Citizens Exhibits 28

RAS 14341

GPU Nuclear

Technical Data Report

TDR No. 1011 Revision No. 0

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Project: OYSTER CREEK	Department/Section E&D/Mechanical Systems
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Document Title: EVALUATION OF FEBRUARY 1990 DRYWELL UT EXAMINATION DATA

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Abstract:

Summary and Purpose

The purpose of this report is to document the preliminary evaluation of the February 1990 Drywell UT Examination Data as well as document the possible reasons for why corrosion has not significantly abated.

Results of UT examination data obtained February 9, 1990 indicated that some locations of the drywell vessel may be experiencing corrosion rates greater than recently projected.

Conclusions

Although a more detailed review is currently underway (to be documented by revision to References 7.6 and 7.8), this report is intended to document preliminary analysis which determined that the drywell would be serviceable up to the 13R outage.

Based on a preliminary analysis of the February, 1990 data, this evaluation projects the most limiting drywell vessel region to be Bay 5 at the 51 foot elevation. The most conservative rates project that this area will not reach minimum thickness until the 13R outage scheduled in January 1991.

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* Abstract Only

Template=SECY-028

SECY-02

OCLR00001669

Recommendations:

1. SE 000243-002 Rev. 3 needs to be revised to indicate the new corrosion rates and projections.

2. The use of actual material properties (CMTR) should be pursued for the 50'2" elevation.

3. The drywell design pressure of the drywell should be lowered.

4. Operation of the Cathodic Protection system needs to be verified and corrected as necessary.

5. Means of abating-corrosion at the upper drywell elevations must be evaluated.

NOTE: All recommendations are being performed through ongoing activities.

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1.0 INTRODUCTION

1.1 Background Information

GPUN has established a drywell corrosion abatement and monitoring program. (References 7.1, 7.2, 7.3, 7.4, 7.5, 7.6 and 7.7.) This program includes: the installation and operation of the cathodic protection system in the sand bed region (3/89); reduction of water inleakage sources (10-12/88), mechanical agitating and draining water from the sand bed region (10-11/88), monitoring the most limiting areas (ongoing), and continued analysis of the situation (ongoing).

The most limiting areas are listed in the table below:

PRIORITY	UT INSPECTION ELEVATION	AREA
1	11'-3"	Eleven 6" x 6" grids in Bays 9, 11, 13, 15, 17, 19 and frame 17/19
1	50'-2"	One 6" x 6" grid above Bays 5
2	87'-5"	Three 6" x 6" grid above Bays 11 & 15
2	11'-3"	Eight strips (1" x 6" reading 1" apart) in Bays 1, 3, 5, 7, 9, 13

Priority 1 areas are inspected at each outage of opportunity but not more frequently than once every three (3) months. Priority 2 areas are inspected in an outage of opportunity if the previous set of data was taken eighteen months (18) or more before the outage.

Review of UT data up to October 1988 (References 7.6 and 7.7) indicated that the most limiting area (sand bed bay 17D) would not corrode below the minimum thickness before June of 1992. The installation of cathodic protection and sand bed draining were intended to significantly abate corrosion and allow extension of the projected date. Interim data taken in September 1989 indicated that corrosion rates in the sand bed regions had been reduced. On February 9, 1990 UT examinations were performed on all Priority 1 locations. Results from this data suggests corrosion rates in some areas may be greater than projected in October 1988 and September 1989. This report documents the assumptions, methods, results of the preliminary analysis, and engineering judgement used to evaluate the corrosion rates in each region.

2.0 METHODOLOGY

In order to understand the results from the February 1990 data the following were evaluated and reviewed:

2.1 A preliminary review of the data was performed to determine the data's validity and calculate new conservative corrosion rates.

2.2 A review of the UT measuring device was performed, in addition to a review of the physical application of the device in the field.

2.3 A review of GPUN's understanding of the perceived corrosion mechanism was performed.

2.4 A review of the Cathodic Protection System operation since installation was conducted to identify any operational changes which may have affected the corrosion mechanism in the sand bed region. As part of this effort, a meeting was held with a cathodic protection expert, Mr. Ian Munroe of Corrosion Services, who designed the present system at OC.

