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April 15, 1982

Harold R Denton, Director  
Office of Nuclear Reactor Regulation  
Division of Licensing  
US Nuclear Regulatory Commission  
Washington, DC 20555



MIDLAND PROJECT

MIDLAND DOCKET NO 50-329, 50-330

UNDERGROUND PIPING INFORMATION

REQUESTED DURING APRIL 7, 1982 TELECON

FILE: 0485.16 SERIAL: 16638

REFERENCE: J W COOK LETTER TO H R DENTON

SERIAL 16269, DATED MARCH 16, 1982

- ENCLOSURES:
- (1) LOAD COMBINATION EQUATIONS AND STRESS ALLOWABLES
  - (2) CALCULATION RESULTS COMBINING FUTURE SETTLEMENT WITH OTHER ASME CODE LOADS
  - (3) INFORMATION ON SAFETY CLASSIFICATION OF THE 48 INCH SERVICE WATER PIPE
  - (4) TABLE 1.0 MONITORING STATION OVALITY AND CORRESPONDING STRAIN

The purpose of this letter is to document information provided in a meeting between the NRC Staff and Consumers Power Company held on April 16, 1982. This information was requested by the Staff in a recent telephone conference on April 7, 1982.

Enclosure (1) is a clarification of the load combination equations used in the submittal entitled Reinstallation Program For 26-Inch and 36-Inch Diameter Buried Service Water Pipes At The Midland Nuclear Plant. Enclosure (2) is the results of calculations we agreed to perform combining future settlement with other ASME code loads. These calculations were performed only on the lines affected by the reinstallation program. Enclosure (3) is additional information concerning the safety classification of the 48-inch service water pipe to the cooling towers. Enclosure (4) is a table showing measured ovalities and corresponding meridional strain for the pipe monitoring stations defined in our earlier submittal entitled Future Monitoring Program Of The Existing Buried Service Water Piping For Midland Plants Units 1 and 2. This tabulated information is intended to supplement the information already submitted on the monitoring program.

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In addition, during the telephone conference on April 7, 1982 Consumers Power Company agreed to measure the pipe ovality of the piping affected by the reinstallation program. Ovality measurements shall be taken twice; before installation and after the pipe is rebedded.

We believe the information supplied satisfies the concerns the NRC Staff expressed to us in the recent telephone conference.

*J. Mooney for JWC*

JWC/WJC/mkh

CC Atomic Safety and Licensing Appeal Board, w/o  
 CBechhoefer, ASLB, w/o  
 FCherney, NRC, w/a  
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 FPCowan, ASLB, w/o  
 RJCook, Midland Resident Inspector, w/o  
 RSDecker, ASLB, w/o  
 SGadler, w/o  
 JHarbour, ASLB, w/o  
 DSHood, NRC, w/a (2)  
 JDKane, NRC, w/a  
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 WHMarshall, w/o  
 WDPaton, Esq, w/o  
 BStamiris, w/o

BCC RCBauman, P-14-312B, w/o  
AJBoos, Bechtel, w/a  
JEBrunner, M-1079, w/a  
WGCorley, w/a  
RWHuston, Washington, w/a  
JAMooney, P-14-115A  
DBMiller, Midland, w/a  
MIMiller, IL&B, w/a  
JARutgers, Bechtel, w/a  
JRSchaub, P-13-309A  
PPSteptoe, IL&B, w/a  
TRThiruvengadam, P-14-400, w/a  
JTsacoyeanes, Teledyne Engineering, w/a  
FCWilliams, IL&B, w/a  
Licensing Clerk  
NRC Correspondence File

## ENCLOSURE 1

## ASME CODE CHECK - STRESS SUMMARY FOR

BURIED SERVICE WATER PIPING<sup>(1)</sup>

(Stresses in psi)

Line Number	Description	Normal Eq 8 <sup>(2)</sup>		Upset Eq 9 <sup>(2)</sup>		Faulted Code Case 1606 <sup>(2)</sup>		Thermal Eq 10 <sup>(2)</sup>	
		Actual Stress	Allowable Stress	Actual Stress	Allowable Stress	Actual Stress	Allowable Stress	Actual Stress	Allowable Stress
36/26"-OHBC-15	SW Supply	10,442	17,500	14,818	21,000	19,193	42,000	7,558	26,250
36/26"-OHBC-16	SW Return	10,442	17,500	19,899	21,000	29,356	42,000	8,866	26,250
36/26"-OHBC-19	SW Supply	10,442	17,500	19,820	21,000	29,199	42,000	4,050	26,250
36/26"-OHBC-20	SW Return	10,442	17,500	19,928	21,000	29,414	42,000	21,613	26,250
26"-OHBC-53	SW Supply	5,842	17,500	16,164	21,000	26,485	42,000	25,590	26,250
26"-OHBC-54	SW Return	5,842	17,500	19,168	21,000	32,494	42,000	25,009	26,250

