

EVALUATION OF ADLPIPE
DEFICIENCY ON COMPLETED STRESS ANALYSIS

Prepared by: A. Chu
A. Chu

Reviewed by: Z. Studnicka
Z. Studnicka

Approved by: O. Michejda
O. Michejda

DECEMBER 1982

REV. 1

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Certified By Sheanne Clark

1) INTRODUCTION

An inconsistency in analysis results between the CDC and IBM versions of ADLPIPE was found at the end of August 1982 (1). This matter was immediately brought to the attention of DIS/ADLPIPE, Inc. After an investigation by the ADLPIPE vendor, Burns and Roe, Inc. was informed that insufficient accuracy occurs in the single precision data storage of the BELLOW stiffness matrix in the IBM 2C, 2D2, and 2D12 versions of ADLPIPE, but the inaccuracy is negligible if the spring constant in the BELLOW card is less than 10^7 lbs per inch (2). This precision problem was corrected by using a double precision method of data storage in the latest IBM version (2D18) of ADLPIPE. The SKEW BELLOW combination model is used to simulate skewed support and the stiffness in the direction of support is input in the BELLOW card. The group 1 piping systems of the Washington Public Power Supply System Nuclear Power Plant No. 2 were analyzed with the IBM 2D2 and 2D12 versions of ADLPIPE. Because of deficiency in these versions of the program, the results of group 1 piping analysis were considered uncertain. A decision was made to check all piping systems which might have been affected by this problem. This report summarizes the evaluation and its results.

2) METHOD OF EVALUATION

Mr. I. W. Dingwell of DIS/ADLPIPE, Inc. stated in reference (2) that the correction for the precision problem was sent to Burns and Roe, Inc. on September 16, 1982. The Computer Services Department implemented these changes in the latest version (2D18) of ADLPIPE. The 2D18 version has been validated according to the corporate procedure (3). The 2D18 version was used to determine whether any of the completed analysis results were affected by the changes in the program. A parametric study was initiated to isolate the calculation steps which use the bellow stiffness and to simplify a way to verify the analysis results. At the meeting with Mr. I. W. Dingwell on 10/18/82, it was found that the fifth row of the 6 X 6 bellow stiffness was incorrect and in some cases the computer run was terminated abnormally due to a negative diagonal term. It was clear that the precision problem affected the natural frequency calculation and might have led to erroneous reaction at supports. Therefore, it was decided that all the geometric models with SKEW BELLOW combination were identified and those analyses which might be affected were checked on the 2D18 version for one dynamic loading case.

Table 1 shows the details of 134 anchor groups analyzed by New Jersey/New York home offices. Finite element program ANSYS was used in some piping systems where time history analysis was required. Many ADLPIPE models did not have any SKEW BELLOW combination. Several anchor groups were also eliminated from the evaluation list, because the stiffness in the BELLOW card was less than 10^7 lbs per inch. The remaining anchor groups which had the bellow stiffness of 10^7 lbs per inch or larger were required to be verified with the 2D18 version. The total number in the evaluation list was 48 anchor groups.

The ADLPIPE input files were retrieved from the computer system. The data were checked to assure that all input remained unchanged from the status as-built analysis. The analysis files were copied and then all executions were deleted except one dynamic loading case. The evaluation input files were created for forty eight anchor groups and stored in the data sets. After all ADLPIPE runs were executed on version 2D18, the results were compared against previous analysis.

3) DISCUSSION OF RESULTS

The first level of check was the system natural frequencies. A good agreement at natural frequencies proved that the precision problem did not affect the eigen extraction solution. If poor agreement, especially at the lower frequencies, was obtained there was little chance for agreement at the displacement or force level. Each solution developed included a determination of natural frequencies, mode shapes and modal participation factors. Since these variables were related to each other, a check on natural frequencies would be satisfactory at this level.

The next level of check was the reaction forces at restraints and anchors. Forces and displacements were the final results of the analyses. The confidence of the completed analyses was determined from comparison of these reaction loads which have been used for design of pipe supports.

Nearly perfect agreement at natural frequencies was obtained in 47 anchor groups, but poor agreement was observed in part C of anchor group 61. Table 2 shows the system frequencies in part C of anchor group 61 calculated by two versions of the program. The cut-off frequency of calculation was 110 Hz. The mismatch in frequency occurred between the 6th mode and the 17th

mode. The analysis was then rerun on CDC computer. The results of CDC and 2D18 versions were in close agreement.

The evaluation results of anchor and support loads are given in Tables 3 through 49. The input data file names and the selected dynamic case for comparison were included in the tables. The 2D2 and 2D12 version results were obtained from the stress calculation (calculation number was shown in the tables). The support nodal points and their corresponding reaction forces in pounds were listed for each of the 48 anchor groups. Good agreement was found in all but one analysis, the above mentioned anchor group 61, part C. The analysis of anchor group 14 duplicated the frequency portion of the analysis, however, further execution was not possible. Mr. Frank LaPlante of DIS/ADLPIPE, Inc. ran the data file on a CDC computer and stated (4) that the CDC results were virtually the same as the output on the 2D2 version for the same file. The comparison in all anchor groups show that a maximum difference of twenty pounds (with exception of anchor group 61, part C) was found only in anchor groups 4 and 55 (see pages 17, 42 and 43). These two anchor groups were much larger than the other ones and had a large number of dynamic degrees of freedom. The

discrepancy in support loads could be the cumulative errors in the calculation of a great number of modes and could be considered insignificant. This small difference did not have any effect on the support design. The only anchor group which showed poor agreement was anchor group 61, part C (see page 48). The support loads at data point 1422 were zero in the 2D2 version results, while the 2D18 output showed a force of 43 pounds in each of X and Z direction. This support was skewed in the direction of 45° from the global axis on the X-Z plan. This zero reaction load at this support was observed previously and led to discovery of the deficiency in single precision data storage in the IBM version of ADLPIPE.

4) CONCLUSION

From this extensive evaluation of ADLPIPE deficiency on the completed analyses, the observations are as follows:

1. The check of the analyses proved that all previously submitted loads and stresses were correct.
2. Small variations in support loads occur in unusually large ADLPIPE models, however, the differences in results are insignificant.
3. A zero reaction at a support indicates that the analysis is affected by the single precision problem and the results are not acceptable.

The support loads for anchor group 61, part C, which were transmitted to the site support design group, were obtained from the output of CDC version of ADLPIPE. The QC-I piping systems were evaluated by the site stress group. The finding was that no change in support loads was found (5). Therefore, the design based on previously submitted result was found correct.

