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SEISMIC AND STRESS ANALYSIS OF LACBWR
RECIRCULATION PIPING SYSTEM

Prepared Under NES Project 5101 for
DAIRYLAND POWER COOPERATIVE

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1. SUMMARY

This report, prepared for Dairyland Power Cooperative, presents the results of seismic and stress analysis of the recirculation piping system for the LACBWR Nuclear Power Station. The seismic and stress analyses have been performed in accordance with the design requirements for Class 2 piping components of the ASME Boiler and Pressure Vessel Code, Section III, Division 1, "Nuclear Power Plant Components, 1974. By providing adequate seismic restraints (snubbers) at critical locations of the recirculation system, the stresses in the piping due to a seismic event can be reduced to acceptable values. That is, the stresses due to seismic, deadweight, pressure and thermal expansion loadings, combined according to the ASME Code rules for Class 2 components, would satisfy design requirements given in the Code with the addition of seismic restraints.

1. SUMMARY

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2. INTRODUCTION

In response to AEC/DL's request to review the effects of an earthquake event on the LaCrosse Boiling Water Reactor, Dairyland Power Cooperative requested Gulf United Nuclear Fuels Corporation to evaluate the adequacy of the major structures and equipment to withstand seismic loadings. The seismic study performed by Gulf United (GU) Nuclear Fuels Corporation (Ref. 1) included an analysis of the main steam line which indicated that high stresses would be generated in the main steam line during a seismic event. It was also evident from these analyses that the LACBWR piping systems in general were not designed to accommodate horizontal accelerations, the primary earthquake induced loading condition. Anticipating the possibility of a seismically induced loss of coolant accident, it was therefore concluded that analyses of the major Class 1 piping systems should be performed to evaluate their structural integrity in a seismic event.

In order to verify that the seismic stresses are acceptable, it is necessary to show that the combined stresses in the piping system are within ASME Boiler and Pressure Vessel Code allowable values. This requires that the seismic stresses be combined with the stresses due to deadweight, pressure and thermal loadings in accordance with the ASME Code Section III rules (Ref.2).

The rules for a Class 1 (Section III) analysis require that thermal stress and fatigue due to thermal cycling be considered. A review of the available recirculation piping system flexibility and stress analyses indicated that only thermal expansion was considered together with the pressure and deadweight loads in the original design. Consequently, it is not possible to perform a Class 1 analysis with the existing analytical data.

The existing analytical data, however, is sufficient to perform a Class 2 (Section III) analysis. Therefore, in the subject analysis, the adequacy of the recirculation piping system to withstand an earthquake event is evaluated by combining the stresses due to deadweight, pressure, thermal and seismic loadings in accordance with ASME Code requirements for the design of Class 2 components. It should be noted that the requirements of the ASME Code, Section III, for the design of Class 2 components are much more rigorous than the design requirements given in the Power Piping Code, USAS B31.1.0 (the applicable code for the LACBWR Project).

Section 3.0 of this report describes the scope of the recirculation piping system considered in the analysis. The loading criteria, design criteria and analytical methods used in the analyses are given in Sections 4.0, 5.0 and 6.0 respectively. The results of the analysis are discussed in Section 7.0. The conclusions are summarized in Section 8.0.

3. DESCRIPTION OF PIPING SYSTEM

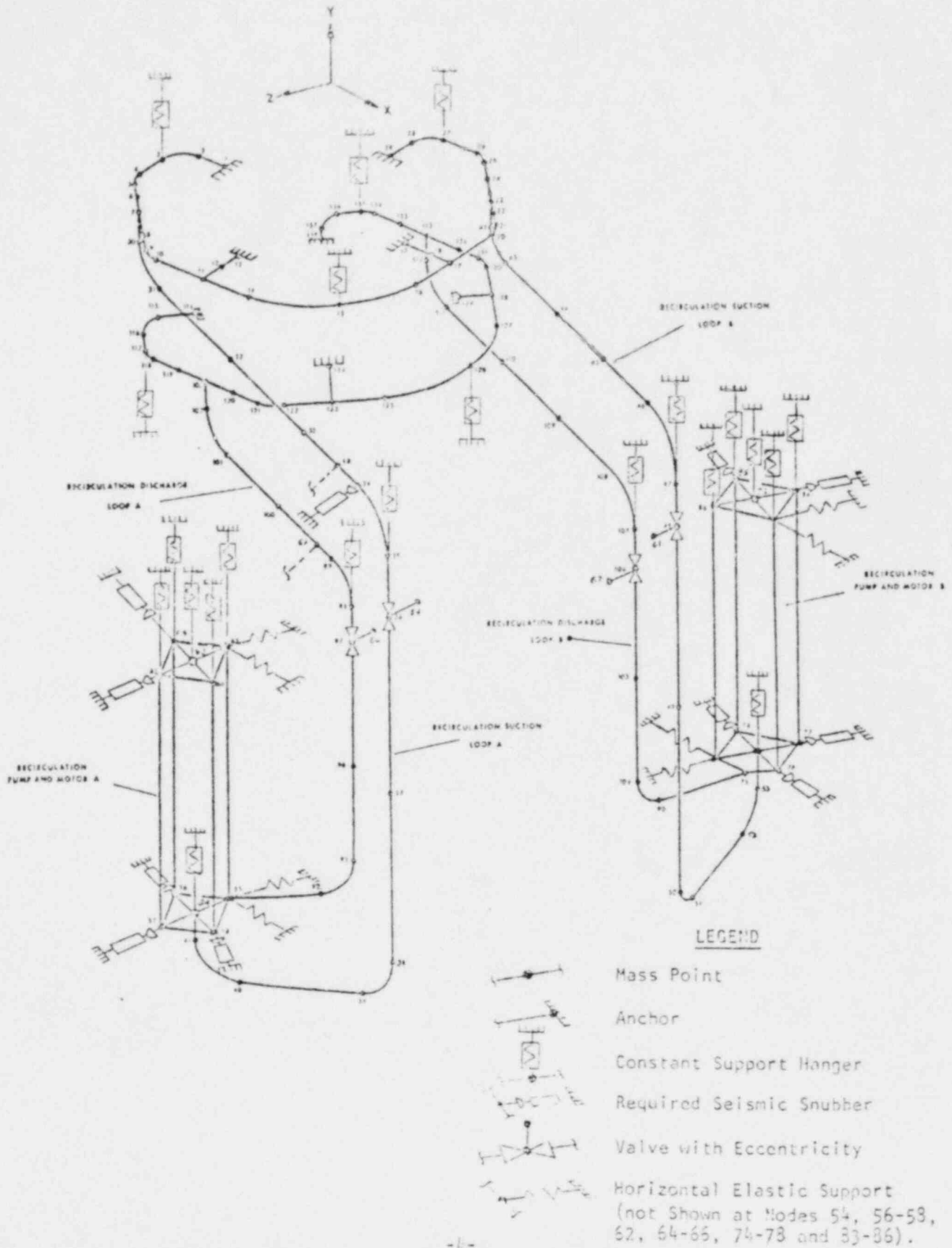
The recirculation piping system provides forced-circulation of water through the reactor core. Referring to Figure 3.1, the water from the reactor vessel flows to the 16-inch diameter forced-circulation suction manifold (upper ring) through four 16-inch diameter nozzles. From the manifold, the water flows through two 20-inch suction lines to the two variable speed forced circulation pumps A and B. The 20-inch diameter pump discharge lines return the water to the 16-inch diameter forced-circulation discharge manifold (lower ring). From the discharge manifold, the water flows to the reactor vessel through four equally-spaced 16-inch reactor inlet nozzles.

The governing design specification used in the analysis of the recirculation piping system is given in Reference 3. The piping arrangement analyzed and piping suspension (hangers, etc.) characteristics have been taken from the drawings listed in Reference 4. Piping properties have been taken from the information given in Reference 5 and from the piping specification (Ref. 3). This information is summarized in Table A-1 of Appendix A.

Figure 3.1

Mathematical Model

LACBYR Recirculation Piping System



4. LOADING CRITERIA

The load cases which must be considered in performing a Class 2 stress analysis include: dead loads and sustained mechanical loads, internal pressure, thermal expansion loading, seismic inertia loads and seismic anchor movement loading.

4.1 Load Case 1

Load Case 1 is the combination of the dead weight of the piping system and the sustained mechanical loads (e.g. valve weights, hanger loads etc. The dead weight of the piping system is calculated considering the piping system to be insulated and filled with water. The weight of valves, valve operators, pumps, pump motors and branch piping as well as the effects of constant weight hangers etc. are included in the analysis. The valve weights and pump/motor weights were taken from vendor instruction manuals (Ref. 6 and 7) and are summarized in Table A-II. The uniform vertical loads applied by the constant weight hangers were taken from LACBWR drawing no. 41-503376 (Ref. 4) and are applied at the appropriate node points.

4.2 Load Cases 2 and 3

Load Cases 2 and 3 are the seismic inertia loadings on the piping system which are imposed in the form of seismic response spectra. Load Case 2 is the simultaneous application of the horizontal spectra in global X direction and the vertical spectra in the global Y direction. Load Case 3 is the simultaneous application of the horizontal spectra in the global Z direction and the vertical spectra in the global Y direction. The applicable horizontal and vertical response spectra were taken from the report on seismic evaluation of the LACBWR (Ref. 1) and are summarized in Table A-III of Appendix A. The response spectrum values for the safe shutdown earthquake (SSE, Figure G.34 of Ref. 1) are only 20% greater than the response spectrum for the operating basis earthquake (OBE Figure G.36 of Ref.1). However, the allowable stress values for the SSE are 50% greater than the allowable stress values for the OBE. Therefore, only OBE inertia loadings were considered in the subject analysis.

4.3 Load Case 4

Load Case 4 is defined as the thermal loading for normal operation which is produced by the overall thermal expansion of the piping system and the thermal movement of the piping/reactor vessel anchors. The overall thermal expansion of the piping system is that which results from the plant heating up from ambient temperature of 70°F to the normal plant operating temperature of 577°F (Reference 8). The thermal movement of the piping/reactor vessel anchors are taken from Reference 5 and are summarized in Table A-IV of Appendix A.

4.4 Load Cases 5 and 6

Load Cases 5 and 6 are the loads imposed on the piping system resulting from the relative displacements between the piping/reactor vessel anchor points and the recirculation pumps support points which are produced by the seismic event. The seismic anchor movement (or displacement) are estimated using data given in Reference 1. Load Case 5 is a 0.5 inch displacement in the X direction of the recirculation pumps support points relative to the piping/reactor vessel anchor points. Load Case 6 is a 0.5 inch displacement in the Z direction of the recirculation pumps support points relative to the piping/reactor vessel anchor points.

4.5 Load Cases 7 and 8

Load Cases 7 and 8 are the internal pressure loads imposed on the piping system by the normal operating pressure of 1300 psi and the peak plant pressure respectively. The peak plant pressure is conservatively taken as the recirculation piping design pressure of 1450 psi from Reference 3.

5. STRESS ACCEPTANCE CRITERIA

The stress acceptance criteria used in this analysis are the ASME Section III, Class 2 component stress design rules which define the stress limits for various load combinations under normal operating, upset and faulted conditions as interpreted by the AEC in Regulatory Guide 1.43, Reference 9.

5.1 Normal Operating Conditions

- A. Combined stresses for Load Cases 1 and 7 should be less than S_h as calculated by equation 8 of Section III, ASME Code (see Section 6.5 of this report).
- B. Combined stresses for Load Cases 4 and 5 (or 4 and 6) should be less than S_A as calculated by equation 10 of Subsection NC-3650 of the ASME Code or the combined stresses for Load Cases 1, 4, 7, and 5 or 6 should be less than the sum of S_A and S_h as calculated by equation 11 of Subsection NC-3650 of the ASME Code (see Section 6.5 of this report).

5.2 Upset Conditions

- A. Combined stresses due to Load Cases 1, 2 and 8 (or 1, 3 and 8) should be less than $1.2 S_h$ as calculated by equation 9 of Subsection NC-3650 of the ASME Code (see Section 6.5 of this report)

Note: For the normal and upset conditions the seismic loadings (Load Cases 2, 3, 5 and 6) correspond to the operating basis earthquake (OBE).

5.3 Faulted Conditions

Combined stresses due to the safe shutdown earthquake (SSE), peak pressure, dead weight and other sustained mechanical loads as calculated by equation 9 of subsection NC-3650 of the ASME Code should be less than $1.8 S_h$. This requirement will be met if the requirements of 5.2 above are met since the SSE magnitude is only 20% greater than the OBE while the allowable faulted stress is 50% greater than the allowable upset stress.

6. ANALYTICAL METHODS

6.1 Mathematical Model

In order to perform static, dynamic and stress analyses, the continuous piping system is mathematically modeled as an assembly of elastic structural elements interconnected at discrete nodal points (Figure 3.1). Nodal points are located at all points of interest in the piping system such as elbows, valves, anchorages, hangers, tee intersections, load points, all structural and material discontinuities, etc. This three dimensional multidegree of freedom model of the piping system is attached to the "ground" (structure) by means of rigid hangers, support springs, hydraulic snubbers and anchors. Stiffness characteristics of structural elements are related to the moment of inertia and the axial and effective shear area of the pipe cross section. The stiffness characteristics of the elbows and tee connections are modified to account for local deformation by using the flexibility factors given in the ASME Code (Ref. 2).

For the seismic analysis the distributed mass of the piping system is lumped at the system nodal points. Masses are lumped so that the lumped mass, multi-degree of freedom model represents the dynamic characteristics of the piping system. In order to reduce the number of dynamic degrees-of-freedom, only translational degrees-of-freedom are considered at each mass point (the masses associated with the rotational degrees of freedom are set to zero). This assumption has been shown to be completely satisfactory for accurate analysis of seismic response. Special items such as valves and actuators are modeled by lumping their masses at an appropriate offset from the center-line of the piping system.

6.2 Static Load Analysis

The static load analysis involves the application of the following loading conditions and their combinations:

- . Design Pressure
- . Gravity Loading (dead weight) and Sustained Mechanical Loads
- . Support Displacement
- . Thermal Expansion

For the pressure loadings, the hoop and longitudinal stresses in the affected piping are calculated using the formulae given in the Code (see Section 6.5).

For the deadweight, support displacement, or thermal expansion loading conditions the following equations of equilibrium written in matrix form are solved:

$$KU = P \quad (1)$$

where:

K = System stiffness matrix

U = Nodal point displacement vector

P = External forces, dead weight or equivalent thermal load vector.

The system stiffness matrix is obtained from element stiffness matrices using direct stiffness methods. The unknown nodal displacements U are obtained as follows:

$$U = K^{-1}P \quad (2)$$

The inversion of the stiffness matrix is performed using the Gauss-Siedel technique.

From the nodal displacements U , the member internal forces are determined using the member stiffness matrix. Finally the member internal forces are used in calculating the stresses.

6.3 Eigenvalue Analysis

The eigenvalues (natural frequencies) and the eigenvectors (mode shapes) for each of the natural modes of vibration are calculated by solving the following frequency equation:

$$\left[K - \omega_n^2 M \right] \left\{ \phi_n \right\} = \left\{ 0 \right\} \quad (3)$$

where:

ω_n = Natural angular frequency for the n^{th} mode

M = System mass matrix

ϕ_n = Mode shape vector for the n^{th} mode

0 = Null vector

The eigenvalue/eigenvector extraction is performed using the Householder-QR technique.

6.4 Dynamic (Seismic) Load Analysis

Considering only translational degrees of freedom and assuming viscous (velocity proportional) form of damping, the equation of motion in matrix form can be expressed as follows:

$$M(\ddot{U}_t + \ddot{U}_{gt}) + C\dot{U}_t + KU_t = 0 \quad (4)$$

where:

\ddot{U}_t = Relative acceleration time history vector

\ddot{U}_{gt} = Ground acceleration time history vector

C = Damping matrix

\dot{U}_t = Velocity time history vector

U_t = Relative displacement time history vector

Rearranging equation (4)

$$M\ddot{U}_t + C\dot{U}_t + KU_t = -M\ddot{U}_{gt} = P_{eff} \quad (5)$$

To uncouple equation (5), assume

$$U = \Phi Y_t$$

where:

Φ = Characteristic free vibration mode shapes matrix.

Y_t = Generalized coordinate displacement time history vector.

Pre-and post-multiplying equation (5) by the transpose of Φ and by Φ respectively and using orthogonality conditions, the following uncoupled equations of motion are obtained:

$$\ddot{Y}_{nt} + 2\omega_n \lambda_n \dot{Y}_{nt} + \omega_n^2 Y_{nt} = M_n^{*-1} R_{n-gt} \ddot{U}_{gt} \quad (6)$$

where:

Y_{nt} = Generalized displacement coordinate time history for nth mode

λ_n = Damping ratio for the nth mode expressed as percent of critical damping

M_n^* = Generalized mass for the nth mode

$$= \Phi_n^T M \Phi_n = \sum M_i \phi_{in}^2$$

The mode shape ϕ_n is normalized such that $M_n^* = 1$

R_n = Participation factor for the n^{th} mode

$$= \phi_n^T M I = \sum M_i \phi_{in}$$

I = Column vector whose elements are generally unity

The solution for the differential equation (6) is given by the Duhamel Integral

$$Y_{nt} = \frac{R_n}{M_n^* \omega_n} \int_0^t \ddot{U}_{gt} e^{-\lambda_n \omega_n (t-\tau)} \sin \omega_n (t-\tau) d\tau$$

Using the response spectrum method of analysis, the maximum values of the generalized response for each mode is given by:

$$\ddot{Y}_{n \max} = \frac{R_n S_{an}}{M_n^*} \quad (7)$$

where:

$\ddot{Y}_{n \max}$ = Maximum generalized coordinate acceleration response for the n^{th} mode.

S_{an} = Spectral acceleration value for the n^{th} mode (from the applicable response spectrum curve)

From the maximum generalized coordinate response, the maximum acceleration ($\ddot{U}_{n \max}$) and maximum inertia forces ($F_{n \max}$) at each mass point are given by:

$$\ddot{U}_{n \max} = \ddot{Y}_{n \max} \phi_{in}$$

$$F_{n \max} = M_n \ddot{U}_{n \max}$$

The inertia forces ($F_{n \max}$) for each of the system natural modes are applied as external static forces, and the piping system response (displacements, member internal forces and stresses) are calculated using the procedure described in Section 4.2. Total system response is then obtained by combining the individual modal response values by the square-root of the sum of the squares method; lower modes having large contribution to the response (all modes having natural frequency under 30 cycles per second) are considered and higher modes with negligible participation are neglected.

6.5 Stress Analysis

The design requirements of the ASME Code for Class 2 piping systems are satisfied when the calculated stresses in the piping system due to thermal expansion, weight, and other sustained and occasional loads are combined in accordance with and meet the limitations of, equations 8,9,10,and 11 of Subsection NC-3652 of Reference 8. These requirements are described below:

A. Sustained Loads

The effects of pressure weight and other sustained mechanical loads must meet the requirements of equation (8).

$$S_{SL} = \frac{PD_o}{4t_n} + \frac{0.75iM_A}{Z} \leq 1.0S_h \quad (8)$$

where:

- P = Internal design pressure, psi
- D_o = Outside diameter of pipe, in.
- t_n = Nominal wall thickness, in.
- M_A = Resultant moment loading on cross section due to weight and other sustained loads, in. (See NC-3652.4, Ref.8)
- Z = Section modulus of pipe, in.³ (See NC-3652.4, Ref.8)
- i = Stress intensification factor (NC-3673.2 (b), Ref.8)
The product of 0.75i shall never be taken as less than 1.0
- S_h = Basic material allowable stress at design temperature

B. Occasional Loads

The effects of pressure, weight, other sustained loads and occasional loads including earthquake must meet the requirements of Equation (9).

$$S_{OL} = \frac{P_{max}D_o}{4t_n} + \frac{0.75i(M_A + M_B)}{Z} \leq 1.2S_h \quad (9)$$

where:

- P_{max} = Peak pressure, psi
- M_B = Resultant moment loading on cross section due to occasional loads such as earthquake loads

C. Thermal Expansion

The requirements of either Equation (10) or Equation (11) must be met.

1. The effects of thermal expansion must meet the requirements of Equation (10)

$$S_{TE} = \frac{iM_C}{Z} \leq S_A \quad (10)$$

where:

M_C = Range of resultant moments due to thermal expansion. Also include moment effects of anchor displacements due to earthquake if anchor displacement effects were omitted from Equation (9)

S_A = Allowable stress range for expansion stresses (HC-3611.2, Ref.8)

2. The effects of pressure, weight, other sustained loads and thermal expansion shall meet the requirements of Equation (11)

$$S_{TE} = \frac{PD_O}{4t_n} + 0.75i \frac{M_A}{Z} + \frac{iM_C}{Z} \leq (S_h + S_A) \quad (11)$$

The above mentioned static, dynamic and stress analyses are carried out using the PIPESD computer code. PIPESD was developed by URS/John A. Blume and Associates, Engineers, San Francisco, California and has been extensively used in the seismic and stress analysis of piping system for a number of nuclear power plants. PIPESD is available to Nuclear Energy Services through the Control Data Corporation CYBERNET Service.

7. DISCUSSION OF RESULTS

A review of the existing support system for the recirculation pump/motor indicated that any small lateral inertia forces acting on the pump/motor due to an earthquake could make the system unstable and cause high stresses in the recirculation piping system. Therefore, eleven seismic restraints (hydraulic snubbers) as shown on Figure 3.1 were required to reduce the stresses in the recirculation piping system within the ASME Code allowable stress values. The results presented in this report are for the piping system with the required seismic restraints.

The frequencies for the first forty-six modes of vibration of the piping system are summarized in Table 7.1, from which it can be seen that the piping system is a fairly flexible (low frequency) system. The deflections at each node points due to the various load cases are summarized in Table B-1 of Appendix B. The maximum deflection due to seismic inertia load (Load Case 3) is 0.80 inches at node point 47. For a flexible piping system this deflection is acceptable. The maximum deflection due to thermal expansion load (Load Case 4) is 1.0 inches at Node Point 52.

Table B-11 of Appendix B summarizes the elastic support reaction forces. The seismic restraints, anchors and other support system should be designed (sized) using these restraint forces. The maximum reaction force in the seismic restraints is due to Y + Z earthquake (Load Case 3) and is of the order of 34 Kips.

The results of the detail stress analysis in accordance with the requirements of subarticle NC3652 of ASME Code for the Class 2 piping system are given in Table B-111. Figure 7.1 through 7.7 indicate node points with maximum stresses or stresses exceeding 10.0 ksi for specified Class 2 load conditions. From these stress results summaries it may be seen that code allowable stress values are not exceeded for operating, upset and faulted (see Section 5.3) conditions when recommended seismic restraints are included in the analysis.

