Reason For Evaluation:

During the 1R21 Refueling Outage, standing water was found in the trench at elevation 10' 3" in Bay 5 of the Drywell. The purpose of this technical evaluation is to develop a conservative approach to address the worst case concerns associated with the as-found water in the drywell concrete. This evaluation will assess the condition through comparisons of the original UT data taken in 1986, and the UT data taken during the 1R21 outage. Note that the sand and water corrosive environment was removed from the sandbed region in 1992. This evaluation will evaluate these UT results as they relate to potential corrosion concerns based on the current plant configuration with water existing in the drywell concrete area. This evaluation will address immediate concerns in the as-found wetted area of the drywell shell to demonstrate adequate design margins exist (in a worst-case scenario) to support startup of the plant and operation of the plant through the next cycle of operation. The complete assessment of all UT data taken in 1R21 and establishing the associated margins to support operating through the period of extended operation of the plant will be addressed separately.

This Tech Eval was developed in accordance with CC-AA-309-101 Revision 7.

The development of this Tech Eval was reviewed with Howie Ray in accordance with HU-AA-1212. The risk rank was assessed as a "2". Therefore a third party review will be performed.

Background:

In 1986 concrete was removed in two locations (one each in Bays 5 and 17) from the interior Drywell floor at elevation 10' 3". Approximately a 1 foot wide by 2 foot long section was removed at each location. These areas have been commonly referenced to as the "trenches". The purpose of the "trenches" was to expose the Drywell Vessel below the concrete inside the Drywell at elevation 10' 3" so that UT readings could be performed on the vessel.

The bottom of trenches in Bay 5 and 17 are located at approximately elevation 8' 9" and 9' 3" respectively, which generally correspond to the elevation of the sandbed floor located outside the Drywell. Therefore the UT readings from the original trench areas correspond to sections of the vessel that are not embedded in outside concrete. The results of these UT inspections were documented in TDR 851 and drawing 3E-SK-S-85. UT readings were taken on 1 inch centers. The results of the 1986 UT inspections show drywell thicknesses which are indicative of the vessel embedded on the inside of the Drywell and exposed to the sand environment on the outside, which was eventually eliminated in 1992 when the sand was removed from the sandbed region.

In 1992, following the removal of the sand from the sandbed region and the removal of corrosion byproducts, the Drywell Vessel was visually inspected from inside the sandbed, which is outside the Drywell Vessel. This inspection identified the thinnest locations in each of the 10 sandbed bays. These thinnest locations were then UT inspected. In some

cases the area had to be slightly grinded so that the UT probe could rest flat against the surface of the vessel. The thickness values and the locations of each reading, referenced from existing welds, were recorded on a series of NDE data sheets. At each location one UT reading was performed.

In 2006, UT readings of the interior Drywell shell were again recorded on 1 inch centers in the two trenches. These readings were intended for a comparison with the 1986 readings.

Also in 2006, 106 readings were taken of the external portion of the Drywell Vessel from within the former sandbed region. These locations were located using the 1992 NDE Inspection Data Sheet maps. These readings were intended for a comparison with the 1992 readings.

Additionally, during the 1R21 outage in 2006 more concrete was removed from the bottom of the trench in Bay 5 to expose an additional 6" by 12" section of the drywell vessel. This newly exposed section of the vessel lies below the sandbed floor on the outside of the drywell. Therefore the results of this inspection show drywell thicknesses that are indicative of the vessel that is embedded on both sides by concrete.

Detailed Evaluation:

Assumptions and Clarifications

1) TDR 851 documents that 23 values initially recorded in the Bay 17 trenches in 1986 were much less than nominal. Further NDE investigation at the time by GPUN NDE personnel and EPRI revealed that the low readings were due to inclusions in the steel plate rather than thin steel. This was later confirmed by the removal of a 2" diameter section of the Drywell vessel, which contained an inclusion (reference TDR 854). The UT technology in 1986 could not distinguish inclusions. However the actual readings were captured in Drawing 3E-SK-S-85. Inclusions of this nature and size were acceptable in the original manufacturing process per ASTM Specification A212B and do not effect the ultimate strength of each plate, which was individually certified by the manufacture per ASME Specification VIII (reference U-1 Form Serial No. G-1276177).

Therefore for the purpose of this evaluation, all readings found to be lower than 0.780 inches were discounted from the 1986 readings for the trench in Bay 17. The discounted readings are circled in attachment 1. Please note this treatment of the 1986 data is actually conservative for computing corrosion rate if they were compared to the 2006 data, because the 1986 values (if included) would have reduced the 1986 average thickness.

The 2006 UT technology can now distinguish inclusions. The results of the 2006 inspection shows no similar low values, since current technology automatically ignores the inclusions. Therefore, this further verifies the conclusions made for these areas in 1986.

2) The uncertainties of the 1986, 1992, and 2006 UT readings can be as great as +/- .020 inches based on:

a) The roughness of the inspected surfaces due to the previously corroded surface of the shell in the sandbed regions
b) The different UT technologies between the 1986, 1992 and 2006
c) UT Equipment Instrument Uncertainties and
d) The poor repeatability in attempting to inspect the exact same location over time

3) Row 7 points 6 and 7 in the Bay 17 trench data for 2006 were discounted because they were much thicker than the previous readings. These points are located on a much thicker weld. These readings were re-verified by NDE to be correct, however these values were discounted to maintain conservative results.

4) The sections of drywell vessel that were exposed by the removal of the concrete in trenches in 1986 continued to corrode from the exterior at elevated rates between 1986 and 1992 prior to the removal of the sand and epoxy coating application. For example inspection in 1992 showed that corrosion rates in Bay 17 could have been as great as 0.0211 inches per year, with 95% confidence (ref. C-1302-187-5300-021). The corrosion rates in the Bay 5 were estimated to be as great as 0.0113 inches per year, at 95% confidence (C1302-187-5300-028). Therefore the material loss measured by the 2006 UT inspection would include the corrosion rates that were known to exist from the sandbed side (exterior) between 1986 and 1992.

Acceptance Criteria

Drywell Vessel Thickness criteria has been previously established (reference C-1302-187-5320-024) as follows:

1) General Uniform Thickness - 0.736 inches or greater.

2) Vessel thicknesses in areas of 6" by 6" or smaller shall be greater than 0.693 inches. C-1302-187-5320-024 has previously dispositioned an area of this magnitude in Bay 13.

3) Vessel thickness in areas of less than 2 inches in diameter shall be greater than 0.49 inches. This is the acceptance criterion for very local wall thickness; areas less than 2 inches in diameter. C-1302-187-5320-024 calculated an acceptance criterion of .479 inches however; this evaluation is conservatively using .490 inches, which is the original GE acceptance criterion. Since the UT readings were taken on 1 inch centers and the transducer size is less than 0.5 inch these readings can be characterized as less than 2 inches in diameter.

Comparison of the Bay 5 Trench

The 1986 and 2006 data for the Bay 5 trench is located in attachment 1. A Mathcad spreadsheet that computes the average of each data set is provided in attachment 2. Please note that zero values are automatically discounted from the average and standard deviation computation. These are the values that were concluded to be inclusions in the 1986 data (see assumption 1).

The computation shows that a total of 294 readings were considered for 2006 and that the mean is 1.074 inches with a standard deviation of .0456 inches and a standard error of .00266 inches. This meets the general acceptance criteria of 0.736 inches with a 95% confidence.

The computation shows that a total of 302 readings were considered for 1986 and that the mean was 1.112 inches with a standard deviation of .045 inches and a standard error of .00259 inches. This meets the general acceptance criteria of 0.736 inches with a 95% confidence.

Assuming the material loss occurred continuously from 1986 to 2006 results in an apparent corrosion rate of 0 .0019 inches per year. However when considering the aggressive corrosive environment that existed from 1986 to 1992 on the outside of the vessel, a corrosion rate of 0.0063 inches per year would be expected during this time frame (1986 to 1992). This rate is well within the range (up to 0.0113 inches per year) measured in bay 5 during this period (see assumption/clarification 4). Therefore, it can be concluded that all the material loss occurred between 1986 and 1992.

The minimum 2006 reading in this trench was 0.957 inches. This meets the local acceptance criteria of 0.49 inches.

Comparison of the Bay 17 Trench

The 1986 and 2006 data for the Bay 17 trench is located in Attachment 1. A Mathcad spreadsheet that computes the average of each data set is provided in Attachment 3. Please note, zero values are automatically discounted from the average and standard deviation computation. These are the 2006 points, which were much thicker than the previous readings (see assumption 3).

The computation shows that a total of 290 readings were considered for 2006 and that the mean was 0.963 inches with a standard deviation of .0713 inches and a standard error of .004184 inches. This meets the general acceptance criteria of 0.736 inches with a 95% confidence.

The computation shows that a total of 250 readings were considered for 1986 and that the mean is 1.024 inches, with 95% confidence, a standard deviation of .045 inches, and a standard error of .002847 inches. This meets the general acceptance criteria of 0.736 inches with a 95% confidence.

Assuming the material loss occurred continuously from 1986 to 2006 results in an apparent corrosion rate of 0 .003055 inches per year. However when considering the aggressive corrosive environment that existed from 1986 to 1992 on the outside, a corrosion rate of 0.0102 inches per year would be expected during this time frame (1986 to 1992). This rate is well within the range (up to 0.0211 inches per year) measured in bay 17 during this period (see assumption/clarification 4). Therefore, it can be concluded that all the material loss occurred between 1986 and 1992.

In addition the minimum 2006 reading in this trench was .702 inches which is estimated to be located in an area no larger than 4" in diameter. This meets the acceptance of criteria 0.693 inches in an area of 6" by 6" or smaller.

Comparison of external inspection locations correlating to beneath the interior Drywell floor at elevation 10' 3" but above the wetted area at elevation 9' 2".

The 1992 and 2006 data are provided in attachment 4.

Review of the 1992 and 2006 locations show 18 readings corresponding to this region (see attachment 5). For each reading the 2006 value was subtracted from the 1992 value and divided by 14 years (time between 1992 and 2006). Locations with positive rates were re-verified by NDE to be correct during the 2006 inspection. However, since these values would result in positive changes in metal thickness, they were discounted from the computation to maintain conservative results.

The resulting differences in UT readings based on point to point comparison in the as found wetted region vary between 0 and .0065 inches per year. On average the differences for this region, ignoring the described uncertainties, equate to 0.00228 inches per year.

The minimum 2006 reading of all the areas was 0.669 inches. This meets the local acceptance criteria of 0.49 inches even after deducting the worst case differences including instrument uncertainties.

Comparison of External Inspection Locations correlating to beneath the wetted elevation of 9' 2" (approximate level at which water was discovered in the Bay 5 trench)

The 1992 and 2006 data are provided in attachment 4.

Comparison of the 1992 and 2006 locations show 22 readings corresponding to this region (see attachment 5). For each reading the 2006 value was subtracted from the 1992 value and divided by 14 years (time between 1992 and 2006). Locations with positive rates were re-verified by NDE to be correct during the 2006 inspection. However, since these values would result in positive metal growth, they were discounted from the computation to maintain conservative results.

The resulting changes based on point to point comparison varied between 0 and .0061 inches per year. On average the changes for this region would equate to 0.00233 inches per year. These values can be conservatively used to demonstrate that even if the rates are not due to the expected uncertainties, there is sufficient margin existing to account for these uncertainties.

Discussion

The maximum worst case localized differences between readings was found in a point-to point comparison of an external point (point 5 in bay 17) located below the concrete floor (not in either trench). The difference in thickness at this point equates to a rate of 0.0065 inches per year, which is not considered credible given the physical limitations of the UT inspections taken from the exterior surface. These limitations include the roughness of the inspected surfaces, the different UT technologies between the 1992 and 2006, UT Equipment Instrument Uncertainties, and the repeatability due to trying to locate the exact same location over time.

However even when considering a 0.0065 inches per year rate of change (recorded on a location that is 0.822 inches thick in 2006) and applying it on the thinnest location recorded in 2006 (0.669 inches in Bay 13 point 11) and applying .020 inch deduction for instrumentation uncertainty this location would only reduce to 0.636 inches by 2008, which still demonstrates significant margins compared to the acceptance criteria of 0.49 inches. Also considering a 0.0065 inches per year rate of change and applying it the to the 2006 Bay 17 trench mean value (0.963 inches) and applying .020 inch deduction for instrumentation uncertainty would only reduce this value to 0.930 inches by 2008,

Conclusion:

The plates exposed by the two trenches exhibit signs of material loss. It is concluded that all the material loss occurred between 1986 and 1992. Assumed corrosion rates for this mechanism between 1986 and 1992 are consistent with as found measured corrosion rates previously established for these bays for this period in time.

Additional concrete was removed from Bay 5 trench and UT readings taken 6 inches below the previous 1986 and 2006 readings. This newly excavated area represents shell

thicknesses of the embedded region (on both sides) of the vessel in Bay 5 of sandbed region. The average Drywell shell thickness measured was 1.113 inches and the minimum reading was 1.052 inches. The UT Data Sheet is Attachment 7 to this evaluation. The shell thickness in this area meets the general uniform thickness criteria of .736 inches with considerable margin. This area will be used to repeat these UT measurements in 1R22.

Evaluation of the NDE examination results at and below the elevation 10'3" concrete slab concludes that the Drywell shell has sufficient thickness to withstand all design requirements.

References:

TDR 851, Rev. 0, "Assessment of Oyster Creek Drywell Shell,

TDR 854, Rev. 0, "Drywell Corrosion Assessment"
Drawing 3E-SK-S-85.
C-1302-187-5320-024, "OC Drywell UT Evaluation in Sandbed"

Attachment 1 – 1986 and 2006 Trench Inspection Data – 10 pages
Attachment 2 – Bay 5 Trench Comparison of 1986 and 2006 data – 17 pages
Attachment 3 – Bay 17 Trench Comparison of 1986 and 2006 data – 16 pages
Attachment 4 – 1986 and 2006 Sandbed External Inspection Data – 20 pages
Attachment 5 – Plan and Elevation locations of the External Inspection locations – 8 pages
Attachment 6 – Comparison of 1986 and 2006 External Data – 2 pages
Attachment 7 – UT Data Sheet 1R21LR-032 – 2 pages
Attachment 8 – Third Party Review Documentation - 3 pages
Attachment 9 – MPR Ass. Independent Review Documentation - 2 pages

This evaluation was Independently Reviewed by Frank Stulb through out its development which took approximately 7 days.

Comment resolution and incorporation of the Independent Third Party Review comments were discussed with Frank Stulb per a telephone conversation on 11/3/06 at 10:12 AM. He provided authorization for documentation and approval of his Independent Review of this document per this telephone conversation.

Independent Review: T. Tamburro for F. Stulb by telecon on 11/3/06

Manager Comments:
The preparer and multiple reviewers of this technical evaluation had the appropriate knowledge and experience and are qualified to perform this task. The Independent Third Party Review (ITPR) was performed by MPR who was selected as a subject matter expert based on their expertise and industry experience on this topic. This document has been

rigorously challenged and adequately addresses the adequacy of the as-found water conditions and potential impacts to demonstrate the drywell vessel maintains its design and licensing bases requirements to support restart from 1R21.

The ITPR has been completed and comments adequately resolved as documented in Attachment 9.

Manager Approval: F.H. Ray 11/3/2006

EXPANDED U.T. AT PT. NO. 5B TRENCH
(6 IN. BY 46 IN. MATRIX)
(DATA SHT. NO. 86-049-47)

1.156	1.166	1.182	1.172	1.225	1.181	1.17
1.160	.437	1.184	1.173	1.175	1.171	1.17
1.165	1.164	1.151	.657	.419	1.170	1.17
1.145	1.151	1.158	1.162	1.155	1.159	1.17
1.123	1.151	1.148	1.167	.456	1.139	1.15
1.128	1.138	1.141	1.157	1.158	1.144	1.13
1.123	1.149	1.130	.734	.735	N/A	N/A
1.109	1.121	1.144	1.155	1.156	1.149	1.15
1.064	1.066	1.068	1.115	1.1	1.109	1.12
1.051	1.096	1.041	1.077	1.162	1.078	.666
1.063	1.100	1.110	1.048	1.101	1.110	1.13
1.047	1.109	1.149	1.13	1.176	1.179	1.05
1.125	1.123	1.090	1.117	1.182	1.200	1.18
1.135	1.091	1.107	1.080	1.084	1.125	1.18
1.094	1.064	1.067	1.079	.646	1.169	1.14
1.043	1.079	1.052	1.079	1.119	1.164	.444
1.058	1.055	1.082	1.044	1.071	.475	1.137
1.087	1.049	1.058	1.114	1.083	1.053	1.144
1.180	1.118	1.093	1.043	1.062	1.178	1.156
1.138	1.071	1.109	1.137	1.096	N/A	1.194
1.109	1.082	1.158	1.098	1.166	1.134	1.056
1.141	1.128	1.088	1.154	1.144	1.141	1.122
1.159	.758	.759	1.170	.771	1.151	1.10
1.166	1.127	1.105	1.174	1.169	1.105	1.131
1.109	1.148	.481	1.166	1.171	1.113	1.141
1.089	1.167	.571	.188	1.128	1.133	1.106
1.126	1.092	1.118	.710	1.167	1.124	1.072
1.069	1.054	1.112	1.090	1.146	1.119	1.098
1.076	1.056	1.098	.453	1.139	1.098	1.077
1.118	1.054	1.100	.459	1.060	1.062	1.101
1.067	1.073	1.110	1.205	1.149	1.090	1.113
1.088	1.106	1.171	1.193	1.041	1.134	1.093
1.094	1.119	1.115	1.148	1.092	1.118	1.109
1.128	1.134	1.125	N/A	1.147	1.145	1.112
1.065	1.077	1.138	1.168	1.077	1.068	1.073
1.062	1.101	.456	1.088	1.069	1.074	1.047
1.100	1.062	1.141	1.059	1.110	1.076	1.078
1.044	1.052	.445	1.045	1.083	1.081	1.076
1.031	.788	1.057	1.073	1.059	1.109	1.062
1.035	.355	1.076	1.060	1.016	1.074	1.037
1.024	1.103	1.030	1.059	1.061	1.062	1.076
.436	1.057	1.021	1.015	1.028	1.089	1.08
1.087	1.110	1.027	1.040	1.070	1.079	1.081
.773	1.132	1.049	1.096	1.052	1.093	1.092
1.168	1.112	1.113	1.101	1.056	1.065	1.108
1.271	1.138	1.117	1.103	1.152	1.142	1.105
1.211	1.158	1.099	1.133	1.134	1.145	1.13

From 3E-SK-S-85

Bay 5

Trench 90°

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 1 OF 10

U.T. AT WELD, BAY NO. 5 (DATA SHT NO. 86-049-39)		
DOWNCOMER AREA	2.901	2.914
HEAT AFFECTED ZONE AREA	.438	1.206
	1.170	1.175
	.870	.411

EXPANDED U.T. AT PT. NO. 5B
3 IN. ABOVE CURB, 5 IN. FROM WE
(6 IN. BY 6 IN. MATRIX)
(DATA SHT. NO. 86-049-36)

1.173	1.179	.466	.44	.498	1.204
1.194	1.181	1.174	1.255	1.15	1.172
1.177	1.184	.465	1.213	1.212	1.184
1.212	1.178	1.177	1.209	1.177	1.18
1.194	1.181	.465	1.22	1.135	1.172
1.174	1.209	1.163	1.16	1.157	1.166
1.155	1.161	1.163	1.221	1.173	1.185

WELD

EL 11-3"

Note circled values were discounted because thes value indicate inclusions.