REFERENCES

- 1) Memo, T. Butler to H. Brandmaier, A. Rodino, M. Shapiro, J. Tang, dated 8/24/82, IBM/CDC ADLPIPE Output Discrepancy
- 2) Letter to T. Butler from I. W. Dingwell of DIS/ADLPIPE, dated 10/22/82
- 3) Burns & Roe, Inc. - Engineering Standard, P015010G1
- 4) Telecon, from T. Butler to F. LaPlante of DIS/ADLPIPE, dated 11/23/82
- 5) Memo, H. Shrivastava to O. Michejda, dated 11/12/82, Use of Bellow to Model Skewed Restraints (F-82-5579) (See Attachment A)

TABLE 1
SKEWED SUPPORT STIFFNESS USED IN THE COMPLETED ANALYSES

ANCHOR GROUP	ISO #	SKEWED SUPPORT STIFFNESS	COMMENTS
1	4	10^7	
2	27	2×10^7	
4	9-12, 31	10^8	
5	13-17, 32	10^7	Skew Spring Model Used
6	18-22, 33	10^7	Skew Spring Model Used
7	30	10^8	
8	5	10^7	
9	6, 8, 44, 46	10^7	
11	7, 45	E10	
12	3	10^7	
13	36, 51	10^7	
14	23-26, 34	$9.0E^7$	
15	29	2×10^9	
16	28	2×10^7	
17	2	10^7	
18	1	2×10^9	
19	53	-	No Skew Bellow Model
20	35	10^7	
21	52	10^7	
22	39	10^7	
23	335	-	No Skew Bellow Model
24	128	-	No Skew Bellow Model
25	101A		Adlpipe Was Not Used

TABLE 1
SKEWED SUPPORT STIFFNESS USED IN THE COMPLETED ANALYSES

ANCHOR GROUP	ISO #	SKEWED SUPPORT STIFFNESS	COMMENTS
25	100 B-F	-	No Skew Bellow Model
26	133	-	No Skew Bellow Model
27	120, 141	10^7	
28	109 A,-CD	-	No Skew Bellow Model
28	109B		Adlpipe Was Not Used
29	111, A, B	-	No Skew Bellow Model
29	111C		Adlpipe Was Not Used
30	107 ect.	-	No Skew Bellow Model
31	112, 113A	10^7	
31	107, 113, 150B		Adlpipe Was Not Used
32	115 A, B	9×10^8	
32	342C	9×10^8	
33	343B	-	No Skew Bellow Model
34	103	10^6	Stiffness Less Than 10^7
35	118, 119	10^6	Stiffness Less Than 10^7
36	107, 119, 127	-	No Skew Bellow Model
37	117, 119	10^6	Stiffness Less Than 10^7
38	315, 316	-	No Skew Below Model
39	316, 400	-	No Skew Bellow Model
40	316, 401	-	No Skew Bellow Model
41	316, 402	-	No Skew Bellow Model
42	141	-	No Skew Bellow Model
43	96, 98	10^7	

TABLE 1
SKEWED SUPPORT STIFFNESS USED IN THE COMPLETED ANALYSES

ANCHOR GROUP	BO #	SKEWED SUPPORT STIFFNESS	COMMENTS
44	97	10^7	
45	98	10^7	
46	155A	-	No Skew Bellow Model
47	155B	10^7	
48	152A	-	No Skew Bellow Model
49	152B	-	No Skew Bellow Model
50	38, 152	10^9	Site Changes in Progress
51	152	-	No Skew Bellow Model
52	38, 155	9×10^8	
53	38	-	No Skew Bellow Model
54	99		No Skew Bellow Model
55	125	10^7	
56	74	10^7	
57	75	9×10^6	
58	40, 152	9×10^5	Stiffness Less Than 10^7
59	41, 43	10^7	
60	42	10^7	
61	42, 43, 153	1.0E9	
63	158		Adlpipe Was Not Used
64	159		Adlpipe Was Not Used
65	612	-	No Skew Bellow Model
66	613	-	No Skew Bellow Model
67	100		Adlpipe Was Not Used

TABLE 1
SKEWED SUPPORT STIFFNESS USED IN THE COMPLETED ANALYSES

ANCHOR GROUP	ISO #	SKEWED SUPPORT STIFFNESS	COMMENTS
68	100, 132		No Skew Bellow Model
69	132	-	No Skew Bellow Model
70	606	-	No Skew Bellow Model
71	126, 128C	10^7	
71	128	-	No Skew Bellow Model
72-74	129	72-73/74 $1.0E09$	
75	142	-	No Skew Bellow Model
76-79	144	-	No Skew Bellow Model
80-81	139	-	No Skew Bellow Model
82	141, 342	10^7	
83	148	-	No Skew Bellow Model
84-87	149	-	No Skew Bellow Model
89	104	-	No Skew Bellow Model
90	105, 110, 117		No Skew Bellow Model
92	105	10^7	
93	106A	-	No Skew Bellow Model
94	106B		Adlpipe Was Not Used.
95	106C	-	No Skew Bellow Model
96	110		No Skew Bellow Model
97	108		Adlpipe Was Not Used
98	104, 108 A,B		Adlpipe Was Not Used
98	104, 108C	10^9	
99-102	116	-	No Skew Bellow Model

TABLE 1
SKEWED SUPPORT STIFFNESS USED IN THE COMPLETED ANALYSES

ANCHOR GROUP	ISO #	SKEWED SUPPORT STIFFNESS	COMMENTS
103-106	123	-	No Skew Bellow Model
107	114A		Adlpipe Was Not Used
108	114B	-	No Skew Bellow Model
109-110	151	10^6	Stiffness Less Than 10^7
114	102A		Adlpipe Was Not Used
115	102B	-	No Skew Bellow Model
116	121		Adlpipe Was Not Used
117	121, 122	-	No Skew Bellow Model
118	160		Adlpipe Was Not Used
119	161		Adlpipe Was Not Used
120	162	-	No Skew Bellow Model
120	163		Adlpipe Was Not Used
121	165		Adlpipe Was Not Used
121	164	-	No Skew Bellow Model
122	166	10^7	
122	167		Adlpipe Was Not Used
123	168		Adlpipe Was Not Used
123	171	-	No Skew Bellow Model
124	169	-	No Skew Bellow Model
124	170		Adlpipe Was Not Used
125	172		Adlpipe Was Not Used
126	706-708	-	No Skew Bellow Model