TABLE 7.1

NATURAL FREQUENCIES OF VIBRATION

<u>Mode No.</u>	<u>Frequency (CPS.)</u>	<u>Mode No.</u>	<u>Frequency (CPS.)</u>
1	1.6550	24	11.9651
2	2.5409	25	13.3819
3	2.5852	26	14.1885
4	3.3346	27	15.1285
5	3.5541	28	15.8105
6	3.6409	29	16.6418
7	3.6739	30	18.4211
8	3.8407	31	19.0631
9	4.1661	32	19.3876
10	4.5406	33	20.8685
11	5.0472	34	20.9838
12	5.2017	35	21.9809
13	5.3582	36	22.4076
14	5.7287	37	23.3592
15	6.6820	38	23.7424
16	7.3111	39	25.6333
17	7.8942	40	26.0691
18	8.0915	41	26.5885
19	9.0668	42	27.9324
20	9.4426	43	28.7675
21	10.5506	44	28.9584
22	10.9844	45	30.0403
23	11.3485	46	30.1992

FIGURE 7.1
 COMPLIANCE WITH ASME CODE EQUATION 3
 Normal Operating Conditions

Applied Loads
Design Pressure
Dead Weight & Other Sustained Mechanical Loads
Allowable Stress, $1.0 S_h = 18.1$ KSI
Maximum Stress at Node 99 = 8.27 KSI

(Stresses Greater Than 8.0 KSI Indicated)

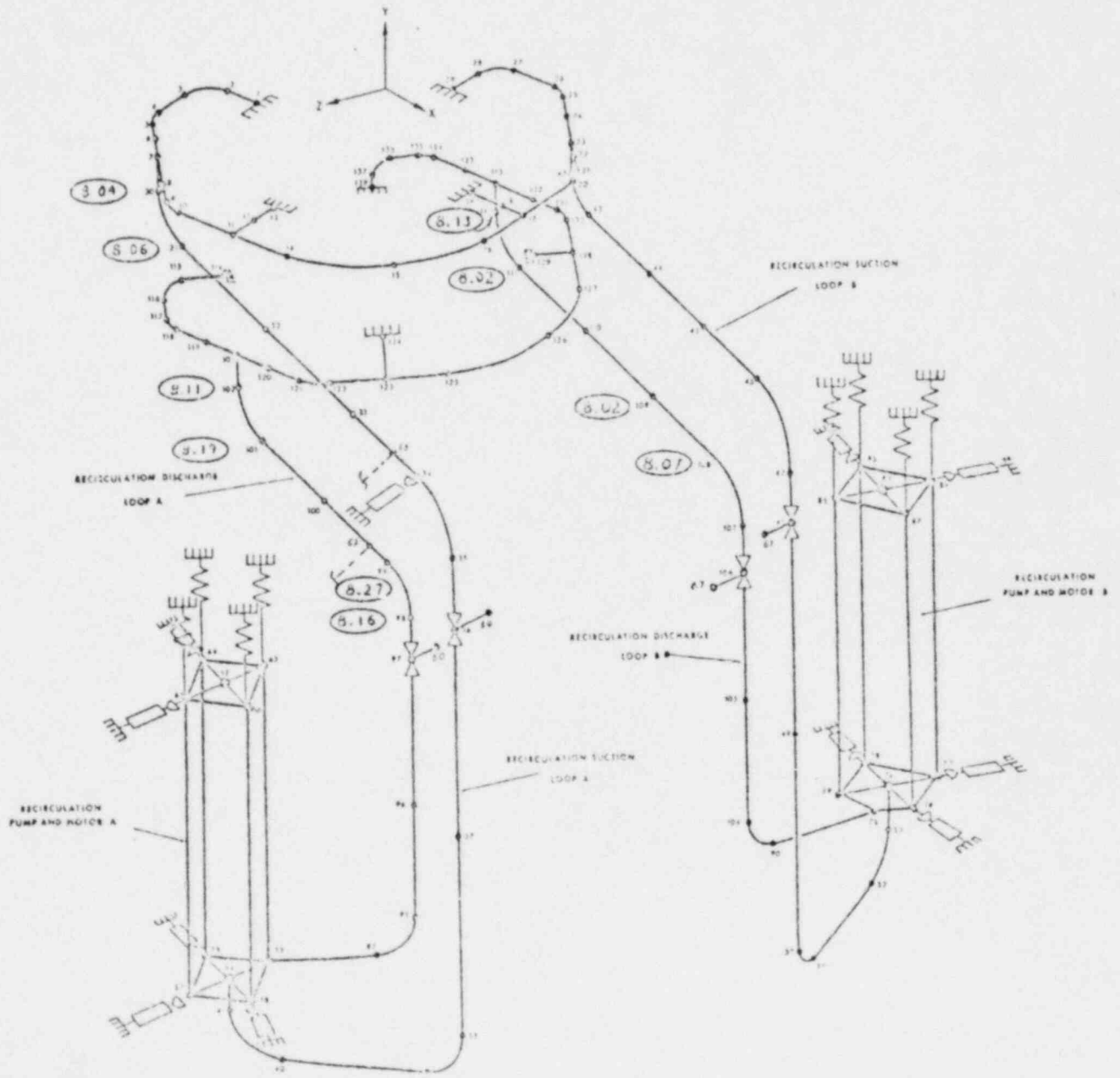


FIGURE 7.2
 COMPLIANCE WITH ASME CODE EQUATION 9
 Upset Conditions

Applied Loads	
Peak Pressure	
Dead Weight & Other Sustained Mechanical Loads	
$x + y$ Earthquake ($\frac{1}{2}$ SSE)	
Allowable Stress, $1.2 S_h$	= 21.7 KSI
Maximum Stress at Node 42	= 12.5 KSI

(Stresses Greater Than 10.0 KSI Indicated)

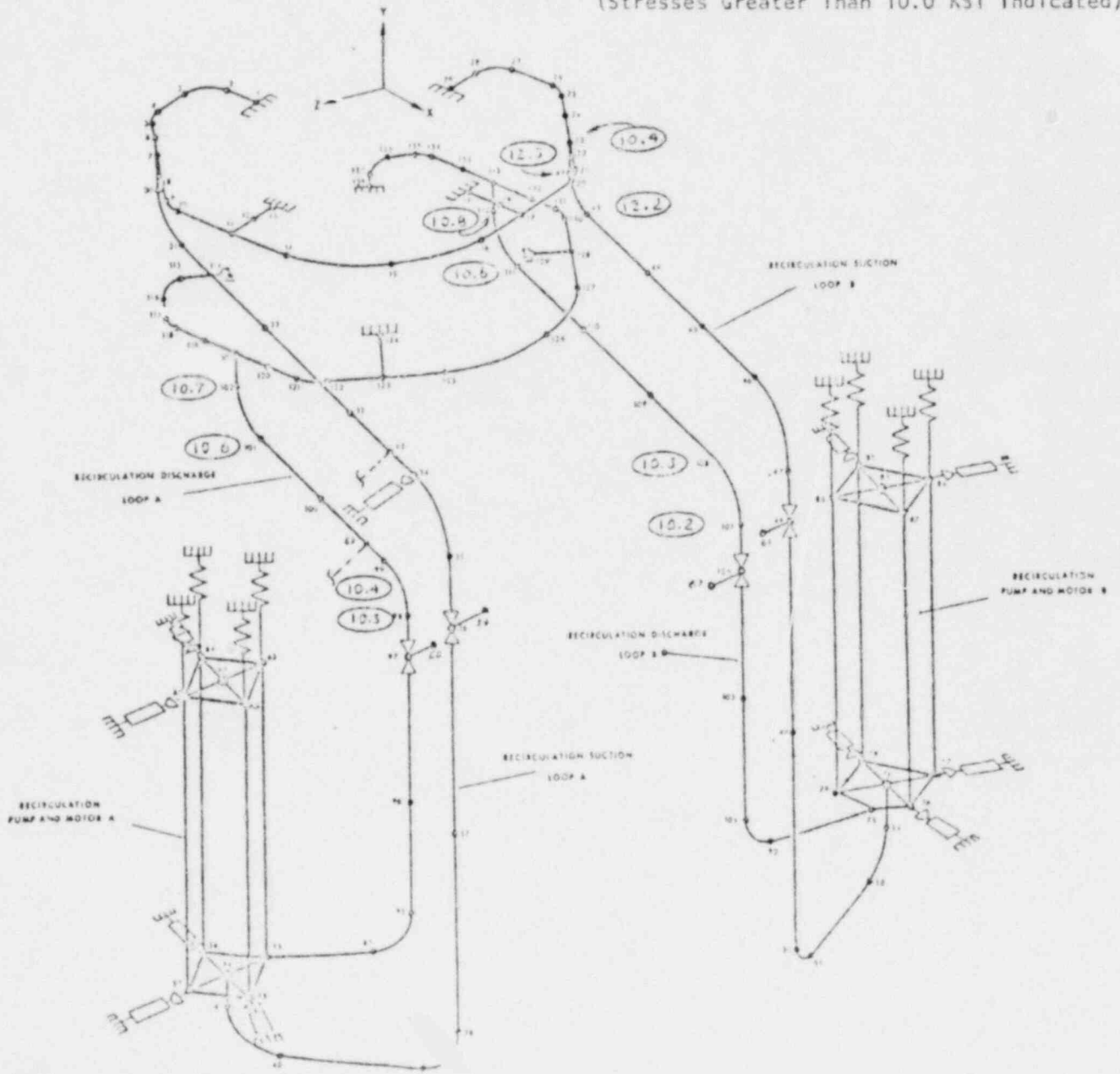


FIGURE 7.3
 COMPLIANCE WITH ASME CODE EQUATION 9
 Upset Conditions

Applied Loads
Peak Pressure
Dead Weight & Other Sustained Mechanical Loads
$z + y$ Earthquake ($\frac{1}{3}$ SSE)
Allowable Stress, $1.2 S_h$ = 21.7 KSI
Maximum Stress at Node 42 = 13.3 KSI

(Stresses Greater Than 10.0 KSI Indicated)

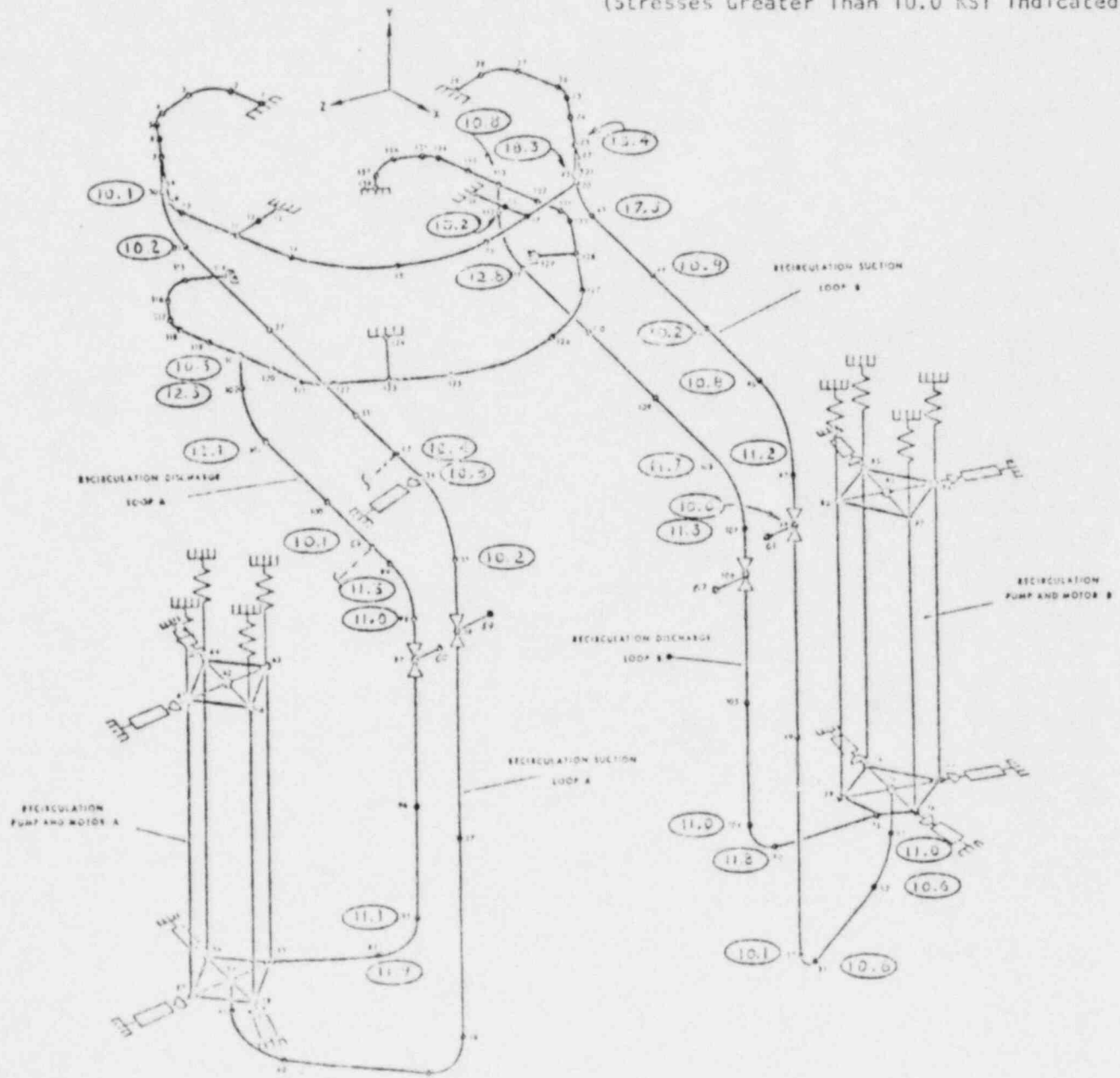


FIGURE 7.4
 COMPLIANCE WITH ASME CODE EQUATION 10
 Normal Operating and Upset Conditions

Applied Loads	
Design Temperature	
Thermal Anchor Movements	
Seismic Anchor Movements (x-direction)	
Allowable Stress, S_A	= 25.1 KSI
Maximum Stress at Node 28	= 13.3 KSI

(Stresses Greater Than 10.0 KSI Indicated)

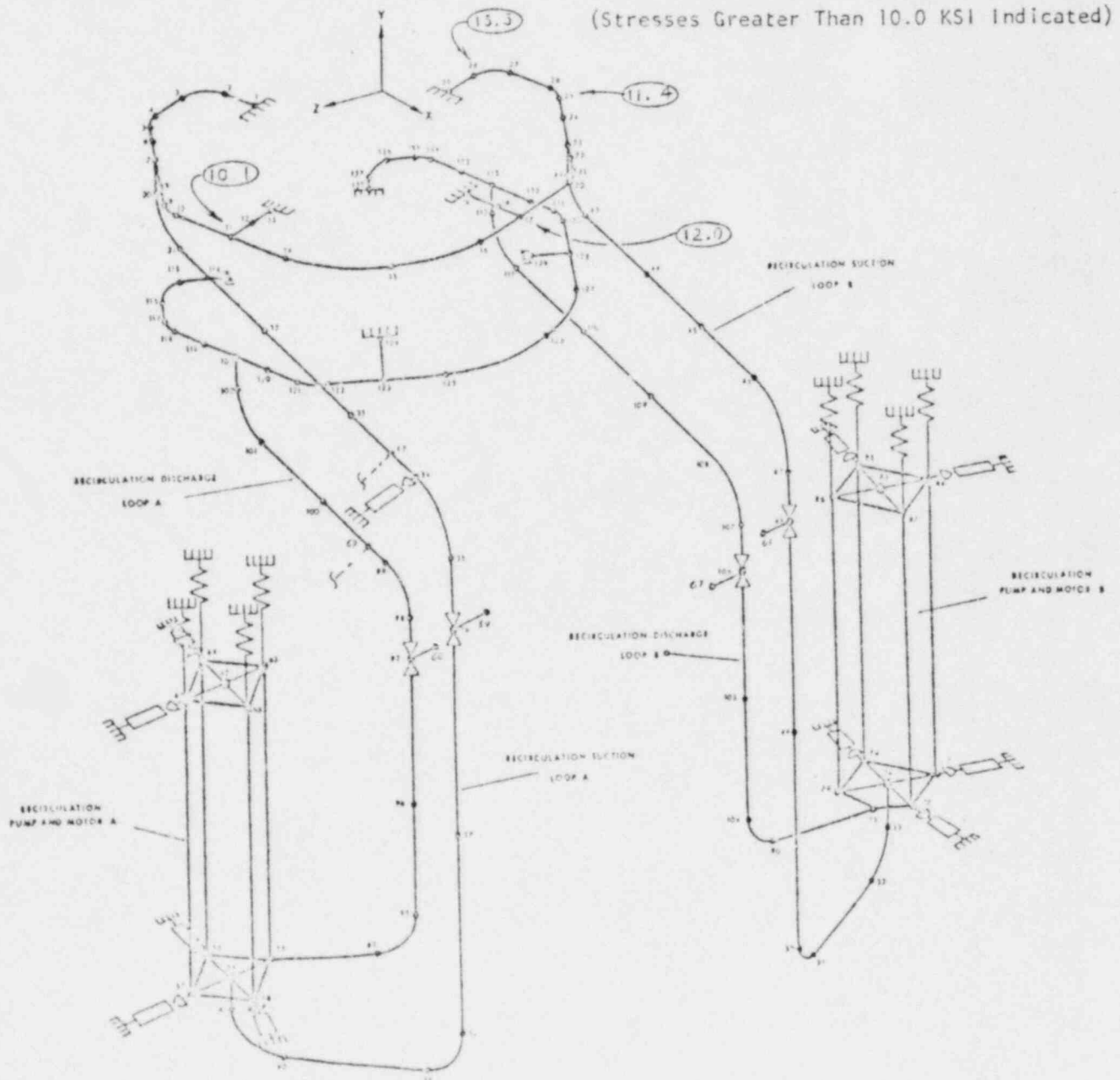


FIGURE 7.5
 COMPLIANCE WITH ASME CODE EQUATION 10
 Normal Operating and Upset Conditions

Applied Loads		
Design Temperature		
Thermal Anchor Movements		
Seismic Anchor Movements (z-direction)		
Allowable Stress	S_A	= 25.1 KSI
Maximum Stress at Node	28	= 13.3 KSI

(Stresses Greater Than 10.0 KSI Indicated)

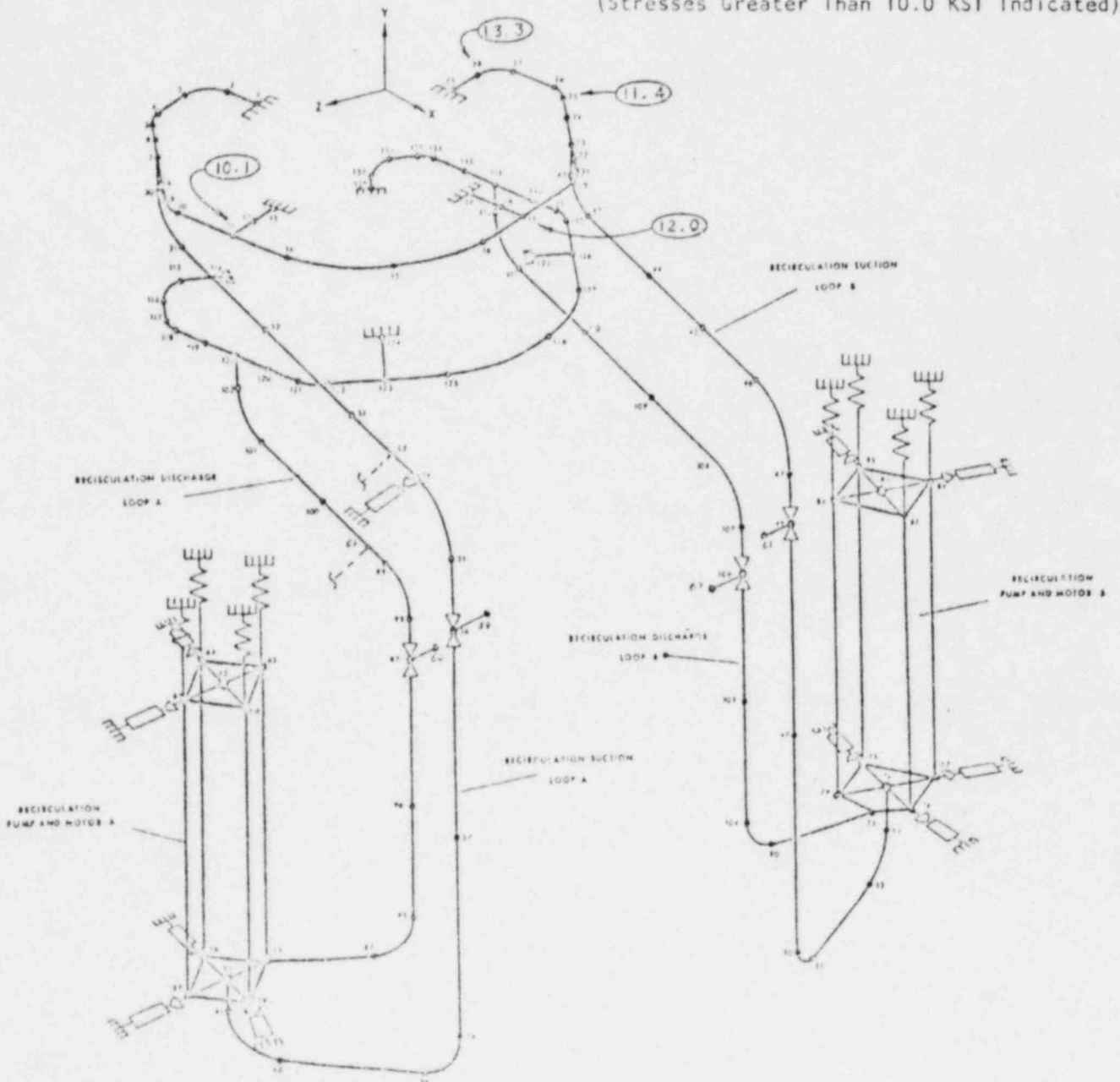


FIGURE 7.6
 COMPLIANCE WITH ASME CODE EQUATION 11
 Normal Operating and Upset Conditions

Applied Loads
Design Pressure & Temperature
Dead Weight & Other Sustained Mechanical Loads
Thermal Anchor Movements
Seismic Anchor Movements (x-direction)
Allowable Stress, $S_A + S_h = 43.2$ KSI
Maximum Stress at Node 28 = 19.8 KSI

(Stresses Greater Than 10.0 KSI Indicated)

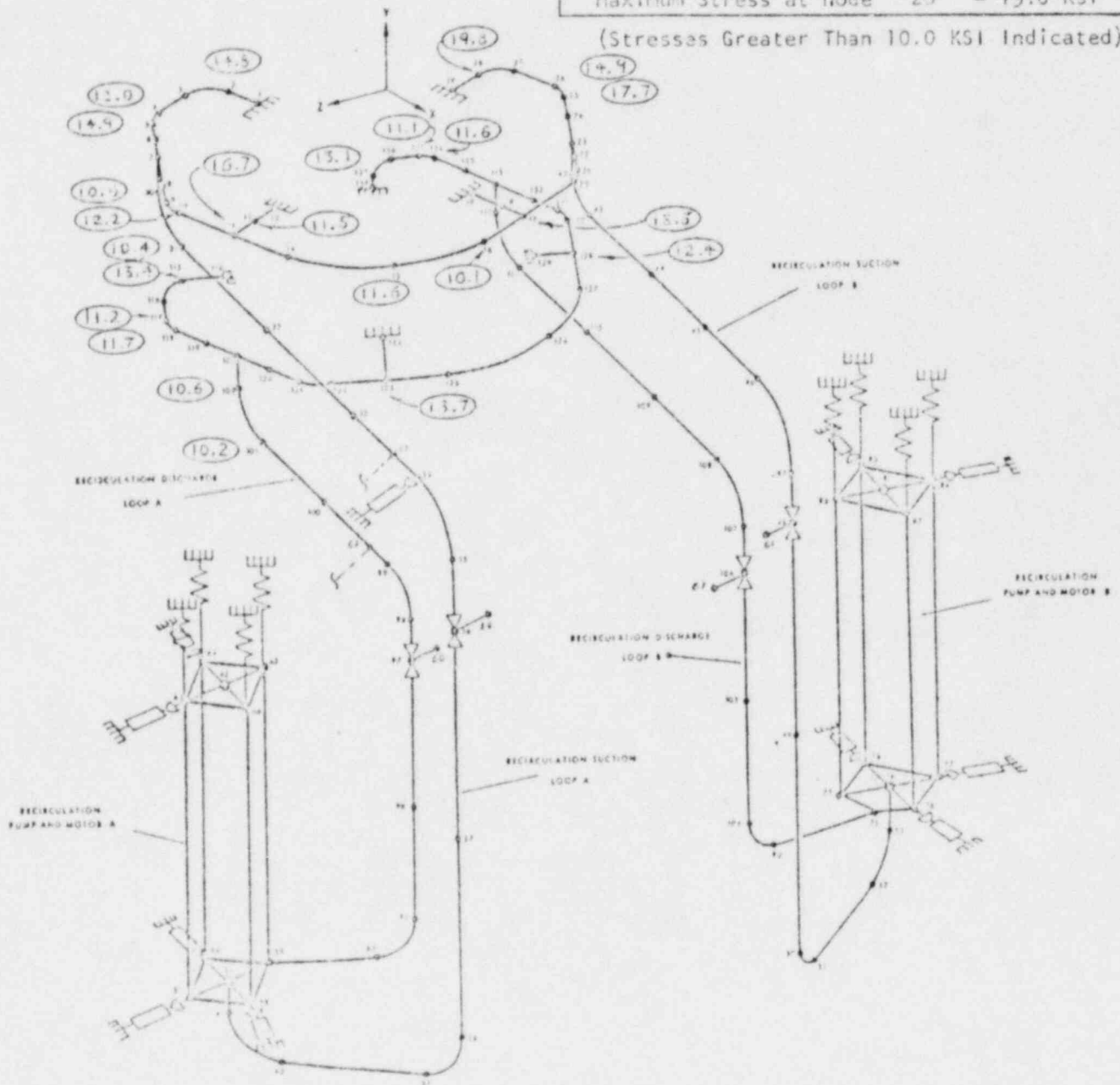
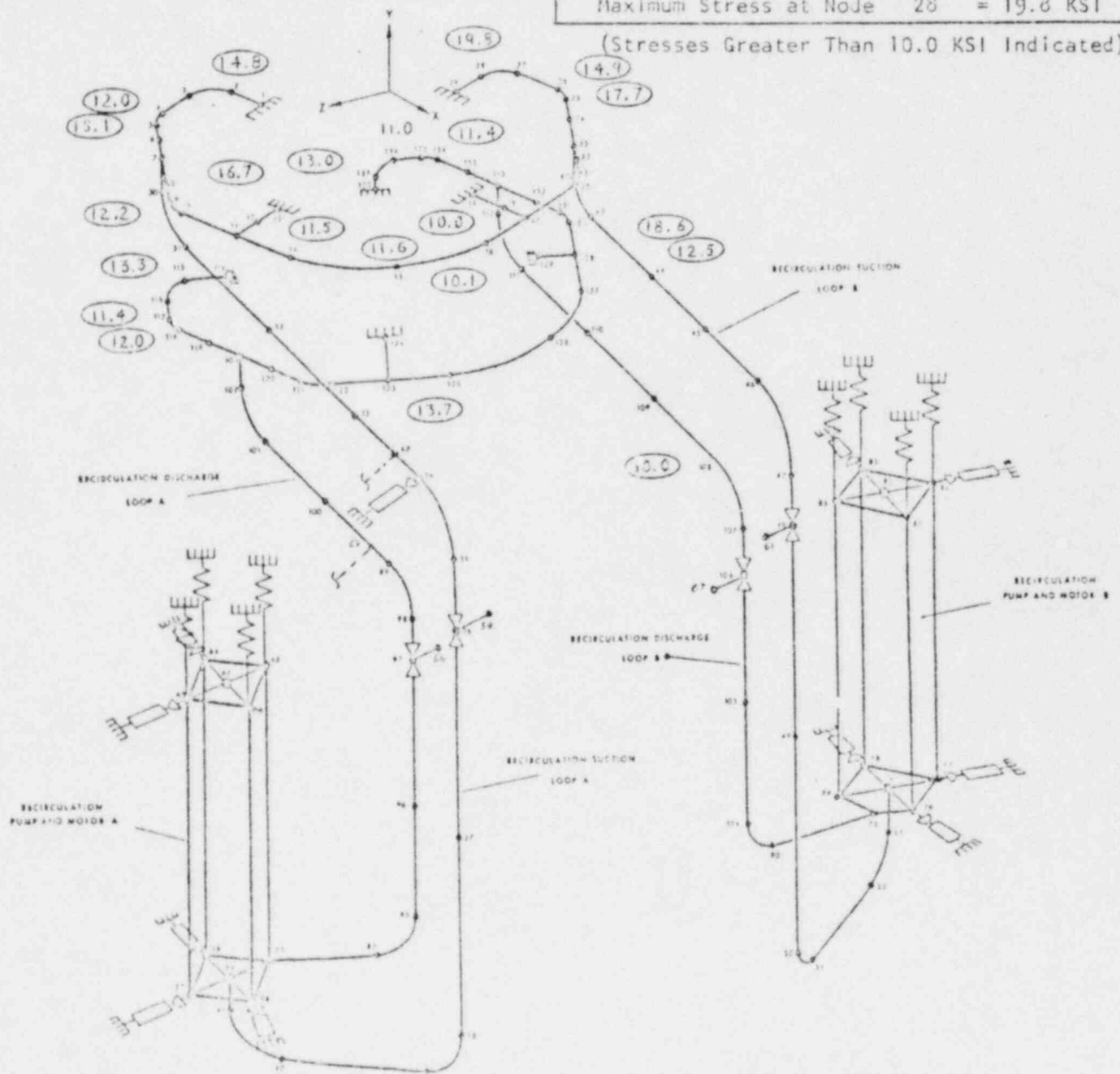


FIGURE 7.7
 COMPLIANCE WITH ASME CODE EQUATION 11
 Normal Operating and Upset Conditions

Applied Loads	
Design Pressure & Temperature	
Dead Weight & Other Sustained Mechanical Loads	
Thermal Anchor Movements	
Seismic Anchor Movements (z-direction)	
Allowable Stress, $S_A + S_h$	= 43.2 KSI
Maximum Stress at Node 28	= 19.8 KSI

(Stresses Greater Than 10.0 KSI Indicated)



8. CONCLUSIONS

By providing adequate seismic restraints (hydraulic snubbers) at the locations shown in Figure 3.1 the deflections and stresses in the piping due to a seismic event can be reduced to acceptable values.

