	3470	3479	3488	3497	3506	3515	3524	3533	3542	3551	3560	3569	3578	3587	3596	3605	3614	3623	3632	3641	3650	3659	3668	3677	3686	3695	3704	3713	3722	3731	3740	3749	3758	3767	3776	3785	3794	3803	3812	3821	3830	3839	3848	3857	3866	3875	3884	3893	3902	3911	3920	3929	3938	3947	3956	3965	3974	3983	3992	4001	4010	4019	4028	4037	4046	4055	4064	4073	4082	4091	4100	4109	4118	4127	4136	4145	4154	4163	4172	4181	4190	4199	4208	4217	4226	4235	4244	4253	4262	4271	4280	4289	4298	4307	4316	4325	4334	4343	4352	4361	4370	4379	4388	4397	4406	4415	4424	4433	4442	4451	4460	4469	4478	4487	4496	4505	4514	4523	4532	4541	4550	4559	4568	4577	4586	4595	4604	4613	4622	4631	4640	4649	4658	4667	4676	4685	4694	4703	4712	4721	4730	4739	4748	4757	4766	4775	4784	4793	4802	4811	4820	4829	4838	4847	4856	4865	4874	4883	4892	4901	4910	4919	4928	4937	4946	4955	4964	4973	4982	4991	5000	5009	5018	5027	5036	5045	5054	5063	5072	5081	5090	5099	5108	5117	5126	5135	5144	5153	5162	5171	5180	5189	5198	5207	5216	5225	5234	5243	5252	5261	5270	5279	5288	5297	5306	5315	5324	5333	5342	5351	5360	5369	5378	5387	5396	5405	5414	5423	5432	5441	5450	5459	5468	5477	5486	5495	5504	5513	5522	5531	5540	5549	5558	5567	5576	5585	5594	5603	5612	5621	5630	5639	5648	5657	5666	5675	5684	5693	5702	5711	5720	5729	5738	5747	5756	5765	5774	5783	5792	5801	5810	5819	5828	5837	5846	5855	5864	5873	5882	5891	5900	5909	5918	5927	5936	5945	5954	5963	5972	5981	5990	5999	6008	6017	6026	6035	6044	6053	6062	6071	6080	6089	6098	6107	6116	6125	6134	6143	6152	6161	6170	6179	6188	6197	6206	6215	6224	6233	6242	6251	6260	6269	6278	6287	6296	6305	6314	6323	6332	6341	6350	6359	6368	6377	6386	6395	6404	6413	6422	6431	6440	6449	6458	6467	6476	6485	6494	6503	6512	6521	6530	6539	6548	6557	6566	6575	6584	6593	6602	6611	6620	6629	6638	6647	6656	6665	6674	6683	6692	6701	6710	6719	6728	6737	6746	6755	6764	6773	6782	6791	6800	6809	6818	6827	6836	6845	6854	6863	6872	6881	6890	6899	6908	6917	6926	6935	6944	6953	6962	6971	6980	6989	6998	7007	7016	7025	7034	7043	7052	7061	7070	7079	7088	7097	7106	7115	7124	7133	7142	7151	7160	7169	7178	7187	7196	7205	7214	7223	7232	7241	7250	7259	7268	7277	7286	7295	7304	7313	7322	7331	7340	7349	7358	7367	7376	7385	7394	7403	7412	7421	7430	7439	7448	7457	7466	7475	7484	7493	7502	7511	7520	7529	7538	7547	7556	7565	7574	7583	7592	7601	7610	7619	7628	7637	7646	7655	7664	7673	7682	7691	7700	7709	7718	7727	7736	7745	7754	7763	7772	7781	7790	7799	7808	7817	7826	7835	7844	7853	7862	7871	7880	7889	7898	7907	7916	7925	7934	7943	7952	7961	7970	7979	7988	7997	8006	8015	8024	8033	8042	8051	8060	8069	8078	8087	8096	8105	8114	8123	8132	8141	8150	8159	8168	8177	8186	8195	8204	8213	8222	8231	8240	8249	8258	8267	8276	8285	8294	8303	8312	8321	8330	8339	8348	8357	8366	8375	8384	8393	8402	8411	8420	8429	8438	8447	8456	8465	8474	8483	8492	8501	8510	8519	8528	8537	8546	8555	8564	8573	8582	8591	8600	8609	8618	8627	8636	8645	8654	8663	8672	8681	8690	8699	8708	8717	8726	8735	8744	8753	8762	8771	8780	8789	8798	8807	8816	8825	8834	8843	8852	8861	8870	8879	8888	8897	8906	8915	8924	8933	8942	8951	8960	8969	8978	8987	8996	9005	9014	9023	9032	9041	9050	9059	9068	9077	9086	9095	9104	9113	9122	9131	9140	9149	9158	9167	9176	9185	9194	9203	9212	9221	9230	9239	9248	9257	9266	9275	9284	9293	9302	9311	9320	9329	9338	9347	9356	9365	9374	9383	9392	9401	9410	9419	9428	9437	9446	9455	9464	9473	9482	9491	9500	9509	9518	9527	9536	9545	9554	9563	9572	9581	9590	9599	9608	9617	9626	9635	9644	9653	9662	9671	9680	9689	9698	9707	9716	9725	9734	9743	9752	9761	9770	9779	9788	9797	9806	9815	9824	9833	9842	9851	9860	9869	9878	9887	9896	9905	9914	9923	9932	9941	9950	9959	9968	9977	9986	9995	10004	10013	10022	10031	10040	10049	10058	10067	10076	10085	10094	10103	10112	10121	10130	10139	10148	10157	10166	10175	10184	10193	10202	10211	10220	10229	10238	10247	10256	10265	10274	10283	10292	10301	10310	10319	10328	10337	10346	10355	10364	10373	10382	10391	10400	10409	10418	10427	10436	10445	10454	10463	10472	10481	10490	10499	10508	10517	10526	10535	10544	10553	10562	10571	10580	10589	10598	10607	10616	10625	10634	10643	10652	10661	10670	10679	10688	10697	10706	10715	10724	10733	10742	10751	10760	10769	10778	10787	10796	10805	10814	10823	10832	10841	10850	10859	10868	10877	10886	10895	10904	10913	10922	10931	10940	10949	10958	10967	10976	10985	10994	11003	11012	11021	11030	11039	11048	11057	11066	11075	11084	11093	11102	11111	11120	11129	11138	11147	11156	11165	11174	11183	11192	11201	11210	11219	11228	11237	11246	11255	11264	11273	11282	11291	11300	11309	11318	11327	11336	11345	11354	11363	11372	11381	11390	11399	11408	11417	11426	11435	11444	11453	11462	11471	11480	11489	11498	11507	11516	11525	11534	11543	11552	11561	11570	11579	11588	11597	11606	11615	11624	11633	11642	11651	11660	11669	11678	11687	11696	11705	11714	11723	11732	11741	11750	11759	11768	11777	11786	11795	11804	11813	11822	11831	11840	11849	11858	11867	11876	11885	11894	11903	11912	11921	11930	11939	11948	11957	11966	11975	11984	11993	12002	12011	12020	12029	12038	12047	12056	12065	12074	12083	12092	12101	12110	12119	12128	12137	12146	12155	12164	12173	12182	12191	12200	12209	12218	12227	12236	12245	12254	12263	12272	12281	12290	12299	12308	12317	12326	12335	12344	12353	12362	
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173	302	310	311	303	353	361	362	354	1	1	0
174	304	312	313	305	355	363	364	356	1	1	0
175	305	313	314	306	356	364	365	357	1	1	0
176	306	314	315	307	357	365	366	358	1	1	0
177	214	112	10	47	222	120	21	58	1	2	0
163	171	0	0	0	0	0	0	0			
178	222	120	21	58	231	129	42	69	1	2	0
171	140	0	0	0	0	0	0	0			
179	239	137	22	59	230	128	11	45	1	2	0
188	179	0	0	0	0	0	0	0			
180	230	128	11	45	221	119	1	38	1	2	0
179	170	0	0	0	0	0	0	0			
181	316	214	47	84	324	222	58	95	1	2	0
265	273	0	0	0	0	0	0	0			
182	324	222	58	95	334	231	69	106	1	2	0
273	262	0	0	0	0	0	0	0			
183	341	239	59	96	332	230	48	85	1	2	0
290	241	0	0	0	0	0	0	0			
184	332	230	48	85	323	221	38	75	1	2	0
241	272	0	0	0	0	0	0	0			

							THK1	THK2	THK3	THK4	STIF
185	515	500	501	517			.625	.625	.625	.625	0.
186	517	501	502	518			.625	.625	.625	.625	0.
187	518	502	503	503			.625	.625	.625	.625	0.
188	518	503	504	504			.625	.625	.625	.625	0.
189	518	504	505	505			.625	.625	.625	.625	0.
190	518	505	506	506			.625	.625	.625	.625	0.
191	518	506	507	517			.625	.625	.625	.625	0.
192	517	507	508	509			.625	.625	.625	.625	0.
193	517	509	510	516			.625	.625	.625	.625	0.
194	516	510	511	511			.625	.625	.625	.625	0.
195	516	511	512	512			.625	.625	.625	.625	0.
196	516	512	513	513			.625	.625	.625	.625	0.
197	516	513	514	514			.625	.625	.625	.625	0.
198	516	514	515	517			.625	.625	.625	.625	0.

							AREA	IZ IP	IY SHRY	THK2 SHRY	THKY	THET
199	530	531					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
200	531	532					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
201	532	533					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
202	533	534					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
203	534	535					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
204	535	536					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
205	536	537					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
206	537	538					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		
207	538	539					.430	.147E-01	.147E-01	.740	.740	0.
							0.	.294E-01	0.	0.		

							THK1	THK2	THK3	THK4	STIF
208	557	555	558	550			1.25	1.25	1.25	1.25	0.
209	550	558	559	551			1.25	1.25	1.25	1.25	0.
210	551	559	577	577			1.25	1.25	1.25	1.25	0.
211	551	577	576	552			1.25	1.25	1.25	1.25	0.
212	552	576	560	560			1.25	1.25	1.25	1.25	0.

ANALYSIS - COMPREHENSIVE ANALYSIS SYSTEM REVISION 3 UPDATE 6/11 CYPRI76 JUNE 1, 1979
 SENSORS ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLUB 4 INCH VALVE LIMITER APP PFI 4270 STATIC ANALYSIS 14.3667 83/ 4/26 CP= 9.896

***** NODE DEFINITIONS (CARD 1) *****

NODE	LOCATION			ROTATION (DEGREES)			
	X (IN IN)	Y (OR THETA)	Z (OR PHI)	THX (OR PT)	THY (OR TP)	THZ (OR RP)	
COORDINATE SYSTEM 3	TYPE 1	CENTER LOCATION	0.000	0.000	0.000	0.00	0.00 0.00
1	2.0000	270.00	0.	0.	0.	0.	COORD. SYSTEM 3
2	30606E-10	-2.0000	0.	0.	0.	0.	COORD. SYSTEM 3
3	2.0000	292.50	0.	0.	0.	0.	COORD. SYSTEM 3
4	76537	-1.4478	0.	0.	0.	0.	COORD. SYSTEM 3
5	2.0000	315.00	0.	0.	0.	0.	COORD. SYSTEM 3
6	1.4142	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
7	1.7510	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
8	2.0000	-2.0000	0.	0.	0.	0.	COORD. SYSTEM 3
9	2.0000	0.	0.	0.	0.	0.	COORD. SYSTEM 3
10	2.0000	22.500	0.	0.	0.	0.	COORD. SYSTEM 3
11	1.4478	76537	0.	0.	0.	0.	COORD. SYSTEM 3
12	2.0000	45.000	0.	0.	0.	0.	COORD. SYSTEM 3
13	1.4142	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
14	2.0000	67.500	0.	0.	0.	0.	COORD. SYSTEM 3
15	76537	1.4478	0.	0.	0.	0.	COORD. SYSTEM 3
16	2.0000	90.000	0.	0.	0.	0.	COORD. SYSTEM 3
17	-10207E-10	2.0000	0.	0.	0.	0.	COORD. SYSTEM 3
18	2.0000	112.50	0.	0.	0.	0.	COORD. SYSTEM 3
19	76537	1.4478	0.	0.	0.	0.	COORD. SYSTEM 3
20	3.7500	270.00	0.	0.	0.	0.	COORD. SYSTEM 3
21	57307E-10	-3.7500	0.	0.	0.	0.	COORD. SYSTEM 3
22	1.7500	292.50	0.	0.	0.	0.	COORD. SYSTEM 3
23	1.4351	-3.4645	0.	0.	0.	0.	COORD. SYSTEM 3
24	3.7500	315.00	0.	0.	0.	0.	COORD. SYSTEM 3
25	2.6517	-2.6517	0.	0.	0.	0.	COORD. SYSTEM 3
26	3.7500	337.50	0.	0.	0.	0.	COORD. SYSTEM 3
27	1.4445	-1.4351	0.	0.	0.	0.	COORD. SYSTEM 3
28	1.7500	-2.0000	0.	0.	0.	0.	COORD. SYSTEM 3
29	3.7500	0.	0.	0.	0.	0.	COORD. SYSTEM 3
30	3.7500	0.	0.	0.	0.	0.	COORD. SYSTEM 3
31	3.7500	22.500	0.	0.	0.	0.	COORD. SYSTEM 3
32	1.4351	76537	0.	0.	0.	0.	COORD. SYSTEM 3
33	2.0000	45.000	0.	0.	0.	0.	COORD. SYSTEM 3
34	2.6517	2.6517	0.	0.	0.	0.	COORD. SYSTEM 3
35	1.7500	67.500	0.	0.	0.	0.	COORD. SYSTEM 3
36	1.4351	3.4645	0.	0.	0.	0.	COORD. SYSTEM 3
37	1.7500	90.000	0.	0.	0.	0.	COORD. SYSTEM 3
38	-19106E-10	3.7500	0.	0.	0.	0.	COORD. SYSTEM 3
39	3.7500	2.50	0.	0.	0.	0.	COORD. SYSTEM 3
40	-1.4351	3.4645	0.	0.	0.	0.	COORD. SYSTEM 3
41	4.5000	270.00	0.	0.	0.	0.	COORD. SYSTEM 3
42	6.864E-10	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
43	4.5000	292.50	0.	0.	0.	0.	COORD. SYSTEM 3
44	1.7500	-4.1575	0.	0.	0.	0.	COORD. SYSTEM 3

27	4.5000	315.00	0.	0.	0.	COORD. SYSTEM 3
28	3.1829	-3.1829	0.	0.	0.	COORD. SYSTEM 3
29	4.5000	337.50	0.	0.	0.	COORD. SYSTEM 3
30	4.1575	-1.7221	0.	0.	0.	COORD. SYSTEM 3
31	4.5000	-91000	0.	0.	0.	COORD. SYSTEM 3
32	4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
33	4.3475	1.0000	0.	0.	0.	COORD. SYSTEM 3
34	4.5000	45.000	0.	0.	0.	COORD. SYSTEM 3
35	3.1820	3.1820	0.	0.	0.	COORD. SYSTEM 3
36	4.5000	67.500	0.	0.	0.	COORD. SYSTEM 3
37	1.7221	4.1575	0.	0.	0.	COORD. SYSTEM 3
38	4.5000	90.000	0.	0.	0.	COORD. SYSTEM 3
39	-2.2965E-10	4.5000	0.	0.	0.	COORD. SYSTEM 3
40	4.5000	112.50	0.	0.	0.	COORD. SYSTEM 3
41	-1.7221	4.1575	0.	0.	0.	COORD. SYSTEM 3
42	5.1250	-2.0750	0.	0.	0.	COORD. SYSTEM 3
43	5.1250	-1.7200	0.	0.	0.	COORD. SYSTEM 3
44	5.1250	-91000	0.	0.	0.	COORD. SYSTEM 3
45	5.1250	0.	0.	0.	0.	COORD. SYSTEM 3
46	2.0000	1.0000	0.	0.	0.	COORD. SYSTEM 3
47	2.0000	270.00	0.	0.	0.	COORD. SYSTEM 3
48	3.0606E-10	-2.0000	0.	0.	0.	COORD. SYSTEM 3
49	2.0000	1.5000	0.	0.	0.	COORD. SYSTEM 3
50	76537	292.50	0.	0.	0.	COORD. SYSTEM 3
51	2.0000	-1.4470	0.	0.	0.	COORD. SYSTEM 3
52	2.0000	315.00	0.	0.	0.	COORD. SYSTEM 3
53	1.4142	-1.4142	0.	0.	0.	COORD. SYSTEM 3
54	1.7010	-91000	0.	0.	0.	COORD. SYSTEM 3
55	2.0000	0.	0.	0.	0.	COORD. SYSTEM 3
56	2.0000	0.	0.	0.	0.	COORD. SYSTEM 3
57	2.0000	22.500	0.	0.	0.	COORD. SYSTEM 3
58	1.8470	76537	0.	0.	0.	COORD. SYSTEM 3
59	2.0000	45.000	0.	0.	0.	COORD. SYSTEM 3
60	1.4142	1.4142	0.	0.	0.	COORD. SYSTEM 3
61	2.0000	67.500	0.	0.	0.	COORD. SYSTEM 3
62	76537	1.4470	0.	0.	0.	COORD. SYSTEM 3
63	2.0000	90.000	0.	0.	0.	COORD. SYSTEM 3
64	-10.207E-10	2.0000	0.	0.	0.	COORD. SYSTEM 3
65	2.0000	112.50	0.	0.	0.	COORD. SYSTEM 3
66	76537	1.8470	0.	0.	0.	COORD. SYSTEM 3
67	2.0000	270.00	0.	0.	0.	COORD. SYSTEM 3
68	57307E-10	-3.7500	0.	0.	0.	COORD. SYSTEM 3
69	3.7500	292.50	0.	0.	0.	COORD. SYSTEM 3
70	1.4371	-3.4645	0.	0.	0.	COORD. SYSTEM 3
71	3.7500	315.00	0.	0.	0.	COORD. SYSTEM 3
72	2.6517	-2.6517	0.	0.	0.	COORD. SYSTEM 3
73	3.7500	337.50	0.	0.	0.	COORD. SYSTEM 3
74	3.4645	-1.4351	0.	0.	0.	COORD. SYSTEM 3
75	3.7500	-91000	0.	0.	0.	COORD. SYSTEM 3
76	3.7500	0.	0.	0.	0.	COORD. SYSTEM 3
77	3.7500	0.	0.	0.	0.	COORD. SYSTEM 3
78	3.7500	22.500	0.	0.	0.	COORD. SYSTEM 3
79	1.4351	1.4351	0.	0.	0.	COORD. SYSTEM 3
80	1.7500	45.000	0.	0.	0.	COORD. SYSTEM 3
81	2.6517	2.6517	0.	0.	0.	COORD. SYSTEM 3
82	3.7500	67.500	0.	0.	0.	COORD. SYSTEM 3
83	1.4371	3.4645	0.	0.	0.	COORD. SYSTEM 3
84	3.7500	90.000	0.	0.	0.	COORD. SYSTEM 3
85	-19130E-10	3.7500	0.	0.	0.	COORD. SYSTEM 3
86	3.7500	112.50	0.	0.	0.	COORD. SYSTEM 3
87	-1.4351	3.4645	0.	0.	0.	COORD. SYSTEM 3

54	4.5000	270.00	1.5000	0.	0.	0.	COORD. SYSTEM 1
54	4.5000E-10	-4.5000	1.5000	0.	0.	0.	
50	4.5000	272.50	1.5000	0.	0.	0.	COORD. SYSTEM 3
60	1.7221	-4.1575	1.5000	0.	0.	0.	
61	4.5000	315.00	1.5000	0.	0.	0.	COORD. SYSTEM 3
61	3.1820	-3.1820	1.5000	0.	0.	0.	
62	4.5000	337.50	1.5000	0.	0.	0.	COORD. SYSTEM 3
62	4.1575	-1.7221	1.5000	0.	0.	0.	
63	4.5000	-4.9100	1.5000	0.	0.	0.	
64	4.5000	0.	1.5000	0.	0.	0.	COORD. SYSTEM 3
64	4.5000	0.	1.5000	0.	0.	0.	
65	4.3875	1.0000	1.5000	0.	0.	0.	
66	4.5000	45.000	1.5000	0.	0.	0.	COORD. SYSTEM 3
66	3.1820	3.1820	1.5000	0.	0.	0.	
67	4.5000	67.500	1.5000	0.	0.	0.	COORD. SYSTEM 3
67	1.7221	4.1575	1.5000	0.	0.	0.	
68	4.5000	90.000	1.5000	0.	0.	0.	COORD. SYSTEM 3
68	-4.22965E-10	4.5000	1.5000	0.	0.	0.	
69	4.5000	112.50	1.5000	0.	0.	0.	COORD. SYSTEM 3
69	-1.7221	4.1575	1.5000	0.	0.	0.	
70	5.1250	-2.8750	1.5000	0.	0.	0.	
71	5.1250	-1.7200	1.5000	0.	0.	0.	
72	5.1250	-4.9100	1.5000	0.	0.	0.	
73	5.1250	0.	1.5000	0.	0.	0.	
74	5.1250	1.0000	1.5000	0.	0.	0.	
75	2.0000	270.00	3.0000	0.	0.	0.	COORD. SYSTEM 3
75	4.30606E-10	-2.0000	3.0000	0.	0.	0.	
76	2.0000	292.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
76	1.76537	-1.8478	3.0000	0.	0.	0.	
77	2.0000	315.00	3.0000	0.	0.	0.	COORD. SYSTEM 3
77	1.4142	-1.4142	3.0000	0.	0.	0.	
78	1.7810	-4.9100	3.0000	0.	0.	0.	
79	2.0000	0.	3.0000	0.	0.	0.	COORD. SYSTEM 3
79	2.0000	0.	3.0000	0.	0.	0.	
80	2.0000	22.500	3.0000	0.	0.	0.	COORD. SYSTEM 3
80	1.8478	1.76537	3.0000	0.	0.	0.	
81	2.0000	45.000	3.0000	0.	0.	0.	COORD. SYSTEM 3
81	1.4142	1.4142	3.0000	0.	0.	0.	
82	2.0000	67.500	3.0000	0.	0.	0.	COORD. SYSTEM 3
82	1.76537	1.8478	3.0000	0.	0.	0.	
83	2.0000	90.000	3.0000	0.	0.	0.	COORD. SYSTEM 3
83	-1.10207E-10	2.0000	3.0000	0.	0.	0.	
84	2.0000	112.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
84	-1.76537	1.8478	3.0000	0.	0.	0.	
85	3.7500	270.00	3.0000	0.	0.	0.	COORD. SYSTEM 3
85	4.57387E-10	-3.7500	3.0000	0.	0.	0.	
86	3.7500	292.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
86	1.4351	-3.4645	3.0000	0.	0.	0.	
87	3.7500	315.00	3.0000	0.	0.	0.	COORD. SYSTEM 3
87	2.6517	-2.6517	3.0000	0.	0.	0.	
88	3.7500	337.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
88	1.4351	-1.4351	3.0000	0.	0.	0.	
89	3.7500	-4.9100	3.0000	0.	0.	0.	
90	3.7500	0.	3.0000	0.	0.	0.	COORD. SYSTEM 3
90	3.7500	0.	3.0000	0.	0.	0.	
91	3.7500	22.500	3.0000	0.	0.	0.	COORD. SYSTEM 3
91	1.4351	1.4351	3.0000	0.	0.	0.	
92	3.7500	45.000	3.0000	0.	0.	0.	COORD. SYSTEM 3
92	2.6517	2.6517	3.0000	0.	0.	0.	
93	3.7500	67.500	3.0000	0.	0.	0.	COORD. SYSTEM 3
93	1.4351	3.4645	3.0000	0.	0.	0.	

94	1.7500	90.000	3.0000	0.	0.	0.	COORD. SYSTEM 3
95	-1.7500	3.7500	3.0000	0.	0.	0.	COORD. SYSTEM 3
96	1.7500	11.250	3.0000	0.	0.	0.	COORD. SYSTEM 3
97	-1.4351	3.6645	3.0000	0.	0.	0.	COORD. SYSTEM 3
98	4.5000	270.00	3.0000	0.	0.	0.	COORD. SYSTEM 3
99	6.6645E-10	-4.5000	3.0000	0.	0.	0.	COORD. SYSTEM 3
100	4.5000	242.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
101	1.7500	-4.1575	3.0000	0.	0.	0.	COORD. SYSTEM 3
102	4.5000	317.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
103	4.1575	-3.1820	3.0000	0.	0.	0.	COORD. SYSTEM 3
104	4.5000	337.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
105	4.1575	-1.7221	3.0000	0.	0.	0.	COORD. SYSTEM 3
106	4.5000	-9.1000	3.0000	0.	0.	0.	COORD. SYSTEM 3
107	4.5000	0.	3.0000	0.	0.	0.	COORD. SYSTEM 3
108	4.5000	1.0000	3.0000	0.	0.	0.	COORD. SYSTEM 3
109	4.5000	45.000	3.0000	0.	0.	0.	COORD. SYSTEM 3
110	3.1820	3.0000	3.0000	0.	0.	0.	COORD. SYSTEM 3
111	4.5000	67.500	3.0000	0.	0.	0.	COORD. SYSTEM 3
112	1.7221	4.1575	3.0000	0.	0.	0.	COORD. SYSTEM 3
113	4.5000	90.000	3.0000	0.	0.	0.	COORD. SYSTEM 3
114	4.5000	4.5000	3.0000	0.	0.	0.	COORD. SYSTEM 3
115	-2.2965E-10	112.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
116	4.5000	112.50	3.0000	0.	0.	0.	COORD. SYSTEM 3
117	-1.7221	4.1575	3.0000	0.	0.	0.	COORD. SYSTEM 3
118	4.5000	-2.4750	3.0000	0.	0.	0.	COORD. SYSTEM 3
119	5.1250	-1.7200	3.0000	0.	0.	0.	COORD. SYSTEM 3
120	5.1250	-9.1000	3.0000	0.	0.	0.	COORD. SYSTEM 3
121	5.1250	0.	3.0000	0.	0.	0.	COORD. SYSTEM 3
122	2.0000	1.0000	3.0000	0.	0.	0.	COORD. SYSTEM 3
123	-2.0000	113.50	0.	0.	0.	0.	COORD. SYSTEM 3
124	-1.7500	1.8341	0.	0.	0.	0.	COORD. SYSTEM 3
125	2.0000	135.00	0.	0.	0.	0.	COORD. SYSTEM 3
126	-1.4142	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
127	2.0000	157.50	0.	0.	0.	0.	COORD. SYSTEM 3
128	-1.4142	157.50	0.	0.	0.	0.	COORD. SYSTEM 3
129	2.0000	-7.6537	0.	0.	0.	0.	COORD. SYSTEM 3
130	-2.0000	180.00	0.	0.	0.	0.	COORD. SYSTEM 3
131	-2.0000	-204.14E-10	0.	0.	0.	0.	COORD. SYSTEM 3
132	-1.7500	-9.1000	0.	0.	0.	0.	COORD. SYSTEM 3
133	2.0000	225.00	0.	0.	0.	0.	COORD. SYSTEM 3
134	-1.4142	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
135	2.0000	247.50	0.	0.	0.	0.	COORD. SYSTEM 3
136	-2.0000	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
137	2.0000	269.00	0.	0.	0.	0.	COORD. SYSTEM 3
138	-2.0000	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
139	2.0000	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
140	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
141	2.0000	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
142	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
143	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
144	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
145	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
146	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
147	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
148	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
149	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
150	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
151	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
152	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
153	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
154	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
155	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
156	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
157	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
158	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
159	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
160	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
161	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
162	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
163	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
164	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
165	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
166	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
167	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
168	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
169	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
170	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
171	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
172	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
173	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
174	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
175	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
176	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
177	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
178	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
179	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
180	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
181	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
182	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
183	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
184	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
185	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
186	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
187	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
188	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
189	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
190	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
191	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
192	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
193	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
194	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
195	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
196	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
197	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
198	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
199	2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
200	-2.0000	1.4142	0.	0.	0.	0.	COORD. SYSTEM 3

[illegible]

[illegible]

222	-1.5394	3.4339	0.	0.	0.	COORD. SYSTEM 3
223	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
224	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
225	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
226	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
227	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
228	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
229	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
230	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
231	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
232	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
233	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
234	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
235	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
236	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
237	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
238	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
239	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
240	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
241	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
242	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
243	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
244	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
245	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
246	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
247	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
248	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
249	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
250	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
251	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
252	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
253	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
254	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
255	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
256	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
257	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
258	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
259	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
260	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
261	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
262	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
263	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
264	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
265	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
266	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
267	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
268	-2.6517	0.5000	0.	0.	0.	COORD. SYSTEM 3
269	3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3
270	-3.7500	1.5000	0.	0.	0.	COORD. SYSTEM 3

268	-1.7010	-91000	0.	0.	0.	COORD. SYSTEM 3
269	2.0000	227.00	0.	0.	0.	
270	-1.4142	0.	0.	0.	0.	COORD. SYSTEM 3
271	2.0000	247.50	0.	0.	0.	
272	-1.7637	0.	0.	0.	0.	COORD. SYSTEM 3
273	2.0000	269.00	0.	0.	0.	
274	-1.4997	0.	0.	0.	0.	COORD. SYSTEM 3
275	3.7500	113.50	0.	0.	0.	
276	-1.4997	0.	0.	0.	0.	COORD. SYSTEM 3
277	3.7500	135.00	0.	0.	0.	
278	-2.6517	0.	0.	0.	0.	COORD. SYSTEM 3
279	3.7500	157.50	0.	0.	0.	
280	-3.4685	0.	0.	0.	0.	COORD. SYSTEM 3
281	3.7500	180.00	0.	0.	0.	
282	-3.4685	0.	0.	0.	0.	COORD. SYSTEM 3
283	3.7500	202.50	0.	0.	0.	
284	-3.4685	0.	0.	0.	0.	COORD. SYSTEM 3
285	3.7500	225.00	0.	0.	0.	
286	-2.6517	0.	0.	0.	0.	COORD. SYSTEM 3
287	3.7500	247.50	0.	0.	0.	
288	-1.4351	0.	0.	0.	0.	COORD. SYSTEM 3
289	3.7500	269.00	0.	0.	0.	
290	-65447E-01	0.	0.	0.	0.	COORD. SYSTEM 3
291	4.5000	113.50	0.	0.	0.	
292	-1.7944	0.	0.	0.	0.	COORD. SYSTEM 3
293	3.7500	135.00	0.	0.	0.	
294	-1.7944	0.	0.	0.	0.	COORD. SYSTEM 3
295	3.7500	157.50	0.	0.	0.	
296	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
297	3.7500	180.00	0.	0.	0.	
298	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
299	3.7500	202.50	0.	0.	0.	
300	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
301	3.7500	225.00	0.	0.	0.	
302	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
303	3.7500	247.50	0.	0.	0.	
304	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
305	3.7500	269.00	0.	0.	0.	
306	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
307	3.7500	291.50	0.	0.	0.	
308	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
309	3.7500	314.00	0.	0.	0.	
310	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
311	3.7500	336.50	0.	0.	0.	
312	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
313	3.7500	359.00	0.	0.	0.	
314	-4.5000	0.	0.	0.	0.	COORD. SYSTEM 3
315	3.7500	381.50	0.	0.	0.	

116	2.0000	113.50	3.0000	0.	0.	0.
116	-2.79750	1.4341	3.0000	0.	0.	0.
117	2.0000	135.00	3.0000	0.	0.	0.
117	-1.4142	1.4142	3.0000	0.	0.	0.
118	2.0000	157.50	3.0000	0.	0.	0.
118	-1.4478	1.6537	3.0000	0.	0.	0.
119	2.0000	180.00	3.0000	0.	0.	0.
119	-2.0000	-2.20414E-10	3.0000	0.	0.	0.
120	-1.7910	-2.41000	3.0000	0.	0.	0.
121	2.0000	225.00	3.0000	0.	0.	0.
121	-1.4142	-1.4142	3.0000	0.	0.	0.
122	2.0000	247.50	3.0000	0.	0.	0.
122	-1.76517	-1.4478	3.0000	0.	0.	0.
123	2.0000	269.00	3.0000	0.	0.	0.
123	-2.34905E-01	-1.4997	3.0000	0.	0.	0.
124	3.7500	113.50	3.0000	0.	0.	0.
124	-1.4453	3.4390	3.0000	0.	0.	0.
125	3.7500	135.00	3.0000	0.	0.	0.
125	-2.6517	2.6517	3.0000	0.	0.	0.
126	3.7500	157.50	3.0000	0.	0.	0.
126	-3.4645	1.4351	3.0000	0.	0.	0.
127	3.7500	180.00	3.0000	0.	0.	0.
127	-3.7500	-3.38276E-10	3.0000	0.	0.	0.
128	-3.7500	-2.41000	3.0000	0.	0.	0.
129	3.7500	202.50	3.0000	0.	0.	0.
129	-3.4645	-1.4351	3.0000	0.	0.	0.
130	3.7500	225.00	3.0000	0.	0.	0.
130	-2.6517	-2.6517	3.0000	0.	0.	0.
131	3.7500	247.50	3.0000	0.	0.	0.
131	-1.4351	-3.4645	3.0000	0.	0.	0.
132	3.7500	269.00	3.0000	0.	0.	0.
132	-2.65447E-01	-3.7494	3.0000	0.	0.	0.
133	4.5000	113.50	3.0000	0.	0.	0.
133	-1.7944	4.1268	3.0000	0.	0.	0.
134	-1.7400	2.5000	3.0000	0.	0.	0.
135	-4.5000	1.0000	3.0000	0.	0.	0.
136	-4.5000	0.	3.0000	0.	0.	0.
137	-4.5000	-2.41000	3.0000	0.	0.	0.
138	-4.5000	-2.7500	3.0000	0.	0.	0.
139	4.5000	225.00	3.0000	0.	0.	0.
139	-3.1420	-3.1420	3.0000	0.	0.	0.
140	-1.4400	-4.2500	3.0000	0.	0.	0.
141	4.5000	269.00	3.0000	0.	0.	0.
141	-2.78515E-01	-4.4993	3.0000	0.	0.	0.
142	-4.5000	2.5000	3.0000	0.	0.	0.
143	-4.5000	-4.2500	3.0000	0.	0.	0.
144	-3.1800	-4.2500	3.0000	0.	0.	0.
145	-5.4340	2.5000	3.0000	0.	0.	0.
146	-5.4340	1.0000	3.0000	0.	0.	0.
147	-5.4340	0.	3.0000	0.	0.	0.
148	-5.4340	-2.41000	3.0000	0.	0.	0.
149	-5.4340	-2.7500	3.0000	0.	0.	0.
150	-5.4340	-4.2500	3.0000	0.	0.	0.
151	-4.4340	4.7500	3.0000	0.	0.	0.
152	-4.4340	3.5400	3.0000	0.	0.	0.
153	-4.4340	2.5000	3.0000	0.	0.	0.
154	-4.4340	1.0000	3.0000	0.	0.	0.
155	-4.4340	-2.7500	3.0000	0.	0.	0.
156	-4.4340	-4.2500	3.0000	0.	0.	0.
157	-4.4340	-5.4100	3.0000	0.	0.	0.
158	-4.4340	-6.5000	3.0000	0.	0.	0.