TDR - 851

EXPANDED U.T. AT PT. N
11 IN. ABOVE CURB, 30 IN
(6 IN. BY 6 IN. MAT
(DATA SHT NO. 86-049

EXPANDED U.T. AT PT. NO. 178 TRENCH
(6 IN. BY 35 IN. MATRIX) 55¼" FROM WELD
(DATA SHT. NO. 86-049-56)

EL11'-5"

.930	.932	.943	.958	.988	.989	.913
1.014	.953	.984	.987	.973	.939	.954
.991	1.005	.951	.968	.939	.945	.954
.992	.995	1.038	1.031	.992	1.003	1.011
1.025	1.011	.968	1.024	1.004	1.002	1.055
1.017	1.036	1.029	1.031	1.084	1.026	1.05
1.041	1.053	1.044	1.047	1.043	2.318	3.46
1.045	1.009	1.024	1.026	1.008	1.070	1.07
.991	1.012	1.041	1.031	1.017	1.076	1.076
1.031	1.101	1.081	1.077	1.040	1.076	1.072
1.087	1.059	1.069	1.057	1.102	1.088	1.047
.998	1.065	1.048	1.004	1.014	1.016	1.016
.984	1.019	.987	1.055	1.045	1.022	1.061
.986	1.040	1.019	.980	1.024	1.010	1.014
.964	1.105	1.083	1.011	1.047	1.016	1.028
1.043	1.012	1.029	1.047	1.056	.972	.987
1.021	1.097	1.071	1.068	1.033	.911	.952
1.066	1.023	1.006	1.063	1.045	1.035	.982
1.052	1.037	1.044	1.078	1.038	1.054	1.038
1.037	1.015	1.028	1.084	1.070	1.056	1.048
1.065	1.059	1.026	1.058	1.047	1.067	1.075
1.088	1.046	1.019	1.103	.993	1.086	1.041
1.056	1.045	.995	1.044	1.042	1.026	1.116
1.102	1.001	1.044	1.082	1.028	1.008	1.08
1.106	1.038	1.002	1.017	1.042	1.034	1.037
1.069	.965	.988	1.122	1.034	1.032	1.07
1.097	1.028	1.051	.951	1.059	1.015	1.005
1.135	1.022	1.076	1.058	.952	.981	1.023
1.023	1.049	.987	1.085	1.048	1.072	.98
1.100	1.017	.958	1.044	.991	1.056	1.074
1.053	1.030	1.025	.987	1.031	1.039	1.007
1.005	1.049	1.006	1.058	1.058	1.011	.992
.972	.985	1.012	1.009	1.067	1.017	.973
.985	.979	.974	.961	1.017	1.008	.982
.999	.987	1.021	.958	.954	1.064	.942
.923	.981	.976	.970	.964	.998	1.004

WELD

EL11'-0"

LEG
LD=
LV=

From
3E-Sk-S-85
Bay 17
Trench.

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT L
PAGE 2 OF 3

EXPANDED U.T. AT PT.NO. 178
14 IN. ABOVE CURB 59M FROM WELD
(6 IN. BY 6 IN. MATRIX)
(DATA SHT. NO. 86-049-049)

EL12'-2"

N/A	1.139	1.139	1.141	1.142	1.141	1.14
1.141	1.141	1.142	1.144	1.145	1.144	1.146
1.140	1.141	1.140	1.142	1.144	1.143	1.140
1.139	1.140	1.140	1.145	1.142	1.143	1.145
1.139	1.140	1.141	1.142	1.142	1.144	1.152
1.140	1.141	1.129	1.139	1.140	1.139	1.152
1.134	1.125	1.126	1.131	1.142	N/A	N/A

WELD

NUMBER
1
2
3
4
5
6
7

56
63
57
57 — EL 12'-2"
53
33
07

General Electric		**Ultrasonic Thickness Measurement Data Sheet**	Report Number:	1R21LR-
Oyster Creek			Date:	10/21/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 1 of	2		Specification:	IS-328227-004

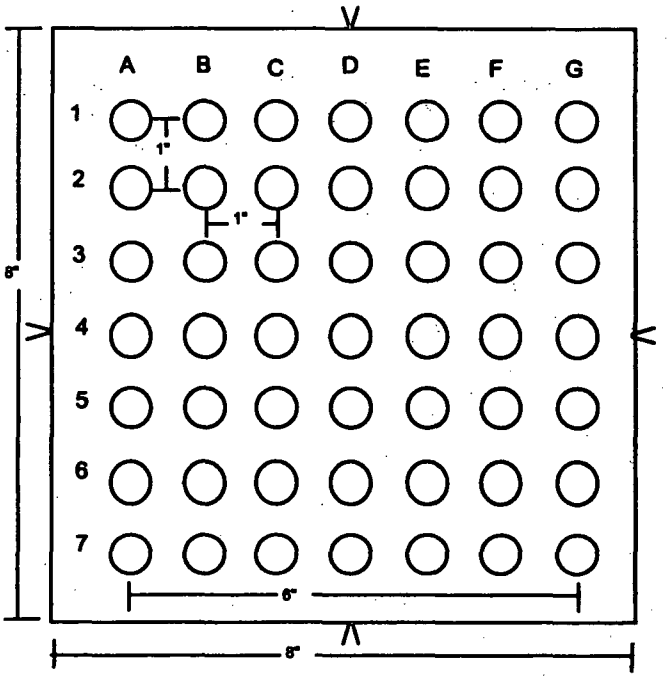
Examiner: Leslie Richter		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: Matt Wilson		Level: II	Instrument No:	031125009	
Transducer Type: DV 506	Serial #: 072561	Size: 0.438"	Freq: 5 Mhz		Angle: 0°
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe		Batch No:	19620
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-139			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	2.0"	11:01	11:32	12:05	12:38	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246647		Comp. Temp: 71°	Block Temp:	68°
Range Calib:	N/A	W/O Number:	C2013479			
Instrument Freq.	N/A	Total Crew Dose	**Drywell Containment Vessel Thickness Examination.**			
Gain:	63 db	96 mr	**Internal UT Inspections.**			
Damping:	N/A	**Trench 1 Bay 5**				
Reject:	N/A					
Filter:	N/A					

Thickness readings taken at holes located in template.

The UT transducer was positioned in the same orientation at each grid point.



PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 3 OF 10

COMMENTS:

Template was placed at the bottom of the trench and forty-nine (49) points were recorded, then template was relocated above previous location with the centerline of the bottom row 1" +/- 1/16" from previous grid top row.
A "V" was stamped next to each side of each template location and above and below top and bottom.
A total of 294 reading were taken.

General Electric		Ultrasonic Thickness Measurement Data Sheet	File Name:	1R21LR- 25
Oyster Creek			Date:	10/18/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 2 of	2		Grid Procedure:	IS-328227-004

Bottom of Trench							
Location ID		Trench 2		Bay	17	Elev.	10' 3"
	A	B	C	D	E	F	G
1	0.937	0.970	0.927	0.946	0.932	0.918	0.942
2	0.924	1.059	0.934	0.941	0.968	0.924	0.916
3	0.948	0.948	0.963	0.941	0.932	0.937	0.967
4	0.977	0.983	1.032	0.982	0.983	0.997	0.953
5	0.972	0.932	0.977	0.973	1.005	0.959	1.028
6	1.026	1.002	0.968	0.972	0.953	0.964	0.990
7	0.981	1.006	0.967	0.945	0.968	0.943	0.978
8	1.026	0.958	0.958	1.026	0.982	0.988	0.967
9	1.026	0.906	0.915	0.991	1.006	0.984	0.962
10	0.979	0.933	1.027	0.934	0.969	0.956	1.042
11	0.963	1.003	1.016	1.062	0.969	0.987	1.030
12	1.027	0.977	1.039	0.999	0.998	1.027	1.039
13	1.023	1.001	0.959	0.997	0.974	1.003	1.090
14	0.986	1.004	1.009	0.946	1.016	1.023	0.995
15	0.966	1.069	1.014	1.055	0.995	1.002	1.029
16	0.987	0.983	0.942	0.941	1.010	1.023	1.016
17	1.034	1.008	0.971	1.064	0.985	1.022	1.032
18	0.972	1.021	0.985	0.992	1.003	0.997	1.008
19	0.975	0.951	0.985	1.059	1.047	0.935	0.980
20	0.940	0.967	0.895	1.020	1.044	1.075	0.980
21	0.918	0.897	0.934	1.036	1.058	0.998	1.009
22	0.973	0.954	1.004	1.013	1.011	1.043	0.948
23	0.998	0.952	1.007	1.000	0.963	1.006	0.951
24	OBST.	0.978	0.979	0.935	1.014	0.981	1.015
25	1.017	1.074	0.968	0.963	0.966	1.014	1.030
26	1.038	1.053	1.026	1.008	0.983	0.979	1.039
27	0.968	1.028	0.998	1.017	1.004	1.030	1.046
28	1.028	0.950	1.047	1.000	0.977	1.002	1.010
29	0.997	1.023	1.060	1.015	0.964	0.995	0.997
30	1.061	0.958	1.022	1.044	0.991	0.990	1.001
31	1.008	1.021	1.010	1.010	1.003	0.959	0.963
32	0.988	0.991	0.961	0.940	1.029	0.979	0.929
33	1.005	1.014	1.003	0.896	0.944	1.013	0.885
34	0.990	0.976	0.962	0.909	0.905	0.863	0.923
35	0.954	0.954	OBST.	0.885	0.887	0.877	0.930
36	0.963	0.972	0.877	0.835	0.891	0.831	0.894
37	0.897	0.937	0.903	0.893	0.838	0.781	0.841
38	0.855	0.884	0.853	0.850	0.840	0.814	0.788
39	0.802	0.891	0.838	0.790	1.082	OBST.	0.809
40	0.746	0.795	0.776	0.822	0.757	1.042	0.794
41	0.702	0.779	0.811	0.835	0.723	0.738	0.837
42	0.726	0.825	0.878	0.868	OBST.	0.864	0.954
Top							

Tscr.	AVG.
0.660	0.963
Min Reading	Max. Reading
0.702	1.090

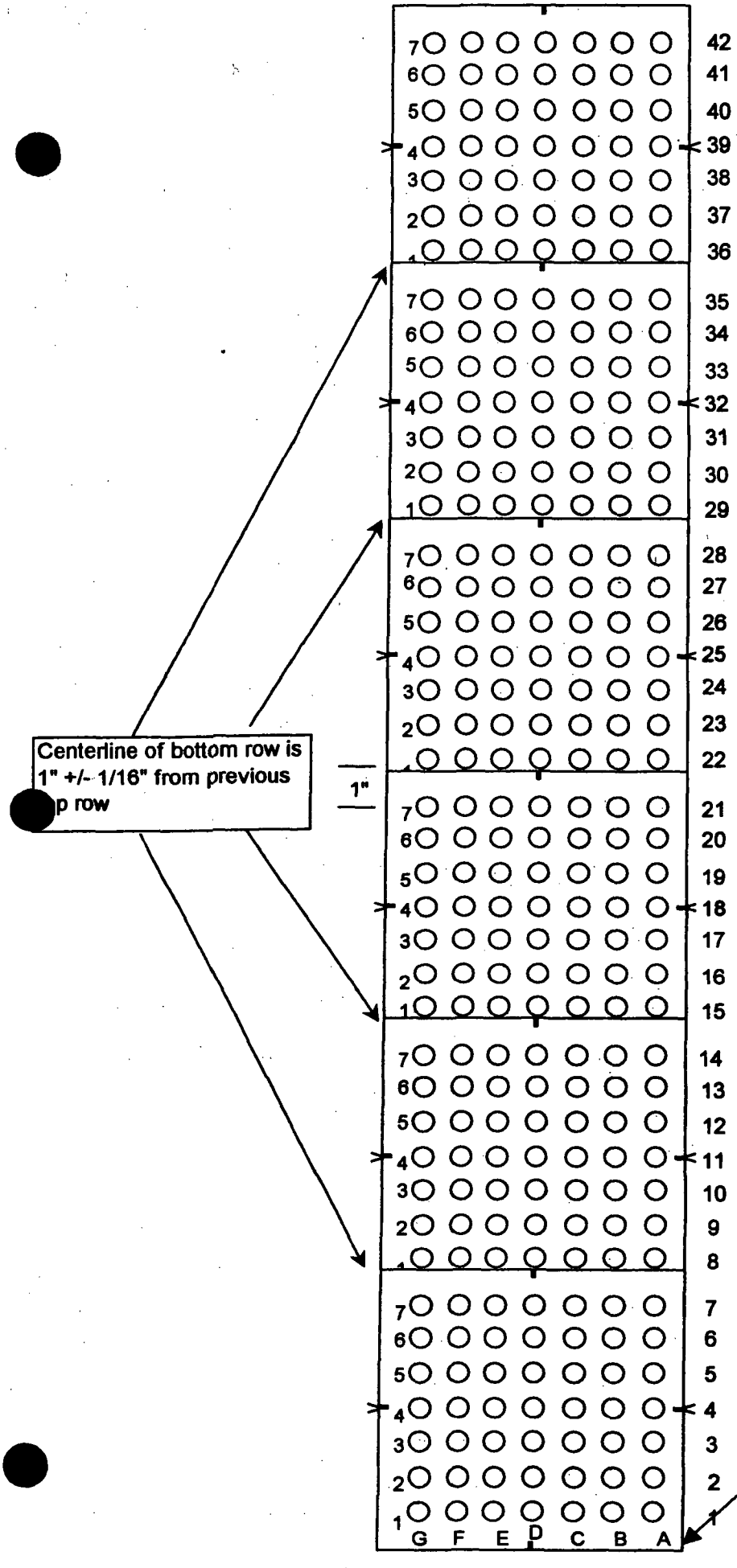
PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 4 OF 12

Page 4

Examined by Jeremy Tuttle Jeremy Tuttle 10/21/06 Level II Date 10/21/2006
Examined by N/A Level N/A Date N/A
Reviewed by: Lee Stone Level II Date 10/21/2006

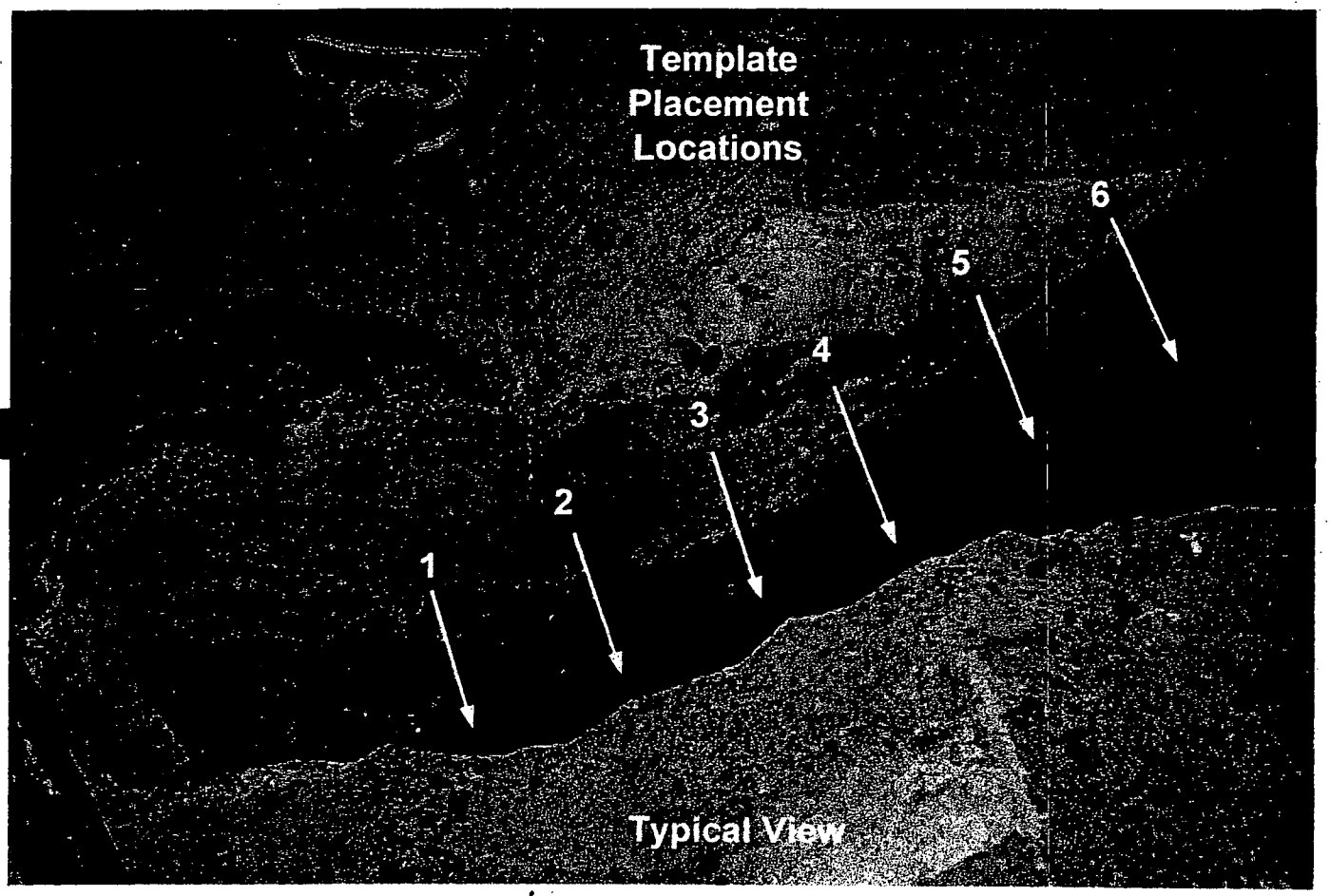
Template layout for Trench UT data.

IR21LR-025 Pg 3 of 4
~~Pg 3~~
signed 10-23-06
L III



PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 5 OF 12

Page 5



PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 6 OF 10

General Electric	**Ultrasonic Thickness Measurement Data Sheet**	File Name:	1R21LR- 25
Oyster Creek		Date:	10/21/2006
Refueling Outage - 1R21		UT Procedure:	ER-AA-335-004
Page 1 of 2		Specification:	IS-328227-004

Examiner: Jeremy Tuttle Jeremy Tuttle 10/21/06		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031125009	
Transducer Type: DV 506	Serial #: 072362	Size: 0.438"	Freq: 5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-139			

SYSTEM CALIBRATION

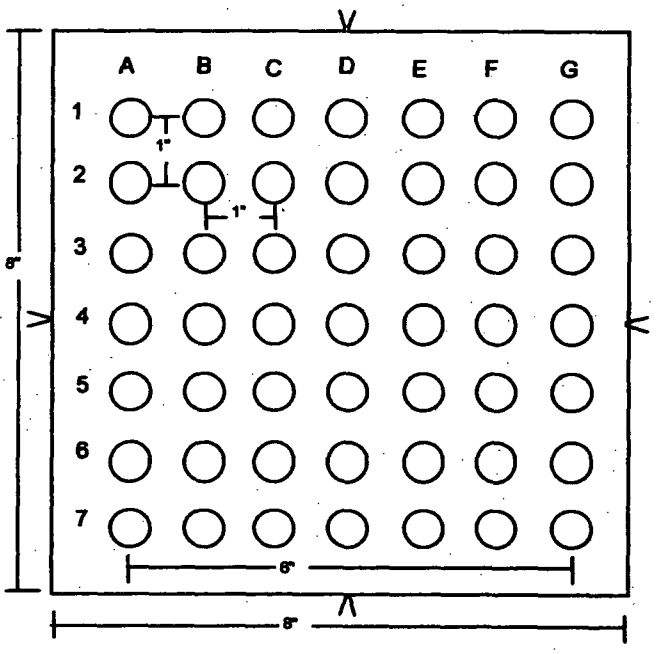
INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	2.0"	7:17	8:22	N/A	9:05	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246672		Comp. Temp: 73°	Block Temp: 68°	
Range Calib:	N/A	W/O Number: C2013479				
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination.			
Gain:	51 db	223 mr	Internal UT Inspections.			
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Trench 2 Bay 17

Thickness readings taken at holes located in template.