The results of the recirculation piping system stress analysis indicate that deflections of the recirculations piping system due to dead weight, thermal expansion and seismic loadings are nominal. The stresses in the piping system due to dead weight, pressure, thermal expansion and seismic loads as calculated and combined in accordance with the rules given in Subarticle NC 3652 of Section III of the ASME Code, satisfy the design requirements for Class 2 piping when the effects of seismic restraints are included in the analysis.

The seismic restraints and their attachments should be designed using the support reaction forces summarized in Appendix B of the subject report.

APPENDIX A
LACBWR RECIRCULATION PIPING ANALYSIS
ANALYTICAL INPUT DATA

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A-III	Seismic Response Spectra	A-3
A-IV	Thermal Anchor Movements	A-4

TABLE A-I PIPE DATA

Line No.	From Point	To Point	O.D. (In)	Wall Thick (In)	Matl. ASTM (In)	Fluid	Wt. of Pipe & Fluid (Lb/in)	Wt. of Insul. (lb/in)	Design Temp. (°F)	Design Press. (PSIG)	Ec (PSI) x10 ⁶	En (PSI) x10 ⁻⁶
1	1	29	16.0	0.867	A-106	Water	16.11	1.60	547	1300	27.9	25.9
4	7	36	20.0	0.891	A-212	Water	24.58	1.92	547	1300	27.9	25.9
4	36	54	20.0	1.031	A-335	Water	26.08	1.92	547	1300	29.9	27.7
5	23	48	20.0	0.891	A-212	Water	24.58	1.92	547	1300	27.9	26.0
5	48	74	20.0	1.031	A-335	Water	26.08	1.92	547	1300	29.9	27.7
6	114	138	16.0	.867	A-106	Water	16.11	1.60	547	1300	27.9	25.9
9	103	97	20.0	.891	A-212	Water	24.58	1.92	547	1300	27.9	26.0
9	97	55	20.0	1.03	A-335	Water	26.08	1.92	547	1300	29.9	27.7
10	113	106	20.0	.891	A-212	Water	24.58	1.92	547	1300	27.9	26.0
10	106	75	20.0	1.03	A-275	Water	26.08	1.92	547	1300	29.9	27.7

A-1

TABLE A-11

CONCENTRATED WEIGHTS

<u>COMPONENT</u>	<u>TOTAL WEIGHT</u> (LBS)	<u>CONCENTRATED NODE WEIGHTS</u>	
		<u>NODE NO.</u>	<u>WEIGHT (LBS)</u>
Pump and Motor A	28,000	54	19,000
		62	9,000
Pump and Motor B	28,000	74	19,000
		83	9,000
Valve	8,935	34	8,000
		59	935
Valve	8,935	48	8,000
		61	935
Valve	8,935	97	8,000
		60	935
Valve	8,935	106	8,000
		67	935
Feedwater Piping		3	225
Effective Weight		11	480
		17	480
		27	225

TABLE A-111

SEISMIC RESPONSE SPECTRA

<u>Spectrum I.D.</u>	<u>Frequency CPS</u>	<u>Period Sec.</u>	<u>Acceleration G's.</u>
1	40.000	.025	.16000
	15.000	.067	.16000
OBE Hori- zontal Spectra for Mass Point 25 1% Damping	10.000	.100	.18000
	7.000	.143	.27000
	5.000	.200	.24000
	4.000	.250	.57000
	3.500	.286	.45000
	3.000	.333	.24000
	2.400	.417	.35000
	2.000	.500	.70000
	1.800	.556	1.70000
	1.600	.625	1.70000
	1.400	.714	.63000
	1.200	.833	.55000
	1.000	1.000	.30000
	.500	2.000	.09000
2	40.000	.025	.04100
	33.000	.030	.04100
OBE Verti- cal Spectra for 1% Damp- ing	20.000	.050	.07500
	15.000	.067	.10600
	10.000	.100	.10300
	2.000	.111	.20000
	2.250	.444	.24000
	1.650	.606	.17100
	1.000	1.000	.10300
	.800	1.250	.09100
	.400	2.500	.04400
	.200	5.000	.01870

Reference 1

TABLE A-IV
THERMAL ANCHOR MOVEMENTS

<u>Joint I.D.</u>	<u>Load Type</u>	<u>Displacement Direction</u>	<u>Displacement Magnitude</u>
1	TRANS.	X	-.2590
1	TRANS.	Y	.2290
1	TRANS.	Z	.1070
13	TRANS.	X	.1070
13	TRANS.	Y	.2290
13	TRANS.	Z	.2590
19	TRANS.	X	.2590
19	TRANS.	Y	.2290
19	TRANS.	Z	-.1070
29	TRANS.	X	-.1070
29	TRANS.	Y	.2290
29	TRANS.	Z	-.2590
114	TRANS.	X	-.0900
114	TRANS.	Y	.0410
114	TRANS.	Z	.2180
124	TRANS.	X	.2180
124	TRANS.	Y	.0410
124	TRANS.	Z	.0910
129	TRANS.	X	.0900
129	TRANS.	Y	.0410
129	TRANS.	Z	-.2180
138	TRANS.	X	-.2180
138	TRANS.	Y	.0410
138	TRANS.	Z	-.0900

APPENDIX B
LACBWR RECIRCULATION PIPING ANALYSIS
TABULATED RESULTS

TABLE		PAGE
B-I	JOINT DISPLACEMENTS	B-1 through B-6
B-II	ELASTIC SUPPORT REACTIONS	B-7 through B-12
B-III	CLASS 2 PIPING STRESS SUMMARY	B-13 through B-40

TABLE B-1 (a)

JOINT DISPLACEMENTS (LOAD CASE I)

MEMBER END JOINT SUPPORTS MECHANICAL LOADS

JOINT (G10)	DISPLACEMENTS (IN.)			MEMBER NO.	MECHANICAL LOADS		
	X	Y	Z		X	Y	Z
1	-.000000	.0001000	.0000000	65	.1122152	1417441	.0032210
2	.0000000	.0000000	.0000000	66	.0156041	1244410	.0020148
3	.0002195	.0022000	.0000112	67	.0014631	1222072	.0022227
4	.0000000	.0000000	.0001000	68	.0054404	.0124400	.0021439
5	.0005680	.0024200	.0001455	69	.0000000	.0000000	.0000000
6	.0000000	.0000000	.0000000	70	.0000000	.0000000	.0000000
7	.0004121	.0004210	.0002352	71	.0027024	.0700011	.1400000
8	.0000000	.0000000	.0000000	72	.0000000	.0000000	.0000000
9	.0002100	.0004652	.0000145	73	.0027011	.0000120	.1700150
10	.0002300	.0000000	.0003000	74	.0027011	.0000120	.1700150
11	.0000710	.0002100	.0000121	75	.0027011	.0000120	.1700150
12	.0000110	.0000110	.0000000	76	.0027011	.0000120	.1700150
13	.0000000	.0000000	.0000000	77	.0027011	.0000120	.1700150
14	.0000000	.0000000	.0000000	78	.0027011	.0000120	.1700150
15	.0000000	.0000000	.0000000	79	.0027011	.0000120	.1700150
16	.0000000	.0000000	.0000000	80	.0027011	.0000120	.1700150
17	.0000000	.0000000	.0000000	81	.0027011	.0000120	.1700150
18	.0000000	.0000000	.0000000	82	.0027011	.0000120	.1700150
19	.0000000	.0000000	.0000000	83	.0027011	.0000120	.1700150
20	.0000000	.0000000	.0000000	84	.0027011	.0000120	.1700150
21	.0000000	.0000000	.0000000	85	.0027011	.0000120	.1700150
22	.0000000	.0000000	.0000000	86	.0027011	.0000120	.1700150
23	.0000000	.0000000	.0000000	87	.0027011	.0000120	.1700150
24	.0000000	.0000000	.0000000	88	.0027011	.0000120	.1700150
25	.0000000	.0000000	.0000000	89	.0027011	.0000120	.1700150
26	.0000000	.0000000	.0000000	90	.0027011	.0000120	.1700150
27	.0000000	.0000000	.0000000	91	.0027011	.0000120	.1700150
28	.0000000	.0000000	.0000000	92	.0027011	.0000120	.1700150
29	.0000000	.0000000	.0000000	93	.0027011	.0000120	.1700150
30	.0000000	.0000000	.0000000	94	.0027011	.0000120	.1700150
31	.0000000	.0000000	.0000000	95	.0027011	.0000120	.1700150
32	.0000000	.0000000	.0000000	96	.0027011	.0000120	.1700150
33	.0000000	.0000000	.0000000	97	.0027011	.0000120	.1700150
34	.0000000	.0000000	.0000000	98	.0027011	.0000120	.1700150
35	.0000000	.0000000	.0000000	99	.0027011	.0000120	.1700150
36	.0000000	.0000000	.0000000	100	.0027011	.0000120	.1700150
37	.0000000	.0000000	.0000000	101	.0027011	.0000120	.1700150
38	.0000000	.0000000	.0000000	102	.0027011	.0000120	.1700150
39	.0000000	.0000000	.0000000	103	.0027011	.0000120	.1700150
40	.0000000	.0000000	.0000000	104	.0027011	.0000120	.1700150
41	.0000000	.0000000	.0000000	105	.0027011	.0000120	.1700150
42	.0000000	.0000000	.0000000	106	.0027011	.0000120	.1700150
43	.0000000	.0000000	.0000000	107	.0027011	.0000120	.1700150
44	.0000000	.0000000	.0000000	108	.0027011	.0000120	.1700150
45	.0000000	.0000000	.0000000	109	.0027011	.0000120	.1700150
46	.0000000	.0000000	.0000000	110	.0027011	.0000120	.1700150
47	.0000000	.0000000	.0000000	111	.0027011	.0000120	.1700150
48	.0000000	.0000000	.0000000	112	.0027011	.0000120	.1700150
49	.0000000	.0000000	.0000000	113	.0027011	.0000120	.1700150
50	.0000000	.0000000	.0000000	114	.0027011	.0000120	.1700150
51	.0000000	.0000000	.0000000	115	.0027011	.0000120	.1700150
52	.0000000	.0000000	.0000000	116	.0027011	.0000120	.1700150
53	.0000000	.0000000	.0000000	117	.0027011	.0000120	.1700150
54	.0000000	.0000000	.0000000	118	.0027011	.0000120	.1700150
55	.0000000	.0000000	.0000000	119	.0027011	.0000120	.1700150
56	.0000000	.0000000	.0000000	120	.0027011	.0000120	.1700150
57	.0000000	.0000000	.0000000	121	.0027011	.0000120	.1700150
58	.0000000	.0000000	.0000000	122	.0027011	.0000120	.1700150
59	.0000000	.0000000	.0000000	123	.0027011	.0000120	.1700150
60	.0000000	.0000000	.0000000	124	.0027011	.0000120	.1700150
61	.0000000	.0000000	.0000000	125	.0027011	.0000120	.1700150
62	.0000000	.0000000	.0000000	126	.0027011	.0000120	.1700150
63	.0000000	.0000000	.0000000	127	.0027011	.0000120	.1700150
64	.0000000	.0000000	.0000000	128	.0027011	.0000120	.1700150
65	.0000000	.0000000	.0000000	129	.0027011	.0000120	.1700150
66	.0000000	.0000000	.0000000	130	.0027011	.0000120	.1700150
67	.0000000	.0000000	.0000000	131	.0027011	.0000120	.1700150
68	.0000000	.0000000	.0000000	132	.0027011	.0000120	.1700150
69	.0000000	.0000000	.0000000	133	.0027011	.0000120	.1700150
70	.0000000	.0000000	.0000000	134	.0027011	.0000120	.1700150
71	.0000000	.0000000	.0000000	135	.0027011	.0000120	.1700150
72	.0000000	.0000000	.0000000	136	.0027011	.0000120	.1700150
73	.0000000	.0000000	.0000000	137	.0027011	.0000120	.1700150
74	.0000000	.0000000	.0000000	138	.0027011	.0000120	.1700150
75	.0000000	.0000000	.0000000	139	.0027011	.0000120	.1700150
76	.0000000	.0000000	.0000000	140	.0027011	.0000120	.1700150

TABLE B-1 (b)

JOINT DISPLACEMENTS (LOAD CASE 2)

X AND Y COMPONENTS OF JOINT DEF

TOTAL RESPONSE EQUALS MODE 1 THROUGH 40 BY SOSS SIMULATION

JOINT DISPLACEMENTS (IN.)

JOINT	X	Y	Z		X	Y	Z
1	.00000	.00000	.00000				
2	.00020	.00024	.00039	65	.031220	.002494	.053461
3	.00041	.00109	.00105	66	.044771	.002357	.041175
4	.001628	.002895	.00151	67	.060714	.005437	.031253
5	.001421	.002778	.00296	68	.060344	.002511	.034494
6	.001402	.001801	.000304	69	.004268	.002466	.002279
7	.001688	.001043	.000574	70	.003481	.002520	.005623
8	.001519	.002113	.000462	75	.025833	.007123	.005457
9	.001304	.002283	.001181	76	.034473	.004467	.004551
10	.001162	.001914	.000608	77	.009714	.000988	.000220
11	.000673	.003457	.00242	78	.038502	.002675	.040045
12	.000211	.001152	.000675	79	.026956	.000384	.001169
13	.000400	.000000	.000000	82	.005292	.002394	.002118
14	.000568	.000301	.000013	83	.003165	.005331	.005370
15	.000709	.001157	.000437	84	.001038	.001048	.005386
16	.000404	.000220	.000409	85	.003156	.007337	.005056
17	.000217	.000782	.000591	86	.007002	.000774	.000470
18	.000042	.000234	.000249	87	.003155	.003259	.003928
19	.000000	.000000	.000000	90	.003230	.001652	.000026
20	.000424	.003309	.001454	95	.004052	.003172	.002505
21	.002085	.004454	.001414	96	.004477	.001400	.002034
22	.002704	.004324	.001402	97	.002140	.001420	.004741
23	.002713	.003000	.001000	98	.000000	.001420	.000499
24	.001766	.003034	.001431	99	.004275	.002674	.004724
25	.001368	.003712	.000429	100	.000421	.003559	.001077
26	.001234	.002730	.002166	101	.004118	.003005	.007048
27	.000038	.001457	.000782	102	.002182	.001079	.001156
28	.000203	.000096	.000098	103	.001492	.001672	.000386
29	.000000	.000000	.000000	104	.001500	.000484	.000411
30	.002542	.001054	.001040	105	.002324	.000029	.005133
31	.001195	.004396	.000077	106	.002024	.006696	.002049
32	.004256	.001280	.006645	107	.004404	.006104	.004714
33	.004323	.000561	.000067	108	.004270	.000043	.001504
34	.004347	.002474	.005153				
35	.001117	.000000	.000000	109	.000444	.002094	.004087
36	.002503	.004344	.007762	110	.000004	.000000	.000036
37	.004464	.003671	.001031	111	.000000	.001022	.001067
38	.004448	.004754	.002019	112	.003203	.002075	.001090
39	.002454	.005522	.002624	113	.001724	.003471	.000449
40	.004255	.001376	.001946	114	.000000	.000000	.000000
41	.000352	.000114	.000493	115	.000203	.000252	.000137
				116	.000610	.001193	.000703
42	.000451	.000490	.001074	117	.000000	.002448	.001061
43	.001701	.001127	.001407	118	.000918	.002014	.001551
44	.000782	.000305	.002361	119	.001103	.002000	.000052
45	.000747	.005940	.003252	120	.001734	.001417	.000773
46	.000793	.000547	.002311	121	.001465	.001342	.001062
47	.002144	.002131	.000400	122	.001611	.001194	.000844
48	.003370	.002137	.002773	123	.000000	.000000	.000000
49	.007806	.002110	.002749	124	.000000	.000000	.000000
50	.000291	.000000	.000000	125	.000193	.000000	.000000
51	.004732	.005380	.006626	126	.000617	.000022	.000097
52	.005592	.007344	.001144	127	.000524	.000000	.000000
53	.004715	.007521	.004931	128	.000594	.000142	.000238
54	.004733	.007611	.004905	129	.000000	.000000	.000000
55	.002452	.000203	.006607	130	.001075	.001351	.001390
56	.000202	.000251	.003111	131	.001143	.002000	.001443
57	.003315	.003539	.003696	132	.001406	.002014	.001249
58	.003972	.002016	.002002	133	.002000	.000000	.000000
59	.003634	.004031	.004766	134	.002235	.004661	.001180
60	.004700	.001652	.004744	135	.002000	.003761	.001009
61	.004137	.002241	.002779	136	.001074	.002002	.000614
62	.004714	.007614	.007911	137	.000100	.000244	.000209
63	.007361	.005974	.001745	138	.000000	.000000	.000000
64	.004686	.000000	.000000				

TABLE B-1 (c)

JOINT DISPLACEMENTS (LOAD CASE 3)

Y AND Z COMPONENTS ONE HALF SSE

TOTAL RESPONSE EQUALS NODE 1 THROUGH 60 BY SSS SUMMATION

JOINT DISPLACEMENTS (IN.)							
JOINT	X	Y	Z	X	Y	Z	
1	.00000	.00000	.00000				
2	.00002	.00074	.00046	65	.058478	.258424	.149098
3	.000903	.001410	.000226	66	.126769	.105424	.091073
4	.001772	.002817	.000151	67	.154976	.158194	.185310
5	.002052	.001744	.000279	68	.005258	.043172	.004643
6	.001119	.001736	.000439	69	.009708	.08544	.173712
7	.001624	.001021	.001092	74	.075717	.145444	.114114
8	.001426	.002104	.001517	75	.10379	.114000	.181163
9	.001244	.002397	.001771	76	.175317	.108274	.207593
10	.001050	.002064	.001407	77	.160159	.171024	.131369
11	.000561	.000613	.000199	78	.074945	.147214	.024100
12	.001174	.001174	.000044	79	.071497	.122000	.08848
13	.000000	.000000	.000000	82	.049112	.044526	.230044
14	.000473	.000933	.000431	83	.077011	.108600	.097404
15	.000941	.001363	.000610	84	.020768	.171659	.000289
16	.000994	.000274	.000729	85	.071972	.167000	.190155
17	.000142	.001205	.001013	86	.168426	.115916	.115188
18	.000133	.000136	.001545	87	.071774	.122000	.017878
19	.000000	.000000	.000000	90	.172314	.107350	.194441
20	.005856	.004654	.003771	95	.145000	.064500	.243074
21	.007289	.005944	.004084	96	.144614	.044951	.224494
22	.006703	.005224	.003473	97	.004747	.065000	.225674
23	.005724	.004464	.000394	98	.024703	.065104	.224494
24	.004717	.003404	.003732	99	.003732	.065000	.107400
25	.003553	.004314	.000600	100	.004979	.033304	.106455
26	.002208	.003394	.000509	101	.002367	.005400	.013077
27	.003873	.001922	.001949	102	.004475	.001300	.000649
28	.000434	.000152	.000226	103	.003300	.001204	.000487
29	.000000	.000000	.000000	104	.225154	.115441	.209691
30	.002536	.001927	.001490	105	.104257	.110070	.270757
31	.005067	.002240	.000674	106	.070174	.118600	.355300
32	.006146	.004874	.001091	107	.035451	.115701	.306473
33	.005228	.001735	.004120	108	.015110	.045024	.306171
34	.005261	.005497	.004420	109	.014900	.050000	.198819
35	.012251	.103757	.072055	110	.014720	.032031	.076312
36	.001050	.103777	.110094	111	.014897	.002500	.006159
37	.054953	.103550	.277847	112	.007621	.007600	.003020
38	.041045	.103224	.034045	113	.004151	.007604	.001074
39	.054602	.105163	.033169	114	.000000	.000000	.000000
40	.103140	.101044	.032066	115	.000236	.000400	.000247
41	.134361	.222154	.234699	116	.001266	.001707	.001478
42	.007011	.004475	.001000	117	.001000	.002711	.003226
43	.001012	.001700	.002500	118	.000012	.002000	.001000
44	.001010	.002057	.001030	119	.002053	.001924	.001938
45	.001010	.000000	.000000	120	.003440	.001000	.001200
46	.0016189	.100000	.072059	121	.004213	.002174	.002038
47	.001000	.000000	.000000	122	.003664	.002300	.001500
48	.0074741	.222541	.774860	123	.000635	.001124	.000511
49	.007447	.222356	.004040	124	.000000	.000000	.000000
50	.200171	.222130	.000744	125	.000331	.000762	.000601
51	.201654	.100270	.001174	126	.001034	.001000	.000700
52	.002024	.102012	.211042	127	.000061	.001781	.000799
53	.004000	.105000	.103000	128	.001072	.000200	.000334
54	.111948	.222134	.106714	129	.000000	.000000	.000000
55	.001000	.100700	.100073	130	.000000	.000000	.000000
56	.112000	.200700	.123000	131	.002422	.004210	.004140
57	.100000	.200000	.100000	132	.002000	.000000	.002000
58	.111000	.100700	.270000	133	.004045	.000000	.001035
59	.000000	.100000	.100000	134	.005070	.000011	.002074
60	.121151	.000000	.200000	135	.004004	.000010	.002047
61	.200000	.200000	.700000	136	.002000	.000000	.001000
62	.104787	.222314	.103066	137	.000205	.000000	.000034
63	.100000	.100000	.100000	138	.000000	.000000	.000000
64	.120753	.250066	.230693				

TABLE B-1 (d)

JOINT DISPLACEMENTS (LOAD CASE 4)

THERMAL-MECHANICAL OPERATING CONDITION

JOINT (101)	DISPLACEMENTS (IN.)				DISPLACEMENTS (IN.)		
	X	Y	Z		X	Y	Z
1	.237000	.225864	.127000				
2	.304104	.224174	.130196				
3	.310133	.224164	.208325	65	.473945	.271659	.414987
4	.265362	.227944	.244903	66	.541074	.2707154	.420766
5	.174761	.224164	.224440	67	.472266	.271133	.224179
6	.131665	.224422	.204689	68	.706825	.161383	.286737
7	.280027	.224422	.313664	69	.603825	.266721	.267302
8	.437744	.229184	.343014	74	.448307	.271036	.344179
9	.700715	.229127	.401295	75	.442267	.274777	.302124
10	.607210	.229114	.394443	76	.465303	.271393	.355412
11	.100259	.224164	.141113	77	.471241	.271739	.343116
12	.131137	.224164	.107297	78	.436297	.272081	.332924
13	.107100	.224164	.249000	79	.457344	.272552	.342038
14	.213244	.224164	.310596	82	.491053	.2694159	.245024
15	.174761	.224164	.124597	83	.477706	.271107	.423316
16	.271878	.224422	.076080	84	.506512	.251609	.435687
17	.171622	.224164	.142826	85	.477706	.272229	.411921
18	.304295	.224777	.125070	86	.554494	.225594	.421144
19	.200000	.224422	.107000	87	.577307	.251200	.434706
20	.404297	.224343	.233753	90	.523310	.271555	.197634
21	.210224	.223637	.233706	95	.710766	.264677	.194514
22	.220812	.223542	.200587	96	.710812	.2624635	.220540
23	.174761	.223727	.304034	97	.700000	.275156	.240913
24	.114561	.223947	.321542	98	.717180	.123674	.257617
25	.057515	.224164	.342634	99	.630291	.262531	.268292
26	.011722	.224762	.343277	100	.451011	.248800	.273472
27	.044494	.224762	.454440	101	.270366	.194815	.206679
28	.123555	.224971	.310736	102	.128856	.262943	.291535
29	.171000	.225000	.250000	103	.120000	.271000	.251000
30	.000020	.104041	.312641	104	.557592	.744491	.147658
31	.019183	.110425	.315073	105	.611197	.403033	.100003
32	.011474	.134160	.310605	106	.654710	.374339	.234178
33	.027931	.142000	.253296	107	.635756	.262660	.251662
34	.077368	.140790	.204241	108	.629759	.165393	.263174
35	.049700	.127300	.200000	109	.307412	.110000	.270000
36	.042431	.071200	.255472	110	.119797	.137404	.200183
37	.055057	.070554	.201000	111	.200000	.132000	.207400
38	.035041	.076100	.143014	112	.117684	.064214	.205211
39	.042540	.060000	.179220	113	.110136	.220067	.207050
40	.057564	.065466	.312539	114	.000000	.041000	.210000
41	.139000	.071000	.375200	115	.110000	.001000	.201000
42	.100314	.175970	.301000	116	.071000	.022465	.320000
43	.220000	.103000	.250000	117	.040000	.001000	.310000
44	.411997	.175220	.300000	118	.021984	.020000	.320000
45	.455380	.000000	.310000	119	.001492	.015000	.313100
46	.700564	.000000	.325525				
47	.000000	.120000	.300000	120	.170517	.201291	.201176
48	.047370	.224117	.207247	121	.200000	.010000	.201000
49	.700000	.224297	.100727	122	.000000	.000000	.200000
50	.700000	.224000	.100000	123	.310000	.015000	.120000
51	.642000	.220000	.137254	124	.210000	.001000	.001000
52	.509036	.0999688	.263179	125	.333124	.019769	.064459
53	.474447	.000000	.333000	126	.334327	.000000	.130000
54	.610000	.071790	.300000	127	.107493	.014917	.205377
55	.010000	.000000	.370000	128	.130000	.000000	.310000
56	.010000	.071000	.370000	129	.000000	.041000	.210000
57	.010000	.071000	.370000	130	.000000	.071000	.340000
58	.010000	.071000	.370000	131	.000000	.021000	.345000
59	.010000	.071000	.370000	132	.000000	.020000	.310000
60	.010000	.071000	.370000	133	.000000	.010000	.270000
61	.010000	.071000	.370000	134	.000000	.010000	.200000
62	.010000	.071000	.370000	135	.000000	.000000	.200000
63	.010000	.071000	.370000	136	.000000	.000000	.200000
64	.010000	.071000	.370000	137	.000000	.000000	.200000
65	.010000	.071000	.370000	138	.000000	.000000	.200000