TABLE 1
 SKEWED SUPPORT STIFFNESS USED IN THE COMPLETED ANALYSES

ANCHOR GROUP	ISO #	SKEWED SUPPORT STIFFNESS	COMMENTS
152	156	9×10^6	
153	157	10^6	Stiffness Less Than 10^7
154	134, 451	-	No Skew Bellow Model
155	451	-	No Skew Bellow Model
130	175	-	No Skew Bellow Model
AAA	173	-	No Skew Bellow Model
BBB	174	-	No Skew Bellow Model
CCC	203	-	No Skew Bellow Model
DDD	48	-	No Skew Bellow Model
EEE	49	-	No Skew Bellow Model
-	54	10^7	
-	56	10^7	
-	58	10^7	
-	59	10^7	
-	61	10^7	
-	62	10^7	
-	63	10^7	
-	70	10^7	
-	71	10^7	
Total Number Of Analysis:			134
Number of Analysis Required checking with Adlpipe Versions 2018:			48

TABLE 2

COMPARISON OF CALCULATED SYSTEM FREQUENCIES
(Part C, Anchor Group 61)

MODE	SYSTEM FREQUENCY VERSION 2D2	SYSTEM FREQUENCY VERSION 2D18
1	6.891	7.018
2	7.939	7.989
3	10.165	10.337
4	14.621	14.687
5	17.135	17.156
6	17.866	18.014
7	23.944	25.647
8	25.683	27.659
9	27.699	38.735
10	38.743	48.085
11	48.086	49.545
12	49.545	52.374
13	52.374	53.876
14	53.876	57.285
15	57.286	61.244
16	61.246	77.598
17	77.607	79.516
18	80.094	80.125
19	94.852	94.841
20	108.457	108.464

TABLE 3

ANCHOR GROUP: 1
ISOMETRIC: M200-SH 4
DYNAMIC CASE FOR COMPARISON: OBE (XY)
CALCULATION: 8.14.84

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 3. SHT 4 APDY</u>			<u>TSO WPPS ROBIN.YOUNT</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
1502	1648	0	3258	1648	0	3258
2302	4494	2348	2273	4494	2348	2273

TABLE 4

ANCHOR GROUP: 2
 ISOMETRIC: M200-SH 27
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.86

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS 5. NCHUG27S</u>			<u>TSO WPPS5.NCHUG275</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
13		4992			4992	
16			5383			5383
15	19430			19430		
362	6668		9155	6668		9155
37		2772			2772	
372	4054		2793	4054		2793
392	1625		7115	1625		7115
1582	387		2354	387		2354
540		3340			3340	
582	1796		658	1746		658

TABLE 5

ANCHOR GROUP: 4
 ISOMETRIC: M200-SH 9, 10, 11, 12, 31
 DYNAMIC CASE FOR COMPARISON: SRV. SINGLE
 CALCULATION: 8.14.77

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. LOOPADR</u>			<u>TSO WPPS 1. LOOPADRZ</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
28	5120		1862	5120		1863
32	492	5667	492	492	5670	492
33	4427		3986	4427		3986
331	4601		4290	4602		4291
41	6728		5132	6729		5132
43	530		4317	530		4317
67	400	6306	1037	401	6311	1038
670	5234		19330	5239		19346
671	5317		576	5321		576
731	7269		8031	7271		8032
740	3866		3734	3866		3734
95	489	4755	681	489	4756	681
940	324		9268	342		9270
950	8661		1064	8662		1064
991	796		6479	796		6478
990	7918		972	7919		973
1061	1235		3971	1233		3971
131	372	4790	758	372	4801	760
1310	1375		8017	1375		8018
1311	4482		1101	4482		1101
134	543		2610	544		2617
135	1967	205	825	1974	206	828
1402	1054		5180	1058		5201
>1461	4108	839	2876	4410	840	2878
1470	1974	499	2819	1976	500	2822
1401	4908	4340		4924	4354	
53	12222		15425	12222		15425
85	14766		8356	14766		8356
119	17860		18011	17856		18010
154	4561		8333	4565		8354

TABLE 6

ANCHOR GROUP: 7
 ISOMETRIC: M200-SH 30
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE OUTER VALVE
 CALCULATION: 8.14.130

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS SH 30</u>			<u>TSO WPPS SH 30 D 18</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
120		3037			3037	
12	1794		3108	1794		3108
241			1120			1120
261	1453			1453		
291	489	1778	369	489	1778	369
301	603		709	603		709
341		973	194		973	194
340			585			585
3400	2074			2075		
370	707		1424	707		1425
3700	2105		1092	2105		1092
510	1784		345	1784		345
510	434	917	304	434	918	304
510	333		1714	333		1714
570	955		1722	955		1722

TABLE 7

ANCHOR GROUP: 8
ISOMETRIC: M200-SH 5
DYNAMIC CASE FOR COMPARISON: OBE (XY)
CALCULATION: 8.14.85

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS.SH 5 SRV 2</u>			<u>TSO WPPS.SH 58 RV 2</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
1	6814	4236	1714	6814	4236	1714
9			1437			1437
12		13847			13847	
150	3625		8753	3625		8753
230	13275	6966	6720	13275	6966	6720
40	3255	10870	1401	3255	10870	1401

TABLE 8

ANCHOR GROUP: 9
 ISOMETRIC: M200-SH 6,8
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE
 CALCULATION: 8.14.107

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. SH 84446</u>			<u>TSO WPPS 8. SH 8</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
345	8223		13684	8223		13684
3455	8127		13525	8127		13525
2371	24320	3866	2128	24320	3866	2128
2375	2473	4737	4855	2473	4737	4855
3711	4243	7837	8699	4243	7837	8699
2391	329	18239	4887	329	18239	4887
1	3821	19361	4553	3821	19361	4553
400	2916	27725	33331	2916	27725	33331
4000	2471	23500	28251	2471	23500	28251
805	10450		6280	10450		6280
8055	16980		8105	16980		8105
815	17835		10717	17835		10717
8155	14504		8716	14504		8716
20	2723	1416	2202	2723	1416	2202
30	4731	2575	4257	4731	2575	4257
211	34364		3007	34364		3007
6230	1043	6272	39596	1043	6272	39596
6235	19006		3694	19006		3694
375	12976		12976	12976		12976

TABLE 8 (Cont'd)