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COORDINATE	SYSTEM	TYPE	1	CENTER	LOCATION	0.000	0.000	0.000	0.00	0.00	0.00
154	-4.6000			4.7500	4.0000	0.	0.	0.			
150	-4.6000			3.7500	3.0000	0.	0.	0.			
151	-4.6000			2.5000	3.0000	0.	0.	0.			
162	-4.6000			1.0000	3.0000	0.	0.	0.			
163	-4.6000			-2.7500	3.0000	0.	0.	0.			
164	-4.6000			-4.2500	3.0000	0.	0.	0.			
165	-4.6000			-5.4100	3.0000	0.	0.	0.			
165	-4.6000			-6.5000	3.0000	0.	0.	0.			
COORDINATE	SYSTEM	TYPE	0	CENTER	LOCATION	0.000	0.000	0.000	0.00	0.00	0.00
500	2.0000		0.	0.	0.75000	0.	0.	0.			COORD. SYSTEM 4
501	2.0000		0.	22.500	0.	0.	0.	0.			COORD. SYSTEM 4
501	1.8478		76537	76537	75000	0.	0.	0.			COORD. SYSTEM 4
502	2.0000		45.000	0.	0.	0.	0.	0.			COORD. SYSTEM 4
502	1.4142		1.4142	75000	0.	0.	0.	0.			COORD. SYSTEM 4
503	2.0000		67.500	0.	0.	0.	0.	0.			COORD. SYSTEM 4
503	76537		1.8478	75000	0.	0.	0.	0.			COORD. SYSTEM 4
504	2.0000		90.000	0.	0.	0.	0.	0.			COORD. SYSTEM 4
504	-10207E-10		2.0000	75000	0.	0.	0.	0.			COORD. SYSTEM 4
505	2.0000		112.50	0.	0.	0.	0.	0.			COORD. SYSTEM 4
505	76537		1.8478	75000	0.	0.	0.	0.			COORD. SYSTEM 4
506	2.0000		135.00	0.	0.	0.	0.	0.			COORD. SYSTEM 4
506	1.4142		1.4142	75000	0.	0.	0.	0.			COORD. SYSTEM 4
507	2.0000		157.50	0.	0.	0.	0.	0.			COORD. SYSTEM 4
507	1.8478		76537	75000	0.	0.	0.	0.			COORD. SYSTEM 4
508	2.0000		180.00	0.	0.	0.	0.	0.			COORD. SYSTEM 4
509	2.0000		-20414E-10	75000	0.	0.	0.	0.			COORD. SYSTEM 4
509	1.8478		202.50	0.	0.	0.	0.	0.			COORD. SYSTEM 4
510	2.0000		-76537	75000	0.	0.	0.	0.			COORD. SYSTEM 4
510	1.4142		225.00	0.	0.	0.	0.	0.			COORD. SYSTEM 4
511	2.0000		-1.4142	75000	0.	0.	0.	0.			COORD. SYSTEM 4
511	2.0000		247.50	0.	0.	0.	0.	0.			COORD. SYSTEM 4
512	-76537		-1.8478	75000	0.	0.	0.	0.			COORD. SYSTEM 4
512	2.0000		270.00	0.	0.	0.	0.	0.			COORD. SYSTEM 4
513	30606E-10		-2.0000	75000	0.	0.	0.	0.			COORD. SYSTEM 4
513	2.0000		292.50	0.	0.	0.	0.	0.			COORD. SYSTEM 4
514	76537		-1.8478	75000	0.	0.	0.	0.			COORD. SYSTEM 4
514	2.0000		315.00	0.	0.	0.	0.	0.			COORD. SYSTEM 4
515	2.0000		-1.4142	75000	0.	0.	0.	0.			COORD. SYSTEM 4
515	2.0000		337.50	0.	0.	0.	0.	0.			COORD. SYSTEM 4
516	0.		-76537	75000	0.	0.	0.	0.			COORD. SYSTEM 5
516	0.		-1.5000	75000	0.	0.	0.	0.			COORD. SYSTEM 5
517	0.		-1.5000	75000	0.	0.	0.	0.			COORD. SYSTEM 5
517	0.		0.	75000	0.	0.	0.	0.			COORD. SYSTEM 5
518	0.		1.5000	75000	0.	0.	0.	0.			COORD. SYSTEM 5
518	0.		1.5000	75000	0.	0.	0.	0.			COORD. SYSTEM 5
519	-15.000		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
520	-5.9375		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
521	-8.5000		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
522	-3.7500		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
523	0.		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
524	0.		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
525	1.7816		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
526	1.7500		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5
527	4.5000		-91000	1.5000	0.	0.	0.	0.			COORD. SYSTEM 5

549	5.1750	-9.91000	1.5000	0.	0.	0.
COORDINATE SYSTEM 6	TYPE 1	CENTER LOCATION	-9.730	-9.910	1.500	ANGLES 0.00 90.00 0.00

COORDINATE SYSTEM 7	CENTER LOCATION	-9.730	-9.910	1.500	ANGLES 0.00 90.00 0.00
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550	1.5000	22.500	0.	0.	0.	COORD. SYSTEM 6
550	-9.7300	-2.13597	2.8858	0.	0.	
551	1.5000	67.500	0.	0.	0.	COORD. SYSTEM 6
551	-9.7300	.47582	2.0740	0.	0.	
552	1.5000	112.50	0.	0.	0.	COORD. SYSTEM 6
552	-9.7300	.47582	.92597	0.	0.	
553	1.5000	157.50	0.	0.	0.	COORD. SYSTEM 6
553	-9.7300	-2.13597	.11418	0.	0.	
554	1.5000	202.50	0.	0.	0.	COORD. SYSTEM 6
554	-9.7300	-1.4840	.11418	0.	0.	
555	1.5000	247.50	0.	0.	0.	COORD. SYSTEM 6
555	-9.7300	-2.2958	.42597	0.	0.	
556	1.5000	292.50	0.	0.	0.	COORD. SYSTEM 6
556	-9.7300	-2.2958	2.0740	0.	0.	
557	1.5000	337.50	0.	0.	0.	COORD. SYSTEM 6
557	-9.7300	-1.4840	2.8858	0.	0.	
558	5.0000	22.500	0.	0.	0.	COORD. SYSTEM 6
558	-9.7300	1.0034	6.1194	0.	0.	
559	5.0000	67.500	0.	0.	0.	COORD. SYSTEM 6
559	-9.7300	3.7094	3.4134	0.	0.	
560	5.0000	112.50	0.	0.	0.	COORD. SYSTEM 6
560	-9.7300	3.7094	-4.1342	0.	0.	
561	5.0000	157.50	0.	0.	0.	COORD. SYSTEM 6
561	-9.7300	1.0034	-3.1194	0.	0.	
562	5.0000	202.50	0.	0.	0.	COORD. SYSTEM 6
562	-9.7300	-2.8234	-3.1194	0.	0.	
563	5.0000	247.50	0.	0.	0.	COORD. SYSTEM 6
563	-9.7300	-5.5294	-4.1342	0.	0.	
564	5.0000	292.50	0.	0.	0.	COORD. SYSTEM 6
564	-9.7300	-5.5294	3.4134	0.	0.	
565	5.0000	337.50	0.	0.	0.	COORD. SYSTEM 6
565	-9.7300	-2.8234	6.1194	0.	0.	
566	6.0000	22.500	0.	0.	0.	COORD. SYSTEM 6
566	-9.7300	1.3861	7.0433	0.	0.	
567	6.0000	67.500	0.	0.	0.	COORD. SYSTEM 6
567	-9.7300	4.6333	3.7961	0.	0.	
568	6.0000	112.50	0.	0.	0.	COORD. SYSTEM 6
568	-9.7300	4.6333	-7.9610	0.	0.	
569	6.0000	157.50	0.	0.	0.	COORD. SYSTEM 6
569	-9.7300	1.3861	-4.0433	0.	0.	
570	6.0000	202.50	0.	0.	0.	COORD. SYSTEM 6
570	-9.7300	-3.2061	-4.0433	0.	0.	
571	6.0000	247.50	0.	0.	0.	COORD. SYSTEM 6
571	-9.7300	-6.4533	-7.9610	0.	0.	
572	6.0000	292.50	0.	0.	0.	COORD. SYSTEM 6
572	-9.7300	-6.4533	3.7961	0.	0.	
573	6.0000	337.50	0.	0.	0.	COORD. SYSTEM 6
573	-9.7300	-3.2061	7.0433	0.	0.	
574	-7.5000	5.5430	0.	0.	0.	COORD. SYSTEM 7
574	-9.7300	4.6330	.75000	0.	0.	
575	-7.5000	5.5430	0.	0.	0.	COORD. SYSTEM 7
575	-9.7300	4.6330	2.2500	0.	0.	
576	-7.5000	4.5000	0.	0.	0.	COORD. SYSTEM 7
575	-9.7300	3.5400	.75000	0.	0.	

577	.75000	4.5000	0.	0.	0.	0.	COORD.SYSTEM 7
577	-4.7300	3.5900	2.2500	0.	0.	0.	
578	.75000	-4.5000	0.	0.	0.	0.	COORD.SYSTEM 7
578	-4.7300	-5.4100	.75000	0.	0.	0.	
579	.75000	-4.5000	0.	0.	0.	0.	COORD.SYSTEM 7
579	-4.7300	-5.4100	2.2500	0.	0.	0.	
580	.75000	-5.5430	0.	0.	0.	0.	COORD.SYSTEM 7
580	-4.7300	-6.4530	.75000	0.	0.	0.	
581	.75000	-5.5430	0.	0.	0.	0.	COORD.SYSTEM 7
581	-4.7300	-6.4530	2.2500	0.	0.	0.	
590	0.	0.	0.	0.	0.	0.	COORD.SYSTEM 7
590	-4.7300	-4.91000	1.5000	0.	0.	0.	
591	-10.538	-4.91000	1.5000	0.	0.	0.	
600	-10.538	-10.510	-1.55000	0.	0.	0.	

XMIN= -15.00 XMAX= 5.125 YMIN= -10.51 YMAX= 4.750 ZMIN= -4.043 ZMAX= 7.043

OCTAL STORAGE REQUIREMENTS FOR NODE INPUT CP= 17.300
 CORE= 00141732 MEMORY= 00007020 TOTAL= 00150752 MEMORY AVAILABLE= 00147770
 MAXIMUM NODE NUMBER FOR AVAILABLE AUXILIARY MEMORY SIZE= 8873

MODEL GEOMETRY WRITTEN ON FILE TAPE 3

PROBLEM DATA WRITTEN ON FILE TAPE 7

AL-SYS - ENGINEERING ANALYSIS SYSTEM, REVISION 3, UPDATE 67L1 CYHD176 JUNE 1, 1979
 SHAWSON ANALYSIS SYSTEMS, INC., HOUSTON, PENNSYLVANIA 15142 PHONE (612) 746-3304

19.367H R3/ 4/26 CP= 31.084

CLON 8 INCH VALVE LIMEHICK NPP DEL R220 STATIC ANALYSIS

***** MATERIAL PROPERTIES (CARD 1) *****

MATERIAL 1
 EX = .299000E+08
 ALPX = .650000E-05
 UENS = .730000E-03
 NUXX = .300000

MATERIAL 2
 EX = .292000E+08
 ALPX = .650000E-05
 UENS = .730000E-03
 NUXX = .300000

MATERIAL 3
 EX = .243000E+08
 ALPX = .650000E-05
 UENS = .730000E-03
 NUXX = .300000

MATERIAL 4
 EX = .299000E+08
 ALPX = .650000E-05
 UENS = 0.
 NUXX = .300000

MATERIAL 5
 EX = .299000E+08
 ALPX = .650000E-05
 UENS = .413000E-03
 NUXX = .300000

***** COUPLED DEFS. OF +H. DEFINITIONS (CARD J) *****

SET	D.O.F.	NUMBER	COUPLED NODES
1	07	2	500
2	07	2	501
3	07	2	502
4	07	2	503
5	07	2	504
6	07	2	505
7	07	2	506
8	07	2	507
9	07	2	508
10	07	2	509
11	07	2	510
12	07	2	511

13	UZ	2	512	1
14	UZ	2	513	2
15	UZ	2	514	1
16	UZ	2	515	4
17	UY	2	533	276
18	UZ	2	533	276
19	UY	2	534	218
20	UZ	2	534	218
21	UY	2	536	41
22	UZ	2	536	41
23	UY	2	537	52
24	UZ	2	537	52
25	UX	2	539	72
26	UX	2	576	207
27	UY	2	576	207
28	UZ	2	576	207
29	UX	2	577	309
30	UY	2	577	309
31	UZ	2	577	309
32	UX	2	578	212
33	UY	2	578	212
34	UZ	2	578	212
35	UX	2	579	314
36	UY	2	579	314
37	UZ	2	579	314

37 COUPLED SETS

OCTAL STORAGE REQUIREMENTS FOR H THROUGH K CASE DATA INPUT CP= 32.146
 CORE= 00144060 MEMORY= 00000000 TOTAL= 00144060 MEMORY AVAILABLE= 00147770

NEW TITLE= INTERNAL PRESSURE LOAD

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INTERNAL PRESSURE LOAD

19.3683 H3/ 4/26 CP= 32.469

LOAD STEP NUMBER = 1

***** LOAD STEP OPTIONS (CARD L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	1	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . . 0.		TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NUPRT	70-72 (CARD M)

***** SPECIFIED DISPLACEMENTS (CARD N) *****

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
12			0.			
14			0.			
17			0.			
19			0.			
21			0.			
59	0.					
68	0.					
73		0.				
86			0.			
88			0.			
91			0.			
93			0.			
95			0.			
122			0.			
125			0.			
127			0.			
234		0.				
326			0.			
329			0.			
331			0.			

***** SPECIFIED PRESSURES (CARD P) *****

NO.	ELEMENT	FACE	VALUE
1	1	5	285.00
2	2	5	285.00
3	3	5	285.00
4	5	5	285.00
5	6	5	285.00

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2	7	1	242.00
3	8	2	245.00
4	9	3	245.00
5	10	4	245.00
6	11	5	245.00
7	12	6	245.00
8	13	7	245.00
9	14	8	245.00
10	15	9	245.00
11	16	10	245.00
12	17	11	245.00
13	18	12	245.00
14	19	13	245.00
15	20	14	245.00
16	21	15	245.00
17	22	16	245.00
18	23	17	245.00
19	24	18	245.00
20	25	19	245.00
21	26	20	245.00
22	27	21	245.00
23	28	22	245.00
24	29	23	245.00
25	30	24	245.00
26	31	25	245.00
27	32	26	245.00
28	33	27	245.00
29	34	28	245.00
30	35	29	245.00
31	36	30	245.00
32	37	31	245.00
33	38	32	245.00
34	39	33	245.00
35	40	34	245.00
36	41	35	245.00
37	42	36	245.00
38	43	37	245.00
39	44	38	245.00
40	45	39	245.00
41	46	40	245.00
42	47	41	245.00
43	48	42	245.00
44	49	43	245.00
45	50	44	245.00
46	51	45	245.00
47	52	46	245.00
48	53	47	245.00
49	54	48	245.00
50	55	49	245.00
51	56	50	245.00
52	57	51	245.00
53	58	52	245.00
54	59	53	245.00
55	60	54	245.00
56	61	55	245.00
57	62	56	245.00
58	63	57	245.00
59	64	58	245.00
60	65	59	245.00
61	66	60	245.00
62	67	61	245.00
63	68	62	245.00
64	69	63	245.00
65	70	64	245.00
66	71	65	245.00
67	72	66	245.00
68	73	67	245.00
69	74	68	245.00
70	75	69	245.00
71	76	70	245.00
72	77	71	245.00
73	78	72	245.00
74	79	73	245.00
75	80	74	245.00
76	81	75	245.00
77	82	76	245.00
78	83	77	245.00
79	84	78	245.00
80	85	79	245.00
81	86	80	245.00
82	87	81	245.00
83	88	82	245.00
84	89	83	245.00
85	90	84	245.00
86	91	85	245.00
87	92	86	245.00
88	93	87	245.00
89	94	88	245.00
90	95	89	245.00
91	96	90	245.00
92	97	91	245.00
93	98	92	245.00
94	99	93	245.00
95	100	94	245.00
96	101	95	245.00
97	102	96	245.00
98	103	97	245.00
99	104	98	245.00
100	105	99	245.00
101	106	100	245.00
102	107	101	245.00
103	108	102	245.00
104	109	103	245.00
105	110	104	245.00
106	111	105	245.00
107	112	106	245.00
108	113	107	245.00
109	114	108	245.00
110	115	109	245.00
111	116	110	245.00
112	117	111	245.00
113	118	112	245.00
114	119	113	245.00
115	120	114	245.00
116	121	115	245.00
117	122	116	245.00
118	123	117	245.00
119	124	118	245.00
120	125	119	245.00
121	126	120	245.00
122	127	121	245.00
123	128	122	245.00
124	129	123	245.00
125	130	124	245.00
126	131	125	245.00
127	132	126	245.00
128	133	127	245.00
129	134	128	245.00
130	135	129	245.00
131	136	130	245.00
132	137	131	245.00
133	138	132	245.00
134	139	133	245.00
135	140	134	245.00
136	141	135	245.00
137	142	136	245.00
138	143	137	245.00
139	144	138	245.00
140	145	139	245.00
141	146	140	245.00
142	147	141	245.00
143	148	142	245.00
144	149	143	245.00
145	150	144	245.00
146	151	145	245.00
147	152	146	245.00
148	153	147	245.00
149	154	148	245.00
150	155	149	245.00
151	156	150	245.00
152	157	151	245.00
153	158	152	245.00
154	159	153	245.00
155	160	154	245.00
156	161	155	245.00
157	162	156	245.00
158	163	157	245.00
159	164	158	245.00
160	165	159	245.00
161	166	160	245.00
162	167	161	245.00
163	168	162	245.00
164	169	163	245.00
165	170	164	245.00
166	171	165	245.00
167	172	166	245.00
168	173	167	245.00
169	174	168	245.00
170	175	169	245.00
171	176	170	245.00
172	177	171	245.00
173	178	172	245.00
174	179	173	245.00
175	180	174	245.00
176	181	175	245.00
177	182	176	245.00
178	183	177	245.00
179	184	178	245.00
180	185	179	245.00
181	186	180	245.00
182	187	181	245.00
183	188	182	245.00
184	189	183	245.00
185	190	184	245.00
186	191	185	245.00
187	192	186	245.00
188	193	187	245.00
189	194	188	245.00
190	195	189	245.00
191	196	190	245.00
192	197	191	245.00
193	198	192	245.00
194	199	193	245.00
195	200	194	245.00
196	201	195	245.00
197	202	196	245.00
198	203	197	245.00
199	204	198	245.00
200	205	199	245.00

TORQUE 2112 IN LB

10.4642 R3/ 4/26 CP= 152.639

LOAD STEP NUMBER = 2

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	1	KUIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS. . . .	1	NITTEW	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NUPRNT	70-72 (CARD M)

***** SPECIFIED DISPLACEMENTS (CARD N) *****

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
12	0.	0.	0.			
14	0.	0.	0.			
17	0.	0.	0.			
19	0.	0.	0.			
21	0.	0.	0.			
86	0.	0.	0.			
88	0.	0.	0.			
91	0.	0.	0.			
93	0.	0.	0.			
95	0.	0.	0.			
122	0.	0.	0.			
125	0.	0.	0.			
127	0.	0.	0.			
326	0.	0.	0.			
329	0.	0.	0.			
331	0.	0.	0.			

***** SPECIFIED FORCES (CARD O) *****

NO.	NODE	DIRECTION	VALUE
1	530	MX	-2112.00
2	600	MX	2112.00

***** LOAD SUMMARY - 48 DISPLACEMENTS 2 FORCES 0 PRESSURES *****

C-40

X DIRECTION ACCEL

19.5436 R3/ 4/26 CP= 501.290

LOAD STEP NUMBER = 3

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS	1	NITEN	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP . . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	44-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NDPRNT	70-72 (CARD M)

COORDINATE ACCELERATIONS 386.40 0. 0.

*** LOADING CHANGES ***

***** SPECIFIED FORCES (CARD O) *****

NO.	NODE	DIRECTION	VALUE
1	530	MX	0.
2	500	MX	0.

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 550.664
 CORE= 00142551 MEMORY= 06007021 TOTAL= 00151572 MEMORY AVAILABLE= 00147770

TIME AT START OF BACK SUBSTITUTION CP= 550.673 STEP= 3 ITERATION= 1

*** STEP 3 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CUM. ITER.= 3

NEW TITLE= Y DIRECTION ACCEL

C-41

Y DIRECTION ACCEL

19.6592 R3/ 4/26 CP= 572.330

LOAD STEP NUMBER = 4

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY . .	2	NPRINT	10-12
TIME AT END OF LOAD STEP. . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY . .	2	NDPRNT	70-72 (CARD M)

COORDINATE ACCELERATIONS 0. 386.40 0.

*** LOADING CHANGES ***

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 621.250
 CORE= 00142551 MEMORY= 00007021 TOTAL= 00151572 MEMORY AVAILABLE= 00147770

TIME AT START OF BACK SUBSTITUTION CP= 621.260 STEP= 4 ITERATION= 1

*** STEP 4 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CUM. ITER.= 4

NEW TITLE= Z DIRECTION ACCEL

C-42

7 DIRECTION ACCEL

19.7586 83/ 4/26 CP= 642.886

LOAD STEP NUMBER = 5

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	-2	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITER	7-9
STRESS PRINTOUT FREQUENCY	2	NPRINT	10-12
TIME AT END OF LOAD STEP.	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
DISPL. PRINTOUT FREQUENCY	2	NUPRNT	70-72 (CARD M)

COORDINATE ACCELERATIONS 0. 0. 386.40

*** LOADING CHANGES ***

OCTAL STORAGE REQUIREMENTS FOR NEW LOAD ON OLD STIFF. MATRIX CP= 691.989
 CORE= 00142551 MEMORY= 00007021 TOTAL= 00151572 MEMORY AVAILABLE= 00147770

C-43

TIME AT START OF BACK SUBSTITUTION CP= 691.999 STEP= 5 ITERATION= 1

*** STEP 5 ITER 1 COMPLETE. TIME= 0. KDIS= -2 KTEMP= 0 CUM. ITER.= 5

***** PROBLEM COMPLETED ***** CP = 713.934

END OF INPUT ENCOUNTERED ON FILE TAPE18

ENTER /NOTES CARD AFTER FINISH CARD (OR AT ANY CARD-A LEVEL)
 FOR DETAILED NOTES ON FEATURES, CHANGES, HELP, ETC.

***** RUN COMPLETED ***** CP = 713.964

***** ANSYS TWO DIMENSIONAL PLOTS *****

***** END PLOTS *****

 REMEMBER:

YOU ARE RESPONSIBLE FOR SAVING YOUR OWN FILES
 FOR MORE INFORMATION INCLUDE THE FOLLOWING CARD

EXPLAIN,ANSYS,FILES.

FOR INFORMATION ON INTERACTIVE EXECUTION
 INCLUDE THE FOLLOWING CARD
 EXPLAIN,ANSYS,INTER.

APPENDIX D
FREQUENCY ANALYSIS

***** ANSYS INPUT DATA LISTING (Tape 16) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
1	CLOW 4 INCH VALVE LIMERICK NPP PEI 8220 MODAL ANALYSIS												
2	DAVIDSON												
3	2	1	1	1-1-1 2 2									
4	350		350	-0.02									
5	1	45											
6	2	94											
7	3	63											
8	4	4	1										
9	5	63											
10	6	63											
11	7	63											
12	8	4	1										
13	9	4	1										
14	10	4	1										
15	11	14	4										
16	12	21	2										
17	-1												
18	1												
19	1												
20	0.625												
21	0.4301	0.0147	0.0147	0.74	0.74								
22	1.25												
23	1.0												
24	1.0												
25	0.3340	0.0155	0.0155	0.75	0.75								
26	0.375	0.0176	0.0078	0.5	0.75								
27	100	1000	1000	10	10								
28	.216E9												
29	1.1905												
30	-1												
31	1	11	12	2	38	48	49	39	1	1	1	3	
32	4	14	15	15	41	51	52	52	1	1	1		
33	4	15	16	5	41	52	53	42	1	1	1	6	
34	11	22	23	12	48	59	60	49	1	1	1	10	
35	25	24	33	34	62	61	70	71	1	1	1	4	
36	38	48	49	39	75	85	86	76	1	1	1	3	
37	41	51	52	52	78	88	89	89	1	1	1		
38	41	52	53	42	78	89	90	79	1	1	1	6	
39	48	59	60	49	85	96	97	86	1	1	1	10	
40	62	61	70	71	99	98	107	108	1	1	1	4	
41	112	120	121	113	163	171	172	164	1	1	1	4	
42	116	124	125	125	167	175	176	176	1	1	1		
43	116	125	126	117	167	176	177	168	1	1	1	3	
44	120	129	130	121	175	180	181	172	1	1	1	8	
45	130	138	131	131	181	189	182	182	1	1	1		
46	134	139	140	135	185	190	191	186	1	1	1		
47	135	140	136	136	186	191	187	187	1	1	1		
48	138	141	142	131	189	192	193	182	1	1	1		
49	131	142	143	132	182	193	194	183	1	1	1	3	
50	134	145	146	139	185	196	197	190	1	1	1		
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TapE18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
51	141	149	150	142	192	200	201	193	1	1	1		
52	145	151	152	146	196	202	203	197	1	1	1		
53	147	155	156	148	198	206	207	199	1	1	1	3	
54	151	159	160	152	202	210	211	203	1	1	1	3	
55	163	171	172	164	214	222	223	215	1	1	1	4	
56	167	175	176	176	218	226	227	227	1	1	1		
57	167	176	177	168	218	227	228	219	1	1	1	3	
58	171	180	181	172	222	231	232	223	1	1	1	8	
59	181	189	182	182	232	240	233	233	1	1	1		
60	185	190	191	186	236	241	242	237	1	1	1		
61	186	191	187	187	237	242	238	238	1	1	1		
62	189	192	193	182	240	243	244	233	1	1	1		
63	182	193	194	183	233	244	245	234	1	1	1	3	
64	185	196	197	190	236	247	248	241	1	1	1		
65	192	200	201	193	243	251	252	244	1	1	1		
66	196	202	203	197	247	253	254	248	1	1	1		
67	198	206	207	199	249	257	258	250	1	1	1	3	
68	202	210	211	203	253	261	262	254	1	1	1	3	
69	214	222	223	215	265	273	274	266	1	1	1	4	
70	218	226	227	227	269	277	278	278	1	1	1		
71	218	227	228	219	269	278	279	270	1	1	1	3	
72	222	231	232	223	273	282	283	274	1	1	1	A	
73	232	240	233	233	283	291	284	284	1	1	1		
74	236	241	242	237	287	292	293	288	1	1	1		
75	237	242	238	238	288	293	289	289	1	1	1		
76	240	243	244	233	291	294	295	284	1	1	1		
77	233	244	245	234	284	295	296	285	1	1	1	3	
78	236	247	248	241	287	298	299	292	1	1	1		
79	243	251	252	244	294	302	303	295	1	1	1		
80	247	253	254	248	298	304	305	299	1	1	1		
81	249	257	258	250	300	308	309	301	1	1	1	3	
82	253	261	262	254	304	312	313	305	1	1	1	3	
83	265	273	274	266	316	324	325	317	1	1	1	4	
84	269	277	278	278	320	328	329	329	1	1	1		
85	269	278	279	270	320	329	330	321	1	1	1	3	
86	273	282	283	274	324	333	334	325	1	1	1	8	
87	283	291	284	284	334	342	335	335	1	1	1		
88	287	292	293	288	338	343	344	339	1	1	1		
89	288	293	289	289	339	344	340	340	1	1	1		
90	291	294	295	284	342	345	346	335	1	1	1		
91	284	295	296	285	335	346	347	336	1	1	1	3	
92	287	298	299	292	338	349	350	343	1	1	1		
93	294	302	303	295	345	353	354	346	1	1	1		
94	298	304	305	299	349	355	356	350	1	1	1		
95	300	308	309	301	351	359	360	352	1	1	1	3	
96	304	312	313	305	355	363	364	356	1	1	1	3	
97	214	112	10	47	222	120	21	58	1	2	2		
98	163	171											
99	222	120	21	58	231	129	32	69	1	2	2		
100	171	180											
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TAE1B) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
101	239	137	22	59	230	128	11	48	1	2	2		
102	188	179											
103	230	128	11	48	221	119	1	38	1	2	2		
104	179	170											
105	316	214	47	84	324	222	58	95	1	2	2		
106	265	273											
107	324	222	58	95	333	231	69	106	1	2	2		
108	273	282											
109	341	239	59	96	332	230	48	85	1	2	2		
110	290	281											
111	332	230	48	85	323	221	38	75	1	2	2		
112	281	272											
113	515	500	501	517					1	3	3		
114	517	501	502	518					1	3	3		
115	518	502	503	503					1	3	3		
116	518	503	504	504					1	3	3		
117	518	504	505	505					1	3	3		
118	518	505	506	506					1	3	3		
119	518	506	507	517					1	3	3		
120	517	507	508	509					1	3	3		
121	517	509	510	516					1	3	3		
122	516	510	511	511					1	3	3		
123	516	511	512	512					1	3	3		
124	516	512	513	513					1	3	3		
125	516	513	514	514					1	3	3		
126	516	514	515	517					1	3	3		
127	530	531							2	4	4		
128	557	565	558	550					5	5	5		
129	550	558	559	551					5	5	5		
130	551	559	577	577					5	5	5		
131	551	577	576	552					5	5	5		
132	552	576	560	560					5	5	5		
133	552	560	561	553					5	5	5		
134	553	561	562	554					5	5	5		
135	554	562	563	555					5	5	5		
136	555	563	578	578					5	5	5		
137	555	578	579	556					5	5	5		
138	556	579	564	564					5	5	5		
139	556	564	565	557					5	5	5		
140	565	573	566	558					5	5	5		
141	558	566	567	559					5	5	5		
142	559	567	575	577					5	5	5		
143	577	575	574	576					5	5	5		
144	576	574	568	560					5	5	5		
145	560	568	569	561					5	5	5		
146	561	569	570	562					5	5	5		
147	562	570	571	563					5	5	5		
148	563	571	580	578					5	5	5		
149	578	580	581	579					5	5	5		
150	579	581	572	564					5	5	5		
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TABLE) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
151	564	572	573	565				5	5	5			
152	516	517	535	535				1	6	6			
153	535	517	518	518				1	6	6			
154	576	207						1	6	8			
155	578	212						1	8	8			
156	577	309						1	8	8			
157	579	314						1	8	8			
158	1	2						3	9	9		3	
159	4	5						3	9	9		6	
160	10	112						3	9	9			
161	112	113						3	9	9		7	
162	119	1						3	9	9			
163	558	590						4	10	10			
164	559	590						4	10	10			
165	560	590						4	10	10			
166	561	590						4	10	10			
167	562	590						4	10	10			
168	563	590						4	10	10			
169	564	590						4	10	10			
170	565	590						4	10	10			
171	591	590						4	10	10			
172	600	591						4	10	10			
173	535	517						1	11	11			
174	600							1	12	12			
175	-1												
176	0	1 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
177	1	3	2.0	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
178	3	3 1	2.0	315.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
179	4		1.781	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180	5	3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	6	3	2.0	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	10	3 1	2.0	112.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	11	3	3.75	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	14	3 1	3.75	337.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	15		3.75	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	16	3	3.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
187	17	3	3.75	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
188	21	3 1	3.75	112.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
189	22	3	4.5	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190	25	3 1	4.5	337.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	26		4.5	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
192	27	3	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
193	28		4.3875	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
194	29	3	4.5	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
195	32	3 1	4.5	112.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
196	33		5.125	-2.875	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
197	34		5.125	-1.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198	35		5.125	-0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199	36		5.125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200	37		5.125	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TapE10) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
201	38	3	2.0		270.0		1.5						
202	40	3 1	2.0		315.0		1.5						
203	41		1.781		-0.91		1.5						
204	42	3	2.0		0.0		1.5						
205	43	3	2.0		22.5		1.5						
206	47	3 1	2.0		112.5		1.5						
207	48	3	3.75		270.0		1.5						
208	51	3 1	3.75		337.5		1.5						
209	52		3.75		-0.91		1.5						
210	53	3	3.75		0.0		1.5						
211	54	3	3.75		22.5		1.5						
212	58	3 1	3.75		112.5		1.5						
213	59	3	4.5		270.0		1.5						
214	62	3 1	4.5		337.5		1.5						
215	63		4.5		-0.91		1.5						
216	64	3	4.5		0.0		1.5						
217	65		4.3875		1.0		1.5						
218	66	3	4.5		45.0		1.5						
219	69	3 1	4.5		112.5		1.5						
220	70		5.125		-2.875		1.5						
221	71		5.125		-1.72		1.5						
222	72		5.125		-0.91		1.5						
223	73		5.125		0.0		1.5						
224	74		5.125		1.0		1.5						
225	75	3	2.0		270.0		3.0						
226	77	3 1	2.0		315.0		3.0						
227	78		1.781		-0.91		3.0						
228	79	3	2.0		0.0		3.0						
229	80	3	2.0		22.5		3.0						
230	84	3 1	2.0		112.5		3.0						
231	85	3	3.75		270.0		3.0						
232	88	3 1	3.75		337.5		3.0						
233	89		3.75		-0.91		3.0						
234	90	3	3.75		0.0		3.0						
235	91	3	3.75		22.5		3.0						
236	95	3 1	3.75		112.5		3.0						
237	96	3	4.5		270.0		3.0						
238	99	3 1	4.5		337.5		3.0						
239	100		4.5		-0.91		3.0						
240	101	3	4.5		0.0		3.0						
241	102		4.3875		1.0		3.0						
242	103	3	4.5		45.0		3.0						
243	106	3 1	4.5		112.5		3.0						
244	107		5.125		-2.875		3.0						
245	108		5.125		-1.72		3.0						
246	109		5.125		-0.91		3.0						
247	110		5.125		0.0		3.0						
248	111		5.125		1.0		3.0						
249	112	3	2.0		113.5		0.0						
250	113	3	2.0		135.0		0.0						
		A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TABLE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
251	114	3	2.0	157.5	0.0	0.0							
252	115	3	2.0	180.0	0.0	0.0							
253	116	3	-1.781	-0.91	0.0	0.0							
254	117	3	2.0	225.0	0.0	0.0							
255	118	3	2.0	247.5	0.0	0.0							
256	119	3	2.0	269.0	0.0	0.0							
257	120	3	3.75	113.5	0.0	0.0							
258	121	3	3.75	135.0	0.0	0.0							
259	122	3	3.75	157.5	0.0	0.0							
260	123	3	3.75	180.0	0.0	0.0							
261	124	3	-3.75	-0.91	0.0	0.0							
262	125	3	3.75	202.5	0.0	0.0							
263	126	3	3.75	225.0	0.0	0.0							
264	127	3	3.75	247.5	0.0	0.0							
265	128	3	3.75	269.0	0.0	0.0							
266	129	3	4.5	113.5	0.0	0.0							
267	130		-3.74	2.5	0.0	0.0							
268	131		-4.5	1.0	0.0	0.0							
269	132		-4.5	0.0	0.0	0.0							
270	133		-4.5	-0.91	0.0	0.0							
271	134		-4.5	-2.75	0.0	0.0							
272	135		4.5	225.0	0.0	0.0							
273	136	3	-1.48	-4.25	0.0	0.0							
274	137	3	4.5	269.0	0.0	0.0							
275	138		-4.5	2.5	0.0	0.0							
276	139		-4.5	-4.25	0.0	0.0							
277	140		-3.18	-4.25	0.0	0.0							
278	141		-5.938	2.5	0.0	0.0							
279	142		-5.938	1.0	0.0	0.0							
280	143		-5.938	0.0	0.0	0.0							
281	144		-5.938	-0.91	0.0	0.0							
282	145		-5.938	-2.75	0.0	0.0							
283	146		-5.938	-4.25	0.0	0.0							
284	147		-8.438	4.75	0.0	0.0							
285	148		-8.438	3.59	0.0	0.0							
286	149		-8.438	2.5	0.0	0.0							
287	150		-8.438	1.0	0.0	0.0							
288	151		-8.438	-2.75	0.0	0.0							
289	152		-8.438	-4.25	0.0	0.0							
290	153		-8.438	-5.41	0.0	0.0							
291	154		-8.438	-6.5	0.0	0.0							
292	155		-9.688	4.75	0.0	0.0							
293	156		-9.688	3.59	0.0	0.0							
294	157		-9.688	2.5	0.0	0.0							
295	158		-9.688	1.0	0.0	0.0							
296	159		-9.688	-2.75	0.0	0.0							
297	160		-9.688	-4.25	0.0	0.0							
298	161		-9.688	-5.41	0.0	0.0							
299	162		-9.688	-6.5	0.0	0.0							
300	163	3	2.0	113.5	0.75	0.0							

***** ANSYS INPUT DATA LISTING (TABLE) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
301	164	2.0		135.0		0.75							
302	165	2.0		157.5		0.75							
303	166	2.0		180.0		0.75							
304	167	-1.781		-0.91		0.75							
305	168	2.0		225.0		0.75							
306	169	2.0		247.5		0.75							
307	170	2.0		269.0		0.75							
308	171	3.75		113.5		0.75							
309	172	3.75		135.0		0.75							
310	173	3.75		157.5		0.75							
311	174	3.75		180.0		0.75							
312	175	-3.75		-0.91		0.75							
313	176	3.75		202.5		0.75							
314	177	3.75		225.0		0.75							
315	178	3.75		247.5		0.75							
316	179	3.75		269.0		0.75							
317	180	4.5		113.5		0.75							
318	181	-3.74		2.5		0.75							
319	182	-4.5		1.0		0.75							
320	183	-4.5		0.0		0.75							
321	184	-4.5		-0.91		0.75							
322	185	-4.5		-2.75		0.75							
323	186	4.5		225.0		0.75							
324	187	-1.48		-4.25		0.75							
325	188	4.5		269.0		0.75							
326	189	-4.5		2.5		0.75							
327	190	-4.5		-4.25		0.75							
328	191	-3.18		-4.25		0.75							
329	192	-5.938		2.5		0.75							
330	193	-5.938		1.0		0.75							
331	194	-5.938		0.0		0.75							
332	195	-5.938		-0.91		0.75							
333	196	-5.938		-2.75		0.75							
334	197	-5.938		-4.25		0.75							
335	198	-8.438		4.75		0.75							
336	199	-8.438		3.59		0.75							
337	200	-8.438		2.5		0.75							
338	201	-8.438		1.0		0.75							
339	202	-8.438		-2.75		0.75							
340	203	-8.438		-4.25		0.75							
341	204	-8.438		-5.41		0.75							
342	205	-8.438		-6.5		0.75							
343	206	-9.688		4.75		0.75							
344	207	-9.688		3.59		0.75							
345	208	-9.688		2.5		0.75							
346	209	-9.688		1.0		0.75							
347	210	-9.688		-2.75		0.75							
348	211	-9.688		-4.25		0.75							
349	212	-9.688		-5.41		0.75							
350	213	-9.688		-6.5		0.75							
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TapE18) *****