2.5 A review of the existing Safety Evaluation (Reference 7.7) which justified continued operation through June 1992 was performed to determine if the conclusions of the SE were still valid.

3.0 RESULTS

3.1 Results of February 1990 UT Examination

Although the February 1990 UT examination data is not completely understood, the data seems to be valid. To ensure a completely thorough and conservative approach, this data was used in establishing new corrosion rates.

3.1.1 Mean Thickness Values

Each priority 1 inspection location consists of an 6" x 6" area. Measurements were made using the template with 49 holes (7 x 7) laid out on a 6" x 6" grid with 1" between centers.

A mean of all points in each grid was calculated. This approach is consistent with earlier mean thicknesses calculations as is documented in Reference 7.5.

Table 1 presents the calculated mean thickness values derived from February 1990 and October 1988 examinations.

TABLE #1

Area	Bay	Mean Thickness as of 10/88 (mils)	Mean Thickness as of 2/90 (mils)	Difference (mils)
Protected Sand Bed Regions	11A	908.6	880.4	-28.2
	11C Top 3	916.6	978.4	-
	Bottom 4		869.0	-
	17D	864.8	839.1	-25.7
	19A	837.9	807.8	-30.1
	19B	856.5	840.7	-15.8
	19C	860.9	830.5	-30.4
	17/19 Frame	981.7	994.4	-
Unprotected Sand Bed Region	9D	1021.4	1010.0	-11.4
	13A	905.3	859.0	-46.3
	15D	1056.0	1057.3	-
	17A Top 3	957.4	1120.2	-
	Bottom 4		937.5	-
50'2" Elevation	5	750.0	739.6	-10.4

Note: After October 1988, Bays 11C and 17A were split into two regions (the top three rows and bottom four rows). This is because these bays showed regions which were corroding at different rates. The February 1990 data show these differences while the October 1988 data presents a mean for the entire grid.

TABLE 2 - ESTIMATED CORROSION RATES - SAND BED REGION

BAY	(1) CORROSION RATE UP TO 10/88 (MPY)	(2) CORROSION RATE FROM 6/89-2/90 (POST CP & H20 DRAIN) (MPY)	(3) CORROSION RATE FROM 10/88 - (2/90 PRE-CP & POST H20 DRAIN) (MPY)	(4) CORROSION RATE TO 2/90 ALL DATA (MPY)	(5) FEB. 1990 THICKNESS (MILS)	(6) REQ. MIN. THICK. (MILS)	(7) DATE WHICH MINIMUM THICK IS REACHED (COL. 2)	(8) DATE WHICH MINIMUM THICK IS REACHED (COL. 3)	(9) DATE WHICH MINIMUM THICK IS REACHED (COL.4)
11A	NOT SIGNIFICANT	-5.0 ±19.5 (128.1)	-4.1 ±6.3 (-22.5)	-12.4 ±3.0 [3] (-18.1)	880.4±	700	5/91	6/97	3/99
11C TOP 3	INDETERMINABLE	-62.0 ±3.8 [3] (-86.4)	-20.3 ±15.2 (-64.7)	-35.0 ±8.5 [3] (-51.5)	978.4±	700	1/93	1/94	1/95
11C BOTTOM 4	INDETERMINABLE	-18.3 ±30.4 (-210.2)	-13.4 ±10.0 (-42.6)	-22.1 ±5.3 [3] (-32.4)	869.0±	700	10-11/90	9/93	11/94
17D [2]	-27.6 ±6.1 [3] (-41.)	-27.8 ±6.6 (-69.5)	-17.7 ±4.3 (-30.25)	-24.0 ±2.4 [3] (-28.5)	839.1±	700	12/91	4/94	7/94
19A	-23.7 ±4.3 [3] (-32.9)	-35.7 ±7.0 (-79.9)	-20.7 ±5.96 [3] (-38.1)	-21.8 ±1.8 [3] (-25.2)	807.8±	700	5/91	9/92	1/94
19B	-29.2 ±0.5 [3] (-30.4)	-21.6 ±11.7 (-95.5)	-10.2 ±5.6 (-26.6)	-19.6 ±2.1 [3] (-23.7)	840.7±	700	6/91	12/95	7/95
19C	-25.9 ±4.1 [3] (-35.5)	-25.3 ±8.6 (-79.6)	-18.4 ±3.8 [3] (-29.5)	-23.9 ±1.5 [3] (-26.8)	830.5±	700	8/91	2/94	7/94
17/19	INDETERMINABLE	-13.0 ±0.9 [3] (-18.7)	-	-2.8 ±8.2 (-26.7)	994.4±	700	2004	-	2000
9D	INDETERMINABLE	-69.0 ±41.4 (-330.)	-11.1 ±28.0 (-92.8)	-16.4 ±7.5 (-34.0)	1010.0±	700	12/90	2/93	5/98