TABLE B-1 (e)

JOINT DISPLACEMENTS				(LOAD CASE 5)			
ANCHOR MOVEMENT Y DIRECTION ONE HALF SSF							
JOINT	DISPLACEMENTS (IN.)						
(101)	X	Y	Z				
1	.000000	.000000	.000000				
2	.000000	.000000	.000243				
3	.000000	.000294	.000002	65	.1107764	.0067684	.0243485
4	.000000	.0017366	.0001023	66	.1003546	.0794966	.0329614
5	.001337	.0016214	.0001252	67	.0200000	.0000000	.0000000
6	.000000	.0009169	.0000414	68	.0036246	.0044534	.0344757
7	.0000516	.0004376	.0000632	69	.0002456	.0027776	.0197582
8	.0000149	.0000069	.0001657	74	.1000000	.0000000	.0000000
9	.0000011	.0000000	.0001079	75	.1000000	.0000000	.0000000
10	.0000124	.0000562	.0001400	76	.1000000	.0000000	.0000000
11	.0000021	.0000000	.0000271	77	.1000000	.0000000	.0000000
12	.0000220	.0000417	.0000114	78	.1000000	.0000000	.0000000
13	.0000000	.0000000	.0000000	79	.1000000	.0000000	.0000000
14	.0000000	.0000000	.0000000	82	.1000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	83	.1000000	.0000000	.0000000
16	.0000000	.0000000	.0000000	84	.1000000	.0000000	.0000000
17	.0000000	.0000000	.0000000	85	.1000000	.0000000	.0000000
18	.0000000	.0000000	.0000000	86	.1000000	.0000000	.0000000
19	.0000000	.0000000	.0000000	87	.1000000	.0000000	.0000000
20	.0000000	.0000000	.0000000	88	.1000000	.0000000	.0000000
21	.0000000	.0000000	.0000000	89	.1000000	.0000000	.0000000
22	.0000000	.0000000	.0000000	90	.1000000	.0000000	.0000000
23	.0000000	.0000000	.0000000	91	.1000000	.0000000	.0000000
24	.0000000	.0000000	.0000000	92	.1000000	.0000000	.0000000
25	.0000000	.0000000	.0000000	93	.1000000	.0000000	.0000000
26	.0000000	.0000000	.0000000	94	.1000000	.0000000	.0000000
27	.0000000	.0000000	.0000000	95	.1000000	.0000000	.0000000
28	.0000000	.0000000	.0000000	96	.1000000	.0000000	.0000000
29	.0000000	.0000000	.0000000	97	.1000000	.0000000	.0000000
30	.0000000	.0000000	.0000000	98	.1000000	.0000000	.0000000
31	.0000000	.0000000	.0000000	99	.1000000	.0000000	.0000000
32	.0000000	.0000000	.0000000	100	.1000000	.0000000	.0000000
33	.0000000	.0000000	.0000000	101	.1000000	.0000000	.0000000
34	.0000000	.0000000	.0000000	102	.1000000	.0000000	.0000000
35	.0000000	.0000000	.0000000	103	.1000000	.0000000	.0000000
36	.0000000	.0000000	.0000000	104	.1000000	.0000000	.0000000
37	.0000000	.0000000	.0000000	105	.1000000	.0000000	.0000000
38	.0000000	.0000000	.0000000	106	.1000000	.0000000	.0000000
39	.0000000	.0000000	.0000000	107	.1000000	.0000000	.0000000
40	.0000000	.0000000	.0000000	108	.1000000	.0000000	.0000000
41	.0000000	.0000000	.0000000	109	.1000000	.0000000	.0000000
42	.0000000	.0000000	.0000000	110	.1000000	.0000000	.0000000
43	.0000000	.0000000	.0000000	111	.1000000	.0000000	.0000000
44	.0000000	.0000000	.0000000	112	.1000000	.0000000	.0000000
45	.0000000	.0000000	.0000000	113	.1000000	.0000000	.0000000
46	.0000000	.0000000	.0000000	114	.1000000	.0000000	.0000000
47	.0000000	.0000000	.0000000	115	.1000000	.0000000	.0000000
48	.0000000	.0000000	.0000000	116	.1000000	.0000000	.0000000
49	.0000000	.0000000	.0000000	117	.1000000	.0000000	.0000000
50	.0000000	.0000000	.0000000	118	.1000000	.0000000	.0000000
51	.0000000	.0000000	.0000000	119	.1000000	.0000000	.0000000
52	.0000000	.0000000	.0000000	120	.1000000	.0000000	.0000000
53	.0000000	.0000000	.0000000	121	.1000000	.0000000	.0000000
54	.0000000	.0000000	.0000000	122	.1000000	.0000000	.0000000
55	.0000000	.0000000	.0000000	123	.1000000	.0000000	.0000000
56	.0000000	.0000000	.0000000	124	.1000000	.0000000	.0000000
57	.0000000	.0000000	.0000000	125	.1000000	.0000000	.0000000
58	.0000000	.0000000	.0000000	126	.1000000	.0000000	.0000000
59	.0000000	.0000000	.0000000	127	.1000000	.0000000	.0000000
60	.0000000	.0000000	.0000000	128	.1000000	.0000000	.0000000
61	.0000000	.0000000	.0000000	129	.1000000	.0000000	.0000000
62	.0000000	.0000000	.0000000	130	.1000000	.0000000	.0000000
63	.0000000	.0000000	.0000000	131	.1000000	.0000000	.0000000
64	.0000000	.0000000	.0000000	132	.1000000	.0000000	.0000000
65	.0000000	.0000000	.0000000	133	.1000000	.0000000	.0000000
66	.0000000	.0000000	.0000000	134	.1000000	.0000000	.0000000
67	.0000000	.0000000	.0000000	135	.1000000	.0000000	.0000000
68	.0000000	.0000000	.0000000	136	.1000000	.0000000	.0000000
69	.0000000	.0000000	.0000000	137	.1000000	.0000000	.0000000
70	.0000000	.0000000	.0000000	138	.1000000	.0000000	.0000000

TABLE B-1 (F)

JOINT DISPLACEMENTS

(LOAD CASE 6)

ANCHOR MOVEMENT & DIRECTION						
JOINT (TOT)	DISPLACEMENTS (IN.)			X	Y	Z
	X	Y	Z			
1	.0000000	.0000000	.0000000			
2	.0000000	.0000000	.0000000			
3	.0000000	.0000000	.0000000	65	.0000000	.0000000
4	.0000000	.0000000	.0000000	66	.0000000	.0000000
5	.0000000	.0000000	.0000000	67	.0000000	.0000000
6	.0000000	.0000000	.0000000	68	.0000000	.0000000
7	.0000000	.0000000	.0000000	69	.0000000	.0000000
8	.0000000	.0000000	.0000000	74	.0000000	.0000000
9	.0000000	.0000000	.0000000	75	.0000000	.0000000
10	.0000000	.0000000	.0000000	76	.0000000	.0000000
11	.0000000	.0000000	.0000000	77	.0000000	.0000000
12	.0000000	.0000000	.0000000	78	.0000000	.0000000
13	.0000000	.0000000	.0000000	79	.0000000	.0000000
14	.0000000	.0000000	.0000000	82	.0000000	.0000000
15	.0000000	.0000000	.0000000	83	.0000000	.0000000
16	.0000000	.0000000	.0000000	84	.0000000	.0000000
17	.0000000	.0000000	.0000000	85	.0000000	.0000000
18	.0000000	.0000000	.0000000	86	.0000000	.0000000
19	.0000000	.0000000	.0000000	87	.0000000	.0000000
20	.0000000	.0000000	.0000000	90	.0000000	.0000000
21	.0000000	.0000000	.0000000	95	.0000000	.0000000
22	.0000000	.0000000	.0000000	96	.0000000	.0000000
23	.0000000	.0000000	.0000000	97	.0000000	.0000000
24	.0000000	.0000000	.0000000	98	.0000000	.0000000
25	.0000000	.0000000	.0000000	99	.0000000	.0000000
26	.0000000	.0000000	.0000000	100	.0000000	.0000000
27	.0000000	.0000000	.0000000	101	.0000000	.0000000
28	.0000000	.0000000	.0000000	102	.0000000	.0000000
29	.0000000	.0000000	.0000000	103	.0000000	.0000000
30	.0000000	.0000000	.0000000	104	.0000000	.0000000
31	.0000000	.0000000	.0000000	105	.0000000	.0000000
32	.0000000	.0000000	.0000000	106	.0000000	.0000000
33	.0000000	.0000000	.0000000	107	.0000000	.0000000
34	.0000000	.0000000	.0000000	108	.0000000	.0000000
35	.0000000	.0000000	.0000000	109	.0000000	.0000000
36	.0000000	.0000000	.0000000	110	.0000000	.0000000
37	.0000000	.0000000	.0000000	111	.0000000	.0000000
38	.0000000	.0000000	.0000000	112	.0000000	.0000000
39	.0000000	.0000000	.0000000	113	.0000000	.0000000
40	.0000000	.0000000	.0000000	114	.0000000	.0000000
41	.0000000	.0000000	.0000000	115	.0000000	.0000000
42	.0000000	.0000000	.0000000	116	.0000000	.0000000
43	.0000000	.0000000	.0000000	117	.0000000	.0000000
44	.0000000	.0000000	.0000000	118	.0000000	.0000000
45	.0000000	.0000000	.0000000	119	.0000000	.0000000
46	.0000000	.0000000	.0000000			
47	.0000000	.0000000	.0000000	120	.0000000	.0000000
48	.0000000	.0000000	.0000000	121	.0000000	.0000000
49	.0000000	.0000000	.0000000	122	.0000000	.0000000
50	.0000000	.0000000	.0000000	123	.0000000	.0000000
51	.0000000	.0000000	.0000000	124	.0000000	.0000000
52	.0000000	.0000000	.0000000	125	.0000000	.0000000
53	.0000000	.0000000	.0000000	126	.0000000	.0000000
54	.0000000	.0000000	.0000000	127	.0000000	.0000000
55	.0000000	.0000000	.0000000	128	.0000000	.0000000
56	.0000000	.0000000	.0000000	129	.0000000	.0000000
57	.0000000	.0000000	.0000000	130	.0000000	.0000000
58	.0000000	.0000000	.0000000	131	.0000000	.0000000
59	.0000000	.0000000	.0000000	132	.0000000	.0000000
60	.0000000	.0000000	.0000000	133	.0000000	.0000000
61	.0000000	.0000000	.0000000	134	.0000000	.0000000
62	.0000000	.0000000	.0000000	135	.0000000	.0000000
63	.0000000	.0000000	.0000000	136	.0000000	.0000000
64	.0000000	.0000000	.0000000	137	.0000000	.0000000
				138	.0000000	.0000000

TABLE B-11 (a)

ELASTIC SUPPORT REACTIONS (LOAD CASE 1)						
DEAD LOAD PLUS SUSTAINED MECHANICAL LOADS						
POINT	FORCE (K.)			MOMENT (IN-K.)		
	X	Y	Z	X	Y	Z
1	129.2	-1232.9	-241.9	16753.2	-377.8	94266.3
13	170.5	3440.5	687.8	-72716.6	5827.6	-114274.1
14	144.6	3440.5	-244.4	166239.6	3778.0	12476.0
24	0.4	-1002.7	43.8	-34074.7	-179.0	44949.4
34	-1.7	0.0	-41.4	0.0	0.0	0.0
35	-19.7	0.0	-41.4	0.0	0.0	0.0
36	-14.0	0.0	-40.8	0.0	0.0	0.0
47	-9.3	0.0	-41.7	0.0	0.0	0.0
50	-14.0	0.0	-42.2	0.0	0.0	0.0
62	-3.1	0.0	-5	0.0	0.0	0.0
63	-3.1	0.0	-5	0.0	0.0	0.0
64	-3.1	0.0	-2	0.0	0.0	0.0
65	-2.2	0.0	-6	0.0	0.0	0.0
66	-3.1	0.0	-1.2	0.0	0.0	0.0
74	-0.6	0.0	23.7	0.0	0.0	0.0
75	-0.9	0.0	24.1	0.0	0.0	0.0
76	-0.8	0.0	24.3	0.0	0.0	0.0
77	-0.0	0.0	23.8	0.0	0.0	0.0
78	-0.8	0.0	23.2	0.0	0.0	0.0
79	-1.1	0.0	23.6	0.0	0.0	0.0
80	-2.7	0.0	-1.4	0.0	0.0	0.0
84	-2.1	0.0	-1.4	0.0	0.0	0.0
85	-2.7	0.0	-2.1	0.0	0.0	0.0
86	-3.2	0.0	-1.7	0.0	0.0	0.0
87	-2.7	0.0	-1.0	0.0	0.0	0.0
114	-245.4	-250.5	7.7	54262.0	-12970.3	9523.9
124	-44.7	2344.2	-60.3	-101544.7	-2441.4	-37965.9
129	45.4	2411.3	-114.9	64150.3	-5040.5	-100600.1
131	-117.3	-311.0	130.3	-34348.0	10401.7	57144.0

TABLE B-11 (b)

1. ELASTIC SUPPORT REACTIONS (LOAD CASE 2)

X AND Y EARTHQUAKE ONE HALF SSE

TOTAL RESPONSE FOR JOINTS 1 THROUGH 40 BY SOSS SUMMATION

SUPPORT /-----FORCE (LBS.)-----/ /-----MOVEMENT (IN-LB.)-----/

JOINT	X	Y	Z	X	Y	Z
1	494.	489.	182.	24964.	15151.	17591.
13	2488.	188.	134.	48536.	64585.	14452.
14	2757.	1847.	521.	64504.	50413.	50474.
24	2175.	461.	2060.	33519.	55806.	11248.
54	0.	0.	14.	0.	0.	0.
55	0.	0.	13.	0.	0.	0.
56	0.	0.	11.	0.	0.	0.
57	0.	0.	15.	0.	0.	0.
58	0.	0.	19.	0.	0.	0.
62	0.	0.	11.	0.	0.	0.
63	13.	0.	12.	0.	0.	0.
64	0.	0.	16.	0.	0.	0.
65	0.	0.	11.	0.	0.	0.
66	0.	0.	8.	0.	0.	0.
74	0.	0.	13.	0.	0.	0.
75	0.	0.	17.	0.	0.	0.
76	0.	0.	19.	0.	0.	0.
77	18.	0.	14.	0.	0.	0.
78	0.	0.	10.	0.	0.	0.
79	0.	0.	12.	0.	0.	0.
83	4.	0.	11.	0.	0.	0.
84	0.	0.	10.	0.	0.	0.
85	4.	0.	17.	0.	0.	0.
86	15.	0.	12.	0.	0.	0.
87	0.	0.	8.	0.	0.	0.
114	494.	489.	182.	45252.	31142.	12135.
124	1471.	804.	2589.	46347.	35006.	38182.
129	1822.	857.	2741.	19422.	45884.	34229.
138	775.	671.	1432.	45675.	17277.	39142.

INCLINED AXIS SUPPORT REACTIONS

-----DIRECTION COSINES-----

(INCLINED AXIS)

SUPPORT JOINT	REACTION TYPE	REACTION MAGNITUDE	X	Y	Z
56	FORCE	4936.7	.8964	.4472	0.0000
77	FORCE	13841.8	-.1776	.4473	-.8780
58	FORCE	13544.6	-.6153	.5860	-.5274
55	FORCE	3974.1	.8964	-.4472	0.0000
55	FORCE	3999.7	-.1719	-.4467	-.8760
75	FORCE	13053.2	-.6101	.5858	-.5278
77	FORCE	12294.0	-.1547	.4481	.8794
76	FORCE	7710.6	.4967	.4496	0.0000
24	FORCE	3530.7	-.1776	-.4473	.8780
65	FORCE	1674.5	.8964	-.4472	0.0000
24	FORCE	3714.7	-.4061	0.0000	-.9138

TABLE B-11 (c)

ELASTIC SUPPORT REACTIONS (LOAD CASE 3)
 Y AND Z EARTHSHAKE ONE HALF SSE

TOTAL RESPONSE FOR THE CASE Y THRUOUT AND BY SDRR SIMULATION

SUPPORT REACTION FORCE (LBS) / MOVEMENT (IN.)

JOINT	X	Y	Z	X	Y	Z
1	591.	699.	213.	29211.	17736.	19121.
13	2147.	1787.	2221.	57571.	57386.	13568.
19	6172.	3124.	13632.	65435.	13742.	77943.
29	472.	1542.	746.	5457.	11218.	11523.
34	22.	1.	30.	1.	0.	0.
35	3.	0.	37.	0.	0.	0.
36	23.	0.	26.	0.	0.	0.
37	27.	0.	47.	0.	0.	0.
38	22.	0.	44.	0.	0.	0.
42	25.	0.	33.	0.	0.	0.
43	41.	0.	35.	0.	0.	0.
44	25.	0.	47.	0.	0.	0.
45	11.	0.	30.	0.	0.	0.
46	25.	0.	14.	0.	0.	0.
74	10.	0.	23.	0.	0.	0.
75	3.	0.	36.	0.	0.	0.
76	19.	0.	42.	0.	0.	0.
77	10.	0.	24.	0.	0.	0.
78	15.	0.	6.	0.	0.	0.
79	1.	0.	10.	0.	0.	0.
83	16.	0.	20.	0.	0.	0.
84	8.	0.	14.	0.	0.	0.
85	16.	0.	30.	0.	0.	0.
86	34.	0.	21.	0.	0.	0.
87	14.	0.	4.	0.	0.	0.
114	11.	1.14.	21.74.	4424.	34.35.	14423.
124	3735.	134.	4532.	42377.	47027.	41445.
129	2331.	547.	4532.	31875.	44340.	50473.
135	1917.	1116.	3445.	112591.	35797.	94711.

INCLINED AXIS SUPPORT REACTIONS

SUPPORT REACTION REACTION / COORDINATE AXES

JOINT	REACTION TYPE	MAGNITUDE	X	Y	Z
56	FORCE	14430.4	0.8044	0.4472	0.0000
57	FORCE	12444.3	-0.1704	0.4671	0.0000
58	FORCE	13344.7	-0.6153	0.4041	0.0000
64	FORCE	14444.2	0.8044	-0.4472	0.0000
65	FORCE	11544.5	-0.1710	-0.4617	0.0000
76	FORCE	14444.4	-0.6151	0.4041	0.0000
77	FORCE	12444.2	-0.1697	0.4441	0.0000
78	FORCE	13344.2	-0.6057	0.4445	0.0000
84	FORCE	11444.6	-0.1704	-0.4671	0.0000
85	FORCE	14444.5	0.8044	-0.4472	0.0000
86	FORCE	14444.7	-0.6041	0.0000	-0.9138

TABLE B-11 (d)

2.1 ELASTIC SUPPORT REACTIONS (LOAD CASE 4)						
THERMAL-NORMAL OPERATING CONDITION						
SUPPORT JOINT	FORCE (LR.)			MOMENT (IN-LB.)		
	X	Y	Z	X	Y	Z
1	-17732.	-52.	-17714.	-5160.	-419028.	-2551.
13	-4873.	-72.	64931.	5580.	-1175616.	-4861.
19	52797.	1146.	-41110.	71854.	516931.	53937.
29	-40346.	-467.	-4203.	14928.	1368560.	3015.
3	-122.	0.	-76.	0.	0.	0.
35	-124.	0.	-74.	0.	0.	0.
36	-122.	0.	-75.	0.	0.	0.
37	-121.	0.	-74.	0.	0.	0.
38	-122.	0.	-74.	0.	0.	0.
39	-116.	0.	-84.	0.	0.	0.
43	-117.	0.	-83.	0.	0.	0.
44	-116.	0.	-82.	0.	0.	0.
45	-115.	0.	-84.	0.	0.	0.
46	-116.	0.	-85.	0.	0.	0.
48	-97.	0.	-89.	0.	0.	0.
49	-99.	0.	70.	0.	0.	0.
50	-67.	0.	71.	0.	0.	0.
77	-45.	0.	69.	0.	0.	0.
78	-47.	0.	67.	0.	0.	0.
79	-49.	0.	68.	0.	0.	0.
83	-112.	0.	82.	0.	0.	0.
84	-113.	0.	85.	0.	0.	0.
85	-115.	0.	82.	0.	0.	0.
86	-116.	0.	84.	0.	0.	0.
87	-116.	0.	87.	0.	0.	0.
114	-22970.	428.	5618.	-138631.	-778274.	-339526.
124	15561.	-2452.	21969.	-249227.	-303686.	488209.
129	8173.	347.	-38940.	693413.	230134.	140238.
130	14317.	-514.	11574.	152048.	745260.	-244124.