ANCHOR GROUP: 9
 ISOMETRIC: M200-SH 6,8
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE
 CALCULATION: 8.14.107

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. SHEET 6 G</u>			<u>TSO WPPS 8. SH 6</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
900		4561	1223		4561	1223
930	4368			4367		
925		3191			3191	
920	8883			8883		
915			7292			7292
914		4406			4406	
910		5534			5534	
103			8959			8958
907	9795			9795		
906		5170			5170	
903	2858			2858		

TABLE 9

ANCHOR GROUP: 11
 ISOMETRIC: M200-SH 7
 DYNAMIC CASE FOR COMPARISON: OBE (XY)
 CALCULATION: 8.14.108

VERSION OF ADLEPIPE INPUT DATA FILE SUPPORT NODAL POINT	<u>2D2</u>			<u>2D18</u>		
	<u>TSO WPPS 8 ASB 74547</u>			<u>TSO WPPS.SH7</u>		
	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
SSR-9 (1045)	1117		98	1117		98
SSR-10 (1047)	335			335		
SSR-1 (1024)	351		351			
SSR-2 (96)		352			352	
SSR-5 (9033)		1119			1119	
SSR-6 (1032)			687			687
SSR-4 (9028)		812			812	
SSR-3 (1030)	302		64	302		64
SSR-7 (107)		544			544	
SSR-8 (1040)	178	52	749	178	52	749
SSR-11 (9047)		467			467	

TABLE 10

ANCHOR GROUP: 12
ISOMETRIC: M200-SH 3
DYNAMIC CASE FOR COMPARISON: OBE (XYZ)
CALCULATION: 8.14.83

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS.SH 3R6B</u>			<u>TSO WPPS.SH 3D18</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
9			467			467
12		1400			1400	
1151	735		1443	735		1443
1231	2471	1291	1250	2471	1291	1250

TABLE 11

ANCHOR GROUP: 13
 ISOMETRIC: M200-SH 36 & 51
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.13J

VERSION OF ADLEPIPE INPUT DATA FILE <u>SUPPORT NODAL POINT</u>	<u>2012</u>			<u>2018</u>		
	<u>TSO WPPS 1. SNSK 3651</u>			<u>TSO WPPS 1. TDWS 36</u>		
	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
6		176			176	
1001		124			124	
215	278	184	361	278	184	361
2122	323			323		
1002		328			328	
541	323		253	323		253
2051	631		808	631		808
630	174			174		
66		149			149	
692		646			646	
1003	755		582	455		582
782	26		33	26		33
79	51		40	51		40
781		38			38	
397	117		150	117		150
3621	88	86	119	88	86	119
211			516			516
215	278		361	278		361
216			152			152
2121		162			162	
21			280			280
620		239			239	
1093		345			345	
1011		36			36	
397		100			100	
3621	88		119	88		119
414	43		74	43		74
418	15		54	15		54
108		56			56	
111			19			19
8407	108		62	108		62
511		66				

TABLE 12

ANCHOR GROUP: 14
 ISOMETRIC: M200-SH 23,24,25,26,34 (REV 3A)
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE VALVE
 CALCULATION: 8.14.80

VERSION OF ADLEPIPE	<u>2D2</u>			<u>CDC</u>		
INPUT DATA FILE	<u>TSO WPPS 1. LOOPDDYNDY</u>			<u>TSO WPPS 2. LOOPDSRV</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
1850	21025	0	24185			
1852	19645	0	4536			
1854	29483	88231	12676			
1856	11881	31605	11881			
1858	18802	37975	18802			
1860	6981	10085	30246			SAME RESULTS AS
1862	25569	3148	1787			
1864	0	35890	38489			
1866	0	43149	30212			
1868	6403	0	2986			
1870	1389	6717	0			2D2 VERSION
1872	2326	0	3448			
1874	3675	0	2333			
1876	928	857	5763			
1878	4436	0	1099			
1880	406	8038	1054			(SEE REFERENCE 4)
1882	2305	0	14558			
1884	5415	0	474			
1886	2903	0	2804			
1888	4093	0	4237			
1890	937	10109	1298			
1892	1517	0	10795			
1894	5331	0	12560			
1898	6400	0	1244			
1900	3036	0	9344			
1902	12846	2293	2035			
1904	452	6486	922			
1906	1793	0	8436			
1908	10962	0	4429			
1910	2052	0	3159			
1912	6540	0	919			
900	0	3871	0			
902	0	0	6951			
53	7907	0	5096			
90	8261	0	9373			
1241	7910	0	14603			
156	5695	0	5717			

TABLE 13

ANCHOR GROUP: 15
 ISOMETRIC: M200-SH 29
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE
 CALCULATION: 8.14 88 A & B

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	TSO WPPS . REVN 29 B . REVN 29 A			TSO WPPS . NEW 29 B . NEW 29 A		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
14	1197		2726	1196		2724
1014		1151			1151	
210	1443		1366	1440		1367
235	285		997	282		999
260		2786			2786	
275	728		692	729		692
282	2147		1802	2148		1802
32		1109			1109	
41	439		629	440		628
42	649		1393	650		1393
1042		1125			1124	

TABLE 14

ANCHOR GROUP: 16
 ISOMETRIC: M200-SH 28
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14 87

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 5. TERRY 28 S</u>			<u>TSO WPPS5.TERRY 28S</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
14		4058			4058	
15	20861			20861		
16			3948			3948
36		3427			3427	
1006	7387		10167	7387		10167
1010	3574		1892	3574		1892
1020	1749		7574	1749		7574
55		3261			3261	
1012	856		329	856		329
1014	172		1085	172		1085

TABLE 15

ANCHOR GROUP: 17
 ISOMETRIC: M200-SH 2
 DYNAMIC CASE FOR COMPARISON: OBE (XY)
 CALCULATION: 8.14 82

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 3. NEW SH 2 C</u>			<u>TSO WPPS 3. SH 2 NEW</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
390		1110			1110	
351		726			726	
16	3570		2061	3570		2061
16	2424		4198	2424		4198
1351	2790		936	2790		936
1351	750		2235	750		2235
27		819			819	
17		2257			2257	
102	1667		963	1667		963
101	1573		2724	1573		2724

