AUGUST 31, 1978

MASTER

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STRESS ANALYSIS OF LOFT (ECC) SYSTEM

LEFT SIDE

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IDAHO NATIONAL ENGINEERING LABORATORY

DEPARTMENT OF ENERGY

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

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LOFT TECHNICAL REPORT LTR 113-41

Report No. RE-A-77-008

Date August 31, 1978

Work Request No.

RESEARCH AND ENGINEERING REPORT ENGINEERING DIVISION

TITLE

STRESS ANALYSIS OF LOFT (ECC) SYSTEM - LEFT SIDE

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**LOFT TECHNICAL REPORT
LOFT PROGRAM**FORM EG&G-229
(Rev. 12-76)

TITLE STRESS ANALYSIS OF LOFT (ECC) SYSTEM - LEFT SIDE		REPORT NO. LTR 113-41
		RE-A-77-008
AUTHOR C. Kido	GWA NO.	
PERFORMING ORGANIZATION Applied Mechanics Branch		
LOFT APPROVAL <i>[Signature]</i> PSE	DATE August 31, 1978	RSB Mgr.
PSE	PSB Mgr.	P&CSB Mgr.

ABSTRACT

An analysis has been performed by the Applied Mechanics Branch on a new Left Side configuration of the LOFT Emergency Core Coolant (ECC) System. This system has been geometrically modified from that analyzed in a previous report, LTR 113-40. LOCE and Safe Shutdown Earthquake (SSE) were the only loading conditions considered capable of producing high stresses. Review of the analyses indicates that the new configuration passes the requirements of the ASME Code for Class 1 and 2 piping.

1.0 INTRODUCTION

An analysis has been completed on a new left side configuration of the LOFT ECC System. This system, as shown in Figures 1 and 2, has been geometrically modified from that analyzed in a previous report, LTR 113-40, Reference (1). The results of that report provided the basis to make a cursory analysis. The only loading conditions considered were LOCE and SSE (Safe Shutdown Earthquake).

2.0 ANALYSIS

Only Elements 1 through 8 differ from the original model as shown in Figures 1 and 2. All design and operating conditions remained the same. Only LOCE and seismic were considered here, as previous results have shown that these dynamic loads produce the highest stresses. LOCE loads were treated as an upset condition and seismic (SSE) as an emergency. SAP IV, Reference (2), a computer program for the static and dynamic response of linear systems was used to determine forces and moments.

3.0 RESULTS

The results are presented in Tables 1 and 2. The new resultant moments increased slightly, but are still well within the allowable limit for LOCE and seismic loads.

4.0 CONCLUSIONS

The new configuration to the ECC left side is structurally adequate and satisfies the requirements of the ASME Code, Reference (3).

5.0 COMPUTER CODE CONTROL

In order to conform with recent ERDA-ID requests for Computer Configuration Control, Appendix A contains microfiche listings or paper copies of computer codes used in this analysis. All codes have not been placed under control.

FIG. 1
(TAKEN FROM
DWG 204283)

● PLAIN - NODES
○ ELEMENTS
ECC LEFT SIDE -
NEW CONFIGURATION

FIGURE 2 ECC LEFT SIDE
NEW CONFIGURATION

ELEMENT	(OLD CONFIGURATION)		(NEW CONFIGURATION)		MAXIMUM M _{ALLOW} [*]
	M _{RESULT} ^[1]	S _{RESULT} ^[2]	M _{RESULT} ^[1]	S _{RESULT} ^[2]	
1	17174 12476	5821 4229	22579 19421	7653 6583	94,600 ↑
2	12476 11538	4229 3911	19421 18483	6583 6265	
3	8128 3555	2755 1205	13665 6562	4632 2224	
4	3555 13039	1205 4453	6562 1390	2224 471	
5	13039 19909	4453 6748	2402 6063	814 2055	
6	19909 5372	6748 1821	6061 24575	2055 8330	
7	5372 13821	1821 4685	24517 10268	8310 3480	
8	13821 18398	4685 6235	10268 25303	3480 8577	
9	3462 2727	1173 924	3223 2561	1092 868	
10	2727 1238	924 419	2561 1251	868 424	
11	1238 3104	419 1052	1251 2947	424 998	
12	2105 1550	713 525	2219 1511	752 512	94600 ↓
79	24317 12519	8243 4243	11449 17103	3880 5797	
80	12519 51321	4243 17336	17103 25699	5797 8711	

* BASED ON ALLOWABLE, $S_H = 16.7$ KSI

TABLE 1 ECC LEFT SIDE, LOCE LOADING

NOTES TO TABLE 1.