## NOTES:

1. a. This table shows maximum stresses in buried portion of the above lines. The extent of the buried pipe summarized here matches that included in Enclosure 2.

b. Actual stresses are based on calculations using 3/8-inch wall pipe

## 2. Piping stress summaries:

a. Equation 8

Stresses included = design pressure, weight and sustained loads (includes overburden)

Allowable stress =  $1.0S_h$  - in accordance with ASME NC-3652.1 and Section III, Division 1, Appendix I

b. Equation 9

Stresses included = peak pressure, weight and sustained loads (includes overburden), occasional load (OBE)

Allowable stress =  $1.2S_h$  - in accordance with ASME NC-3652.2 and Section III, Division 1, Appendix I

c. Code Case 1606

Stresses included = peak pressure, weight and sustained loads (includes overburden), occasional load (SSE)

Allowable stress =  $2.4S_h$  - in accordance with Code Case 1606 and Section III, Division 1, Appendix I

d. Equation 10

Stresses included = thermal expansion, anchor movement (OBE)

Allowable stress =  $S_A$  - in accordance with ASME NC-3652.3 and Section III, Division 1, Appendix I

## ENCLOSURE 1

PRELIMINARY RESULTS OF WALL PENETRATION ANALYSIS

Line Number	Annulus at Wall Penetration (in) (A)	Seismic Disp. <sup>(1)</sup> at Wall Penetration (in) (B)	Disp. Due to <sup>(2)</sup> 1-1/2" Settlement 30' from Wall (in) (C)	Margin (in) A - (B + C)
36"-0HBC-15	2.625	0.1741	0.204	2.2469
36"-0HBC-16	2.625	0.1801	0.0705	2.3744
36"-0HBC-19	2.625	0.3361	0.204	2.0849
36"-0HBC-20	2.625	0.7220	0.1935	1.7095

NOTES:

(1) Seismic displacement was determined by combining the absolute values of the following four motions:

- a. Building movement - lateral and vertical
- b. Soil movement - lateral and vertical
- c. Pipe in soil - lateral and vertical
- d. Pipe in building - lateral and vertical

The lateral and vertical absolute sums were then combined by the square-root-of-the-sum-of-the-squares method.

(2) Settlement displacement is the pipe displacement at the penetration because of 1-1/2" of settlement 30 feet from the building.

## ENCLOSURE 1

RESULTS OF TERMINAL END ANALYSIS

<u>Line Number</u>	<u>Allowable<sup>(1)</sup> Stress <math>3S_c</math> (psi)</u>	<u>Maximum Stress for 1-1/2" Settlement 30' from Wall (psi)</u>	<u>Settlement at 30' for Stress to be <math>3S_c</math> (in)</u>
36"-0HBC-15	52,500	14,264	8.401
36"-0HBC-16	52,500	38,825	9.3717
36"-0HBC-19	52,500	11,705	8.401
36"-0HBC-20	52,500	15,949	9.3717

NOTE:

(1) ASME 1977 Edition, Subsection NC-3652.3, Equation 10a -  $\frac{iM_D}{Z} \leq 3.0S_c$

MIDLAND PLANT UNITS 1 AND 2  
REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-OHBC-15  
(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
86 (Tee in Line 36"-OHBC-15)	2,442	3,340	0	35,390 <sup>(1)</sup>	9,793	8,908	0	59,873
215 (90° Elbow)	2,442	630	0	7,561	13,960	4,270	0	28,863
350	2,442	306	0	1,212	4,476	3,058	0	11,494
-----	-----	-----	-----	-----	-----	-----	-----	-----
351 (Outside Face of SWPS)	2,442	0	8,000	806	7,023	2,132	0	20,403
352	2,442	0	8,000	1,310	10,934	2,015	0	24,701
353	2,442	0	8,000	1,304	14,264	1,923	0	27,993
354	2,442	0	8,000	1,260	14,061	1,985	0	27,748
355	2,442	0	8,000	1,494	5,466	2,374	0	19,776
356 (Tee for Line 26"-OHBC-53)	2,442	0	8,000	7,558	39,414 <sup>(2)</sup>	8,751	0	66,165 <sup>(2)</sup>
357 (36" x 26" Reducer)	2,442	0	8,000	910	10,218 <sup>(2)</sup>	3,054	0	24,624 <sup>(2)</sup>
358	1,742	0	4,100	1,479	27,543 <sup>(2)</sup>	-	0	-
359	1,742	0	4,100	1,198	37,549 <sup>(2)</sup>	2,514	0	47,103 <sup>(2)</sup>