TABLE B-11 (e)

ELASTIC SUPPORT REACTIONS (LOAD CASE 5)

ANCHOR MOVEMENT X DIRECTION ONE HALF SSE

SUPPORT / JOINT	FORCE (KIP.)			MOVEMENT (IN.-H.)		
	X	Y	Z	X	Y	Z
1	55.73	531.13	-356.27	-20632.76	-4536.67	-9812.96
13	-276.43	-524.48	347.27	13177.81	-5742.69	4848.70
14	57.44	-274.32	-247.88	-272.5.34	2498.96	-21846.01
29	-221.46	415.60	249.50	10448.09	5858.05	2246.17
34	0.00	0.00	4.73	0.00	0.00	0.00
35	63.40	0.00	3.92	0.00	0.00	0.00
36	61.41	0.00	2.50	0.00	0.00	0.00
37	54.72	0.00	4.73	0.00	0.00	0.00
38	41.41	0.00	4.45	0.00	0.00	0.00
62	79.43	0.00	4.47	0.00	0.00	0.00
63	52.01	0.00	4.04	0.00	0.00	0.00
64	79.43	0.00	2.34	0.00	0.00	0.00
65	77.44	0.00	4.87	0.00	0.00	0.00
70	79.43	0.00	4.59	0.00	0.00	0.00
74	66.74	0.00	4.60	0.00	0.00	0.00
75	68.23	0.00	-4.32	0.00	0.00	0.00
76	66.74	0.00	-4.61	0.00	0.00	0.00
77	66.41	0.00	-4.28	0.00	0.00	0.00
78	66.74	0.00	-2.90	0.00	0.00	0.00
79	68.75	0.00	-4.52	0.00	0.00	0.00
83	71.12	0.00	-2.58	0.00	0.00	0.00
84	79.13	0.00	-4.06	0.00	0.00	0.00
88	71.12	0.00	-1.85	0.00	0.00	0.00
89	73.12	0.00	-3.29	0.00	0.00	0.00
97	71.12	0.00	-5.70	0.00	0.00	0.00
114	-673.01	838.72	-390.14	-11714.90	-20564.96	-9812.56
124	34.27	-1227.24	291.63	33426.02	-4936.10	-29951.92
129	-530.54	-242.27	-194.70	189.70	14007.01	-6035.52
130	154.72	548.67	314.05	12974.85	9950.11	-19048.79

TABLE B-11 (f)

ELASTIC SUPPORT REACTIONS

(LOAD CASE 6)

ANCHOR MOVEMENT / DIRECTION

SUPPORT / JOIST	FORCE (L.B.)			MOMENT (IN-LB.)		
	X	Y	Z	X	Y	Z
1	-81.64	-151.20	-97.15	-4025.43	-4920.70	-9175.83
13	84.46	-244.50	-97.19	24192.89	404.44	-3522.22
14	231.53	-42.80	-541.74	14442.21	1302.72	12491.28
24	-1.1.03	104.24	335.46	24024.33	4720.80	3941.15
25	6.47	0.00	61.44	0.00	0.00	0.00
55	4.99	0.00	42.11	0.00	0.00	0.00
56	6.24	0.00	43.14	0.00	0.00	0.00
57	7.54	0.00	41.41	0.00	0.00	0.00
58	6.24	0.00	40.54	0.00	0.00	0.00
62	5.65	0.00	74.44	0.00	0.00	0.00
63	5.25	0.00	74.71	0.00	0.00	0.00
64	4.45	0.00	77.78	0.00	0.00	0.00
65	4.96	0.00	74.21	0.00	0.00	0.00
66	5.65	0.00	75.14	0.00	0.00	0.00
74	3.74	0.00	54.05	0.00	0.00	0.00
75	-2.79	0.00	57.10	0.00	0.00	0.00
76	3.74	0.00	54.79	0.00	0.00	0.00
77	4.06	0.00	57.79	0.00	0.00	0.00
78	3.74	0.00	59.39	0.00	0.00	0.00
79	-2.42	0.00	54.31	0.00	0.00	0.00
83	-5.64	0.00	72.39	0.00	0.00	0.00
84	-4.41	0.00	72.13	0.00	0.00	0.00
85	-5.50	0.00	72.73	0.00	0.00	0.00
86	-4.27	0.00	72.44	0.00	0.00	0.00
87	-3.54	0.00	71.04	0.00	0.00	0.00
114	203.03	-270.00	404.24	27082.03	4371.04	3543.21
124	-273.44	214.53	-1112.51	-35250.07	-12434.14	-18609.87
129	-273.73	425.83	-597.14	-56472.91	4584.91	-7522.57
134	175.65	-402.31	603.26	4002.55	2064.14	1788.14

D.1 CLASS 2 STRESS FOR ANALYSIS SET NUMBER 1

ASSIGNED LOAD COMBINATIONS IDENTIFIERS
TENSILE AND COMPRESSIVE

NORMAL OPERATING CONDITION

STRAIGHT MEMBERS FOR EQUATION 4 (ANALYSIS SET 1)

MEMBER NUMBER NO. ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SM)	MODIFIED STRESS RATIO
19	1	322,234	0,000	272,244	0,000	0,000	3387,742	28229,655	1.8717
	2	322,234	0,000	272,274	0,000	0,000	3319,214	28277,214	1.8337
25	3	322,234	0,000	272,244	0,000	0,000	3325,861	27608,244	1.3455
	4	322,234	0,000	272,244	0,000	0,000	3200,120	27624,971	1.3544
36	5	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	6	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
49	7	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	8	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
65	9	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	10	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
85	11	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	12	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
105	13	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	14	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
125	15	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	16	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
145	17	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	18	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
165	19	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437
	20	322,234	0,000	272,244	0,000	0,000	3225,861	27624,971	1.3437

CURVED MEMBERS FOR EQUATION 4

MEMBER NUMBER NO. ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SM)	MODIFIED STRESS RATIO
10	2	597,003	0,000	459,497	0,000	0,000	6857,194	27444,347	1.7845
	3	597,003	0,000	459,497	0,000	0,000	6757,343	27444,347	1.7533
20	4	597,003	0,000	459,497	0,000	0,000	6441,720	27473,634	1.3590
	5	597,003	0,000	459,497	0,000	0,000	7424,450	27473,634	1.3737
30	6	597,003	0,000	459,497	0,000	0,000	7414,449	27473,634	1.3737
	7	597,003	0,000	459,497	0,000	0,000	7414,449	27473,634	1.3737
40	8	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
	9	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
50	10	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
	11	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
60	12	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
	13	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
70	14	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
	15	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
80	16	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
	17	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
90	18	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437
	19	597,003	0,000	459,497	0,000	0,000	6744,124	27444,347	1.3437

STRAIGHT MEMBERS FOR EQUATION 4

MEMBER NUMBER NO. ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SM)	MODIFIED STRESS RATIO
174	11	597,003	0,000	459,497	0,000	0,000	7071,308	27473,634	1.3468
	12	597,003	0,000	459,497	0,000	0,000	6721,349	27473,634	1.3712
184	13	597,003	0,000	459,497	0,000	0,000	3530,450	28149,107	1.4577
	14	597,003	0,000	459,497	0,000	0,000	2532,496	28149,107	1.4514

SEISMIC AND STRESS ANALYSIS OF PILE CAP AND LINE LAGUNA 4/10/1976

STRAIGHT PILES FOR WIND 3

Table with 11 columns: MEMBER NO., MEMBER ENDS, INTERNAL STRESS (IP), PEAK STRESS (IPMAX), SUSTAINED STRESS (I-S), OCCASIONAL STRESS (I-M), THERMAL EXPANSION STRESS (I-C), TOTAL STRESS (I-T), MODIFIED ALLOWABLE STRESS (I-SM), DESIGN STRESS RATIO (TBR/(I-T)SM), and MODIFIED STRESS RATIO. Rows include member 199 (17-18) and 209 (18-19).

STRAIGHT PILES FOR WIND 4

Table with 11 columns: MEMBER NO., MEMBER ENDS, INTERNAL STRESS (IP), PEAK STRESS (IPMAX), SUSTAINED STRESS (I-S), OCCASIONAL STRESS (I-M), THERMAL EXPANSION STRESS (I-C), TOTAL STRESS (I-T), MODIFIED ALLOWABLE STRESS (I-SM), DESIGN STRESS RATIO (TBR/(I-T)SM), and MODIFIED STRESS RATIO. Rows include members 214, 224, 234, 244, 254, 264, 274, 284, 294, and 304.

CURVED PILES FOR WIND 4

Table with 11 columns: MEMBER NO., MEMBER ENDS, INTERNAL STRESS (IP), PEAK STRESS (IPMAX), SUSTAINED STRESS (I-S), OCCASIONAL STRESS (I-M), THERMAL EXPANSION STRESS (I-C), TOTAL STRESS (I-T), MODIFIED ALLOWABLE STRESS (I-SM), DESIGN STRESS RATIO (TBR/(I-T)SM), and MODIFIED STRESS RATIO. Rows include members 9C, 10C, 11C, and 12C.

STRAIGHT PILES FOR WIND 4

Table with 11 columns: MEMBER NO., MEMBER ENDS, INTERNAL STRESS (IP), PEAK STRESS (IPMAX), SUSTAINED STRESS (I-S), OCCASIONAL STRESS (I-M), THERMAL EXPANSION STRESS (I-C), TOTAL STRESS (I-T), MODIFIED ALLOWABLE STRESS (I-SM), DESIGN STRESS RATIO (TBR/(I-T)SM), and MODIFIED STRESS RATIO. Rows include members 314, 324, 334, 344, 354, 364, 374, 384, 394, and 404.

CURVED MEMBERS FOR PIPE

Table with 10 columns: MEMBER NO., MEMBER EACS, INTERNAL STRESS, PEAK STRESS, SURFACED STRESS, PERMISSIBLE STRESS, THERMAL EXPANSION STRESS, TOTAL STRESS, MODIFIED ALLOWABLE STRESS, DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 13C, 14C, 15C, 16C, 17C.

STRAIGHT MEMBERS FOR PIPE

Table with 10 columns: MEMBER NO., MEMBER EACS, INTERNAL STRESS, PEAK STRESS, SURFACED STRESS, PERMISSIBLE STRESS, THERMAL EXPANSION STRESS, TOTAL STRESS, MODIFIED ALLOWABLE STRESS, DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 18C, 19C, 20C, 21C, 22C, 23C, 24C, 25C, 26C, 27C, 28C, 29C, 30C, 31C, 32C, 33C, 34C, 35C, 36C, 37C, 38C, 39C, 40C, 41C, 42C, 43C, 44C, 45C, 46C, 47C, 48C, 49C, 50C, 51C, 52C, 53C, 54C, 55C, 56C, 57C, 58C, 59C, 60C, 61C, 62C, 63C, 64C, 65C, 66C, 67C, 68C, 69C, 70C, 71C, 72C, 73C, 74C, 75C, 76C, 77C, 78C, 79C, 80C, 81C, 82C, 83C, 84C, 85C, 86C, 87C, 88C, 89C, 90C, 91C, 92C, 93C, 94C, 95C, 96C, 97C, 98C, 99C, 100C.

PIPE

Table with 10 columns: MEMBER NO., MEMBER EACS, INTERNAL STRESS, PEAK STRESS, SURFACED STRESS, PERMISSIBLE STRESS, THERMAL EXPANSION STRESS, TOTAL STRESS, MODIFIED ALLOWABLE STRESS, DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 101C, 102C.

CURVED MEMBERS FOR PIPE

Table with 10 columns: MEMBER NO., MEMBER EACS, INTERNAL STRESS, PEAK STRESS, SURFACED STRESS, PERMISSIBLE STRESS, THERMAL EXPANSION STRESS, TOTAL STRESS, MODIFIED ALLOWABLE STRESS, DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 103C, 104C, 105C, 106C, 107C, 108C, 109C, 110C, 111C, 112C, 113C, 114C, 115C, 116C, 117C, 118C, 119C, 120C, 121C, 122C, 123C, 124C, 125C, 126C, 127C, 128C, 129C, 130C, 131C, 132C, 133C, 134C, 135C, 136C, 137C, 138C, 139C, 140C, 141C, 142C, 143C, 144C, 145C, 146C, 147C, 148C, 149C, 150C, 151C, 152C, 153C, 154C, 155C, 156C, 157C, 158C, 159C, 160C, 161C, 162C, 163C, 164C, 165C, 166C, 167C, 168C, 169C, 170C, 171C, 172C, 173C, 174C, 175C, 176C, 177C, 178C, 179C, 180C, 181C, 182C, 183C, 184C, 185C, 186C, 187C, 188C, 189C, 190C, 191C, 192C, 193C, 194C, 195C, 196C, 197C, 198C, 199C, 200C.

STRAIGHT MEMBERS FOR PIPE

Table with 10 columns: MEMBER NO., MEMBER EACS, INTERNAL STRESS, PEAK STRESS, SURFACED STRESS, PERMISSIBLE STRESS, THERMAL EXPANSION STRESS, TOTAL STRESS, MODIFIED ALLOWABLE STRESS, DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 201C, 202C.

STRESS AND STRAIN ANALYSIS OF APPROXIMATION LEVER LAMINA 1074

STRAIGHT MEMBERS FOR 1074

MEMBER NUMBER NO.	ENDS	TOTAL STRESS (PSI)	PEAK STRESS (PSI)	AVERAGE STRESS (PSI)	MODIFIED STRESS (PSI)	THERMAL EXPANSION (INCH)	TOTAL STRESS (PSI)	MODIFIED ALLORABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SH)	MODIFIED STRESS RATIO
826	126	3048,174	4,400	312,444	0,000	0,000	3047,172	2875,000	1,0932	1,9134

STRAIGHT MEMBERS FOR 1074

MEMBER NUMBER NO.	ENDS	TOTAL STRESS (PSI)	PEAK STRESS (PSI)	AVERAGE STRESS (PSI)	MODIFIED STRESS (PSI)	THERMAL EXPANSION (INCH)	TOTAL STRESS (PSI)	MODIFIED ALLORABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SH)	MODIFIED STRESS RATIO
826	126	3048,174	4,400	312,444	0,000	0,000	3047,172	2875,000	1,0932	1,9134

CURVED MEMBERS FOR 1074

MEMBER NUMBER NO.	ENDS	TOTAL STRESS (PSI)	PEAK STRESS (PSI)	AVERAGE STRESS (PSI)	MODIFIED STRESS (PSI)	THERMAL EXPANSION (INCH)	TOTAL STRESS (PSI)	MODIFIED ALLORABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SH)	MODIFIED STRESS RATIO
250	02	3348,000	4,400	334,800	0,000	0,000	3347,000	3175,000	1,0976	1,9977
240	04	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
270	147	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577

STRESS AND STRAIN ANALYSIS OF APPROXIMATION LEVER LAMINA 1074

STRAIGHT MEMBERS FOR 1074

MEMBER NUMBER NO.	ENDS	TOTAL STRESS (PSI)	PEAK STRESS (PSI)	AVERAGE STRESS (PSI)	MODIFIED STRESS (PSI)	THERMAL EXPANSION (INCH)	TOTAL STRESS (PSI)	MODIFIED ALLORABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SH)	MODIFIED STRESS RATIO
808	07	3348,000	4,400	334,800	0,000	0,000	3347,000	3175,000	1,0976	1,9977
824	126	3048,174	4,400	312,444	0,000	0,000	3047,172	2875,000	1,0932	1,9134
805	126	3048,174	4,400	312,444	0,000	0,000	3047,172	2875,000	1,0932	1,9134
845	147	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
806	147	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
810	147	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
811	147	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
812	147	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577

CURVED MEMBERS FOR 1074

MEMBER NUMBER NO.	ENDS	TOTAL STRESS (PSI)	PEAK STRESS (PSI)	AVERAGE STRESS (PSI)	MODIFIED STRESS (PSI)	THERMAL EXPANSION (INCH)	TOTAL STRESS (PSI)	MODIFIED ALLORABLE STRESS (PSI)	DESIGN STRESS RATIO TR/(1.45SH)	MODIFIED STRESS RATIO
240	04	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
240	04	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577
300	117	3248,174	4,400	324,817	0,000	0,000	3247,172	3075,000	1,0977	1,9577

CURVED HOOKS FOR BIL

Table with 11 columns: VERNUM NO., HOOK NO., INTERNAL STRESS, PEAK STRESS, DISTORTION, OCCASIONAL LOAD, THERMAL EXPANSION, TOTAL STRESS, MODIFIED ALLIABLE STRESS, UPSET RATIO, EMERGENCY STRESS RATIO.

STRAIGHT HOOKS FOR BIL

Table with 11 columns: VERNUM NO., HOOK NO., INTERNAL STRESS, PEAK STRESS, DISTORTION, OCCASIONAL LOAD, THERMAL EXPANSION, TOTAL STRESS, MODIFIED ALLIABLE STRESS, UPSET RATIO, EMERGENCY STRESS RATIO.

WAST

WAST 440.

Table with 11 columns: VERNUM NO., HOOK NO., INTERNAL STRESS, PEAK STRESS, DISTORTION, OCCASIONAL LOAD, THERMAL EXPANSION, TOTAL STRESS, MODIFIED ALLIABLE STRESS, UPSET RATIO, EMERGENCY STRESS RATIO.

CURVED HOOKS FOR BIL

Table with 11 columns: VERNUM NO., HOOK NO., INTERNAL STRESS, PEAK STRESS, DISTORTION, OCCASIONAL LOAD, THERMAL EXPANSION, TOTAL STRESS, MODIFIED ALLIABLE STRESS, UPSET RATIO, EMERGENCY STRESS RATIO.

STRAIGHT HOOKS FOR BIL

Table with 11 columns: VERNUM NO., HOOK NO., INTERNAL STRESS, PEAK STRESS, DISTORTION, OCCASIONAL LOAD, THERMAL EXPANSION, TOTAL STRESS, MODIFIED ALLIABLE STRESS, UPSET RATIO, EMERGENCY STRESS RATIO.

SEISMIC AND STRESS ANALYSIS OF RECTIFICATION LINES LAGUNA BAY, 1974

UPSET AND EMERGENCY CONDITIONS

0.2-g SATISFACTION OF EQUATION 9

(ANALYSIS SET 2)

(Z + Y Earthquake)

STRAIGHT MEMBERS FOR WIN 1

MEMBER NUMBER NO. ENDS	INTERNAL STRESS (PSI)	PIPE DRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	UPSET STRESS RATIO T9/(1.2ASH)	EMERGENCY STRESS RATIO T9/(1.4ASH)
15 1	0.000	3452.101	372.544	147.724	0.000	3872.349	24222.246	.17738	.11825
2 2	0.000	3452.101	428.774	07.550	0.000	3777.755	24232.214	.17774	.11841
3 3	0.000	3452.101	120.144	174.408	0.000	3127.748	24249.244	.32932	.21044
4 4	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.32746	.21574
5 5	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.33394	.22242
6 6	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34505	.23044
7 7	0.000	3452.101	231.252	94.554	0.000	3774.457	24274.271	.34497	.22942
8 8	0.000	3452.101	428.774	147.724	0.000	3777.755	24274.271	.34497	.22942
9 9	0.000	3452.101	120.144	174.408	0.000	3127.748	24274.271	.34497	.22942
10 10	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
11 11	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942
12 12	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34497	.22942
13 13	0.000	3452.101	231.252	94.554	0.000	3774.457	24274.271	.34497	.22942
14 14	0.000	3452.101	428.774	147.724	0.000	3777.755	24274.271	.34497	.22942
15 15	0.000	3452.101	120.144	174.408	0.000	3127.748	24274.271	.34497	.22942
16 16	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
17 17	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942
18 18	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34497	.22942
19 19	0.000	3452.101	231.252	94.554	0.000	3774.457	24274.271	.34497	.22942
20 20	0.000	3452.101	428.774	147.724	0.000	3777.755	24274.271	.34497	.22942
21 21	0.000	3452.101	120.144	174.408	0.000	3127.748	24274.271	.34497	.22942
22 22	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
23 23	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942
24 24	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34497	.22942

CUMULATIVE MEMBERS FOR WIN 1

MEMBER NUMBER NO. ENDS	INTERNAL STRESS (PSI)	PIPE DRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	UPSET STRESS RATIO T9/(1.2ASH)	EMERGENCY STRESS RATIO T9/(1.4ASH)
1C 2	0.000	3452.101	428.774	147.724	0.000	3777.755	24274.271	.34497	.22942
3 3	0.000	3452.101	120.144	174.408	0.000	3127.748	24274.271	.34497	.22942
2C 4	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
5 5	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942
3C 9	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34497	.22942
14 14	0.000	3452.101	231.252	94.554	0.000	3774.457	24274.271	.34497	.22942
4C 14	0.000	3452.101	428.774	147.724	0.000	3777.755	24274.271	.34497	.22942
16 16	0.000	3452.101	120.144	174.408	0.000	3127.748	24274.271	.34497	.22942
5C 15	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
16 16	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942
9C 21	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34497	.22942
21 21	0.000	3452.101	231.252	94.554	0.000	3774.457	24274.271	.34497	.22942
7C 21	0.000	3452.101	428.774	147.724	0.000	3777.755	24274.271	.34497	.22942
24 24	0.000	3452.101	120.144	174.408	0.000	3127.748	24274.271	.34497	.22942
4C 24	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
24 24	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942

STRAIGHT MEMBERS FOR WIN 2

MEMBER NUMBER NO. ENDS	INTERNAL STRESS (PSI)	PIPE DRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	UPSET STRESS RATIO T9/(1.2ASH)	EMERGENCY STRESS RATIO T9/(1.4ASH)
12S 11	0.000	3452.101	147.724	374.442	0.000	4127.748	24274.271	.34497	.22942
12 12	0.000	3452.101	272.442	132.772	0.000	3797.654	24274.271	.34497	.22942
14S 12	0.000	3452.101	40.554	162.442	0.000	3251.497	24274.271	.34497	.22942
13 13	0.000	3452.101	174.774	174.774	0.000	3751.498	24274.271	.34497	.22942

STATIC AND STRESS ANALYSIS OF RECTIFICATION LIAIS LACRO 400, 1974

STRAIGHT MEMBERS FOR WIP - 4

MEMBER NUMBER	MEMBER NO. EXOS	INTERNAL	BEAR	SUSTAINED	OCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	RATIO TQ/(1.2*SM)	RATIO TQ/(1.2*SM)
195	13	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
195	14	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
199	15	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
199	16	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200

STRAIGHT MEMBERS FOR WIP - 4

MEMBER NUMBER	MEMBER NO. EXOS	INTERNAL	BEAR	SUSTAINED	OCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	RATIO TQ/(1.2*SM)	RATIO TQ/(1.2*SM)
215	17	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
215	18	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
225	19	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
225	20	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
235	21	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
235	22	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
245	23	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
245	24	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
255	25	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
255	26	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
265	27	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
265	28	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
275	29	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
275	30	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
285	31	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
285	32	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
295	33	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
295	34	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200

CURVED MEMBERS FOR WIP - 4

MEMBER NUMBER	MEMBER NO. EXOS	INTERNAL	BEAR	SUSTAINED	OCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	RATIO TQ/(1.2*SM)	RATIO TQ/(1.2*SM)
40	35	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
40	36	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
100	37	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
100	38	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
110	39	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
110	40	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
120	41	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
120	42	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200

STRAIGHT MEMBERS FOR WIP - 4

MEMBER NUMBER	MEMBER NO. EXOS	INTERNAL	BEAR	SUSTAINED	OCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	STRESS (PSI)	RATIO TQ/(1.2*SM)	RATIO TQ/(1.2*SM)
315	43	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
315	44	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
325	45	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
325	46	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
335	47	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
335	48	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
345	49	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
345	50	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
355	51	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
355	52	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
365	53	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
365	54	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
375	55	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
375	56	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
385	57	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
385	58	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
395	59	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200
395	60	2,000	2,000	1,100	1,100	0,000	4,200	2,700	1,500	1,200

CURVED MEMBERS FOR WIND

MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	DESIGN STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)		ALL-CORNER STRESS (PSI)		
13C	42	0.000	4134.024	493.743	0.021,417	0.000	1424.130	27244.466	44443	54279
	43	0.000	4134.024	441.244	0.021,417	0.000	1744.447	27244.466	4514	53478
14C	44	0.000	4134.024	443.224	0.021,417	0.000	1702.470	27244.466	44691	53129
	47	0.000	4134.024	424.343	0.021,417	0.000	1164.147	27244.466	44405	54279
15C	48	0.000	4032.000	240.422	0.021,417	0.000	1131.160	27244.466	44449	53274
	49	0.000	4032.000	434.244	0.021,417	0.000	1074.160	27244.466	51948	54444
16C	50	0.000	4032.000	374.233	0.021,417	0.000	1454.160	27244.466	52034	54491
	43	0.000	4032.000	199.744	0.021,417	0.000	1099.079	27244.466	54061	54554

STRAIGHT MEMBERS FOR WIND

MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	DESIGN STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)		ALL-CORNER STRESS (PSI)		
45	100	0.000	4044.000	474.444	0.021,417	0.000	840.170	27244.466	34670	26744
	101	0.000	4044.000	301.444	0.021,417	0.000	774.110	27244.466	35473	23744
46	113	0.000	4044.000	374.444	0.021,417	0.000	821.181	27244.466	34952	28044
	114	0.000	4044.000	144.444	0.021,417	0.000	754.462	27244.466	34444	27044
47	114	0.000	4044.000	172.412	0.021,417	0.000	302.114	27244.466	18454	17474
	115	0.000	4044.000	113.354	0.021,417	0.000	374.404	27244.466	17149	11444
48	114	0.000	4044.000	147.447	0.021,417	0.000	407.147	27244.466	32100	21444
	117	0.000	4044.000	147.447	0.021,417	0.000	714.484	27244.466	33111	22444
49	114	0.000	4044.000	72.144	0.021,417	0.000	744.147	27244.466	34402	22444
	119	0.000	4044.000	157.444	0.021,417	0.000	742.434	27244.466	35417	23412
50	114	0.000	4044.000	113.444	0.021,417	0.000	743.444	27244.466	34088	22744
	121	0.000	4044.000	244.444	0.021,417	0.000	783.444	27244.466	34443	24442
	121	0.000	4044.000	174.444	0.021,417	0.000	817.122	27244.466	37401	25444
51	122	0.000	4044.000	144.444	0.021,417	0.000	771.144	27244.466	35544	27444
	123	0.000	4044.000	144.444	0.021,417	0.000	771.144	27244.466	33742	22105
48	123	0.000	4044.000	144.444	0.021,417	0.000	774.244	27244.466	35710	23413
	124	0.000	4044.000	441.244	0.021,417	0.000	743.114	27244.466	35134	23423
49	125	0.000	4044.000	374.444	0.021,417	0.000	714.429	27244.466	33144	22044
	127	0.000	4044.000	144.444	0.021,417	0.000	721.127	27244.466	33152	22104
	127	0.000	4044.000	444.444	0.021,417	0.000	774.127	27244.466	34444	24444
50	124	0.000	4044.000	274.144	0.021,417	0.000	424.424	27244.466	37444	24444
	127	0.000	4044.000	344.444	0.021,417	0.000	764.143	27244.466	35444	24444
51	121	0.000	4044.000	314.444	0.021,417	0.000	744.444	27244.466	34444	24444
	127	0.000	4044.000	444.444	0.021,417	0.000	744.444	27244.466	34444	24444
52	122	0.000	4044.000	113.444	0.021,417	0.000	784.444	27244.466	34444	24444
	123	0.000	4044.000	414.444	0.021,417	0.000	817.444	27244.466	34444	24444
53	123	0.000	4044.000	221.444	0.021,417	0.000	474.444	27244.466	34444	24444
	124	0.000	4044.000	74.444	0.021,417	0.000	344.444	27244.466	34444	24444
54	125	0.000	4044.000	214.444	0.021,417	0.000	344.444	27244.466	34444	24444
	126	0.000	4044.000	144.444	0.021,417	0.000	701.450	27244.466	32466	21444

WIND

WIND 404.