The UT transducer was positioned in the same orientation at each grid point.

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 2 OF 12



COMMENTS:
Grid Template aligned with V-stamps.
Template was placed at the bottom of the trench and forty-nine (49) points were recorded, then template was relocated above previous location with the centerline of the bottom row 1" +/- 1/16" from previous grid top row.
A total of 290 readings were taken.

All obstructions due to rough surface conditions. Some readings taken as best effort readings due to rough surface conditions.

Reviewed by: Lee Stone Level II Date 10/21/2006

General Electric		Ultrasonic Thickness Measurement Data Sheet	File Name:	1R21LR- 24
Oyster Creek			Date:	10/21/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 2 of	2		Grid Procedure:	IS-328227-004

mgmt L III
10-23-06

Bottom of Trench

Location ID	Trench 1		Bay	5	Elev.	10' 3"
	A	B	C	D	E	F	G
1	1.059	1.034	1.036	1.106	1.074	1.131	1.078
2	1.061	1.021	1.008	1.051	1.047	1.049	1.024
3	1.062	1.026	1.047	1.026	0.968	1.049	1.032
4	1.016	1.055	1.026	0.959	1.013	1.061	0.987
5	1.027	1.046	1.001	0.993	1.064	1.070	0.993
6	1.035	1.021	1.004	0.985	1.013	1.150	0.957
7	1.032	1.054	1.023	1.033	0.962	0.962	0.991
8	1.065	1.023	1.069	1.043	1.092	1.028	1.030
9	1.111	1.037	1.086	1.071	1.044	0.996	0.976
10	1.061	1.034	1.009	1.099	1.036	0.988	1.105
11	1.014	1.022	1.028	1.142	1.064	1.040	1.041
12	1.125	1.146	1.145	1.125	1.079	1.087	1.089
13	1.101	1.157	1.127	1.155	1.072	1.130	1.043
14	1.116	1.077	1.108	1.094	1.087	1.056	1.051
15	1.127	1.042	1.119	1.126	1.079	1.102	1.075
16	1.109	1.176	1.169	1.112	1.054	1.131	1.113
17	1.106	1.090	1.096	1.079	1.073	1.083	1.030
18	1.094	1.115	1.073	1.068	1.065	1.073	1.091
19	1.045	1.117	1.049	1.114	1.082	1.090	1.095
20	1.111	1.123	1.117	1.086	1.138	1.090	1.091
21	1.151	1.131	1.145	1.091	1.075	1.116	1.114
22	1.126	1.094	1.159	1.058	1.088	1.109	1.134
23	1.129	1.100	1.162	1.023	1.096	1.112	1.070
24	1.089	1.159	1.137	1.109	1.091	1.165	1.124
25	1.135	1.167	1.099	1.075	1.141	1.122	1.050
26	1.054	1.050	1.036	1.074	1.032	1.078	1.070
27	1.134	1.045	1.026	1.082	1.171	1.145	1.178
28	1.069	1.085	1.102	1.142	1.120	1.061	1.116
29	1.020	1.065	1.068	1.021	1.040	1.001	1.066
30	1.085	1.064	1.045	1.033	1.006	1.033	1.056
31	1.047	1.059	0.997	1.083	1.018	1.065	1.030
32	1.084	1.062	1.063	1.105	1.143	1.089	1.048
33	1.107	1.093	1.057	1.050	1.130	1.061	1.064
34	1.099	1.066	1.005	1.027	1.044	1.018	1.073
35	1.059	1.118	1.045	1.023	1.039	1.068	1.087
36	1.067	1.072	1.041	1.035	1.030	1.015	1.047
37	1.093	1.050	1.099	1.039	1.033	0.992	1.033
38	1.142	1.094	1.099	1.086	1.086	1.039	1.048
39	1.151	1.122	1.112	1.074	1.115	1.073	1.049
40	1.132	1.115	1.103	1.106	1.083	1.052	1.047
41	1.137	1.130	1.139	1.119	1.106	1.084	1.087
42	1.113	1.131	1.097	1.122	1.131	1.104	1.063

Top

Tscr.	**AVG.**
0.660	**1.074**
Min Reading	**Max. Reading**
0.957	**1.178**

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 8 OF 12

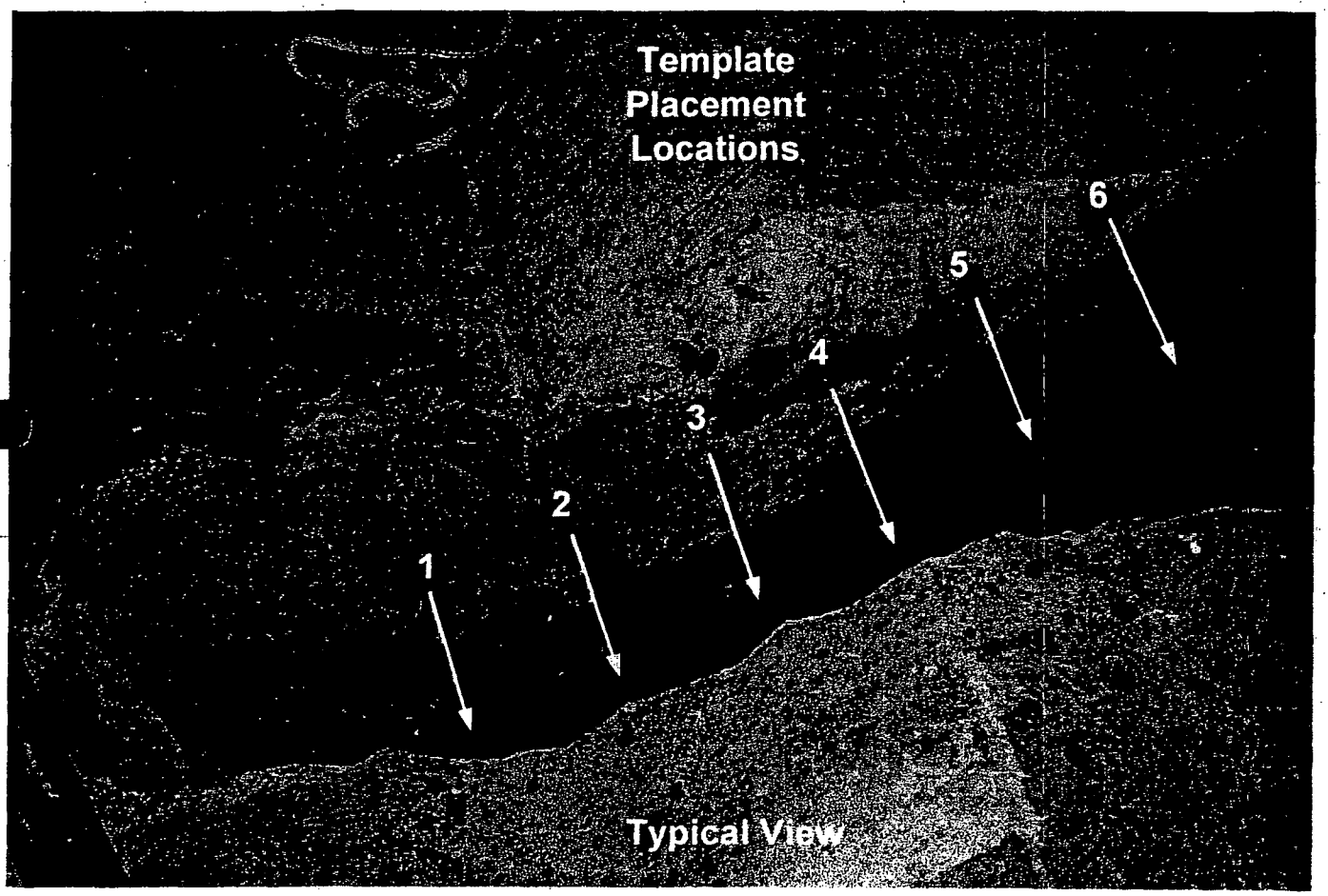
Page 8

mgmt
L III
10-23-06

Examined by Leslie Richter Level II Date 10/21/2006
Examined by Matt Wilson Level II Date 10/21/2006
Reviewed by: Lee Stone Level II Date 10/21/2006

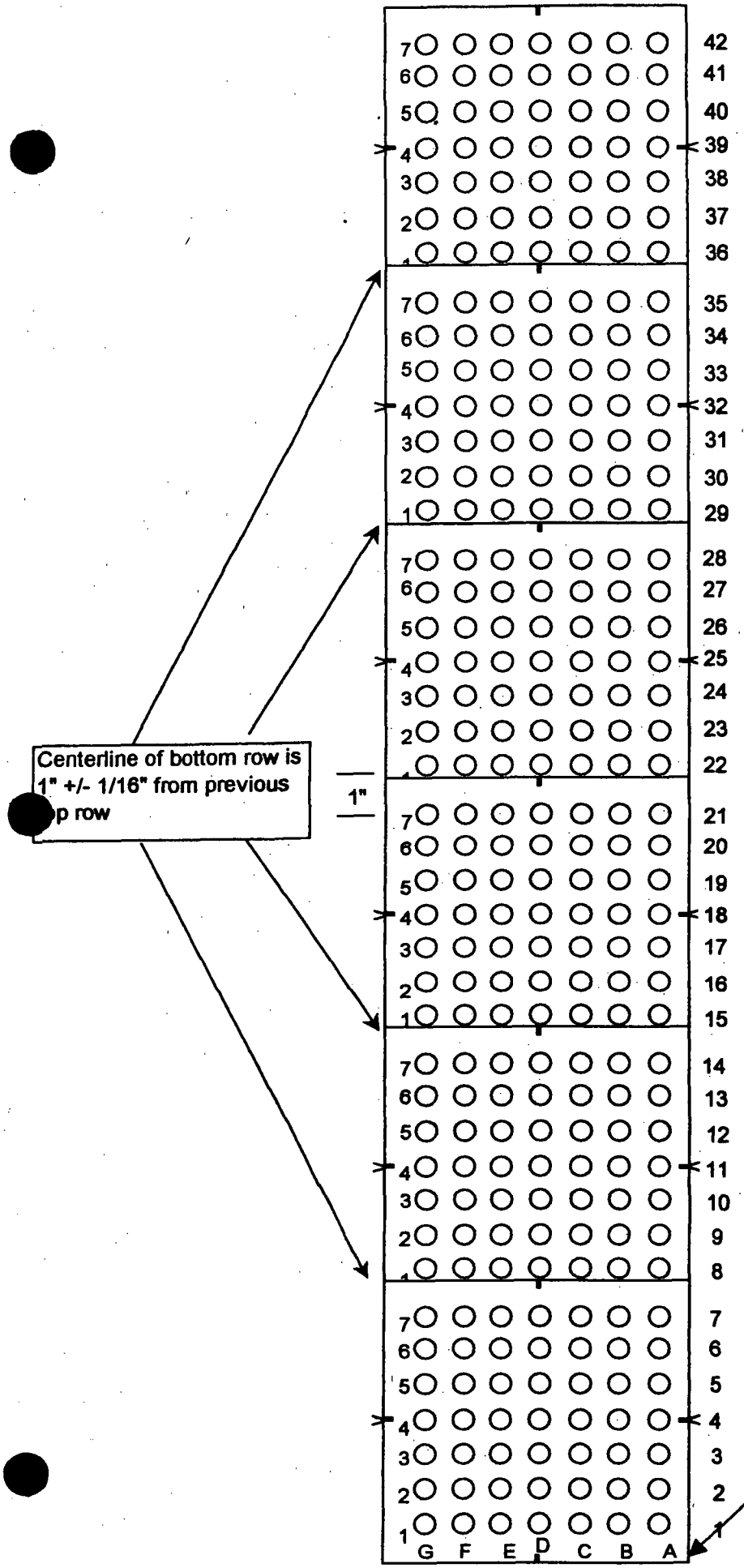
PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 9 OF 10

PT



Template layout for Trench UT data.

IR2ILR-024
Pg 4 of 4
MM&C L III
10-23-06



PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 10 OF 10

Attachment 2 - Bay 5 Trench

1986 Data

The data shown below was collected in 1986 in the trench in Bay 5

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-1.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 1.156 & 1.166 & 1.182 & 1.172 & 1.225 & 1.181 & 1.171 \\ 1.16 & 0 & 1.184 & 1.173 & 1.175 & 1.171 & 1.176 \\ 1.165 & 1.164 & 1.151 & 0 & 0 & 1.17 & 1.17 \\ 1.145 & 1.151 & 1.158 & 1.162 & 1.155 & 1.159 & 1.172 \\ 1.123 & 1.151 & 1.148 & 1.167 & 0 & 1.139 & 1.156 \\ 1.128 & 1.138 & 1.141 & 1.157 & 1.158 & 1.144 & 1.159 \\ 1.123 & 1.149 & 1.13 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$XXXS := convert(Points_{49}, 7) \qquad No_{DataCells} := length(XXXS)$$

$$XXXS := deletezero_{cells}(XXXS, No_{DataCells})$$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-2.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 1.109 & 1.121 & 1.144 & 1.155 & 1.156 & 1.149 & 1.155 \\ 1.064 & 1.066 & 1.068 & 1.115 & 1.1 & 1.109 & 1.124 \\ 1.051 & 1.096 & 1.041 & 1.077 & 1.162 & 1.078 & 0 \\ 1.063 & 1.1 & 1.11 & 1.048 & 1.101 & 1.11 & 1.133 \\ 1.047 & 1.109 & 1.149 & 1.13 & 1.176 & 1.179 & 1.058 \\ 1.125 & 1.123 & 1.09 & 1.117 & 1.182 & 1.2 & 1.182 \\ 1.135 & 1.091 & 1.107 & 1.08 & 1.084 & 1.125 & 1.183 \end{bmatrix}$$

$$XXX := convert(Points_{49}, 7) \qquad No_{DataCells} := length(XXX)$$

$$XXX := deletezero_{cells}(XXX, No_{DataCells})$$

$$Cells_{86} := stack(XXX, XXXS) \qquad No_{DataCells} := length(Cells_{86}) \qquad No_{DataCells} = 89$$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-3.txt")

Points $_{49}$:= showcells(page, 7, 0)

$$\text{Points}_{49} = \begin{bmatrix} 1.094 & 1.064 & 1.067 & 1.079 & 0 & 1.169 & 1.14 \\ 1.043 & 1.079 & 1.052 & 1.079 & 1.119 & 1.164 & 0 \\ 1.058 & 1.055 & 1.082 & 1.044 & 1.071 & 0 & 1.137 \\ 1.087 & 1.049 & 1.058 & 1.114 & 1.083 & 1.053 & 1.164 \\ 1.18 & 1.118 & 1.093 & 1.043 & 1.062 & 1.178 & 1.156 \\ 1.138 & 1.071 & 1.109 & 1.137 & 1.096 & 0 & 1.194 \\ 1.109 & 1.082 & 1.158 & 1.098 & 1.166 & 1.134 & 1.056 \end{bmatrix}$$

XXX := convert(Points $_{49}$, 7)

No $_{DataCells}$:= length(XXX)

XXX := deletezero $_{cells}$(XXX, No $_{DataCells}$)

Cells $_{86}$:= stack(Cells $_{86}$, XXX)

No $_{DataCells}$:= length(Cells $_{86}$)

No $_{DataCells}$ = 134

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-4.txt")

Points $_{49}$:= showcells(page, 7, 0)

$$\text{Points}_{49} = \begin{bmatrix} 1.141 & 1.128 & 1.089 & 1.154 & 1.164 & 1.141 & 1.122 \\ 1.159 & 0 & 0 & 1.17 & 0 & 1.151 & 1.105 \\ 1.166 & 1.127 & 1.105 & 1.174 & 1.169 & 1.105 & 1.131 \\ 1.109 & 1.148 & 0 & 1.166 & 1.171 & 1.113 & 1.141 \\ 1.089 & 1.167 & 0 & 1.18 & 1.128 & 1.133 & 1.106 \\ 1.126 & 1.092 & 1.178 & 0 & 1.167 & 1.124 & 1.072 \\ 1.069 & 1.054 & 1.112 & 1.089 & 1.146 & 1.119 & 1.098 \end{bmatrix}$$

XXX := convert(Points $_{49}$, 7)

No $_{DataCells}$:= length(XXX)

XXX := deletezero $_{cells}$(XXX, No $_{DataCells}$)

Cells $_{86}$:= stack(Cells $_{86}$, XXX)

No $_{DataCells}$:= length(Cells $_{86}$)

No $_{DataCells}$ = 177

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-5.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.076 & 1.056 & 1.098 & 0 & 1.139 & 1.098 & 1.077 \\ 1.118 & 1.054 & 1.1 & 1.159 & 1.06 & 1.062 & 1.101 \\ 1.067 & 1.073 & 1.11 & 1.205 & 1.149 & 1.09 & 1.113 \\ 1.088 & 1.106 & 1.171 & 1.193 & 1.041 & 1.134 & 1.093 \\ 1.094 & 1.119 & 1.115 & 1.148 & 1.092 & 1.118 & 1.109 \\ 1.128 & 1.134 & 1.125 & 0 & 1.147 & 1.145 & 1.112 \\ 1.065 & 1.077 & 1.179 & 1.168 & 1.077 & 1.068 & 1.073 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $No\ DataCells := length(XXX)$

$XXX := deletezero_{cells}(XXX, No\ DataCells)$

$Cells_{86} := stack(Cells_{86}, XXX)$ $No\ DataCells := length(Cells_{86})$ $No\ DataCells = 224$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-6.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.062 & 1.101 & 0 & 1.088 & 1.069 & 1.074 & 1.067 \\ 1.1 & 1.062 & 1.141 & 1.059 & 1.11 & 1.076 & 1.078 \\ 1.044 & 1.052 & 0 & 1.045 & 1.083 & 1.081 & 1.076 \\ 1.031 & 0 & 1.057 & 1.073 & 1.059 & 1.109 & 1.062 \\ 1.035 & 0 & 1.076 & 1.06 & 1.016 & 1.074 & 1.037 \\ 1.024 & 1.103 & 1.03 & 1.059 & 1.061 & 1.062 & 1.076 \\ 0 & 1.057 & 1.021 & 1.015 & 1.028 & 1.089 & 1.08 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $No\ DataCells := length(XXX)$

$XXX := deletezero_{cells}(XXX, No\ DataCells)$

$Cells_{86} := stack(Cells_{86}, XXX)$

$No\ DataCells := length(Cells_{86})$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench5-7.txt")

$Points_{49} := showcells(page, 7, 0)$

$$\text{Points}_{49} = \begin{bmatrix} 1.087 & 1.11 & 1.027 & 1.04 & 1.07 & 1.079 & 1.081 \\ 0 & 1.132 & 1.049 & 1.096 & 1.052 & 1.093 & 1.092 \\ 1.168 & 1.112 & 1.113 & 1.101 & 1.056 & 1.065 & 1.108 \\ 1.271 & 1.138 & 1.117 & 1.103 & 1.152 & 1.142 & 1.108 \\ 1.211 & 1.158 & 1.099 & 1.133 & 1.134 & 1.145 & 1.108 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$XXX := \text{convert}(\text{Points}_{49}, 7)$ $\quad No_{DataCells} := \text{length}(XXX)$