		6	12	18	24	30	36	42	48	54	60	66	72	78
		V	V	V	V	V	V	V	V	V	V	V	V	V
351	214	3	2.0		113.5		1.5							
352	215	3	2.0		135.0		1.5							
353	216	3	2.0		157.5		1.5							
354	217	3	2.0		180.0		1.5							
355	218		-1.781		-0.91		1.5							
356	219	3	2.0		225.0		1.5							
357	220	3	2.0		247.5		1.5							
358	221	3	2.0		269.0		1.5							
359	222	3	3.75		113.5		1.5							
360	223	3	3.75		135.0		1.5							
361	224	3	3.75		157.5		1.5							
362	225	3	3.75		180.0		1.5							
363	226		-3.75		-0.91		1.5							
364	227	3	3.75		202.5		1.5							
365	228	3	3.75		225.0		1.5							
366	229	3	3.75		247.5		1.5							
367	230	3	3.75		269.0		1.5							
368	231	3	4.5		113.5		1.5							
369	232		-3.74		2.5		1.5							
370	233		-4.5		1.0		1.5							
371	234		-4.5		0.0		1.5							
372	235		-4.5		-0.91		1.5							
373	236		-4.5		-2.75		1.5							
374	237	3	4.5		225.0		1.5							
375	238		-1.48		-4.25		1.5							
376	239	3	4.5		269.0		1.5							
377	240		-4.5		2.5		1.5							
378	241		-4.5		-4.25		1.5							
379	242		-3.18		-4.25		1.5							
380	243		-5.938		2.5		1.5							
381	244		-5.938		1.0		1.5							
382	245		-5.938		0.0		1.5							
383	246		-5.938		-0.91		1.5							
384	247		-5.938		-2.75		1.5							
385	248		-5.938		-4.25		1.5							
386	249		-8.438		4.75		1.5							
387	250		-8.438		3.59		1.5							
388	251		-8.438		2.5		1.5							
389	252		-8.438		1.0		1.5							
390	253		-8.438		-2.75		1.5							
391	254		-8.438		-4.25		1.5							
392	255		-8.438		-5.41		1.5							
393	256		-8.438		-6.5		1.5							
394	257		-9.688		4.75		1.5							
395	258		-9.688		3.59		1.5							
396	259		-9.688		2.5		1.5							
397	260		-9.688		1.0		1.5							
398	261		-9.688		-2.75		1.5							
399	262		-9.688		-4.25		1.5							
400	263		-9.688		-5.41		1.5							
		A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (Tape 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
401	264		-9.680		-6.5		1.5						
402	265	3	2.0		113.5		2.25						
403	266	3	2.0		135.0		2.25						
404	267	3	2.0		157.5		2.25						
405	268	3	2.0		180.0		2.25						
406	269		-1.781		-0.91		2.25						
407	270	3	2.0		225.0		2.25						
408	271	3	2.0		247.5		2.25						
409	272	3	2.0		269.0		2.25						
410	273	3	3.75		113.5		2.25						
411	274	3	3.75		135.0		2.25						
412	275	3	3.75		157.5		2.25						
413	276	3	3.75		180.0		2.25						
414	277		-3.75		-0.91		2.25						
415	278	3	3.75		202.5		2.25						
416	279	3	3.75		225.0		2.25						
417	280	3	3.75		247.5		2.25						
418	281	3	3.75		269.0		2.25						
419	282	3	4.5		113.5		2.25						
420	283		-3.74		2.5		2.25						
421	284		-4.5		1.0		2.25						
422	285		-4.5		0.0		2.25						
423	286		-4.5		-0.91		2.25						
424	287		-4.5		-2.75		2.25						
425	288	3	4.5		225.0		2.25						
426	289		-1.48		-4.25		2.25						
427	290	3	4.5		269.0		2.25						
428	291		-4.5		2.5		2.25						
429	292		-4.5		-4.25		2.25						
430	293		-3.18		-4.25		2.25						
431	294		-5.930		2.5		2.25						
432	295		-5.930		1.0		2.25						
433	296		-5.930		0.0		2.25						
434	297		-5.930		-0.91		2.25						
435	298		-5.930		-2.75		2.25						
436	299		-5.930		-4.25		2.25						
437	300		-8.430		4.75		2.25						
438	301		-8.430		3.59		2.25						
439	302		-8.430		2.5		2.25						
440	303		-8.430		1.0		2.25						
441	304		-8.430		-2.75		2.25						
442	305		-8.430		-4.25		2.25						
443	306		-8.430		-5.41		2.25						
444	307		-8.430		-6.5		2.25						
445	308		-9.680		4.75		2.25						
446	309		-9.680		3.59		2.25						
447	310		-9.680		2.5		2.25						
448	311		-9.680		1.0		2.25						
449	312		-9.680		-2.75		2.25						
450	313		-9.680		-4.25		2.25						

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***** ANSYS INPUT DATA LISTING (TapE18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
451	314		-9.688		-5.41		2.25						
452	315		-9.688		-6.5		2.25						
453	316	3	2.0		113.5		3.0						
454	317	3	2.0		135.0		3.0						
455	318	3	2.0		157.5		3.0						
456	319	3	2.0		180.0		3.0						
457	320		-1.781		-0.91		3.0						
458	321	3	2.0		225.0		3.0						
459	322	3	2.0		247.5		3.0						
460	323	3	2.0		269.0		3.0						
461	324	3	3.75		113.5		3.0						
462	325	3	3.75		135.0		3.0						
463	326	3	3.75		157.5		3.0						
464	327	3	3.75		180.0		3.0						
465	328		-3.75		-0.91		3.0						
466	329	3	3.75		202.5		3.0						
467	330	3	3.75		225.0		3.0						
468	331	3	3.75		247.5		3.0						
469	332	3	3.75		269.0		3.0						
470	333	3	4.5		113.5		3.0						
471	334		-3.74		2.5		3.0						
472	335		-4.5		1.0		3.0						
473	336		-4.5		0.0		3.0						
474	337		-4.5		-0.91		3.0						
475	338		-4.5		-2.75		3.0						
476	339	3	4.5		225.0		3.0						
477	340		-1.48		-4.25		3.0						
478	341	3	4.5		269.0		3.0						
479	342		-4.5		2.5		3.0						
480	343		-4.5		-4.25		3.0						
481	344		-3.18		-4.25		3.0						
482	345		-5.938		2.5		3.0						
483	346		-5.938		1.0		3.0						
484	347		-5.938		0.0		3.0						
485	348		-5.938		-0.91		3.0						
486	349		-5.938		-2.75		3.0						
487	350		-5.938		-4.25		3.0						
488	351		-8.438		4.75		3.0						
489	352		-8.438		3.59		3.0						
490	353		-8.438		2.5		3.0						
491	354		-8.438		1.0		3.0						
492	355		-8.438		-2.75		3.0						
493	356		-8.438		-4.25		3.0						
494	357		-8.438		-5.41		3.0						
495	358		-8.438		-6.5		3.0						
496	359		-9.688		4.75		3.0						
497	360		-9.688		3.59		3.0						
498	361		-9.688		2.5		3.0						
499	362		-9.688		1.0		3.0						
500	363		-9.688		-2.75		3.0						
		A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TABLE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
501	364		-9.688		-4.25		3.0						
502	365		-9.688		-5.41		3.0						
503	366		-9.688		-6.5		3.0						
504	0	1 4	0.0		0.0		0.75		n.0		0.0		0.0
505	0	0 5	0.0		0.0		0.75		n.0		0.0		0.0
506	500	4	2.0		0.0		0.0						
507	515	4 1	2.0		337.5		0.0						
508	516	5	0.0		-1.5		0.0						
509	517	5	0.0		0.0		0.0						
510	518	5	0.0		1.5		0.0						
511	530		-15.0		-0.91		1.5						
512	531		-5.938		-0.91		1.5						
513	532		-4.5		-0.91		1.5						
514	533		-3.75		-0.91		1.5						
515	534		-1.781		-0.91		1.5						
516	535		0.0		-0.91		1.5						
517	536		1.781		-0.91		1.5						
518	537		3.75		-0.91		1.5						
519	538		4.5		-0.91		1.5						
520	539		5.125		-0.91		1.5						
521	0	1 6	-9.73		-0.91		1.5		n.0		90.0		0.0
522	0	0 7	-9.73		-0.91		1.5		n.0		90.0		0.0
523	550	6	1.5		22.5		0.0						
524	557	6 1	1.5		337.5		0.0						
525	558	6	5.0		22.5		0.0						
526	565	6 1	5.0		337.5		0.0						
527	566	6	6.0		22.5		0.0						
528	573	6 1	6.0		337.5		0.0						
529	574	7	-0.75		5.543		0.0						
530	575	7	0.75		5.543		0.0						
531	576	7	-0.75		4.5		0.0						
532	577	7	0.75		4.5		0.0						
533	578	7	-0.75		-4.5		0.0						
534	579	7	0.75		-4.5		0.0						
535	580	7	-0.75		-5.543		0.0						
536	581	7	0.75		-5.543		0.0						
537	590	7	0.0		0.0		0.0						
538	591		-10.538		-0.91		1.5						
539	600		-10.538		-10.51		-0.55						
540	-1												
541	500	5	16	27	36	42	53	64	73	79	90	101	
542	110	515	4	15	26	35	41	52	63	72	83	94	105
543	538	539	78	89	100	109	-1						
544	501	6	17	28	37	43	54	65	74	80	91	102	
545	111	-1											
546	514	3	13	24	33	34	25	14	40	50	61	70	
547	71	62	51	77	87	98	107	108	99	88	-1		
548	502	7	18	29	44	55	66	81	92	103	-1		
549	513	2	12	23	39	49	60	76	86	97	-1		
550	503	8	19	30	45	56	67	82	93	104	-1		
		A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TABLE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
551	512	1	11	22	38	48	59	75	85	96	119	128	
552	137	170	179	188	221	230	239	272	281	290	323	332	
553	341	-1											
554	504	9	20	31	46	57	68	83	94	105	-1		
555	511	118	127	136	169	178	187	220	229	238	271	280	
556	289	322	331	340	-1								
557	505	10	21	32	47	58	69	84	95	106	316	324	
558	333	265	273	282	214	222	231	163	171	180	112	120	
559	129	-1											
560	510	117	126	135	140	168	177	186	191	219	228	237	
561	242	270	279	288	293	321	330	339	344	-1			
562	506	113	121	130	164	172	181	215	223	232	266	274	
563	283	317	325	334	-1								
564	509	116	124	125	167	175	176	218	226	227	269	277	
565	278	320	328	329	534	533	-1						
566	507	114	122	165	173	216	224	267	275	318	326	-1	
567	508	115	123	166	174	217	225	268	276	319	327	516	
568	517	518	535	-1									
569	138	131	132	133	134	139	189	182	183	184	185	190	
570	240	233	234	235	236	241	291	284	285	286	287	292	
571	342	335	336	337	338	343	532	-1					
572	141	142	143	144	145	146	192	193	194	195	196	197	
573	243	244	245	246	247	248	294	295	296	297	298	299	
574	345	346	347	348	349	350	531	530	-1				
575	147	148	149	150	151	152	153	154	198	199	200	201	
576	202	203	204	205	249	250	251	252	253	254	255	256	
577	300	301	302	303	304	305	306	307	351	352	353	354	
578	355	356	357	358	-1								
579	155	156	157	158	159	160	161	162	206	207	208	209	
580	210	211	212	213	257	258	259	260	261	262	263	264	
581	308	309	310	311	312	313	314	315	359	360	361	362	
582	363	364	365	366	-1								
583	550	551	552	553	554	555	556	557	558	559	560	561	
584	562	563	564	565	566	567	568	569	570	571	572	573	
585	574	575	576	577	578	579	580	581	590	591	600	-1	
586	-1												
587	EX	1	.299E8										
588	ALPX	1	.65E-5										
589	DENS	1	0.73E-3										
590	NUXY	1	0.3										
591	EX	2	29.2E6										
592	ALPX	2	6.5E-6										
593	DENS	2	0.00013										
594	NUXY	2	0.3										
595	EX	3	28.3E6										
596	ALPX	3	6.5E-6										
597	DENS	3	0.00013										
598	NUXY	3	0.3										
599	EX	4	29.9E6										
600	ALPX	4	6.5E-6										

***** ANSYS INPUT DATA LISTING (Tape 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
601	DENS	4	0.0										
602	NUXY	4	0.3										
603	EX	5	29.9E6										
604	ALPX	5	6.5E-6										
605	DENS	5	0.000013										
606	NUXY	5	0.3										
607	-1												
608	UZ	2	500	5									
609	UZ	2	501	6									
610	UZ	2	502	7									
611	UZ	2	503	8									
612	UZ	2	504	9									
613	UZ	2	505	10									
614	UZ	2	506	113									
615	UZ	2	507	114									
616	UZ	2	508	115									
617	UZ	2	509	116									
618	UZ	2	510	117									
619	UZ	2	511	118									
620	UZ	2	512	1									
621	UZ	2	513	2									
622	UZ	2	514	3									
623	UZ	2	515	4									
624	UY	2	533	226									
625	UZ	2	533	226									
626	UY	2	534	218									
627	UZ	2	534	218									
628	UY	2	536	41									
629	UZ	2	536	41									
630	UY	2	537	52									
631	UZ	2	537	52									
632	UX	2	539	72									
633	UX	2	576	207									
634	UY	2	576	207									
635	UZ	2	576	207									
636	UX	2	577	309									
637	UY	2	577	309									
638	UZ	2	577	309									
639	UX	2	578	212									
640	UY	2	578	212									
641	UZ	2	578	212									
642	UX	2	579	314									
643	UY	2	579	314									
644	UZ	2	579	314									
645	-1												
646	600	UX						UY	UZ				
647	566	UX						UY	UZ				
648	570	UX						UY	UZ				
649	574	UX						UY	UZ				
650	580	UX						UY	UZ				

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***** ANSYS INPUT DATA LISTING (TABLE 18) *****

	6	12	18	24	30	36	42	48	54	60	66	72	78
	V	V	V	V	V	V	V	V	V	V	V	V	V
651	576	UX							UY	UZ			
652	577	UX							UY	UZ			
653	578	UX							UY	UZ			
654	579	UX							UY	UZ			
655	257	UX							UY	UZ			
656	264	UX							UY	UZ			
657	251	UX							UY	UZ			
658	254	UX							UY	UZ			
659	243	UX							UY	UZ			
660	248	UX							UY	UZ			
661	240	UX							UY	UZ			
662	241	UX							UY	UZ			
663	-1												
664	/TITLE	X DIRECTION											
665	1	1	1		1.0	0.0	0.0		0.0		100.0		
666													
667													
668	17	UX	0.0						UY	UZ			
669	19	UX	0.0						UY	UZ			
670	21	UX	0.0						UY	UZ			
671	122	UX	0.0						UY	UZ			
672	125	UX	0.0						UY	UZ			
673	127	UX	0.0						UY	UZ			
674	12	UX	0.0						UY	UZ			
675	14	UX	0.0						UY	UZ			
676	54	UX	0.0						UY	UZ			
677	56	UX	0.0						UY	UZ			
678	58	UX	0.0						UY	UZ			
679	224	UX	0.0						UY	UZ			
680	227	UX	0.0						UY	UZ			
681	229	UX	0.0						UY	UZ			
682	49	UX	0.0						UY	UZ			
683	51	UX	0.0						UY	UZ			
684	91	UX	0.0						UY	UZ			
685	93	UX	0.0						UY	UZ			
686	95	UX	0.0						UY	UZ			
687	326	UX	0.0						UY	UZ			
688	329	UX	0.0						UY	UZ			
689	331	UX	0.0						UY	UZ			
690	86	UX	0.0						UY	UZ			
691	88	UX	0.0						UY	UZ			
692	-1												
693	-1												
694	-1												
695	/TITLE	Y DIRECTION											
696	0	1	1		0.0	1.0	0.0		0.0		100.0		
697													
698													
699	/TITLE	Z DIRECTION											
700	0	1	1		0.0	0.0	1.0		0.0		100.0		
	A	A	A	A	A	A	A	A	A	A	A	A	A

***** ANSYS INPUT DATA LISTING (TABLE 1) *****

6	12	18	24	30	36	42	48	54	60	66	72	78
V	V	V	V	V	V	V	V	V	V	V	V	V

701
702
703
704

END
FINISH

X DIRECTION

19.0386 83/ 3/28 CP= 32.397

LOAD STEP NUMBER = 1

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	1	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS. . . .	1	NITER	7-9
SOLUTION PRINTOUT FREQUENCY .	1	NPRINT	10-12
TIME AT END OF LOAD STEP. . .	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
EXPAND. DISP. PRINTOUT FREQ.	1	NDPRNT	70-72 (CARD M)
SEISMIC EXCITATION DIRECTION	1.0000	0.0000	0.0000
FREQ. RANGE FOR EXPANDED MODES	0.0000	100.0000	
SIGNIFICANCE CRITERION	.1000E-02		

***** SPECTRUM DATA TABLE (CARD M1) *****

FREQUENCY	SPECTRUM
0.00	0.
0.00	0.

***** SPECIFIED DISPLACEMENTS (CARD N) *****

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
12	0.	0.	0.			
14	0.	0.	0.			
17	0.	0.	0.			
19	0.	0.	0.			
21	0.	0.	0.			
49	0.	0.	0.			
51	0.	0.	0.			
54	0.	0.	0.			
56	0.	0.	0.			
58	0.	0.	0.			
86	0.	0.	0.			
88	0.	0.	0.			
91	0.	0.	0.			
93	0.	0.	0.			
95	0.	0.	0.			
122	0.	0.	0.			
125	0.	0.	0.			
127	0.	0.	0.			
224	0.	0.	0.			

227	0.	0.	0.
229	0.	0.	0.
326	0.	0.	0.
329	0.	0.	0.
331	0.	0.	0.

***** LOAD SUMMARY - 72 DISPLACEMENTS 0 FORCES 0 PRESSURES *****

OCTAL STORAGE REQUIREMENTS FOR L THROUGH P CARD DATA INPUT CP= 33.214
CORE= 00142740 MEMORY= 00000000 TOTAL= 00142740 MEMORY AVAILABLE= 00107770

MAXIMUM STIFFNESS = .680171E+12 AT ELEMENT 264
MINIMUM STIFFNESS = .130589E+07 AT ELEMENT 199

OCTAL STORAGE REQUIREMENTS FOR ELEMENT FORMULATION CP= 214.810
CORE= 00142740 MEMORY= 00000000 TOTAL= 00142740 MEMORY AVAILABLE= 00107770

*** ELEMENT STIFFNESS FORMULATION TIMES

TYPE	NUMBER	STIF	TOTAL CP	AVE CP
------	--------	------	----------	--------

1	176	45	158.711	.902
2	8	94	4.546	.568
3	14	63	4.944	.352
4	9	4	.618	.069
5	24	63	10.171	.424
6	2	63	.542	.271
8	4	4	.270	.068
9	18	4	1.273	.071
10	10	4	.401	.040
11	1	14	.008	.008
12	1	21	.008	.008

TIME AT END OF ELEMENT STIFFNESS FORMULATION CP = 214.839

MAXIMUM IN-CORE WAVE FRONT ALLOWED FOR REQUESTED MEMORY SIZE= 189

OCTAL STORAGE REQUIREMENTS FOR WAVE FRONT MATRIX SOLUTION CP= 500.845
CORE= 00142740 MEMORY= 00103444 TOTAL= 00246404 MEMORY AVAILABLE= 00107770

MAXIMUM IN-CORE WAVE FRONT (EQUATIONS) USED= 184

*** MATRIX SOLUTION TIMES

READ IN ELEMENT STIFFNESSES	CP=	5.110
NODAL COORD. TRANSFORMATION	CP=	.058
MATRIX TRIANGULARIZATION	CP=	280.718

TIME AT END OF MATRIX TRIANGULARIZATION CP = 500.854

TIME AT START OF EIGENVALUE EXTRACTION CP= 500.873

EIGENVALUE EXTRACTION TIME = 28.872

OCTAL STORAGE REQUIREMENTS FOR EIGENVALUE EXTRACTION CP= 539.644
CORE= 00142740 MEMORY= 00012122 TOTAL= 00155062 MEMORY AVAILABLE= 00107770

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ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYPRI76 JUNE 1, 1979
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

X DIRECTION

19.12P1 83/ 3/28 CP= 539.707

***** EIGENVALUE (NATURAL FREQUENCY) SOLUTION *****

MODE FREQUENCY (CYCLES/TIME)

1 86.64755
2 129.8948
3 372.2842
4 778.0686
5 1834.421
6 2062.720
7 4703.661
8 5183.642
9 5504.920
10 6300.129
11 8094.694
12 8559.247
13 9854.948
14 9944.896
15 10786.89
16 10914.79
17 12750.41
18 14078.03
19 15964.81
20 16391.99
21 17720.47
22 19692.33
23 22689.05
24 26079.06
25 26287.66
26 26887.10
27 28515.48
28 29743.27
29 32105.71
30 33088.32
31 33803.87
32 35940.54
33 36442.57
34 36925.03
35 40950.37
36 42514.23
37 43999.62
38 44158.57
39 44923.24
40 45718.73
41 47075.68
42 49604.52
43 51990.69
44 54414.17
45 58476.99
46 59180.56
47 60154.27
48 61698.59
49 62611.42
50 66946.84
51 67913.49

***** REDUCED MASS DISTRIBUTION *****

ROW	NODE	DIR	VALUE
1	243	UX	.43975E-02
2	251	UX	.54824E-02
3	240	UX	.23471E-02
4	264	UY	.12624E-02
5	240	UZ	.17584E-02
6	243	UY	.51870E-02
7	244	UX	.21806E-02
8	248	UX	.33877E-02
9	254	UX	.43653E-02
10	248	UY	.40397E-02
11	248	UZ	.59642E-02
12	257	UX	-.37827E-04
13	579	UY	.12676E-01
14	578	UZ	.13055E-01
15	241	UY	.21406E-02
16	578	UY	.12993E-01
17	578	UX	.16657E-01
18	579	UZ	.14449E-01
19	576	UX	.20981E-01
20	251	UZ	.10921E-01
21	264	UZ	-.26196E-03
22	254	UY	.75373E-02
23	240	UY	.22154E-02
24	254	UZ	.11287E-01
25	257	UZ	-.21640E-03
26	251	UY	.71148E-02
27	576	UY	.12011E-01
28	241	UZ	.27086E-02
29	257	UY	.90202E-03
30	579	UX	.16123E-01
31	576	UZ	.16627E-01
32	243	UZ	.53708E-02
33	577	UZ	.15043E-01
34	241	UX	.16463E-02
35	577	UX	.21622E-01
36	577	UY	.12588E-01
37	566	UX	.10651E-01
38	566	UY	.72570E-02
39	566	UZ	.14116E-01
40	600	UZ	1.2030
41	600	UY	1.2304
42	600	UX	1.1988
43	570	UX	.92366E-02
44	570	UY	.81588E-02
45	570	UZ	.13587E-01
46	574	UZ	.41724E-02
47	574	UY	.27782E-02
48	574	UX	.90618E-03
49	580	UZ	.18680E-02
50	580	UY	.56828E-04
51	580	UX	.28646E-03

MASS(X,Y,Z) =

1.319

1.329

1.333

MODE	FREQUENCY	P. FACTOR	MODE COEF.	M.C. RATIO	EQUIV. MASS
1	86.65	.377E-01	0.	0.000000	.3567
2	129.9	.8975	0.	0.000000	.2382
3	372.3	.6444	0.	0.000000	.1323
4	776.1	-.603E-01	0.	0.000000	.9508E-02
5	1834.	.1952	0.	0.000000	.1140E-01
6	2063.	.2015	0.	0.000000	.9174E-02
7	4764.	-.7775E-03	0.	0.000000	.7963E-02
8	5184.	-.2334E-01	0.	0.000000	.4846E-02
9	5505.	.5207E-02	0.	0.000000	.6953E-02
10	6300.	.7748E-01	0.	0.000000	.3844E-02
11	8095.	.2063E-01	0.	0.000000	.4276E-02
12	8559.	-.7925E-03	0.	0.000000	.2914E-02
13	9855.	-.3616E-01	0.	0.000000	.2213E-02
14	9945.	-.5748E-01	0.	0.000000	.2218E-02
15	.1079E+05	.4968E-01	0.	0.000000	.2100E-02
16	.1091E+05	.2252E-01	0.	0.000000	.2157E-02
17	.1275E+05	-.1404E-01	0.	0.000000	.1708E-02
18	.1408E+05	-.2072E-01	0.	0.000000	.8432E-03
19	.1596E+05	-.2573E-04	0.	0.000000	.1170E-02
20	.1639E+05	-.2281E-02	0.	0.000000	.1985E-02
21	.1772E+05	-.2005E-03	0.	0.000000	.1164E-02
22	.1696E+05	.1323E-01	0.	0.000000	.1126E-02
23	.2269E+05	-.2453E-02	0.	0.000000	.5365E-03
24	.2608E+05	.8117E-02	0.	0.000000	.6091E-03
25	.2629E+05	.5983E-02	0.	0.000000	.8257E-03
26	.2639E+05	-.1658E-02	0.	0.000000	.5884E-03
27	.2852E+05	.1599E-02	0.	0.000000	.6276E-03
28	.2974E+05	.1821E-02	0.	0.000000	.9545E-03
29	.3211E+05	-.1868E-03	0.	0.000000	.6638E-03
30	.3309E+05	.5555E-04	0.	0.000000	.5778E-03
31	.3380E+05	.6490E-02	0.	0.000000	.4766E-03
32	.3594E+05	.2867E-02	0.	0.000000	.6131E-03
33	.3644E+05	.1262E-02	0.	0.000000	.6563E-03
34	.3693E+05	-.7465E-02	0.	0.000000	.6044E-03
35	.4095E+05	-.7009E-03	0.	0.000000	.5901E-03
36	.4251E+05	.1905E-04	0.	0.000000	.3690E-03
37	.4400E+05	.3479E-03	0.	0.000000	.6365E-03
38	.4416E+05	-.1218E-02	0.	0.000000	.2866E-03
39	.4492E+05	-.5655E-03	0.	0.000000	.7604E-03
40	.4572E+05	-.1770E-03	0.	0.000000	.9295E-03
41	.4708E+05	-.5814E-04	0.	0.000000	.4953E-03
42	.4960E+05	-.2609E-04	0.	0.000000	.4612E-03
43	.5199E+05	.1424E-02	0.	0.000000	.1550E-03
44	.5441E+05	.6655E-03	0.	0.000000	.1876E-03
45	.5848E+05	.7925E-03	0.	0.000000	.2191E-03
46	.5918E+05	.1032E-02	0.	0.000000	.1851E-03
47	.6015E+05	.3234E-02	0.	0.000000	.1773E-03
48	.6170E+05	-.5075E-03	0.	0.000000	.1211E-03
49	.6261E+05	.1257E-02	0.	0.000000	.1370E-03
50	.6695E+05	.2388E-03	0.	0.000000	.2650E-03
51	.6791E+05	-.6374E-04	0.	0.000000	.2640E-03

CROSS COUPLING COEFFICIENTS FOR ID = 10.00

MODE	FREQUENCY	DAMPED FREQ.	DAMPING	COEFFICIENTS
1	86.65	86.63	.0204	1 1.0000
2	129.89	129.87	.0202	2 1.0000
				7 .0102

2-21

3	372.28	372.21	.0201	3	1.0000				
4	778.07	777.91	.0200	4	1.0000				
5	1834.42	1834.05	.0200	5	1.0000	6	.1046		
6	2062.72	2062.31	.0200	6	1.0000				
7	4703.66	4702.72	.0200	7	1.0000	8	.1452	9	.0610
8	5183.64	5182.60	.0200	8	1.0000	9	.3071	10	.0406
9	5504.92	5503.82	.0200	9	1.0000	10	.0811	11	.0109
10	6300.13	6298.87	.0200	10	1.0000	11	.0251	12	.0170
11	8094.69	8093.07	.0200	11	1.0000	12	.3397	13	.0400
				16	.0179			14	.0367
12	8559.25	8557.54	.0200	12	1.0000	13	.0748	15	.0293
				17	.0102			16	.0266
13	9854.95	9852.98	.0200	13	1.0000	14	.9510	17	.1332
				18	.0127			18	.0238
14	9944.90	9942.91	.0200	14	1.0000	15	.1953	19	.0255
						16	.1562	20	.0133
15	10786.89	10784.73	.0200	15	1.0000	17	.9202	21	.0223
						18	.0544	22	.0106
16	10914.79	10912.61	.0200	16	1.0000	19	.0624	23	.0112
17	12750.41	12747.86	.0200	17	1.0000	20	.1405	24	.0250
						21	.0310	25	.0148
18	14078.03	14075.21	.0200	18	1.0000	22	.0921	26	.0296
						23	.0649	27	.0143
19	1596.81	15961.62	.0200	19	1.0000	24	.1284	28	.0353
						25	.0966	29	.0131
20	16391.99	16388.71	.0200	20	1.0000	26	.2088	30	.0152
21	17720.47	17716.93	.0200	21	1.0000	27	.1259	31	.0109
						28	.0258	32	.0105
22	19692.33	19688.39	.0200	22	1.0000	29	.0741	33	.0191
				27	.0118			34	.0165
23	22689.05	22684.51	.0200	23	1.0000	30	.0765	35	.0300
				28	.0216	31	.0690	36	.0529
24	26079.06	26073.84	.0200	24	1.0000	32	.0134	37	.0102
				29	.0360	33	.0114	38	.0187
				34	.0133	34	.0632	39	.0850
25	26287.66	26282.40	.0200	25	1.0000	35	.0235	40	.0144
				30	.0296	36	.0759	41	.0952
26	26887.10	26881.72	.0200	26	1.0000	37	.0249	42	.0388
				31	.0299	38	.0164	43	.0139
27	28515.48	28509.77	.0200	27	1.0000	39	.3166	44	.0361
				32	.0293	40	.0189	45	.0159
28	29743.27	29737.32	.0200	28	1.0000	41	.4740	46	.0577
				33	.0376	42	.1024	47	.0123
				38	.0104	43	.0237	48	.0893
29	32105.71	32099.29	.0200	29	1.0000	44	.1237	49	.0126
				34	.0759	45	.0157	50	.0106
				39	.0142	46	.6379	51	.1119
30	33088.32	33081.70	.0200	30	1.0000	47	.0266	52	.0909
				35	.0343	48	.0202	53	.0158
				40	.0153	49	.0129	54	.1467
31	33803.87	33797.11	.0200	31	1.0000	50	.7777	55	.1176
				36	.0298	51	.0251	56	.0171
				41	.0146	52	.0130	57	.1705
32	35940.54	35933.35	.0200	32	1.0000	53	.2989	58	.0420
				37	.0379	54	.0228	59	.0175
				42	.0154	55	.0110	60	.0539
33	36442.57	36435.28	.0200	33	1.0000	56	.8927	61	.0218
				38	.0418	57	.6867	62	.0434
				43	.0128	58	.0314	63	.0168
34	36925.03	36917.64	.0200	34	1.0000	59	.9025	64	.0479
				39	.0402	60	.0355	65	.0137
						61	.0101		
						62	.1303		
						63	.0341		
						64	.0748		
						65	.0267		

35	40950.37	40942.18	.0200	44 .0108	34 .5327	37 .2370	38 .2197	39 .1575
				35 1.0000	41 .0763	42 .0420	43 .0276	44 .0197
				40 .1168	44 .0119	47 .0110		
36	42514.23	42505.72	.0200	45 .0127	37 .5758	38 .5265	39 .3452	40 .2328
				36 1.0000	42 .0633	43 .0383	44 .0259	45 .0158
				41 .1337	47 .0134	48 .0117	49 .0108	
37	43959.62	43990.82	.0200	46 .0147	38 .9919	39 .7877	40 .5215	41 .2597
				37 1.0000	43 .0546	44 .0345	45 .0197	46 .0182
				42 .1004	48 .0141	49 .0130		
38	44158.57	44149.74	.0200	47 .0164	39 .8445	40 .5705	41 .2813	42 .1060
				38 1.0000	44 .0357	45 .0201	46 .0186	47 .0167
				43 .0569	49 .0152			
39	44923.24	44914.26	.0200	48 .0144	40 .8386	41 .4223	42 .1403	43 .0700
				39 1.0000	45 .0228	46 .0209	47 .0187	48 .0159
				44 .0420	50 .0102			
40	45718.73	45709.59	.0200	49 .0146	41 .6517	42 .1941	43 .0885	44 .0504
				40 1.0000	46 .0237	47 .0211	48 .0178	49 .0162
				45 .0260	51 .0104			
41	47075.68	47066.27	.0200	50 .0111	42 .3691	43 .1398	44 .0711	45 .0332
				41 1.0000	47 .0262	48 .0217	49 .0196	50 .0130
				46 .0299				
				51 .0120				
42	49604.52	49594.60	.0200	42 1.0000	43 .4204	44 .1577	45 .0561	46 .0491
				47 .0415	48 .0328	49 .0289	50 .0178	51 .0162
43	51990.69	51980.29	.0200	43 1.0000	44 .4355	45 .1040	46 .0873	47 .0702
				48 .0520	49 .0445	50 .0247	51 .0222	
44	54414.17	54403.28	.0200	44 1.0000	45 .2360	46 .1852	47 .1375	48 .0923
				49 .0754	50 .0362	51 .0318		
45	58476.99	58465.29	.0200	45 1.0000	46 .9180	47 .6669	48 .3577	49 .2555
				50 .0807	51 .0670			
46	59180.56	59168.72	.0200	46 1.0000	47 .8574	48 .4798	49 .3352	50 .0955
				51 .0781				
47	60154.27	60142.24	.0200	47 1.0000	48 .7136	49 .4997	50 .1229	51 .0983
48	61698.59	61686.25	.0200	48 1.0000	49 .8813	50 .1938	51 .1482	
49	62611.42	62598.90	.0200	49 1.0000	50 .2633	51 .1952		
50	66946.84	66933.45	.0200	50 1.0000	51 .8862			

X DIRECTION

19.1292 R3/ 3/28 CP= 540.922

***** EIGENVECTOR (MODE SHAPE) SOLUTION *****

REDUCED EIGENVECTOR FOR MODE 1 FREQUENCY = 84.6475 (CYCLES/TIME)

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
240	-.136912E-02	-.908117E-03	-.161063E-01			
241	.262053E-02	-.100523E-02	.658862E-01			
243	-.408305E-02	-.391257E-02	-.430811E-01			
248	.507769E-02	-.412674E-02	.137212			
251	-.894241E-02	-.233930E-01	-.122018			
254	.103206E-01	-.231848E-01	.338657			
257	-.364841E-01	-.389832E-01	-.302199			
264	.391712E-01	-.391749E-01	.642523			
566	.317187E-01	.436834	-.345102E-01			
570	-.282063E-01	-.516961	.361001			
574	-.301690E-01	-.103347	-.312819			
576	-.260657E-01	-.102056	-.222697			
577	-.166824E-01	.232511E-01	-.222628			
578	.165164E-01	-.107171	.545512			
579	.327044E-01	.281159E-01	.545452			
580	.218017E-01	-.106655	.638524			
600	.355281E-01	-.221634	1.00000			

MAXIMUM VALUE
 NODES 264 570 600 0 0 0
 DISPL .391712E-01 -.516961 1.00000 .0 .0 .0

REDUCED EIGENVECTOR FOR MODE 2 FREQUENCY = 129.895 (CYCLES/TIME)

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
240	-.193271E-01	-.108325E-01	-.200774E-02			
241	.386699E-01	-.119077E-01	-.124586E-01			
243	-.597968E-01	-.528449E-01	-.838962E-02			
248	.756031E-01	-.497535E-01	-.284224E-01			
251	-.139431	-.338572	-.285992E-01			
254	.184495	-.316675	-.747076E-01			
257	-.573029	-.578612	-.403263E-01			
264	.723079	-.591797	-.133101			
566	-.246360	-.638817	-.633114E-01			
570	.386487	-.545069	-.101915			
574	-.390988	-.579005	-.375046E-01			
576	-.327407	-.577999	-.442303E-01			
577	-.354480	-.589369	-.433215E-01			
578	.488166	-.584607	-.119312			
579	.460454	-.598815	-.119707			
580	.553320	-.584875	-.128950			
600	1.00000	-.650494	-.179752			

MAXIMUM VALUE
 NODES 600 600 600 0 0 0

DISPL 1.00000 -0.650494 -0.179752 0. 0. 0.

REDUCED EIGENVECTOR FOR MODE 3 FREQUENCY = 372.284 (CYCLES/TIME)

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
240	.362221E-01	.407499E-01	.397719E-01			
241	-.309387E-01	.513719E-01	.461144E-01			
243	.946096E-01	.121642	.125821			
248	-.808040E-01	.179044	.103995			
251	.145466	.564532	.356106			
254	.506925E-01	.713126	.245774			
257	.552551	.835149	.595786			
264	.309320	.755570	.349334			
566	-.431116E-01	.756554	.494741			
570	.729737	1.00000	.395298			
574	.315476	.879963	.569713			
576	.325031	.879821	.533709			
577	.246935	.824525	.531605			
578	.401647	.811121	.333725			
579	.321098	.798847	.338868			
580	.427376	.826179	.298639			
600	.686624	.931223	.181756			

MAXIMUM VALUE

NODES 570 570 257 0 0 0
DISPL .729737 1.00000 .595786 0. 0. 0.

REDUCED EIGENVECTOR FOR MODE 4 FREQUENCY = 778.069 (CYCLES/TIME)

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
240	-.488456E-02	-.477509E-02	.609844E-01			
241	.716846E-02	-.571314E-02	.335039E-01			
243	-.141087E-01	-.159664E-01	.194375			
248	.153708E-01	-.206158E-01	.676661E-01			
251	-.274840E-01	-.828634E-01	.568221			
254	.156609E-01	-.937759E-01	.225254			
257	-.108137	-.130680	1.00000			
264	.482335E-01	-.124997	.276961			
566	.131968	-.495431	.748072			
570	-.177296	.227088	.448407			
574	-.918528E-01	-.72267E-01	.957347			
576	-.895520E-01	-.732993E-01	.882994			
577	-.335857E-01	-.191036	.883182			
578	-.601790E-02	-.886295E-01	.301368			
579	.441781E-01	-.169039	.300967			
580	.508799E-03	-.858096E-01	.238644			
600	-.961053E-02	-.824649E-02	-.218982E-02			

MAXIMUM VALUE

NODES 570 566 257 0 0 0
DISPL -.177296 -.495431 1.00000 0. 0. 0.

REDUCED EIGENVECTOR FOR MODE 5 FREQUENCY = 1214.42 (CYCLES/TIME)

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
------	----	----	----	------	------	------

Y DIRECTION

19.2533 83/ 3/28 CP= 555.055

LOAD STEP NUMBER = 2

***** LOAD STEP OPTIONS (CARDS L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	0	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITITER	7-9
SOLUTION PRINTOUT FREQUENCY	1	NPRINT	10-12
TIME AT END OF LOAD STEP.	0.	TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
EXPAND. DISP. PRINTOUT FREQ.	1	NDPRNT	70-72 (CARD M)
SEISMIC EXCITATION DIRECTION	0.0000	1.0000	0.0000
FREQ. RANGE FOR EXPANDED MODES	0.0000	100.0000	
SIGNIFICANCE CRITERION	.1000E-02		

***** SPECTRUM DATA TABLE (CARD M1) *****

FREQUENCY	SPECTRUM
0.00	0.
0.00	0.