TABLE 16

ANCHOR GROUP: 18
 ISOMETRIC: M200-SH 1
 DYNAMIC CASE FOR COMPARISON: OBE (XY)
 CALCULATION: 8.14 81

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS SH 01 CT</u>			<u>TSO WPPS SH 1 D 18</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
16	5768		2325	5768		2325
17		3838			3838	
27		981			981	
350		624			624	
351	1161		3458	1161		3458
352	2849		759	2849		760
380		621			621	
48	2111	1129	2488	2111	1129	2488

TABLE 17

ANCHOR GROUP: 20
 ISOMETRIC: M200-SH 35
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.150

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 3. 1335</u>			<u>TSO WPPS 2. C35</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
195	21		76	21		76
3001	11		41	11		41
1525	10	4	5	10	4	5
1508	3	3	3	3	3	3
1700	20		43	20		43
18		41			41	
201	7	86	20	7	86	20
391	16		3	16		3
5	7		15	7		15
1515	1	1	2	1	1	2
1535	8	2	8	8	2	8
1243	2		2	2		2
235	10	29		10	29	
67	20	89	9	20	89	9
6001	17		47	17		47
41	23		26	23		26
9		33			33	
195	21		76	21		76
3001	11		41	11		41
1525	10	4	5	10	4	5
1508	3	3	3	3	3	3
1700	20		43	20		43
18		41			41	
201	7	86	20	7	86	20
391	16		3	16		3
5	7		15	7		15
1515	1	1	2	1	1	2
1535	8	2	8	8	2	8
1243	2		2	2		2
235	10	29		10	29	
67	20	89	9	20	89	9
6001	17		47	17		47
41	23		26	23		26
9		33			33	
12	47		24	47		24
176	24	27	52	24	27	52
224	21	51		21	51	

TABLE 18

ANCHOR GROUP: 21
 ISOMETRIC: M200-SH 52
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.143

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .S14143.WRK1</u>			<u>TSO WPPS .S14143 SKBELL</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
79	5	5	8	5	5	8
6	64	61	42	64	61	42
81	107			107		
9			102			102
15	102		64	102		64
18		54			54	
240	190		122	190		122
26	138		143	138		143
280		226			226	
290	118		140	118		140
2901		197			197	
3331	52	147	62	52	147	62
1335		63			63	
1337	8		9	8		9
1339	32	16	27	32	16	27
1341	5		4	5		4
343	6	19	7	6	19	7
370		281			281	
411		271			271	
4150	93		103	93		103
43	113	57	43	113	57	43
44	30	28		30	28	
45	40	10	16	40	10	16
457	27	7	26	27	7	26
465	20	9	43	20	9	43
468		15	58		15	58
51	28	20	74	58	20	74

TABLE 19

ANCHOR GROUP: 22
 ISOMETRIC: M200-SH 39
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.46

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .S1446.WRK1</u>			<u>TSO WPPS .S1446.WRK2</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
617	93		70	93		70
8061			109			109
3071			56			56
3072	62			62		
3111		73			73	
317	52		54	52		54
521		53			53	
5210	86		110	86		110
620		14			14	
6492	10	0	10	10	0	10
6682		7			7	
6642	7		10	7		10
806	69			69		

TABLE 20

ANCHOR GROUP: 27
ISOMETRIC: M200-SH 120
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 3.14.124A

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS 6. JP120RE</u>			<u>TSO WPPS 5.MJM 120C</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
85		241			241	
100	316	153		316	153	
115		180			180	
115			89			89
852	259		259	259		259

TABLE 21

ANCHOR GROUP: 31
ISOMETRIC: M200-SH 113
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.120

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 2. DYN 112AB</u>			<u>TSO WPPS 2. TUST1FF1</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
26		891			891	
21	1959			1959		
52	2177			2177		
51		1292	982		1292	982
13	329	1570	1785	329	1570	1785

TABLE 22

ANCHOR GROUP: 32
 ISOMETRIC: M200-SH 115 REV 6B
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE VALVE
 CALCULATION: 8.14.96A

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. CYF 96A7</u>			<u>TSO TANG.A632ATES.ANDY</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
105	72	7	99	72	7	99
164	1194	186	3992	1194	186	3992
500	125	389	465	125	389	465
109	75	12	0	75	12	0
113	148	59	0	148	59	0
150	43	1	48	43	1	48
158	37	1	126	37	1	126
160	60	2	220	60	2	220
127	36	79	21	36	79	21
1286	496	36	133	496	36	133

NOTE: EVERY NUMBER IS IDENTICAL

TABLE 22

ANCHOR GROUP: 32
 ISOMETRIC: M200-SH 115
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.96C

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS 3. 5115C</u>			<u>TSO WPPS 3. S115C</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
11	271	192		271	192	
181	608		559	608		559
20	297	295	307	297	295	307
261/262	551		180	551		180
290		97	149		97	149
34	107	607		107	607	
37		296	179		296	179
40		248	176		248	176
44		176	224		176	224
47		227	340		227	340
50		301	475		301	475
55	161	292		161	292	
60	236		625	236		625
64	253			253		
67	140		537	140		537
69	232			232		
207	1526	361	473	1526	361	473
223	27	612		27	612	
2045	219			219		
1003			505			505

TABLE 23

ANCHOR GROUP: 43
 ISOMETRIC: M200-SH 96
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.110

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS 5. S95NB</u>			<u>TSO WPPS 5. S96NF</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
245	83		81	105		96
156	16		7	17		7
161	40		50	42		54
164	51	70	56	53	78	49
167	57		53	53		49
174	54		80	54		80
177	103	49	70	105	50	71
180	45	133	88	49	152	94
193	130	146	26	151	170	31
195	2	29	20	3	30	28
197	6	56	9	6	47	8
209	9		7	15		12
210	8	44	6	12	42	6
213	29		29	33		28
218	55		42	54		40
223	19		16	24		21

TABLE 24

ANCHOR GROUP: 44
 ISOMETRIC: M200-SH 97
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.110A

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .S14110A.WRK1</u>			<u>TSO WPPS .S14110D.WRK1</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
35	77	47		77	47	
25	274	361		274	361	
32	94		72	94		72
245	46	63	73	46	63	73
11	24	266		24	266	
14	60	299	136	100	299	136
18	303		116	303		116

TABLE 25

ANCHOR GROUP: 45
 ISOMETRIC: M200-SH 98 & 97
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.110B

VERSION OF ADLEPIPE	<u>2D12</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS.514110B.WRK1</u>			<u>TSO WPPS.514110B.WRK1</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
126	38	28		38	28	
135	8	7	6	8	7	6
114	34	9		34	9	
116	12			12		
118	53	18		53	18	
81	21	2		21	2	
93		2	20		2	20
105	30	13		30	13	
68		11			11	
69	29	16		29	16	
75	7	9	7	7	9	7