End of Reinstalled Line

NOTE:

<sup>(1)</sup>Stress intensification factor at the tee resulted in high thermal stress. Use of alternative Equation 11 gave results within allowable stresses (43,750 psi)

<sup>(2)</sup>The data point is within 10 feet of assumed anchor imposed for terminal end analysis. The imposed restraints influence the stress values. This stress value is not valid because of end conditions.



MIDLAND PLANT UNITS 1 AND 2  
REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-0HBC-16  
(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
847 (36" x 30" Reducer to Line 30"-0HBC-34)	2,442	786	0	2,497	8,140	606	0	14,471
845	2,442	1,378	0	2,893	9,490	877	0	17,080
830 (Tee for Line 36"-0HBC-1)	2,442	4,749	0	11,171	24,854	2,180	0	45,396
835 (First Weld Inside SWPS)	2,442	878	0	686	4,071	610	0	8,687
834	2,442	567	0	-	4,263	598	0	7,870
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836 (Outside Face of SWPS)	2,442	0	8,000	497	4,568	2,079	0	15,981
90R	2,442	0	8,000	1,207	5,890	2,958	0	20,497
290 (Tee for Line 26"-0HBC-54)	2,442	0	8,000	8,866	38,084	18,914	0	76,306
90Q (36" x 26" Reducer to Line 26"-0HBC-16)	2,442	0	8,000	2,792	36,894	3,876	0	54,004
90F	1,742	0	4,100	2,088	38,825	5,035	0	51,790
90N	1,742	0	4,100	310	15,497 <sup>(1)</sup>	3,422	0	25,071 <sup>(1)</sup>

End of Reinstalled Line

NOTE:

<sup>(1)</sup>The data point is within 10 feet of assumed anchor imposed for terminal end analysis. The imposed restraints influence the stress values. This stress value is not valid because of end conditions.



MIDLAND PLANT UNITS 1 AND 2  
REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-0HBC-19

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
32 (Tee in Line 36"-0HBC-19)	2,442	2,150	0	8,313	2,547	8,207	0	23,659
200 (90° Elbow)	2,442	2,012	0	9,066	5,644	8,778	0	27,942
200A	2,442	397	0	775	383	3,555	0	7,552
205A (90° Elbow)	2,442	2,031	0	6,370	8,544	8,099	0	27,486
700 (First Weld Inside SWPS)	2,442	639	0	1,166	2,559	4,099	0	10,905
-----	-----	-----	-----	-----	-----	-----	-----	-----
701 (Outside Face of SWPS)	2,442	0	8,000	613	3,795	5,326	0	20,176
702	2,442	0	8,000	693	6,887	5,105	0	23,127
703	2,442	0	8,000	471	10,824	4,882	0	26,619
704	2,442	0	8,000	425	11,705	4,662	0	27,234
705	2,442	0	8,000	337	3,912 <sup>(2)</sup>	4,444	0	19,135 <sup>(2)</sup>
706	2,442	0	8,000	1,330	20,395 <sup>(2)</sup>	4,232	0	36,399 <sup>(2)</sup>
707 <sup>(1)</sup>	2,442	0	8,000	4,050	68,738 <sup>(2)</sup>	4,032	0	87,262 <sup>(2)</sup>
- (Tee for Line 26"-0HBC-55)	2,442	0	8,000	-	0 <sup>(3)</sup>	18,757	0	-
End of Reinstalled Line								

NOTE:

<sup>(1)</sup> Assumed anchor and end of analysis for thermal and terminal end analyses.

<sup>(2)</sup> Data point is within 10 feet of assumed anchor. The imposed restraints influence the stress values. This stress value is not valid because of end conditions.

<sup>(3)</sup> Because supporting fill is being replaced and pipe is being rebedded, settlement stress beyond the effects of terminal ends is considered to be zero.