Y DIRECTION

19.2536 83/ 3/28 CP= 555.131

***** MODAL PARTICIPATION FACTORS *****

MODE	FREQUENCY	P. FACTOR	MODE COEF.	M.C. RATIO	EQUIV. MASS
1	86.65	-.2385	0.	0.000000	.3567
2	129.9	-.6323	0.	0.000000	.2382
3	372.3	.9159	0.	0.000000	.1323
4	778.1	-.1130	0.	0.000000	.9508E-02
5	1834.	-.4544E-02	0.	0.000000	.1140E-01
6	2063.	-.1042	0.	0.000000	.9174E-02
7	4704.	.9039E-02	0.	0.000000	.7963E-02
8	5184.	.7518E-01	0.	0.000000	.4846E-02
9	5505.	-.9723E-02	0.	0.000000	.6953E-02
10	6300.	.1574E-01	0.	0.000000	.3844E-02
11	8095.	-.1190E-01	0.	0.000000	.4276E-02
12	8559.	-.8594E-03	0.	0.000000	.2914E-02
13	9855.	-.7789E-02	0.	0.000000	.2213E-02
14	9945.	-.8881E-02	0.	0.000000	.2214E-02
15	.1079E+05	-.5062E-02	0.	0.000000	.2100E-02
16	.1091E+05	-.1415E-02	0.	0.000000	.2157E-02
17	.1275E+05	-.6295E-01	0.	0.000000	.1708E-02
18	.1408E+05	.1909E-01	0.	0.000000	.8432E-03
19	.1596E+05	-.3895E-02	0.	0.000000	.1170E-02
20	.1639E+05	.2123E-01	0.	0.000000	.1985E-02
21	.1772E+05	-.5607E-03	0.	0.000000	.1164E-02
22	.1969E+05	-.2788E-02	0.	0.000000	.1126E-02
23	.2269E+05	-.4611E-02	0.	0.000000	.5365E-03
24	.2608E+05	.2017E-02	0.	0.000000	.6091E-03
25	.2629E+05	.1254E-02	0.	0.000000	.8257E-03
26	.2689E+05	.3533E-02	0.	0.000000	.5884E-03
27	.2852E+05	.8609E-02	0.	0.000000	.6276E-03
28	.2974E+05	.1371E-02	0.	0.000000	.9545E-03
29	.3211E+05	.5670E-04	0.	0.000000	.6638E-03
30	.3309E+05	-.1276E-03	0.	0.000000	.5778E-03
31	.3380E+05	-.4849E-02	0.	0.000000	.4766E-03
32	.3594E+05	-.1155E-02	0.	0.000000	.6131E-03
33	.3644E+05	-.1228E-02	0.	0.000000	.6563E-03
34	.3693E+05	.3534E-02	0.	0.000000	.6044E-03
35	.4095E+05	.5117E-03	0.	0.000000	.5901E-03
36	.4251E+05	.6595E-04	0.	0.000000	.3690E-03
37	.4400E+05	-.8475E-04	0.	0.000000	.6365E-03
38	.4416E+05	.1039E-03	0.	0.000000	.2866E-03
39	.4492E+05	.2261E-03	0.	0.000000	.7604E-03
40	.4572E+05	-.1043E-03	0.	0.000000	.9295E-03
41	.4708E+05	.1316E-03	0.	0.000000	.4953E-03
42	.4960E+05	.6404E-04	0.	0.000000	.6612E-03
43	.5199E+05	.3125E-02	0.	0.000000	.1550E-03
44	.5441E+05	.1267E-02	0.	0.000000	.1876E-03
45	.5448E+05	.2470E-03	0.	0.000000	.2191E-03
46	.5918E+05	.3081E-03	0.	0.000000	.1851E-03
47	.6015E+05	-.1065E-02	0.	0.000000	.1773E-03
48	.6170E+05	-.2518E-04	0.	0.000000	.1211E-03
49	.6261E+05	-.1583E-02	0.	0.000000	.1370E-03
50	.6695E+05	-.2529E-03	0.	0.000000	.2650E-03

MODE	FREQUENCY	DAMPED FREQ.	DAMPING	COEFFICIENTS
1	1.0000	0.9999	0.0001	1.0000
2	1.0000	0.9999	0.0001	1.0000
3	1.0000	0.9999	0.0001	1.0000
4	1.0000	0.9999	0.0001	1.0000
5	1.0000	0.9999	0.0001	1.0000
6	1.0000	0.9999	0.0001	1.0000
7	1.0000	0.9999	0.0001	1.0000
8	1.0000	0.9999	0.0001	1.0000
9	1.0000	0.9999	0.0001	1.0000
10	1.0000	0.9999	0.0001	1.0000
11	1.0000	0.9999	0.0001	1.0000
12	1.0000	0.9999	0.0001	1.0000
13	1.0000	0.9999	0.0001	1.0000
14	1.0000	0.9999	0.0001	1.0000
15	1.0000	0.9999	0.0001	1.0000
16	1.0000	0.9999	0.0001	1.0000
17	1.0000	0.9999	0.0001	1.0000
18	1.0000	0.9999	0.0001	1.0000
19	1.0000	0.9999	0.0001	1.0000
20	1.0000	0.9999	0.0001	1.0000
21	1.0000	0.9999	0.0001	1.0000
22	1.0000	0.9999	0.0001	1.0000
23	1.0000	0.9999	0.0001	1.0000
24	1.0000	0.9999	0.0001	1.0000
25	1.0000	0.9999	0.0001	1.0000
26	1.0000	0.9999	0.0001	1.0000
27	1.0000	0.9999	0.0001	1.0000
28	1.0000	0.9999	0.0001	1.0000
29	1.0000	0.9999	0.0001	1.0000
30	1.0000	0.9999	0.0001	1.0000
31	1.0000	0.9999	0.0001	1.0000
32	1.0000	0.9999	0.0001	1.0000
33	1.0000	0.9999	0.0001	1.0000
34	1.0000	0.9999	0.0001	1.0000
35	1.0000	0.9999	0.0001	1.0000
36	1.0000	0.9999	0.0001	1.0000
37	1.0000	0.9999	0.0001	1.0000
38	1.0000	0.9999	0.0001	1.0000
39	1.0000	0.9999	0.0001	1.0000
40	1.0000	0.9999	0.0001	1.0000
41	1.0000	0.9999	0.0001	1.0000
42	1.0000	0.9999	0.0001	1.0000
43	1.0000	0.9999	0.0001	1.0000
44	1.0000	0.9999	0.0001	1.0000
45	1.0000	0.9999	0.0001	1.0000
46	1.0000	0.9999	0.0001	1.0000
47	1.0000	0.9999	0.0001	1.0000
48	1.0000	0.9999	0.0001	1.0000
49	1.0000	0.9999	0.0001	1.0000
50	1.0000	0.9999	0.0001	1.0000
51	1.0000	0.9999	0.0001	1.0000
52	1.0000	0.9999	0.0001	1.0000
53	1.0000	0.9999	0.0001	1.0000
54	1.0000	0.9999	0.0001	1.0000
55	1.0000	0.9999	0.0001	1.0000
56	1.0000	0.9999	0.0001	1.0000
57	1.0000	0.9999	0.0001	1.0000
58	1.0000	0.9999	0.0001	1.0000
59	1.0000	0.9999	0.0001	1.0000
60	1.0000	0.9999	0.0001	1.0000
61	1.0000	0.9999	0.0001	1.0000
62	1.0000	0.9999	0.0001	1.0000
63	1.0000	0.9999	0.0001	1.0000
64	1.0000	0.9999	0.0001	1.0000
65				

MODE	FREQUENCY	DAMPED FREQ.	DAMPING	COEFFICIENTS	
1	86.65	86.63	.0204	1 1.0000	2 .0102
2	129.89	129.87	.0202	2 1.0000	
3	372.28	372.21	.0201	3 1.0000	
4	778.07	777.91	.0200	4 1.0000	
5	1834.42	1834.05	.0200	5 1.0000	6 .1046
6	2662.72	2662.31	.0200	6 1.0000	
7	4703.66	4702.72	.0200	7 1.0000	8 .1452
8	5183.64	5182.60	.0200	8 1.0000	9 .3071
9	5508.92	5503.82	.0200	9 1.0000	10 .0811
10	6300.13	6298.67	.0200	10 1.0000	11 .0251
11	8094.69	8093.07	.0200	11 1.0000	12 .2397
12	8559.25	8557.54	.0200	12 1.0000	13 .0748
13	9854.95	9852.94	.0200	13 1.0000	14 .9510
14	9944.90	9942.91	.0200	14 1.0000	15 .1953
15	10786.89	10784.73	.0200	15 1.0000	16 .9202
16	10914.79	10912.61	.0200	16 1.0000	17 .0624
17	12750.61	12747.86	.0200	17 1.0000	18 .1405
18	14078.03	14075.21	.0200	18 1.0000	19 .0921
19	15964.81	15961.62	.0200	19 1.0000	20 .6966
20	16391.99	16388.71	.0200	20 1.0000	21 .2088
21	17720.47	17716.93	.0200	21 1.0000	22 .1259
22	19692.33	19688.39	.0200	22 1.0000	23 .0741
23	22689.05	22684.51	.0200	23 1.0000	24 .0765
24	26079.06	26073.84	.0200	24 1.0000	25 .9619
25	26287.66	26282.40	.0200	25 1.0000	26 .0133
26	26887.10	26881.72	.0200	26 1.0000	27 .0118
27	28515.48	28509.77	.0200	27 1.0000	28 .0216
28	29743.27	29737.32	.0200	28 1.0000	29 .0360
29	32105.71	32099.29	.0200	29 1.0000	30 .0296
30	33088.32	33081.70	.0200	30 1.0000	31 .0299
31	33803.87	33797.11	.0200	31 1.0000	32 .0293
32				32 1.0000	33 .0333
33				33 1.0000	34 .0104
34				34 1.0000	35 .0200
35				35 1.0000	36 .0202
36				36 1.0000	37 .0159
37				37 1.0000	38 .0159
38				38 1.0000	39 .0173
39				39 1.0000	40 .0173
40				40 1.0000	41 .0173
41				41 1.0000	42 .0173
42				42 1.0000	43 .0173
43				43 1.0000	44 .0173
44				44 1.0000	45 .0173
45				45 1.0000	46 .0173
46				46 1.0000	47 .0173
47				47 1.0000	48 .0173
48				48 1.0000	49 .0173
49				49 1.0000	50 .0173
50				50 1.0000	51 .0173
51				51 1.0000	52 .0173
52				52 1.0000	53 .0173
53				53 1.0000	54 .0173
54				54 1.0000	55 .0173
55				55 1.0000	56 .0173
56				56 1.0000	57 .0173
57				57 1.0000	58 .0173
58				58 1.0000	59 .0173
59				59 1.0000	60 .0173
60				60 1.0000	61 .0173
61				61 1.0000	62 .0173
62				62 1.0000	63 .0173
63				63 1.0000	64 .0173
64				64 1.0000	65 .0173
65				65 1.0000	66 .0173
66				66 1.0000	67 .0173
67				67 1.0000	68 .0173
68				68 1.0000	69 .0173

32	35940.54	35933.35	.0200	31	.0146	42	.0110	34	.6867	35	.0861	36	.0539
				32	1.0000	33	.8927	39	.0314	40	.0272	41	.0218
				37	.0379	38	.0366						
				42	.0154	43	.0119						
33	36442.57	36435.28	.0200	33	1.0000	34	.9025	35	.1055	36	.0634	37	.0434
				38	.0418	39	.0355	40	.0304	41	.0241	42	.0168
				43	.0128	44	.0101						
34	36925.03	36917.64	.0200	34	1.0000	35	.1303	36	.0748	37	.0498	38	.0479
				39	.0402	40	.0341	41	.0267	42	.0183	43	.0137
				44	.0108								
35	40950.37	40942.18	.0200	35	1.0000	36	.5327	37	.2370	38	.2197	39	.1575
				40	.1168	41	.0763	42	.0420	43	.0276	44	.0197
				45	.0127	46	.0119	47	.0110				
36	42514.23	42505.72	.0200	36	1.0000	37	.5758	38	.5265	39	.3452	40	.2328
				41	.1337	42	.0633	43	.0383	44	.0259	45	.0158
				46	.0147	47	.0134	48	.0117	49	.0108		
37	43999.62	43990.82	.0200	37	1.0000	38	.9919	39	.7877	40	.5215	41	.2597
				42	.1004	43	.0546	44	.0345	45	.0197	46	.0182
				47	.0164	48	.0141	49	.0130				
38	44158.57	44149.74	.0200	38	1.0000	39	.8445	40	.5705	41	.2813	42	.1060
				43	.0569	44	.0357	45	.0201	46	.0186	47	.0167
				48	.0144	49	.0132						
39	44923.24	44914.26	.0200	39	1.0000	40	.8386	41	.4223	42	.1403	43	.0700
				44	.0420	45	.0228	46	.0209	47	.0187	48	.0159
				49	.0146	50	.0102						
40	45718.73	45709.59	.0200	40	1.0000	41	.6517	42	.3941	43	.0885	44	.0504
				45	.0260	46	.0237	47	.0211	48	.0178	49	.0162
				50	.0111	51	.0104						
41	47075.68	47066.27	.0200	41	1.0000	42	.3691	43	.1398	44	.0711	45	.0332
				46	.0299	47	.0262	48	.0217	49	.0156	50	.0130
				51	.0120								
42	49604.52	49594.60	.0200	42	1.0000	43	.4204	44	.1577	45	.0561	46	.0491
				47	.0415	48	.0328	49	.0289	50	.0178	51	.0162
43	51990.69	51980.29	.0200	43	1.0000	44	.4355	45	.1040	46	.0873	47	.0702
				48	.0520	49	.0445	50	.0247	51	.0222		
44	54414.17	54403.28	.0200	44	1.0000	45	.2360	46	.1852	47	.1375	48	.0923
				49	.0754	50	.0362	51	.0318				
45	58476.99	58465.29	.0200	45	1.0000	46	.9180	47	.6669	48	.3577	49	.2555
				50	.0807	51	.0670						
46	59180.56	59168.72	.0200	46	1.0000	47	.8574	48	.4798	49	.3352	50	.0955
				51	.0781								
47	60154.27	60142.24	.0200	47	1.0000	48	.7136	49	.4997	50	.1229	51	.0983
48	61698.59	61686.25	.0200	48	1.0000	49	.8813	50	.1938	51	.1482		
49	62611.42	62598.90	.0200	49	1.0000	50	.2633	51	.1952				
50	66946.84	66933.45	.0200	50	1.0000	51	.8862						

OCTAL STORAGE REQUIREMENTS FOR REDUCED MODAL OUTPUT CP= 556.217
CORE= 00142736 MEMORY= 00012205 TOTAL= 00155143 MEMORY AVAILABLE= 00107770

NEW TITLE= Z DIRECTION

Z DIRECTION

19.2547 83/ 3/28 CP= 556.287

LOAD STEP NUMBER = 3

***** LOAD STEP OPTIONS (CARD L AND M) *****

	VALUE	VARIABLE NAME	COLUMNS
LOAD STEP KEY	0	KDIS	2-3
TEMPERATURE KEY	0	KTEMP	4-6
NUMBER OF ITERATIONS.	1	NITITER	7-9
SOLUTION PRINTOUT FREQUENCY .	1	NPRINT	10-12
TIME AT END OF LOAD STEP. . . 0.		TIME	13-24
ITER FREQ OF POST ELEM. DATA	1	IFED	49-51 (CARD M)
ITER FREQ OF POST NODAL DATA	1	IFND	52-54 (CARD M)
ITER FREQ OF POST REACT. DATA	1	IFRD	55-57 (CARD M)
EXPAND. DISP. PRINTOUT FREQ.	1	NDPRNT	70-72 (CARD M)
SEISMIC EXCITATION DIRECTION	0.0000	0.0000	1.0000
FREQ. RANGE FOR EXPANDED MODES	0.0000	100.0000	
SIGNIFICANCE CRITERION	.1000E-02		

***** SPECTRUM DATA TABLE (CARD M1) *****

FREQUENCY	SPECTRUM
0.00	0.
0.00	0.

19.2550 R3/ 3/2M Co= 556.365

Z DIRECTION

***** MODAL PARTICIPATION FACTORS *****

MODE	FREQUENCY	P. FACTOR	MODE COEF.	M.C. RATIO	EQUIV. MASS
1	86.65	1.075	0.	0.00000	.3567
2	129.9	-.1678	0.	0.00000	.2382
3	372.3	.2041	0.	0.00000	.1323
4	778.1	.3077	0.	0.00000	.9508E-02
5	1834.	-.3822E-01	0.	0.00000	.1140E-01
6	2063.	.2302E-01	0.	0.00000	.9174E-02
7	4704.	.8080E-01	0.	0.00000	.7963E-02
8	5184.	-.9.10E-03	0.	0.00000	.4846E-02
9	5505.	.3482E-01	0.	0.00000	.6953E-02
10	6300.	-.1206E-02	0.	0.00000	.3864E-02
11	8095.	-.6378E-03	0.	0.00000	.4276E-02
12	8559.	-.3433E-01	0.	0.00000	.2914E-02
13	9855.	.2380E-01	0.	0.00000	.2213E-02
14	9945.	-.1722E-01	0.	0.00000	.2218E-02
15	.1079E+05	-.1763E-01	0.	0.00000	.2100E-02
16	.1091E+05	.3200E-01	0.	0.00000	.2157E-02
17	.1275E+05	.8569E-03	0.	0.00000	.1708E-02
18	.1408E+05	-.1005E-03	0.	0.00000	.8432E-03
19	.1596E+05	-.1977E-01	0.	0.00000	.1170E-02
20	.1639E+05	-.2470E-02	0.	0.00000	.1945E-02
21	.1772E+05	.6327E-03	0.	0.00000	.1168E-02
22	.1969E+05	-.7343E-04	0.	0.00000	.1126E-02
23	.2269E+05	-.2990E-03	0.	0.00000	.5365E-03
24	.2608E+05	.2985E-03	0.	0.00000	.6091E-03
25	.2629E+05	.6558E-03	0.	0.00000	.8257E-03
26	.2689E+05	.7590E-03	0.	0.00000	.5884E-03
27	.2852E+05	-.7627E-03	0.	0.00000	.6276E-03
28	.2974E+05	.2148E-02	0.	0.00000	.9545E-03
29	.3211E+05	.1621E-03	0.	0.00000	.6638E-03
30	.3309E+05	.4463E-02	0.	0.00000	.5778E-03
31	.3380E+05	-.6530E-04	0.	0.00000	.4766E-03
32	.3594E+05	.2869E-03	0.	0.00000	.6131E-03
33	.3644E+05	-.7591E-03	0.	0.00000	.6563E-03
34	.3693E+05	.1030E-03	0.	0.00000	.6044E-03
35	.4095E+05	.5001E-03	0.	0.00000	.5901E-03
36	.4251E+05	-.6985E-02	0.	0.00000	.3690E-03
37	.4400E+05	-.5053E-03	0.	0.00000	.6365E-03
38	.4416E+05	-.3438E-03	0.	0.00000	.2864E-03
39	.4492E+05	-.5570E-03	0.	0.00000	.7604E-03
40	.4572E+05	.1013E-02	0.	0.00000	.9295E-03
41	.4708E+05	.1292E-02	0.	0.00000	.4953E-03
42	.4960E+05	.4185E-03	0.	0.00000	.4612E-03
43	.5199E+05	.6138E-05	0.	0.00000	.1550E-03
44	.5441E+05	-.7499E-05	0.	0.00000	.1876E-03
45	.5848E+05	.3805E-04	0.	0.00000	.2191E-03
46	.5918E+05	.3859E-04	0.	0.00000	.1851E-03
47	.6015E+05	-.3193E-04	0.	0.00000	.1773E-03
48	.6170E+05	.2959E-04	0.	0.00000	.1211E-03
49	.6261E+05	-.1781E-04	0.	0.00000	.1370E-03
50	.6695E+05	.5725E-04	0.	0.00000	.2650E-03

CROSS COUPLING COEFFICIENTS FOR TO = 10.00

MODE	FREQUENCY	DAMPED FREQ.	DAMPING	COEFFICIENTS									
1	86.65	86.63	.0204	1	1.0000								
2	129.89	129.87	.0202	2	1.0000								
3	372.28	372.21	.0201	3	1.0000								
4	777.91	777.91	.0200	4	1.0000								
5	1834.42	1834.05	.0200	5	1.0000								
6	2062.72	2062.31	.0200	6	1.0000								
7	4703.66	4702.72	.0200	7	1.0000								
8	5183.64	5182.60	.0200	8	1.0000								
9	5504.92	5503.82	.0200	9	1.0000								
10	6300.13	6298.87	.0200	10	1.0000								
11	8094.69	8093.07	.0200	11	1.0000								
12	8559.25	8557.54	.0200	12	1.0000								
13	9854.95	9852.98	.0200	13	1.0000								
14	9944.90	9942.91	.0200	14	1.0000								
15	10786.89	10784.73	.0200	15	1.0000								
16	10914.79	10912.61	.0200	16	1.0000								
17	12750.41	12747.86	.0200	17	1.0000								
18	14078.03	14075.21	.0200	18	1.0000								
19	15964.81	15961.62	.0200	19	1.0000								
20	16391.99	16388.71	.0200	20	1.0000								
21	17720.47	17716.93	.0200	21	1.0000								
22	19692.33	19688.39	.0200	22	1.0000								
23	22689.05	22684.51	.0200	23	1.0000								
24	26079.06	26073.84	.0200	24	1.0000								
25	26287.66	26282.40	.0200	25	1.0000								
26	26887.10	26881.72	.0200	26	1.0000								
27	28515.48	28509.77	.0200	27	1.0000								
28	29743.27	29737.32	.0200	28	1.0000								
29	32105.71	32099.29	.0200	29	1.0000								
30	33086.32	33081.70	.0200	30	1.0000								
31	33803.87	33797.11	.0200	31	1.0000								

32	35940.54	35933.35	.0200	41 .0146	42 .0110	34 .6867	35 .0861	36 .6539
				32 1.0000	33 .8927	39 .0314	40 .0272	41 .0218
				37 .0379	38 .0366			
				42 .0154	43 .0119			
33	36442.57	36435.28	.0200	33 1.0000	34 .9025	35 .1055	36 .0634	37 .0434
				38 .0418	39 .0355	40 .0304	41 .0241	42 .0168
				43 .0128	44 .0101			
34	36925.03	36917.64	.0200	34 1.0000	35 .1303	36 .0748	37 .0498	38 .0479
				39 .0402	40 .0341	41 .0267	42 .0183	43 .0137
				44 .0108				
35	40950.37	40942.18	.0200	35 1.0000	36 .5327	37 .2370	38 .2197	39 .1575
				40 .1168	41 .0763	42 .0420	43 .0276	44 .0197
				45 .0127	46 .0119	47 .0110		
36	42514.23	42505.72	.0200	36 1.0000	37 .5758	38 .5265	39 .3452	40 .2328
				41 .1337	42 .0633	43 .0383	44 .0259	45 .0158
				46 .0147	47 .0134	48 .0117	49 .0108	
37	43999.62	43990.82	.0200	37 1.0000	38 .9919	39 .7877	40 .5215	41 .2597
				42 .1004	43 .0546	44 .0345	45 .0197	46 .0182
				47 .0164	48 .0141	49 .0130		
38	44158.57	44149.74	.0200	38 1.0000	39 .8445	40 .5705	41 .2813	42 .1060
				43 .0569	44 .0357	45 .0201	46 .0186	47 .0167
				48 .0144	49 .0132			
39	44923.24	44914.26	.0200	39 1.0000	40 .8386	41 .4223	42 .1403	43 .0700
				44 .0420	45 .0228	46 .0209	47 .0187	48 .0159
				49 .0146	50 .0102			
40	45718.73	45709.59	.0200	40 1.0000	41 .6517	42 .1941	43 .0885	44 .0504
				45 .0260	46 .0237	47 .0211	48 .0178	49 .0162
				50 .0111	51 .0104			
41	47075.68	47066.27	.0200	41 1.0000	42 .3691	43 .1398	44 .0711	45 .0332
				46 .0299	47 .0262	48 .0217	49 .0196	50 .0130
				51 .0120				
42	49604.52	49594.60	.0200	42 1.0000	43 .4204	44 .1577	45 .0561	46 .0491
				47 .0415	48 .0328	49 .0289	50 .0178	51 .0162
43	51990.69	51980.29	.0200	43 1.0000	44 .4355	45 .1040	46 .0873	47 .0702
				48 .0520	49 .0445	50 .0247	51 .0222	
44	54414.17	54403.28	.0200	44 1.0000	45 .2360	46 .1852	47 .1375	48 .0923
				49 .0754	50 .0362	51 .0318		
45	58476.99	58465.29	.0200	45 1.0000	46 .9180	47 .6669	48 .3577	49 .2555
				50 .0807	51 .0670			
46	59180.56	59168.72	.0200	46 1.0000	47 .8574	48 .4798	49 .3352	50 .0955
				51 .0781				
47	60154.27	60142.24	.0200	47 1.0000	48 .7136	49 .4997	50 .1229	51 .0983
48	61698.59	61686.25	.0200	48 1.0000	49 .8813	50 .1938	51 .1482	
49	62611.42	62598.90	.0200	49 1.0000	50 .2633	51 .1952		
50	66946.84	66933.45	.0200	50 1.0000	51 .8862			

OCTAL STORAGE REQUIREMENTS FOR REDUCED MODAL OUTPUT CP= 557.444
 CORE= 00142736 MEMORY= 00012205 TOTAL= 00155143 MEMORY AVAILABLE= 00107770

FILE TAPE13 RECORD 0 RECORD MANAGER ERROR - 0354
 ERROR NUMBER 103 DETECTED BY IOERR AT ADDRESS 000021
 CALLED FROM ENDFIL= AT ADDRESS 000003
 CALLED FROM ASYNIO AT LINE 39
 CALLED FROM CLOSFL AT LINE 67
 CALLED FROM NMAIN9 AT LINE 112
 CALLED FROM MAIN AT LINE 120
 CALLED FROM ANSYS AT LINE 28

APPENDIX E
ANSYS POST 27
LOAD COMBINATIONS

***** ANSYS INPUT DATA LISTING (TABLES) *****

		12	14	24	36	42	44	54	66	72	74
		V	V	V	V	V	V	V	V	V	V
1	CLOW 4 INCH VALVE 4.56 LOAD COMBINATIONS PLUS OPERATING										
2	(AVALUSOP)	1	1	27							2
3		1	1								1
4	350		350								
5	1 45										
6	2 44										
7	3 63										
8	4 4										
9	5 63										
10	6 63										
11	7 63										
12	8 4										
13	9 4										
14	10 4										
15	11 14 4										
16	12 21 2										
17	-1										
18	/TITLE										
19	OPTION1										
20	ALOP12	3	1								
21	SPSS 12	4	1	10	1	11			4.5	4.5	
22	SPSS 12	5	1	11	1	10					1
23	ABSOLU12	2	1	10	1	11					
24	ABSOLU12	4	1	11	1	10					
25	OPTION1	1									
26	PS14 1										
27	ABSOLU12	1	1	10	1	1	2				
28	PRINT										
29	DUPT										
30	PF14 10										
31	POPT										
32	SCAN 1	1	10000								
33	SCAN 1	13	10000								
34	SCAN 1	14	10000								
35	SCAN 1	15	10000								
36	SCAN 1	16	10000								
37	SCAN 1	17	10000								
38	SCAN 2	19	10000								
39	SCAN 2	20	10000								
40	SCAN 2	21	10000								
41	SCAN 2	22	10000								
42	SCAN 3	24	10000								
43	SCAN 3	19	10000								
44	SCAN 3	20	10000								
45	SCAN 3	21	10000								
46	SCAN 3	23	10000								
47	SCAN 3	24	10000								
48	SCAN 3	25	10000								
49	SCAN 3	26	10000								
50	SCAN 3	28	10000								

***** ANSYS INPUT DATA LISTING (Last 16) *****

51	SCAL	3	12	18	24	30	36	42	48	54	60	66	72	78
52	SCAL	3	V	V	V	V	V	V	V	V	V	V	V	V
53	SCAL	3	29	30	10000									
54	SCAL	3	31	10000										
55	SCAL	4	19	10000										
56	SCAL	4	20	10000										
57	SCAL	4	21	10000										
58	SCAL	4	22	10000										
59	SCAL	5	18	10000										
60	SCAL	5	19	10000										
61	SCAL	5	20	10000										
62	SCAL	5	21	10000										
63	SCAL	5	23	10000										
64	SCAL	5	24	10000										
65	SCAL	5	25	10000										
66	SCAL	5	26	10000										
67	SCAL	5	28	10000										
68	SCAL	5	29	10000										
69	SCAL	5	30	10000										
70	PFIL	2	31	10000										
71	SCAL	2	1											
72	TYPES	4												
73	PFIL	2	1											
74	TYPES													
75	POPT	1												
76	PFIL	2												
77	FINISH													

CLOW 4 INCH VALVE 4.5G LOAD COMBINATIONS PLUS OPERATING

TYPE	STEP	DESCRIPTION	KEYSUB OPTIONS						NJ	INOTPR
			1B	1A	1	2H	2A	2		
1	45	ISOPAR ₀ SOLID	0	0	0	0	0	0	0	
2	44	IN VOID ISOPAR ₀ SHELL	0	0	0	0	0	0	0	
3	63	QUAD ₀ FLAT SHELL	0	0	0	0	0	0	0	
4	4	ELASTIC BEAM, 3-D	0	0	0	0	0	1	0	
5	63	QUAD ₀ FLAT SHELL	0	0	0	0	0	0	0	
6	63	QUAD ₀ FLAT SHELL	0	0	0	0	0	0	0	
7	63	QUAD ₀ FLAT SHELL	0	0	0	0	0	0	0	

CLOW 4 INCH VALVE 4.50 LOAD COMBINATION PLUS OPERATING

R.M.H.39 H3/ 4/27 CP= 4.067

***** GENERAL POST DATA PROCESSOR (POST27) *****

*** POST27 OPERATION DEFINITIONS

NEW TITLE= CLOW 4 INCH VALVE 4.50 LOAD COMBINATION PLUS OPERATING

OPTIONS CHOSEN ARE- KNOU= 1 KELM= 1 FWER= 1

SUMMATION TYPE IS ALGE

INPUT FILES ARE * TAPE= 12 L.S.= 3 ITER= 1 FACTOR= 1.0000

TAPE= 0 L.S.= 1 ITER= 0 FACTOR= 1.0000

OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 267

BEGIN ALGE SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	3	1		0	1	0		10	1	1	NODAL
12	3	1		0	1	0		10	1	1	ELEMENT
12	3	1		0	1	0		10	1	1	REACT.FORC.

SUMMATION TYPE IS SRSS

INPUT FILES ARE * TAPE= 12 L.S.= 4 ITER= 1 FACTOR= 4.5000

TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 4.5000

OUTPUT FILE IS * TAPE= 11 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 267

BEGIN SRSS SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	4	1		10	1	1		11	1	1	NODAL
12	4	1		10	1	1		11	1	1	ELEMENT
12	4	1		10	1	1		11	1	1	REACT.FORC.

SUMMATION TYPE IS SRSS

INPUT FILES ARE * TAPE= 12 L.S.= 5 ITER= 1 FACTOR= 4.5000

TAPE= 11 L.S.= 1 ITER= 1 FACTOR= 1.0000

OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 267

BEGIN SRSS SUMMATION FOR -

TAPE	LSTP	ITER	AND	TAPE	LSTP	ITER	ON	TAPE	LSTP	ITER	DATA TYPE
12	5	1		11	1	1		10	1	1	
12	5	1		11	1	1		10	1	1	ELEMENT
12	5	1		11	1	1		10	1	1	REACT.FORC.

END OF FILE ON TAPE 12

END OF FILE ENCOUNTERED ON TAPE 12

SUMMATION TYPE IS RSST

INPUT FILES ARE * TAPE= 12 L.S.= 2 ITER= 1 FACTOR= 1.0000
 TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 1.0000
 OUTPUT FILE IS * TAPE= 11 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 267

BEGIN ABSO SUMMATION FOR =
 TAPE LSTP ITER AND TAPE LSTP ITER ON TAPE LSTP ITER DATA TYPE
 12 2 1 10 1 1 11 1 1
 12 2 1 10 1 1 11 1 1 ELEMENT
 12 2 1 10 1 1 11 1 1 REACT.FORC.

SUMMATION TYPE IS ABSO
 INPUT FILES ARE * TAPE= 12 L.S.= 4 ITER= 1 FACTOR= 1.0000
 TAPE= 11 L.S.= 1 ITER= 1 FACTOR= 1.0000
 OUTPUT FILE IS * TAPE= 10 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 267

BEGIN ABSO SUMMATION FOR =
 TAPE LSTP ITER AND TAPE LSTP ITER ON TAPE LSTP ITER DATA TYPE
 12 4 1 11 1 1 10 1 1
 12 4 1 11 1 1 10 1 1 ELEMENT
 12 4 1 11 1 1 10 1 1 REACT.FORC.