NOTE 1. FOR CLASS 2 NUCLEAR PIPING THE RESULTANT MOMENT DUE TO STATIC AND DYNAMIC LOADING IS DEFINED BY PARAGRAPH NC-3652.4

NC-3652.4 Determination of Moments and Section Modulus

(a) For purposes of Eqs. (8), (9), (10), and (11), the resultant moment for straight through components, curved pipe, or welding elbows may be calculated as follows:

Determine resultant moment:

$$M_j = [M_{xj}^2 + M_{yj}^2 + M_{zj}^2]^{1/2}$$

where

$j = A, B, C, \text{ or } D$ which are the subscripts of M_A, M_B, M_C, M_D defined in NC-3652.1, NC-3652.2 and NC-3652.3

NOTE 2. THE RESULTANT MOMENTS DUE TO LOCE LOADS ARE ENTERED IN PARAGRAPH NC-3652.2, EQUATION (9) TO CALCULATE THE RESULTANT STRESSES.

NC-3652.2 Occasional Loads.²⁹ The effects of pressure, weight, other sustained loads, and occasional loads, including earthquake, must meet the requirements of Eq. (9).

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

$P_{\max}$ = peak pressure, psi

M_B = resultant moment loading on cross section due to occasional loads, such as thrusts from relief and safety valve loads from pressure and flow transients, and earthquake, if the Design Specifications require calculation of moments due to earthquake. For earthquake, use only one-half the range. Effects of anchor displacement due to earthquake may be excluded from Eq. (9) if they are included in Eqs. (10) and (11) (NC-3652.3).

NOTES TO TABLE 1 CONT'D

- 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.
 lb (NC-3652.4)
 Z = section modulus of pipe, in.³ (NC-3652.4)
 i = stress intensification factor [NC-3673.2(b)].
 The product of $0.75i$ shall never be taken as
 less than 1.0.
 S_h = basic material allowable stress at Design
 Temperature, psi

NOTE 3 THE ALLOWABLE MOMENT IS CALCULATED BY
 SUBSTITUTING IN THE VALUE FOR S_h . THIS PROVIDES
 A CONVENIENT MEANS FOR CHECKING WHETHER
 THE RESULTANT STRESSES SATISFY EQUATION (9).

ELEMENT	(OLD CONFIGURATION)		(NEW CONFIGURATION)		MAXIMUM MALLOW. *
	MRESULT	SRESULT	MRESULT	SRESULT	
69	1459 1333	494 461	7750 6869	2627 2328	94600 ↑
70	1333 845	461 286	6869 5021	2328 1702	
71	845 595	286 201	5021 2790	1702 945	
72	595 691	201 234	2790 2886	945 978	
73	691 786	234 266	2886 3115	978 1056	
74	786 877	266 297	3115 3448	1056 1168	
75	877 945	297 320	3448 3772	1168 1278	94600 ↓
79	1317 708	446 240	3496 5644	1185 1913	119,906 ↓
80	708 2900	240 983	5644 9172	1913 3109	119,906 ↓
81	2900 3555	983 1205	9172 10177	3109 3449	
82	1963 1574	666 533	5081 4066	1722 1378	
83	1574 496	533 169	4066 1228	1378 416	
84	496 988	169 334	1228 2499	416 847	
85	1610 1336	545 452	5184 4227	1757 1432	
86	1336 453	452 153	4227 975	1432 330	
87	453 421	153 142	975 1273	330 431	
88	421 631	142 213	1273 2160	431 732	
					119,906 ↓

* BASED ON ALLOWABLE, $S_u = 16.7$ KSI

TABLE 2 ECC LEFT SIDE SEISMIC (SSE) LOADING

6.0 REFERENCES

1. C. Kido, Stress Analysis of LOFT Emergency Core Coolant System (Right and Left Side), LTR 113-40 (RE-B-77-209), June 9, 1977.
2. Klaus-Jürgen Bathe, et al, "SAP IV, A Structural Analysis Program for Static and Dynamic Response of Linear Systems", Earthquake Engineering Research Center, Berkeley, California, June 1973.
3. American Society of Mechanical Engineers, ASME Boiler and Pressure Vessel Code, Section III, Division I, "Nuclear Power Plant Components", Subsections NB and NC, 1974.