MIDLAND PLANT UNITS 1 AND 2  
REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-OHBC-20

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
886 (Tee at Line 36"-OHBC-1 Inside SWPS)	2,442	1,644	0	6,407	15,949	3,362	0	29,804
887 (90° Elbow)	2,442	1,892	0	3,324	12,627	1,722	0	22,007
890	2,442	615	0	636	2,128	618	0	6,439
892 (90° Elbow)	2,442	1,463	0	4,714	10,574	3,808	0	23,001
894 (90° Elbow)	2,442	1,417	0	2,376	4,507	2,282	0	13,024
896	2,442	727	0	531	894	648	0	5,242
897 (90° Elbow)	2,442	1,693	0	5,017	10,645	1,256	0	21,053
898 (First Weld Inside SWPS)	2,442	609	0	791	2,838	816	0	7,496
----- 899 (Outside Face of SWPS)	2,442	0	8,000	734	3,274	5,536	0	19,986
A99	2,442	0	8,000	667	4,466	5,536	0	21,161
B99	2,442	0	8,000	655	2,540 <sup>(2)</sup>	5,472	0	19,109 <sup>(2)</sup>
C99	2,442	0	8,000	596	22,493 <sup>(2)</sup>	5,265	0	38,796 <sup>(2)</sup>
D99 <sup>(1)</sup>	2,442	0	8,000	560	79,104 <sup>(2)</sup>	5,058	0	95,164 <sup>(2)</sup>
E99	2,442	0	8,000	-	0 <sup>(3)</sup>	4,852	0	-
F99	2,442	0	8,000	543	0	4,650	0	15,635
G99	2,442	0	8,000	588	0	4,453	0	15,483
H99	2,442	0	8,000	712	0	4,270	0	15,424
J99	2,442	0	8,000	905	0	4,112	0	15,459
K99	2,442	0	8,000	1,081	0	4,007	0	15,530
L99	2,442	0	8,000	1,058	0	4,005	0	15,505

<u>Data Point</u>	<u>Pressure</u>	<u>Weight</u>	<u>Overburden</u>	<u>Thermal</u>	<u>Settlement</u>	<u>Seismic (SSE)</u>	<u>Hydraulic Transients</u>	<u>Total</u>
M99	2,442	0	8,000	669	0	4,209	0	15,320
N99	2,442	0	8,000	1,437	0	4,815	0	16,694
700	2,442	0	8,000	21,613	0	18,972	0	51,027

(Tee for Line 26"-OHBC-56)

End of Reinstalled Line

NOTES:

- (1) Assumed anchor for terminal end analysis.
- (2) Data point is within 10 feet of assumed anchor imposed for terminal end analysis. The imposed restraints influence the stress values. This stress value is not valid because of end conditions.
- (3) Because supporting fill is being replaced and pipe is being rebedded, settlement stress beyond the effects of terminal ends is considered to be zero.

MIDLAND PLANT UNITS 1 AND 2  
REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 26"-0HBC-53

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
356 (Tee at 36"-0HBC-15)	1,742	0	4,100	25,590	119,785	20,643	0	171,860 <sup>(2)</sup>
-	1,742	0	4,100	-	18,573 <sup>(2)</sup>	-	0	-(2)
-(5)	1,742	0	4,100	-	65,343 <sup>(2)</sup>	-	0	-(2)
366	1,742	0	4,100	552	0 <sup>(4)</sup>	5,216	0	11,610
367 (90° Elbow)	1,742	0	4,100	2,563	0	263	0	8,668
368	1,742	0	4,100	460	0	723	0	7,025
370	1,742	0	4,100	443	0	744	0	7,029
371	0	0	4,100	381	0	622	0	6,845
372 (90° Elbow)	1,742	0	4,100	2,761	0	2,064	0	10,667
374 (45° Elbow)	1,742	0	4,100	2,552	0	7,168	0	15,562
375	1,742	0	4,100	1,007	0	2,609	0	9,458
376	1,742	0	4,100	1,054	0	2,078	0	8,974
377	1,742	0	4,100	818	0	-	0	-
378	1,742	0	4,100	583	0	2,274	0	8,699
379	1,742	0	4,100	475	0	2,654	0	8,971
380 <sup>(1)</sup>	1,742	0	4,100	527	0	3,089	0	9,458
96B	1,742	0	4,100	-(3)	0	3,533	0	9,375
95I	1,742	0	4,100	-	0	3,980	0	9,822
95C	1,742	0	4,100	-	0	4,424	0	10,266
95B	1,742	0	4,100	-	0	4,868	0	10,710
94I	1,742	0	4,100	-	0	5,311	0	11,153
94C	1,742	0	4,100	-	0	5,536	0	11,378
94B	1,742	0	4,100	-	0	5,536	0	11,378
93I	1,742	0	4,100	-	0	5,536	0	11,378
92I	1,742	0	4,100	-	0	5,536	0	11,378
92C	1,742	0	4,100	-	0	5,536	0	11,378
92B	1,742	0	4,100	-	0	5,536	0	11,378
92I	1,742	0	4,100	-	0	5,536	0	11,378
92C	1,742	0	4,100	-	0	5,536	0	11,378
92B	1,742	0	4,100	-	0	5,536	0	11,378
91I	1,742	0	4,100	-	0	5,536	0	11,378
91C	1,742	0	4,100	-	0	5,536	0	11,378
91B	1,742	0	4,100	-	0	5,536	0	11,378
90I	1,742	0	4,100	-	0	5,536	0	11,378