TABLE 26

ANCHOR GROUP: 47
ISOMETRIC: M200-SH 155
DYNAMIC CASE FOR COMPARISON: SRV ALL VALVE 1
CALCULATION: 8.14 57B

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS1.CYF38E</u>			<u>TSO WPPS1.CYF38E</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
111	370		67	370		67
1328		170	208		170	208
411	313		50	313		50
320		162			162	
611	38		152	38		152

TABLE 27

ANCHOR GROUP: 52
 ISOMETRIC: M200-SH 38 & 155
 DYNAMIC CASE FOR COMPARISON: SRV SINGLE
 CALCULATION: 8.14 53E

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. CYF 38 E</u>			<u>TSO WPPS 1. CYF 38 E</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
15	666	288	766	666	288	766
240		545			545	
28		281			281	
70	608	507	100	608	507	100
68	243	350	130	243	350	130
1316	126	0	65	126	0	65
314	110	81	50	110	81	50

TABLE 28

ANCHOR GROUP: 55
 ISOMETRIC: M200-SH 125
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.156

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS.514156.WRK5</u>			<u>TSO WPPS.514156.WRK5</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
106	2			2		
1053	1			1		
1604	32			32		
206	6		4	6		4
81	5	41		5	41	
11	45	48		45	48	
28		68	33		68	33
399	33		16	33		16
309	66	21		66	21	
316		42	35		42	35
318		23	22		23	22
324	33	24		33	24	
330	11	11		11	11	
335	14	10		14	10	
338	9	9	23	9	9	23
353		5	1		4	1
356	10	9		10	9	
358	6	6		5	5	
1360	5	5		5	5	
367	6			5		
370		20	3		19	3
374	5		12	5		12
376	9		22	9		22
383	10	18		10	17	
385	6	19		6	19	
389	7		27	7		27
392	17		19	17		18
395		20	8		20	8

TABLE 28 (Cont'd)

ANCHOR GROUP: 55
 ISOMETRIC: M200-SH 125
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.156

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS.514156.WRK5</u>			<u>TSO WPPS.514156.WRK5</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
1400	13	8		13	8	
1403	7	7		7	7	
407	13		16	13		19
413		15	2		15	2
416		21	14		24	16
420		11	10		11	11
422		14	12		15	13
425		5	127		5	105
428	124	8		103	8	
431		8	194		8	194
442	28			24		
451	18		37	19		34
472		14	17		17	16
475	18			16		
485	21	17		21	18	
489		16	8		16	7
498		15	9		14	9
504	15	6		15	6	
530	33	78		29	86	
537	42		106	37		86
540	47			42		
548	21		49	20		49
574		15	26		16	23
577	11			12		
590	25		61	22		58
593		72	70		78	67
608	31		69	30		59
611		74	71		68	66

TABLE 29

ANCHOR GROUP: 56
 ISOMETRIC: M200-SH 74
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.103

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS .S14103.WRK5</u>			<u>TSO WPPS .S14103.WRK2</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
78		29			29	
41	36	5	12	36	5	12
53	16	18	27	16	18	27
24	23	24	12	23	24	12
29	7	13	6	7	13	6
38	7	4	11	7	4	11
121	7	15	15	7	15	15
20	12	26	15	12	26	15
22	26	15	6	26	15	6
60	8	12	6	8	12	6

TABLE 30

ANCHOR GROUP: 57
ISOMETRIC: M200-SH 75
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.95

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .LOOP AB1</u>			<u>TSO WPPS .LOOP AB1</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
82	26	51		26	51	
59		8			8	
14	20	46		20	46	
181		17			17	
231	29	7		29	7	
29	54	22		54	22	
33		23			23	
51	16	23	24	16	23	24
57	36	7		36	7	

TABLE 31

ANCHOR GROUP: 59
 ISOMETRIC: M200-SH 41 & 43
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.50

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .S1456WRK1</u>			<u>TSO WPPS .S1450WRK20BE</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
111	12		12	12		12
375		700			700	
2830		132			132	
4450		75			75	
390		681			681	
120		43			43	
1601		5			5	
261	39		39	39		39
260	37		37	37		37
40	27		27	27		27
391	24		24	24		24
4410	56			56		
446			217			217
800	64			64		
1503	4			4		
1503			5			5
647	13		12	13		12
63		54			54	
63	13		14	13		14
6500	23		21	23		21
7500	65		180	65		180
1768	4		4	4		4

TABLE 32

ANCHOR GROUP: 60
 ISOMETRIC: M200-SH 42 & 43
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.56

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 6. JP42BE</u>			<u>TSO WPPS .S1456.WRK1</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
210	121			121		
1407	59		59	59		59
2131	431		431	431		431
245		281			281	
1625	0			0		
250		14			14	
210		49			49	
1120			162			162
1330			334			334
218		392			392	
225		78			78	
1450	284			284		
230			336			336
176		96			96	
240	267			267		
1525			37			37
154			336			336
1605	112		112	112		112
1615	39	200	56	39	200	56
1195		515			515	

TABLE 33

ANCHOR GROUP: 61
ISOMETRIC: M200-SH 153
DYNAMIC CASE FOR COMPARISON: SRV ALL VALVE 1
CALCULATION: 8.14 36C

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .SHT 153</u>			<u>TSO WPPS .SRV 153</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
1403	36		101	37		103
1404	102		172	106		180
1405	367		85	373		86
1422	0		0	43		43

TABLE 33 (Cont'd)

ANCHOR GROUP: 61
 ISOMETRIC: M200-SH 43 & 42
 DYNAMIC CASE FOR COMPARISON: SRV ALL VALVE 1
 CALCULATION: 8.14 36A

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS .SHT 4342</u>			<u>TSO WPPS .SRV 4342</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
229	122		275	122		275
258	143		134	143		133

TABLE 33 (Cont'd)

ANCHOR GROUP: 61
ISOMETRIC: M200-SH 43 & 153
DYNAMIC CASE FOR COMPARISON: SRV ALL VALVE 1
CALCULATION: 8.14 36B

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .SHT 43153</u>			<u>TSO WPPS .SRV 43753</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
1307	728		355	728		355
365	567		441	567		441
1365	207		264	207		265