OPTIONS CHOSEN ARE- KNOD= 1 KELM= 1 KDFV= 0

CALCULATE PRINCIPAL STRESSES FOR THIS OPERATION

SUMMATION TYPE IS ABSO
 INPUT FILES ARE * TAPE= 12 L.S.= 1 ITER= 1 FACTOR= 1.0000
 TAPE= 10 L.S.= 1 ITER= 1 FACTOR= 1.0000
 OUTPUT FILE IS * TAPE= 2 L.S.= 1 ITER= 1

MAX. NODE NUMBER= 600 NUMBER OF ELEMENTS= 267

BEGIN ABSO SUMMATION FOR =
 TAPE LSTP ITER AND TAPE LSTP ITER ON TAPE LSTP ITER DATA TYPE
 12 1 1 10 1 1 2 1 1
 12 1 1 10 1 1 2 1 1 ELEMENT

ANALYSIS - ENGINEERING ANALYSIS SYSTEM REVISION 1 UPDATE 6711 CYR0176 JUNE 1, 1979
 SYRMON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3104

CLOS 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

8.8961 R3/ 4/27 CP= 21.791

SECTION 17 POINT SECTION

CONSTRAINTS ARE- KNOU= 0 KEST= 0 KFFR= 0 KRFH= 1

PR NO. = 10 L.S.= 1 ITER= 0

***** REACTION FORCES *****

LOAD STEP= 1 ITERATION= 1

NODI	LABEL	FORCE
17	FX	72.0497
17	FY	67.4685
17	FZ	43.9730
19	FX	210.806
19	FY	118.773
19	FZ	99.1059
21	FX	444.176
21	FY	263.875
21	FZ	346.029
122	FX	462.797
122	FY	1267.55
122	FZ	637.106
125	FX	2167.49
125	FY	2986.78
125	FZ	1979.77
127	FX	1561.17
127	FY	430.994
127	FZ	543.578
12	FX	487.810
12	FY	96.1696
12	FZ	252.483
14	FX	242.923
14	FY	75.6254
14	FZ	116.760
91	FX	91.1112
91	FY	68.4717
91	FZ	53.7215
93	FX	238.882
93	FY	127.797
93	FZ	138.612
95	FX	613.834
95	FY	244.965
95	FZ	176.625
326	FX	1027.01
326	FY	1029.69
326	FZ	729.444
329	FX	2293.02
329	FY	2569.75
329	FZ	1957.95
331	FX	1663.45
331	FY	412.022
331	FZ	622.015

46	FX	521.444
46	FY	85.6254
46	FZ	263.257
48	FX	242.003
48	FY	77.1317
48	FZ	113.661

END OF FILE ON TAPE 10

END OF FILE ENCOMPILERED ON TAPE 10

PRINT OPTIONS ARE- KNOB= 0 KEST= 1 KFFH= 1 KMFH= 0

SCAN LIST ENTRY NO.= 1

ITYP	ITEM	VALU T	VALU B	KEY
1	13	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 2

ITYP	ITEM	VALU T	VALU B	KEY
1	14	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 3

ITYP	ITEM	VALU T	VALU B	KEY
1	15	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 4

ITYP	ITEM	VALU T	VALU B	KEY
1	16	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 5

ITYP	ITEM	VALU T	VALU B	KEY
1	17	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 6

ITYP	ITEM	VALU T	VALU B	KEY
2	19	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 7

ITYP	ITEM	VALU T	VALU B	KEY
2	20	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 8

ITYP	ITEM	VALU T	VALU B	KEY
2	21	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 9

ITYP	ITEM	VALU T	VALU B	KEY
2	22	.1000E+05	0.	0

SCAN LIST ENTRY NO.= 10

ITYP	ITEM	VALU T	VALU B	KEY
2	23	.1000E+05	0.	0

SCAN LIST ENTRY NO.=11

ITYP	ITEM	VALU T	VALU H	KEY
1	18	.1000E+05	0.	0

SCAN LIST ENTRY NO.=12

ITYP	ITEM	VALU T	VALU H	KEY
1	19	.1000E+05	0.	0

SCAN LIST ENTRY NO.=13

ITYP	ITEM	VALU T	VALU H	KEY
3	20	.1000E+05	0.	0

SCAN LIST ENTRY NO.=14

ITYP	ITEM	VALU T	VALU H	KEY
3	21	.1000E+05	0.	0

SCAN LIST ENTRY NO.=15

ITYP	ITEM	VALU T	VALU H	KEY
3	23	.1000E+05	0.	0

SCAN LIST ENTRY NO.=16

ITYP	ITEM	VALU T	VALU H	KEY
3	24	.1000E+05	0.	0

SCAN LIST ENTRY NO.=17

ITYP	ITEM	VALU T	VALU H	KEY
3	25	.1000E+05	0.	0

SCAN LIST ENTRY NO.=18

ITYP	ITEM	VALU T	VALU H	KEY
3	26	.1000E+05	0.	0

SCAN LIST ENTRY NO.=19

ITYP	ITEM	VALU T	VALU H	KEY
3	28	.1000E+05	0.	0

SCAN LIST ENTRY NO.=20

ITYP	ITEM	VALU T	VALU H	KEY
3	29	.1000E+05	0.	0

SCAN LIST ENTRY NO.=21

ITYP	ITEM	VALU T	VALU H	KEY
3	30	.1000E+05	0.	0

SCAN LIST ENTRY NO.=22

ITYP	ITEM	VALU T	VALU H	KEY
3	31	.1000E+05	0.	0

SCAN LIST ENTRY NO.=23

ITYP	ITEM	VALU T	VALU H	KEY
4	19	.1000E+05	0.	0

SCAN LIST ENTRY NO.=24
 ITYP ITEM VALU T KEY
 5 20 .1000E+05 0

SCAN LIST ENTRY NO.=25
 ITYP ITEM VALU T KEY
 5 21 .1000E+05 0

SCAN LIST ENTRY NO.=26
 ITYP ITEM VALU T KEY
 5 22 .1000E+05 0

SCAN LIST ENTRY NO.=27
 ITYP ITEM VALU T KEY
 5 18 .1000E+05 0

SCAN LIST ENTRY NO.=28
 ITYP ITEM VALU T KEY
 5 19 .1000E+05 0

SCAN LIST ENTRY NO.=29
 ITYP ITEM VALU T KEY
 5 20 .1000E+05 0

SCAN LIST ENTRY NO.=30
 ITYP ITEM VALU T KEY
 5 21 .1000E+05 0

SCAN LIST ENTRY NO.=31
 ITYP ITEM VALU T KEY
 5 23 .1000E+05 0

SCAN LIST ENTRY NO.=32
 ITYP ITEM VALU T KEY
 5 24 .1000E+05 0

SCAN LIST ENTRY NO.=33
 ITYP ITEM VALU T KEY
 5 25 .1000E+05 0

SCAN LIST ENTRY NO.=34
 ITYP ITEM VALU T KEY
 5 26 .1000E+05 0

SCAN LIST ENTRY NO.=35
 ITYP ITEM VALU T KEY
 5 24 .1000E+05 0

SCAN LIST ENTRY NO.=36
 ITYP ITEM VALU T KEY
 5 24 .1000E+05 0

5 29 -1000E+05 0. 0

SCAN LIST ENTRY NO.=31

ITYP	ITEM	VALU I	VALU H	KEY
5	30	-1000E+05	0.	0

SCAN LIST ENTRY NO.=3H

ITYP	ITEM	VALU I	VALU H	KEY
5	31	-1000E+05	0.	0

PRINT TAP= NO.= 2 L.S.= 1 ITER= 1

SCAN LIST -		VALU I	VALU H	KEY	OPERATION
NO.	ITYP	ITEM			
1	1	13	-1000E+05	0.	ABSO ON VALUT
2	1	14	-1000E+05	0.	ABSO ON VALUT
3	1	15	-1000E+05	0.	ABSO ON VALUT
4	1	16	-1000E+05	0.	ABSO ON VALUT
5	1	17	-1000E+05	0.	ABSO ON VALUT
6	2	14	-1000E+05	0.	ABSO ON VALUT
7	2	20	-1000E+05	0.	ABSO ON VALUT
8	2	21	-1000E+05	0.	ABSO ON VALUT
9	2	22	-1000E+05	0.	ABSO ON VALUT
10	2	23	-1000E+05	0.	ABSO ON VALUT
11	3	14	-1000E+05	0.	ABSO ON VALUT
12	3	19	-1000E+05	0.	ABSO ON VALUT
13	3	20	-1000E+05	0.	ABSO ON VALUT
14	3	21	-1000E+05	0.	ABSO ON VALUT
15	3	23	-1000E+05	0.	ABSO ON VALUT
16	3	24	-1000E+05	0.	ABSO ON VALUT
17	3	25	-1000E+05	0.	ABSO ON VALUT
18	3	26	-1000E+05	0.	ABSO ON VALUT
19	3	28	-1000E+05	0.	ABSO ON VALUT
20	3	29	-1000E+05	0.	ABSO ON VALUT
21	3	30	-1000E+05	0.	ABSO ON VALUT
22	3	31	-1000E+05	0.	ABSO ON VALUT
23	4	19	-1000E+05	0.	ABSO ON VALUT
24	4	20	-1000E+05	0.	ABSO ON VALUT
25	4	21	-1000E+05	0.	ABSO ON VALUT
26	4	22	-1000E+05	0.	ABSO ON VALUT
27	5	16	-1000E+05	0.	ABSO ON VALUT
28	5	19	-1000E+05	0.	ABSO ON VALUT
29	5	20	-1000E+05	0.	ABSO ON VALUT
30	5	21	-1000E+05	0.	ABSO ON VALUT
31	5	23	-1000E+05	0.	ABSO ON VALUT
32	5	24	-1000E+05	0.	ABSO ON VALUT
33	5	25	-1000E+05	0.	ABSO ON VALUT
34	5	26	-1000E+05	0.	ABSO ON VALUT
35	5	28	-1000E+05	0.	ABSO ON VALUT
36	5	29	-1000E+05	0.	ABSO ON VALUT
37	5	30	-1000E+05	0.	ABSO ON VALUT
38	5	31	-1000E+05	0.	ABSO ON VALUT

***** ELEMENT DATA OUTPUT *****

LOAD STEP= 1 ITERATION= 1

*** MAXIMUMS FOR ALL SCANNED VARIABLES ***

SCAN NO.	ELEM NO.	ITEM	MAX/MIN
1	61	13	4104.949
2	157	14	4411.1602
3	60	15	1400.544
4	61	16	2122.167
5	61	17	3457.940
6	157	19	1020.498
7	157	20	344.6284
8	157	21	248.5541
9	157	22	400.9719
10	157	23	773.2176
11	191	18	3304.635
12	191	19	1946.237
13	185	20	1008.164
14	191	21	2884.522
15	193	23	30.69660
16	155	24	7.606964
17	193	25	16.84297
18	193	26	32.29606
19	193	28	3256.559
20	191	29	1993.256
21	185	30	1000.037
22	191	31	2842.960
23	202	13	1946.644
24	202	20	1914.044
25	201	21	1946.644
26	201	22	1918.044
27	212	18	1846.989
28	229	19	1114.263
29	210	20	895.8544
30	215	21	1790.873
31	216	23	431.8377
32	216	24	138.8391
33	216	25	485.3384
34	216	26	909.2424
35	214	28	1726.494
36	229	29	1180.364
37	216	30	623.9593
38	216	31	1619.696

END OF FILE ON TAPE 2
END OF FILE ENCOUNTERED ON TAPE 2

SCAN LIST ENDED

ELEMENT TYPE = 4

POINT TAPE NO. = 1 L.S. = 1 ITEM = 1

***** ELEMENT DATA OUTPUT *****

LOAD STEP = 1 ITERATION = 1

AN ELEMENT MESSAGING LIST, OR TYPE IS OR HAS STARTED

EL = 204 SITE 4 NODES = 55 5.6

FACE	SOIW	SHZ	SHY			
1	44.4477	1082.00	284.720			
2	47.2084	605.954	171.419			
END	FX	FY	FZ	MX	MY	MZ
1	19.3320	8.15747	37.7692	.366014E-11	43.1305	11.3142
J	20.3043	4.51522	37.8642	.366014E-11	24.0746	6.81045
EL= 205	STIF	4	NODES= 536 537			
FACE	SOIW	SHZ	SHY			
1	47.2084	605.954	171.419			
2	49.7077	12.9848	15.8764			
END	FX	FY	FZ	MX	MY	MZ
1	20.3043	3.79062	12.2386	.274550E-11	24.0746	6.81045
J	21.3793	2.50443	12.9561	.274550E-11	.510080	.630765
EL= 206	STIF	4	NODES= 537 538			
FACE	SOIW	SHZ	SHY			
1	49.7077	12.9848	15.8764			
2	50.6597	2.68344	3.26025			
END	FX	FY	FZ	MX	MY	MZ
1	21.3793	.417476	.750662	.917710E-12	.516080	.630765
J	21.7867	.417035	.341210	.917710E-12	.106628	.130323
EL= 207	STIF	4	NODES= 538 539			
FACE	SOIW	SHZ	SHY			
1	50.6597	2.68344	3.28025			
2	51.4530	.246730E-09	.113788E-09			
END	FX	FY	FZ	MX	MY	MZ
1	21.7867	.417035	.341210	.182721E-11	.106628	.130323
J	22.1294	.992648E-11	.283301E-10	.182721E-11	.980252E-11	.452075E-11
EL= 202	STIF	4	NODES= 533 534			
FACE	SOIW	SHZ	SHY			
1	14.2794	869.564	1062.80			
2	16.7792	731.544	86.8119			
END	FX	FY	FZ	MX	MY	MZ
1	6.14178	21.5930	26.8494	2112.00	34.5475	42.2248
J	7.21673	20.2818	25.7757	2112.00	29.0641	3.44901
EL= 203	STIF	4	NODES= 534 535			
FACE	SOIW	SHZ	SHY			
1	16.7792	731.544	86.8119			
2	19.0344	1190.42	303.219			
END	FX	FY	FZ	MX	MY	MZ
1	7.21673	7.25565	43.3074	2112.00	29.0641	3.44901
J	8.14404	6.12365	42.3781	2112.00	47.2951	12.0468
EL= 201	STIF	4	NODES= 532 533			
FACE	SOIW	SHZ	SHY			
1	13.3274	757.447	925.817			
2	14.2794	869.564	1062.80			
END	FX	FY	FZ	MX	MY	MZ
1	5.73233	7.00618	5.73233	2112.00	30.0947	36.7825
J	6.14178	7.50662	6.14178	2112.00	34.5475	42.2248
EL= 200	STIF	4	NODES= 531 532			
FACE	SOIW	SHZ	SHY			
1	11.5026	767.213	849.596			
2	13.3274	757.447	925.817			
END	FX	FY	FZ	MX	MY	MZ
1	4.44727	6.04667	4.44727	2112.00	22.4161	27.3975

7.73233 7.00014 5.73233 2112.00 10.0947 35.7825

FILE= 199 STEP= 4 NODES= 530 531
 FACE= 501R SHZ SHY
 1 .606239E-12 .378770E-11 .154751E-10
 2 .11.5026 564.215 689.546
 END Fx Fy Fz MX MY MZ
 1 .260743E-12 .317253E-12 .264455E-12 2112.00 .150484E-12 .630713E-12
 3 4.94727 6.04667 4.94727 2112.00 22.4161 27.3975

END OF FILE ON TAPE 2
 END OF FILE ENCOUNTERED ON TAPE 2

ELEMENT TYPE LIST ENDED

PRINT OPTIONS ARE- KNOB= 1 KEST= 0 KEFR= 0 KRFH= 0

PRINT TAPE NO. = 2 L.S.= 1 ITEM= 0

***** DISPLACEMENT SOLUTION *****

LOAD STEP= 1 ITERATION= 1

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
1	.304131E-04	.411172E-04	.355015E-04	.137785E-04	.266627E-05	.251475E-04
2	.334084E-04	.299249E-04	.339045E-04	.171263E-04	.431497E-05	.468704E-05
3	.339075E-04	.188752E-04	.201621E-04	.160313E-04	.990946E-05	.107811E-04
4	.333438E-04	.884788E-05	.113221E-04	.947192E-05	.552488E-05	.970368E-05
5	.284853E-04	.587781E-05	.341193E-05	.834590E-05	.398475E-05	.709226E-05
6	.259854E-04	.157480E-04	.720354E-05	.793030E-05	.432333E-05	.708280E-05
7	.243102E-04	.276308E-04	.142224E-04	.136755E-04	.949105E-05	.799944E-05
8	.186318E-04	.343879E-04	.266376E-04	.159306E-04	.530066E-05	.539064E-05
9	.410770E-05	.438472E-04	.242016E-04	.128789E-04	.408335E-05	.881687E-05
10	.251594E-04	.488924E-04	.307993E-04	.156567E-04	.540878E-05	.135640E-04
11	.245696E-04	.287831E-04	.653032E-05	0.	0.	0.
12	.498221E-05	.144655E-04	0.	0.	0.	0.
13	.272415E-04	.114415E-04	.902891E-05	0.	0.	0.
14	.166010E-04	.241325E-05	0.	0.	0.	0.
15	.204444E-04	.266906E-05	.184714E-05	0.	0.	0.
16	.213738E-04	.688481E-05	.228494E-05	0.	0.	0.
17	.176401E-04	.107963E-04	0.	0.	0.	0.
18	.201014E-04	.196049E-04	.324213E-05	0.	0.	0.
19	.761705E-05	.226205E-04	0.	0.	0.	0.
20	.689411E-05	.334048E-04	.846685E-05	0.	0.	0.
21	.852887E-05	.230802E-04	0.	0.	0.	0.
22	.204030E-04	.244831E-04	.521011E-05	0.	0.	0.
23	.198950E-04	.158266E-04	.940383E-05	0.	0.	0.
24	.262868E-04	.815624E-05	.657880E-05	0.	0.	0.
25	.216210E-04	.545144E-05	.361189E-05	0.	0.	0.
26	.194664E-04	.443367E-05	.231565E-05	0.	0.	0.
27	.145744E-04	.657436E-05	.164135E-05	0.	0.	0.
28	.184324E-04	.439470E-05	.121240E-05	0.	0.	0.
29	.144310E-04	.145233E-04	.263508E-05	0.	0.	0.
30	.121502E-04	.219640E-04	.509067E-05	0.	0.	0.
31	.681470E-05	.100483E-04	.711917E-05	0.	0.	0.
32	.172525E-04	.287686E-04	.116717E-04	0.	0.	0.
33	.265087E-04	.707751E-05	.316841E-05	0.	0.	0.
34	.212052E-04	.604934E-05	.255590E-05	0.	0.	0.
35	.142084E-04	.585977E-05	.186125E-05	0.	0.	0.
36	.187143E-04	.729114E-05	.126225E-05	0.	0.	0.
37	.195299E-04	.642730E-05	.134292E-05	0.	0.	0.

38	214139-04	314039-04	310994-04	0.	0.	0.
39	264194-04	271154-04	271154-04	0.	0.	0.
40	305294-04	142764-04	105934-04	0.	0.	0.
41	320664-04	105045-04	123464-04	0.	0.	0.
42	327064-04	240510-05	221924-05	0.	0.	0.
43	291310-04	147251-04	647205-05	0.	0.	0.
44	242001-04	246474-04	100775-04	0.	0.	0.
45	170712-04	367049-04	133700-04	0.	0.	0.
46	255564-05	394514-04	165425-04	0.	0.	0.
47	251065-04	364190-04	185709-04	0.	0.	0.
48	211456-04	141197-04	107597-04	0.	0.	0.
49	280172-04	165720-04	133645-04	0.	0.	0.
50	251343-04	997372-05	893201-05	0.	0.	0.
51	250346-04	534689-05	664419-05	0.	0.	0.
52	223444-04	332824-05	322521-05	0.	0.	0.
53	200104-04	651430-05	249149-05	0.	0.	0.
54	200144-04	123895-04	395075-05	0.	0.	0.
55	146543-04	192534-04	510251-05	0.	0.	0.
56	155064-04	273606-04	825587-05	0.	0.	0.
57	734324-05	303464-04	100876-04	0.	0.	0.
58	263344-04	317982-04	142053-04	0.	0.	0.
59	197012-04	171153-04	419734-05	0.	0.	0.
60	247665-04	149276-04	612566-05	0.	0.	0.
61	264100-04	721148-05	704137-05	0.	0.	0.
62	226074-04	447106-05	359569-05	0.	0.	0.
63	206751-04	424832-05	213042-05	0.	0.	0.
64	191126-04	619449-05	191946-05	0.	0.	0.
65	192130-04	470584-05	193921-05	0.	0.	0.
66	182759-04	140382-04	295157-05	0.	0.	0.
67	142020-04	244436-04	403590-05	0.	0.	0.
68	724625-05	290356-04	655881-05	0.	0.	0.
69	162944-04	241976-04	939428-05	0.	0.	0.
70	262433-04	637653-05	346762-05	0.	0.	0.
71	213594-04	574444-05	287596-05	0.	0.	0.
72	209076-04	557147-05	209865-05	0.	0.	0.
73	184439-04	527022-05	194871-05	0.	0.	0.
74	196964-04	613056-05	211544-05	0.	0.	0.
75	321940-04	378304-04	244043-04	0.	0.	0.
76	340254-04	335322-04	252885-04	0.	0.	0.
77	320712-04	145307-04	171874-04	0.	0.	0.
78	343534-04	927078-05	137774-04	0.	0.	0.
79	306257-04	642565-05	830680-05	0.	0.	0.
80	284443-04	142672-04	109439-04	0.	0.	0.
81	250333-04	274954-04	119666-04	0.	0.	0.
82	204204-04	172324-04	170045-04	0.	0.	0.
83	124493-04	408124-04	171036-04	0.	0.	0.
84	392146-04	430612-04	238234-04	0.	0.	0.
85	296262-04	273984-04	125191-04	0.	0.	0.
86	431621-05	137884-04	0.	0.	0.	0.
87	274562-04	110859-04	119664-04	0.	0.	0.
88	157669-04	313452-05	0.	0.	0.	0.
89	197366-04	245151-05	266619-05	0.	0.	0.
90	205550-04	734653-05	366044-05	0.	0.	0.
91	171140-04	108177-04	0.	0.	0.	0.
92	204710-04	202765-04	744747-05	0.	0.	0.
93	707647-05	221244-04	0.	0.	0.	0.
94	460675-05	325545-04	140757-04	0.	0.	0.
95	406370-05	224757-04	0.	0.	0.	0.
96	230665-04	271107-04	127903-04	0.	0.	0.
97	207444-04	152366-04	132713-04	0.	0.	0.
98	261156-04	794404-05	954154-05	0.	0.	0.

221	216947E-04	308859E-04	322229E-04	0.	0.
222	335137E-04	316921E-04	169016E-04	0.	0.
223	400569E-04	270653E-04	272365E-04	0.	0.
224	385712E-04	295294E-04	240266E-04	0.	0.
225	301423E-04	386436E-04	236674E-04	0.	0.
226	379401E-04	400298E-04	477435E-04	0.	0.
227	250321E-04	352593E-04	459424E-04	0.	0.
228	541643E-04	205588E-04	257641E-04	0.	0.
229	407621E-04	190226E-04	167057E-04	0.	0.
230	300215E-04	184329E-04	103610E-04	0.	0.
231	197761E-04	290807E-04	100361E-04	0.	0.
232	628208E-04	334855E-04	660072E-04	0.	0.
233	238125E-04	503511E-04	324549E-04	0.	0.
234	346101E-04	671539E-04	437926E-04	0.	0.
235	347714E-04	712333E-04	101682E-03	0.	0.
236	645060E-04	556791E-04	268081E-03	0.	0.
237	703536E-04	248920E-04	131991E-03	0.	0.
238	465865E-04	174847E-04	166106E-04	0.	0.
239	27373E-04	168494E-04	467759E-05	0.	0.
240	810162E-04	537025E-04	117056E-03	0.	0.
241	133696E-03	575325E-04	446736E-03	0.	0.
242	850766E-04	290856E-04	173493E-03	0.	0.
243	185444E-03	169383E-03	296587E-03	0.	0.
244	646167E-04	145248E-03	902529E-04	0.	0.
245	287994E-04	101797E-03	857993E-04	0.	0.
246	388007E-04	920199E-04	190411E-03	0.	0.
247	592360E-04	145878E-03	586929E-03	0.	0.
248	228620E-03	171962E-03	907751E-03	0.	0.
249	146773E-02	916605E-03	199605E-02	0.	0.
250	896966E-03	919416E-03	142665E-02	0.	0.
251	378041E-03	932036E-03	827313E-03	0.	0.
252	278887E-03	942615E-03	219111E-03	0.	0.
253	211702E-03	909900E-03	130367E-02	0.	0.
254	489024E-03	893135E-03	220705E-02	0.	0.
255	118055E-02	856949E-03	314146E-02	0.	0.
256	181665E-02	854511E-03	385187E-02	0.	0.
257	147344E-02	154586E-02	202453E-02	0.	0.
258	896875E-03	152210E-02	147433E-02	0.	0.
259	384481E-03	150325E-02	978406E-03	0.	0.
260	296495E-03	147561E-02	354595E-03	0.	0.
261	236709E-03	148437E-02	177496E-02	0.	0.
262	520903E-03	152041E-02	271262E-02	0.	0.
263	116181E-02	156273E-02	348101E-02	0.	0.
264	141738E-02	157094E-02	417301E-02	0.	0.
265	314544E-04	408114E-04	208171E-04	0.	0.
266	371644E-04	379123E-04	191525E-04	0.	0.
267	411317E-04	329497E-04	205116E-04	0.	0.
268	521894E-04	216818E-04	188748E-04	0.	0.
269	524468E-04	291819E-04	201192E-04	0.	0.
270	482658E-04	350373E-04	398941E-04	0.	0.
271	487012E-04	457338E-04	240996E-04	0.	0.
272	240631E-04	348753E-04	278841E-04	0.	0.
273	146949E-04	269588E-04	101793E-04	0.	0.
274	847746E-04	275372E-04	294578E-04	0.	0.
275	483645E-04	359836E-04	197561E-04	0.	0.
276	361704E-04	492242E-04	244860E-04	0.	0.
277	532040E-04	255224E-04	483964E-04	0.	0.
278	706638E-04	590770E-04	369029E-04	0.	0.
279	244441E-04	410539E-04	599336E-04	0.	0.
280	578214E-04	246858E-04	147981E-04	0.	0.
281	278240E-04	216988E-04	103938E-04	0.	0.

282	153421E-04	271877E-04	139240E-04	0.	0.	0.	0.
283	704962E-04	354966E-04	662505E-04	0.	0.	0.	0.
284	625451E-04	628666E-04	315669E-04	0.	0.	0.	0.
285	386355E-04	867831E-04	466701E-04	0.	0.	0.	0.
286	591102E-04	104001E-03	100197E-03	0.	0.	0.	0.
287	148643E-03	826448E-04	271875E-03	0.	0.	0.	0.
288	115033E-03	432436E-04	136759E-03	0.	0.	0.	0.
289	266757E-04	177198E-04	175759E-04	0.	0.	0.	0.
290	194569E-04	149048E-04	445900E-05	0.	0.	0.	0.
291	959269E-04	620458E-04	120781E-03	0.	0.	0.	0.
292	203204E-03	834552E-04	455442E-03	0.	0.	0.	0.
293	124853E-03	402981E-04	182198E-03	0.	0.	0.	0.
294	207887E-03	179721E-03	303789E-03	0.	0.	0.	0.
295	450415E-04	158100E-03	869503E-04	0.	0.	0.	0.
296	317961E-04	113021E-03	615964E-04	0.	0.	0.	0.
297	533600E-04	102471E-03	196126E-03	0.	0.	0.	0.
298	215915E-03	181968E-03	594953E-03	0.	0.	0.	0.
299	300102E-03	202938E-03	918255E-03	0.	0.	0.	0.
300	936976E-03	920250E-03	199753E-02	0.	0.	0.	0.
301	414871E-03	938536E-03	830872E-03	0.	0.	0.	0.
302	280666E-03	949049E-03	212870E-03	0.	0.	0.	0.
303	405412E-03	967295E-03	130424E-02	0.	0.	0.	0.
304	547331E-03	944037E-03	221057E-02	0.	0.	0.	0.
305	119397E-02	939510E-03	308229E-02	0.	0.	0.	0.
306	182622E-02	950712E-02	385401E-02	0.	0.	0.	0.
307	151660E-02	153863E-02	201098E-02	0.	0.	0.	0.
308	903580E-03	157242E-02	150139E-02	0.	0.	0.	0.
309	440183E-03	150012E-02	980789E-03	0.	0.	0.	0.
310	291436E-03	147681E-02	349319E-03	0.	0.	0.	0.
311	402781E-03	152575E-02	177778E-02	0.	0.	0.	0.
312	601925E-03	155676E-02	270222E-02	0.	0.	0.	0.
313	117643E-02	159500E-02	354250E-02	0.	0.	0.	0.
314	143593E-02	159744E-02	417068E-02	0.	0.	0.	0.
315	412272E-04	414571E-04	217950E-04	0.	0.	0.	0.
316	372221E-04	420645E-04	171822E-04	0.	0.	0.	0.
317	584775E-04	490994E-04	259536E-04	0.	0.	0.	0.
318	674280E-04	308781E-04	189388E-04	0.	0.	0.	0.
319	728849E-04	466782E-04	125375E-04	0.	0.	0.	0.
320	621847E-04	557216E-04	338970E-04	0.	0.	0.	0.
321	870174E-04	652967E-04	261899E-04	0.	0.	0.	0.
322	321932E-04	347475E-04	255951E-04	0.	0.	0.	0.
323	195719E-04	243098E-04	645684E-05	0.	0.	0.	0.
324	651846E-04	373189E-04	380312E-04	0.	0.	0.	0.
325	166189E-04	908986E-05	0.	0.	0.	0.	0.
326	501642E-04	791466E-04	260567E-04	0.	0.	0.	0.
327	884156E-04	529040E-04	536440E-04	0.	0.	0.	0.
328	133971E-04	363237E-05	0.	0.	0.	0.	0.
329	580029E-05	849159E-04	0.	0.	0.	0.	0.
330	382327E-04	318296E-04	0.	0.	0.	0.	0.
331	199692E-04	273834E-04	146914E-04	0.	0.	0.	0.
332	862171E-04	393145E-04	167628E-04	0.	0.	0.	0.
333	691618E-04	106674E-03	705366E-04	0.	0.	0.	0.
334	456282E-04	136891E-03	412011E-04	0.	0.	0.	0.
335	102884E-03	168088E-03	483718E-04	0.	0.	0.	0.
336	282684E-03	146427E-03	105233E-03	0.	0.	0.	0.
337	194710E-03	777582E-04	300144E-03	0.	0.	0.	0.
338	820473E-04	179764E-04	152327E-03	0.	0.	0.	0.
339	301745E-04	147912E-04	292358E-04	0.	0.	0.	0.
340	126154E-03	445933E-04	127812E-03	0.	0.	0.	0.
341							
342							

343	.340648E-03	.134848E-03	.469732E-03	0.	0.	0.
344	.201746E-03	.649927E-04	.198582E-03	0.	0.	0.
345	.257849E-03	.223640E-03	.316545E-03	0.	0.	0.
346	.126340E-03	.211554E-03	.423978E-04	0.	0.	0.
347	.435019E-04	.173216E-03	.760249E-04	0.	0.	0.
348	.400623E-04	.173830E-03	.208267E-03	0.	0.	0.
349	.415280E-03	.240508E-03	.619370E-03	0.	0.	0.
350	.504007E-03	.293777E-03	.435305E-03	0.	0.	0.
351	.154821E-02	.106717E-02	.149750E-02	0.	0.	0.
352	.472883E-03	.106005E-02	.140418E-02	0.	0.	0.
353	.470424E-03	.103321E-02	.840133E-03	0.	0.	0.
354	.307947E-03	.103077E-02	.209338E-03	0.	0.	0.
355	.686616E-03	.117219E-02	.131301E-02	0.	0.	0.
356	.725134E-03	.116637E-02	.222157E-02	0.	0.	0.
357	.125503E-02	.122814E-02	.307280E-02	0.	0.	0.
358	.186041E-02	.123455E-02	.385074E-02	0.	0.	0.
359	.155814E-02	.162375E-02	.201476E-02	0.	0.	0.
360	.477724E-03	.159934E-02	.149011E-02	0.	0.	0.
361	.487376E-03	.158342E-02	.941780E-03	0.	0.	0.
362	.307547E-03	.154139E-02	.341771E-03	0.	0.	0.
363	.661569E-03	.169137E-02	.176661E-02	0.	0.	0.
364	.756815E-03	.174875E-02	.271192E-02	0.	0.	0.
365	.124440E-02	.176692E-02	.351072E-02	0.	0.	0.
366	.187327E-02	.175017E-02	.420106E-02	0.	0.	0.
500	.413407E-04	.839129E-04	.341193E-05	.271071E-04	.474665E-04	.139564E-04
501	.522556E-04	.827328E-04	.720354E-05	.861177E-04	.142056E-03	.139046E-04
502	.609160E-04	.740882E-04	.142228E-04	.119843E-03	.152860E-03	.138445E-04
503	.662530E-04	.765234E-04	.266376E-04	.163278E-03	.778442E-04	.136754E-04
504	.685193E-04	.794210E-04	.292016E-04	.183906E-03	.341298E-05	.136345E-04
505	.665657E-04	.847573E-04	.307993E-04	.162444E-03	.774236E-04	.136751E-04
506	.598183E-04	.905032E-04	.209334E-04	.120413E-03	.152784E-03	.138437E-04
507	.509498E-04	.966215E-04	.181707E-04	.870810E-04	.143414E-03	.139426E-04
508	.412426E-04	.981609E-04	.116178E-04	.314845E-04	.465571E-04	.139863E-04
509	.323808E-04	.963790E-04	.149158E-04	.841092E-04	.134982E-03	.138386E-04
510	.242905E-04	.901913E-04	.277984E-04	.118301E-03	.146189E-03	.136233E-04
511	.196355E-04	.845403E-04	.366167E-04	.156004E-03	.739890E-04	.132799E-04
512	.190189E-04	.791983E-04	.355015E-04	.175005E-03	.164344E-05	.131931E-04
513	.196361E-04	.763649E-04	.339045E-04	.156847E-03	.728758E-04	.132694E-04
514	.233202E-04	.778678E-04	.201621E-04	.115674E-03	.146359E-03	.135880E-04
515	.313075E-04	.825121E-04	.113221E-04	.829312E-04	.133646E-03	.137879E-04
516	.229912E-04	.742799E-04	.119810E-03	.154162E-03	.306899E-05	.131116E-04
517	.410132E-04	.760690E-04	.478426E-04	.409469E-03	.279518E-05	.141785E-04
518	.617042E-04	.795227E-04	.118641E-03	.161101E-03	.283182E-05	.135942E-04
519	.340552E-04	.414146E-02	.375314E-02	.963656E-01	.405145E-03	.456908E-03
531	.322741E-04	.436177E-03	.439130E-03	.384012E-01	.247406E-03	.264228E-03
532	.316711E-04	.131755E-03	.143322E-03	.292031E-01	.159775E-03	.157310E-03
533	.313187E-04	.400298E-04	.477935E-04	.244058E-01	.103366E-03	.887400E-04
534	.302783E-04	.174302E-04	.295959E-04	.118113E-01	.425153E-04	.199532E-04
535	.291941E-04	.336214E-04	.934167E-04	.419247E-03	.406342E-05	.113199E-04
536	.264121E-04	.105845E-04	.123444E-04	.419247E-03	.413202E-04	.132823E-04
537	.232032E-04	.332824E-05	.322521E-05	.419247E-03	.166341E-04	.968277E-05
538	.214533E-04	.437221E-05	.130356E-04	.419247E-03	.171316E-04	.102068E-04
539	.209076E-04	.155025E-04	.235485E-04	.419247E-03	.171832E-04	.102622E-04
550	.120133E-03	.168307E-02	.781111E-03	.562445E-03	.584866E-04	.231302E-03
551	.233847E-03	.157158E-02	.469274E-03	.562352E-03	.683942E-04	.272943E-03
552	.218424E-03	.167914E-02	.466835E-03	.5623. E-03	.616802E-04	.270840E-03
553	.201078E-03	.142738E-02	.779689E-03	.562423E-03	.782804E-04	.231082E-03
554	.394396E-03	.142816E-02	.136833E-02	.562362E-03	.573877E-04	.230790E-03
555	.558258E-03	.168583E-02	.182077E-02	.562164E-03	.705628E-04	.267478E-03
556	.516196E-03	.157918E-02	.182212E-02	.562183E-03	.643559E-04	.267196E-03
557	.289539E-03	.168401E-02	.136988E-02	.562384E-03	.750214E-04	.230859E-03

554	.447056E-03	.281358E-02	.325125E-03	.562552E-03	.633361E-04	.224274E-03
559	.970566E-03	.180766E-02	.157649E-02	.562286E-03	.632240E-04	.228575E-03
560	.859162E-03	.212589E-02	.157661E-02	.562235E-03	.632310E-04	.228857E-03
561	.374670E-03	.336967E-02	.325099E-03	.562539E-03	.633033E-04	.224270E-03
562	.837315E-03	.336964E-02	.212190E-02	.562530E-03	.633482E-04	.229282E-03
563	.131082E-02	.212717E-02	.363810E-02	.561986E-03	.632702E-04	.228075E-03
564	.117985E-02	.140902E-02	.363802E-02	.562039E-03	.633146E-04	.228691E-03
565	.526889E-03	.281354E-02	.212190E-02	.562543E-03	.632935E-04	.229280E-03
566	.626054E-03	.322986E-02	.369212E-03	.562456E-03	.656128E-04	.230967E-03
567	.118445E-02	.145718E-02	.208790E-02	.562404E-03	.633504E-04	.217176E-03
568	.104768E-02	.228067E-02	.209252E-02	.562372E-03	.626007E-04	.218892E-03
569	.444731E-03	.384179E-02	.366578E-03	.562431E-03	.634698E-04	.230863E-03
570	.967467E-03	.384179E-02	.233823E-02	.562377E-03	.643760E-04	.231361E-03
571	.152320E-02	.228101E-02	.414731E-02	.562247E-03	.649295E-04	.214352E-03
572	.136822E-02	.141741E-02	.414402E-02	.562270E-03	.636777E-04	.218253E-03
573	.601673E-03	.322990E-02	.322990E-02	.562400E-03	.614810E-04	.230922E-03
574	.101581E-02	.171993E-02	.208901E-02	.562313E-03	.565723E-04	.171192E-03
575	.106084E-02	.157747E-02	.208391E-02	.562324E-03	.890952E-04	.167887E-03
576	.858131E-03	.171374E-02	.150242E-02	.562311E-03	.395076E-04	.106713E-03
577	.403586E-03	.157242E-02	.150139E-02	.562325E-03	.455509E-04	.108750E-03
578	.122104E-02	.173719E-02	.354313E-02	.562119E-03	.538651E-04	.107400E-03
579	.117643E-02	.159500E-02	.354250E-02	.562133E-03	.366545E-04	.106247E-03
580	.138303E-02	.173779E-02	.415080E-02	.562124E-03	.100687E-03	.176555E-03
581	.133470E-02	.159530E-02	.414715E-02	.562134E-03	.597125E-04	.172862E-03
590	.211460E-03	.158509E-02	.105412E-02	.562583E-03	.633197E-04	.229217E-03
591	.212018E-03	.176732E-02	.109525E-02	.563405E-03	.634114E-04	.229673E-03
600	.247409E-02	.234644E-02	.651226E-02	.567588E-03	.638668E-04	.232341E-03

END OF FILE ON TAPE 2
END OF FILE ENCOUNTERED ON TAPE 2

PLOT DATA (IF ANY) WRITTEN ON FILE TAPE?1

***** PROBLEM COMPLETED ***** CP = 26.531

END OF INPUT ENCOUNTERED ON FILE TAPE1R

ENTER /NOTES CARD AFTER FINISH CARD (OR AT ANY CARD-A LEVEL)
FOR DETAILED NOTES ON FEATURES, CHANGES, HELP, ETC.

***** RUN COMPLETED ***** CP = 26.543

***** ANSYS TWO DIMENSIONAL PLOTS *****

***** END PLOTS *****

REMEMBER:

YOU ARE RESPONSIBLE FOR SAVING YOUR OWN FILES
FOR MORE INFORMATION INCLUDE THE FOLLOWING CARD

EXPLAIN,ANSYS,FILES.

FOR INFORMATION ON INTERACTIVE EXECUTION
INCLUDE THE FOLLOWING CARD
EXPLAIN,ANSYS,INTER.

CLASS 3 ERROR LIST IS NOW AVAILABLE
EXPLAIN,ANSYS,ERRORS

APPENDIX F
ANSYS POST 23
VALVE BODY NODAL STRESSES
AND
NODAL DISPLACEMENT DATA

***** ANSYS INPUT DATA LISTING (TAPE 1) *****

```

1 CLOS 4 INCH VALVE POST 23 SOLIOS LIMERICK NPP
2 DAVIDSON
3      1 1 1 23
4      350 350
5      1 45
6      2 94
7      3 63
8      4 4 1
9      5 63
10     6 63
11     7 63
12     8 4 1
13     9 4 1
14    10 4 1
15    11 14 4
16    12 21 2
17    -1
18      /TITLE      4 INCH VALVE LIMERICK NPP
19      SET,1,1
20      TYPES,1
21      ZONE,4
22      DISPL,1
23      STRESS,.....1,1
24      PRINT
25      DISPL
26      STRESS
27      STRESS,....7,1000
28      PLOT
29      /TITLE      VALVE BODY SECTION CUT Z=0.375 4 INCH VALVE
30      POINT,....0.375
31      STRESS,.....1,1
32      /TITLE      VALVE BODY SECTION CUT Z=1.125 4 INCH VALVE
33      POINT,....1.125
34      STRESS,.....1,1
35      /TITLE      VALVE BODY SECTION CUT Z=1.875 4 INCH VALVE
36      POINT,....1.875
37      STRESS,.....1,1
38      /TITLE      VALVE BODY SECTION CUT Z=2.625 4 INCH VALVE
39      POINT,....2.625
40      STRESS,.....1,1
41      FINISH

```

CLD 4 INCH VALVE POST 21 SOLIDS LIMFWICK NPP Q. H264 H3/ 4/27 CP= 2.940

SWANSON ANALYSIS SYSTEMS, INC. IS ENDEAVORING TO MAKE THE ANSYS PROGRAM AS COMPLETE, ACCURATE, AND EASY TO USE AS POSSIBLE. SUGGESTIONS AND COMMENTS ARE WELCOMED. ANY ERRORS ENCOUNTERED IN EITHER THE DOCUMENTATION OR THE RESULTS SHOULD BE IMMEDIATELY BROUGHT TO OUR ATTENTION.