NOTE: 1) RATES IN PARENTHESIS REPRESENT MOST CONSERVATIVE RATES WHICH CAPTURES 95% CERTAINTY.
2) BAY 17D WAS THE MOST LIMITING BAY AFTER OCTOBER 1988 UT RESULTS
3) STATISTICAL REGRESSION MODELING MORE APPROPRIATE THAN MEAN MODEL.

TABLE 2 - ESTIMATED CORROSION RATES - SAND BED REGION

BAY	(1) CORROSION RATE UP TO 10/88 (MPY)	(2) CORROSION RATE FROM 6/89-2/90 (POST CP & H20 DRAIN)	(3) CORROSION RATE FROM 10/88 - (2/90 PRE-CP & POST H20 DRAIN)	(4) CORROSION RATE TO 2/90 ALL DATA	(5) FEB. 1990 THICKNESS	(6) REQ. MIN. THICK. (MILS)	(7) DATE WHICH MINIMUM THICK IS REACHED (COL. 2)	(8) DATE WHICH MINIMUM THICK IS REACHED (COL. 3)	(9) DATE WHICH MINIMUM THICK IS REACHED (COL.4)
13A	INDETERMINABLE	-41.8 ±15.4 (-139.)	-39.3 ±6.0[3] (-56.8)	-16.3 ±4.8[3] (-27.6)	859.0±	700	2/91	8/92	5/95
15D	NOT SIGNIFICANT	-5.2 ±3.2 (-25.4)	-	-1.54 ±3.4 (-11.5)	1057.7±	700	2002	-	2018
17A TOP 3	INDETERMINABLE	+17.4 ±7.6 (-65.4)	-	-10.9 ±4.3 (-23.5)	1120.2±	700	12/95	-	2006
17B BOTTOM 4		-44.3 ±.01[3] (-44.4)	-	-18.1 ±12.3 (-54.)	937.5±	700	12/94	-	2/94

NOTE: 1) RATES IN PARENTHESIS REPRESENT MOST CONSERVATIVE RATES WHICH CAPTURES 95% CERTAINTY.

2) BAY 17D WAS THE MOST LIMITING BAY AFTER OCTOBER 1988 UT RESULTS.

3) STATISTICAL REGRESSION MODELING MORE APPROPRIATE THAN MEAN MODEL.

TABLE 3- ESTIMATED CORROSION RATES - UPPER ELEVATIONS

BAY	(1) CORROSION RATE UP TO 10/88 (MPY)	(2) CORROSION RATE BASED ON SECTION 3.3	(3) CORROSION RATE BASED ON STRAIGHT AVG. 6/89 - 2/90	(4) CORROSION RATE TO 2/90 ALL DATA	(5) FEB. 1990 THICKNESS	(6) REQ. MIN. THICK. (MILS)	(7) DATE WHICH MINIMUM THICK IS REACHED (COL. 2)	(8) DATE WHICH MINIMUM THICK IS REACHED (COL. 3)	(9) DATE WHICH MINIMUM THICK IS REACHED (COL. 4)
51' (ALL DATA)	- 4.3 ±0.03 (3) (-4.5)	16	15	-3.6 ±2.9 (-9.8)	739.6±	725	1/91	2/91	6/91
51' (9/89 DELETED)	N/A	N/A	N/A	-5.6 ±1.6 (3) (-9.5)	739.6±	725	N/A	N/A	7/91
51' (USING CMTRs)	N/A	16	15	-3.6 ±2.9 (-9.8)	739.6±	671	5/94	7/94	6/96
86' 9	NOT SIGNIFICANT	16	N/A	USING (-9.8)	(AS OF 6/26/89) 619.1	591	3/91	N/A	1/92