APPENDIX A
COMPUTER CODE OUTPUT

EL NO	END	TX	MY	MZ	RES-MR	END	TX	MY	MZ	RES-MR
1	I	1380.	442.	2200.	2257.	J	1380.	3780.	19000.	19421.
2	I	1380.	3780.	19000.	19421.	J	1380.	3480.	18100.	18483.
3	I	1380.	3480.	18100.	18483.	J	1380.	591.	6520.	6562.
4	I	442.	592.	6520.	6562.	J	442.	142.	1310.	1390.
5	I	87.	2390.	2402.	2402.	J	2030.	5610.	1080.	6063.
6	I	2830.	1080.	6063.	6063.	J	2830.	6240.	23600.	24575.
7	I	2830.	6240.	23600.	24575.	J	2830.	1480.	5010.	10268.
8	I	2830.	1480.	5010.	10268.	J	2830.	6500.	22800.	25303.
9	I	2830.	6500.	22800.	25303.	J	2830.	2410.	813.	2561.
10	I	2410.	813.	2561.	2561.	J	298.	1160.	363.	1251.
11	I	2410.	1160.	363.	1251.	J	298.	2880.	543.	2947.
12	I	2410.	2880.	543.	2947.	J	298.	1390.	512.	1511.
13	I	2410.	1390.	512.	1511.	J	298.	511.	815.	1007.
14	I	2410.	511.	815.	1007.	J	298.	728.	960.	1241.
15	I	2410.	728.	960.	1241.	J	298.	1240.	1120.	1697.
16	I	2410.	1240.	1120.	1697.	J	1360.	1430.	3160.	3743.
17	I	2410.	1430.	3160.	3743.	J	1650.	2010.	12600.	12866.
18	I	2410.	2010.	12600.	12866.	J	23000.	12000.	15700.	30323.
19	I	2410.	12000.	15700.	30323.	J	24700.	7940.	9400.	27595.
20	I	2410.	7940.	9400.	27595.	J	24700.	17900.	5640.	31021.
21	I	2410.	17900.	5640.	31021.	J	12300.	32400.	7750.	35512.
22	I	2410.	32400.	7750.	35512.	J	12700.	21400.	10500.	27009.
23	I	2410.	21400.	10500.	27009.	J	2590.	1160.	7220.	7758.
24	I	2410.	1160.	7220.	7758.	J	2590.	2530.	17100.	17479.
25	I	2410.	2530.	17100.	17479.	J	2590.	2640.	16600.	17007.
26	I	2410.	2640.	16600.	17007.	J	2590.	2160.	10900.	11410.
27	I	2410.	2160.	10900.	11410.	J	2590.	684.	264.	1106.
28	I	2410.	684.	264.	1106.	J	2590.	3570.	18900.	19246.
29	I	2410.	3570.	18900.	19246.	J	2590.	4700.	24200.	24637.
30	I	2410.	4700.	24200.	24637.	J	6450.	4030.	6460.	9979.
31	I	6450.	4030.	6460.	9979.	J	6450.	10300.	4900.	13104.
32	I	6450.	10300.	4900.	13104.	J	6450.	17300.	15900.	24366.
33	I	6450.	17300.	15900.	24366.	J	6450.	5810.	29900.	31135.
34	I	6450.	5810.	29900.	31135.	J	6450.	7780.	10400.	14501.
35	I	6450.	7780.	10400.	14501.	J	6450.	8550.	6290.	12421.
36	I	6450.	8550.	6290.	12421.	J	6450.	8190.	4220.	12176.
37	I	6450.	8190.	4220.	12176.	J	7960.	11800.	4130.	14821.
38	I	6450.	11800.	4130.	14821.	J	7960.	18500.	6970.	21312.
39	I	6450.	18500.	6970.	21312.	J	8620.	8430.	17100.	20923.
40	I	6450.	8430.	17100.	20923.	J	8620.	28400.	9500.	30198.