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***** ANALYSIS OPTIONS (CARDS C1 AND C2) *****
```

F-7

TYPE	STIFF	DESCRIPTION	KEYSUB OPTIONS						NJ	INOTPR
			1b	1a	1	2b	2A	c		
1	45	ISOPAR. SOLID	0	0	0	0	0	0	0	
2	94	16 NODE ISOPAR. SHELL	0	0	0	0	0	0	0	
3	63	QUAD. FLAT SHELL	0	0	0	0	0	0	0	
4	4	ELASTIC BEAM, 3-D	0	0	0	0	1	0	0	
5	63	QUAD. FLAT SHELL	0	0	0	0	0	0	0	
6	63	QUAD. FLAT SHELL	0	0	0	0	0	0	0	
7	63	QUAD. FLAT SHELL	0	0	0	0	0	0	0	

CLOSURE VALVE 4.56 LOAD COMBINATION PLUS OPERATING 0.810R R3/ 4/77 CO= 12.20Y

ANSYS POST23 MODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

MODE	UX	UY	UZ
1	.304131E-04	.41172E-04	.25015E-04
2	.33484E-04	.29269E-04	.33905E-04
3	.33907E-04	.18875E-04	.20162E-04
4	.33434E-04	.68478E-05	.11322E-04
5	.29485E-04	.58778E-05	.34119E-05
6	.25985E-04	.15748E-04	.12035E-05
7	.24310E-04	.27630E-04	.14222E-04
8	.16631E-04	.38387E-04	.26637E-04
9	.91077E-05	.43947E-04	.29201E-04
10	.25154E-04	.48092E-04	.30799E-04
11	.24564E-04	.28793E-04	.65303E-05
12	.89822E-05	.14465E-04	0.
13	.27241E-04	.11441E-04	.90289E-05
14	.16601E-04	.29132E-05	0.
15	.20444E-04	.26690E-05	.18471E-05
16	.21373E-04	.68481E-05	.22849E-05
17	.17640E-04	.10763E-04	0.
18	.20101E-04	.19604E-04	.32421E-05
19	.76170E-05	.22620E-04	0.
20	.68941E-05	.33404E-04	.44668E-05
21	.85280E-05	.23080E-04	0.
22	.20403E-04	.24431E-04	.52101E-05
23	.18950E-04	.15826E-04	.94030E-05
24	.26286E-04	.81562E-05	.65788E-05
25	.21621E-04	.54514E-05	.36189E-05
26	.19466E-04	.44336E-05	.23156E-05
27	.19579E-04	.66743E-05	.16413E-05
28	.18932E-04	.93947E-05	.12124E-05
29	.18431E-04	.18523E-04	.26350E-05
30	.12150E-04	.21964E-04	.50906E-05
31	.68147E-05	.30048E-04	.71191E-05
32	.17252E-04	.26766E-04	.11671E-04
33	.26504E-04	.78775E-05	.31684E-05
34	.21205E-04	.60493E-05	.25559E-05
35	.19209E-04	.58597E-05	.18612E-05
36	.18714E-04	.72911E-05	.12622E-05
37	.19529E-04	.69273E-05	.13429E-05
38	.21912E-04	.31903E-04	.31094E-04
39	.26819E-04	.27115E-04	.23251E-04
40	.30552E-04	.18276E-04	.16593E-04
41	.32666E-04	.10544E-04	.12366E-04
42	.32706E-04	.29051E-05	.52192E-05
43	.29131E-04	.18725E-04	.64720E-05
44	.26200E-04	.28687E-04	.10078E-04
45	.17071E-04	.36704E-04	.14370E-04
46	.95566E-05	.39451E-04	.16542E-04
47	.25109E-04	.28419E-04	.14570E-04
48	.21185E-04	.18119E-04	.10769E-04
49	.28017E-04	.16572E-04	.13365E-04
50	.25134E-04	.99737E-05	.49320E-05

Q.430R R3/ 4/27 C0= 72.337

CLIM 8 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

ANALYSIS POST23 JOINT DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	UX	UY	UZ
51	.26038E-04	.53858E-05	.66441E-05
52	.22344E-04	.33242E-05	.32252E-05
53	.20410E-04	.65143E-05	.28914E-05
54	.20014E-04	.12349E-04	.39507E-05
55	.14456E-04	.19253E-04	.51025E-05
56	.15064E-04	.27360E-04	.62558E-05
57	.13932E-05	.30346E-04	.10047E-04
58	.26039E-04	.31798E-04	.18205E-04
59	.19761E-04	.17115E-04	.41973E-05
60	.24766E-04	.14927E-04	.61258E-05
61	.26410E-04	.72114E-05	.70413E-05
62	.22607E-04	.44710E-05	.35956E-05
63	.20675E-04	.42483E-05	.21304E-05
64	.19112E-04	.61994E-05	.19196E-05
65	.14213E-04	.87058E-05	.19392E-05
66	.14275E-04	.18038E-04	.29515E-05
67	.14202E-04	.24443E-04	.40359E-05
68	.72462E-05	.29035E-04	.65588E-05
69	.16294E-04	.28197E-04	.93942E-05
70	.26243E-04	.63765E-05	.34676E-05
71	.21354E-04	.57844E-05	.24754E-05
72	.20907E-04	.55714E-05	.20946E-05
73	.14443E-04	.52702E-05	.19487E-05
74	.19696E-04	.61305E-05	.21154E-05
75	.32199E-04	.37430E-04	.24404E-04
76	.34025E-04	.33532E-04	.25244E-04
77	.32071E-04	.18538E-04	.17187E-04
78	.34353E-04	.92707E-05	.13777E-04
79	.30625E-04	.64256E-05	.43064E-05
80	.24864E-04	.18267E-04	.10943E-04
81	.25033E-04	.27895E-04	.11968E-04
82	.20420E-04	.37723E-04	.17002E-04
83	.12489E-04	.40812E-04	.17103E-04
84	.34214E-04	.43061E-04	.23824E-04
85	.24626E-04	.27898E-04	.12519E-04
86	.43162E-05	.13748E-04	0.
87	.27454E-04	.11085E-04	.11966E-04
88	.15766E-04	.31345E-05	0.
89	.14736E-04	.24515E-05	.26661E-05
90	.20550E-04	.73485E-05	.34604E-05
91	.17110E-04	.10417E-04	0.
92	.204110E-04	.20776E-04	.14474E-05
93	.70769E-05	.22128E-04	0.
94	.46067E-05	.32588E-04	.14075E-04
95	.40634E-05	.22475E-04	.12790E-04
96	.23066E-04	.23138E-04	.14771E-04
97	.20763E-04	.15238E-04	.14771E-04
98	.26116E-04	.74480E-05	.95615E-05
99	.21167E-04	.57402E-05	.46269E-05
100	.14770E-04	.46763E-05	.33988E-05

ANSYS - PROGRAMMING ANALYSIS SYSTEM, REVISION 3, UPDATE 67L1, CYRILITE JUNE 1-1979
 SHANNON ANALYSIS SYSTEMS, INC., HOUSTON, PENNSYLVANIA 15142 PHONE (412) 746-3304

9.410R M3/ 4/27 CP= 12.470

CLOW 8 EACH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

ANSYS POST23 MODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	UX	UY	UZ
101	.145518E-04	.706069E-05	.320769E-05
102	.140257E-04	.995458E-05	.424102E-05
103	.185476E-04	.184910E-04	.694831E-05
104	.123761E-04	.214127E-04	.917563E-05
105	.746317E-05	.295951E-04	.125401E-04
106	.177601E-04	.256962E-04	.182266E-04
107	.264549E-04	.765094E-05	.357951E-05
108	.208149E-04	.665808E-05	.267315E-05
109	.145201E-04	.647679E-05	.245429E-05
110	.177365E-04	.790657E-05	.235541E-05
111	.185345E-04	.747050E-05	.354555E-05
112	.259743E-04	.489254E-04	.304902E-04
113	.304521E-04	.492312E-04	.209334E-04
114	.405044E-04	.460895E-04	.161707E-04
115	.555841E-04	.346302E-04	.116178E-04
116	.671474E-04	.455246E-04	.149158E-04
117	.842474E-04	.549712E-04	.277984E-04
118	.886544E-04	.578007E-04	.366167E-04
119	.304875E-04	.419283E-04	.354988E-04
120	.194545E-04	.250719E-04	.360968E-05
121	.466329E-04	.397349E-04	.285918E-04
122	.177466E-04	.933354E-05	0.
123	.540082E-04	.942613E-04	.239797E-04
124	.490140E-04	.633855E-04	.550517E-04
125	.145930E-04	.352449E-05	0.
126	.152631E-03	.941974E-04	.768444E-04
127	.655747E-05	.139649E-04	0.
128	.33301E-04	.327124E-04	.723031E-05
129	.187604E-04	.292462E-04	.104315E-04
130	.606777E-04	.43197E-04	.575414E-04
131	.656514E-04	.130113E-03	.438270E-04
132	.636650E-04	.167976E-03	.479327E-04
133	.195906E-03	.194912E-03	.104723E-03
134	.271299E-03	.193343E-03	.300438E-03
135	.177143E-03	.943172E-04	.147713E-03
136	.726617E-04	.195410E-04	.226477E-04
137	.256147E-04	.263797E-04	.731923E-05
138	.016244E-04	.100306E-03	.109727E-03
139	.306620E-03	.155232E-03	.459250E-03
140	.141654E-03	.739584E-04	.141588E-03
141	.173714E-03	.274642E-03	.297420E-03
142	.141731E-03	.266749E-03	.129908E-03
143	.577114E-04	.214537E-03	.670263E-04
144	.906666E-04	.211250E-03	.210794E-03
145	.477344E-03	.392538E-03	.632200E-03
146	.456207E-03	.349712E-03	.925467E-03
147	.142296E-02	.131644E-02	.199720E-02
148	.442424E-03	.130442E-02	.140414E-02
149	.145624E-03	.126020E-02	.832590E-03
150	.449640E-03	.124729E-02	.242198E-03

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.8309 R3/ 4/27 CP= 72.601

ANSYS POST23 NODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	UX	UY	UZ
151	.752550E-03	.137933E-02	.132171E-02
152	.676440E-03	.137605E-02	.221856E-02
153	.125264E-02	.145452E-02	.307635E-02
154	.187503E-02	.146422E-02	.385066E-02
155	.142749E-02	.184305E-02	.200934E-02
156	.851269E-03	.186284E-02	.149308E-02
157	.354168E-03	.185794E-02	.100382E-02
158	.447418E-03	.180592E-02	.349371E-03
159	.723735E-03	.194358E-02	.176722E-02
160	.712185E-03	.201382E-02	.271842E-02
161	.123769E-02	.202561E-02	.351219E-02
162	.187892E-02	.200305E-02	.419679E-02
163	.235852E-04	.422313E-04	.239136E-04
164	.296647E-04	.388929E-04	.197131E-04
165	.376001E-04	.356086E-04	.172558E-04
166	.516175E-04	.233036E-04	.161672E-04
167	.506761E-04	.290124E-04	.196472E-04
168	.424955E-04	.354293E-04	.407587E-04
169	.435372E-04	.439328E-04	.330246E-04
170	.235735E-04	.326307E-04	.329259E-04
171	.145710E-04	.275063E-04	.108341E-04
172	.385785E-04	.285464E-04	.253143E-04
173	.335886E-04	.420908E-04	.186433E-04
174	.383844E-04	.620520E-04	.242292E-04
175	.529711E-04	.668987E-04	.497452E-04
176	.660591E-04	.693122E-04	.363156E-04
177	.828739E-04	.428895E-04	.568562E-04
178	.509244E-04	.224057E-04	.137498E-04
179	.201343E-04	.206900E-04	.767114E-05
180	.150616E-04	.269734E-04	.100998E-04
181	.583585E-04	.386142E-04	.595408E-04
182	.345470E-04	.833659E-04	.350799E-04
183	.490241E-04	.110424E-03	.449409E-04
184	.601573E-04	.125461E-03	.100807E-03
185	.137044E-03	.992854E-04	.72032E-03
186	.102997E-03	.480441E-04	.134027E-03
187	.729898E-04	.173960E-04	.146513E-04
188	.182757E-04	.191745E-04	.356749E-05
189	.744189E-04	.738698E-04	.112908E-03
190	.142650E-03	.100329E-03	.451052E-03
191	.112526E-03	.468176E-04	.178328E-03
192	.175675E-03	.215701E-03	.295630E-03
193	.122258E-03	.193358E-03	.104545E-03
194	.344302E-04	.136248E-03	.871900E-04
195	.537004E-04	.121246E-03	.197477E-03
196	.224515E-03	.218436E-03	.600761E-03
197	.275255E-03	.242781E-03	.911477E-03
198	.145103E-02	.107613E-02	.199762E-02
199	.873210E-03	.105688E-02	.140582E-02
200	.959605E-03	.106141E-02	.828355E-03

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR0176 JUNE 1, 1979
 VIBRATION ANALYSIS SYSTEM, INC. PHOENIX (412) 766-3304

9.830M R3/ 4/27 CO= 72.730

CLOW & LECH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

ANSYS POST23 BODAL DISPLACEMENTS

LOAD STEP 1 ITERATION= 1 TIME = 0.

NODE	UX	UY	UZ
201	.364945E-03	.107442E-02	.228224E-03
202	.453163E-03	.104159E-02	.130820E-02
203	.527445E-03	.106513E-02	.220975E-02
204	.114023E-02	.107500E-02	.408340E-02
205	.143626E-02	.109603E-02	.385419E-02
206	.145040E-02	.167107E-02	.200423E-02
207	.458111E-03	.171374E-02	.150242E-02
208	.372874E-03	.164451E-02	.985191E-03
209	.371543E-03	.162106E-02	.355133E-03
210	.447355E-03	.167208E-02	.177873E-02
211	.574665E-03	.170565E-02	.270464E-02
212	.122104E-02	.177191E-02	.354313E-02
213	.163270E-02	.173632E-02	.416920E-02
214	.275326E-04	.378519E-04	.196927E-04
215	.335619E-04	.334438E-04	.194541E-04
216	.356696E-04	.251722E-04	.174840E-04
217	.393715E-04	.140457E-04	.171194E-04
218	.452779E-04	.174302E-04	.295959E-04
219	.427244E-04	.249160E-04	.410900E-04
220	.335286E-04	.302444E-04	.343227E-04
221	.216887E-04	.308859E-04	.322229E-04
222	.335137E-04	.316421E-04	.169016E-04
223	.400569E-04	.276653E-04	.272385E-04
224	.485732E-04	.295294E-04	.480268E-04
225	.301423E-04	.385436E-04	.238674E-04
226	.379840E-04	.400298E-04	.477935E-04
227	.425032E-04	.352593E-04	.459424E-04
228	.543643E-04	.285588E-04	.557641E-04
229	.407662E-04	.190226E-04	.167057E-04
230	.300215E-04	.184329E-04	.103610E-04
231	.197761E-04	.280407E-04	.100361E-04
232	.526700E-04	.334355E-04	.660072E-04
233	.238127E-04	.503511E-04	.324549E-04
234	.396101E-04	.671539E-04	.437926E-04
235	.347714E-04	.712333E-04	.101682E-03
236	.645060E-04	.556791E-04	.268081E-03
237	.703536E-04	.284920E-04	.131971E-03
238	.465865E-04	.174987E-04	.166104E-03
239	.273473E-04	.168494E-04	.467754E-05
240	.401527E-04	.537025E-04	.117758E-03
241	.144646E-03	.575325E-04	.446740E-03
242	.850766E-04	.290856E-04	.173493E-03
243	.185444E-03	.169383E-03	.296567E-03
244	.461671E-04	.145928E-03	.902524E-04
245	.287994E-04	.101797E-03	.457993E-04
246	.408007E-04	.920154E-04	.190411E-03
247	.542300E-04	.145478E-03	.486924E-03
248	.228620E-03	.171962E-03	.90751E-03
249	.146773E-02	.916605E-03	.199605E-02
250	.890086E-03	.919416E-03	.142665E-02

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

9.8308 R3/ 4/27 CP= 72.860

ANSYS POSITIVE NODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	UX	UY	UZ
251	.378041E-03	.932036E-03	.827313E-03
252	.278887E-03	.942615E-03	.219111E-03
253	.211702E-03	.904900E-03	.130167E-02
254	.449024E-03	.893135E-03	.220705E-02
255	.118055E-02	.859694E-03	.314146E-02
256	.181865E-02	.854511E-03	.385187E-02
257	.147344E-02	.154586E-02	.202453E-02
258	.896875E-03	.152210E-02	.147433E-02
259	.389401E-03	.150325E-02	.978406E-03
260	.296495E-03	.147561E-02	.354595E-03
261	.236704E-03	.148437E-02	.177496E-02
262	.520903E-03	.152041E-02	.271262E-02
263	.116131E-02	.156273E-02	.348101E-02
264	.181738E-02	.157094E-02	.417301E-02
265	.314584E-04	.408114E-04	.208171E-04
266	.371684E-04	.374123E-04	.191525E-04
267	.411317E-04	.329497E-04	.205116E-04
268	.521894E-04	.216818E-04	.188748E-04
269	.525468E-04	.291819E-04	.201192E-04
270	.482655E-04	.350373E-04	.398941E-04
271	.487012E-04	.457338E-04	.290996E-04
272	.260631E-04	.344753E-04	.278841E-04
273	.146999E-04	.269588E-04	.101793E-04
274	.487746E-04	.275372E-04	.294578E-04
275	.483695E-04	.354836E-04	.197581E-04
276	.361708E-04	.499242E-04	.244880E-04
277	.552040E-04	.559224E-04	.483964E-04
278	.706838E-04	.590770E-04	.369029E-04
279	.934383E-04	.410539E-04	.589538E-04
280	.578235E-04	.246458E-04	.147981E-04
281	.226290E-04	.216988E-04	.103939E-04
282	.153421E-04	.271877E-04	.139280E-04
283	.704462E-04	.354946E-04	.662505E-04
284	.425451E-04	.654866E-04	.315869E-04
285	.396355E-04	.887831E-04	.446701E-04
286	.591102E-04	.104001E-03	.100197E-03
287	.148643E-03	.820448E-04	.271875E-03
288	.115033E-03	.432436E-04	.136759E-03
289	.588757E-04	.177198E-04	.175759E-04
290	.194569E-04	.189040E-04	.845900E-05
291	.959268E-04	.620458E-04	.120781E-03
292	.203204E-03	.834552E-04	.455442E-03
293	.124853E-03	.402941E-04	.182198E-03
294	.207847E-03	.174721E-03	.303789E-03
295	.450419E-04	.158100E-03	.869503E-04
296	.117961E-04	.113021E-03	.815964E-04
297	.533600E-04	.102471E-03	.196120E-03
298	.215915E-03	.181968E-03	.594553E-03
299	.100102E-03	.202238E-03	.918255E-03
300	.151295E-02	.932635E-03	.199753E-02

ANALYSIS - 4 DISCRETE LOAD CASES SYSTEM REVISION 3 UPDATE 4711 CYR0176 JUNE 1, 1979
 ANALYSIS SYSTEMS, INC. PHOENIX, ARIZONA 85016-3306 PHONE (612) 746-3306

Q.430P R3/ 4/27 CD= 12.940

CLOW * FOUR VALUE * TWO LOAD COMBINATION PLUS OPERATING

ANALYSIS POST-23 INITIAL DISPLACEMENTS

LOAD STEP=	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
NODE	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
U1	936976E-03	61471E-03	260666E-03	405412E-03	247331E-03	114397E-02	182622E-02	151860E-02	903586E-03	440183E-03	291836E-03	402701E-03	601925E-03	117643E-02	143593E-02	412212E-04	372221E-04	558775E-04	674240E-04	728849E-05	621847E-04	970174E-04	321942E-04	195719E-04	651846E-04	166189E-04	501642E-04	884156E-04	133971E-04	169740E-03	580027E-05	382327E-04	194992E-04	462171E-04	691618E-04	456282E-04	102094E-03	242043E-03	194710E-03	420473E-04	401747E-04	126154E-03	400888E-03	201748E-03	277899E-03	176340E-03	450181E-04	400624E-04	15290E-03	504007E-03
U2	920250E-03	93536E-03	949049E-03	967295E-03	948037E-03	934510E-03	950712E-03	153663E-02	151742E-02	150012E-02	147681E-02	152575E-02	155676E-02	159500E-02	159744E-02	41571E-04	420645E-04	490994E-04	365781E-04	65782E-04	55210E-04	652967E-04	347475E-04	243098E-04	373189E-04	908986E-05	791866E-04	529040E-04	363237E-05	89159E-04	124483E-04	316296E-04	273834E-04	393145E-04	106074E-03	136891E-03	164088E-03	168427E-03	777582E-04	179764E-04	274530E-04	845333E-04	134448E-03	64927E-04	223640E-03	211554E-03	171216E-03	171010E-03	290508E-03	293777E-03
U3	18047E-02	83047E-03	212870E-03	130424E-02	221057E-02	306224E-02	385401E-02	201098E-02	150139E-02	980789E-03	349319E-03	177778E-02	270222E-02	354250E-02	417068E-02	217950E-04	171822E-04	259530E-04	189388E-04	125375E-04	338970E-04	261894E-04	255951E-04	645684E-05	380312E-04	0.	260567E-04	536440E-04	0.	842190E-04	0.	146914E-04	167620E-04	705330E-04	412011E-04	483718E-04	105243E-03	300144E-03	152327E-03	287350E-04	147912E-04	127612E-03	469732E-03	198542E-03	316595E-03	423940E-04	760249E-04	408297E-03	619170E-03	945305E-03

ANALYSIS - FATHOMLINE ANALYSIS SYSTEM, REVISION 3, UPDATE 67L1, CYR0176, JUNE 1, 1979
 SARDINIA ANALYSIS SYSTEMS, INC., HOUSTON, PENNSYLVANIA 15342, PHONE (612) 746-3304

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING 9.830A R3/ 4/27 CP= 73.11H

ANALYSIS POINTS MODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

MODE	UX	UY	UZ
351	-154821E-02	-106717E-02	-199750E-02
352	-972683E-03	-106005E-02	-140418E-02
353	-470428E-03	-103321E-02	-640133E-03
354	-307947E-03	-103077E-02	-209398E-03
355	-686616E-03	-117219E-02	-131301E-02
356	-725134E-03	-116637E-02	-222157E-02
357	-125503E-02	-122414E-02	-307290E-02
358	-188041E-02	-123455E-02	-345074E-02
359	-155614E-02	-162375E-02	-201476E-02
360	-977724E-03	-159934E-02	-149011E-02
361	-447376E-03	-154342E-02	-991740E-03
362	-307547E-03	-154139E-02	-341771E-03
363	-661569E-03	-169137E-02	-176891E-02
364	-756815E-03	-174875E-02	-271192E-02
365	-124940E-02	-176692E-02	-351072E-02
366	-187327E-02	-175017E-02	-420106E-02

CLOW 4 INCH VALVE 4.50 LOAD COMBINATION PLUS OPERATION

9.830R R3/ 4/27 CP= 73.189

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SI6X	SI6Y	SI6Z	SXY	SYZ	SXZ	SMAX	SMIN	TMAX	SI6E
1	392.34	268.54	190.94	190.50	124.50	103.49	592.60	92.49	250.06	467.42
2	367.70	184.99	153.58	161.48	92.23	135.81	547.77	70.17	238.80	468.79
3	246.41	148.10	94.34	171.20	67.94	119.92	430.98	9.62	210.68	403.44
4	192.13	174.35	64.39	149.40	53.40	99.67	371.96	1.41	185.28	345.94
5	144.88	218.53	47.55	112.70	44.78	66.43	321.19	12.84	154.17	281.82
6	133.48	185.03	54.72	132.59	43.89	63.76	315.68	7.78	153.95	289.20
7	161.97	126.83	87.26	159.46	53.21	70.81	336.14	-16.75	176.45	322.51
8	243.70	138.09	124.44	158.94	75.01	71.32	396.55	18.58	188.98	347.42
9	286.24	193.30	150.91	161.19	102.86	62.74	450.17	44.50	202.84	364.61
10	297.24	279.18	150.88	217.74	139.66	67.88	554.91	31.53	263.69	483.40
11	476.41	49.72	131.04	129.52	78.02	72.26	536.87	19.62	258.52	468.52
12	261.15	49.06	100.00	96.94	34.10	73.94	327.79	11.04	158.37	291.30
13	113.04	59.84	54.72	96.33	23.76	56.96	209.57	-17.91	113.74	205.90
14	90.31	111.69	36.19	75.79	20.02	50.23	192.65	-9.94	96.80	174.78
15	73.30	118.79	29.81	50.38	17.24	38.12	161.06	6.35	77.35	137.13
16	44.22	130.65	18.62	39.41	16.30	24.22	150.95	4.76	73.09	131.64
17	39.06	125.78	23.07	77.35	13.95	18.27	174.10	-8.83	91.47	169.40
18	88.49	13.27	49.63	97.57	14.08	29.87	186.04	-18.55	102.30	181.61
19	173.76	37.93	75.56	75.79	26.91	36.65	221.21	2.62	109.30	195.42
20	199.88	47.93	96.54	45.34	42.27	32.37	226.80	20.04	103.38	180.93
21	342.82	139.66	94.24	143.61	79.05	76.67	448.02	30.21	208.90	388.56
22	472.34	21.94	93.01	104.46	59.31	55.10	506.22	-21.18	263.70	477.80
23	154.81	8.02	69.20	69.29	7.83	33.31	199.85	-18.46	109.15	191.44
24	69.45	26.99	41.70	60.57	7.43	25.60	120.50	-17.37	68.94	120.55
25	39.09	71.38	24.36	34.00	10.92	23.02	99.26	4.70	47.28	84.57
26	23.54	69.18	15.26	14.78	8.87	14.61	76.27	4.16	36.06	63.72
27	17.37	68.70	10.76	15.54	8.95	9.66	75.03	3.79	35.62	65.30
28	7.68	76.87	16.05	32.12	6.05	6.34	90.34	-5.58	47.96	87.20
29	57.22	57.11	32.93	59.63	-1.36	9.67	117.20	-4.12	60.66	107.42
30	114.08	6.07	42.23	33.54	1.87	18.22	127.52	-3.00	65.26	115.47
31	118.94	-8.82	55.78	-3.48	6.64	13.64	121.80	-9.68	65.74	113.89
32	340.20	71.72	65.07	113.44	43.59	92.74	411.78	23.58	194.10	379.50
33	-23.31	-7.48	2.95	-12.28	-7.46	-12.18	8.31	-35.32	21.82	39.86
34	-13.52	16.99	7.25	-1.59	-2.84	.46	17.85	-13.61	15.73	27.59
35	-7.70	28.45	6.61	-1.76	2.74	1.81	28.86	-8.05	18.45	32.19
36	-5.33	26.33	5.83	1.52	5.25	.34	27.67	-5.41	16.54	29.39
37	-12.51	15.07	5.99	13.26	1.93	-3.27	21.13	-18.32	19.72	34.55
38	344.59	193.18	97.52	174.77	82.85	145.84	550.27	35.25	257.51	490.03
39	347.93	150.75	83.45	169.13	72.93	120.81	493.64	34.49	229.58	449.71
40	256.25	149.04	60.41	166.16	51.64	97.63	411.36	12.14	199.61	385.06
41	212.15	165.43	46.36	147.49	42.01	79.16	362.43	10.12	176.15	333.59
42	169.05	195.71	36.38	123.45	37.59	55.18	320.91	15.75	152.58	284.32
43	159.21	166.21	40.46	135.96	37.96	51.50	311.94	15.01	148.46	287.04
44	167.82	130.35	51.97	153.07	43.96	52.31	320.78	-5.20	162.99	307.24
45	222.20	137.65	69.22	159.96	57.95	56.56	364.99	11.12	177.94	337.73
46	254.89	163.65	84.74	155.04	77.16	59.02	410.67	21.93	194.37	394.84
47	243.15	185.11	97.29	187.27	106.90	69.80	446.97	2.38	222.29	412.66
48	469.39	59.62	43.24	75.69	36.61	124.40	520.92	32.09	244.42	475.84
49	263.14	44.12	71.06	98.11	23.52	72.78	324.25	9.63	157.31	297.10
50	132.12	59.24	48.68	96.39	20.19	50.23	215.50	-10.48	112.99	207.01

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.830R H3/ 4/27 CP= 73.407

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SHY	SHZ	SHX	SMAK	SMIN	TMAX	SIGC
51	91.22	108.76	34.20	76.51	20.34	43.18	189.58	4.32	92.63	170.15
52	73.21	116.62	29.86	54.77	17.03	32.94	162.02	10.30	75.86	137.00
53	56.05	127.55	20.80	47.08	15.93	19.72	154.91	11.66	71.62	132.12
54	51.00	117.88	24.57	78.76	15.31	15.70	173.10	-2.03	87.57	164.29
55	94.33	77.29	38.52	92.01	14.54	23.30	185.41	-5.35	95.38	174.42
56	167.13	41.79	49.86	74.22	19.52	34.03	211.08	7.00	102.04	189.49
57	201.28	40.47	61.49	59.28	30.53	46.74	237.40	14.64	111.38	206.92
58	321.23	67.12	80.17	146.67	64.29	133.25	447.75	-2.28	224.02	437.76
59	456.09	4.47	70.24	35.33	20.77	105.95	486.49	-1.61	244.05	466.16
60	189.65	8.51	61.37	73.26	4.18	41.42	225.55	-18.74	122.15	217.55
61	45.22	24.46	44.01	63.62	8.05	26.65	133.43	-16.64	75.04	131.73
62	39.36	68.17	25.22	36.90	10.68	21.06	99.28	5.47	46.91	84.82
63	24.12	67.48	16.65	20.24	8.33	13.39	78.13	5.80	36.17	65.08
64	20.46	69.49	14.41	21.41	8.72	8.32	79.42	7.81	35.81	67.44
65	13.82	74.19	21.62	34.96	7.77	4.71	91.37	-2.23	46.80	84.56
66	69.29	57.83	32.42	58.13	2.47	11.04	123.11	4.16	59.48	107.69
67	120.33	6.56	33.88	32.92	.87	23.64	134.47	-3.13	68.80	124.55
68	135.60	-14.97	42.35	7.62	5.06	35.72	148.19	-15.57	81.88	146.30
69	345.71	18.98	67.57	133.83	46.18	165.70	467.24	-33.52	250.38	485.52
70	-22.90	-6.97	3.98	-10.75	-6.25	-11.00	8.37	-32.67	20.52	37.08
71	-14.35	16.84	5.90	-2.26	-2.03	-7.72	17.20	-14.38	15.79	27.66
72	-7.10	28.56	6.30	.12	2.43	1.39	28.83	-7.24	18.03	31.58
73	-4.23	23.88	7.91	4.84	4.27	-8.01	25.69	-5.08	15.39	26.86
74	-10.64	18.34	10.62	13.85	2.29	-4.00	23.92	-16.95	20.44	36.26
75	431.14	295.05	48.80	198.13	79.40	82.75	596.13	23.26	286.44	519.51
76	389.27	196.34	43.98	203.40	57.97	93.62	542.26	19.63	261.31	500.32
77	265.44	154.11	29.04	196.14	42.42	71.06	430.53	-3.34	215.43	421.81
78	221.60	177.47	24.05	169.14	34.24	60.08	382.91	3.83	189.54	363.90
79	186.35	218.58	17.17	129.35	32.41	37.84	340.35	8.90	165.73	304.56
80	161.01	180.96	16.13	149.30	30.89	36.41	327.84	6.88	160.48	313.03
81	161.70	129.31	20.05	177.96	33.25	35.92	331.88	-33.20	182.54	344.56
82	234.05	148.73	22.75	179.16	40.10	37.05	386.03	2.56	191.74	374.62
83	302.24	197.80	30.42	187.83	52.87	36.05	453.72	12.29	220.71	417.78
84	324.43	237.50	34.52	246.59	82.51	35.50	544.07	-13.93	279.00	522.52
85	563.94	96.36	72.94	150.93	62.14	92.30	628.76	19.33	304.71	579.33
86	310.53	56.60	52.44	118.69	20.63	64.25	371.58	9.12	181.23	348.54
87	132.67	58.43	39.79	111.76	41.42	19.22	224.25	-23.60	123.92	225.80
88	101.66	120.49	37.16	82.86	21.64	42.44	206.24	9.82	98.21	182.03
89	42.54	128.78	34.41	56.42	17.50	31.91	174.22	17.21	78.50	142.13
90	45.15	137.69	21.02	44.90	15.48	13.36	161.91	17.19	72.36	133.09
91	54.19	130.61	22.60	82.49	16.91	11.48	185.87	1.47	92.20	175.84
92	99.45	75.68	27.10	104.26	14.22	19.20	195.86	-17.44	106.67	195.97
93	142.93	45.51	26.57	83.31	14.64	32.55	228.51	6.21	111.15	215.61
94	218.76	53.34	40.21	66.34	18.82	44.50	252.53	18.97	116.78	227.88
95	449.80	116.00	44.27	201.55	65.42	89.73	567.35	.78	283.28	547.15
96	572.90	12.61	77.61	128.89	57.57	87.64	618.91	-30.71	324.81	601.78
97	275.94	8.56	56.21	87.41	3.71	42.05	264.77	-23.62	144.20	299.63
98	74.07	22.86	43.23	70.03	10.13	25.02	140.01	-22.17	81.09	142.26
99	41.40	76.50	33.19	38.81	11.48	22.50	108.07	4.25	49.91	89.56
100	26.50	73.88	20.33	18.13	7.81	12.75	82.20	9.79	36.20	65.04

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

9.470R R3/ 4/27 CP= 73.630

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SRX	SRZ	SRZ	SMAX	SMIN	TMAX	SIGE
101	23.52	73.29	16.55	17.61	8.06	5.30	80.24	13.64	33.30	63.89
102	13.70	83.82	30.36	33.15	9.19	1.46	99.22	.37	48.93	87.08
103	78.60	59.64	32.47	60.93	7.48	12.53	132.85	7.20	62.82	115.71
104	134.76	7.13	25.11	36.01	1.71	31.02	151.56	-4.02	77.79	145.27
105	134.18	-11.05	26.66	12.98	1.03	45.03	155.05	-13.07	84.08	177.38
106	471.58	60.16	51.28	181.86	53.29	131.69	578.69	-9.14	293.91	576.86
107	-23.65	-6.99	4.41	-10.81	-4.78	-11.52	8.59	-33.10	20.85	37.62
108	-12.81	17.09	7.82	.25	-1.22	.02	17.25	-12.82	15.03	26.60
109	-6.04	27.85	7.07	-4.40	1.81	1.37	28.01	-6.19	17.10	29.86
110	-2.96	25.77	9.46	2.33	3.26	-1.17	26.54	-3.31	14.92	25.98
111	-10.67	16.75	13.34	13.34	2.47	-5.32	22.19	-17.11	19.65	37.12
112	291.76	282.26	148.75	221.81	141.71	65.32	561.20	25.94	267.63	489.72
113	200.58	311.82	153.90	261.33	130.84	68.44	573.49	-17.38	295.44	538.54
114	121.83	515.23	133.67	291.19	84.50	67.29	690.21	-35.43	362.82	663.04
115	150.56	564.78	109.43	346.95	59.62	70.38	775.52	-45.58	410.55	757.19
116	226.99	547.32	161.15	425.15	158.72	94.82	888.29	-67.96	478.12	879.12
117	544.75	406.32	174.38	374.98	177.33	118.43	913.74	46.31	433.71	814.43
118	604.57	269.01	190.16	260.34	147.34	114.67	795.59	62.04	366.78	673.18
119	393.05	271.52	191.89	191.76	125.72	101.99	594.83	92.45	251.19	468.74
120	360.52	144.67	92.68	152.78	81.67	81.66	471.85	29.36	221.24	412.98
121	456.13	256.64	125.00	313.17	114.92	132.84	735.30	23.93	255.68	685.69
122	581.66	442.69	288.03	672.84	218.82	163.89	1284.32	-143.17	713.75	1284.66
123	596.83	661.10	163.55	1442.36	77.78	136.33	2083.56	-815.66	1449.61	2556.34
124	1103.13	1069.71	499.97	1612.99	264.69	412.20	2799.53	-537.35	1668.44	2978.28
125	1384.48	1610.06	750.72	1220.93	419.38	630.88	2968.36	177.73	1395.31	2605.60
126	1773.58	851.80	461.94	772.12	2.40	287.57	2295.55	290.58	1002.49	1908.40
127	1424.86	167.37	211.67	301.69	89.19	204.91	1530.89	80.81	724.64	1396.83
128	488.84	91.26	132.96	133.13	80.60	71.36	549.79	18.41	265.69	488.80
129	362.14	78.20	61.84	126.89	47.76	97.65	441.47	20.91	210.28	411.45
130	723.74	320.48	301.62	535.26	205.60	260.01	1214.06	-51.60	632.83	1166.07
131	960.75	624.91	169.71	1099.17	62.44	189.46	1922.76	-329.27	1126.01	2051.19
132	700.46	623.53	127.87	1615.64	81.04	122.40	2287.72	-954.81	1621.26	2860.99
133	1202.30	815.94	374.75	1841.39	207.37	289.95	2910.21	-843.71	1876.96	3325.87
134	2054.35	924.16	329.49	1159.30	240.57	274.48	2833.67	169.41	1332.13	2597.32
135	2103.33	836.11	415.77	825.35	267.37	261.04	2568.11	265.79	1151.16	2145.79
136	1215.43	95.00	94.26	222.86	128.18	163.66	1246.96	-35.34	661.15	1238.89
137	483.04	15.40	92.25	102.89	61.10	55.02	515.21	-27.34	271.28	490.60
138	851.31	277.14	177.07	494.26	52.94	355.76	1242.37	-100.16	671.27	1232.11
139	2277.07	187.85	-6.14	547.60	23.67	249.39	2437.84	-44.85	1240.95	2424.09
140	1971.60	155.70	16.80	401.37	118.20	217.48	2085.50	-50.93	1068.22	2060.01
141	754.49	130.91	60.20	473.22	47.44	267.50	1075.37	-166.56	620.97	1153.78
142	1053.61	546.64	80.57	1222.79	92.70	146.11	2063.82	-449.43	1256.63	2249.13
143	714.99	590.15	35.94	1213.46	98.09	92.84	1877.51	-562.59	1220.05	2205.47
144	666.38	691.29	-8.73	1159.09	126.00	91.06	1850.68	-481.57	1186.12	2149.20
145	1860.19	844.94	93.64	1370.99	162.34	264.52	2883.11	-64.54	1433.82	2807.32
146	2191.86	351.34	73.82	178.07	112.39	412.91	2550.13	-15.33	1282.73	2518.10
147	332.77	-441.30	-45.28	172.01	-138.75	-79.80	393.94	-512.11	453.03	744.84
148	308.44	310.60	64.35	257.38	163.36	17.54	598.79	-57.97	328.38	542.96
149	363.28	821.63	167.81	452.99	311.79	121.32	1204.90	15.81	594.55	1145.47
150	249.90	312.94	138.46	481.84	45.97	-42.20	759.71	-217.65	488.68	855.13

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.830R R3/ 4/27 CP= 73.857

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SI0X	SI0Y	SI0Z	SX1	SY1	SX2	SMAX	SMIN	THAX	SI0E
151	227.94	398.80	135.07	550.60	-80.80	-131.94	493.53	-254.04	573.79	1015.25
152	867.86	612.94	194.91	870.11	364.58	180.90	1713.36	-213.79	963.57	1764.79
153	630.82	192.53	30.44	352.65	66.79	58.89	835.63	-23.09	429.36	824.43
154	416.86	-321.03	-157.67	-176.43	-439.57	34.70	495.38	-698.23	596.80	1061.74
155	-104.23	30.79	54.57	-238.20	163.07	-91.45	334.08	-286.67	310.37	545.06
156	19.03	989.21	224.63	36.93	888.59	36.80	1229.45	-20.35	624.90	1228.34
157	-19.37	426.62	237.01	102.34	363.06	5.10	1008.21	-42.51	525.36	995.72
158	-100.73	219.17	190.86	146.79	51.33	-177.38	288.68	-237.03	262.85	510.90
159	-611.29	225.67	189.19	87.80	-199.03	-516.28	576.78	-864.37	720.57	1270.00
160	15.46	540.30	286.13	463.33	382.88	-176.02	920.37	-431.91	676.14	1176.19
161	334.44	591.55	269.34	557.27	620.13	-79.06	1260.14	-448.94	854.54	1480.26
162	-185.62	-56.13	37.25	-273.19	172.50	-96.23	303.48	-404.29	353.86	615.25
163	255.34	214.84	130.93	185.30	123.82	66.48	473.32	16.59	228.36	417.54
164	197.13	244.17	120.98	228.60	137.23	73.42	509.59	-23.67	266.63	490.95
165	139.66	359.53	93.32	231.70	137.37	61.32	554.23	-14.06	284.15	538.17
166	173.29	386.44	78.28	237.48	137.30	63.46	584.52	5.04	289.74	559.05
167	210.92	330.61	100.03	303.79	153.11	101.41	642.02	-42.87	342.44	646.48
168	371.02	254.11	116.60	283.58	141.14	132.46	668.87	8.62	330.12	634.27
169	419.82	216.35	138.30	219.66	116.63	139.88	627.15	51.85	287.65	554.77
170	386.68	215.63	147.24	179.08	105.37	139.03	570.98	70.05	250.46	482.85
171	316.09	90.80	87.08	140.07	67.10	109.60	430.79	16.92	206.94	400.01
172	435.24	197.81	104.69	273.84	103.01	177.68	689.08	13.44	337.82	663.60
173	461.90	392.96	177.16	428.98	153.35	163.50	924.98	-2.96	463.97	876.94
174	448.93	509.76	145.37	921.87	181.11	136.11	1440.74	-444.43	942.59	1678.63
175	702.67	685.45	326.45	1030.51	284.28	289.82	1833.93	-336.49	1085.21	1933.37
176	868.90	906.65	456.12	785.21	365.48	384.23	1871.64	100.17	885.73	1697.26