<u>Data Point</u>	<u>Pressure</u>	<u>Weight</u>	<u>Overburden</u>	<u>Thermal</u>	<u>Settlement</u>	<u>Seismic (SSE)</u>	<u>Hydraulic Transients</u>	<u>Total</u>
90C	1,742	0	4,100	-	0	5,536	0	11,378
90B	1,742	0	4,100	-	0	5,536	0	11,378
89I	1,742	0	4,100	-	0	5,536	0	11,378
89C	1,742	0	4,100	-	0	5,536	0	11,378
89B	1,742	0	4,100	-	0	5,536	0	11,378
88I	1,742	0	4,100	-	0	5,536	0	11,378
88C	1,742	0	4,100	-	0	5,536	0	11,378
88B	1,742	0	4,100	-	0	5,536	0	11,378
87I	1,742	0	4,100	-	0	5,536	0	11,378
87C	1,742	0	4,100	-	0	5,536	0	11,378
87B	1,742	0	4,100	-	0	5,536	0	11,378

End of Reinstalled Line

NOTES:

- (1) Assumed anchor and end of analysis for thermal analysis.
- (2) Data point is within 10 feet of assumed anchor imposed for terminal end analysis of line 36"-0HBC-15. The imposed restraints influence the stress values. This stress value is not valid because of end conditions.
- (3) Thermal stresses beyond this point will vary similarly to those for line 26"-0HBC-54 and will not exceed line 54 values.
- (4) Because supporting fill is being replaced and pipe is being rebedded, settlement stress beyond the effects of terminal ends is considered to be zero.
- (5) Assumed anchor for terminal end analysis of line 36"-0HBC-15.

MIDLAND PLANT UNITS 1 AND 2  
REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 26"-0HBC-54

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
290 (Tee at 36"-0HBC-16)	1,742	0	4,100	25,009	28,249	26,652	0	85,752
A40 (45° Elbow)	1,742	0	4,100	10,945	32,566 <sup>(2)</sup>	7,488	0	56,841 <sup>(2)</sup>
B40	1,742	0	4,100	4,222	5,752 <sup>(2)</sup>	2,088	0	17,904 <sup>(2)</sup>
C40 <sup>(1)</sup>	1,742	0	4,100	3,403	111,530 <sup>(2)</sup>	2,279	0	123,054 <sup>(2)</sup>
D40	1,742	0	4,100	1,788	0 <sup>(3)</sup>	-	0	-
E40	1,742	0	4,100	603	0	2,661	0	9,106
F40	1,742	0	4,100	74	0	3,090	0	9,006
G40	1,742	0	4,100	175	0	3,529	0	9,546
H40	1,742	0	4,100	162	0	3,969	0	9,973
J40	1,742	0	4,100	109	0	4,409	0	10,360
K40	1,742	0	4,100	79	0	4,849	0	10,770
L40	1,742	0	4,100	73	0	5,289	0	11,204
M40	1,742	0	4,100	73	0	-	0	-
N40	1,742	0	4,100	73	0	5,536	0	11,451
P40	1,742	0	4,100	73	0	5,536	0	11,451
Q40	1,742	0	4,100	73	0	5,536	0	11,451
R40	1,742	0	4,100	73	0	5,536	0	11,451
S40	1,742	0	4,100	73	0	5,536	0	11,451
T40	1,742	0	4,100	73	0	5,536	0	11,451
U40	1,742	0	4,100	73	0	5,536	0	11,451
V40	1,742	0	4,100	73	0	5,536	0	11,451
W40	1,742	0	4,100	73	0	5,536	0	11,451
X40	1,742	0	4,100	73	0	5,536	0	11,451
Y40	1,742	0	4,100	73	0	-	0	-
Z40	1,742	0	4,100	73	0	5,536	0	11,451
A45	1,742	0	4,100	73	0	5,536	0	11,451
B45	1,742	0	4,100	73	0	5,536	0	11,451
C45	1,742	0	4,100	73	0	5,536	0	11,451
D45	1,742	0	4,100	73	0	5,536	0	11,451
E45	1,742	0	4,100	73	0	-	0	-
F45	1,742	0	4,100	73	0	5,536	0	11,451
G45	1,742	0	4,100	73	0	5,536	0	11,451
H45	1,742	0	4,100	73	0	5,536	0	11,451