$XXX := \text{deletezero}_{cells}(XXX, No_{DataCells})$

$\text{Cells}_{86} := \text{stack}(\text{Cells}_{86}, XXX)$ $\quad No_{DataCells} := \text{length}(\text{Cells}_{86})$ $\quad No_{DataCells} = 302$

$No_{DataCells} = 302$

The thinnest point at this location is shown below

$minpoint := \min(\text{Cells}_{86})$ $\quad minpoint = 1.015 \cdot 10^{3}$

Mean and Standard Deviation

$\mu 86_{actual} := mean(Cells_{86})$ $\mu 86_{actual} = 1.1123 \cdot 10^3$ $\sigma 86_{actual} := Stdev(Cells_{86})$ $\sigma 86_{actual} = 45.002$

Standard Error

$$Standard_{error} := \frac{\sigma 86_{actual}}{\sqrt{No_{DataCells}}}$$

$Standard_{error} = 2.59$

Skewness

$$Skewness := \frac{(No_{DataCells}) \cdot \overrightarrow{\Sigma(Cells_{86} - \mu 86_{actual})^3}}{(No_{DataCells} - 1) \cdot (No_{DataCells} - 2) \cdot (\sigma 86_{actual})^3}$$

$Skewness = 0.132$

Kurtosis

$$Kurtosis := \frac{No_{DataCells} \cdot (No_{DataCells} + 1) \cdot \overrightarrow{\Sigma(Cells_{86} - \mu 86_{actual})^4}}{(No_{DataCells} - 1) \cdot (No_{DataCells} - 2) \cdot (No_{DataCells} - 3) \cdot (\sigma 86_{actual})^4} \ldots + - \frac{3 \cdot (No_{DataCells} - 1)^2}{(No_{DataCells} - 2) \cdot (No_{DataCells} - 3)}$$

$Kurtosis = -0.534$

Normal Probability Plot

In a normal plot, each data value is plotted against what its value would be if it actually came from a normal distribution. The expected normal values, called normal scores, and can be estimated by first calculating the rank scores of the sorted data.

$$j := 0 .. \text{last}(\text{Cells}_{86}) \qquad \text{srt} := \text{sort}(\text{Cells}_{86})$$

Then each data point is ranked. The array rank captures these ranks

$$r_j := j + 1$$

$$\text{rank}_j := \frac{\overrightarrow{\Sigma\left(\overrightarrow{\text{srt} = \text{srt}_j}\right) \cdot r}}{\overrightarrow{\Sigma \text{srt} = \text{srt}_j}}$$

$$p_j := \frac{\text{rank}_j}{\text{rows}(\text{Cells}_{86}) + 1}$$

The normal scores are the corresponding ***p***th percentile points from the standard normal distribution:

$$x := 1 \qquad \text{N\_Score}_j := \text{root}\left[\text{cnorm}(x) - \left(p_j\right), x\right]$$

Upper and Lower Confidence Values

The Upper and Lower confidence values are calculated based on .05 degree of confidence "α"

$$\text{No}_{\text{DataCells}} := \text{length}(\text{Cells}_{86})$$

$$\alpha := .05 \qquad T\alpha := qt\left[\left(1 - \frac{\alpha}{2}\right), \text{No}_{\text{DataCells}}\right] \qquad T\alpha = 1.968$$

$$\text{Lower}_{95\%\text{Con}} := \mu 86_{\text{actual}} - T\alpha \cdot \frac{\sigma 86_{\text{actual}}}{\sqrt{\text{No}_{\text{DataCells}}}} \qquad \text{Lower}_{95\%\text{Con}} = 1.107 \cdot 10^3$$

$$\text{Upper}_{95\%\text{Con}} := \mu 86_{\text{actual}} + T\alpha \cdot \frac{\sigma 86_{\text{actual}}}{\sqrt{\text{No}_{\text{DataCells}}}} \qquad \text{Upper}_{95\%\text{Con}} = 1.117 \cdot 10^3$$

These values represent a range on the calculated mean in which there is 95% confidence.

Graphical Representation

Distribution of the "Cells" data points are sorted in 1/2 standard deviation increments (bins) within +/- 3 standard deviations

$$\text{Bins} := \text{Make}_{\text{bins}}(\mu 86_{\text{actual}}, \sigma 86_{\text{actual}})$$

$$\text{Distribution} := \text{hist}(\text{Bins}, \text{Cells}_{86})$$

$$\text{Distribution} = \begin{matrix} 0 \\ 3 \\ 14 \\ 42 \\ 45 \\ 54 \\ 41 \\ 43 \\ 45 \\ 11 \\ 2 \\ 1 \end{matrix}$$

The mid points of the Bins are calculated

$$k := 0 .. 11 \qquad \text{Midpoints}_k := \frac{(\text{Bins}_k + \text{Bins}_{k+1})}{2}$$

The Mathcad function pnorm calculates a portion of normal distribution curve based on a given mean and standard deviation

$$\text{normal}_{\text{curve}_0} := \text{pnorm}(\text{Bins}_1, \mu 86_{\text{actual}}, \sigma 86_{\text{actual}})$$

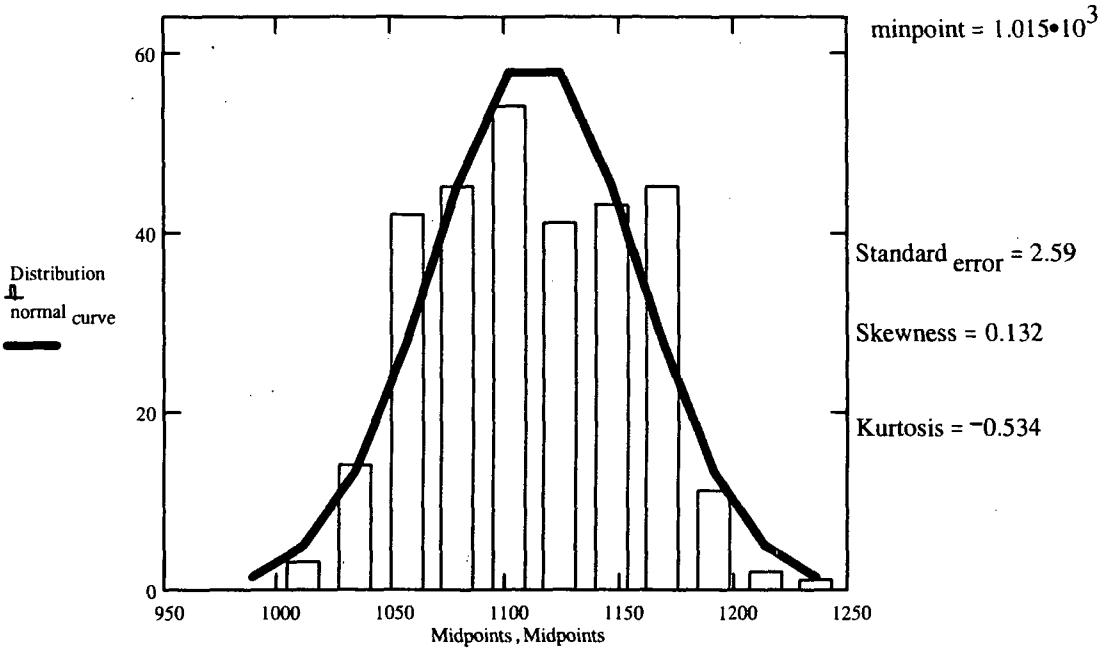
$$\text{normal}_{\text{curve}_k} := \text{pnorm}(\text{Bins}_{k+1}, \mu 86_{\text{actual}}, \sigma 86_{\text{actual}}) - \text{pnorm}(\text{Bins}_k, \mu 86_{\text{actual}}, \sigma 86_{\text{actual}})$$

$$\text{normal}_{\text{curve}} := \text{No}_{\text{DataCells}} \cdot \text{normal}_{\text{curve}}$$

Results For Elevation Sandbed elevation Locatiobn Oct. 2006

The following schematic shows: the the distribution of the samples, the normal curve based on the actual mean and standard deviation, the kurtosis, the skewness, the number of data points, and the the lower and upper 95% confidence values. Below is the Normal Plot for the data.

Data Distribution

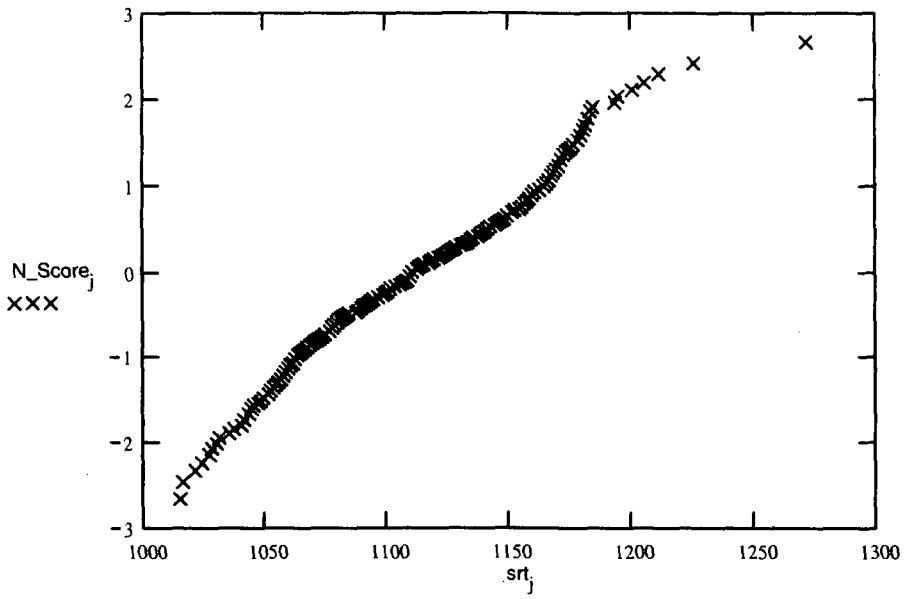


Lower $_{95\%Con}$ = $1.107 \cdot 10^3$ Upper $_{95\%Con}$ = $1.117 \cdot 10^3$

$\mu 86_{actual} = 1.112 \cdot 10^3$ $\sigma 86_{actual} = 45.002$ minpoint = $1.015 \cdot 10^3$

A Kurtosis value which is less than +/- 1.0 and approaches 0 is indicative of a normal distrubution

Normal Probability Plot



The Normal Probability Plot and the Kurtosis this data is normally distributed.

A Normal Probability Plot which approaches a straight line is indicative of a normal distrubution

OCT 2006 Data

The data shown below was collected in 2006 in the trench in Bay 5

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench5-1.txt")

Points $_{49}$:= showcells(page, 7, 0)

$$\text{Points}_{49} = \begin{bmatrix} 1.067 & 1.072 & 1.041 & 1.035 & 1.03 & 1.015 & 1.047 \\ 1.093 & 1.05 & 1.099 & 1.039 & 1.033 & 0.992 & 1.033 \\ 1.142 & 1.094 & 1.099 & 1.086 & 1.086 & 1.039 & 1.048 \\ 1.151 & 1.122 & 1.112 & 1.074 & 1.115 & 1.073 & 1.049 \\ 1.132 & 1.115 & 1.103 & 1.106 & 1.083 & 1.052 & 1.047 \\ 1.137 & 1.13 & 1.139 & 1.119 & 1.106 & 1.084 & 1.087 \\ 1.113 & 1.131 & 1.097 & 1.122 & 1.131 & 1.104 & 1.063 \end{bmatrix}$$

XXXS := convert(Points $_{49}$, 7)

No $_{\text{DataCells}}$:= length(XXXS)

XXXS := deletezero $_{\text{cells}}$(XXXS, No $_{\text{DataCells}}$)

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench5-2.txt")

Points $_{49}$:= showcells(page, 7, 0)

$$\text{Points}_{49} = \begin{bmatrix} 1.02 & 1.065 & 1.068 & 1.021 & 1.04 & 1.001 & 1.066 \\ 1.085 & 1.064 & 1.045 & 1.033 & 1.006 & 1.033 & 1.056 \\ 1.047 & 1.059 & 0.997 & 1.083 & 1.018 & 1.065 & 1.03 \\ 1.084 & 1.062 & 1.063 & 1.105 & 1.143 & 1.089 & 1.048 \\ 1.107 & 1.093 & 1.057 & 1.05 & 1.13 & 1.061 & 1.064 \\ 1.099 & 1.066 & 1.005 & 1.027 & 1.044 & 1.018 & 1.073 \\ 1.059 & 1.118 & 1.045 & 1.023 & 1.039 & 1.068 & 1.087 \end{bmatrix}$$

XXX := convert(Points $_{49}$, 7)

No $_{\text{DataCells}}$:= length(XXX)

XXX := deletezero $_{\text{cells}}$(XXX, No $_{\text{DataCells}}$)

Cells $_{06}$:= stack(XXX, XXXS)

No $_{\text{DataCells}}$:= length(Cells $_{06}$)

No $_{\text{DataCells}}$ = 98

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench5-3.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.126 & 1.094 & 1.159 & 1.058 & 1.088 & 1.109 & 1.134 \\ 1.129 & 1.1 & 1.162 & 1.023 & 1.096 & 1.112 & 1.07 \\ 1.089 & 1.159 & 1.137 & 1.109 & 1.091 & 1.165 & 1.124 \\ 1.135 & 1.167 & 1.099 & 1.075 & 1.141 & 1.122 & 1.05 \\ 1.054 & 1.05 & 1.036 & 1.074 & 1.032 & 1.078 & 1.07 \\ 1.134 & 1.045 & 1.026 & 1.082 & 1.171 & 1.145 & 1.178 \\ 1.069 & 1.085 & 1.102 & 1.142 & 1.12 & 1.061 & 1.116 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$

$No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{06} := stack(Cells_{06}, XXX)$

$No_{DataCells} := length(Cells_{06})$

$No_{DataCells} = 147$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench5-4.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.127 & 1.042 & 1.119 & 1.126 & 1.079 & 1.102 & 1.075 \\ 1.109 & 1.176 & 1.169 & 1.112 & 1.054 & 1.131 & 1.113 \\ 1.106 & 1.09 & 1.096 & 1.079 & 1.073 & 1.083 & 1.03 \\ 1.094 & 1.115 & 1.073 & 1.068 & 1.065 & 1.073 & 1.091 \\ 1.045 & 1.117 & 1.049 & 1.114 & 1.082 & 1.09 & 1.095 \\ 1.111 & 1.123 & 1.117 & 1.086 & 1.138 & 1.09 & 1.091 \\ 1.151 & 1.131 & 1.145 & 1.091 & 1.075 & 1.116 & 1.114 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$

$No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{06} := stack(Cells_{06}, XXX)$

$No_{DataCells} := length(Cells_{06})$

$No_{DataCells} = 196$

Mean and Standard Deviation

$\mu 06_{actual} := mean(Cells_{06})$ $\mu 06_{actual} = 1.0743 \cdot 10^3$ $\sigma 06_{actual} := Stdev(Cells_{06})$ $\sigma 06_{actual} = 45.628$

Standard Error

$$Standard_{error} := \frac{\sigma 06_{actual}}{\sqrt{No\ DataCells}}$$ $Standard_{error} = 2.661$

Skewness

$$Skewness := \frac{(No\ DataCells) \cdot \overrightarrow{\Sigma(Cells_{06} - \mu 06_{actual})^3}}{(No\ DataCells - 1) \cdot (No\ DataCells - 2) \cdot (\sigma 06_{actual})^3}$$ $Skewness = -0.071$

Kurtosis

$$Kurtosis := \frac{No\ DataCells \cdot (No\ DataCells + 1) \cdot \overrightarrow{\Sigma(Cells_{06} - \mu 06_{actual})^4}}{(No\ DataCells - 1) \cdot (No\ DataCells - 2) \cdot (No\ DataCells - 3) \cdot (\sigma 06_{actual})^4} \ldots + - \frac{3 \cdot (No\ DataCells - 1)^2}{(No\ DataCells - 2) \cdot (No\ DataCells - 3)}$$ $Kurtosis = -0.432$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench5-5.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.065 & 1.023 & 1.069 & 1.043 & 1.092 & 1.028 & 1.03 \\ 1.111 & 1.037 & 1.086 & 1.071 & 1.044 & 0.996 & 0.976 \\ 1.061 & 1.034 & 1.009 & 1.099 & 1.036 & 0.988 & 1.105 \\ 1.014 & 1.022 & 1.028 & 1.142 & 1.064 & 1.04 & 1.041 \\ 1.125 & 1.146 & 1.145 & 1.125 & 1.079 & 1.087 & 1.089 \\ 1.101 & 1.157 & 1.127 & 1.155 & 1.072 & 1.13 & 1.043 \\ 1.116 & 1.077 & 1.108 & 1.094 & 1.087 & 1.056 & 1.051 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $\quad No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{06} := stack(Cells_{06}, XXX)$ $\quad No_{DataCells} := length(Cells_{06})$

$No_{DataCells} = 245$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench5-6.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.059 & 1.034 & 1.036 & 1.106 & 1.074 & 1.131 & 1.078 \\ 1.061 & 1.021 & 1.008 & 1.051 & 1.047 & 1.049 & 1.024 \\ 1.062 & 1.026 & 1.047 & 1.026 & 0.968 & 1.049 & 1.032 \\ 1.016 & 1.055 & 1.026 & 0.959 & 1.013 & 1.061 & 0.987 \\ 1.027 & 1.046 & 1.001 & 0.993 & 1.064 & 1.07 & 0.993 \\ 1.035 & 1.021 & 1.004 & 0.985 & 1.013 & 1.15 & 0.957 \\ 1.032 & 1.054 & 1.023 & 1.033 & 0.962 & 0.962 & 0.991 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $\quad No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{06} := stack(Cells_{06}, XXX)$ $\quad No_{DataCells} := length(Cells_{06})$ $\quad No_{DataCells} = 294$

$minpoint := min(XXX)$ $\quad minpoint = 957$

The thinnest point at this location is shown below

$minpoint := min(Cells_{06})$ $\quad minpoint = 957$

Normal Probability Plot

In a normal plot, each data value is plotted against what its value would be if it actually came from a normal distribution. The expected normal values, called normal scores, and can be estimated by first calculating the rank scores of the sorted data.

$$j := 0 .. \text{last}(\text{Cells}_{06}) \qquad \text{srt} := \text{sort}(\text{Cells}_{06})$$

Then each data point is ranked. The array rank captures these ranks

$$z_j := j + 1$$

$$\text{rank}_j := \frac{\overrightarrow{\Sigma\left(\overrightarrow{\text{srt} = \text{srt}_j}\right) \cdot z}}{\overrightarrow{\Sigma \text{srt} = \text{srt}_j}}$$

$$p_j := \frac{\text{rank}_j}{\text{rows}(\text{Cells}_{06}) + 1}$$

The normal scores are the corresponding pth percentile points from the standard normal distribution:

$$x := 1 \qquad \text{N\_Score}_j := \text{root}\left[\text{cnorm}(x) - (p_j), x\right]$$

Upper and Lower Confidence Values

The Upper and Lower confidence values are calculated based on .05 degree of confidence "α"

$$No_{DataCells} := length(Cells_{06})$$

$$\alpha := .05 \qquad T\alpha := qt\left[\left(1 - \frac{\alpha}{2}\right), No_{DataCells}\right] \qquad T\alpha = 1.968$$

$$Lower_{95\%Con} := \mu 06_{actual} - T\alpha \cdot \frac{\sigma 06_{actual}}{\sqrt{No_{DataCells}}} \qquad Lower_{95\%Con} = 1.069 \cdot 10^3$$

$$Upper_{95\%Con} := \mu 06_{actual} + T\alpha \cdot \frac{\sigma 06_{actual}}{\sqrt{No_{DataCells}}} \qquad Upper_{95\%Con} = 1.08 \cdot 10^3$$

These values represent a range on the calculated mean in which there is 95% confidence.