177	1164.99	495.79	292.05	502.09	204.98	223.84	1505.30	150.75	677.27	1287.75
178	977.56	119.27	147.91	195.77	83.52	184.99	1063.24	47.05	508.10	975.43
179	475.87	68.72	100.63	98.46	53.94	111.27	532.20	27.84	252.18	474.28
180	341.43	39.78	63.77	128.24	42.48	138.80	443.86	-10.36	227.11	443.71
181	631.62	263.71	184.41	306.23	94.83	290.04	926.23	19.34	453.45	855.28
182	755.84	495.85	151.97	709.37	100.83	219.78	1391.08	-112.91	751.99	1400.09
183	539.61	512.29	126.55	1040.93	163.09	151.36	1600.50	-515.22	1057.86	1886.59
184	755.77	578.64	248.08	1150.20	225.20	239.54	1886.77	-486.40	1186.59	2119.52
185	1410.61	607.98	210.91	771.41	251.49	332.71	1976.41	83.27	946.57	1851.39
186	1386.69	463.95	245.45	501.82	204.77	249.10	1674.67	119.31	777.68	1472.49
187	920.43	60.99	74.26	128.06	122.11	195.11	988.42	-54.32	521.37	965.10
188	461.16	6.41	71.60	57.68	35.28	93.62	490.98	-9.70	250.34	470.54
189	790.72	208.24	157.26	270.93	29.01	441.87	1091.55	-106.92	599.23	1046.31
190	1627.47	110.47	-17.17	318.38	148.48	453.64	1824.38	-154.51	984.44	1870.51
191	1424.31	90.23	14.43	234.18	171.02	306.55	1534.61	-130.20	833.40	1555.90
192	611.12	119.60	71.69	290.80	65.53	387.93	932.83	-155.68	544.25	1003.24
193	825.50	489.49	88.33	874.04	104.50	228.11	1586.81	-246.42	916.62	1699.81
194	561.00	441.38	42.88	824.43	128.37	160.49	1377.98	-305.18	841.58	1548.97
195	710.18	511.92	-2.67	782.96	193.19	155.33	1339.28	-274.95	807.11	1512.39
196	1310.88	623.41	88.69	931.02	270.33	429.16	2100.87	-51.70	1076.29	2129.99
197	1579.65	734.27	51.87	491.74	245.08	652.18	1970.34	-203.18	1086.76	2049.18
198	414.02	-318.79	-55.27	262.19	-125.03	171.32	530.07	-475.17	502.62	871.41
199	128.16	200.44	53.59	276.63	126.12	218.39	652.45	-72.73	362.59	690.66
200	300.44	571.55	127.03	377.73	283.81	280.84	1014.22	-80.24	547.23	1024.74

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.830R 83/ 4/27 CP= 74.082

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SHY	SHZ	SHX	SHY	SHZ	SHX	SHY	SHZ
201	162.43	189.72	111.50	358.59	111.28	10.37	552.50	-198.97	375.74	654.20	
202	166.25	271.41	97.84	409.68	-22.89	-56.62	637.40	-196.79	417.09	733.23	
203	670.89	503.94	192.74	734.22	559.70	592.55	1843.80	-234.81	1039.30	1988.98	
204	734.73	151.19	95.82	334.65	124.44	449.80	1099.64	-146.41	623.02	1168.45	
205	657.87	-260.07	-24.06	-48.59	-477.22	378.98	884.55	-665.02	774.78	1342.70	
206	57.86	114.42	73.34	-45.96	151.83	146.97	272.08	-156.35	214.22	377.96	
207	76.99	739.34	185.59	69.19	431.09	328.33	1525.52	-286.04	655.78	1146.69	
208	-28.64	544.30	184.55	85.60	339.94	159.38	779.36	-132.24	455.80	834.52	
209	-117.07	67.63	150.31	85.40	130.68	-139.19	258.93	-235.27	247.10	432.95	
210	-509.01	105.57	131.01	52.84	-181.07	-500.10	492.68	-784.63	638.65	1118.49	
211	168.84	431.36	272.13	421.22	576.28	212.44	1148.89	-279.27	714.08	1310.13	
212	574.83	553.57	335.39	570.30	953.77	641.97	1939.23	-529.08	1234.16	2234.68	
213	238.82	33.59	164.91	-6.94	202.17	276.76	518.02	-196.54	357.28	620.45	
214	240.71	184.88	97.11	188.71	108.10	70.46	447.76	.22	223.77	415.33	
215	190.82	201.27	81.93	218.57	136.91	68.72	470.18	-48.25	259.21	476.25	
216	155.66	270.58	58.96	208.64	169.35	50.35	493.50	-62.57	278.04	507.84	
217	173.66	279.06	57.02	175.60	191.88	55.39	492.15	-63.19	277.67	499.17	
218	204.62	206.13	59.11	225.02	151.22	110.58	507.18	-44.95	276.07	527.81	
219	255.95	169.44	69.25	233.79	116.40	139.13	522.97	-25.07	274.02	537.48	
220	324.23	184.07	89.13	201.84	90.84	153.82	540.75	12.76	263.99	511.31	
221	344.61	193.61	97.31	174.91	83.03	147.05	551.20	34.30	258.45	491.41	
222	335.31	66.98	80.59	155.37	67.61	144.02	471.22	-4.23	237.73	465.72	
223	446.28	157.53	96.95	272.41	100.61	225.15	708.41	-31.70	370.05	713.87	
224	384.40	328.27	100.23	256.57	91.18	161.25	671.98	23.63	324.17	606.96	
225	323.90	414.11	140.81	553.12	266.14	132.64	1017.60	-210.52	614.06	1114.13	
226	408.48	435.62	213.48	617.53	308.14	209.26	1179.32	-209.40	694.36	1266.60	
227	509.34	445.88	266.91	481.23	349.91	219.81	1143.98	-66.79	605.38	1120.01	
228	774.61	271.77	181.74	326.11	146.67	177.99	997.00	64.21	466.40	885.92	
229	731.93	88.86	110.03	130.15	75.69	170.90	805.20	22.54	391.33	745.65	
230	475.83	59.99	84.00	71.70	36.26	128.42	527.55	32.09	247.73	482.03	
231	368.10	19.63	68.15	147.44	50.63	180.50	502.59	-40.72	271.66	526.81	
232	613.55	215.27	121.50	156.88	20.47	311.07	802.69	-40.04	421.37	755.08	
233	628.32	410.71	154.74	447.39	129.91	240.35	1060.20	21.64	519.28	996.49	
234	406.12	433.95	129.14	644.54	224.27	169.07	1141.44	-229.01	685.23	1252.26	
235	439.85	422.58	163.75	688.87	239.09	207.97	1215.14	-259.35	737.24	1340.39	
236	1038.93	433.80	151.12	549.16	266.22	379.70	1519.66	-14.51	767.08	1472.08	
237	945.79	248.00	148.88	298.35	168.58	247.52	1141.48	21.97	559.75	1049.76	
238	805.40	43.62	86.31	75.00	114.09	221.21	880.87	-61.52	471.20	867.37	
239	470.85	5.01	71.11	29.17	20.42	112.90	502.59	-8.82	251.71	442.14	
240	862.27	176.54	169.80	148.93	19.40	516.50	1158.01	-115.92	636.97	1158.82	
241	1273.01	78.99	-23.23	196.66	230.60	581.33	1544.23	-306.52	925.38	1647.47	
242	1144.91	72.56	31.60	153.52	209.91	375.37	1298.67	-188.23	743.45	1352.33	
243	615.12	113.17	78.11	213.24	80.23	450.28	932.75	-182.74	557.75	1017.23	
244	655.85	436.96	91.00	631.37	102.48	278.64	1260.33	-146.12	703.23	1308.28	
245	454.11	407.65	45.25	588.58	129.71	200.38	1054.45	-151.85	603.15	1136.27	
246	411.51	490.54	-1.07	536.74	222.53	194.34	1022.74	-143.98	583.36	1134.62	
247	1007.46	486.17	85.31	690.07	338.17	527.17	1723.65	-156.30	939.98	1801.89	
248	1204.42	169.97	43.03	351.89	324.15	781.06	1733.09	-387.92	1060.51	1932.46	
249	469.97	-220.12	-30.44	310.27	-116.37	336.69	694.57	-478.11	588.34	1025.09	
250	366.98	189.38	60.71	301.63	122.82	363.20	781.41	-196.35	488.88	885.94	

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.8308 R3/ 4/27 CP= 74.305

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SXY	SYZ	SXZ	SMAX	SMIN	TMAX	SIGE
251	287.98	410.58	189.62	342.00	278.14	392.30	956.83	-203.55	580.19	1055.17
252	114.78	110.56	88.78	301.25	152.64	30.20	460.17	-215.81	337.99	587.76
253	165.04	196.22	66.63	346.99	-11.20	-41.46	530.88	-168.83	349.85	616.82
254	842.53	434.21	198.19	651.81	709.30	869.92	2032.57	-494.23	1263.40	2327.38
255	855.66	165.37	157.64	369.94	178.55	697.33	1419.64	-278.51	849.07	1564.26
256	807.62	-207.74	62.75	32.00	-514.20	586.40	1169.23	-712.93	941.08	1630.15
257	232.92	203.26	93.08	137.30	136.75	307.05	577.27	-153.43	365.35	641.70
258	89.93	568.33	176.16	103.55	411.12	492.42	986.25	-409.35	697.80	1209.02
259	-6.56	393.69	163.65	89.61	349.14	251.86	716.13	-227.63	471.88	837.33
260	-145.44	-11.45	122.76	57.11	178.32	-127.85	260.45	-265.48	262.97	456.24
261	-454.29	34.79	92.22	40.39	-181.44	-513.61	472.28	-767.26	619.77	1079.64
262	260.11	369.33	267.99	403.81	706.16	431.15	1346.58	-393.32	869.95	1598.11
263	702.42	515.82	373.19	562.71	1159.78	1045.15	2382.20	-853.28	1617.74	2888.60
264	604.99	118.63	259.49	238.51	185.70	493.85	1053.04	-92.41	572.72	1092.54
265	264.77	207.80	61.01	201.82	96.17	46.44	464.23	-6.33	235.28	435.39
266	193.60	231.21	58.34	247.32	116.97	48.90	493.28	-57.23	275.26	506.48
267	117.51	331.78	53.23	245.43	130.10	41.04	528.88	-59.81	294.34	548.64
268	153.27	337.98	59.57	229.55	139.71	48.19	536.07	-30.47	283.27	532.74
269	192.46	300.12	68.37	300.72	137.22	79.71	598.06	-66.80	332.43	622.25
270	339.40	231.65	62.89	280.01	123.80	101.72	615.55	-21.64	318.59	608.70
271	410.83	214.92	61.67	217.38	96.25	115.82	593.40	14.62	289.39	549.26
272	403.23	227.09	69.20	187.03	81.88	120.87	564.85	26.02	269.42	502.64
273	362.80	84.76	67.68	168.09	66.09	125.38	489.45	3.43	243.01	476.83
274	544.93	192.35	97.89	314.69	107.51	199.44	802.15	4.98	398.58	785.90
275	649.04	398.63	212.16	428.99	150.08	210.38	1050.35	76.33	487.01	946.89
276	408.88	493.46	176.54	785.71	202.65	151.97	1294.67	-337.46	816.07	1457.84
277	663.76	644.92	329.63	891.75	282.83	301.25	1674.95	-235.72	955.33	1733.44
278	821.11	837.24	444.14	721.96	349.95	393.77	1761.14	99.70	830.72	1595.22
279	1184.25	478.62	280.77	492.58	191.83	229.10	1506.60	153.91	676.45	1293.22
280	1060.33	123.28	144.82	206.88	79.42	199.27	1148.54	52.69	547.93	1060.56
281	525.27	70.52	79.77	108.38	46.70	115.54	580.06	28.18	275.94	533.39
282	401.26	36.16	66.67	161.36	52.81	171.57	531.44	-29.16	280.30	545.78
283	933.48	268.62	221.50	331.69	91.66	348.58	1201.15	61.47	569.84	1093.33
284	804.87	466.20	191.70	637.19	115.62	247.23	1355.96	-42.97	699.46	1313.21
285	462.80	477.08	145.75	866.96	169.07	167.11	1382.62	-397.06	889.84	1590.49
286	711.89	567.12	260.20	974.16	218.54	251.49	1693.70	-337.56	1015.63	1827.44
287	1429.88	585.56	202.68	745.70	245.39	334.86	1961.60	80.45	940.58	1835.21
288	1437.42	457.51	240.18	504.88	197.12	259.76	1718.75	121.95	798.40	1517.94
289	1010.66	53.20	90.45	143.55	125.47	209.16	1083.21	-55.98	569.60	1059.59
290	521.47	1.17	75.59	67.34	35.46	103.34	554.02	-14.49	284.25	535.67
291	1163.66	197.23	169.53	320.27	39.95	471.53	1431.06	-54.92	742.99	1393.22
292	1757.75	125.08	-22.06	380.64	157.54	456.27	1958.35	-152.98	1055.66	2015.23
293	1549.54	96.15	26.34	269.33	179.28	322.29	1672.29	-126.33	899.27	1686.51
294	860.48	106.90	69.50	329.77	78.57	389.77	1130.13	-112.98	621.56	1182.36
295	726.43	344.81	75.55	738.41	90.61	235.12	1359.01	-223.80	791.40	1464.49
296	419.49	399.39	30.22	664.14	47.73	166.66	1106.31	-263.17	684.74	1256.72
297	429.73	465.98	-11.07	654.62	167.78	158.15	1148.55	-207.10	677.82	1287.11
298	1301.48	571.57	78.38	867.44	270.84	429.00	2010.75	-57.20	1033.97	2040.96
299	1635.36	223.36	42.79	532.61	257.16	646.60	2053.86	-202.61	1128.23	2141.26
300	416.50	-288.34	-45.64	239.70	-115.76	204.05	537.34	-441.32	489.33	849.78

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.8108 R3/ 4/27 CP= 74.535

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SAX	SYZ	SKZ	SMAK	SMIN	IMAX	SIGE
301	348.62	180.62	51.06	270.95	117.23	229.41	655.65	-80.23	367.94	697.23
302	316.13	506.22	117.23	367.17	271.22	277.18	965.11	-78.28	521.69	984.43
303	104.71	171.77	90.62	329.25	117.96	11.51	492.21	-210.03	351.12	610.74
304	154.52	237.24	81.62	395.44	-18.70	-44.94	600.10	-201.08	400.54	704.15
305	810.43	420.87	182.58	668.31	547.06	581.68	1722.27	-261.19	991.73	1885.38
306	725.63	131.26	92.84	318.27	121.60	441.06	1073.70	-142.00	607.85	1144.11
307	686.05	-220.17	-18.87	-30.10	-463.90	380.87	899.81	-632.40	766.10	1327.73
308	141.76	132.20	78.34	11.30	141.94	165.56	334.56	-107.28	220.92	382.82
309	124.51	671.00	188.26	115.97	417.12	326.72	996.39	-225.38	610.88	1071.45
310	11.32	497.79	173.57	117.42	332.58	154.69	750.73	-99.97	425.35	792.29
311	-164.16	67.92	125.98	88.57	139.25	-140.17	247.73	-276.43	262.08	459.74
312	-484.67	81.75	112.27	76.39	-174.56	-492.67	480.12	-762.67	621.40	1084.50
313	146.48	360.53	260.70	395.65	565.35	203.68	1078.22	-303.47	690.84	1254.90
314	524.82	464.86	332.90	515.08	934.87	623.27	1830.23	-553.20	1191.71	2147.59
315	283.30	42.96	166.95	30.70	196.07	263.66	541.16	-153.94	347.55	688.31
316	320.37	238.37	33.42	250.63	64.57	32.72	545.82	-19.63	282.72	527.88
317	190.77	276.94	67.34	296.94	80.16	32.31	547.36	-73.40	310.38	572.15
318	81.57	451.41	63.78	318.06	67.23	32.33	643.94	-101.61	372.77	681.07
319	135.91	453.17	74.67	330.26	57.70	45.54	669.89	-72.28	371.09	643.56
320	194.73	471.26	100.34	428.48	116.21	54.41	805.75	-120.18	462.97	843.60
321	475.05	351.48	78.02	372.00	132.94	58.47	813.71	-17.94	415.82	776.08
322	572.76	261.04	51.83	249.38	105.24	72.54	730.44	5.61	362.42	664.65
323	431.82	248.45	48.72	198.72	80.24	81.86	598.14	23.18	287.48	520.90
324	475.86	120.75	44.04	214.54	69.49	94.13	600.49	-2.26	301.37	581.69
325	660.36	246.93	107.28	385.60	113.81	158.54	936.78	11.17	462.80	899.16
326	472.13	530.93	345.13	670.93	207.41	262.59	1550.54	44.38	753.08	1413.33
327	541.83	624.57	225.57	1194.70	106.67	180.18	1804.46	-615.95	1210.20	2132.25
328	1034.54	480.40	512.64	1369.86	247.80	442.61	2498.64	-384.46	1441.55	2578.48
329	1299.54	1431.25	732.52	1117.94	380.93	655.23	2749.56	124.69	1312.44	2426.23
330	1804.47	806.55	440.37	761.70	257.06	246.33	2295.29	292.89	1001.20	1922.91
331	1574.75	178.54	202.16	325.13	84.06	238.40	1689.11	92.96	798.07	1557.50
332	576.46	96.73	75.36	154.78	65.12	93.06	642.58	17.40	312.59	592.80
333	505.81	65.97	50.42	200.53	59.84	136.08	622.09	-13.37	317.73	622.47
334	1347.45	372.62	354.21	587.41	190.54	381.70	1753.34	95.99	828.67	1596.78
335	1074.08	581.95	242.95	960.11	91.28	246.07	1858.04	-179.01	1018.53	1869.77
336	574.93	565.71	173.64	1300.34	91.76	164.06	1892.26	-730.41	1311.34	2310.43
337	1126.97	146.08	410.74	1516.26	187.38	321.64	2548.99	-569.78	1559.38	2774.57
338	2084.18	479.82	314.72	1102.73	223.62	281.32	2789.70	192.49	1298.61	2546.79
339	2180.10	405.60	401.27	832.09	249.61	280.71	2630.43	267.68	1181.38	2260.30
340	1370.84	40.24	100.74	258.14	135.16	203.77	1458.23	-47.55	752.84	1420.87
341	584.30	4.85	77.18	128.18	54.96	84.10	629.42	-38.36	333.84	618.83
342	1544.02	261.44	172.55	577.34	66.11	415.35	1865.85	-30.13	947.99	1815.90
343	2503.42	214.09	-15.20	650.18	38.23	256.18	2699.60	-44.46	1374.63	2699.62
344	2186.82	154.58	24.80	462.36	132.11	246.66	2318.91	-53.76	1186.33	2295.16
345	1163.46	104.07	51.71	533.04	62.80	274.51	1440.76	-134.35	787.56	1506.93
346	406.54	368.75	63.88	981.83	74.43	160.67	1674.20	-383.73	1028.97	1874.41
347	454.91	442.95	19.21	910.82	60.14	104.54	1372.34	-461.44	916.84	1644.08
348	515.98	608.36	-21.54	912.21	92.94	97.21	1487.52	-351.34	914.43	1702.32
349	1815.60	758.23	75.97	1202.40	161.43	265.57	2638.07	-28.07	1333.07	2632.87
350	2327.33	331.60	56.14	837.74	131.36	403.80	2700.50	-16.84	1358.67	2643.54

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYHR17A JUNE 1, 1979
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

9.830R R3/ 4/27 CP= 74.754

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGx	SIGy	SIGz	SHY	SHZ	SHX	SMAX	SMIN	TMAX	SIGE
351	321.16	-408.52	-75.63	128.04	-119.91	-31.84	349.47	-463.45	406.46	704.06
352	327.17	245.70	41.22	248.92	126.08	20.42	557.44	-53.25	305.35	547.66
353	340.23	681.25	119.60	418.10	248.91	97.27	1036.74	-4.14	520.44	989.39
354	139.79	256.16	94.75	396.51	52.60	-40.06	599.10	-216.25	407.68	711.04
355	212.30	304.10	98.04	504.98	-77.86	-117.49	792.23	-252.39	522.31	925.51
356	760.13	436.42	158.07	748.02	320.18	150.03	1443.13	-238.97	841.05	1525.13
357	590.52	119.02	15.15	306.30	45.67	29.65	744.30	-45.24	394.77	756.60
358	437.17	-270.94	-149.76	-160.83	-418.46	26.78	501.27	-643.37	572.32	1017.54
359	-3.80	39.72	51.63	-150.92	142.49	-69.62	276.72	-147.70	212.21	342.54
360	99.11	849.74	177.22	116.54	391.81	1.42	1041.85	-23.00	532.43	1006.09
361	.46	712.07	180.65	140.55	297.77	-25.36	861.74	-70.08	465.91	858.97
362	-162.71	194.63	137.50	133.16	59.47	-180.88	238.81	-291.40	265.10	522.01
363	-558.14	156.77	144.43	117.92	-197.68	-499.62	541.27	-817.81	679.54	1147.54
364	-31.21	372.27	242.41	406.35	332.96	-206.25	712.01	-464.37	588.19	1040.60
365	247.87	402.76	235.94	473.08	549.12	-137.15	994.10	-485.97	740.04	1247.80
366	-146.92	-64.00	35.35	-225.52	157.40	-129.15	287.95	-334.77	311.36	549.48

PRINT ONLY VALUES FOR ITEM 7 BETWEEN .100E+04 AND .100E+21 KABS= 0

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.8308 R3/ 4/27 CP= 74.865

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SHY	SHZ	SXZ	SMAX	SMIN	TMAX	SIGE
122	581.66	492.69	288.03	672.84	218.82	163.89	1284.32	-143.17	713.75	1284.66
123	596.83	661.10	163.55	1442.36	77.78	136.33	2083.56	-815.66	1449.61	2556.34
124	1103.13	1069.71	499.97	1612.99	264.89	412.20	2799.53	-537.35	1668.44	2978.28
125	1384.48	1610.06	750.72	1220.93	419.38	630.88	2968.36	177.73	1395.31	2605.60
126	1773.58	851.80	461.94	772.12	285.40	267.57	2295.55	290.58	1002.49	1908.40
127	1424.86	167.37	211.07	301.69	89.19	204.91	1530.09	80.81	724.64	1396.83
130	723.74	320.48	301.62	535.26	205.60	260.01	1214.06	-51.60	632.83	1166.07
131	960.75	624.91	169.21	1099.17	62.44	180.46	1922.76	-329.27	1126.01	2051.19
132	700.46	623.53	127.87	1615.64	81.04	122.40	2287.72	-954.81	1621.26	2860.99
133	1202.30	815.94	379.75	1841.39	207.37	289.95	2910.21	-843.71	1876.96	3325.87
134	2058.35	924.16	329.49	1159.30	240.57	274.48	2833.67	169.41	1332.13	2597.32
135	2103.33	836.11	415.77	825.35	267.37	261.04	2568.11	265.79	1151.16	2185.79
136	1215.43	95.00	96.26	222.86	128.18	163.66	1286.96	-35.34	661.15	1238.89
138	851.31	277.14	177.07	494.26	52.94	355.76	1242.37	-100.16	671.27	1232.11
139	2277.07	187.85	-6.14	547.60	23.67	249.39	2437.04	-44.85	1240.95	2428.09
140	1973.60	155.70	16.80	401.37	118.20	217.48	2085.50	-50.93	1068.22	2060.01
141	754.49	130.91	60.20	473.22	47.44	267.50	1075.37	-166.56	620.97	1153.78
142	1053.61	546.69	80.57	1222.79	92.70	146.11	2063.82	-449.43	1256.63	2299.13
143	714.99	590.15	35.94	1213.46	98.09	92.84	1877.51	-562.59	1220.05	2205.47
144	660.38	691.28	-8.73	1159.09	126.00	91.06	1850.68	-481.57	1166.12	2139.20
145	1860.19	844.98	93.68	1320.89	162.34	264.52	2803.11	-64.54	1433.82	2807.32
146	2191.86	351.34	73.82	778.07	112.39	412.91	2550.13	-15.33	1282.73	2518.10
149	363.28	821.63	167.81	452.99	311.79	121.32	1204.90	15.81	594.55	1135.47
152	867.86	612.94	194.91	870.11	364.58	180.90	1713.36	-213.79	963.57	1764.79
156	19.03	949.21	224.63	38.93	488.59	36.80	1229.45	-20.35	624.90	1228.34
157	-19.37	826.62	237.01	102.34	363.06	5.10	1008.21	-42.51	525.36	995.72
161	334.44	591.55	269.34	557.27	620.13	-79.06	1260.14	-448.94	854.54	1480.26
174	448.93	509.76	145.37	921.87	181.11	136.11	1440.74	-444.43	942.59	1678.63
175	702.67	685.45	326.45	1030.51	284.28	289.82	1833.93	-336.49	1085.21	1953.37
176	868.90	406.65	456.12	785.21	365.48	384.23	1871.64	100.17	885.73	1697.26
177	1164.99	495.79	292.08	502.09	204.98	223.84	1505.30	150.75	677.27	1287.75
178	977.56	119.27	147.91	195.77	83.52	184.99	1063.24	47.05	508.10	975.43
182	755.84	495.85	151.97	709.37	100.83	219.78	1391.08	-112.91	751.99	1400.09
183	539.61	512.29	126.55	1040.93	163.09	151.36	1600.50	-515.22	1057.86	1886.59
184	755.77	578.64	248.08	1150.20	225.20	239.54	1886.77	-486.40	1186.59	2119.52
185	1410.61	607.98	210.91	771.41	251.49	332.71	1976.41	83.27	946.57	1851.39
186	1386.69	463.95	245.45	501.82	204.77	249.10	1674.67	119.31	777.68	1472.49
189	740.72	208.24	157.26	270.93	29.91	441.87	1091.53	-106.92	599.23	1086.31
190	1627.47	110.47	-17.17	318.38	148.48	453.64	1814.38	-154.51	984.44	1870.51
191	1424.31	90.23	14.43	234.18	171.02	306.55	1536.61	-130.20	833.40	1555.90
193	825.50	489.44	89.33	874.04	104.50	228.11	1586.81	-246.42	916.62	1699.81
194	561.00	481.34	42.88	824.43	128.37	160.49	1377.98	-305.18	841.58	1548.97
195	510.18	511.92	-2.67	782.96	193.19	155.33	1339.28	-274.95	807.11	1512.39
196	1330.88	623.81	88.69	931.02	270.33	429.16	2100.87	-51.70	1076.29	2129.99
197	1554.65	234.27	51.87	491.74	245.08	652.14	1970.34	-203.18	1086.76	2049.18
200	300.48	573.55	127.03	377.73	283.81	280.84	1014.22	-80.24	547.23	1028.74
203	870.89	501.94	192.74	734.22	559.70	592.56	1843.80	-234.81	1039.30	1984.98
204	134.73	151.19	95.82	334.65	124.44	449.80	1099.64	-146.41	623.02	1168.45
207	26.99	739.34	185.59	69.19	431.09	328.33	1025.52	-286.04	655.78	1146.69
211	168.84	431.36	272.13	421.22	576.28	212.44	1148.89	-279.27	714.08	1310.13

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.830R R3/ 4/27 CP= 75.138

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SHX	SHY	SHZ	SMAX	SMIN	TMAX	SIGE
212	574.83	553.57	335.39	570.30	453.77	641.97	1939.23	-529.08	1234.16	2234.68
225	323.90	414.11	140.81	553.12	266.14	132.64	1017.60	-210.52	614.06	1114.13
226	408.48	435.62	213.48	617.53	308.14	209.26	1179.33	-209.40	694.36	1266.60
227	509.34	445.88	266.91	481.23	349.91	219.81	1143.98	-66.79	605.38	1120.01
233	628.32	410.71	154.74	447.39	129.91	240.35	1060.20	21.64	519.28	996.49
234	406.12	433.95	129.14	644.54	224.27	169.07	1141.44	-229.01	685.23	1252.26
235	439.85	422.58	163.75	688.87	239.09	207.97	1215.14	-259.35	737.24	1340.39
236	1038.93	433.80	151.12	549.16	266.22	379.70	1519.66	-14.51	767.08	1472.08
237	945.74	248.00	148.88	298.35	168.58	247.52	1141.48	21.97	559.75	1049.76
240	862.27	176.54	169.80	148.93	19.40	516.50	1158.01	-115.92	636.97	1158.82
241	1273.01	78.99	-23.23	196.66	230.60	581.33	1544.23	-306.52	925.38	1687.47
242	1144.41	72.56	31.60	153.52	209.91	375.37	1298.67	-188.23	743.45	1352.33
244	665.85	436.96	91.00	631.37	102.48	278.64	1260.33	-146.12	703.23	1308.28
245	454.11	407.65	45.25	568.58	129.71	200.38	1054.45	-151.85	603.15	1136.27
246	411.51	390.54	-0.07	536.74	222.53	194.34	1022.74	-143.98	583.36	1134.62
247	1007.46	486.17	85.31	690.07	338.17	527.17	1723.65	-156.30	939.98	1801.89
248	1204.42	169.97	43.03	351.89	324.15	781.06	1733.09	-387.92	1060.51	1932.46
254	882.53	434.21	198.19	651.81	709.30	869.92	2032.57	-494.23	1263.40	2327.38
255	855.66	165.37	157.64	369.94	178.55	697.33	1419.64	-278.11	849.07	1564.26
256	807.62	-207.74	62.75	32.00	-514.20	586.40	1169.23	-712.93	941.08	1630.15
262	260.11	369.33	267.99	403.81	706.16	431.15	1346.58	-393.32	869.95	1598.11
263	702.42	515.82	373.19	562.71	1159.78	1045.15	2382.20	-853.28	1617.74	2888.60
264	604.99	118.63	259.49	238.51	185.70	493.85	1053.04	-92.41	572.72	1092.54
275	649.04	398.63	212.16	428.99	150.08	210.38	1050.35	76.33	487.01	946.89
276	408.88	493.46	176.54	785.71	202.65	151.97	1294.67	-337.46	816.07	1457.84
277	663.76	648.92	329.63	891.75	282.83	301.25	1674.95	-235.72	955.33	1733.44
278	821.11	837.24	444.14	721.96	349.95	393.77	1761.14	99.70	830.72	1595.22
279	1184.25	478.62	280.77	492.58	191.83	229.10	1506.80	153.91	676.45	1293.22
280	1060.33	123.28	144.82	206.88	79.42	199.27	1148.54	52.69	547.93	1060.56
283	933.48	268.62	221.50	331.69	91.66	348.58	1201.15	61.47	569.84	1093.33
284	804.87	456.20	191.70	637.19	115.62	247.23	1355.96	-42.97	699.46	1313.21
285	462.80	477.08	145.75	866.96	169.07	167.11	1382.62	-397.06	889.84	1590.49
286	711.69	567.12	260.20	974.16	218.54	251.49	1693.70	-337.56	1015.63	1827.44
287	1429.88	585.56	202.64	745.70	245.39	334.86	1961.60	80.45	940.58	1835.21
288	1437.42	457.51	240.18	504.88	197.12	259.76	1718.75	121.95	798.40	1517.94
289	1010.66	53.20	90.45	143.55	125.47	209.16	1083.21	-55.98	569.60	1059.59
291	1163.66	197.23	169.53	320.27	39.95	471.53	1431.04	-54.92	742.99	1393.22
292	1757.75	125.04	-22.06	380.64	157.54	456.27	1958.35	-152.98	1055.66	2015.23
293	1549.54	96.15	26.34	269.33	179.28	322.29	1672.20	-126.33	899.27	1686.51
294	860.48	106.90	69.50	329.77	78.57	389.77	1130.13	-112.98	621.56	1142.36
295	126.93	384.81	75.55	738.41	90.61	235.12	1359.61	-223.80	791.40	1464.49
296	419.49	399.39	30.22	664.14	97.73	166.66	1106.31	-263.17	684.74	1296.72
297	429.73	465.98	-11.07	654.62	167.78	158.15	1148.55	-207.10	677.82	1287.11
298	1301.48	571.57	74.38	867.44	270.84	429.00	2010.75	-57.20	1033.97	2040.96
299	1635.46	223.36	42.79	542.61	257.16	446.60	2053.86	-202.61	1128.23	2141.26
305	610.93	420.87	182.56	668.31	547.06	581.68	1722.27	-261.19	991.73	1855.38
306	125.63	131.26	92.84	318.27	121.00	441.06	1073.70	-142.00	607.85	1144.11
313	146.48	360.53	260.70	395.65	565.35	203.68	1078.22	-303.47	690.84	1259.90
314	524.82	464.86	332.90	515.08	434.87	623.27	1830.23	-553.20	1191.71	2147.59
326	972.13	530.93	345.13	670.93	207.41	262.59	1550.54	44.38	753.08	1413.33

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR176 JUNE 1, 1979
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.8311 R3/ 4/27 CP= 75.385

ANSYS POST23 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SIGX	SIGY	SIGZ	SHY	SYZ	SXZ	SMAX	SMIN	TMAX	SIGR
327	541.83	624.57	225.57	1194.70	106.67	180.18	1804.46	-615.95	1210.20	2132.25
328	1034.54	980.40	512.64	1369.86	247.80	442.61	2498.64	-384.46	1441.55	2578.48
329	1299.59	1431.25	732.52	1117.99	380.93	655.23	2749.56	124.69	1312.44	2426.23
330	1804.47	806.55	440.37	761.70	257.06	296.33	2295.29	292.89	1001.20	1922.91
331	1574.75	174.54	202.16	325.13	84.06	238.40	1689.11	92.96	798.07	1557.50
334	1347.45	372.62	354.21	587.41	190.54	381.70	1753.34	95.99	828.67	1596.78
335	1074.08	581.95	242.95	960.11	91.28	246.07	1858.04	-179.01	1018.53	1069.77
336	579.93	565.71	173.69	1300.34	91.76	164.06	1892.26	-730.41	1311.34	2310.43
337	1126.97	796.09	410.79	1516.26	187.38	321.64	2548.99	-569.78	1559.38	2774.57
338	2084.18	879.82	314.72	1102.73	223.82	281.32	2789.70	192.49	1298.61	2546.79
339	2180.10	805.60	401.27	832.09	249.61	280.71	2630.43	267.68	1181.38	2260.30
340	1370.84	80.24	100.74	258.14	135.16	203.77	1458.23	-47.55	752.89	1420.87
342	1544.02	261.49	172.55	577.34	66.11	415.35	1865.85	-30.13	947.99	1815.90
343	2503.42	214.09	-15.20	650.18	38.23	256.18	2699.60	-48.46	1374.03	2699.62
344	2186.82	158.58	29.80	462.36	132.11	246.66	2318.91	-53.76	1186.33	2295.16
345	1163.46	104.07	51.71	533.04	62.80	274.51	1440.76	-134.35	787.56	1506.93
346	906.53	308.75	63.88	981.83	74.43	160.67	1674.20	-383.73	1028.97	1879.41
347	459.91	442.95	19.21	910.82	60.14	104.54	1372.34	-461.44	916.89	1649.08
348	515.98	608.36	-21.59	912.21	92.99	97.21	1487.52	-351.34	919.43	1702.32
349	1615.60	758.23	75.97	1202.40	161.43	265.57	2638.07	-28.07	1333.07	2632.87
350	2327.33	331.60	56.14	837.79	131.36	403.80	2700.50	-16.84	1358.67	2693.54
353	340.23	681.25	119.60	418.10	248.91	97.27	1036.74	-4.14	520.44	989.39
356	760.13	436.42	158.07	746.02	320.18	150.03	1443.13	-238.97	841.05	1525.13
360	99.11	849.74	177.22	116.54	391.81	1.42	1041.85	-23.00	532.43	1006.09

*** POST23 PLOT SECTION

NEW TITLE= VALVE BODY SECTION CUT Z=0.375 4 INCH VALVE

SECTION POINT (X,Y,Z)= 0. 0. 0.3750

SMAX CONTOUR LINE VALUES

0.	150.00	300.00	450.00	600.00
750.00	900.00	1050.0	1200.0	1350.0
1500.0	1650.0	1800.0	1950.0	2100.0
2250.0	2400.0	2550.0	2700.0	2850.0

MAX= 2968.36 AT NODE 125 X
MIN= 8.31459 AT NODE 33 0

CUMULATIVE PLOT NUMBER 1

VALVE BODY SECTION CUT Z=0.375 4 INCH VALVE

SMAX ANSYS

SECTION EXTREMES MAX= 2452.0 MIN= 8.3287

SMIN CONTOUR LINE VALUES

-960.00 -800.00 -720.00 -640.00
 -560.00 -400.00 -320.00 -240.00
 -160.00 -40.000 -10914E-10 0.0000
 240.00 320.00 400.00 480.00
 MAX= 292.808 AT NODE 330 X
 MIN= -954.808 AT NODE 132 0

CUMULATIVE PLOT NUMBER 2
 VALVE BODY SECTION CUT Z=0.375 4 INCH VALVE
 SECTION EXTREMES MAX= 220.66 MIN= -824.50
 NEW TITLE= VALVE BODY SECTION CUT Z=1.125 4 INCH VALVE
 SECTION POINT (X,Y,Z)= 0. 0. 1.125

SMIN ANSYS

SMAK CONTOUR LINE VALUES

0. 150.00 300.00 450.00 600.00
 750.00 900.00 1050.0 1200.0 1350.0
 1500.0 1650.0 1800.0 1950.0 2100.0
 2250.0 2400.0 2550.0 2700.0 2850.0
 MAX= 2968.36 AT NODE 125 X
 MIN= 8.31459 AT NODE 33 0

CUMULATIVE PLOT NUMBER 3
 VALVE BODY SECTION CUT Z=1.125 4 INCH VALVE
 SECTION EXTREMES MAX= 2160.7 MIN= 0.3569

SMAK ANSYS

SMIN CONTOUR LINE VALUES

-960.00 -800.00 -720.00 -640.00
 -560.00 -400.00 -320.00 -240.00
 -160.00 -40.000 -10914E-10 0.0000
 240.00 320.00 400.00 480.00
 MAX= 292.808 AT NODE 330 X
 MIN= -954.808 AT NODE 132 0

CUMULATIVE PLOT NUMBER 4
 VALVE BODY SECTION CUT Z=1.125 4 INCH VALVE
 SECTION EXTREMES MAX= 107.48 MIN= -775.95
 NEW TITLE= VALVE BODY SECTION CUT Z=1.125 4 INCH VALVE
 SECTION POINT (X,Y,Z)= 0. 0. 1.125

SMIN ANSYS

SMAX CONTOUR LINE VALUES

0. 150.00 300.00 450.00 600.00
 750.00 900.00 1050.0 1200.0
 1500.0 1650.0 1800.0 1950.0
 2250.0 2400.0 2550.0 2700.0
 2850.0

MAX= 2968.36 AT NODE 125 X
 MIN= 8.31459 AT NODE 33 0

CUMULATIVE PLOT NUMBER 5
 VALVE BODY SECTION CUT Z=1.875 4 INCH VALVE

SECTION EXTREMES MAX= 2106.2 MIN= 8.4269

SMIN CONTOUR LINE VALUES

-960.00 -800.00 -800.00 -720.00 -640.00
 -560.00 -480.00 -400.00 -320.00 -240.00
 -160.00 -80.000 -10914E-10 80.000 160.00
 240.00 320.00 400.00 480.00 560.00

MAX= 292.888 AT NODE 330 X
 MIN= -954.808 AT NODE 132 0

CUMULATIVE PLOT NUMBER 6
 VALVE BODY SECTION CUT Z=1.875 4 INCH VALVE

SECTION EXTREMES MAX= 109.06 MIN= -764.97

NEW TITLE= VALVE BODY SECTION CUT Z=2.625 4 INCH VALVE

SECTION POINT (X,Y,Z)= 0. 0. 2.625

SMAX CONTOUR LINE VALUES

0. 150.00 300.00 450.00 600.00
 750.00 900.00 1050.0 1200.0
 1500.0 1650.0 1800.0 1950.0
 2250.0 2400.0 2550.0 2700.0
 2850.0

MAX= 2968.36 AT NODE 125 X
 MIN= 8.31459 AT NODE 33 0

CUMULATIVE PLOT NUMBER 7
 VALVE BODY SECTION CUT Z=2.525 4 INCH VALVE

SECTION EXTREMES MAX= 2377.2 MIN= 4.5387

SMIN CONTOUR LINE VALUES

-960.00 -800.00 -800.00 -720.00 -640.00

-540.00	-480.00	-400.00	-320.00	-240.00
-160.00	-80.000	.10914E-10	80.000	160.00
240.00	320.00	400.00	480.00	540.00

MAX= 242.8MM AT NODE 330 X
MIN= -954.80M AT NODE 132 0

CUMULATIVE PLOT NUMBER 8
VALVE BODY SECTION CUT Z=2.625 4 INCH VALVE

SMIN ANSYS

SECTION EXTREMES MAX= 223.40 MIN= -790.24

PLOT DATA (IF ANY) WRITTEN ON FILE TAPE21

***** PROBLEM COMPLETED ***** CP = 109.182

END OF INPUT ENCOUNTERED ON FILE TAPE1R

ENTER /NOTES CARD AFTER FINISH CARD (OR AT ANY CARD-A LEVEL)
FOR DETAILED NOTES ON FEATURES, CHANGES, HELP, ETC.

***** RUN COMPLETED ***** CP = 109.193
***** ANSYS TWO DIMENSIONAL PLOTS *****
***** END PLOTS *****

REMEMBER:

- YOU ARE RESPONSIBLE FOR SAVING YOUR OWN FILES
- FOR MORE INFORMATION INCLUDE THE FOLLOWING CARD
-
- EXPLAIN,ANSYS,FILES.
-
- FOR INFORMATION ON INTERACTIVE EXECUTION
- INCLUDE THE FOLLOWING CARD
- EXPLAIN,ANSYS,INTER.
-
- CLASS 3 ERROR LIST IS NOW AVAILABLE
- EXPLAIN,ANSYS,ERRORS
-

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APPENDIX G

ANSYS POST 25
VALVE DISC AND ADAPTER PLATE NODAL
STRESSES AND DISPLACEMENTS

***** ANSYS INPUT DATA LISTING (TAPE18) *****