41	I	6450.	28400.	9500.	30198.	J	12700.	22100.	13100.	28659.
42	I	12700.	22100.	13100.	28659.	J	12700.	20700.	20500.	31781.
43	I	12700.	20700.	20500.	31781.	J	12700.	15100.	25600.	32321.
44	I	12700.	15100.	25600.	32321.	J	12700.	20000.	12000.	23468.
45	I	10100.	20000.	12000.	23468.	J	2600.	39900.	2710.	40076.
46	I	2600.	39900.	2710.	40076.	J	2600.	62800.	11500.	63897.
47	I	2600.	62800.	11500.	63897.	J	2600.	21600.	29200.	36414.
48	I	2600.	21600.	29200.	36414.	J	2600.	10300.	20700.	23267.
49	I	2600.	10300.	20700.	23267.	J	2600.	16300.	35400.	39059.
50	I	2600.	16300.	35400.	39059.	J	2600.	9700.	39300.	40563.
51	I	2600.	9700.	39300.	40563.	J	2600.	6320.	39400.	39988.
52	I	2600.	6320.	39400.	39988.	J	19400.	23100.	34000.	45453.
53	I	19400.	23100.	34000.	45453.	J	19400.	30200.	38800.	52857.
54	I	19400.	30200.	38800.	52857.	J	19400.	34400.	31100.	47952.
55	I	19400.	34400.	31100.	47952.	J	12200.	27200.	38900.	49009.
56	I	12200.	27200.	38900.	49009.	J	12200.	17500.	50100.	54453.
57	I	12200.	17500.	50100.	54453.	J	12200.	15500.	31900.	35714.
58	I	4930.	15500.	31900.	35714.	J	4930.	13300.	24200.	28051.
59	I	4930.	13300.	24200.	28051.	J	4210.	11000.	17300.	20929.
60	I	4210.	11000.	17300.	20929.	J	4210.	8360.	9370.	13260.
61	I	4210.	8360.	9370.	13260.	J	4220.	10500.	14500.	18393.
62	I	4220.	10500.	14500.	18393.	J	4220.	14700.	22900.	27537.
63	I	4220.	14700.	22900.	27537.	J	4210.	31100.	50400.	59373.
64	I	4220.	31100.	50400.	59373.	J	4230.	49700.	74500.	93852.
65	I	15700.	49700.	74500.	93852.	J	15700.	8500.	17000.	24652.
66	I	15700.	8500.	17000.	24652.	J	15700.	14300.	13100.	24952.
67	I	15700.	14300.	13100.	24952.	J	15700.	5860.	6690.	11660.
68	I	15700.	5860.	6690.	11660.	J	7540.	59800.	29700.	67194.
69	I	7540.	59800.	29700.	67194.	J	7540.	1510.	17500.	19199.
70	I	7540.	1510.	17500.	19199.	J	7540.	11600.	1090.	13993.
71	I	7540.	11600.	1090.	13993.	J	7540.	334.	4250.	8845.
72	I	7540.	334.	4250.	8845.	J	7540.	2100.	4530.	9219.
73	I	7540.	2100.	4530.	9219.	J	7540.	3890.	4700.	9863.
74	I	7540.	3890.	4700.	9863.	J	7540.	5690.	4790.	10742.
75	I	7540.	5690.	4790.	10742.	J	7540.	7100.	4840.	11571.
76	I	7100.	4840.	11571.	11571.	J	7100.	5890.	2780.	9635.
77	I	7100.	5890.	2780.	9635.	J	7100.	81.	2460.	7521.
78	I	7100.	81.	2460.	7521.	J	7100.	6710.	5970.	11449.
79	I	7100.	6710.	5970.	11449.	J	7100.	14000.	6780.	17103.
80	I	7100.	14000.	6780.	17103.	J	7100.	24500.	3110.	25699.