Graphical Representation

Distribution of the "Cells" data points are sorted in 1/2 standard deviation increments (bins) within +/- 3 standard deviations

$$Bins := Make_{bins}(\mu 06_{actual}, \sigma 06_{actual})$$

$$Distribution := hist(Bins, Cells_{06})$$

$$Distribution = \begin{matrix} 2 \\ 4 \\ 13 \\ 28 \\ 54 \\ 51 \\ 48 \\ 42 \\ 33 \\ 14 \\ 5 \\ 0 \end{matrix}$$

The mid points of the Bins are calculated

$$k := 0 .. 11 \qquad Midpoints_k := \frac{(Bins_k + Bins_{k+1})}{2}$$

The Mathcad function pnorm calculates a portion of normal distribution curve based on a given mean and standard deviation

$$normal_{curve_0} := pnorm(Bins_1, \mu 06_{actual}, \sigma 06_{actual})$$

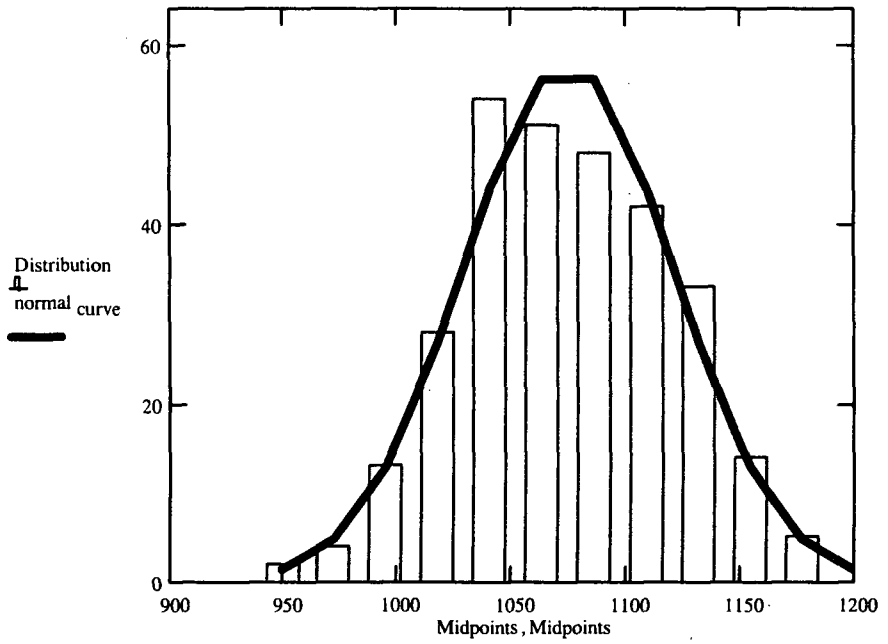
$$normal_{curve_k} := pnorm(Bins_{k+1}, \mu 06_{actual}, \sigma 06_{actual}) - pnorm(Bins_k, \mu 06_{actual}, \sigma 06_{actual})$$

$$normal_{curve} := No_{DataCells} \cdot normal_{curve}$$

Results For Elevation Sandbed elevation Locatiobn Oct. 2006

The following schematic shows: the the distribution of the samples, the normal curve based on the actual mean and standard deviation, the kurtosis, the skewness, the number of data points, and the the lower and upper 95% confidence values. Below is the Normal Plot for the data.

Data Distribution



minpoint = 957

Standard $_{error}$ = 2.661

Skewness = −0.071

Kurtosis = −0.432

Lower $_{95\%Con}$ = $1.069 \cdot 10^3$

Upper $_{95\%Con}$ = $1.08 \cdot 10^3$

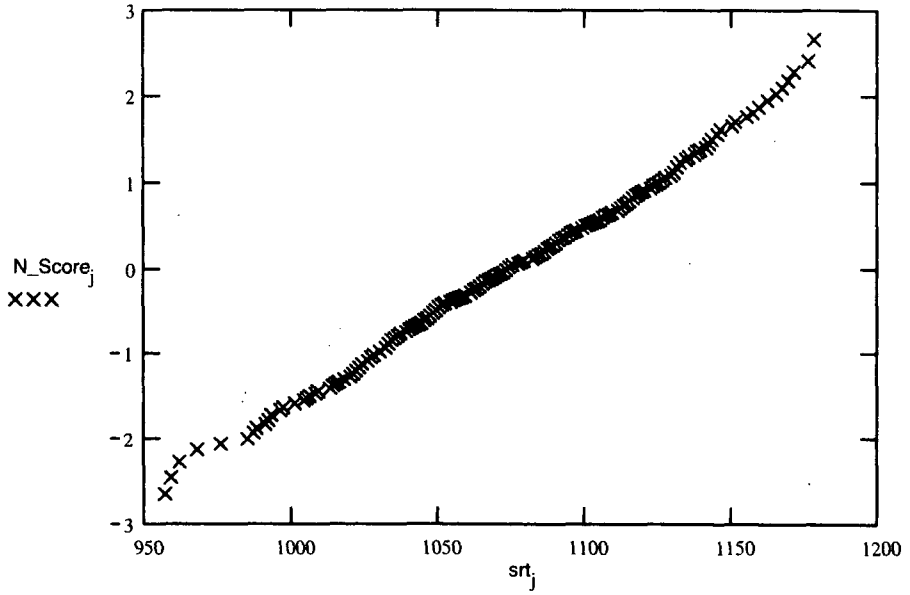
$\mu 06_{actual}$ = $1.074 \cdot 10^3$

$\sigma 06_{actual}$ = 45.628

minpoint = 957

A Kurtosis value which is less than +/- 1.0 and approaches 0 is indicative of a normal distrubution

Normal Probability Plot



The Normal Probability Plot and the Kurtosis this data is normally distributed.

A Normal Probability Plot which approaches a straight line is indicative of a normal distrubution

Corrosion Rate assuming corrosion occured between 1986 and 2006

$$\frac{\left(\mu 86_{\text{actual}} - \mu 06_{\text{actual}}\right)}{2006 - 1986} = 1.9$$

Corrosion Rate assuming corrosion occured between 1986 and 1992

$$\frac{\left(\mu 86_{\text{actual}} - \mu 06_{\text{actual}}\right)}{1992 - 1986} = 6.334$$

Attachment 3 Bay 17 Trench

1986 Data

The data shown below was collected in 1986 in the trench in Bay 17

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench17-1.txt")

Points $_{49}$:= showcells(page, 7, 0)

$$\text{Points}_{49} = \begin{bmatrix} 0.93 & 0.932 & 0.943 & 0.958 & 0.927 & 0.889 & 0.913 \\ 1.014 & 0.953 & 0.984 & 0.987 & 0.973 & 0.939 & 0.956 \\ 0.991 & 1.005 & 0.951 & 0.968 & 0.939 & 0.945 & 0.956 \\ 0.995 & 0.995 & 1.038 & 1.031 & 0.992 & 1.003 & 1.011 \\ 1.025 & 1.011 & 0.968 & 1.024 & 1.004 & 1.002 & 1.055 \\ 1.017 & 1.036 & 1.029 & 1.031 & 1.084 & 1.026 & 1.05 \\ 1.041 & 1.055 & 1.044 & 1.047 & 1.043 & 0 & 0 \end{bmatrix}$$

XXXS := convert(Points $_{49}$, 7)

No $_{DataCells}$:= length(XXXS)

XXXS := deletezero $_{cells}$(XXXS, No $_{DataCells}$)

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench17-2.txt")

Points $_{49}$:= showcells(page, 7, 0)

$$\text{Points}_{49} = \begin{bmatrix} 1.045 & 1.009 & 1.024 & 1.026 & 1.008 & 1.07 & 1.07 \\ 0.991 & 1.012 & 1.041 & 1.031 & 1.017 & 1.076 & 1.076 \\ 1.031 & 1.101 & 1.081 & 1.077 & 1.04 & 1.076 & 1.072 \\ 1.087 & 1.059 & 1.069 & 1.057 & 1.102 & 1.088 & 1.047 \\ 0.998 & 1.065 & 1.048 & 1.004 & 1.014 & 1.016 & 1.016 \\ 0.964 & 1.019 & 0.987 & 1.055 & 1.045 & 1.022 & 1.061 \\ 0.906 & 1.04 & 1.019 & 0.98 & 1.024 & 1.01 & 1.014 \end{bmatrix}$$

XXX := convert(Points $_{49}$, 7)

No $_{DataCells}$:= length(XXX)

XXX := deletezero $_{cells}$(XXX, No $_{DataCells}$)

Cells $_{86}$:= stack(XXX, XXXS)

No $_{DataCells}$:= length(Cells $_{86}$)

No $_{DataCells}$ = 96

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench17-3.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 0.964 & 1.105 & 1.083 & 1.011 & 1.047 & 1.016 & 1.028 \\ 1.063 & 1.012 & 1.029 & 1.047 & 1.056 & 0.972 & 0.907 \\ 1.021 & 1.097 & 1.071 & 1.068 & 1.033 & 0.911 & 0.952 \\ 1.066 & 1.023 & 1.006 & 1.063 & 1.045 & 1.035 & 0.992 \\ 1.052 & 1.037 & 1.044 & 1.078 & 1.05 & 1.054 & 1.051 \\ 1.037 & 1.015 & 1.026 & 1.064 & 1.07 & 1.056 & 1.044 \\ 1.065 & 1.059 & 1.026 & 1.058 & 1.047 & 1.067 & 1.075 \end{bmatrix}$$

$$XXX := convert(Points_{49}, 7) \qquad No_{DataCells} := length(XXX)$$

$$XXX := deletezero_{cells}(XXX, No_{DataCells})$$

$$Cells_{86} := stack(Cells_{86}, XXX) \qquad No_{DataCells} := length(Cells_{86})$$

$$No_{DataCells} = 145$$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench17-4.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 1.088 & 1.046 & 1.019 & 1.103 & 0.993 & 1.086 & 1.041 \\ 1.056 & 1.045 & 0.995 & 1.044 & 1.042 & 1.026 & 1.116 \\ 1.102 & 1.001 & 1.044 & 1.082 & 1.028 & 1 & 1.08 \\ 1.106 & 1.05 & 1.002 & 1.017 & 1.042 & 1.034 & 1.037 \\ 1.069 & 0.965 & 0.988 & 1.122 & 1.034 & 1.032 & 1.07 \\ 1.097 & 1.028 & 1.051 & 0.951 & 1.059 & 1.015 & 1.005 \\ 1.135 & 1.022 & 1.076 & 1.058 & 0.952 & 0.981 & 1.023 \end{bmatrix}$$

$$XXX := convert(Points_{49}, 7) \qquad No_{DataCells} := length(XXX)$$

$$XXX := deletezero_{cells}(XXX, No_{DataCells})$$

$$Cells_{86} := stack(Cells_{86}, XXX) \qquad No_{DataCells} := length(Cells_{86})$$

$$No_{DataCells} = 194$$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench17-5.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 1.023 & 1.049 & 0.987 & 1.085 & 1.048 & 1.072 & 0.98 \\ 1.1 & 1.017 & 0.958 & 1.044 & 0.991 & 1.056 & 1.074 \\ 1.053 & 1.03 & 1.025 & 0.987 & 1.031 & 1.059 & 1.087 \\ 1.005 & 1.049 & 1.006 & 1.058 & 1.058 & 1.011 & 0.992 \\ 0.972 & 0.985 & 1.012 & 1.009 & 1.067 & 1.017 & 0.975 \\ 0.985 & 0.979 & 0.974 & 0.961 & 1.017 & 1.008 & 0.982 \\ 0.999 & 0.987 & 1.021 & 0.958 & 0.954 & 1.064 & 0.942 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{86} := stack(Cells_{86}, XXX)$ $No_{DataCells} := length(Cells_{86})$ $No_{DataCells} = 243$

page := READPRN("H:\MSOFFICE\Drywell Program data\1986 trenches\Trench17-6.txt")

$Points_{49} := showcells(page, 7, 0)$

$$Points_{49} = \begin{bmatrix} 0.923 & 0.981 & 0.976 & 0.97 & 0.964 & 0.99 & 1.004 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{86} := stack(Cells_{86}, XXX)$

$No_{DataCells} := length(Cells_{86})$

$No_{DataCells} = 250$

The thinnest point at this location is shown below

$minpoint := min(Cells_{86})$ $minpoint = 889$

Mean and Standard Deviation

$$\mu 86_{actual} := mean(Cells_{86}) \qquad \mu 86_{actual} = 1.0239 \cdot 10^{3} \qquad \sigma 86_{actual} := Stdev(Cells_{86}) \qquad \sigma 86_{actual} = 45.019$$

Standard Error

$$Standard_{error} := \frac{\sigma 86_{actual}}{\sqrt{No_{DataCells}}} \qquad Standard_{error} = 2.847$$

Skewness

$$Skewness := \frac{(No_{DataCells}) \cdot \overrightarrow{\Sigma(Cells_{86} - \mu 86_{actual})^{3}}}{(No_{DataCells} - 1) \cdot (No_{DataCells} - 2) \cdot (\sigma 86_{actual})^{3}} \qquad Skewness = -0.387$$

Kurtosis

$$Kurtosis := \frac{No_{DataCells} \cdot (No_{DataCells} + 1) \cdot \overrightarrow{\Sigma(Cells_{86} - \mu 86_{actual})^{4}}}{(No_{DataCells} - 1) \cdot (No_{DataCells} - 2) \cdot (No_{DataCells} - 3) \cdot (\sigma 86_{actual})^{4}} \ldots + - \frac{3 \cdot (No_{DataCells} - 1)^{2}}{(No_{DataCells} - 2) \cdot (No_{DataCells} - 3)} \qquad Kurtosis = -0.033$$

Normal Probability Plot

In a normal plot, each data value is plotted against what its value would be if it actually came from a normal distribution. The expected normal values, called normal scores, and can be estimated by first calculating the rank scores of the sorted data.

$$j := 0 .. \text{last}(\text{Cells}_{86}) \qquad \text{srt} := \text{sort}(\text{Cells}_{86})$$

Then each data point is ranked. The array rank captures these ranks

$$r_j := j + 1 \qquad \text{rank}_j := \frac{\overrightarrow{\Sigma\left(\overrightarrow{\text{srt} = \text{srt}_j}\right) \cdot r}}{\overrightarrow{\Sigma \text{srt} = \text{srt}_j}}$$

=

$$p_j := \frac{\text{rank}_j}{\text{rows}(\text{Cells}_{86}) + 1}$$

The normal scores are the corresponding ***p***th percentile points from the standard normal distribution:

$$x := 1 \qquad \text{N\_Score}_j := \text{root}\left[\text{cnorm}(x) - (p_j), x\right]$$

Upper and Lower Confidence Values

The Upper and Lower confidence values are calculated based on .05 degree of confidence "α"

$$\text{No}_{\text{DataCells}} := \text{length}(\text{Cells}_{86})$$

$$\alpha := .05 \qquad T\alpha := qt\left[\left(1 - \frac{\alpha}{2}\right), \text{No}_{\text{DataCells}}\right] \qquad T\alpha = 1.969$$

$$\text{Lower}_{95\%\text{Con}} := \mu 86_{\text{actual}} - T\alpha \cdot \frac{\sigma 86_{\text{actual}}}{\sqrt{\text{No}_{\text{DataCells}}}} \qquad \text{Lower}_{95\%\text{Con}} = 1.018 \cdot 10^3$$

$$\text{Upper}_{95\%\text{Con}} := \mu 86_{\text{actual}} + T\alpha \cdot \frac{\sigma 86_{\text{actual}}}{\sqrt{\text{No}_{\text{DataCells}}}} \qquad \text{Upper}_{95\%\text{Con}} = 1.029 \cdot 10^3$$

These values represent a range on the calculated mean in which there is 95% confidence.

Graphical Representation

Distribution of the "Cells" data points are sorted in 1/2 standard deviation increments (bins) within +/- 3 standard deviations

$$\text{Bins} := \text{Make}_{\text{bins}}(\mu 86_{\text{actual}}, \sigma 86_{\text{actual}})$$

$$\text{Distribution} := \text{hist}(\text{Bins}, \text{Cells}_{86})$$

$$\text{Distribution} = \begin{matrix} 4 \\ 5 \\ 13 \\ 17 \\ 30 \\ 47 \\ 50 \\ 44 \\ 28 \\ 9 \\ 3 \\ 0 \end{matrix}$$

The mid points of the Bins are calculated

$$k := 0 .. 11 \qquad \text{Midpoints}_k := \frac{(\text{Bins}_k + \text{Bins}_{k+1})}{2}$$

The Mathcad function pnorm calculates a portion of normal distribution curve based on a given mean and standard deviation

$$\text{normal}_{\text{curve}_0} := \text{pnorm}(\text{Bins}_1, \mu 86_{\text{actual}}, \sigma 86_{\text{actual}})$$

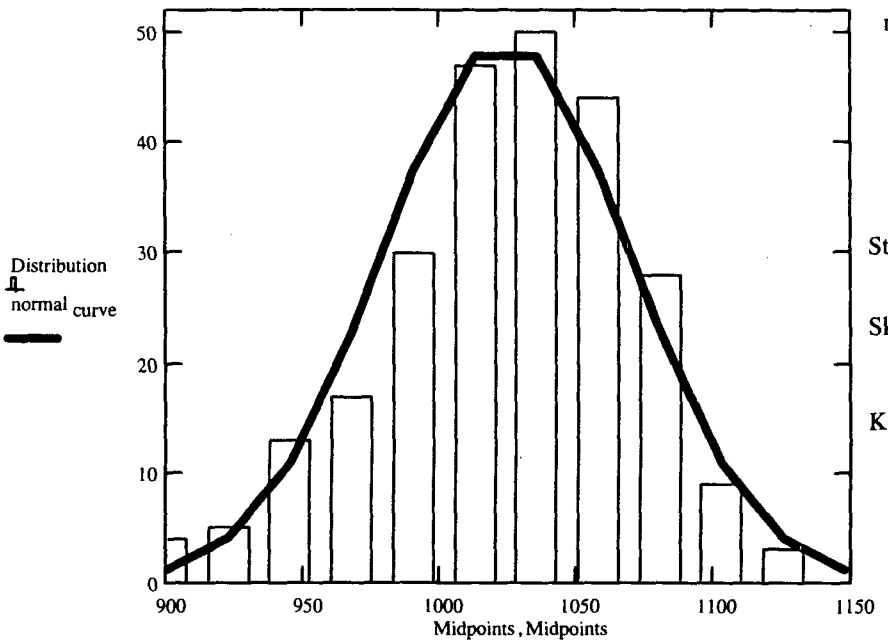
$$\text{normal}_{\text{curve}_k} := \text{pnorm}(\text{Bins}_{k+1}, \mu 86_{\text{actual}}, \sigma 86_{\text{actual}}) - \text{pnorm}(\text{Bins}_k, \mu 86_{\text{actual}}, \sigma 86_{\text{actual}})$$

$$\text{normal}_{\text{curve}} := \text{No}_{\text{DataCells}} \cdot \text{normal}_{\text{curve}}$$

Results For Elevation Sandbed elevation Locatiobn Oct. 2006

The following schematic shows: the the distribution of the samples, the normal curve based on the actual mean and standard deviation, the kurtosis, the skewness, the number of data points, and the the lower and upper 95% confidence values. Below is the Normal Plot for the data.