```

1 CLUM 4 INCH VALVE POS: 25 PLATES LIMERICK NPP
2 DAVISON 1 1 1 25
3 350 1 1 350
4 1 45
5 2 94
6 3 63
7 4 4
8 5 63
9 6 63
10 7 63
11 8 4
12 9 4
13 10 4
14 11 14 4
15 12 21 2
16 13 1
17 14 1
18 15 1
19 16 1
20 17 1
21 18 1
22 19 1
23 20 1
24 21 1
25 22 1
26 23 1
27 24 1
28 25 1
29 26 1
30 27 1
31 28 1
32 29 1
33 30 1
34 31 1
35 32 1
36 33 1
37 34 1
38 35 1
39 36 1
40 37 1
41 38 1
42 39 1
43 40 1
44 41 1
45 42 1
46 43 1
47 44 1
48 45 1
49 46 1
50 47 1

```

DISC LIMERICK NPP 4 INCH

ADAPTER PLATE LIMERICK NPP

VIEW=-1,0,0

***** ANSYS INPUT DATA LISTING (TABLE 18) *****

```

51 6 12 18 24 30 36 42 48 54 60 66 72 78
52  V V V V V V V V V V V V V
    PSTARS.....1
    FINISH

```

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR176 JUNE 1, 1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE POST 25 PLATES LIMERICK NPP

9.9203 83/ 4/27 CP= 2.655

THE ANSYS PROGRAM IS IN A STATE OF CONTINUOUS DEVELOPMENT, MODIFICATION, AND CHECKING. NEITHER SWANSON ANALYSIS SYSTEMS, INC. NOR THE CORPORATION SUPPLYING THE COMPUTER FACILITIES FOR THIS ANALYSIS ASSUME ANY RESPONSIBILITY FOR THE VALIDITY, ACCURACY, OR APPLICABILITY OF ANY RESULTS OBTAINED FROM THE ANSYS SYSTEM. THE USER MUST VERIFY HIS OWN RESULTS.

SWANSON ANALYSIS SYSTEMS, INC. IS ENDEAVORING TO MAKE THE ANSYS PROGRAM AS COMPLETE, ACCURATE, AND EASY TO USE AS POSSIBLE. SUGGESTIONS AND COMMENTS ARE WELCOMED. ANY ERRORS ENCOUNTERED IN EITHER THE DOCUMENTATION OR THE RESULTS SHOULD BE IMMEDIATELY BROUGHT TO OUR ATTENTION.

***** ANALYST = DAVIDSON

***** ANALYSIS OPTIONS (CARDS C1 AND C2) *****

	VALUE	VARIABLE NAME	COLUMNS
ANALYSIS TYPE	0	KAN	5-7
COUPLED DEGREES OF FREEDOM KEY	1	KCDF	10
ELEMENT CONSTANT TABLE . . .	1	KTB	11-12
REACTION FORCE KEY	1	KRF	15-16
POST-RUN PROCESS KEY	25	KYPOST	27-28
ADDITIONAL POST PROCESSING KEY	2	KAPOST	80
REFERENCE TEMPERATURE	350.00	TREF	1-12
UNIFORM TEMPERATURE	350.00	TUNIF	13-24
ELEMENT REORDERING KEY	1	KORDER	77-78
CORE SIZE REQUESTED (OCTAL) . .	00200000		
LCM SIZE REQUESTED (OCTAL) . .	00147770		
BLOCKED BINARY FILE NAMES . .	TAPE3	TAPE2 TAPE11 TAPE4 TAPE10 TAPE12	
BLOCK SIZES	580	580 1160 580 580 580	

***** ELEMENT TYPES (CARD D) *****

TYPE	STIF	DESCRIPTION	KEYSUB OPTIONS				NJ	INOTPR
			1H 1A	1	2H 2A	2		
1	45	ISOPAR. SOLID	0	0	0	0	0	0
2	94	16 NODE ISOPAR. SHELL	0	0	0	0	0	0
3	63	QUAD. FLAT SHELL	0	0	0	0	0	0
4	4	ELASTIC BEAM, 3-D	0	0	0	0	1	0
5	63	QUAD. FLAT SHELL	0	0	0	0	0	0
6	63	QUAD. FLAT SHELL	0	0	0	0	0	0
7	63	QUAD. FLAT SHELL	0	0	0	0	0	0

9.9206 43/ 4/27 CP= 2.984

CLUM 6 INCH VALVE POST 25 PLATES LIMFWICK NPP

***** SHELL AND PLATE ELEMENT POSTPROCESSOR (POST5) *****

*** POST25 REGION DEFINITION

NEW TITLE= DISC LIMERICK NPP 4 INCH

LOAD STEP= 1 ITERATIONS= 1

ELEMENT TYPES= 3

STRESS FIT ZONE= 4.0000

DISPLACEMENTS STORED

STRESS COMPONENTS STORED= 1 1 1 1 1 1 1 0

```
LOAD STEP= 1 ITERATION= 1 TIME= 0.
```

NUMBER OF ELEMENTS IN REGION= 14 MAX. NODE NUMBER OF MODEL= 600

GEOMETRY RANGE = -2.000 2.000 -2.000 2.000 .750 .750

*** POST25 PRINT SECTION

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYHR176 JUNE 1-1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

9.9217 83/ 4/27 CP= 4.013

ANSYS POST25 NODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	UX	UY	UZ	ROT X	ROT Y	ROT Z
500	.413407E-04	.839124E-04	.341193E-05	.271071E-04	.474665E-04	.139564E-04
501	.522556E-04	.827328E-04	.720354E-05	.861177E-04	.142056E-03	.139046E-04
502	.609168E-04	.780882E-04	.142228E-04	.119843E-03	.152860E-03	.138445E-04
503	.662530E-04	.765234E-04	.266376E-04	.163278E-03	.778442E-04	.136754E-04
504	.685193E-04	.794210E-04	.292016E-04	.183906E-03	.341298E-05	.136345E-04
505	.665657E-04	.847573E-04	.307993E-04	.162444E-03	.774236E-04	.136751E-04
506	.598183E-04	.905032E-04	.209334E-04	.120413E-03	.152784E-03	.138437E-04
507	.509498E-04	.966215E-04	.181707E-04	.870810E-04	.143414E-03	.139426E-04
508	.412926E-04	.981609E-04	.116178E-04	.314845E-04	.465571E-04	.139863E-04
509	.323808E-04	.963790E-04	.149158E-04	.841092E-04	.134982E-03	.138386E-04
510	.242905E-04	.901913E-04	.277984E-04	.116301E-03	.146189E-03	.136233E-04
511	.196355E-04	.845403E-04	.366167E-04	.156004E-03	.739890E-04	.132799E-04
512	.190189E-04	.791983E-04	.355015E-04	.175005E-03	.164344E-05	.131931E-04
513	.196361E-04	.763649E-04	.339045E-04	.156847E-03	.728758E-04	.132694E-04
514	.233202E-04	.778678E-04	.201621E-04	.115674E-03	.146359E-03	.135880E-04
515	.313075E-04	.825121E-04	.113221E-04	.829312E-04	.133646E-03	.137879E-04
516	.229912E-04	.792799E-04	.119810E-03	.154162E-03	.306899E-05	.131116E-04
517	.410132E-04	.760690E-04	.478426E-04	.409469E-03	.279518E-05	.141785E-04
518	.617042E-04	.795227E-04	.118641E-03	.161101E-03	.283182E-05	.135942E-04

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYPR176 JUNE 1, 1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

9.4217 R3/ 4/27 CP= 4.115

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMXT	SMNT	TMXT	SGET	SMXM	SMNM	TMXM	SGEM	SMXB	SMND
500	1365.56	-1349.85	1357.71	2351.63	9.49	-3.32	6.41	11.52	1360.06	-1237.84
501	1623.33	-325.00	1074.17	2005.68	12.33	-4.46	6.39	12.56	1806.39	-314.09
502	2055.07	1192.05	431.51	1787.33	14.12	5.91	4.11	12.28	2047.51	1200.12
503	1284.33	860.01	214.16	1136.42	15.06	1.52	6.77	14.35	1311.90	862.89
504	1038.78	492.44	273.17	900.02	19.86	-7.42	13.64	24.43	1015.59	524.75
505	1201.77	730.43	235.67	1048.80	15.74	-4.75	10.24	18.57	1201.11	744.66
506	1676.11	1137.61	269.25	1482.14	13.04	1.16	5.94	12.50	1693.82	1127.00
507	1695.97	339.92	678.03	1554.15	10.75	.99	4.88	10.29	1703.77	327.15
508	1603.37	-505.85	1054.61	1907.29	8.41	-1.85	5.13	9.47	1609.64	-510.85
509	1970.37	252.07	859.14	1857.20	12.79	-4.11	6.45	12.85	1984.62	245.55
510	2134.51	1330.93	403.79	1870.40	13.99	6.52	3.74	12.13	2145.53	1324.14
511	1328.17	946.16	191.00	1184.31	15.53	1.35	7.09	14.90	1316.74	943.73
512	958.57	468.73	244.92	830.21	24.04	-9.84	16.94	30.19	975.47	451.20
513	1068.06	652.05	208.00	932.46	17.67	-4.76	11.22	20.47	1069.46	644.24
514	1506.23	942.66	281.78	1318.13	12.72	1.81	5.45	11.91	1489.32	954.38
515	1490.11	-286.97	888.54	1652.39	11.20	.48	5.34	10.97	1484.25	-272.29
516	1600.90	994.22	303.34	1399.90	21.56	-2.85	12.20	23.11	1615.43	984.24
517	2437.91	1446.52	495.69	2123.52	22.16	1.32	10.42	21.53	2432.84	1447.49
518	1660.82	1027.44	316.69	1451.74	19.24	-1.66	10.45	20.12	1638.56	1046.59

PRINT ONLY VALUES FOR ITEM 1 BETWEEN .100E+04 AND .100E+21 KABS= 0

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ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR176 JUNE 1, 1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.4217 83/ 4/27 CP= 4.236

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMXT	SMNT	TMXT	SGET	SMXM	SMNM	TMXM	SGEM	SMXB	SMND
500	1365.56	-1349.85	1357.71	2351.63	9.49	-3.32	6.41	11.52	1360.06	-1337.84
501	1623.33	-325.00	1074.17	2005.68	12.33	-4.46	6.39	12.56	1806.39	-314.09
502	2055.07	1192.05	431.51	1787.33	14.12	5.91	4.11	12.28	2047.51	1290.12
503	1288.33	860.01	214.16	1136.42	15.06	1.52	6.77	14.35	1311.90	862.89
504	1038.78	492.44	273.17	900.02	19.86	-7.42	13.64	24.43	1015.59	524.75
505	1201.77	730.43	235.67	1048.80	15.74	-4.75	10.24	18.57	1201.11	744.66
506	1676.11	1137.61	269.25	1482.14	13.04	1.16	5.94	12.50	1693.82	1127.08
507	1695.97	339.92	678.03	1554.15	10.75	.99	4.88	10.29	1703.77	327.15
508	1603.37	-505.85	1054.61	1907.29	8.41	-1.85	5.13	9.47	1609.64	-510.85
509	1970.37	252.09	859.14	1857.20	12.79	-1.11	6.45	12.85	1964.62	245.55
510	2138.51	1330.93	403.79	1870.40	13.99	6.52	3.74	12.13	2145.53	1324.14
511	1328.17	946.16	191.00	1184.31	15.53	1.35	7.09	14.90	1316.74	943.73
513	1068.06	652.05	208.00	932.46	17.67	-4.76	11.22	20.47	1069.46	644.24
514	1506.23	942.66	281.78	1318.13	12.72	1.81	5.45	11.91	1489.32	954.38
515	1490.11	-286.97	888.54	1652.39	11.20	.48	5.36	10.97	1484.25	-272.29
516	1600.90	994.22	303.34	1399.90	21.56	-2.85	12.20	23.11	1615.43	984.24
517	2437.91	1446.52	495.69	2123.52	22.16	1.32	10.42	21.53	2432.84	1447.49
518	1660.82	1027.44	316.69	1451.74	19.24	-1.66	10.45	20.12	1638.56	1046.59

PRINT ONLY VALUES FOR ITEM 5 BETWEEN .100E+04 AND .100E+21 KABS= 0

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYHP176 JUNE 1, 1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING 9.9217 R3/ 4/27 CP= 4.354

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMX1	SMY1	SMZ1	TX1	TY1	TZ1	SMX8	SMY8	SMZ8	TX8	TY8	TZ8	SMX4	SMY4	SMZ4	TX4	TY4	TZ4

PRINT ONLY VALUES FOR ITEM 9 BETWEEN .100E+04 AND .100E+21 KARS= 0

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.9217 R3/ 4/27 CP= 4.406

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMXT	SMNT	TMXT	SGET	SMXM	SMNM	TMXM	SGEM	SMXH	SMNH
500	1365.56	-1349.85	1357.71	2351.63	9.49	-3.32	6.41	11.52	1360.06	-1337.84
501	1823.33	-325.00	1074.17	2005.68	12.33	-4.46	6.39	12.56	1806.39	-314.09
502	2055.07	1192.05	431.51	1787.33	14.12	5.91	4.11	12.28	2047.51	1200.12
503	1288.33	860.01	214.16	1136.42	15.06	1.52	6.77	14.35	1311.90	862.89
504	1038.78	492.44	273.17	900.02	19.86	-7.42	13.64	24.43	1015.59	524.75
505	1201.77	730.43	235.67	1048.80	15.74	-4.75	10.24	18.57	1201.11	744.66
506	1676.11	1137.61	269.25	1482.14	13.04	1.16	5.94	12.50	1693.82	1127.00
507	1695.97	339.92	678.03	1554.15	10.75	.99	4.88	10.29	1703.77	327.15
508	1603.37	-505.85	1054.61	1907.29	8.41	-1.85	5.13	9.47	1609.64	-510.85
509	1970.37	252.09	859.14	1857.20	12.79	-1.11	6.45	12.85	1984.62	245.55
510	2138.51	1330.93	403.79	1870.40	13.99	6.52	3.74	12.13	2145.53	1324.14
511	1328.17	946.16	191.00	1184.31	15.53	1.35	7.09	14.90	1316.74	943.73
513	1068.06	652.05	208.00	932.46	17.67	-4.76	11.22	20.47	1069.46	644.24
514	1506.23	942.66	281.78	1318.13	12.72	1.81	5.45	11.91	1489.32	954.38
515	1490.11	-286.97	888.54	1652.39	11.20	.48	5.36	10.97	1484.25	-272.29
516	1600.90	494.22	303.34	1399.90	21.56	-2.85	12.20	23.11	1615.43	984.24
517	2437.91	1446.52	495.69	2123.52	22.16	1.32	10.42	21.53	2432.84	1447.49
518	1660.82	1027.44	316.69	1451.74	19.24	-1.66	10.45	20.12	1638.56	1046.59

*** POST25 PLOT SECTION

SMXT CONTOUR LINE VALUES

880.00	960.00	1040.0	1120.0	1200.0
1280.0	1360.0	1440.0	1520.0	1600.0
1680.0	1760.0	1840.0	1920.0	2000.0
2080.0	2160.0	2240.0	2320.0	2400.0

MAX= 2437.91 AT NODE 517 X
MIN= 958.566 AT NODE 512 0

CUMULATIVE PLOT NUMBER 1

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

SMXT ANSYS

SMXM CONTOUR LINE VALUES

7.0000	8.0000	9.0000	10.000	11.000
12.000	13.000	14.000	15.000	16.000
17.000	18.000	19.000	20.000	21.000
22.000	23.000	24.000	25.000	26.000

MAX= 24.0353 AT NODE 512 X
MIN= 8.40653 AT NODE 508 0

CUMULATIVE #LOT NUMBER /
CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

SMX# CONTOUR LINE VALUES

960.00	1040.0	1120.0	1200.0	1280.0
1360.0	1440.0	1520.0	1600.0	1680.0
1760.0	1840.0	1920.0	2000.0	2080.0
1860.0	2240.0	2320.0	2400.0	2480.0

MAX =	2432.44	AT NODE	517	X
MIN =	975.468	AT NODE	512	Q

CUMULATIVE PLOT NUMBER 3
CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

NEW TITLE= ADAPTER PLATE LIMERICK NPP

*** POST25 REGION DEFINITION

LOAD STEP= 1 ITERATION= 1

ELEMENT TYPE LIST ERASED

ELEMENT TYPES= 5

STRESS FIT ZONE= 7.0000

DISPLACEMENTS STORED

STYESS COMPONENTS STORED= 1 1 1 1 1 1 1 1 0 0

```
LOAD STEP= 1 ITERATION= 1 TIME= 0.
```

NUMBER OF ELEMENTS IN REGION= 24 MAX. NODE NUMBER OF MODEL= 600

GEOMETRY RANGE= -9.730 -9.730 -6.453 4.633 -4.043 7.043

*** POST25 PRINT SECTION

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYRPI76 JUNE 1, 1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.56 LOAD COMBINATION PLUS OPERATING

9.9225 R3/ 4/27 CP= 6.917

ANSYS POST25 NODAL DISPLACEMENTS

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	UX	UY	UZ	ROTX	ROTY	ROTZ
550	.120135E-03	.168307E-02	.781111E-03	.562445E-03	.584866E-04	.231302E-03
551	.233847E-03	.157158E-02	.469274E-03	.562352E-03	.683942E-04	.272943E-03
552	.218424E-03	.167914E-02	.466835E-03	.562333E-03	.616802E-04	.270840E-03
553	.201078E-03	.192738E-02	.774689E-03	.562423E-03	.782804E-04	.231082E-03
554	.344396E-03	.192816E-02	.136833E-02	.562362E-03	.573877E-04	.230790E-03
555	.558258E-03	.168583E-02	.182077E-02	.562164E-03	.705628E-04	.267478E-03
556	.516196E-03	.157918E-02	.182212E-02	.562183E-03	.643559E-04	.267196E-03
557	.289539E-03	.168401E-02	.136968E-02	.562384E-03	.750214E-04	.230859E-03
558	.497086E-03	.281358E-02	.325125E-03	.562552E-03	.633361E-04	.229274E-03
559	.970566E-03	.180766E-02	.157649E-02	.562286E-03	.632280E-04	.228575E-03
560	.859162E-03	.212589E-02	.157661E-02	.562235E-03	.632310E-04	.228857E-03
561	.374670E-03	.336967E-02	.325099E-03	.562539E-03	.633033E-04	.229270E-03
562	.837315E-03	.336964E-02	.212190E-02	.562530E-03	.633482E-04	.229282E-03
563	.131082E-02	.212717E-02	.363810E-02	.561986E-03	.632702E-04	.228075E-03
564	.117985E-02	.180902E-02	.363802E-02	.562039E-03	.633146E-04	.228691E-03
565	.526689E-03	.281354E-02	.212190E-02	.562543E-03	.632935E-04	.229280E-03
566	.626054E-03	.322986E-02	.369212E-03	.562456E-03	.656128E-04	.230967E-03
567	.118445E-02	.191718E-02	.208790E-02	.562404E-03	.633504E-04	.217176E-03
568	.104768E-02	.228067E-02	.209252E-02	.562372E-03	.626007E-04	.218892E-03
569	.444731E-03	.384179E-02	.366578E-03	.562431E-03	.634698E-04	.230863E-03
570	.967467E-03	.384179E-02	.233823E-02	.562377E-03	.643760E-04	.231361E-03
571	.152320E-02	.228101E-02	.414731E-02	.562247E-03	.649295E-04	.214352E-03
572	.136822E-02	.191741E-02	.414402E-02	.562270E-03	.636777E-04	.218253E-03
573	.601673E-03	.322990E-02	.233897E-02	.562400E-03	.614810E-04	.230922E-03
574	.101581E-02	.171993E-02	.208901E-02	.562313E-03	.565723E-04	.171192E-03
575	.106084E-02	.157747E-02	.208391E-02	.562324E-03	.890952E-04	.167887E-03
576	.858131E-03	.171374E-02	.150242E-02	.562311E-03	.395076E-04	.106713E-03
577	.903586E-03	.157242E-02	.150139E-02	.562325E-03	.455509E-04	.108750E-03
578	.122104E-02	.173719E-02	.354313E-02	.562119E-03	.538651E-04	.107400E-03
579	.117643E-02	.159500E-02	.354250E-02	.562133E-03	.366545E-04	.106247E-03
580	.138303E-02	.173779E-02	.415040E-02	.562124E-03	.100687E-03	.176555E-03
581	.133470E-02	.159530E-02	.414715E-02	.562134E-03	.597125E-04	.172862E-03

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR176 JUNE 1, 1979
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.9225 R3/ 4/27 CP= 7.067

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMXT	SMNT	TMXT	SGET	SMXM	SMNM	TMXM	SGEM	SMXH	SMNH
550	493.04	188.75	152.14	430.88	127.34	-3.83	65.59	129.30	491.77	184.94
551	690.97	323.35	183.81	598.81	135.80	-16.04	75.92	144.49	640.64	328.28
552	667.39	342.63	162.38	578.04	136.52	-6.85	71.68	140.07	610.60	356.94
553	472.74	202.78	134.98	410.78	130.60	3.99	63.31	128.66	472.02	209.27
554	481.76	180.04	150.86	421.63	140.01	-11.97	75.99	146.37	487.81	161.56
555	644.57	294.53	175.02	558.91	166.58	-40.32	103.45	189.97	657.80	244.74
556	622.53	318.18	152.18	539.17	162.36	-26.37	94.36	177.02	630.75	272.27
557	469.79	198.68	135.56	408.46	134.96	3.30	65.83	133.34	467.29	188.54
558	13.08	-7.53	10.31	18.06	36.01	10.45	12.78	32.09	13.07	-11.68
559	1049.86	90.33	479.76	1007.73	248.77	14.23	117.27	241.97	770.81	245.38
560	1060.97	-458.05	759.51	1349.60	251.22	-54.93	153.07	282.71	824.50	-215.08
561	13.40	-22.02	17.71	30.98	23.41	2.13	10.64	22.42	8.47	-32.62
562	17.32	5.10	6.11	15.42	60.60	7.30	26.65	57.30	39.03	3.41
563	1012.15	98.80	456.67	966.54	417.22	-3.24	210.23	418.85	882.75	282.77
564	1131.41	-373.30	752.35	1357.12	475.09	-35.34	255.21	493.71	1062.32	-183.65
565	21.65	-41.38	31.51	55.47	56.19	-13.84	35.01	64.24	34.68	-35.00
566	-71.58	-191.32	59.87	167.43	44.13	-26.33	35.23	61.67	-85.69	-187.84
567	1076.89	119.47	478.71	1022.40	222.46	29.16	96.65	209.41	726.72	237.79
568	884.20	-960.24	922.22	1597.79	154.13	-89.17	121.65	213.19	733.79	-686.97
569	-58.42	-228.78	85.18	205.88	6.05	-29.56	17.81	33.01	-123.00	-195.42
570	-70.47	-182.66	56.10	159.56	77.75	-46.41	62.08	108.66	-48.19	-165.68
571	971.16	36.65	467.26	953.37	443.76	-22.28	233.02	455.31	815.90	403.77
572	992.08	-928.02	960.05	1663.17	418.53	-86.78	252.66	468.00	929.77	-562.37
573	-121.43	-210.80	44.69	183.26	33.59	-53.68	43.64	76.24	-96.20	-196.68
574	1091.50	128.24	481.63	1033.37	200.54	-69.53	135.04	242.89	1152.55	216.86
575	1264.01	585.86	339.07	1095.63	228.43	-13.68	121.06	235.57	1158.55	654.95
576	1383.11	249.54	566.79	1276.77	337.94	-40.86	189.40	360.12	1196.14	422.24
577	1341.60	314.47	513.57	1215.28	352.47	-24.34	188.41	365.25	1183.20	504.88
578	1496.42	474.00	511.21	1324.63	488.69	-30.95	259.82	504.88	1355.53	507.00
579	1507.39	445.45	530.47	1341.33	465.97	4.64	230.67	463.67	1422.10	514.64
580	1382.36	688.24	347.06	1197.16	267.60	19.26	124.17	258.51	1286.35	923.29
581	1345.53	260.38	542.57	1236.08	269.63	-22.52	146.08	281.57	1259.14	516.05

PRINT ONLY VALUES FOR ITEM 1 BETWEEN .100E+04 AND .100E+21 KABS= 0

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION J UPDATE 67L1 CYR0176 JUNE 1, 1979
 SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.9225 R3/ 4/27 CP= 7.242

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMXT	SMNT	TMXT	SGLT	SMXM	SMNM	TMXM	SGEM	SMXB	SMNB
559	1049.86	90.33	479.76	1007.73	248.77	14.23	117.27	241.97	770.81	245.38
560	1060.97	-458.05	754.51	1349.60	251.22	-54.93	153.07	282.71	824.50	-215.08
563	1012.35	98.80	456.67	966.54	417.22	-3.24	210.23	419.85	882.75	282.77
564	1131.41	-373.30	752.35	1357.12	475.09	-35.34	255.21	493.71	1062.32	-183.65
567	1076.89	119.47	478.71	1022.40	222.46	29.16	96.65	209.41	726.72	237.79
574	1091.50	128.24	481.63	1033.37	200.54	-69.53	135.04	242.89	1152.55	216.86
575	1264.01	585.86	339.07	1095.63	228.43	-13.68	121.06	235.57	1158.55	654.95
576	1383.11	249.54	566.79	1276.77	337.94	-40.86	189.40	360.12	1196.14	422.24
577	1341.60	314.47	513.57	1215.28	352.47	-24.34	188.41	365.25	1183.20	504.88
578	1496.42	474.00	511.21	1324.63	488.69	-30.95	259.82	504.88	1355.53	507.00
579	1507.39	445.45	530.97	1341.33	465.97	4.64	230.67	463.67	1422.10	514.64
580	1382.36	688.24	347.06	1197.16	267.60	19.26	124.17	258.51	1286.35	923.29
581	1345.53	260.38	542.57	1236.08	269.63	-22.52	146.08	281.57	1259.14	516.05

PRINT ONLY VALUES FOR ITEM 5 BETWEEN .100E+04 AND .100E+21 KABS= 0

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 3 UPDATE 67L1 CYR176 JUNE 1, 1974
SWANSON ANALYSIS SYSTEMS, INC. HOUSTON, PENNSYLVANIA 15342 PHONE (412) 746-3304

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.9225 R3/ 4/27 CP= 7.345

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NOUE	SMXT	SMNT	TMXT	SGET	SMXM	SMNM	TMXM	SGEM	SMXH	SMNH
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PRINT ONLY VALUES FOR ITEM 9 BETWEEN .100E+04 AND .100E+21 KABS= 0

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

9.9225 R3/ 4/27 CP= 7.401

ANSYS POST25 NODAL POINT STRESSES

LOAD STEP= 1 ITERATION= 1 TIME= 0.

NODE	SMXT	SMYT	TMXT	SMET	SMXM	SMNM	TMXM	SGEM	SMXB	SMYB
564	1131.41	-373.30	752.35	1357.12	475.09	-35.34	255.21	493.71	1062.32	-183.65
574	1091.50	128.24	481.83	1033.37	200.54	-69.53	135.04	242.89	1152.55	216.86
575	1264.01	585.86	339.07	1095.63	228.43	-13.68	121.06	235.57	1158.55	654.95
576	1383.11	249.54	566.74	1276.77	337.94	-40.86	189.40	360.12	1196.14	422.24
577	1341.60	314.47	513.57	1215.28	352.47	-24.34	188.41	365.25	1183.20	504.88
578	1496.42	474.00	511.21	1324.63	488.69	-30.95	259.82	504.88	1355.53	507.00
579	1507.39	445.45	530.97	1341.33	465.97	4.64	230.67	463.67	1422.10	514.64
580	1382.36	688.24	347.06	1197.16	267.60	19.26	124.17	258.51	1286.35	923.29
581	1345.53	260.38	542.57	1236.08	269.63	-22.52	146.08	281.57	1259.14	516.05

*** POST25 PLOT SECTION

VIEW DIRECTION (X,Y,Z)= -1.000 0. 0.

SMXT CONTOUR LINE VALUES

-200.00	-100.00	-13642E-11	100.00	200.00
300.00	400.00	500.00	600.00	700.00
800.00	900.00	1000.0	1100.0	1200.0
1300.0	1400.0	1500.0	1600.0	1700.0

MAX= 1507.39 AT NODE 579 X
 MIN= -121.428 AT NODE 573 0

CUMULATIVE PLOT NUMBER 4

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

SMXT ANSYS

SMXM CONTOUR LINE VALUES

0.	25.000	50.000	75.000	100.00
125.00	150.00	175.00	200.00	225.00
250.00	275.00	300.00	325.00	350.00
375.00	400.00	425.00	450.00	475.00

MAX= 488.692 AT NODE 578 X
 MIN= 6.05377 AT NODE 569 0

CUMULATIVE PLOT NUMBER 5

CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

SMXM ANSYS

SMXB CONTOUR LINE VALUES

-160.00	-80.000	-45475E-12	80.000	160.00
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240.00	120.00	400.00	480.00	560.00
640.00	720.00	800.00	880.00	960.00
1040.0	1120.0	1200.0	1280.0	1360.0

MAX= 1422.10 AT NODE 579 X
MIN= -122.998 AT NODE 569 0

CUMULATIVE PLOT NUMBER 6
CLOW 4 INCH VALVE 4.5G LOAD COMBINATION PLUS OPERATING

SMXH ANSYS

PLOT DATA (IF ANY) WRITTEN ON FILE TAPE21

***** PROBLEM COMPLETED ***** CP = 9.143

END OF INPUT ENCOUNTERED ON FILE TAPE18

ENTER /NOTES CARD AFTER FINISH CARD (OR AT ANY CARD-A LEVEL)
FOR DETAILED NOTES ON FEATURES, CHANGES, HELP, ETC.

***** RUN COMPLETED ***** CP = 9.153
***** ANSYS TWO DIMENSIONAL PLOTS *****
***** END PLOTS *****

REMEMBER:
YOU ARE RESPONSIBLE FOR SAVING YOUR OWN FILES
FOR MORE INFORMATION INCLUDE THE FOLLOWING CARD

EXPLAIN,ANSYS,FILES.

FOR INFORMATION ON INTERACTIVE EXECUTION
INCLUDE THE FOLLOWING CARD
EXPLAIN,ANSYS,INTER.

CLASS 3 ERROR LIST IS NOW AVAILABLE
EXPLAIN,ANSYS,ERRORS

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