ECC LEFT
SIDE

LOCE LOADS

NEW CONFIGURATION
CHANGES

4" SCH 160
CLASS II
H.P.

4" SCH 160
CLASS I

4" SCH 160
CLASS II
H.P.

6x4 RED. CLASS II

6" SCH 160
CLASS II
H.P.

4x6" RED. } CLASS II
4" LINE
CK VALVE
4" LINE
4x6 RED
6" LINE

4" SCH 160
CLASS II
H.P.

4" SCH 160
CLASS II L.P.

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50	I	4220.	11000.	17300.	20931.	J	4220.	8380.	9370.	13260.
51	I	4220.	8380.	9370.	13260.	J	4220.	10500.	14500.	18393.
62	I	4220.	10500.	14500.	18393.	J	4220.	14700.	22900.	27537.
63	I	4210.	14700.	22900.	27536.	J	4210.	31100.	50400.	59373.
64	I	4230.	31100.	50400.	59374.	J	4230.	49700.	79500.	93852.
65	I	15700.	15000.	21200.	30347.	J	15700.	8500.	17000.	24652.
66	I	15700.	8500.	17000.	24652.	J	15700.	14300.	13100.	24952.
67	I	7950.	5900.	30800.	32352.	J	7950.	5860.	6690.	11660.
68	I	7540.	6690.	5860.	11660.	J	7540.	59800.	29700.	67194.
69	I	6250.	5150.	20100.	21670.	J	7750.	1510.	17500.	19199.
70	I	7750.	17500.	1510.	19199.	J	7750.	11600.	1090.	13993.
71	I	7750.	11600.	1090.	13993.	J	7750.	334.	4250.	8845.
72	I	7750.	334.	4250.	8845.	J	7750.	2100.	4530.	9219.
73	I	7750.	2100.	4530.	9219.	J	7750.	3890.	4700.	9863.
74	I	7750.	3890.	4700.	9863.	J	7750.	5690.	4790.	10742.
75	I	7750.	5690.	4790.	10742.	J	7750.	7100.	4840.	11571.
76	I	7100.	7750.	4840.	11571.	J	7100.	5890.	2780.	9635.
77	I	7100.	5890.	2780.	9635.	J	7100.	81.	2480.	7521.
78	I	7100.	81.	2480.	7521.	J	7100.	6710.	5970.	11449.
79	I	7100.	6710.	5970.	11449.	J	7100.	14000.	6790.	17103.
80	I	7100.	14000.	6790.	17103.	J	7100.	24500.	3120.	25699.
81	I	7100.	24500.	3120.	25699.	J	7100.	27400.	1540.	28347.
82	I	2820.	13900.	3560.	14623.	J	2820.	11100.	2110.	11645.
83	I	2820.	11100.	2110.	11645.	J	2820.	2590.	3700.	5325.
84	I	2820.	2590.	3700.	5325.	J	2820.	5940.	10300.	12220.
85	I	2130.	5900.	13500.	14886.	J	2130.	4800.	10900.	12099.
86	I	2130.	4800.	10900.	12099.	J	2130.	3910.	1880.	4833.
87	I	2130.	3910.	1880.	4833.	J	2130.	7120.	3470.	8202.
88	I	2130.	7120.	3470.	8202.	J	2130.	8850.	5990.	10897.

LOCE
CONT'D

4" SCH 160
CLASS II
H.P.

4" SCH 160
CLASS II
L.P.

END-OF-FILE ENCOUNTERED, FILENAME - TAPE11
ERROR NUMBER 65 DETECTED BY INPC- AT ADDRESS 000145
CALLED FROM PDYN AT LINE 5

A-2

SCOPE 2 LOAD MAP
PROGRAM WILL BE ENTERED AT TITLE (167)

LOADER VERSION 1.0 06/06/77 16.08.09 PAGE 1
SCM LENGTH 5371 LCM LENGTH 0

BLOCK	ADDRESS	LENGTH
TITLE	100	127
LOCNOV	227	107
LOCNOV	336	63
LOCNOV	421	17
LOCNOV	440	207
LOCNOV	647	1

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ECC- LEFT SIDE

SEISMIC LOADS

EL NO	END	TX	MY	MZ	PES-MM	END	TX	MY	MZ	PES-MM
1	1	1	0	1	1	J	1	0	0	1
2	1	1	0	0	1	J	1	0	0	1
3	1	1	0	0	0	J	1	0	0	0
4	1	1	0	0	0	J	1	0	0	0
5	1	1	0	0	0	J	1	0	0	0
6	1	1	0	0	0	J	1	0	0	0
7	1	1	0	0	0	J	1	0	0	0
8	1	1	0	0	0	J	1	0	0	0
9	1	1	0	0	0	J	1	0	0	0
10	1	1	0	0	0	J	1	0	0	0
11	1	1	0	0	0	J	1	0	0	0
12	1	1	0	0	0	J	1	0	0	0
13	1	1	0	0	0	J	1	0	0	0
14	1	1	0	0	0	J	1	0	0	0
15	1	1	0	0	0	J	1	0	0	0
16	1	1	0	0	0	J	1	0	0	0
17	1	1	0	0	0	J	1	0	0	0
18	1	1	0	0	0	J	1	0	0	0
19	1	1	0	0	0	J	1	0	0	0
20	1	1	0	0	0	J	1	0	0	0
21	1	1	0	0	0	J	1	0	0	0
22	1	1	0	0	0	J	1	0	0	0
23	1	1	0	0	0	J	1	0	0	0
24	1	1	0	0	0	J	1	0	0	0
25	1	1	0	0	0	J	1	0	0	0
26	1	1	0	0	0	J	1	0	0	0
27	1	1	0	0	0	J	1	0	0	0
28	1	1	0	0	0	J	1	0	0	0
29	1	1	0	0	0	J	1	0	0	0
30	1	1	0	0	0	J	1	0	0	0
31	1	1	0	0	0	J	1	0	0	0
32	1	1	0	0	0	J	1	0	0	0
33	1	1	0	0	0	J	1	0	0	0
34	1	1	0	0	0	J	1	0	0	0
35	1	1	0	0	0	J	1	0	0	0
36	1	1	0	0	0	J	1	0	0	0
37	1	1	0	0	0	J	1	0	0	0
38	1	1	0	0	0	J	1	0	0	0
39	1	1	0	0	0	J	1	0	0	0
40	1	1	0	0	0	J	1	0	0	0
41	1	1	0	0	0	J	1	0	0	0
42	1	1	0	0	0	J	1	0	0	0
43	1	1	0	0	0	J	1	0	0	0
44	1	1	0	0	0	J	1	0	0	0
45	1	1	0	0	0	J	1	0	0	0
46	1	1	0	0	0	J	1	0	0	0
47	1	1	0	0	0	J	1	0	0	0
48	1	1	0	0	0	J	1	0	0	0
49	1	1	0	0	0	J	1	0	0	0
50	1	1	0	0	0	J	1	0	0	0
51	1	1	0	0	0	J	1	0	0	0
52	1	1	0	0	0	J	1	0	0	0
53	1	1	0	0	0	J	1	0	0	0
54	1	1	0	0	0	J	1	0	0	0
55	1	1	0	0	0	J	1	0	0	0
56	1	1	0	0	0	J	1	0	0	0
57	1	1	0	0	0	J	1	0	0	0
58	1	1	0	0	0	J	1	0	0	0
59	1	1	0	0	0	J	1	0	0	0
60	1	1	0	0	0	J	1	0	0	0