Data Distribution

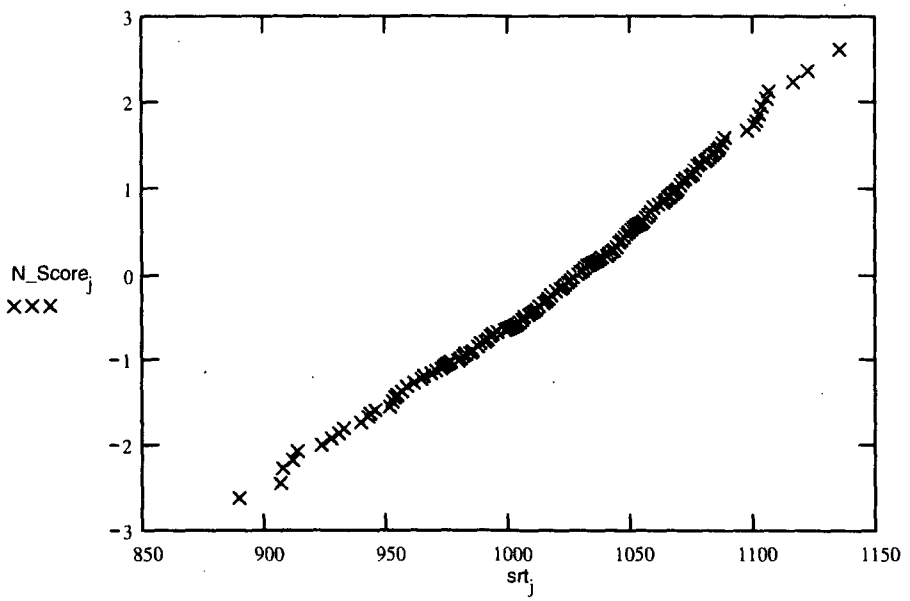


$\text{Lower}_{95\%\text{Con}} = 1.018 \cdot 10^3$ $\text{Upper}_{95\%\text{Con}} = 1.029 \cdot 10^3$

$\mu 86_{\text{actual}} = 1.024 \cdot 10^3$ $\sigma 86_{\text{actual}} = 45.019$ minpoint = 889

A Kurtosis value which is less than +/- 1.0 and approaches 0 is indicative of a normal distrubution

Normal Probability Plot



The Normal Probability Plot and the Kurtosis this data is normally distributed.

A Normal Probability Plot which approaches a straight line is indicative of a normal distrubution

Appendix LATER - Sand Bed Elevation ALL

OCT 2006 Data

The data shown below was collected in 1986 in the trench in Bay 17

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench17-1.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 0.963 & 0.972 & 0.877 & 0.835 & 0.891 & 0.831 & 0.894 \\ 0.897 & 0.937 & 0.903 & 0.893 & 0.838 & 0.781 & 0.841 \\ 0.855 & 0.884 & 0.853 & 0.85 & 0.84 & 0.814 & 0.788 \\ 0.802 & 0.891 & 0.838 & 0.79 & 1.082 & 0 & 0.809 \\ 0.746 & 0.795 & 0.776 & 0.822 & 0.757 & 1.042 & 0.794 \\ 0.702 & 0.779 & 0.811 & 0.835 & 0.723 & 0.738 & 0.837 \\ 0.726 & 0.825 & 0.878 & 0.868 & 0 & 0.864 & 0.954 \end{bmatrix}$$

$$XXXS := convert(Points_{49}, 7)$$

$$No_{DataCells} := length(XXXS)$$

$$XXXS := deletezero_{cells}(XXXS, No_{DataCells})$$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench17-2.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 0.997 & 1.023 & 1.06 & 1.015 & 0.964 & 0.995 & 0.997 \\ 1.061 & 0.958 & 1.022 & 1.044 & 0.991 & 0.99 & 1.001 \\ 1.008 & 1.021 & 1.01 & 1.01 & 1.003 & 0.959 & 0.963 \\ 0.988 & 0.991 & 0.961 & 0.94 & 1.029 & 0.979 & 0.929 \\ 1.005 & 1.014 & 1.003 & 0.896 & 0.944 & 1.013 & 0.885 \\ 0.99 & 0.976 & 0.962 & 0.909 & 0.905 & 0.863 & 0.923 \\ 0.954 & 0.954 & 0 & 0.885 & 0.887 & 0.877 & 0.93 \end{bmatrix}$$

$$XXX := convert(Points_{49}, 7)$$

$$No_{DataCells} := length(XXX)$$

$$XXX := deletezero_{cells}(XXX, No_{DataCells})$$

$$Cells_{06} := stack(XXX, XXXS)$$

$$No_{DataCells} := length(Cells_{06})$$

$$No_{DataCells} = 95$$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench17-3.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 0.973 & 0.954 & 1.004 & 1.013 & 1.011 & 1.043 & 0.948 \\ 0.998 & 0.952 & 1.007 & 1 & 0.963 & 1.006 & 0.951 \\ 0 & 0.978 & 0.979 & 0.935 & 1.014 & 0.981 & 1.015 \\ 1.017 & 1.074 & 0.968 & 0.963 & 0.966 & 1.014 & 1.03 \\ 1.038 & 1.053 & 1.026 & 1.008 & 0.983 & 0.979 & 1.039 \\ 0.968 & 1.028 & 0.998 & 1.017 & 1.004 & 1.03 & 1.046 \\ 1.028 & 0.95 & 1.047 & 1 & 0.977 & 1.002 & 1.01 \end{bmatrix}$$

$$XXX := convert(Points_{49}, 7) \qquad No_{DataCells} := length(XXX)$$

$$XXX := deletezero_{cells}(XXX, No_{DataCells})$$

$$Cells_{06} := stack(Cells_{06}, XXX)$$

$$No_{DataCells} := length(Cells_{06})$$

$$No_{DataCells} = 143$$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench17-4.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 0.966 & 1.069 & 1.014 & 1.055 & 0.995 & 1.002 & 1.029 \\ 0.987 & 0.983 & 0.942 & 0.941 & 1.01 & 1.023 & 1.016 \\ 1.034 & 1.008 & 0.971 & 1.064 & 0.985 & 1.022 & 1.032 \\ 0.972 & 1.021 & 0.985 & 0.992 & 1.003 & 0.997 & 1.008 \\ 0.975 & 0.951 & 0.985 & 1.059 & 1.047 & 0.935 & 0.98 \\ 0.94 & 0.967 & 0.895 & 1.02 & 1.044 & 1.075 & 0.98 \\ 0.918 & 0.897 & 0.934 & 1.036 & 1.058 & 0.998 & 1.009 \end{bmatrix}$$

$$XXX := convert(Points_{49}, 7) \qquad No_{DataCells} := length(XXX)$$

$$XXX := deletezero_{cells}(XXX, No_{DataCells})$$

$$Cells_{06} := stack(Cells_{06}, XXX)$$

$$No_{DataCells} := length(Cells_{06})$$

$$No_{DataCells} = 192$$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench17-5.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 1.026 & 0.958 & 0.958 & 1.026 & 0.982 & 0.988 & 0.967 \\ 1.026 & 0.906 & 0.915 & 0.991 & 1.006 & 0.984 & 0.962 \\ 0.979 & 0.933 & 1.027 & 0.934 & 0.969 & 0.956 & 1.042 \\ 0.963 & 1.003 & 1.016 & 1.062 & 0.969 & 0.987 & 1.03 \\ 1.027 & 0.977 & 1.039 & 0.999 & 0.998 & 1.027 & 1.039 \\ 1.023 & 1.001 & 0.959 & 0.997 & 0.974 & 1.003 & 1.09 \\ 0.986 & 1.004 & 1.009 & 0.946 & 1.016 & 1.023 & 0.995 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $\quad No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{06} := stack(Cells_{06}, XXX)$ $\quad No_{DataCells} := length(Cells_{06})$

$No_{DataCells} = 241$

page := READPRN("H:\MSOFFICE\Drywell Program data\2006 trenchs\Trench17-6.txt")

$$Points_{49} := showcells(page, 7, 0)$$

$$Points_{49} = \begin{bmatrix} 0.937 & 0.97 & 0.927 & 0.946 & 0.932 & 0.918 & 0.942 \\ 0.924 & 1.059 & 0.934 & 0.941 & 0.968 & 0.924 & 0.916 \\ 0.948 & 0.948 & 0.963 & 0.941 & 0.932 & 0.937 & 0.967 \\ 0.977 & 0.983 & 1.032 & 0.982 & 0.983 & 0.997 & 0.953 \\ 0.972 & 0.932 & 0.977 & 0.973 & 1.005 & 0.959 & 1.028 \\ 1.026 & 1.002 & 0.968 & 0.972 & 0.953 & 0.964 & 0.99 \\ 0.981 & 1.006 & 0.967 & 0.945 & 0.968 & 0.943 & 0.978 \end{bmatrix}$$

$XXX := convert(Points_{49}, 7)$ $\quad No_{DataCells} := length(XXX)$

$XXX := deletezero_{cells}(XXX, No_{DataCells})$

$Cells_{06} := stack(Cells_{06}, XXX)$ $\quad No_{DataCells} := length(Cells_{06})$ $\quad No_{DataCells} = 290$

$minpoint := min(XXX)$ $\quad minpoint = 916$

The thinnest point at this location is shown below

$minpoint := min(Cells_{06})$ $\quad minpoint = 702$

Mean and Standard Deviation

$\mu 06_{actual} := mean(Cells_{06})$ $\mu 06_{actual} = 962.7897$ $\sigma 86_{actual} := Stdev(Cells_{06})$ $\sigma 86_{actual} = 71.259$

Standard Error

$$Standard_{error} := \frac{\sigma 86_{actual}}{\sqrt{No\ DataCells}}$$ $Standard_{error} = 4.184$

Skewness

$$Skewness := \frac{(No\ DataCells) \cdot \overrightarrow{\Sigma(Cells_{06} - \mu 06_{actual})^3}}{(No\ DataCells - 1) \cdot (No\ DataCells - 2) \cdot (\sigma 86_{actual})^3}$$ $Skewness = -1.252$

Kurtosis

$$Kurtosis := \frac{No\ DataCells \cdot (No\ DataCells + 1) \cdot \overrightarrow{\Sigma(Cells_{06} - \mu 06_{actual})^4}}{(No\ DataCells - 1) \cdot (No\ DataCells - 2) \cdot (No\ DataCells - 3) \cdot (\sigma 86_{actual})^4} \cdots + - \frac{3 \cdot (No\ DataCells - 1)^2}{(No\ DataCells - 2) \cdot (No\ DataCells - 3)}$$ $Kurtosis = 1.587$

Normal Probability Plot

In a normal plot, each data value is plotted against what its value would be if it actually came from a normal distribution. The expected normal values, called normal scores, and can be estimated by first calculating the rank scores of the sorted data.

$$j := 0 .. \text{last}(\text{Cells}_{06}) \qquad \text{srt} := \text{sort}(\text{Cells}_{06})$$

Then each data point is ranked. The array rank captures these ranks

$$z_j := j + 1$$

$$\text{rank}_j := \frac{\overrightarrow{\Sigma\left(\overrightarrow{\text{srt} = \text{srt}_j}\right) \cdot z}}{\overrightarrow{\Sigma \text{srt} = \text{srt}_j}}$$

$$p_j := \frac{\text{rank}_j}{\text{rows}(\text{Cells}_{06}) + 1}$$

The normal scores are the corresponding ***p***th percentile points from the standard normal distribution:

$$x := 1 \qquad \text{N\_Score}_j := \text{root}\left[\text{cnorm}(x) - \left(p_j\right), x\right]$$

Upper and Lower Confidence Values

The Upper and Lower confidence values are calculated based on .05 degree of confidence "α"

$$\text{No}_{\text{DataCells}} := \text{length}(\text{Cells}_{06})$$

$$\alpha := .05 \qquad T\alpha := qt\left[\left(1 - \frac{\alpha}{2}\right), \text{No}_{\text{DataCells}}\right] \qquad T\alpha = 1.968$$

$$\text{Lower}_{95\%\text{Con}} := \mu 06_{\text{actual}} - T\alpha \cdot \frac{\sigma 86_{\text{actual}}}{\sqrt{\text{No}_{\text{DataCells}}}} \qquad \text{Lower}_{95\%\text{Con}} = 954.554$$

$$\text{Upper}_{95\%\text{Con}} := \mu 06_{\text{actual}} + T\alpha \cdot \frac{\sigma 86_{\text{actual}}}{\sqrt{\text{No}_{\text{DataCells}}}} \qquad \text{Upper}_{95\%\text{Con}} = 971.025$$

These values represent a range on the calculated mean in which there is 95% confidence.

Graphical Representation

Distribution of the "Cells" data points are sorted in 1/2 standard deviation increments (bins) within +/- 3 standard deviations

$$\text{Bins} := \text{Make}_{\text{bins}}(\mu 06_{\text{actual}}, \sigma 86_{\text{actual}})$$

$$\text{Distribution} := \text{hist}(\text{Bins}, \text{Cells}_{06})$$

$$\text{Distribution} = \begin{matrix} 4 \\ 8 \\ 13 \\ 12 \\ 18 \\ 49 \\ 80 \\ 74 \\ 23 \\ 4 \\ 0 \\ 0 \end{matrix}$$

The mid points of the Bins are calculated

$$k := 0 .. 11 \qquad \text{Midpoints}_k := \frac{(\text{Bins}_k + \text{Bins}_{k+1})}{2}$$

The Mathcad function pnorm calculates a portion of normal distribution curve based on a given mean and standard deviation

$$\text{normal}_{\text{curve}_0} := \text{pnorm}(\text{Bins}_1, \mu 06_{\text{actual}}, \sigma 86_{\text{actual}})$$

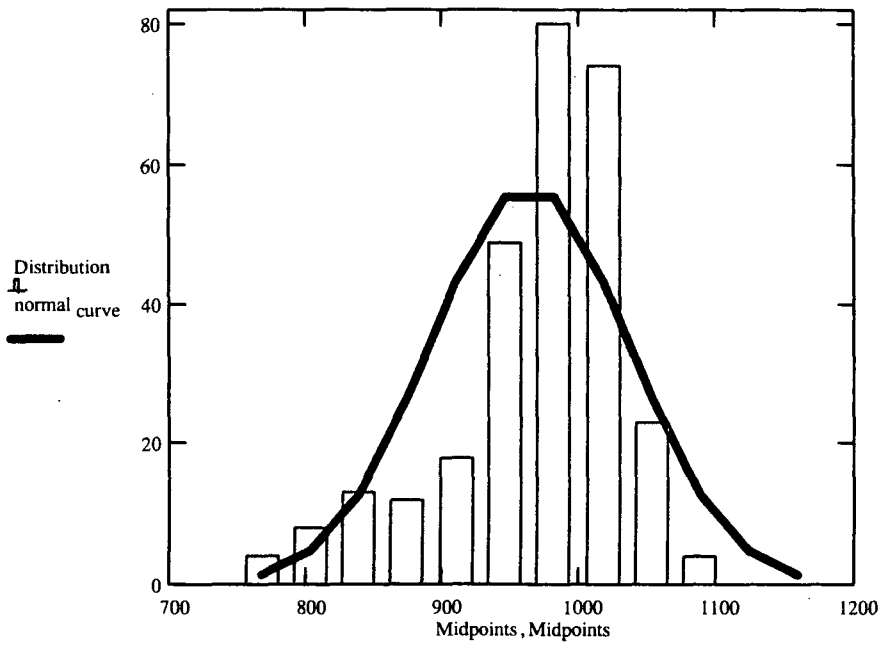
$$\text{normal}_{\text{curve}_k} := \text{pnorm}(\text{Bins}_{k+1}, \mu 06_{\text{actual}}, \sigma 86_{\text{actual}}) - \text{pnorm}(\text{Bins}_k, \mu 06_{\text{actual}}, \sigma 86_{\text{actual}})$$

$$\text{normal}_{\text{curve}} := \text{No}_{\text{DataCells}} \cdot \text{normal}_{\text{curve}}$$

Results For Elevation Sandbed elevation Locatiobn Oct. 2006

The following schematic shows: the the distribution of the samples, the normal curve based on the actual mean and standard deviation, the kurtosis, the skewness, the number of data points, and the the lower and upper 95% confidence values. Below is the Normal Plot for the data.

Data Distribution



minpoint = 702

Standard $_{error}$ = 4.184

Skewness = −1.252

Kurtosis = 1.587

Lower $_{95\%Con}$ = 954.554

Upper $_{95\%Con}$ = 971.025

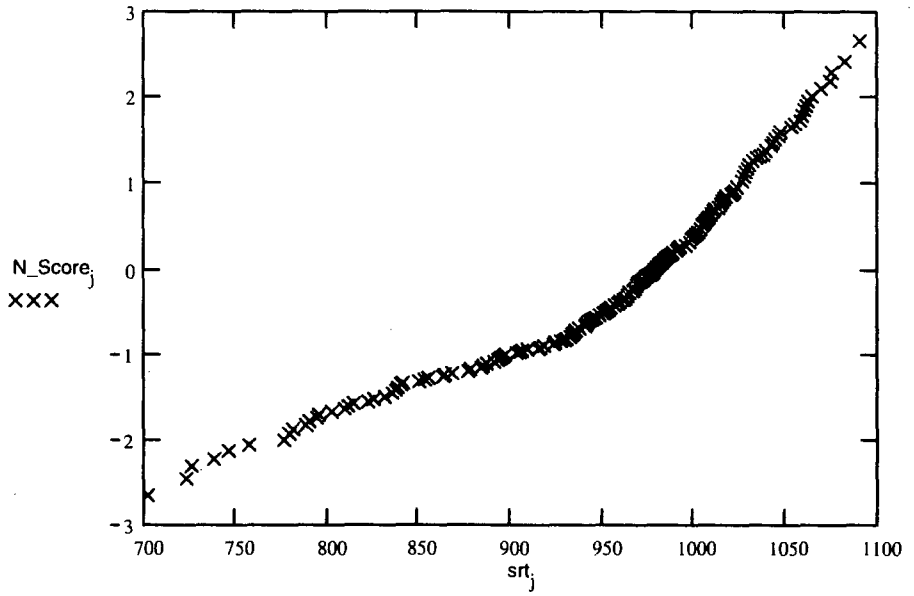
$\mu 06_{actual}$ = 962.79

$\sigma 86_{actual}$ = 71.259

minpoint = 702

A Kurtosis value which is less than +/- 1.0 and approaches 0 is indicative of a normal distrubution. Therefore this distribution may not be completely normal. Additional testing will be performed by the normal probability plot.

Normal Probability Plot



The Normal Probability Plot and the Kurtosis this data is normally distributed.