NOTE: 1) RATES IN PARENTHESIS REPRESENT MOST CONSERVATIVE RATES WHICH CAPTURES 95% CERTAINTY.

3) STATISTICAL REGRESSION MODELING MORE APPROPRIATE THAN MEAN MODEL.

In addition the NDE/ISI group at Oyster Creek performed an equipment functional check on the UT meter (D-meter) and probe used to record the data. Different D-meter and probe combinations were used on various thickness. The results were generally identical with variances of only several thousands on an inch.

3.3 Existing Corrosion Mechanism

3.3.1 Corrosion Mechanism in Sand Bed Region

Per Reference 7.2, the cause of the corrosion in the sand bed region is the result of water trapped in the sand bed. The water which may have leaked into the sand bed during construction and/or outages in 1980, 1983 and 1986 was contaminated with chlorides, sulfates and numerous other metal ions. Per Reference 7.2, a likely corrosion rate (based on plug samples, analysis of inleakage water, laboratory testing, and literature research of related phenomena) is 17 mils/year. However, to ensure conservatism, Reference 7.8 arrived at a conservative rate assuming all material loss observed in 1986 had occurred in the six year period of water intrusion since 1980. The resulting rate -48 MPY was used to justify continued plant operation to June 1992.

3.3.2 Corrosion Mechanism in Upper Elevation

Per reference 7.3 the cause of the corrosion in the upper elevation was the result of the drywell steel exposed to the "firebar" insulation laden with chloride containing water. This was based on analysis of drywell vessel plug samples, analysis of inleakage water, laboratory testing, and literature research of related phenomena. Reference 7.3 concludes that the most conservative corrosion rate (based on plug samples, analysis of inleakage water, laboratory testing, and literature research of related phenomena) is 16 mils per year.

3.4 Review of Cathodic Protection System Operation Since Installation

A review was performed on the Drywell Cathodic Protection System (CPS). This review included verification of the electrical installation and system operating parameters. According to the design documentation, the system is configured correctly. Review of system electrical potential data has shown that since the initial draining of water from the sand bed, generally there has been a steady reduction of current as a function of time.

The data indicates that since June of 1989, many of the cathodic protection system probes have experienced zero current. There are several possible reasons for this occurrence.

1) The sand bed could have become uniformly dry, including the sand in contact with the vessel wall. With the sand bed completely dry, the corrosion mechanism and subsequent rate were expected to halt.

2) Only the sand in areas close to and around the CPS probes has completely dried. The remaining sand bed region, including the sand in contact with the vessel wall, is still wet and the corrosion mechanism is still in place. The locally dry sand around the probes may be developing very high resistivity factors which have resulted in low and/or zero currents. Per discussions with Ian Munroe, of Corrosion Services, this is thought to be unlikely because the current density of the system is not high enough for this kind of phenomena.

3) The current provided initially is too low. Per discussing with Ian Munroe, of Corrosion Services, the electrical power supplied to the system may need to be increased. This may be required due to the grade positioning being different than the conceptual layout of grades.

3.5 Review of Safety Evaluation 000243-002, Rev. 3 (Reference 7.7)

3.5.1 Sand Bed Region

The above referenced Safety Evaluation projects Bay 17D in the sand bed region as the most limiting of all monitored locations. Mean thickness was expected to reach the minimum allowable mean thickness of .700 inches by June 1992.