4" CLASS I
NEW CONFIGURATION
CHANGES

4" SCH 160
CLASS II
H.P.

4" SCH 160
CLASS I

4" SCH 160
CLASS II
H.P.

6x4 RED. CLASS II

6" SCH 160
CLASS II
H.P.

4x6 RED. } CLASS II
4" LINE

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A-4

30	C	583.	24.	218.	625.	J	502.	345.	751.	724.
41	I	227.	849.	376.	928.	J	227.	1890.	827.	411.
42	I	445.	224.	772.	710.	J	445.	224.	877.	481.
43	I	445.	78.	1010.	1093.	J	445.	98.	1010.	1093.
44	C	471.	555.	1032.	1032.	J	445.	31.	1032.	1154.
45	I	843.	1310.	89.	1560.	J	843.	1310.	89.	1560.
46	I	843.	1947.	1028.	2167.	J	843.	1940.	162.	2167.
47	I	843.	3220.	2035.	2027.	J	843.	2700.	324.	2847.
48	I	843.	1010.	1120.	1135.	J	843.	1660.	1120.	1135.
49	I	843.	555.	1032.	1032.	J	843.	555.	1032.	1154.
50	I	843.	770.	4250.	4410.	J	843.	770.	4250.	4410.
51	I	843.	555.	8310.	8373.	J	843.	555.	8310.	8373.
52	I	843.	1150.	2000.	8342.	J	843.	555.	8310.	8373.
53	I	843.	1420.	4450.	9513.	J	843.	555.	8310.	8373.
54	I	843.	2420.	2420.	6423.	J	843.	555.	8310.	8373.
55	I	843.	2420.	11800.	12411.	J	843.	555.	8310.	8373.
56	I	843.	2420.	12411.	12411.	J	843.	555.	8310.	8373.
57	I	843.	1780.	1135.	11486.	J	843.	555.	8310.	8373.
58	I	611.	1030.	2270.	5414.	J	611.	790.	3110.	3265.
59	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
60	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
61	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
62	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
63	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
64	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
65	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
66	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
67	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
68	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
69	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
70	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
71	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
72	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
73	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
74	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
75	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
76	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
77	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
78	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
79	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
80	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
81	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
82	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
83	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
84	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
85	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
86	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
87	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
88	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
89	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.
90	I	516.	770.	3120.	3230.	J	516.	546.	1230.	1571.

SEISMIC
CONT'D

4" X 6 RED.
4" LINE
CK VALVE
4" LINE
4" X 6 RED
6" LINE

CLASS II

4" SCH 160
CLASS II
H.P.

4" SCH 160
CLASS II
L.P.

END-OF-FILE ENCOUNTERED. FILENAME = TAP211
CROSS NUMBER 65 DETECTED BY INPC= AT ADDRESS 000145
CALLED FROM PDYN AT LINE 5

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