A Normal Probability Plot which approaches a straight line is indicative of a normal distrubution. Based on review of this plot it is concluded that the distribution is normal

Corrosion Rate assuming corrosion occured between 1986 and 2006

$$\frac{\left(\mu 86_{\text{actual}} - \mu 06_{\text{actual}}\right)}{2006 - 1986} = 3.054$$

Corrosion Rate assuming corrosion occured between 1986 and 1992

$$\frac{\left(\mu 86_{\text{actual}} - \mu 06_{\text{actual}}\right)}{1992 - 1986} = 10.18$$

1R21LR-022
Pg 1 of 2

General Electric	**Ultrasonic Thickness Measurement Data Sheet**	File Name:	N/A
Oyster Creek		Date:	10/22/2006
Refueling Outage - 1R21		UT Procedure:	ER-AA-335-004
Page 1 of 2		Specification	IS-328227-004

Examiner: Leslie Richter		Level:	II	Instrument Type:	Panametrics 37DL Plus		
Examiner: N/A		Level:	N/A	Instrument No:	031124909		
Transducer Type: D795	Serial #: 104012	Size:	0.200"	Freq:	5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics Length: 5'		Couplant: Soundsafe		Batch No:	19620		
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-080					

SYSTEM CALIBRATION

INSTRUMENT SETTINGS						
Coarse Range:	5.0"	Initial Cal. Time: 11:59	Calibration Checks: 13:00	13:30	Final Cal. Time: 14:30	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"	Inches to 1.500" Inches			
Delay Calib:	N/A	Thermometer: 246647	Comp. Temp: 82°		Block Temp: 79°	
Range Calib:	N/A	W/O Number: ~~R2086926~~ C2013477	Drywell Containment Vessel Thickness Examination. External UT Inspections.			
Instrument Freq.	N/A	Total Crew Dose 7 mr	mm 10-22-06			
Gain:	74 db					
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 1

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 1 OF 2
E09 PT

BAY	Point Number		Vertical Location			Horizonal Location			

See Attached for Locations and Thickness Readings

COMMENTS: Coated surface is rough at all reading points. Unable to slide off of best measurement spot. Plot measurement numbers are more accurate if measuring tape is placed 13" to the right from the center of the weld on the nozzle, then follow down passing through point # 8.

[signature] L III 10-22-06

Reviewed by: Lee Stone [signature] Level II Date 10/22/2006

BAY 1

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D16	R27	0.720	0.710	
	2	D22	R17	0.716	0.690	
	3	D23	L3	0.705	0.665	
	4	D24	L33	0.760	0.738	Very Rough Surface
	5	D24	L45	0.710	0.680	
	6	D48	R19	0.760	0.731	
	7	D39	R7	0.700	0.669	
	8	D48	R0	0.805	0.783	
	9	D36	L38	0.805	0.754	
	10	D16	R23	0.839	0.824	
	11	D23	R12	0.714	0.711	
	12	D24	L5	0.724	0.722	
	13	D24	L40	0.792	0.719	
	14	D2	R35	1.147	1.157	
	15	D8	L51	1.156	1.160	
	16	D50	R40	0.796	0.795	
	17	D40	R16	0.860	0.846	
	18	D38	L2	0.917	0.899	
	19	D38	L24	0.890	0.865	
	20	D18	R13	0.965	0.912	
	21	D24	R15	0.726	0.712	
	22	D32	R13	0.852	0.854	
	23	D48	R15	0.850	0.828	

Data obtained from
NDE Data Sheets 92-072-12 page 1 of 1
NDE Data Sheets 92-072-18 page 1 of 1
NDE Data Sheets 92-072-19 page 1 of 1
All horizonal measurements taken 13" to the right of the centerline of the reinforcement ring (Boss).
All vertical measurements taken from bottom of vent nozzle at the 13" reference line.
Surface roughness prohibited characterization of all readings.

Note: Per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.

10-22-06

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 2 OF 2

IR 21LR-022
PG 2 OF 2
MMC & IA 10-22-06

General Electric		Ultrasonic Thickness Measurement Data Sheet	File Name:	N/A
Oyster Creek			Date:	10/20/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 1 of	2		Specification	IS-328227-004

Examiner: Scott Erickson *Scott R. Erickson*			Level: II		Instrument Type:	Panametrics 37DL Plus		
Examiner: N/A			Level: N/A		Instrument No:	031120708		
Transducer Type: D7908	Serial #: 338302		Size: 0.200"		Freq: 7.5 Mhz		Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'		Couplant	Soundsafe		Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-136						

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	2.0"	22:05	N/A	N/A	23:50	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500" Inches to 1.500" Inches				
Delay Calib:	N/A	Thermometer: 246647		Comp. Temp: 78°	Block Temp: 75°	
Range Calib:	N/A	W/O Number:	C2013477			
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination. External UT Inspections.			
Gain:	54 db	1 mr				
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 3

BAY	Point Number		Vertical Location			Horizonal Location			Thickness Reading
			See Attached for Locations and Thickness Readings						

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 3 OF 23

COMMENTS: N/A

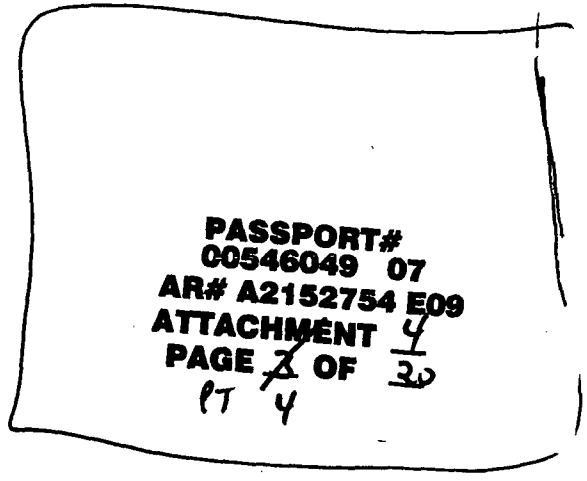
[signature] L III 10-22-06

Reviewed by: Lee Stone *[signature]* Level II Date 10/19/2006

BAY 3

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D16	R63	0.795	0.795	N/A
	2	D18	R48	1	0.999	
	3	D17	R33	0.857	0.850	
	4	D13	L5	0.898	0.903	
	5	D25	L8	0.823	0.819	
	6	D15	L56	0.968	0.972	
	7	D29	R4	0.826	0.816	
	8	D34	L4	0.78	0.764	

Data obtained from
NDE Data Sheets 92-072-14 page 1 of 1
Note: Per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.



IR21LR-0012 Pg 2 of 2
MM' L III 10-22-06

REPORT # 1R21LR-019
PG 1 OF 2

General Electric	**Ultrasonic Thickness Measurement Data Sheet**			File Name:	N/A
Oyster Creek				Date:	10/20/2006
Refueling Outage - 1R21				UT Procedure:	ER-AA-335-004
Page 1 of 2				Specification	IS-328227-004

Examiner: Leslie Richter		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031124909	
Transducer Type: D795	Serial #: 104012	Size: 0.200"	Freq: 5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-136			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	15:38	15:51	16:45	17:28	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246647		Comp. Temp: 82°	Block Temp:	76°
Range Calib:	N/A	W/O Number:	C2013477			
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination. External UT Inspections.			
Gain:	72 db	2 mr				
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 5

BAY	Point Number		Vertical Location			Horizonal Location			Thickness Reading
		See Attached for Locations and Thickness Readings							

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 5 OF 20

COMMENTS: N/A

mm ahl LIII 10-22-06

Reviewed by: Scott Erickson Scott R Erickson Level II Date 10/19/2006

IR3LR-019 Pg 2 of 2
MM 10-22-06

PASSPORT#
0054604 9 07
AR# A2152754 E09
ATTACHMENT V
PAGE 6 OF 30

BAY 5

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
*	1	D38	R12	0.97	0.948	up .97 dn .97
*	2	D38	R7	1.04	0.955	Rough surface - up .99 dn .99
*	3	D42	R10	1.02	0.989	up 1.0 dn 1.04
*	4	D41	L7	0.97	0.948	Rough surface, also dished
*	5	D42	L11	0.89	0.88	Rough surface
**	6	D47	R5	1.06	0.981	up 1.018 dn 1.014
**	7	D48	L18	0.99	0.974	Rough surface left .99 right N/A
**	8	D46	L31	1.01	1.007	Rough surface

Note: up, dn, left & right readings were taken 1/8" from recorded 2006 value reading.
Rough surface limited taking additional readings. Reference above.
* =Vertical and horizontal measurements taken from top of coating on long seam 62" to right
** =Vertical and horizontal measurements taken from bottom of nozzle at 6 o'clock position
Reference NDE Data Sheets 92-072-16 page 1 of 1

1 - Reference off the weld 62" to the right of the centerline of the bay.
2 The original data sheet is not clear as to whether this point is to the right or left of the weld.
Therefore NDE shall verify this dimension.

Note: per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.

10-20-06

General Electric	**Ultrasonic Thickness Measurement Data Sheet**	File Name:	N/A
Oyster Creek		Date:	10/19/2006
Refueling Outage - 1R21		UT Procedure:	ER-AA-335-004
Page 1 of 2		Specification	IS-328227-004 *

Examiner: Lee Stone		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031124909	
Transducer Type: D795	Serial #: 1103007	Size: 0.200"	Freq: 5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-109			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	14:20	N/A	N/A	15:10	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246737		Comp. Temp: 72°	Block Temp: 74°	
Range Calib:	N/A	W/O Number:	C2013477			
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination.			
Gain:	67 db	12 mr	External UT Inspections.			
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 7

BAY	Point Number	Vertical Location	Horizonal Location	Thickness Reading
		See Attached for Locations and Thickness Readings		

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 2 OF 20

COMMENTS: ~~N/A~~

* INSPECTION PERFORMED IAW ENGINEERING DIRECTION REF. REV 14 DRAFT. MK 10-22-06

MK Mikhail LIII 10-22-06

Reviewed by: Kimberly Wert Kimberly Wert Level II Date 10/19/2006

BAY 7

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D21	R39	0.92	N/A	Could not locate area
	2	D21	R32	1.016	N/A	Could not locate area
	3	D10	R20	0.984	0.964	up/dn ranged from 0.956 to 0.980
	4	D10	R10	1.04	1.04	N/A
	5	D21	L6	1.03	1.003	up/dn ranged from 1.000 to 1.049
	6	D10	L23	1.045	1.023	up/dn ranged from 1.020 to 1.052
	7	D21	L12	1	1.003	up/dn ranged from 1.002 to 1.026

Data obtained from
NDE Data Sheets 92-072-20 page 1 of 1
Note: up, dn readings were taken 1/8" from recorded 2006 value reading.

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 8 OF 20

10-19-2006

IR2LR-005 Pg 2 of 2
10-24-06

General Electric		**Ultrasonic Thickness Measurement Data Sheet**		File Name:	N/A
Oyster Creek				Date:	10/19/2006
Refueling Outage -	1R21			UT Procedure:	ER-AA-335-004
Page 1 of	2			Specification	IS-328227-004

Examiner: Scott Erickson Scott R. Erickson		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031120708	
Transducer Type: D7908	Serial #: 338302	Size: 0.200"	Freq: 7.5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-080			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	2.0"	22:05	N/A	N/A	23:50	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246737		Comp. Temp: 74°	Block Temp:	72°
Range Calib:	N/A	W/O Number: C2013477				
Instrument Freq.	N/A	Total Crew Dose 6 mr	Drywell Containment Vessel Thickness Examination. External UT Inspections.			
Gain:	61 db					
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 9

BAY	Point Number		Vertical Location			Horizonal Location			Thickness Reading
		See Attached for Locations and Thickness Readings							

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 4 OF 22

COMMENTS: N/A

mm Walsh L III 10-22-06

Reviewed by: Lee Stone Lee Stone Level II Date 10/19/2006

BAY 9

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D29	R32	0.96	0.968	N/A
	2	D18	R17	0.94	0.934	
	3	D20	R8	0.994	0.989	
	4	D27	R15	1.02	1.016	
	5	D35	L5	0.985	0.964	
	6	D13	L30	0.82	0.802	
	7	D16	L35	0.825	0.82	
	8	D21	L38	0.791	0.781	
	9	D20	L53	0.832	0.823	
	10	D30	L8	0.98	0.955	

Data obtained from
NDE Data Sheets 92-072-22 page 1 of 1

Note: per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 10 OF 20

IR21LR-006 Pg 2 of 2
24M'L III
10-22-06

1R21CR-008 Pg 1 of 2

GMM 10-22-06

General Electric	**Ultrasonic Thickness Measurement Data Sheet**	File Name:	N/A
Oyster Creek		Date:	10/20/2006
Refueling Outage - 1R21		UT Procedure:	ER-AA-335-004
Page 1 of 2		Specification	IS-328227-004

Examiner: Graham McNabb			Level: II	Instrument Type:		Panametrics 37DL Plus	
Examiner: N/A			Level: N/A	Instrument No:		031124909	
Transducer Type: D795	Serial #: 104010		Size: 0.200"	Freq: 5 Mhz		Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe			Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-080					

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	2:15	N/A	N/A	5:15	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to	1.500"	Inches
Delay Calib:	N/A	Thermometer:	246534	Comp. Temp:	74°	Block Temp: 72°
Range Calib:	N/A	W/O Number:	C2013477			
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination.			
Gain:	58 db	6 mr	External UT Inspections.			
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 11

BAY	Point Number	Vertical Location	Horizonal Location	Thickness Reading
		See Attached for Locations and Thickness Readings		

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT #2
PAGE 1 OF 2

COMMENTS: N/A

GMM acted 1 & III 10-22-06

Reviewed by: Scott Erickson Scott R. Erickson Level II Date 10/20/2006

BAY 11

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D20	R29	0.705	0.700	N/A
	2	D25	R32	0.77	0.760	
	3	D21	L4	0.832	0.830	
	4	D24	L6	0.755	0.751	
	5	D32	L14	0.831	0.823	
	6	D27	L22	0.8	0.756	
	7	D31	R20	0.831	0.817	
	8	D40	R13	0.85	0.825	

Data obtained from
NDE Data Sheets 92-072-10 page 1 of 1
Note: per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.

MMC L III 10-22-06

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 12 OF 22

IR21LR-008 Pg 20 of 22

General Electric		**Ultrasonic Thickness Measurement Data Sheet**	File Name:	N/A
Oyster Creek			Date:	10/19/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 1 of	2		Specification	IS-328227-004

Examiner: Scott Erickson Scott R. Erickson		Level: II	Instrument Type:	Panametrics 37DL Plus		
Examiner: N/A		Level: N/A	Instrument No:	031120708		
Transducer Type: D799	Serial #: 104044	Size: 0.312"	Freq: 5 Mhz	Angle: 0°		
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe		Batch No:	04120B	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-109				

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	3:00	N/A	N/A	4:15	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246737		Comp. Temp: 72°	Block Temp:	70°
Range Calib:	N/A	W/O Number:	C2013477			
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination.			
Gain:	51 db	0 mr	External UT Inspections.			
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 13

BAY	Point Number	Vertical Location		Horizonal Location		Thickness Reading
		See Attached for Locations and Thickness Readings				

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT V 12
PAGE 13 OF 22

COMMENTS: N/A

Reviewed by: Lee Stone Level II Date 10/19/2006

Level III 10-22-06

BAY 13

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	U1	R45	0.672	N/A	Could not locate area
	2	U1	R38	0.729	N/A	Could not locate area
	3	D21	R48	0.941	0.923	
	4	D12	R36	0.915	0.873	
	5	D21	R6	0.718	0.708	
	6	D24	L8	0.655	0.658	
	7	D17	L23	0.618	0.602	
	8	D24	L20	0.718	0.704	
	9	D28	R41	0.924	0.915	
	10	D28	R12	0.728	0.741	
	11	D28	L15	0.685	0.669	
	12	D28	L23	0.885	0.886	
	13	D18	D40	0.932	0.814	
	14	D18	R8	0.868	0.870	
	15	D20	L9	0.683	0.666	
	16	D20	L29	0.829	0.814	
	17	D9	R38	0.807	N/A	Could not locate area
	18	D22	R38	0.825	N/A	Could not locate area
	19	D37	R38	0.912	0.916	

5
8
8
19

Data obtained from
NDE Data Sheets 92-072-24 page 1 of 2
Note: per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 14 OF 20

10-22-06

IR2117R-00-PS 2 of 2

1R21LR-015 Pg 1 of 2

General Electric	**Ultrasonic Thickness Measurement Data Sheet**	File Name:	N/A
Oyster Creek		Date:	10/20/2006
Refueling Outage - 1R21		UT Procedure:	ER-AA-335-004
Page 1 of 2		Specification	IS-328227-004

Examiner: Matt Wilson (signature)	Level: II	Instrument Type:	Panametrics 37DL Plus
Examiner: N/A	Level: N/A	Instrument No:	031124709
Transducer Type: D795	Serial #: 1103008	Size: 0.200"	Freq: 5 Mhz / Angle: 0°
Transducer Cable Type: Panametrics Length: 5'	Couplant: Soundsafe	Batch No:	19620
Calibration Block Type: C/S Step Wedge	Block Number: CAL-STEP-088		

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	10:30	12:10	12:33	13:05	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500" Inches to 1.500" Inches				
Delay Calib:	N/A	Thermometer: 246484	Comp. Temp: 82°		Block Temp: 76°	
Range Calib:	N/A	W/O Number: C2013477				
Instrument Freq.	N/A	Total Crew Dose 2 mr	Drywell Containment Vessel Thickness Examination. External UT Inspections.			
Gain:	67 db					
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 15

BAY	Point Number		Vertical Location			Horizonal Location			Thickness Reading

See Attached for Locations and Thickness Readings

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 15 OF 32

COMMENTS: N/A

(signature) L III 10-22-06

Reviewed by: Lee Stone (signature) Level II Date 10/20/2006

BAY 15

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D12	R26	0.786	0.779	0.711 to 0.779
	2	D22	R21	0.829	0.798	0.777 to 0.798
	3	D33	R17	0.932	0.935	
	4	D30	R7	0.795	0.791	
	5	D26	L3	0.85	0.855	0.817 to 0.855
	6	D6	L8	0.794	0.787	0.715 to 0.787
	7	D26	L18	0.808	0.805	
	8	D20	L36	0.77	0.760	
	9	D36	L44	0.722	0.749	0.720 to 0.749
	10	D24	L48	0.86	0.852	0.837 to 0.852
	11	D24	L65	0.825	0.843	0.798 to 0.843

Data obtained from
NDE Data Sheets 92-072-21 page 1 of 1
Note: scanned 0.25" area around recorded 2006 value number - see comments for ranges.

KPART# 1R21LR-04 021
Pg. 1 OF 2

General Electric		Ultrasonic Thickness Measurement Data Sheet	File Name:	N/A
Oyster Creek			Date:	10/19/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 1 of	2		Specification	IS-328227-004

Examiner: Matt Wilson		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031124709	
Transducer Type: D795	Serial #: 104010	Size: 0.200"	Freq: 5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-088			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	15:36	N/A	N/A	17:18	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500" Inches		
Delay Calib:	N/A	Thermometer: 246534		Comp. Temp: 82°	Block Temp:	78°
Range Calib:	N/A	W/O Number:	C2013477			
Instrument Freq.	N/A	Total Crew Dose	Drywell Containment Vessel Thickness Examination.			
Gain:	67 db	2 mr	External UT Inspections.			
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 17

BAY	Point Number	Vertical Location	Horizonal Location	Thickness Reading
		See Attached for Locations and Thickness Readings		

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 1 OF 2

COMMENTS: N/A

10-22-06

Reviewed by: Scott Erickson Scott R Erickson Level II Date 10/19/2006

BAY 17

Note: measurement from vent pipe CL to floor 60"

	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D12	R50	0.916	0.909	
	2	D9	R40	1.150	0.681	up .705 dn .663
	3	D16	R26	0.898	0.894	
	4	D34	R24	0.951	0.963	
	5	D6	R20	0.913	0.822	
	6	D17	R7	0.992	0.909	
	7	D18	L14	0.970	0.970	
	8	D34	L46	0.990	0.960	
	9	D21	L29	0.720	0.970	
	10	D3	L2	0.830	0.844	
	11	N/A	N/A	N/A	N/A	

Note: Down measurements taken from bottom of boss which is 18" below vent line.
Locations 8,9, & 3 look to be un-prepped flat areas of the original surface.
All left, right measurements taken from 8" left of liner long seam
Data obtained from
NDE Data Sheets 92-072-08 page 1 of 1

Note: Per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.