TABLE 34

ANCHOR GROUP: 71
 ISOMETRIC: M200-SH 126
 DYNAMIC CASE FOR COMPARISON: OBE (XY)
 CALCULATION: 8.14 148C

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. S126 CV</u>			<u>TSO WPPS 1. TESTAG 71</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
288	92			92		
280		104			104	
58	65		38	65		38
62		336			336	
63	367			367		
65			361			361
678	86		53	86		53
68		375			375	
71	334		94	335		94
34			130			130

TABLE 35

ANCHOR GROUP: 72-74
ISOMETRIC: M200-SH 129
DYNAMIC CASE FOR COMPARISON: SRV
CALCULATION: 8.14.126

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .SHT 129B</u>			<u>TSO WPPS .SRV 129B</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
331	270		166	270		166

TABLE 36

ANCHOR GROUP: 82
 ISOMETRIC: M200-SH 139
 DYNAMIC CASE FOR COMPARISON: OBE (XY)
 CALCULATION: 8.14 87B

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. SH 342 B</u>			<u>TSO WPPS 1. TESTAG 82</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
601	258	176		258	176	
603	148	130		148	130	
600	175	221		175	221	
153		131			131	
1524			351			351
1155	182		63	182		63
1159		60			60	
602			55			55
165		48			48	
166			73			73

TABLE 37

ANCHOR GROUP: 92
ISOMETRIC: M200-SH 105
DYNAMIC CASE FOR COMPARISON: OBE (XY)
CALCULATION: 8.14.63D

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS .SH105D</u>			<u>TSO WPPS .NEW105D</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
431	319	5016	87	319	5016	87
450	86	35	95	86	35	95
1466		60	601		60	601
1413	1268			1268		
408		642	130		642	130
430	696		482	696		482
4251	2078		1264	2078		1264
4080	815			815		
4480	230			230		
444	61	235	68	61	235	68

TABLE 38

ANCHOR GROUP: 98
 ISOMETRIC: M200-SH 104 & 108
 DYNAMIC CASE FOR COMPARISON: SRV ALL VALVE 1
 CALCULATION: 8.14.59B & 8.14.66A

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS .JJF59B</u>			<u>TSO WPPS .JJF59BTST</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
39		116			116	
34			1310			1310
42	2409	442		2409	442	
110		5706			5706	
112			9677			9677
1181		7068			7068	
1411			18154			18147
171			7843			7843
177		20726			20726	
1762	51611		6166	51611		6165

TABLE 38

ANCHOR GROUP: 98
 ISOMETRIC: M200-SH 108 & 104
 DYNAMIC CASE FOR COMPARISON: SRV ALL VALVE 1
 CALCULATION: 8.14.59B

VERSION OF ADL PIPE	<u>2D</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS.JJF59B</u>			<u>TSO WPPS.JJR59BTST</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
16	62	25	12	62	25	12
30	87	78	43	87	78	43
340	93	-	-	93	-	-
34	-	-	1310	-	-	1310
39	-	116	-	-	116	-
42	2409	442	-	2409	442	-
53	350	107	-	350	107	-
63	140	82	125	140	82	125
105	6619	4950	7946	6619	4950	7946
110	-	5706	-	-	5706	-
112	-	-	9677	-	-	9677
1181	-	7068	-	-	7068	-
120	2505	2076	6772	2505	2076	6772
130	-	3748	-	-	3748	-
132	25465	-	-	25454	-	-
133	-	2406	-	-	2406	-
1380	24407	-	-	24397	-	-
139	-	1647	-	-	1647	-
141	9556	-	-	9553	-	-
1411	-	-	18154	-	-	18147
143	-	1226	-	-	1226	-
150	10180	-	-	10176	-	-
153	-	465	-	-	465	-
1580	19076	346	1645	19069	346	1645
171	-	-	7843	-	-	7843
1762	51611	-	6166	51611	-	6165
177	-	20726	-	-	20726	-
182	107272	17174	38096	107272	17174	38097
23	112	-	-	112	-	-
35	-	98	-	-	98	-
42	-	-	4441	-	-	4441
126	10849	-	-	10846	-	-
303	16458	-	-	16458	-	-

TABLE 39

ANCHOR GROUP: 122
ISOMETRIC: M200-SH 166
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.122

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .AG122</u>			<u>TSO WPPS .S14122.WRK1</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
100		154			154	
95	83		198	83		198
106		112			112	
105		146			146	
104	188		146	188		146

TABLE 40

ANCHOR GROUP: 152
ISOMETRIC: M200-SH 156
DYNAMIC CASE FOR COMPARISON: OBE (XY)
CALCULATION: 8.14.116

VERSION OF ADLEPIPE	<u>202</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS .S156</u>			<u>TSO WPPS 2.SH156</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
195	694	791	1193	694	791	1193
1851	5110		1086	5510		1086
185		2423			2423	
1804	236		1113	236		1113
176	564	1597		564	1592	
172		870	2522		870	2522
169	548	715	765	548	715	765

TABLE 41

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 54
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.02

VERSION OF ADLEPIPE	<u>2D2</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO WPPS 7. SRV 1A54</u>			<u>TSO WPPS 7.T54</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
451	363		277	363		277
559	1845		1860	1845		1860

TABLE 42

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 56
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.22

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO PENG .ISO 56</u>			<u>TSO WPPS 3. STSRV 56</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
112	55	217	104	55	217	204
190	527		58	527		58
559	1465		1684	1465		1684

TABLE 43

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 58
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.12

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 2. S1412 WORK1</u>			<u>TSO WPPS 2. C58</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
113	469	250	392	469	250	392
20	323		262	323		262
59	1613		1637	1613		1637

TABLE 44

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 59
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.16

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 1. S1416 WORK1</u>			<u>TSO WPPS 2. C59</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
559	2080		1912	2080		1912
23	566		131	566		131
231	88		452	88		452
215	162	203	109	162	203	109
500		295			295	

TABLE 45

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 61
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.08

VERSION OF ADLEPIPE INPUT DATA FILE SUPPORT NODAL POINT	<u>2012</u>			<u>2018</u>		
	<u>TSO WPPS 7. S61E</u>			<u>TSO WPPS 7. T61</u>		
	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
911/992	528		1036	528		1036
911		363			362	
130		282			282	
225/326	332		207	332		207
226/331	165		264	165		264
559	1569		1294	1569		1294

TABLE 46

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 62
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.01