404	127	0.000	4044.000	117.444	0.021,417	0.000	384.414	27244.466	17754	11447
	127	0.000	4044.000	344.444	0.021,417	0.000	464.444	27244.466	18433	12444

CURVED MEMBERS FOR WIND

MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	DESIGN STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)		ALL-CORNER STRESS (PSI)		
17C	115	0.000	4044.000	494.227	0.021,417	0.000	774.402	27244.466	35414	27044
	116	0.000	4044.000	324.144	0.021,417	0.000	734.144	27244.466	33724	22444
18C	117	0.000	4044.000	534.244	0.021,417	0.000	704.404	27244.466	36177	24244
	118	0.000	4044.000	244.444	0.021,417	0.000	704.404	27244.466	36774	24417
19C	121	0.000	4044.000	1144.177	0.021,417	0.000	814.177	27244.466	44444	27444
	122	0.000	4044.000	444.112	0.021,417	0.000	767.444	27244.466	36444	24444
20C	125	0.000	4044.000	344.444	0.021,417	0.000	717.444	27244.466	33027	22414
	124	0.000	4044.000	474.174	0.021,417	0.000	721.174	27244.466	33224	22144
	124	0.000	4044.000	444.224	0.021,417	0.000	444.224	27244.466	33192	22124
	124	0.000	4044.000	344.174	0.021,417	0.000	721.174	27244.466	33234	22144
22C	127	0.000	4044.000	441.214	0.021,417	0.000	614.124	27244.466	42167	28131
	131	0.000	4044.000	1144.224	0.021,417	0.000	674.114	27244.466	45102	30444
23C	124	0.000	4044.000	244.444	0.021,417	0.000	424.144	27244.466	34444	24444
	124	0.000	4044.000	474.444	0.021,417	0.000	424.144	27244.466	34444	24444
24C	124	0.000	4044.000	314.124	0.021,417	0.000	744.124	27244.466	34415	23114
	127	0.000	4044.000	494.227	0.021,417	0.000	830.127	27244.466	34254	24414

STRAIGHT MEMBERS FOR WIND

MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	DESIGN STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)		ALL-CORNER STRESS (PSI)		
405	127	0.000	4044.000	441.244	0.021,417	0.000	432.441	27244.466	19413	13444
	124	0.000	4044.000	314.244	0.021,417	0.000	414.444	27244.466	19123	12844

SEISMIC AND STRESS ANALYSIS OF REINFORCEMENT LINES LAGUNA 4/15/1974

STRAIGHT MEMBERS FOR WIND 1										
MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (MAX)	STRESS (PSI)	STRESS (MAX)	EXPANSION (IN)	STRESS (PSI)	ALLOWABLE STRESS (SAV)	STRESS RATIO	STRESS RATIO
57g	124	0.000	1082.341	612.488	543.811	0.000	4598.481	28176.858	20744	13835
	128	0.000	7447.361	766.172	205.944	0.000	4114.667	28274.540	18952	12435

STRAIGHT MEMBERS FOR WIND 2										
MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (MAX)	STRESS (PSI)	STRESS (MAX)	EXPANSION (IN)	STRESS (PSI)	ALLOWABLE STRESS (SAV)	STRESS RATIO	STRESS RATIO
58g	48	0.000	4134.925	612.488	1305.673	0.000	10046.549	27244.212	46225	31817
	52	0.000	2134.075	747.806	826.247	0.000	4329.367	27316.712	42035	28423
	56	0.000	7032.104	142.743	1433.427	0.000	9295.374	27373.173	44524	29491
	60	0.000	7132.009	80.447	2167.071	0.000	4234.481	27171.812	45600	30247
	64	0.000	7032.104	142.743	1400.627	0.000	4074.149	27279.567	39774	26671
	68	0.000	7032.104	142.743	1400.627	0.000	4717.274	27276.214	42838	28560
61g	07	0.000	7032.104	142.743	874.874	0.000	7854.200	27276.214	38425	26774
	08	0.000	7032.104	142.743	841.974	0.000	8174.149	27373.173	39774	26471
62g	34	0.000	4134.925	747.806	747.806	0.000	4221.974	27373.173	42458	28374
	37	0.000	4134.925	747.806	707.874	0.000	4254.074	27373.173	42415	28417
63g	141	0.000	4134.925	612.488	871.744	0.000	4444.810	27279.567	43402	28000
	144	0.000	4134.925	612.488	1334.401	0.000	10857.104	27244.212	46304	31860
64g	141	0.000	4134.925	612.488	1175.658	0.000	4404.810	27373.173	44234	28491
	144	0.000	4134.925	612.488	871.744	0.000	4444.810	27279.567	43402	28000
65g	147	0.000	4134.925	612.488	1702.400	0.000	10349.720	27373.173	47451	31747
	152	0.000	4134.925	612.488	1245.200	0.000	4404.810	27373.173	44234	28491

CURVED MEMBERS FOR WIND 1										
MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (MAX)	STRESS (PSI)	STRESS (MAX)	EXPANSION (IN)	STRESS (PSI)	ALLOWABLE STRESS (SAV)	STRESS RATIO	STRESS RATIO
25c	48	0.000	7032.104	612.488	747.806	0.000	11071.776	27276.214	54434	34944
	52	0.000	7032.104	612.488	474.874	0.000	11497.402	27416.613	54474	34994
	56	0.000	7032.104	612.488	2274.174	0.000	11314.800	27176.613	52107	34731
	60	0.000	7032.104	612.488	2074.104	0.000	11034.400	27276.214	50422	33802
27c	147	0.000	4134.925	612.488	747.806	0.000	12245.053	27276.214	56565	37717
	151	0.000	4134.925	612.488	3732.206	0.000	12073.462	27276.214	55587	37454

SEISMIC AND STRESS ANALYSIS OF REINFORCEMENT LINES LAGUNA 4/15/1974

STRAIGHT MEMBERS FOR WIND 10										
MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (MAX)	STRESS (PSI)	STRESS (MAX)	EXPANSION (IN)	STRESS (PSI)	ALLOWABLE STRESS (SAV)	STRESS RATIO	STRESS RATIO
66g	08	0.000	7032.104	100.749	1787.149	0.000	9805.610	27276.214	44052	28420
	12	0.000	7032.104	94.811	2173.417	0.000	9247.049	27276.214	45713	28474
67g	104	0.000	7032.104	142.743	1433.427	0.000	4717.274	27276.214	39774	26671
	108	0.000	7032.104	142.743	1441.124	0.000	4452.400	27276.214	42930	28274
68g	104	0.000	7032.104	142.743	874.874	0.000	7987.114	27276.214	39774	26671
	108	0.000	7032.104	142.743	820.874	0.000	8017.114	27276.214	39774	26671
69g	107	0.000	4134.925	747.806	907.737	0.000	4300.219	27373.173	43274	28417
	111	0.000	4134.925	747.806	977.541	0.000	4341.071	27373.173	43254	28417
70g	107	0.000	4134.925	612.488	1013.574	0.000	4494.408	27276.214	44434	28744
	111	0.000	4134.925	612.488	1020.674	0.000	4455.143	27373.173	43532	28421
71g	107	0.000	4134.925	612.488	1234.272	0.000	4817.149	27276.214	45100	28102
	111	0.000	4134.925	612.488	1013.574	0.000	4644.400	27276.214	44434	28744
72g	111	0.000	4134.925	612.488	1477.644	0.000	4844.149	27276.214	45412	28741
	115	0.000	4134.925	612.488	1234.272	0.000	4817.149	27276.214	45100	28102
73g	111	0.000	4134.925	612.488	1102.474	0.000	10781.750	27373.173	49548	33132
	115	0.000	4134.925	612.488	1544.244	0.000	10812.414	27373.173	46008	30732

CURVED MEMBERS FOR WIND 10										
MEMBER NO.	MEMBER TYPE	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	UPSET	EMERGENCY
		STRESS (PSI)	STRESS (MAX)	STRESS (PSI)	STRESS (MAX)	EXPANSION (IN)	STRESS (PSI)	ALLOWABLE STRESS (SAV)	STRESS RATIO	STRESS RATIO
24c	104	0.000	7032.104	612.488	747.806	0.000	10974.414	27276.214	53434	34947
	108	0.000	7032.104	612.488	474.874	0.000	11418.400	27373.173	50785	33724
49c	104	0.000	4134.925	747.806	747.806	0.000	11442.423	27276.214	53405	34907
	108	0.000	4134.925	747.806	2442.461	0.000	11512.907	27276.214	53104	34534
31c	112	0.000	4134.925	612.488	4183.400	0.000	13152.402	27276.214	67857	45111
	117	0.000	4134.925	612.488	747.806	0.000	12812.544	27276.214	54989	36324

STRESS AND STRAIN ANALYSIS OF REINFORCEMENT LIAK LAMPED 21/9, 1974

NORMAL OPERATING AND UPSET CONDITIONS

0.1.3 SATISFACTION OF EQUATION 10 (ANALYSIS SET 1)

(X-SEISMIC ANCHOR MOVEMENTS)

STRAIGHT MEMBERS FOR UNIT 1

MEMBER NUMBER NO.	MEMBER TYPE	INTERNAL STRESS (MPa)	DEFL. (mm)	SUSTAINED LOAD (kN)	ACCIDENTAL LOAD (kN)	THERMAL EXPANSION (mm)	TOTAL STRESS (MPa)	MODIFIED ALLOWABLE STRESS (MPa)	DESIGN RATIO	MODIFIED STRESS RATIO
1x	1	0.000	0.000	0.000	0.000	3361.379	3361.377	28222.806	1.3194	1.1010
	2	0.000	0.000	0.000	0.000	2979.771	2979.771	28222.810	0.8750	0.7741
2x	3	0.000	0.000	0.000	0.000	144.708	144.708	27528.254	0.0545	0.0532
	4	0.000	0.000	0.000	0.000	1047.808	1047.808	27528.271	0.4334	0.3937
3x	5	0.000	0.000	0.000	0.000	1171.378	1171.378	27528.275	0.5448	0.4247
	6	0.000	0.000	0.000	0.000	811.018	811.018	27528.288	0.2934	0.1804
4x	7	0.000	0.000	0.000	0.000	367.847	367.847	27528.298	0.1465	0.1334
	8	0.000	0.000	0.000	0.000	187.797	187.797	27528.314	0.0720	0.0687
5x	9	0.000	0.000	0.000	0.000	1114.740	1114.740	27528.311	0.4442	0.4004
	10	0.000	0.000	0.000	0.000	471.342	471.342	27528.344	0.1590	0.1477
6x	11	0.000	0.000	0.000	0.000	557.849	557.849	27528.327	0.2223	0.2028
	12	0.000	0.000	0.000	0.000	275.048	275.048	27528.338	0.1100	0.1007
7x	13	0.000	0.000	0.000	0.000	1822.253	1822.253	27528.311	0.7241	0.6603
	14	0.000	0.000	0.000	0.000	803.845	803.845	27528.334	0.2853	0.2644
8x	15	0.000	0.000	0.000	0.000	15144.729	15144.729	27528.600	4.8031	3.8874
	16	0.000	0.000	0.000	0.000	2643.071	2643.071	27528.647	0.9731	0.8784
9x	17	0.000	0.000	0.000	0.000	3784.069	3784.069	27528.628	1.5004	1.3714
	18	0.000	0.000	0.000	0.000	11982.140	11982.140	27528.602	4.7745	4.7407
10x	19	0.000	0.000	0.000	0.000	11305.348	11305.348	27528.624	4.5447	4.1348
	20	0.000	0.000	0.000	0.000	1118.084	1118.084	27528.678	0.4440	0.4007
11x	21	0.000	0.000	0.000	0.000	821.154	821.154	27528.619	0.3272	0.2987
	22	0.000	0.000	0.000	0.000	1474.916	1474.916	27528.612	0.5445	0.5100
12x	23	0.000	0.000	0.000	0.000	1042.875	1042.875	27528.672	0.4234	0.3806
	24	0.000	0.000	0.000	0.000	2042.044	2042.044	27528.674	0.8227	0.7514
13x	25	0.000	0.000	0.000	0.000	1755.124	1755.124	27528.685	0.6474	0.6307
	26	0.000	0.000	0.000	0.000	1474.849	1474.849	27528.719	0.5474	0.5107
14x	27	0.000	0.000	0.000	0.000	2324.412	2324.412	27528.658	0.9280	0.8487
	28	0.000	0.000	0.000	0.000	2974.453	2974.453	27528.644	1.1482	1.0701
15x	29	0.000	0.000	0.000	0.000	4084.244	4084.244	27528.748	1.2154	1.1147
	30	0.000	0.000	0.000	0.000	544.514	544.514	27528.612	0.2178	0.1970
16x	31	0.000	0.000	0.000	0.000	3442.714	3442.714	28257.428	1.3708	1.2284
	32	0.000	0.000	0.000	0.000	8881.748	8881.748	28247.819	2.2648	2.0113

CURVED MEMBERS FOR UNIT 1

MEMBER NUMBER NO.	MEMBER TYPE	INTERNAL STRESS (MPa)	DEFL. (mm)	SUSTAINED LOAD (kN)	ACCIDENTAL LOAD (kN)	THERMAL EXPANSION (mm)	TOTAL STRESS (MPa)	MODIFIED ALLOWABLE STRESS (MPa)	DESIGN RATIO	MODIFIED STRESS RATIO
1C	2	0.000	0.000	0.000	0.000	794.448	794.448	27484.347	0.3172	0.2893
	3	0.000	0.000	0.000	0.000	330.878	330.878	27484.348	0.1354	0.1238
2C	4	0.000	0.000	0.000	0.000	5443.074	5443.074	27473.074	2.2047	2.0103
	5	0.000	0.000	0.000	0.000	8122.871	8122.871	27484.070	3.2347	2.9501
3C	6	0.000	0.000	0.000	0.000	1151.882	1151.882	27347.014	0.4440	0.4270
	7	0.000	0.000	0.000	0.000	8100.100	8100.100	27444.656	2.9117	2.6043
4C	8	0.000	0.000	0.000	0.000	2643.074	2643.074	27414.273	1.0732	0.9754
	9	0.000	0.000	0.000	0.000	8015.301	8015.301	27544.573	1.9984	1.8274
5C	10	0.000	0.000	0.000	0.000	4414.245	4414.245	27444.041	1.6984	1.5274
	11	0.000	0.000	0.000	0.000	3784.404	3784.404	27414.213	1.5448	1.3714
6C	12	0.000	0.000	0.000	0.000	2273.533	2273.533	27528.447	0.8440	0.8241
	13	0.000	0.000	0.000	0.000	2274.844	2274.844	27528.404	0.8440	0.8273
7C	14	0.000	0.000	0.000	0.000	11433.048	11433.048	27444.410	4.5540	4.1414
	15	0.000	0.000	0.000	0.000	8790.000	8790.000	27632.041	3.4702	3.1614
8C	16	0.000	0.000	0.000	0.000	1244.105	1244.105	27511.744	0.5445	0.4400
	17	0.000	0.000	0.000	0.000	13308.747	13308.747	27444.448	5.3031	4.8242

STRAIGHT MEMBERS FOR UNIT 2

MEMBER NUMBER NO.	MEMBER TYPE	INTERNAL STRESS (MPa)	DEFL. (mm)	SUSTAINED LOAD (kN)	ACCIDENTAL LOAD (kN)	THERMAL EXPANSION (mm)	TOTAL STRESS (MPa)	MODIFIED ALLOWABLE STRESS (MPa)	DESIGN RATIO	MODIFIED STRESS RATIO
18x	11	0.000	0.000	0.000	0.000	2163.457	2163.457	27410.828	0.8421	0.7884
	12	0.000	0.000	0.000	0.000	4744.721	4744.721	27514.421	1.9440	1.7412
18y	13	0.000	0.000	0.000	0.000	2887.441	2887.441	28192.197	1.1504	1.0243
	14	0.000	0.000	0.000	0.000	4812.403	4812.403	28191.911	1.9177	1.7071

STRESS AND STRAIN ANALYSIS OF RECIRCULATION LINE LACRHO AUG. 1974

STRAIGHT MEMBERS FOR RUN 3

MEMBER NO.	MEMBER	INTERNAL PRESSURE STRESS (PI)	PEAK PRESSURE STRESS (PWK)	SUSTAINED LOAD STRESS (SLM)	OCCASIONAL LOAD STRESS (LOL)	THERMAL EXPANSION STRESS (TMC)	TOTAL STRESS (TTL)	MODIFIED ALLOWABLE STRESS (SAM)	DESIGN STRESS RATIO (TTL/(1.0SAM))	MODIFIED STRESS RATIO (TTL/(1.0SAM))
195	19	0.000	0.000	0.000	0.000	760.219	720.217	27451.908	0.2470	0.2474
	18	0.000	0.000	0.000	0.000	2003.050	2003.050	27507.454	0.2481	0.2482
205	17	0.000	0.000	0.000	0.000	1257.353	1257.353	28180.244	0.2481	0.2481
	16	0.000	0.000	0.000	0.000	2127.410	2127.410	28177.804	0.2477	0.2454

STRAIGHT MEMBERS FOR RUN 4

MEMBER NO.	MEMBER	INTERNAL PRESSURE STRESS (PI)	PEAK PRESSURE STRESS (PWK)	SUSTAINED LOAD STRESS (SLM)	OCCASIONAL LOAD STRESS (LOL)	THERMAL EXPANSION STRESS (TMC)	TOTAL STRESS (TTL)	MODIFIED ALLOWABLE STRESS (SAM)	DESIGN STRESS RATIO (TTL/(1.0SAM))	MODIFIED STRESS RATIO (TTL/(1.0SAM))
215	7	0.000	3.300	0.000	0.000	1340.630	1340.630	27311.134	0.2422	0.2422
	6	0.000	0.000	0.000	0.000	061.700	061.700	27333.447	0.2332	0.2310
225	31	0.000	0.000	0.000	0.000	845.084	845.084	27131.471	0.2347	0.2314
	32	0.000	0.000	0.000	0.000	497.884	497.884	27244.507	0.2344	0.2327
235	32	0.000	0.000	0.000	0.000	497.884	497.884	27244.507	0.2344	0.2327
	33	0.000	0.000	0.000	0.000	330.408	330.408	27228.488	0.2354	0.2345
245	33	0.000	0.000	0.000	0.000	330.408	330.408	27228.488	0.2354	0.2345
	34	0.000	0.000	0.000	0.000	421.848	421.848	27201.721	0.2478	0.2274
255	34	0.000	0.000	0.000	0.000	344.449	344.449	27131.770	0.2377	0.2344
	35	0.000	0.000	0.000	0.000	714.214	714.214	27133.214	0.2340	0.2157
265	34	0.000	0.000	0.000	0.000	270.184	270.184	27170.391	0.2123	0.2131
	37	0.000	0.000	0.000	0.000	244.470	244.470	27140.274	0.2104	0.2000
275	37	0.000	0.000	0.000	0.000	244.470	244.470	27140.274	0.2104	0.2000
	38	0.000	0.000	0.000	0.000	378.120	378.120	27120.247	0.2122	0.2130
285	38	0.000	0.000	0.000	0.000	378.120	378.120	27120.247	0.2122	0.2140
	41	0.000	0.000	0.000	0.000	344.450	344.450	27074.444	0.2304	0.2247
295	41	0.000	0.000	0.000	0.000	330.070	330.070	27060.214	0.2332	0.2222
	42	0.000	0.000	0.000	0.000	301.211	301.211	27045.174	0.2312	0.2112
305	42	0.000	0.000	0.000	0.000	424.444	424.444	27294.297	0.2450	0.2240
	43	0.000	0.000	0.000	0.000	391.507	391.507	27330.670	0.2150	0.2132

CURVED MEMBERS FOR RUN 3

MEMBER NO.	MEMBER	INTERNAL PRESSURE STRESS (PI)	PEAK PRESSURE STRESS (PWK)	SUSTAINED LOAD STRESS (SLM)	OCCASIONAL LOAD STRESS (LOL)	THERMAL EXPANSION STRESS (TMC)	TOTAL STRESS (TTL)	MODIFIED ALLOWABLE STRESS (SAM)	DESIGN STRESS RATIO (TTL/(1.0SAM))	MODIFIED STRESS RATIO (TTL/(1.0SAM))
9C	31	0.000	0.000	0.000	0.000	2570.344	2570.344	27554.494	0.2250	0.2245
	31	0.000	0.000	0.000	0.000	2313.403	2313.403	27220.477	0.2210	0.2245
10C	34	0.000	0.000	0.000	0.000	745.400	745.400	27240.444	0.2301	0.2285
	35	0.000	0.000	0.000	0.000	674.400	674.400	27271.900	0.2242	0.2277
11C	35	0.000	0.000	0.000	0.000	944.483	944.483	27190.178	0.2344	0.2311
	36	0.000	0.000	0.000	0.000	894.424	894.424	27014.044	0.2343	0.2204
12C	40	0.000	0.000	0.000	0.000	587.440	587.440	27042.574	0.2345	0.2173
	41	0.000	0.000	0.000	0.000	590.480	590.480	27074.474	0.2413	0.2214

STRAIGHT MEMBERS FOR RUN 4

MEMBER NO.	MEMBER	INTERNAL PRESSURE STRESS (PI)	PEAK PRESSURE STRESS (PWK)	SUSTAINED LOAD STRESS (SLM)	OCCASIONAL LOAD STRESS (LOL)	THERMAL EXPANSION STRESS (TMC)	TOTAL STRESS (TTL)	MODIFIED ALLOWABLE STRESS (SAM)	DESIGN STRESS RATIO (TTL/(1.0SAM))	MODIFIED STRESS RATIO (TTL/(1.0SAM))
315	47	0.000	0.000	0.000	0.000	497.487	497.487	27114.301	0.2343	0.2184
	47	0.000	0.000	0.000	0.000	413.404	413.404	27137.153	0.2449	0.2154
325	47	0.000	0.000	0.000	0.000	347.011	347.011	27138.121	0.2444	0.2144
	44	0.000	0.000	0.000	0.000	311.474	311.474	27173.944	0.2241	0.2141
335	44	0.000	0.000	0.000	0.000	311.474	311.474	27173.944	0.2241	0.2141
	45	0.000	0.000	0.000	0.000	274.451	274.451	27200.711	0.2173	0.2134
345	45	0.000	0.000	0.000	0.000	274.451	274.451	27200.711	0.2173	0.2134
	46	0.000	0.000	0.000	0.000	272.737	272.737	27132.144	0.2147	0.2114
355	46	0.000	0.000	0.000	0.000	242.420	242.420	27116.270	0.2144	0.2099
	47	0.000	0.000	0.000	0.000	274.448	274.448	27134.111	0.2144	0.2047
365	47	0.000	0.000	0.000	0.000	184.707	184.707	27080.474	0.2077	0.2047
	48	0.000	0.000	0.000	0.000	42.470	42.470	27040.784	0.2037	0.2041
375	48	0.000	0.000	0.000	0.000	42.470	42.470	27040.784	0.2037	0.2041
	49	0.000	0.000	0.000	0.000	141.333	141.333	27048.374	0.2044	0.2044
385	49	0.000	0.000	0.000	0.000	141.333	141.333	27048.374	0.2044	0.2044
	50	0.000	0.000	0.000	0.000	274.444	274.444	27074.544	0.2074	0.2044
395	50	0.000	0.000	0.000	0.000	274.444	274.444	27074.544	0.2074	0.2044
	51	0.000	0.000	0.000	0.000	194.470	194.470	27040.944	0.2074	0.2074
405	51	0.000	0.000	0.000	0.000	170.334	170.334	27022.741	0.2045	0.2049

CURVED MEMBERS FOR DIM. A

Table with 11 columns: MEMBER NO., MEMBER E-POS, INTERNAL STRESS (PSI), PEAK STRESS (PSI), SUSTAINED STRESS (PSI), OCCASIONAL STRESS (PSI), THERMAL EXPANSION STRESS (PSI), TOTAL STRESS (PSI), MODIFIED ALLOWABLE STRESS (PSI), DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 13C, 14C, 15C, 16C, 17C.

STRAIGHT MEMBERS FOR DIM. A

Table with 11 columns: MEMBER NO., MEMBER E-POS, INTERNAL STRESS (PSI), PEAK STRESS (PSI), SUSTAINED STRESS (PSI), OCCASIONAL STRESS (PSI), THERMAL EXPANSION STRESS (PSI), TOTAL STRESS (PSI), MODIFIED ALLOWABLE STRESS (PSI), DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 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, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60.

CURVED MEMBERS FOR DIM. A

Table with 11 columns: MEMBER NO., MEMBER E-POS, INTERNAL STRESS (PSI), PEAK STRESS (PSI), SUSTAINED STRESS (PSI), OCCASIONAL STRESS (PSI), THERMAL EXPANSION STRESS (PSI), TOTAL STRESS (PSI), MODIFIED ALLOWABLE STRESS (PSI), DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 17C, 18C, 19C, 20C, 21C, 22C, 23C, 24C.

STRAIGHT MEMBERS FOR DIM. A

Table with 11 columns: MEMBER NO., MEMBER E-POS, INTERNAL STRESS (PSI), PEAK STRESS (PSI), SUSTAINED STRESS (PSI), OCCASIONAL STRESS (PSI), THERMAL EXPANSION STRESS (PSI), TOTAL STRESS (PSI), MODIFIED ALLOWABLE STRESS (PSI), DESIGN STRESS RATIO, MODIFIED STRESS RATIO. Rows include members 54, 55.