3.5.2 Elevation 50'-2"

The above referenced Safety Evaluation projects mean thickness on EL. 50'-2" as .730 inch by June 1992 which is above the minimum mean thickness of .725 inches. Note that this value does not take credit for the actual material properties of the steel plate (CMTRs). Minimum allowable thickness using actual stress values from CMTRs is .671 inches (Ref. 7.4).

3.5.3 Elevation 87 Foot

The above referenced Safety Evaluation does not project mean thickness on Elevation 86-'5" as no corrosion was ongoing at this elevation. However, the minimum allowable mean thickness at this elevation is .591. Note that this value is derived from actual material properties of the steel (CMTRs).

The minimum allowable thickness for localized areas at this elevation is .425 inches.

4.0 EVALUATION

4.1 Evaluation Approach

This evaluation documents and illustrates the preliminary approach used to estimate corrosion rates, identify the limiting bay and project the date at which minimum shell thickness is reached. The statistical appropriateness of these analyses is to be verified by revision to Reference 7.5. Reference 7.5 will be updated to provide statistically appropriate corrosion rates.

4.1.1 Sand Bed Region

A logical approach based on an understanding of the corrosion phenomena, a vigorous application of statistics, and sound engineering judgement was necessary to develop appropriate conservative corrosion rates.

Rates based on data from June 1989 to February 1990 were intended to capture a rate post cathodic protection installation and sand bed draining. These rates may have indicated the most recent changes in corrosion. However, these rates are based on only three observations (6/89, 9/89 and 2/90 data) which generally resulted in statistically inappropriate rates.

Corrosion rates based on all data up to February 1990 would capture an overall rate and would statistically be more accurate (Table 2, Column 4). However, these rates may not capture possible recent increases in corrosion rates. Therefore, this approach may not be the most conservative.

Rates were also calculated based on data from 10/88 to 2/90. Although these rates are based on only four observations, the time period is almost doubled (compared to the 6/88 to 2/90 period).

Table 2 shows which of the rates are based on data which fit the regression model more appropriately than the mean model (indicated by Note #3). (This will be referred to as "statistical appropriateness" throughout this report.) However, the most "statistically appropriate" rate may not be the most conservative. Therefore, to take a consistently conservative approach, the greatest rate must be chosen, unless that value can be discounted (based on sound engineering judgement coupled with an understanding of the corrosion phenomena).

The evaluation approach was to find the date in columns 7, 8 and 9 which would occur soonest in time. The rate used in projecting this date was then evaluated to see if it was based on a statistically appropriate curve fit and if the rate could be realistically expected (i.e. $\leq$ 60 MPY). If the rate was not realistic and not statistically appropriate, then it would be disregarded and the next date in time in column 7, 8 and 9 would be chosen.

The date which occurs soonest in time is Bay 11C (bottom four rows) which projects a 10-11/90 date (in column 7). The corresponding corrosion rate is -18.3 $\pm$ 30.4 (column 2). This suggests a standard error which is almost twice as much as the rate. As a result of this uncertainty, and the small number of observations, the 95% confidence rate is -210.4 MPY. This type of corrosion rate is considered unrealistic (see Section 3.3). Therefore, this rate and the projected date based on this rate must be disregarded.

For the next, Bay 9D, the column 2 rate is -69 $\pm$ 41.4 MPY. This results in a 95% confidence rate of -330.0 MPY. This rate is considered unrealistic and is not based on a statistically appropriate model. Again, this rate and the projected date are disregarded. Bays 11A, 11C (top 3 rows), 13A, 17D, 19A, 19B and 19C showed similar unrealistic results in column 2. In general, all column 2 results and projected dates (column 7) were not considered reasonable.

4.1.2 Upper Elevations

Table #3 presents 3 rows for Bay 5 at the 51 foot elevation. The first row presents an overall rate up to October 1988 (column 1), a rate based on section 3.3 (column 2), a rate based on straight line average from June 1989 to February 1990 (column 3), and an overall rate up to February 1990 (column 4).