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO WPPS 7. S62 E</u>			<u>TSO WPPS 7. T62</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
116		252			252	
13/1312	331			331		
133/1332	246			246		
559	1217		1090	1217		1090

TABLE 47

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 63
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.10

ADLEPIPE	<u>202</u>			<u>2018</u>		
FILE	<u>TSO WPPS 7. SRV 1C63</u>			<u>TSO WPPS 7. T63</u>		
<u>ADAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
.0	42	206	176	42	206	176
.9	451			451		
.8			442			442
.9	1254		1447	1254		1447

TABLE 48

ANCHOR GROUP: SRV LINE IN WETWELL
ISOMETRIC: M200-SH 70
DYNAMIC CASE FOR COMPARISON: OBE
CALCULATION: 8.14.14

VERSION OF ADLEPIPE	<u>2D12</u>			<u>2D18</u>		
INPUT DATA FILE	<u>TSO PENG .ISO 70</u>			<u>TSO 0786 .ISO70</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
215		151			151	
301	480			480		
302			418			418
559	1633		1605	1633		1605

TABLE 49

ANCHOR GROUP: SRV LINE IN WETWELL
 ISOMETRIC: M200-SH 71
 DYNAMIC CASE FOR COMPARISON: OBE
 CALCULATION: 8.14.11

VERSION OF ADLEPIPE	<u>2012</u>			<u>2018</u>		
INPUT DATA FILE	<u>TSO PENG .IS071</u>			<u>TSO 0786 .IS071</u>		
<u>SUPPORT NODAL POINT</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>	<u>Fx</u>	<u>Fy</u>	<u>Fz</u>
255	556		175	556		175
258	159		506	159		506
130		203			203	
132	269		37	269		37
559	1990		1990	1990		1990

VITS CONTROL FORM

83-67

AIITS NO.

VITS NO.

VENDOR

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8	3	-	0	6	7
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D	I	S	/	A	D	L	P	I	P	E	.				
N	C.														

INSPECTOR

DATE ENTERED

B	R	I	C	K	L	E	Y				
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7	2	0	3	-	1	5	-	8	3
			month			day			year

CATEGORY

DUE DATE

REQUESTING OFFICE

REQUESTOR

1 2

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R	I	V
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H	A	L	E	D	I	V	I	T	A								
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CLOSEOUT METHOD

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PLANT DOCKET NO. (s)

5	0	-	7	9	7															
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TYPE OF REPORT

CDR PART 21 LER ALLEGATION
 OTHER

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DESCRIPTION

VENDOR DOCKET NO.

9	9	9	0	0	8	1	5
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E	R	R	O	R	S	I	N	A	D	L	P	I	P	E	P	I	P	E	S	T	R	E	S	S	A
A	N	A	L	Y	S	I	S	P	R	O	G	R	A	M											

SECT	CHE/DATE	RR	CHE/DATE	SECRY/DATE	INSP/DATE
#2	1/6/83	W/UP	3/10	MC	
	J. Bann			3/23	

VITS CONTROL FORM

53-67

AIITS NO.

VITS NO.

VENDOR

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8	3	-	0	6	7
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D	I	S	/	A	D	L	P	I	P	E		1
N	C.											

INSPECTOR

DATE ENTERED

B	R	I	C	K	Z	E	Y				
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MC	0	3	-	1	5	-	8	3
	month		day		year			

CATEGORY

DUE DATE

<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	2
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	-		-	
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REQUESTING OFFICE

REQUESTOR

R	I	V	E
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K	A	L	E	D	V	E	T	A											
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CLOSEOUT METHOD

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PLANT DOCKET NO.(s)

5	0	-	3	9	7															
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TYPE OF REPORT

<input type="checkbox"/>	CDR	<input checked="" type="checkbox"/>	PART 21	<input type="checkbox"/>	LER	<input type="checkbox"/>	ALLEGATION
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OTHER

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DESCRIPTION

VENDOR DOCKET NO.

9	9	9	0	0	8	1	5
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E	R	R	O	R	S	I	N	A	D	L	P	I	P	E	P	I	P	E	S	T	R	E	S	S	A
A	N	A	L	Y	S	I	S	P	R	O	G	R	A	M											

SECT	CHE/DATE	RD	CHE/DATE	SECY	DATE	INSP	DATE
#2	1/6/83	W/UP	3/10	MC	3/23		
	In Revis 3/1/83						

VITS CONTROL FORM

83-66

AIIS NO.

VITS NO.

VENDOR

FC0001383

83-066

SARGENT & LUK
DX

INSPECTOR

DATE ENTERED

CHAMBERLAIN

MC 03-15-83
month day year

CATEGORY

DUE DATE

REQUESTING OFFICE

1 2

04-10-83

REQUESTOR

R1111 SPEESARD DP&RA

CLOSEOUT METHOD

PLANT DOCKET NO.(s)

50-461

TYPE OF REPORT

CDRP PART 21 LER ALLEGATION
OTHER

DESCRIPTION

VENDOR DOCKET NO.

99900507

TWO 55(c) REPORTS DEALING WITH
USAGE OF INCOMPLETE SOIL CHARAC
TERISTIC VALUE AND SMALL BORE PIP
ING SUPPORT DESIGN CALCULATIONS

SECT CHE/DATE

RR CHE/DATE

SECRV/DATE

INSP/DATE

A 2/24/83
I. Brown 3/6/83
W/UP 3/16
3/23
MC

VITS CONTROL FORM

RF

83-66

AIIS NO.

F03001383

VITS NO.

83-066

VENDOR

SARGENT & LUKE
DX

INSPECTOR

CHAMBERLAIN

DATE ENTERED

RC 03-15-83
month day year

CATEGORY

1 2

DUE DATE

04-10-83

REQUESTING OFFICE

R111

REQUESTOR

SPEESARD DEPERA

CLOSEOUT METHOD

PLANT DOCKET NO. (s)

50-461

TYPE OF REPORT

CORRECTIVE PART 21 DEFICIENCY ALLEGATION

OTHER

DESCRIPTION

VENDOR DOCKET NO.

99900507

TWO 55(c) REPORTS DEALING WITH
USAGE OF INCORRECT SOIL CHARAC
TERISTIC VALUE AND SMALL BORE PIP
ING SUPPORT DESIGN CALCULATIONS

SECT CHE/DATE

RD CHE/DATE

SECRY/DATE

INSP/DATE

2/24/82
D. B. 3/1/83
A/UP 3/16
3/23
RC