MECHANICAL AND STRESS ANALYSIS OF RECIRCULATION LINE LACHAR 419, 1974

STRAIGHT MEMBERS FOR RUN 1

MEMBER NO.	MEMBER TYPE	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED STRESS (PSI)	OPERATIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN RATIO	MODIFIED STRESS RATIO
575	124	0,000	1,000	0,000	0,000	210,544	210,544	2074,658	1,0039	1,00747
	126	0,000	1,000	0,000	0,000	210,984	210,984	2074,658	1,0740	1,0661

STRAIGHT MEMBERS FOR RUN 2

MEMBER NO.	MEMBER TYPE	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED STRESS (PSI)	OPERATIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN RATIO	MODIFIED STRESS RATIO
585	45	0,000	0,000	0,000	0,000	188,318	188,318	2724,212	1,0738	1,0688
	46	0,000	0,000	0,000	0,000	183,048	183,048	2731,112	1,0573	1,0524
595	42	0,000	0,000	0,000	0,000	174,343	174,343	2707,073	1,0071	1,0051
	44	0,000	0,000	0,000	0,000	180,043	180,043	2717,112	1,0027	1,0017
605	44	0,000	0,000	0,000	0,000	182,743	182,743	2719,047	1,0402	1,0392
	45	0,000	0,000	0,000	0,000	210,243	210,243	2719,047	1,0470	1,0460
615	47	0,000	0,000	0,000	0,000	158,713	158,713	2712,047	1,0074	1,0073
	48	0,000	0,000	0,000	0,000	182,743	182,743	2719,047	1,0402	1,0400
625	47	0,000	0,000	0,000	0,000	182,774	182,774	2719,047	1,0402	1,0400
	48	0,000	0,000	0,000	0,000	194,441	194,441	2719,047	1,0700	1,0643
635	107	0,000	0,000	0,000	0,000	244,100	244,100	2719,047	1,1161	1,1160
	108	0,000	0,000	0,000	0,000	241,043	241,043	2719,047	1,1049	1,1047
645	107	0,000	0,000	0,000	0,000	254,407	254,407	2719,047	1,2004	1,2042
	108	0,000	0,000	0,000	0,000	244,100	244,100	2719,047	1,1161	1,1160
655	107	0,000	0,000	0,000	0,000	1314,814	1314,814	2719,047	1,9739	1,9816
	108	0,000	0,000	0,000	0,000	127,740	127,740	2719,047	1,0367	1,0334

CURVED MEMBERS FOR RUN 1

MEMBER NO.	MEMBER TYPE	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED STRESS (PSI)	OPERATIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN RATIO	MODIFIED STRESS RATIO
23C	48	0,000	0,000	0,000	0,000	424,418	424,418	2719,047	1,0211	1,0191
	47	0,000	0,000	0,000	0,000	423,774	423,774	2719,047	1,1706	1,1648
44C	46	0,000	0,000	0,000	0,000	188,418	188,418	2719,047	1,1533	1,1410
	44	0,000	0,000	0,000	0,000	410,814	410,814	2719,047	1,0254	1,0204
27C	102	0,000	0,000	0,000	0,000	244,100	244,100	2719,047	1,0807	1,0849
	101	0,000	0,000	0,000	0,000	207,007	207,007	2719,047	1,0041	1,0010

MECHANICAL AND STRESS ANALYSIS OF RECIRCULATION LINE LACHAR 419, 1974

STRAIGHT MEMBERS FOR RUN 3

MEMBER NO.	MEMBER TYPE	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED STRESS (PSI)	OPERATIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN RATIO	MODIFIED STRESS RATIO
665	75	0,000	0,000	0,000	0,000	197,407	197,407	2714,554	1,0793	1,0070
	76	0,000	0,000	0,000	0,000	120,047	120,047	2705,437	1,0693	1,0040
675	104	0,000	0,000	0,000	0,000	188,000	188,000	2719,047	1,0078	1,0027
	106	0,000	0,000	0,000	0,000	211,044	211,044	2719,047	1,0013	1,0074
685	104	0,000	0,000	0,000	0,000	222,744	222,744	2719,047	1,0004	1,0020
	105	0,000	0,000	0,000	0,000	148,644	148,644	2719,047	1,0078	1,0022
695	107	0,000	0,000	0,000	0,000	224,040	224,040	2714,740	1,0174	1,0179
	104	0,000	0,000	0,000	0,000	241,044	241,044	2719,047	1,1002	1,0020
705	107	0,000	0,000	0,000	0,000	212,007	212,007	2714,740	1,0055	1,0047
	104	0,000	0,000	0,000	0,000	200,044	200,044	2719,047	1,1195	1,0197
715	117	0,000	0,000	0,000	0,000	203,047	203,047	2714,740	1,0090	1,0010
	105	0,000	0,000	0,000	0,000	214,407	214,407	2714,740	1,0045	1,00747
725	117	0,000	0,000	0,000	0,000	204,044	204,044	2714,740	1,1103	1,0113
	115	0,000	0,000	0,000	0,000	223,374	223,374	2719,047	1,0000	1,0010
735	117	0,000	0,000	0,000	0,000	373,044	373,044	2714,740	1,1004	1,1054
	112	0,000	0,000	0,000	0,000	324,015	324,015	2714,740	1,1200	1,1107

CURVED MEMBERS FOR RUN 3

MEMBER NO.	MEMBER TYPE	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED STRESS (PSI)	OPERATIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN RATIO	MODIFIED STRESS RATIO
24C	104	0,000	0,000	0,000	0,000	440,044	440,044	2714,740	1,1105	1,1104
	102	0,000	0,000	0,000	0,000	410,000	410,000	2714,740	1,0014	1,1140
29C	104	0,000	0,000	0,000	0,000	401,000	401,000	2719,047	1,1105	1,2045
	102	0,000	0,000	0,000	0,000	747,044	747,044	2719,047	1,0179	1,2000
30C	117	0,000	0,000	0,000	0,000	871,047	871,047	2714,740	1,1473	1,3243
	113	0,000	0,000	0,000	0,000	740,041	740,041	2714,740	1,2950	1,2718

2.2.3 SATISFACTION OF EQUATION 10 (ANALYSIS SET 2)

(Z-SEISMIC ANCHOR MOVEMENTS)

STRESS RATIO FOR EQUATION 10

MEMBER NO.	ENDS	INTERNAL PRESSURE STRESS (PSI)	BEAK PRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	ACCIDENTAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
10	1	0.000	0.000	0.000	0.000	3312.000	3312.000	2022.000	1.638	1.638
20	2	0.000	0.000	0.000	0.000	2022.000	2022.000	2022.000	1.000	1.000
30	3	0.000	0.000	0.000	0.000	1344.000	1344.000	2022.000	1.466	1.466
40	4	0.000	0.000	0.000	0.000	1155.000	1155.000	2022.000	1.750	1.750
50	5	0.000	0.000	0.000	0.000	807.000	807.000	2022.000	2.514	2.514
60	6	0.000	0.000	0.000	0.000	470.000	470.000	2022.000	4.264	4.264
70	7	0.000	0.000	0.000	0.000	144.000	144.000	2022.000	13.462	13.462
80	8	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
90	9	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
100	10	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
110	11	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
120	12	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
130	13	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
140	14	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
150	15	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
160	16	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
170	17	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
180	18	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
190	19	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931
200	20	0.000	0.000	0.000	0.000	0.000	0.000	2022.000	19.931	19.931

MEMBER

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CURVED MEMBERS FOR WIN 1

MEMBER NO.	ENDS	INTERNAL PRESSURE STRESS (PSI)	BEAK PRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	ACCIDENTAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
10	2	0.000	0.000	0.000	0.000	7037.700	7037.700	2700.000	2.607	2.607
20	3	0.000	0.000	0.000	0.000	3111.210	3111.210	2700.000	1.152	1.152
30	4	0.000	0.000	0.000	0.000	8006.700	8006.700	2700.000	2.966	2.966
40	5	0.000	0.000	0.000	0.000	8314.810	8314.810	2700.000	3.080	3.080
50	6	0.000	0.000	0.000	0.000	1747.130	1747.130	2700.000	1.554	1.554
60	7	0.000	0.000	0.000	0.000	2744.700	2744.700	2700.000	1.017	1.017
70	8	0.000	0.000	0.000	0.000	2600.820	2600.820	2700.000	0.963	0.963
80	9	0.000	0.000	0.000	0.000	5016.000	5016.000	2700.000	1.858	1.858
90	10	0.000	0.000	0.000	0.000	8018.000	8018.000	2700.000	2.970	2.970
100	11	0.000	0.000	0.000	0.000	7819.400	7819.400	2700.000	2.896	2.896
110	12	0.000	0.000	0.000	0.000	2614.000	2614.000	2700.000	0.968	0.968
120	13	0.000	0.000	0.000	0.000	3606.000	3606.000	2700.000	1.336	1.336
130	14	0.000	0.000	0.000	0.000	11410.000	11410.000	2700.000	4.226	4.226
140	15	0.000	0.000	0.000	0.000	8721.000	8721.000	2700.000	3.230	3.230
150	16	0.000	0.000	0.000	0.000	1451.200	1451.200	2700.000	1.300	1.300
160	17	0.000	0.000	0.000	0.000	13303.700	13303.700	2700.000	4.927	4.927

STRAIGHT MEMBERS FOR WIN 2

MEMBER NO.	ENDS	INTERNAL PRESSURE STRESS (PSI)	BEAK PRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	ACCIDENTAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
170	11	0.000	0.000	0.000	0.000	2300.700	2300.700	2700.000	0.852	0.852
180	12	0.000	0.000	0.000	0.000	4820.100	4820.100	2700.000	1.785	1.785
190	13	0.000	0.000	0.000	0.000	2011.000	2011.000	2700.000	1.337	1.337
200	14	0.000	0.000	0.000	0.000	4780.211	4780.211	2700.000	1.770	1.770

STRESS AND STRAIN ANALYSIS OF ACCUMULATION LINES LOCATED AUG. 1974

STRAIGHT MEMBERS FOR WIP-3

MEMBER NO.	MEMBER ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO (10^4/1.785SA)	MODIFIED STRESS RATIO (10^4/1.785SA)
198	17	0.000	0.000	0.000	0.000	949,827	949,827	2745,208	0.346	0.346
	18	0.000	0.000	0.000	0.000	949,827	949,827	2745,208	0.346	0.346
207	18	0.000	0.000	0.000	0.000	2167,778	2167,778	2817,706	0.769	0.769
	19	0.000	0.000	0.000	0.000	2167,778	2167,778	2817,706	0.769	0.769

STRAIGHT MEMBERS FOR WIP-4

MEMBER NO.	MEMBER ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO (10^4/1.785SA)	MODIFIED STRESS RATIO (10^4/1.785SA)
215	7	0.000	0.000	0.000	0.000	749,174	749,174	2731,134	0.274	0.274
225	11	0.000	0.000	0.000	0.000	574,767	574,767	2731,134	0.210	0.210
234	22	0.000	0.000	0.000	0.000	357,844	357,844	2731,134	0.131	0.131
245	32	0.000	0.000	0.000	0.000	459,349	459,349	2731,134	0.168	0.168
254	34	0.000	0.000	0.000	0.000	324,939	324,939	2731,134	0.119	0.119
265	34	0.000	0.000	0.000	0.000	247,211	247,211	2731,134	0.090	0.090
274	37	0.000	0.000	0.000	0.000	244,444	244,444	2731,134	0.089	0.089
284	41	0.000	0.000	0.000	0.000	348,347	348,347	2731,134	0.127	0.127
294	41	0.000	0.000	0.000	0.000	291,124	291,124	2731,134	0.107	0.107
304	44	0.000	0.000	0.000	0.000	457,444	457,444	2731,134	0.167	0.167

CURVED MEMBERS FOR WIP-3

MEMBER NO.	MEMBER ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO (10^4/1.785SA)	MODIFIED STRESS RATIO (10^4/1.785SA)
90	11	0.000	0.000	0.000	0.000	1437,207	1437,207	2724,904	0.528	0.528
100	14	0.000	0.000	0.000	0.000	1411,972	1411,972	2724,904	0.518	0.518
110	14	0.000	0.000	0.000	0.000	630,187	630,187	2724,904	0.231	0.231
120	14	0.000	0.000	0.000	0.000	497,949	497,949	2724,904	0.183	0.183
130	14	0.000	0.000	0.000	0.000	444,414	444,414	2724,904	0.163	0.163
140	14	0.000	0.000	0.000	0.000	924,444	924,444	2724,904	0.339	0.339

STRAIGHT MEMBERS FOR WIP-4

MEMBER NO.	MEMBER ENDS	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO (10^4/1.785SA)	MODIFIED STRESS RATIO (10^4/1.785SA)
315	27	0.000	0.000	0.000	0.000	1049,778	1049,778	2731,134	0.384	0.384
325	47	0.000	0.000	0.000	0.000	721,844	721,844	2731,134	0.264	0.264
334	48	0.000	0.000	0.000	0.000	547,944	547,944	2731,134	0.200	0.200
344	48	0.000	0.000	0.000	0.000	444,421	444,421	2731,134	0.162	0.162
354	48	0.000	0.000	0.000	0.000	474,414	474,414	2731,134	0.173	0.173
364	49	0.000	0.000	0.000	0.000	324,414	324,414	2731,134	0.119	0.119
374	49	0.000	0.000	0.000	0.000	187,374	187,374	2731,134	0.068	0.068
384	49	0.000	0.000	0.000	0.000	243,341	243,341	2731,134	0.089	0.089
394	49	0.000	0.000	0.000	0.000	324,414	324,414	2731,134	0.119	0.119
404	49	0.000	0.000	0.000	0.000	243,414	243,414	2731,134	0.089	0.089

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
130	1970	10:00	1000 1000	1000	...
131	1970	10:05	1000 1000	1000	...
132	1970	10:10	1000 1000	1000	...
133	1970	10:15	1000 1000	1000	...
134	1970	10:20	1000 1000	1000	...
135	1970	10:25	1000 1000	1000	...
136	1970	10:30	1000 1000	1000	...
137	1970	10:35	1000 1000	1000	...
138	1970	10:40	1000 1000	1000	...
139	1970	10:45	1000 1000	1000	...
140	1970	10:50	1000 1000	1000	...

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
141	1970	10:55	1000 1000	1000	...
142	1970	11:00	1000 1000	1000	...
143	1970	11:05	1000 1000	1000	...
144	1970	11:10	1000 1000	1000	...
145	1970	11:15	1000 1000	1000	...
146	1970	11:20	1000 1000	1000	...
147	1970	11:25	1000 1000	1000	...
148	1970	11:30	1000 1000	1000	...
149	1970	11:35	1000 1000	1000	...
150	1970	11:40	1000 1000	1000	...

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
151	1970	11:45	1000 1000	1000	...
152	1970	11:50	1000 1000	1000	...
153	1970	11:55	1000 1000	1000	...
154	1970	12:00	1000 1000	1000	...
155	1970	12:05	1000 1000	1000	...
156	1970	12:10	1000 1000	1000	...
157	1970	12:15	1000 1000	1000	...
158	1970	12:20	1000 1000	1000	...
159	1970	12:25	1000 1000	1000	...
160	1970	12:30	1000 1000	1000	...

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
161	1970	12:35	1000 1000	1000	...
162	1970	12:40	1000 1000	1000	...
163	1970	12:45	1000 1000	1000	...
164	1970	12:50	1000 1000	1000	...
165	1970	12:55	1000 1000	1000	...
166	1970	13:00	1000 1000	1000	...
167	1970	13:05	1000 1000	1000	...
168	1970	13:10	1000 1000	1000	...
169	1970	13:15	1000 1000	1000	...
170	1970	13:20	1000 1000	1000	...

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
171	1970	13:25	1000 1000	1000	...
172	1970	13:30	1000 1000	1000	...
173	1970	13:35	1000 1000	1000	...
174	1970	13:40	1000 1000	1000	...
175	1970	13:45	1000 1000	1000	...
176	1970	13:50	1000 1000	1000	...
177	1970	13:55	1000 1000	1000	...
178	1970	14:00	1000 1000	1000	...
179	1970	14:05	1000 1000	1000	...
180	1970	14:10	1000 1000	1000	...

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
181	1970	14:15	1000 1000	1000	...
182	1970	14:20	1000 1000	1000	...
183	1970	14:25	1000 1000	1000	...
184	1970	14:30	1000 1000	1000	...
185	1970	14:35	1000 1000	1000	...
186	1970	14:40	1000 1000	1000	...
187	1970	14:45	1000 1000	1000	...
188	1970	14:50	1000 1000	1000	...
189	1970	14:55	1000 1000	1000	...
190	1970	15:00	1000 1000	1000	...

STATION POINTS FOR...

STATION	DATE	TIME	COORDINATE	HEIGHT	REMARKS
191	1970	15:05	1000 1000	1000	...
192	1970	15:10	1000 1000	1000	...
193	1970	15:15	1000 1000	1000	...
194	1970	15:20	1000 1000	1000	...
195	1970	15:25	1000 1000	1000	...
196	1970	15:30	1000 1000	1000	...
197	1970	15:35	1000 1000	1000	...
198	1970	15:40	1000 1000	1000	...
199	1970	15:45	1000 1000	1000	...
200	1970	15:50	1000 1000	1000	...

STRESS AND STRESS ANALYSIS OF CIRCULATION LINE LACHR AUG. 1974

STRAIGHT MEMBERS FOR RUN 8

MEMBER NO.	MEMBER NO.	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
875	124	0.000	0.000	0.000	0.000	189,876	189,876	20378,888	0.0940	0.478
	125	0.000	0.000	0.000	0.000	2903,730	2903,730	70204,548	0.1174	0.1245

STRAIGHT MEMBERS FOR RUN 9

MEMBER NO.	MEMBER NO.	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
884	88	0.000	0.000	0.000	0.000	548,204	548,204	27244,212	0.2184	0.2111
	89	0.000	0.000	0.000	0.000	349,408	349,408	27316,712	0.1474	0.1354
	90	0.000	0.000	0.000	0.000	227,842	227,842	27197,792	0.0984	0.0814
	91	0.000	0.000	0.000	0.000	243,408	243,408	27197,792	0.1147	0.1044
	92	0.000	0.000	0.000	0.000	174,006	174,006	27197,792	0.0716	0.0647
	93	0.000	0.000	0.000	0.000	197,874	197,874	27197,792	0.0754	0.0674
	94	0.000	0.000	0.000	0.000	271,842	271,842	27197,792	0.1004	0.0904
	95	0.000	0.000	0.000	0.000	174,006	174,006	27197,792	0.0716	0.0647
	96	0.000	0.000	0.000	0.000	347,408	347,408	27197,792	0.1444	0.1344
	97	0.000	0.000	0.000	0.000	307,842	307,842	27197,792	0.1307	0.1127
	98	0.000	0.000	0.000	0.000	221,408	221,408	27197,792	0.0814	0.0744
	99	0.000	0.000	0.000	0.000	477,842	477,842	27197,792	0.2104	0.2104
	100	0.000	0.000	0.000	0.000	349,408	349,408	27197,792	0.1307	0.1174
	101	0.000	0.000	0.000	0.000	221,408	221,408	27197,792	0.0814	0.0744
	102	0.000	0.000	0.000	0.000	307,842	307,842	27197,792	0.1307	0.1174

CURVED MEMBERS FOR RUN 9

MEMBER NO.	MEMBER NO.	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
890	95	0.000	0.000	0.000	0.000	474,741	474,741	27024,744	0.2190	0.1747
	96	0.000	0.000	0.000	0.000	534,451	534,451	27197,792	0.2133	0.1847
	97	0.000	0.000	0.000	0.000	449,002	449,002	27197,792	0.2047	0.2047
	98	0.000	0.000	0.000	0.000	463,947	463,947	27197,792	0.2021	0.2044
	99	0.000	0.000	0.000	0.000	1044,033	1044,033	27197,792	0.4240	0.4240
	100	0.000	0.000	0.000	0.000	934,444	934,444	27201,147	0.3723	0.3435

STRESS AND STRESS ANALYSIS OF CIRCULATION LINE LACHR AUG. 1974

STRAIGHT MEMBERS FOR RUN 10

MEMBER NO.	MEMBER NO.	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
895	74	0.000	0.000	0.000	0.000	534,222	534,222	27074,444	0.2134	0.1944
	75	0.000	0.000	0.000	0.000	394,004	394,004	27,491,444	0.1444	0.1444
	76	0.000	0.000	0.000	0.000	414,707	414,707	27197,792	0.1444	0.1517
	77	0.000	0.000	0.000	0.000	524,674	524,674	27197,792	0.2147	0.1944
	78	0.000	0.000	0.000	0.000	534,413	534,413	27084,400	0.2147	0.1944
	79	0.000	0.000	0.000	0.000	414,707	414,707	27084,400	0.1444	0.1517
	80	0.000	0.000	0.000	0.000	714,408	714,408	27197,792	0.2647	0.2647
	81	0.000	0.000	0.000	0.000	402,407	402,407	27197,792	0.2445	0.2247
	82	0.000	0.000	0.000	0.000	544,741	544,741	27244,212	0.2173	0.1944
	83	0.000	0.000	0.000	0.000	741,334	741,334	27334,710	0.2654	0.2717
	84	0.000	0.000	0.000	0.000	514,520	514,520	27207,792	0.2044	0.1802
	85	0.000	0.000	0.000	0.000	444,343	444,343	27274,122	0.2173	0.1944
	86	0.000	0.000	0.000	0.000	404,222	404,222	27197,792	0.2144	0.2174
	87	0.000	0.000	0.000	0.000	514,520	514,520	27207,792	0.2044	0.1802
	88	0.000	0.000	0.000	0.000	1071,644	1071,644	27331,910	0.4214	0.3944
	89	0.000	0.000	0.000	0.000	714,407	714,407	27324,141	0.2647	0.2414

CURVED MEMBERS FOR RUN 10

MEMBER NO.	MEMBER NO.	INTERNAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED STRESS (PSI)	DESIGN STRESS RATIO	MODIFIED STRESS RATIO
896	104	0.000	0.000	0.000	0.000	1275,004	1275,004	27421,411	0.5130	0.4910
	105	0.000	0.000	0.000	0.000	1244,107	1244,107	27424,212	0.4517	0.4347
	106	0.000	0.000	0.000	0.000	1444,224	1444,224	27227,617	0.5000	0.4747
	107	0.000	0.000	0.000	0.000	1404,274	1404,274	27234,518	0.4744	0.4544
	108	0.000	0.000	0.000	0.000	1411,144	1411,144	27214,307	0.4715	0.4522
	109	0.000	0.000	0.000	0.000	1544,244	1544,244	27224,541	0.5633	0.5434

STRAIN AND STRESS ANALYSIS OF REINFORCEMENT LINES LACNO AUG. 1974

NORMAL OPERATING AND UPSET CONDITIONS

0.344 SATISFACTION OF EQUATION 11

(ANALYSIS SET 11)

(X-SEISMIC ANCHOR MOVEMENTS)

STRAIGHT MEMBERS FOR PIPE 1

MEMBER NUMBER	FLANS	INTERNAL PRESSURE STRESS (PSI)	WEAK PRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2+S3)
15	1	3745,254	0,000	242,574	0,000	3361,327	4749,249	28222,215	.15224	.14574
25	3	5447,403	0,000	372,348	0,000	184,708	4722,447	27404,254	.14984	.14164
35	5	4328,324	0,000	272,442	0,000	1087,458	7297,743	27474,271	.14871	.14914
45	7	4328,324	0,000	272,442	0,000	1171,378	7599,729	27474,271	.14874	.14491
55	9	4328,324	0,000	272,442	0,000	1255,298	7902,027	27474,271	.14874	.14944
65	11	4328,324	0,000	272,442	0,000	1339,218	8204,325	27474,271	.14874	.14944
75	13	4328,324	0,000	272,442	0,000	1423,138	8506,623	27474,271	.14874	.14944
85	15	4328,324	0,000	272,442	0,000	1507,058	8808,921	27474,271	.14874	.14944
95	17	4328,324	0,000	272,442	0,000	1590,978	9111,219	27474,271	.14874	.14944
105	19	4328,324	0,000	272,442	0,000	1674,898	9413,517	27474,271	.14874	.14944
115	21	4328,324	0,000	272,442	0,000	1758,818	9715,815	27474,271	.14874	.14944
125	23	4328,324	0,000	272,442	0,000	1842,738	10018,113	27474,271	.14874	.14944
135	25	4328,324	0,000	272,442	0,000	1926,658	10320,411	27474,271	.14874	.14944
145	27	4328,324	0,000	272,442	0,000	2010,578	10622,709	27474,271	.14874	.14944
155	29	4328,324	0,000	272,442	0,000	2094,498	10925,007	27474,271	.14874	.14944
165	31	4328,324	0,000	272,442	0,000	2178,418	11227,305	27474,271	.14874	.14944
175	33	4328,324	0,000	272,442	0,000	2262,338	11529,603	27474,271	.14874	.14944
185	35	4328,324	0,000	272,442	0,000	2346,258	11831,901	27474,271	.14874	.14944
195	37	4328,324	0,000	272,442	0,000	2430,178	12134,199	27474,271	.14874	.14944
205	39	4328,324	0,000	272,442	0,000	2514,098	12436,497	27474,271	.14874	.14944

PIPE 11

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0.344 SATISFACTION OF EQUATION 11

MEMBER NUMBER	FLANS	INTERNAL PRESSURE STRESS (PSI)	WEAK PRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2+S3)
1C	2	4447,403	0,000	452,407	0,000	794,444	14817,459	27474,271	.34333	.32544
2C	4	4447,403	0,000	745,460	0,000	337,422	10972,171	27474,271	.14433	.14442
3C	6	4447,403	0,000	745,460	0,000	8122,671	14807,929	27474,271	.34454	.32433
4C	8	4447,403	0,000	1414,360	0,000	1151,412	4564,844	27474,271	.14833	.14444
5C	10	4447,403	0,000	1414,360	0,000	4148,170	12214,340	27474,271	.24372	.24274
6C	12	4447,403	0,000	271,411	0,000	2447,374	4942,479	27474,271	.24749	.24444
7C	14	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
8C	16	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
9C	18	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
10C	20	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
11C	22	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
12C	24	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
13C	26	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
14C	28	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
15C	30	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
16C	32	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
17C	34	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
18C	36	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
19C	38	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394
20C	40	4447,403	0,000	474,434	0,000	4014,351	11591,422	27474,271	.24434	.24394

STRAIGHT MEMBERS FOR PIPE 2

MEMBER NUMBER	FLANS	INTERNAL PRESSURE STRESS (PSI)	WEAK PRESSURE STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2+S3)
124	11	4447,403	0,000	1074,374	0,000	2142,447	9234,455	27474,271	.21379	.20279
125	12	4447,403	0,000	722,474	0,000	474,470	11511,491	27474,271	.24448	.24374
126	13	4447,403	0,000	435,444	0,000	2447,441	4414,470	27474,271	.14422	.13444
127	14	4447,403	0,000	435,444	0,000	4812,447	8344,473	27474,271	.14914	.14824