Since it appears that a significant amount of material was lost from June 1989 to February 1990 (see Table #4) a straight average using mean thicknesses on these two dates was developed.

TABLE 4

Bay 5 Elevation 51 Mean Thickness

Date of UT	Mean Thickness
11/1/87	753.8
7/12/88	750.0
10/8/88	750.2
6/26/89	749.6
9/13/89	755.6
2/9/90	739.6

The second row presents a rate with the September 1989 data disregarded. Review of the September 1989 mean thickness value shows an increase over the June 1989 mean thickness (by approximately 6 mils). This increase, coupled with a resulting overall rate which is based on a curve fit which is not statistically appropriate, prompted an analysis of the data with the September 1989 observation deleted. The resulting rate of -5.6 ± 1.6 is based on a curve fit which is statistically appropriate.

Regardless, the more conservative of either resulting 95% confidence rate (with or without the September 1989 data) was chosen as the most conservative projection (-9.8 MPY).

The third row for the 51 foot elevation presents the same rates as in the first, except a CMTR based minimum mean thickness is applied. Resulting projections are presented in column 7, 8 and 9.

4.2 Sand Bed Region

4.2.1 Most Limiting Bay In The Sand Bed Region

The October 1988 Safety Evaluation (Reference 7.11) projected Bay 17D (in the sand bed region) has the most limiting of all monitored locations. Based on a rate of -27.6 ± 6.1 MPY and a 95% confidence conservative rate of -41 MPY, mean thickness was projected to reach the minimum allowable mean thickness of 0.700 inch by June 1992.

Results from February 1990 data now suggests that a conservative rate of -17.7 ± 4.3 MPY and a 95% confidence conservative rate of -30.25 MPY can be applied, and that this bay is projected to reach a mean thickness of 700 mils by April of 1994.

The February data now indicates that Bay 19A is the most limiting bay of all monitored locations in the sand bed region. Based on a new conservative rate of -20.7 ± 5.6 MPY and 95% confidence rate of -38.1 MPY, it is projected that this bay may reach a mean thickness of 700 mils by September 1992. The conservative rate is both realistic and is based on a statistically appropriate curve fit. Note, this rate is based on data recorded from October 1988 through February 1990 (column 4).

4.2.2 Protected Bays

Interim data recorded in September 1989 indicated that corrosion rates in the protected sand bed region had generally decreased, yet the February 1990 data indicates that corrosion rates generally increased almost to former levels before cathodic protection installation.

A possible explanation for this may be the reduced or zero probe current rates which has occurred since June 1989 (Section 3.4).

Up to June 1989 the sand bed region may have been uniformly wet and Cathodic Protection System may have performed its intended purpose by inducing a current throughout the sand bed. Then in June the sand close to and around the probes may have completely dried with the remaining sand (including the sand in contact with the vessel wall) remaining wet. The locally dried sand around the probe may have developed very high resistivity factors resulting in very low and zero currents.

The lack of impressed current prevents the cathodic protection system from performing it's function. This may explain the increased corrosion rates observed in February 1990.

4.3 50"-2" Elevation

The most limiting bay at the 50 feet elevation is Bay 5. October 1988 data had resulted in a mean thickness of approximately .75 inches. October 1988 data indicated an on-going rate of -4.3 ± .03 MPY.

February 1990 data indicates a loss of material resulting in a mean thickness of .7396 inches. Although the February 1990 data is not been thoroughly understood an overall rate of -3.6 ± 2.9 MPY and a 95% confidence conservative rate of -9.8 MPY has been calculated. Based on this rate, it is projected that this area may reach a minimum mean thickness of .725 inches by June 1991. This thickness is based on code allowable stress values for the steel and not CMTR results.

The minimum mean thickness at this elevation based on measured stress values (per vendor CMTRs) is .671 inch (Reference 7.7). Use of this minimum (instead of a minimum based on code allowable stress values) and the -9.8 MPY rate allow a projection for serviceability to June 1996.

The more conservative rates of 16 and 15 MPY were also considered. The most limiting projection based on these rates (without CMTR stress values) resulted in a January 1991 date. Use of CMTR stress values and resulting minimum mean thickness result in a May 1994 date.