Line 26"-0BHC-54 (Continued)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement	Seismic (SSE)	Hydraulic Transients	Total
J45	1,742	0	4,100	73	0	5,536	0	11,451
K45	1,742	0	4,100	73	0	5,536	0	11,451
L45	1,742	0	4,100	73	0	5,536	0	11,451
M45	1,742	0	4,100	73	0	-	0	-
N45	1,742	0	4,100	73	0	5,536	0	11,451

End of Reinstalled Line

NOTES:

- (1) Assumed anchor for terminal end analysis of line 36-0HBC-16.
- (2) Data point is within 10 feet of assumed anchor imposed for terminal end analysis of line 36"-0HBC-16. The imposed restraints influence the stress values. This stress value is not valid because of end conditions.
- (3) Because supporting fill being replaced and pipe is being rebedded, settlement stress beyond the effects of terminal ends is considered to be zero.



ENCLOSURE 3

48-INCH DIAMETER SERVICE WATER LINE

TO

COOLING TOWER

(LINE 48"-0HBC-2/48"-0YJJ-1)

This line is used to route the returning service water to the cooling tower in lieu of discharge to the emergency cooling water reservoir. Inside the service water pump structure (SWPS), there are two Seismic Category I butterfly valves isolating this line from the normal routing to the cooling pond. Functionally, the class change is at the butterfly valves; however, design practice is to extend the pipe class to the first anchor point beyond the safety/non-safety isolation valves. This anchor point was the soil outside the structure. At the class change, the line also changes from carbon steel to concrete.

The routing of this line is shown in drawings:

- M-183, Sh 1
- M-183, Sh 2
- M-184, Sh 1
- M-184, Sh 2
- M-618, Sh 1

The analysis of the piping system inside the SWPS included a terminal end analysis which continued to an assumed anchor at the change from steel pipe to concrete pipe.

## ENCLOSURE 4

TABLE 1.0

## Monitoring Station Ovality and Corresponding Strain

Line: 26-OHBC 15  
Reference: Figure 1

Allowable Strain = .48%

<u>Station*</u>	<u>Measured Ovality (%)</u>	<u>Meridional Strain (%)</u>
1	2.34	0.35
2	1.88	0.32
3	2.34	0.35
4	2.34	0.35
5	1.24	0.25

Line: 26-OHBC 16  
Reference: Figure 2

1	2.18	0.34
2	2.18	0.34
3	2.34	0.35
4	2.18	0.34
5	1.12	0.23

Line: 26-OHBC 53  
Reference: Figure 3

1	1.40	0.27
2	2.96	0.40
3	2.18	0.34
4	2.18	0.34

Line: 26-OHBC 54  
Reference: Figure 4

1	2.50	0.36
2	2.50	0.36
3	2.18	0.34
4	2.03	0.32
5	2.50	0.36
6	2.03	0.32

Line: 26-OHBC 55  
Reference: Figure 5

1	2.03	0.32
2	1.47	0.27
3	1.56	0.28
4	1.56	0.28

<u>Station*</u>	<u>Measured Ovality (%)</u>	<u>Meridional Strain (%)</u>
Line 26-OHBC 56		
Reference: Figure 5		
1	1.09	0.22
2	1.87	0.31
3	0.90	0.21
4	2.49	0.36
Line 26-OHBC 19		
Reference: Figure 6		
1	1.87	0.31
2	1.87	0.31
3	1.87	0.31
4	0.89	0.21
Line 26-OHBC 20		
Reference: Figure 6		
1	1.87	0.31
2	1.87	0.31
3	1.87	0.31
4	1.79	0.30

\*The station numbers are numbered from left to right from the given reference figure.