STATIC AND STRESS ANALYSIS OF RECIRCULATION LINE LACROW AUG. 1974

STRAIGHT REHEATERS FROM RUN 3

REHEATER NO.	REHEATER ENDS	INTERNAL OPERATING STRESS (PSI)	PEAK OPERATING STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (MC)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2)
195	17	2947,000	0,000	1012,073	0,000	720,217	2734,284	27451,920	.17904	.14904
	18	2947,000	0,000	753,473	0,000	2007,050	2754,523	27447,884	.22704	.19104
207	18	2947,000	0,000	4947,224	0,000	1707,353	4754,577	28144,240	.11012	.10277
	19	2947,224	0,000	403,321	0,000	2127,419	5724,978	28127,804	.13254	.12377

STRAIGHT REHEATERS FROM RUN 4

REHEATER NO.	REHEATER ENDS	INTERNAL OPERATING STRESS (PSI)	PEAK OPERATING STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (MC)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2)
215	7	2245,174	0,000	341,544	0,000	1360,670	2607,214	27311,134	.20222	.19002
	8	2245,174	0,000	274,788	0,000	941,709	2220,901	27317,447	.19754	.18704
225	31	2245,174	0,000	244,847	0,000	845,444	2090,621	27311,404	.19554	.18402
	32	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
235	32	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	33	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
245	33	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	34	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
255	34	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	35	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
265	35	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	36	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
275	36	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	37	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
285	37	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	38	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
295	38	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404
	39	2245,174	0,000	441,071	0,000	407,004	2653,178	27244,517	.19420	.18404

STATIC AND STRESS ANALYSIS OF RECIRCULATION LINE LACROW AUG. 1974

STRAIGHT REHEATERS FROM RUN 5

REHEATER NO.	REHEATER ENDS	INTERNAL OPERATING STRESS (PSI)	PEAK OPERATING STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (MC)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2)
90	30	2245,174	0,000	747,147	0,000	2472,344	2992,518	27214,904	.24557	.23104
	31	2245,174	0,000	744,112	0,000	2317,544	2987,656	27220,477	.24314	.22804
100	34	2245,174	0,000	443,014	0,000	754,804	2200,984	27244,444	.19781	.18704
	35	2245,174	0,000	454,494	0,000	474,804	2175,298	27277,900	.19741	.18704
110	34	2245,174	0,000	443,014	0,000	754,804	2200,984	27244,444	.19781	.18704
	35	2245,174	0,000	443,014	0,000	754,804	2200,984	27244,444	.19781	.18704
120	40	2245,174	0,000	334,240	0,000	547,854	1722,440	27244,574	.17292	.16431
	41	2245,174	0,000	334,240	0,000	547,854	1722,440	27244,574	.17292	.16431

STRAIGHT REHEATERS FROM RUN 6

REHEATER NO.	REHEATER ENDS	INTERNAL OPERATING STRESS (PSI)	PEAK OPERATING STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (MC)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(S1+S2)	MODIFIED STRESS RATIO T11/(S1+S2)
315	42	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	43	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
325	43	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	44	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
335	44	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	45	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
345	45	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	46	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
355	47	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	48	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
365	44	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	45	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
375	45	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	46	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
385	46	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	47	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
395	47	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177
	48	2245,174	0,000	242,120	0,000	497,947	2743,121	27310,323	.19111	.18177

CURVED MEMBERS FOR DIM. 6

MEMBER NO.	MEMBER ENDS	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
		STRESS (PSI)	STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)				
13C	67	224,178	1,000	493,748	0,000	1134,739	6094,481	27244,454	.21957	.20860
	68	224,178	0,000	441,448	0,000	862,949	494,749	27244,454	.27444	.19741
14C	67	224,178	1,000	553,224	0,000	531,222	4381,422	27244,454	.18444	.18477
	68	224,178	0,000	524,343	0,000	473,974	2293,437	27244,454	.19200	.18375
15C	67	434,444	0,000	900,442	0,000	381,774	4542,442	27244,454	.16706	.16840
	68	434,444	0,000	434,444	0,000	444,444	2184,437	27244,454	.17102	.16743
16C	67	434,444	0,000	374,733	0,000	381,502	7071,442	27244,454	.14914	.14974
	68	434,444	0,000	199,784	0,000	374,112	6874,421	27244,454	.16454	.15625

STRAIGHT MEMBERS FOR DIM. 6

MEMBER NO.	MEMBER ENDS	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
		STRESS (PSI)	STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)				
40S	107	4224,444	1,000	474,444	1,000	1474,444	4331,749	27444,454	.14342	.14977
	108	4224,444	0,000	471,444	0,000	862,949	7344,444	27444,454	.17144	.14144
41S	110	4224,444	0,000	374,444	0,000	944,444	7544,451	27444,454	.17544	.14571
	111	4224,444	0,000	154,444	0,000	402,755	2242,442	27444,454	.16425	.15044
42S	114	3044,444	0,000	172,442	0,000	341,704	4871,444	27444,454	.15044	.14421
	115	3044,444	0,000	133,344	0,000	152,210	4744,415	27444,454	.14944	.14244
43S	114	4044,444	1,000	112,444	0,000	422,442	4754,444	27444,454	.15444	.14775
	115	4044,444	0,000	122,442	0,000	1842,444	4051,746	27444,454	.18454	.17422
44S	114	4044,444	0,000	72,144	0,000	1544,444	7981,444	27444,454	.18474	.17471
	115	4044,444	1,000	142,442	0,000	1124,444	7451,444	27444,454	.17724	.14771
45S	114	4224,444	0,000	113,444	0,000	444,742	7144,442	27444,454	.16634	.15725
	115	4224,444	0,000	244,444	0,000	444,444	7341,452	27444,454	.17442	.14121
46S	121	4344,444	1,000	414,444	0,000	1124,444	7042,442	27444,454	.18444	.17414
	122	4344,444	0,000	334,444	0,000	412,744	3262,444	27444,454	.16424	.14927
47S	122	4444,444	0,000	342,114	0,000	424,442	4744,442	27444,454	.15444	.14432
	123	4444,444	0,000	144,442	0,000	4344,442	1244,442	27444,454	.14432	.27334
48S	123	4444,444	0,000	441,204	0,000	7004,174	13474,122	27444,454	.31662	.29442
	124	4444,444	0,000	374,444	0,000	2444,444	4444,444	27444,454	.27731	.19444
49S	122	4444,444	0,000	342,114	0,000	1844,444	4134,442	27444,454	.18474	.17031
	123	4444,444	0,000	442,444	0,000	4744,444	1234,444	27444,454	.24442	.27144
50S	124	4444,444	0,000	272,144	0,000	4444,444	1234,444	27444,454	.24442	.27144
	125	4444,444	1,000	342,442	0,000	744,442	2444,442	27444,454	.15144	.14442
51S	131	4344,444	0,000	332,444	0,000	744,442	2444,442	27444,454	.16672	.15731
	132	4344,444	0,000	414,444	0,000	944,444	2644,444	27444,454	.17742	.14474
52S	131	4344,444	0,000	314,444	0,000	444,444	7144,442	27444,454	.16644	.14742
	132	4344,444	0,000	414,444	0,000	1244,442	7444,442	27444,454	.18474	.17432
53S	131	4344,444	0,000	272,144	0,000	1224,442	7774,444	27444,454	.17442	.17242
	132	4344,444	0,000	74,442	0,000	1544,442	3444,442	27444,454	.14426	.17431
54S	134	4444,444	0,000	214,204	0,000	1844,442	4014,444	27444,454	.18544	.17541
	135	4444,444	1,000	144,444	0,000	552,442	6694,415	27444,454	.15514	.14444

R175J

50S	137	3444,444	0,000	132,341	0,000	1464,474	4494,169	27444,454	.10874	.10137
	138	3444,444	0,000	122,133	0,000	3344,413	4461,149	27444,454	.10421	.14373

CURVED MEMBERS FOR DIM. 6

MEMBER NO.	MEMBER ENDS	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
		STRESS (PSI)	STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)				
17C	114	4444,444	1,000	442,322	0,000	4444,474	13374,444	27444,454	.30964	.29244
	115	4444,444	0,000	312,144	0,000	1414,444	3921,427	27444,454	.18144	.17374
18C	117	4444,444	0,000	474,474	0,000	4444,744	11224,445	27444,454	.25477	.24574
	118	4444,444	0,000	244,444	0,000	4414,444	11661,449	27444,454	.26927	.24474
19C	121	4444,444	1,000	1044,134	0,000	1444,444	4552,434	27444,454	.21457	.14477
	122	4444,444	0,000	442,112	0,000	1414,442	7444,444	27444,454	.18144	.17234
20C	124	4444,444	0,000	344,442	0,000	2424,422	4444,442	27444,454	.27444	.14474
	125	4444,444	0,000	474,134	0,000	2744,134	4471,442	27444,454	.27444	.14474
21C	124	4444,444	0,000	444,774	0,000	2744,574	4423,442	27444,454	.24424	.14321
	125	4444,444	0,000	344,342	0,000	1454,432	4194,412	27444,454	.18441	.17024
22C	131	4444,444	0,000	441,714	0,000	744,452	7444,442	27444,454	.17444	.14744
	132	4444,444	0,000	1144,724	0,000	1444,444	4444,444	27444,454	.24442	.14477
23C	134	4444,444	0,000	244,444	0,000	4314,442	11561,122	27444,454	.26744	.24744
	135	4444,444	0,000	474,444	0,000	4424,522	11492,442	27444,454	.25441	.24114
24C	134	4444,444	1,000	134,134	0,000	1542,574	7474,444	27444,454	.18232	.17234
	135	4444,444	0,000	444,744	0,000	4414,444	13121,154	27444,454	.31374	.28737

STRAIGHT MEMBERS FOR DIM. 6

MEMBER NO.	MEMBER ENDS	INTERNAL	PEAK	SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
		STRESS (PSI)	STRESS (PSI)	LOAD STRESS (PSI)	LOAD STRESS (PSI)	EXPANSION STRESS (PSI)				
50S	127	3044,444	0,000	441,744	0,000	422,243	4204,219	24244,444	.14933	.14444
	128	3044,444	1,000	331,243	0,000	2444,314	5871,439	24244,444	.13593	.12474

SEISMIC AND STRESS ANALYSIS OF RECIRCULATION LINES LACAMP AUG. 1974

STRAIGHT MEMBERS FOR RUN 1

MEMBER NO.	MEMBER NO.	INTEGRAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(SH+SAM)	MODIFIED STRESS RATIO T11/(SH+SAM)
975	129	2740,274	4,000	312,488	0,000	21,044	3018,270	2875,888	1,0487	1,0487
	129	2740,274	0,000	345,122	0,000	272,041	617,122	2828,044		1,13327

STRAIGHT MEMBERS FOR RUN 2

MEMBER NO.	MEMBER NO.	INTEGRAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(SH+SAM)	MODIFIED STRESS RATIO T11/(SH+SAM)
595	89	7245,174	4,000	412,451	0,000	185,318	803,143	2724,212	1,8713	1,7814
	89	7245,174	0,000	343,586	0,000	143,048	790,877	2735,112	1,8443	1,7181
595	92	7245,174	0,000	192,743	0,000	174,343	667,143	2707,173	1,5945	1,5149
	92	7245,174	0,000	92,847	0,000	52,847	527,143	2717,112	1,5743	1,4474
605	94	7245,174	4,000	142,147	0,000	142,043	684,297	2720,847	1,5858	1,5148
	94	7245,174	0,000	142,043	0,000	214,249	675,476	2717,114	1,5841	1,5231
615	97	7245,174	4,000	142,043	0,000	155,074	697,117	2720,249	1,5816	1,5014
	97	7245,174	0,000	142,147	0,000	142,043	684,298	2720,847	1,5858	1,5445
625	94	7245,174	4,000	321,122	0,000	192,774	714,122	2732,114	1,6184	1,7197
	94	7245,174	0,000	321,122	0,000	174,441	775,441	2732,244	1,6153	1,7144
635	100	7245,174	4,000	432,241	0,000	244,109	799,415	2724,149	1,6519	1,7421
	100	7245,174	0,000	432,241	0,000	261,053	813,409	2724,913	1,6837	1,7976
645	101	7245,174	4,000	374,223	0,000	244,407	834,407	2727,149	1,6443	1,7441
	101	7245,174	0,000	432,241	0,000	244,109	799,417	2727,149	1,6519	1,7421
655	102	7245,174	4,000	421,317	0,000	1314,418	935,126	2731,244	1,2006	1,9449
	102	7245,174	0,000	374,223	0,000	927,244	852,144	2732,244	1,9127	1,8754

CURVED MEMBERS FOR RUN 3

MEMBER NO.	MEMBER NO.	INTEGRAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(SH+SAM)	MODIFIED STRESS RATIO T11/(SH+SAM)
250	88	7245,174	4,000	434,943	0,000	424,416	727,116	2727,754	1,7387	1,6629
	88	7245,174	0,000	434,144	0,000	424,734	719,124	2714,413	1,7274	1,6367
260	95	7245,174	4,000	472,444	0,000	344,418	867,244	2718,614	2,0030	1,9144
	95	7245,174	0,000	442,117	0,000	515,584	867,364	2724,349	2,0086	1,9149
270	101	7245,174	4,000	414,419	0,000	244,122	1057,485	2721,361	2,4441	2,3335
	101	7245,174	0,000	492,241	0,000	2017,907	10212,322	2721,187	2,3642	2,2543

SEISMIC AND STRESS ANALYSIS OF RECIRCULATION LINES LACAMP AUG. 1974

STRAIGHT MEMBERS FOR RUN 1A

MEMBER NO.	MEMBER NO.	INTEGRAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(SH+SAM)	MODIFIED STRESS RATIO T11/(SH+SAM)
605	90	7245,174	4,000	194,744	0,000	197,079	4487,141	2707,154	1,5998	1,5107
	90	7245,174	0,000	74,441	0,000	170,447	4529,446	2743,413	1,5419	1,4424
675	105	7245,174	4,000	142,043	0,000	142,044	621,107	2708,364	1,5441	1,5139
	105	7245,174	0,000	174,343	0,000	211,044	688,446	2718,917	1,5994	1,5184
685	106	7245,174	4,000	117,118	0,000	222,045	4444,142	2708,049	1,5494	1,5487
	106	7245,174	0,000	144,043	0,000	144,444	621,077	2708,364	1,5441	1,5439
695	107	7245,174	4,000	27,447	0,000	294,548	784,127	2713,670	1,6197	1,7344
	107	7245,174	0,000	243,343	0,000	251,547	784,126	2713,670	1,6127	1,7274
705	109	7245,174	4,000	244,043	0,000	214,877	854,126	2724,120	1,6441	1,7754
	109	7245,174	0,000	244,043	0,000	244,442	784,442	2724,120	1,6441	1,7754
715	110	7245,174	4,000	444,444	0,000	224,333	704,122	2724,120	1,6436	1,7542
	110	7245,174	0,000	444,444	0,000	214,119	674,119	2724,120	1,6441	1,7754
725	111	7245,174	4,000	274,444	0,000	274,444	744,120	2724,120	1,6441	1,7754
	111	7245,174	0,000	444,444	0,000	274,444	744,120	2724,120	1,6441	1,7754
735	112	7245,174	4,000	424,444	0,000	477,124	874,144	2730,110	1,6979	1,8047
	112	7245,174	0,000	311,221	0,000	325,914	793,110	2732,111	1,7363	1,7462

CURVED MEMBERS FOR RUN 1A

MEMBER NO.	MEMBER NO.	INTEGRAL STRESS (PSI)	PEAK STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	OCCASIONAL LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	MODIFIED ALLOWABLE STRESS (PSI)	DESIGN STRESS RATIO T11/(SH+SAM)	MODIFIED STRESS RATIO T11/(SH+SAM)
280	114	7245,174	4,000	434,442	0,000	444,444	724,120	2721,411	1,7247	1,6434
	114	7245,174	0,000	434,442	0,000	474,444	724,120	2721,411	1,7247	1,6434
290	114	7245,174	4,000	774,444	0,000	474,444	724,120	2721,411	2,1539	1,9573
	114	7245,174	0,000	774,444	0,000	774,444	724,120	2721,411	2,1539	1,9573
300	113	7245,174	4,000	434,444	0,000	474,444	724,120	2721,411	1,6979	1,8047
	113	7245,174	0,000	434,444	0,000	474,444	724,120	2721,411	1,6979	1,8047

SEISMIC TIE STRESS ANALYSIS IN REINFORCING STEEL LATCH-UP STUDS

NORMAL OPERATING AND UPSET CONDITIONS

UPPER SATISFACTION OF CONNECTION IS ANALYSIS SET 21

(Z-SEISMIC ANCHOR MOVEMENTS)

STRAIGHT REBAR FOR SET 1

MEMBER NO.	REBAR NO.	INTERNAL STRESS (PSI)	DEVELOPMENT STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	PERMISSIBLE LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	UNIFIED STRESS (PSI)	DEFLECTION RATIO	MODIFIED STRESS RATIO
1A	1	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
2A	2	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
3A	3	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
4A	4	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
5A	5	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
6A	6	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
7A	7	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
8A	8	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
9A	9	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
10A	10	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
11A	11	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
12A	12	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
13A	13	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
14A	14	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
15A	15	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
16A	16	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
17A	17	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
18A	18	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
19A	19	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
20A	20	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443

CURVED REBAR FOR SET 1

MEMBER NO.	REBAR NO.	INTERNAL STRESS (PSI)	DEVELOPMENT STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	PERMISSIBLE LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	UNIFIED STRESS (PSI)	DEFLECTION RATIO	MODIFIED STRESS RATIO
1C	1	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
2C	2	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
3C	3	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
4C	4	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
5C	5	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
6C	6	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
7C	7	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
8C	8	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
9C	9	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
10C	10	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
11C	11	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
12C	12	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
13C	13	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
14C	14	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
15C	15	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
16C	16	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
17C	17	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
18C	18	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
19C	19	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
20C	20	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443

STRAIGHT REBAR FOR SET 2

MEMBER NO.	REBAR NO.	INTERNAL STRESS (PSI)	DEVELOPMENT STRESS (PSI)	SUSTAINED LOAD STRESS (PSI)	PERMISSIBLE LOAD STRESS (PSI)	THERMAL EXPANSION STRESS (PSI)	TOTAL STRESS (PSI)	UNIFIED STRESS (PSI)	DEFLECTION RATIO	MODIFIED STRESS RATIO
1B	11	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
2B	12	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443
3B	13	304,234	1,000	242,074	0,000	322,094	449,026	3022,616	1.0517	1.0443

SEISMIC AND STRESS ANALYSIS OF RECIRCULATION LINE LACHO 400, 1974

STRAIGHT MEMBERS FOR RUN 9

MEMBER NO.	MEMBER NO.	X	Y	INTERNAL		SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
				STRESS	STRESS							
NO.	NO.	FT	FT	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	TII/(SH+S)	TII/(SH+S)
87	100	7245.174	7245.174	0.000	0.000	0.000	0.000	167.878	3770.402	24128.858	0.1370	0.1818
87	179	7245.174	7245.174	0.000	0.000	0.000	0.000	2013.730	6367.479	26264.546	0.1476	0.1376

CURVED MEMBERS FOR RUN 9

MEMBER NO.	MEMBER NO.	X	Y	INTERNAL		SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
				STRESS	STRESS							
NO.	NO.	FT	FT	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	TII/(SH+S)	TII/(SH+S)
88	85	7245.174	7245.174	0.000	0.000	0.000	0.000	588.274	8888.429	27260.212	0.1953	0.1818
88	89	7245.174	7245.174	0.000	0.000	0.000	0.000	340.800	8024.649	27310.172	0.1858	0.1678
88	89	7245.174	7245.174	0.000	0.000	0.000	0.000	220.547	4717.889	27073.073	0.1671	0.1628
88	87	7245.174	7245.174	0.000	0.000	0.000	0.000	287.918	5447.889	27141.817	0.1501	0.1548
88	89	7245.174	7245.174	0.000	0.000	0.000	0.000	178.414	4444.752	27170.547	0.1518	0.1547
88	87	7245.174	7245.174	0.000	0.000	0.000	0.000	167.571	4444.800	27170.547	0.1502	0.1548
88	89	7245.174	7245.174	0.000	0.000	0.000	0.000	271.847	4724.435	27170.547	0.1470	0.1578
88	87	7245.174	7245.174	0.000	0.000	0.000	0.000	178.414	4444.752	27170.547	0.1468	0.1547
88	89	7245.174	7245.174	0.000	0.000	0.000	0.000	247.912	7044.428	27333.518	0.1680	0.1747
88	100	7245.174	7245.174	0.000	0.000	0.000	0.000	270.067	7071.672	27322.646	0.1644	0.1748
88	89	7245.174	7245.174	0.000	0.000	0.000	0.000	791.454	7054.473	27249.149	0.1816	0.1782
88	101	7245.174	7245.174	0.000	0.000	0.000	0.000	477.904	8453.739	27244.413	0.1957	0.1833
88	100	7245.174	7245.174	0.000	0.000	0.000	0.000	340.248	7047.788	27332.428	0.1874	0.1751
88	179	7245.174	7245.174	0.000	0.000	0.000	0.000	201.488	7054.473	27264.149	0.1816	0.1752
88	178	7245.174	7245.174	0.000	0.000	0.000	0.000	523.103	8238.674	27170.547	0.1972	0.1815
				0.000	0.000	0.000	0.000	297.847	7008.719	27227.251	0.1851	0.1768

CURVED MEMBERS FOR RUN 9

MEMBER NO.	MEMBER NO.	X	Y	INTERNAL		SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
				STRESS	STRESS							
NO.	NO.	FT	FT	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	TII/(SH+S)	TII/(SH+S)
250	85	7245.174	7245.174	0.000	0.000	0.000	0.000	474.741	7218.742	27170.547	0.1768	0.1818
250	82	7245.174	7245.174	0.000	0.000	0.000	0.000	530.551	7247.768	27170.547	0.1758	0.1800
250	89	7245.174	7245.174	0.000	0.000	0.000	0.000	480.847	6988.429	27170.547	0.1770	0.1747
250	87	7245.174	7245.174	0.000	0.000	0.000	0.000	464.517	6144.478	27274.749	0.1717	0.1717
250	100	7245.174	7245.174	0.000	0.000	0.000	0.000	764.873	5177.428	27218.747	0.2166	0.2161
250	101	7245.174	7245.174	0.000	0.000	0.000	0.000	934.441	6128.451	27271.147	0.2133	0.2151

SEISMIC AND STRESS ANALYSIS OF RECIRCULATION LINE LACHO 400, 1974

STRAIGHT MEMBERS FOR RUN 10

MEMBER NO.	MEMBER NO.	X	Y	INTERNAL		SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
				STRESS	STRESS							
NO.	NO.	FT	FT	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	TII/(SH+S)	TII/(SH+S)
89	89	7245.174	7245.174	0.000	0.000	0.000	0.000	534.222	7026.445	27170.547	0.1678	0.1807
89	78	7245.174	7245.174	0.000	0.000	0.000	0.000	384.459	4744.149	27170.547	0.1658	0.1628
89	100	7245.174	7245.174	0.000	0.000	0.000	0.000	410.707	6844.182	27170.547	0.1642	0.1680
89	104	7245.174	7245.174	0.000	0.000	0.000	0.000	528.278	7017.497	27170.547	0.1676	0.1678
89	108	7245.174	7245.174	0.000	0.000	0.000	0.000	439.413	4954.401	27170.547	0.1637	0.1628
89	107	7245.174	7245.174	0.000	0.000	0.000	0.000	414.717	4884.152	27170.547	0.1621	0.1688
89	108	7245.174	7245.174	0.000	0.000	0.000	0.000	713.489	4270.393	27170.547	0.1617	0.1622
89	109	7245.174	7245.174	0.000	0.000	0.000	0.000	453.997	4181.670	27170.547	0.1641	0.1688
89	104	7245.174	7245.174	0.000	0.000	0.000	0.000	741.308	3339.732	27170.547	0.1816	0.1684
89	104	7245.174	7245.174	0.000	0.000	0.000	0.000	741.316	3324.189	27170.547	0.1816	0.1627
89	104	7245.174	7245.174	0.000	0.000	0.000	0.000	414.200	4954.401	27170.547	0.1614	0.1617
89	107	7245.174	7245.174	0.000	0.000	0.000	0.000	544.363	4247.170	27170.547	0.1616	0.1688
89	107	7245.174	7245.174	0.000	0.000	0.000	0.000	504.224	4140.880	27170.547	0.1607	0.1688
89	117	7245.174	7245.174	0.000	0.000	0.000	0.000	514.571	4254.451	27170.547	0.1614	0.1617
89	117	7245.174	7245.174	0.000	0.000	0.000	0.000	1071.886	3792.713	27170.547	0.2054	0.1616
89	112	7245.174	7245.174	0.000	0.000	0.000	0.000	714.547	4320.445	27170.547	0.1923	0.1618

CURVED MEMBERS FOR RUN 10

MEMBER NO.	MEMBER NO.	X	Y	INTERNAL		SUSTAINED	OCCASIONAL	THERMAL	TOTAL	MODIFIED	DESIGN	MODIFIED
				STRESS	STRESS							
NO.	NO.	FT	FT	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	(KSI)	TII/(SH+S)	TII/(SH+S)
260	104	7245.174	7245.174	0.000	0.000	0.000	0.000	1225.000	4015.427	27170.547	0.1875	0.1678
260	107	7245.174	7245.174	0.000	0.000	0.000	0.000	1044.107	4047.227	27170.547	0.1971	0.1628
260	107	7245.174	7245.174	0.000	0.000	0.000	0.000	1044.107	4047.227	27170.547	0.1971	0.1678
260	112	7245.174	7245.174	0.000	0.000	0.000	0.000	1018.278	4027.444	27170.547	0.2241	0.1815
260	117	7245.174	7245.174	0.000	0.000	0.000	0.000	1411.195	1028.737	27170.547	0.2242	0.2153
260	117	7245.174	7245.174	0.000	0.000	0.000	0.000	1589.268	5637.489	27170.547	0.2242	0.2191