4.4 <u>86 Foot Elevation</u>

The most limiting bay at the 86 foot elevation is bay 9. June 1989 data indicates that this bay had a mean thickness of .6191 inches. As of June 1989 this bay was considered to be experiencing a rate of 0 MPY.

UT examination was not performed at this elevation in February 1990. Although it is very likely that this area is continuing to experience rates close to zero MPY, the conservative rate calculated at the 51 foot elevation applied to the June 1989 mean thickness at Bay 9 on the 86 foot elevation projects that this bay may reach the minimum mean thickness of .591 inches by January of 1992.

A more conservative rate of 16 mils/year based on the original safety evaluation (Section 3.3) was considered. Projection based on this rate resulted in a March 1991 date.

If CMTR stress values are applied to the 51 foot elevation projection, then bay 9 on the 86 foot elevation becomes the most limiting bay with a serviceability date of March 1991.

5.0 <u>CONCLUSION</u>

5.1 Based on this evaluation, the sand bed region is no longer the limiting elevation for drywell vessel service. Bay 5 at the 51 foot elevation is now the most limiting. Based on February 1990 mean thickness of .7396 inches and a conservative rate of 16 MPY (Sec. 3.3), this area is projected to reach the minimum mean thickness of .725 inch by January 1991. This projection is based on a theoretical rate of 16 MPY. The detailed review currently underway may determine a different projection which is based on a statistically derived rate from the data. However, this conservative projection does show that the drywell will be serviceable until January 1991.

5.2 Use of CMTR stress values applied to bay 5 at the 51 foot elevation projects this area to reach the minimum mean thickness of .671 inch by May 1994.

5.3 Although no data was taken in February 1990 at the 86 foot elevation and it is likely that corrosion rates remain at zero MPY, the conservative rate of 16 MPY (Sec. 3.3) projects bay 9 on the 86 foot elevation to reach the minimum mean thickness by March 1991.

5.4 February 1990 data now indicates that Bay 17D in the sand bed is no longer the most limiting bay. Results from the February 1990 data projects the most limiting bay in the sand bed is 19A. It is conservatively projected that this area will reach the minimum mean thickness by September 1992.

Based on these results in the sand bed region, it is concluded that cathodic protection is currently producing very limited positive results in abating corrosion in the sand bed region.

6.0 RECOMMENDATIONS

6.1 Safety Evaluation 000243-002 Rev. 3 (Reference 7.6) which projects drywell service life up to June 1992 must be revised to reflect the new rate and a new date of January 1991. This is ongoing.

6.2 The minimum mean thickness at the 50'2" elevation is .725 inches. This value is based on code requirements. It is recommended that GPUN pursue using CMTR results to calculate a reduced minimum mean thickness value of .671 inches. This would result in projected serviceability date (at this elevation only) of June 1996. This is ongoing.

6.3 It is recommended that GPUN pursue lowering the design pressure of the drywell. This would further reduce the minimum mean thickness value in the upper elevation and provide more margin. This is ongoing.

6.4 Current cathodic protection system potential data indicates a postulated mechanism which may be defeating cathodic protection. The proper operation of this system needs to be verified and corrected as necessary. This is ongoing.

6.5 Evaluate methods for abating corrosion in the upper elevations. This is ongoing.

7.0 REFERENCES

7.1 TDR 851 Assessment of Oyster Creek Drywell Shell.

7.2 TDR 854 Drywell Sand Bed Region Corrosion Assessment.

7.3 TDR 922 Drywell Upper Elevation, Wall Thinning Evaluation.

7.4 TDR 926 OC Drywell Structural Evaluations.

7.5 TDR 948, Statistical Analysis of Drywell Thickness Data.

7.6 Calculation C-1302-187-5360-006 Projection of Drywell Mean Thickness through October, 1992.

7.7 Safety Evaluation SE 000243-002, Rev. 3.

7.8 Safety Evaluation SE 000243-002, Rev. 1.