Matthew E Watson 10-19-2006

Report [illegible] -020

Page 1 of 2

General Electric		**Ultrasonic Thickness Measurement Data Sheet**	File Name:	N/A
Oyster Creek			Date:	10/22/2006
Refueling Outage -	1R21		UT Procedure:	ER-AA-335-004
Page 1 of	2		Specification	IS-328227-004

Examiner: Matt Wilson Matthew Wilson		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031124709	
Transducer Type: D795	Serial #: 104010	Size: 0.200"	Freq: 5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-088			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	5.0"	14:26	15:36	N/A	16:09	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246534		Comp. Temp: 82°	Block Temp: 82°	
Range Calib:	N/A	W/O Number: ~~R2088926~~				
Instrument Freq.	N/A	Total Crew Dose 7 mr	C2013477 Drywell Containment Vessel Thickness Examination. External UT Inspections.			
Gain:	67 db					
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Bay - 19

BAY	Point Number	Vertical Location	Horizonal Location	Thickness Reading
		See Attached for Locations and Thickness Readings		

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 4
PAGE 15 OF 32

COMMENTS: N/A

Steve A. Miller 10-22-06

Reviewed by: Lee Stone Level II Date 10/22/2006

10-22-06

Pg. 2 of 2 Ltr Mill

BAY 19

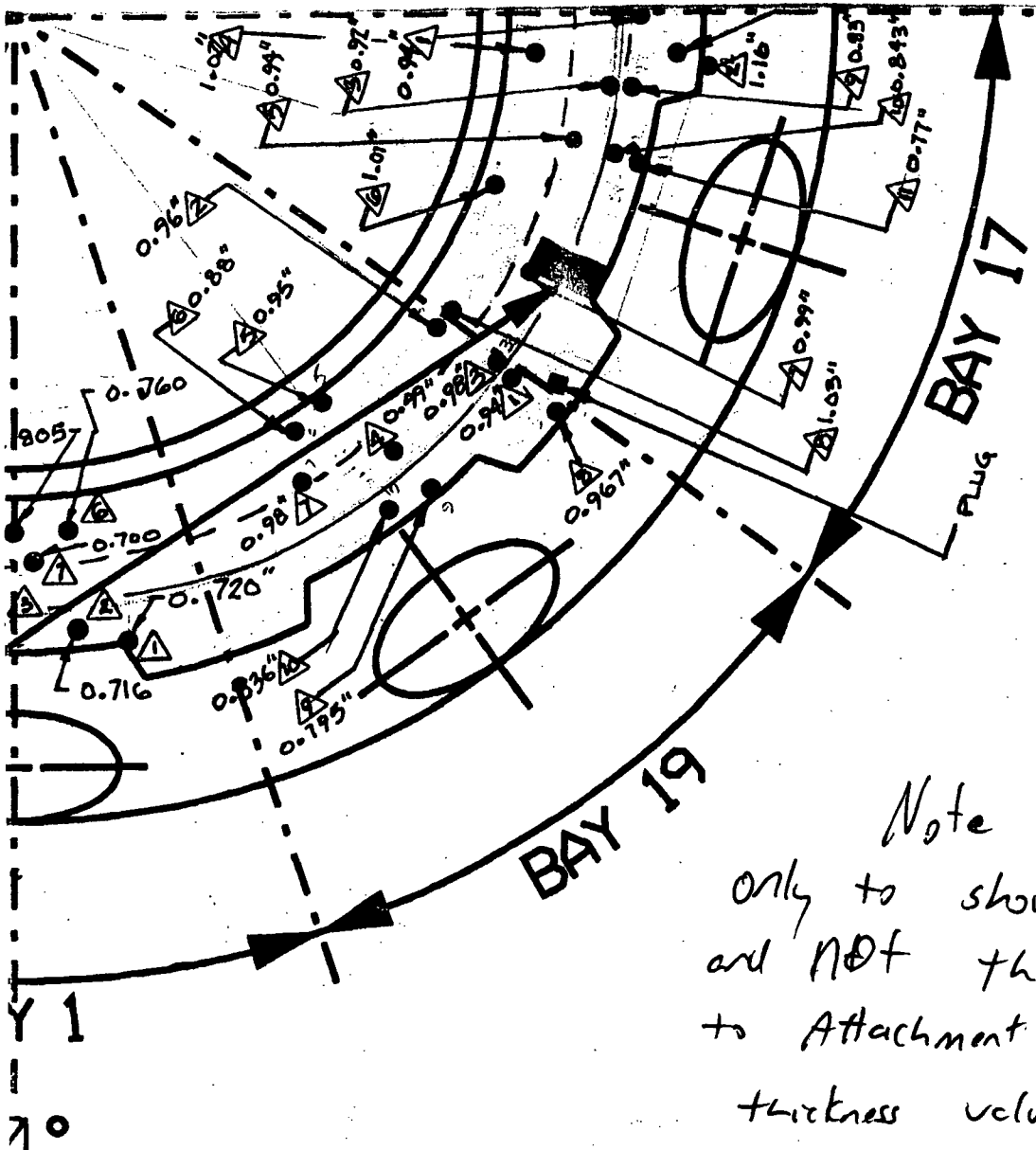
	Point	Vertical	Horizontal	1992 value	2006 Value	Comments
	1	D30	R60	0.932	0.904	up .897 dn .867
	2	D52	R58	0.924	0.921	up .850 dn .907
	3	D33	R40	0.955	0.932	up .894 dn .905
	4	D32	R11	0.94	N/A	Could not locate area
	5	D31	R3	0.95	0.932	up .883 dn .897
	6	D52	L65	0.86	N/A	Could not locate area
	7	D54	L10	0.969	0.891	up .821 dn .912
	8	D16	R64	0.793/0.953 ***	0.745	up .721 dn .747
	9	D18	R12	0.776	0.780	up .728 dn .745
	10	D19	R0	0.79	0.791	up .736 dn .846
	11	20D	L18	N/A	0.738	up .738 dn .712

New Value.

Data obtained from
NDE Data Sheets 92-072-05 page 1 of 1
NDE Data Sheets 92-072-07 page 1 of 1
Note: Per discussion with Engineering, single point readings were taken in lieu of 6, based on surface curvature.
*** - This value is not clear form the original datasheet -NDE to verify this value.
Note: per discussion with Engineering, single ~~point readings~~ were taken in lieu of 6, based on surface curvature.

Matthew E Watson 10/22/06

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 6
PAGE 22 OF 22



PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5
PAGE 1 OF 80

Note This sketch is provided only to show Location of points and NOT the actual value. Refer to Attachment 4 for 1992 and 2006 thickness values.

BAY 9
PERF
AREA

BAY 1
PER
AREA

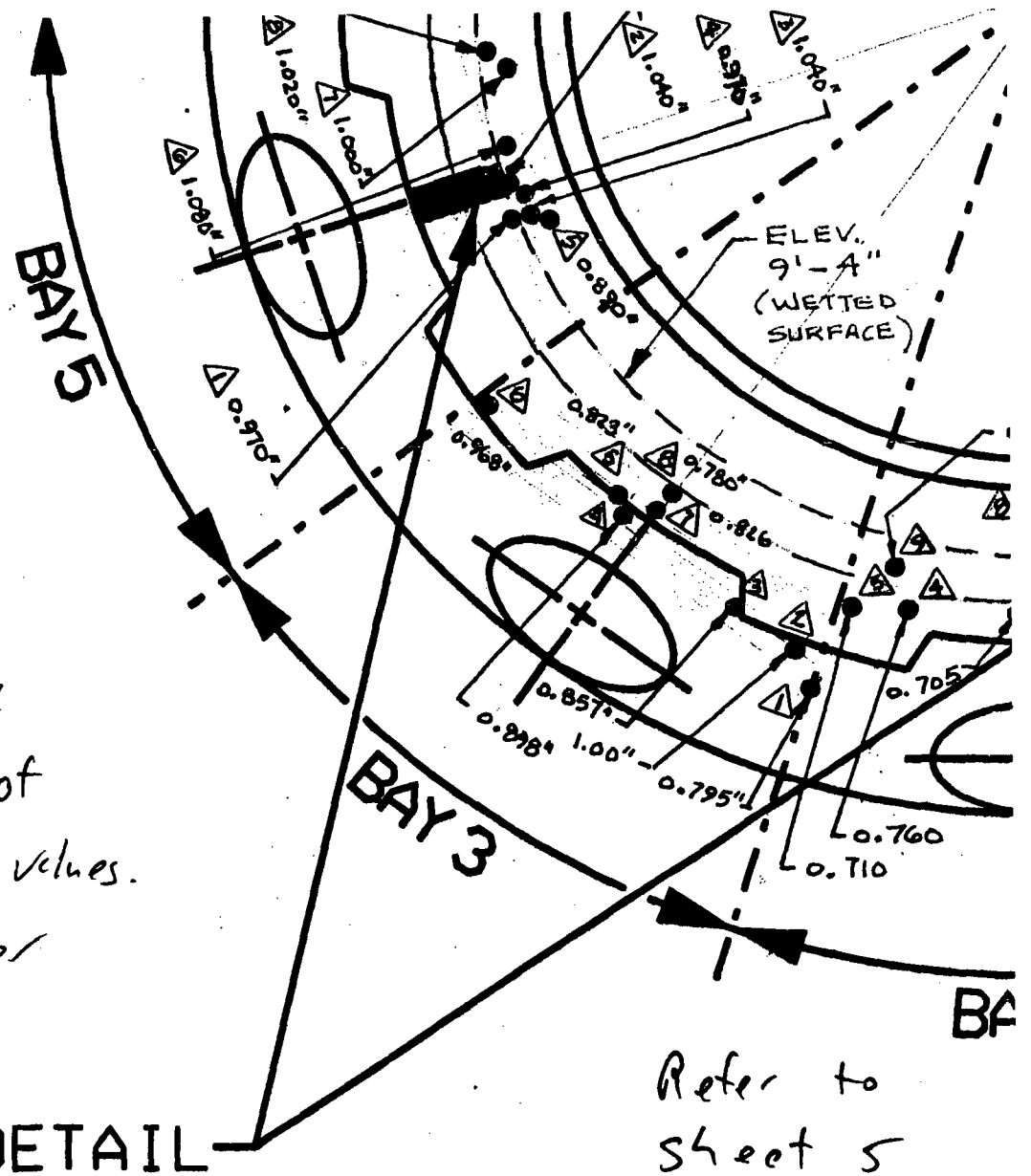
BAY 1
PER
AREA

BAY 1
PERF
AREA

BAY 17
PERF
12-
AREA

BAY 19
PERFO
12-16
AREA

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5
PAGE 2 OF 8



This sketch is provided only to show Location of points and not the actual values. Refer to Attachment 4 for 1992 and 2000 Thickness Readings

SEE DETAIL
CROSS SECTION AREA
OF TRENCH

Refer to sheet 5 for Additional Points

KEY

(SCALE

KEY (SCALE

30°

11

BAY 13

BAY 15

FLOOR ELEV
10'-3"

ELEV. 12'-3"

△ - DATA POINT UT
WITH SHELL THICKNESS
FOR EACH INDIVIDUAL
BAY

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5
PAGE 3 OF 8

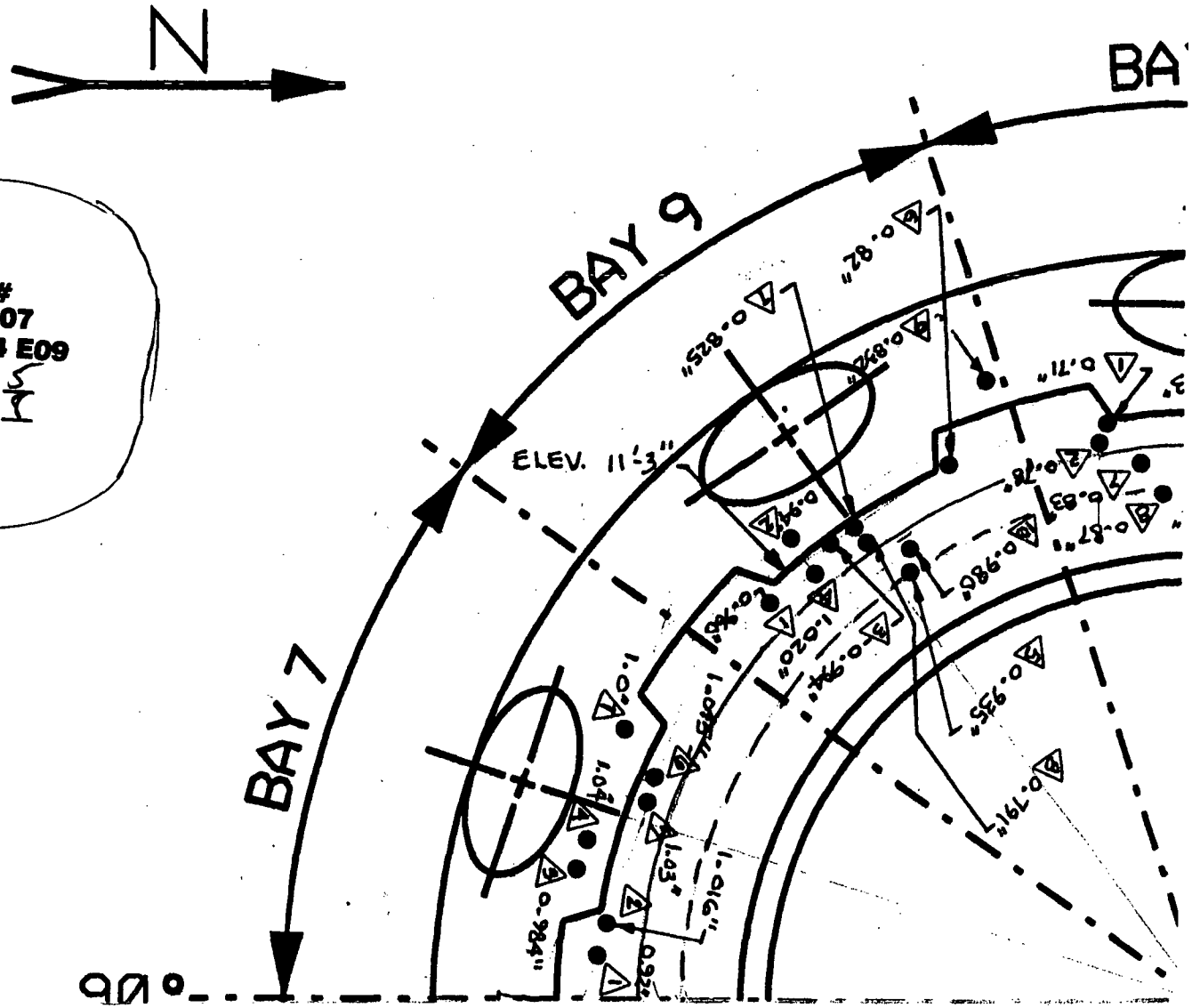
Refer to page
8 for additional
Points

BAY 1
PER FO
AREA

BAY 3
PERFOR
AREA

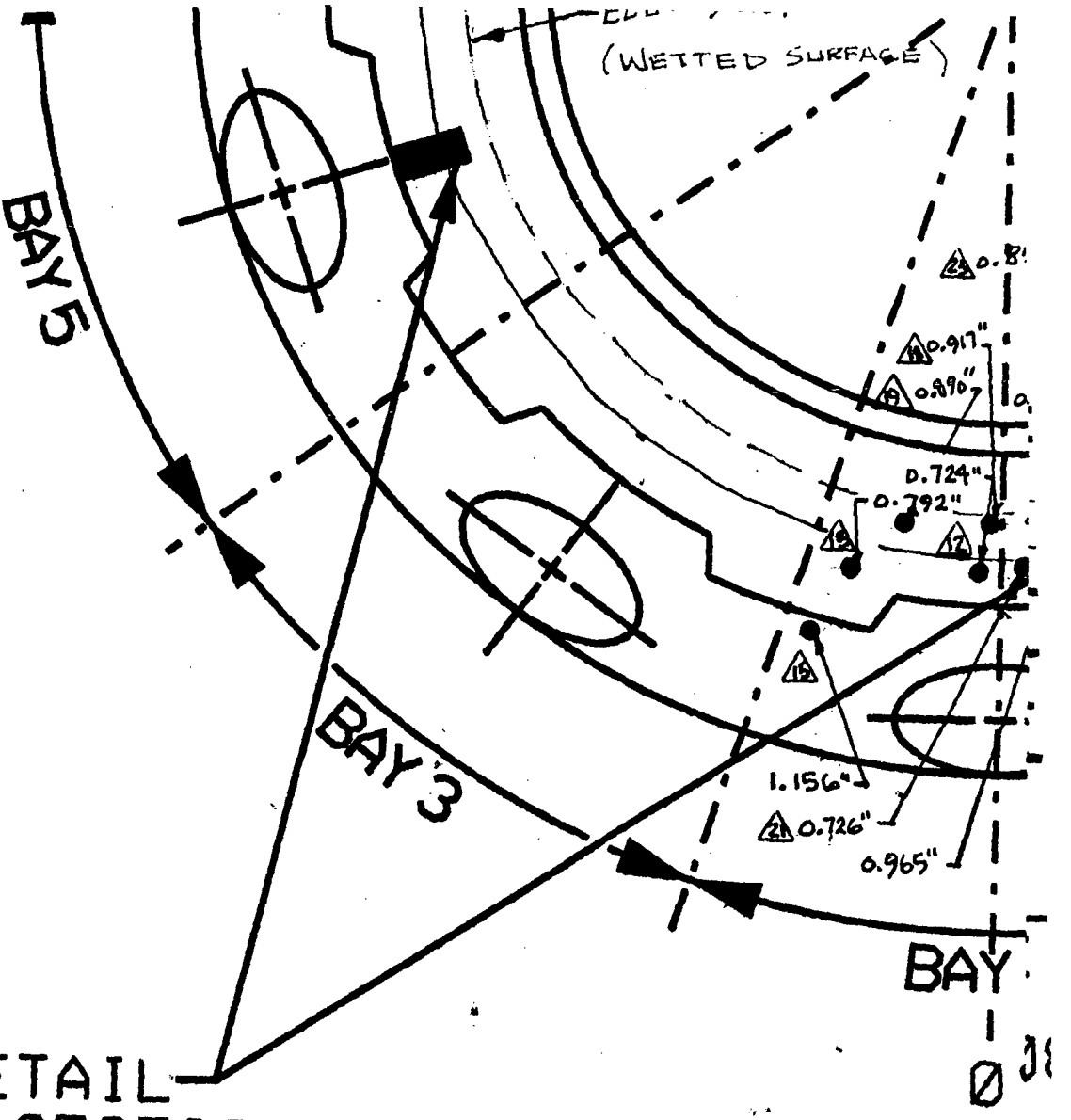
BAY 5
PERFOR
AREA

BAY 7
PERFOR
AREA D



PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5/8
PAGE 5 OF 8

Page 5 of 8



SEE DETAIL
CROSS SECTION AREA
OF TRENCH

KEY
(SCALE

PLAN (NONE)

PART II

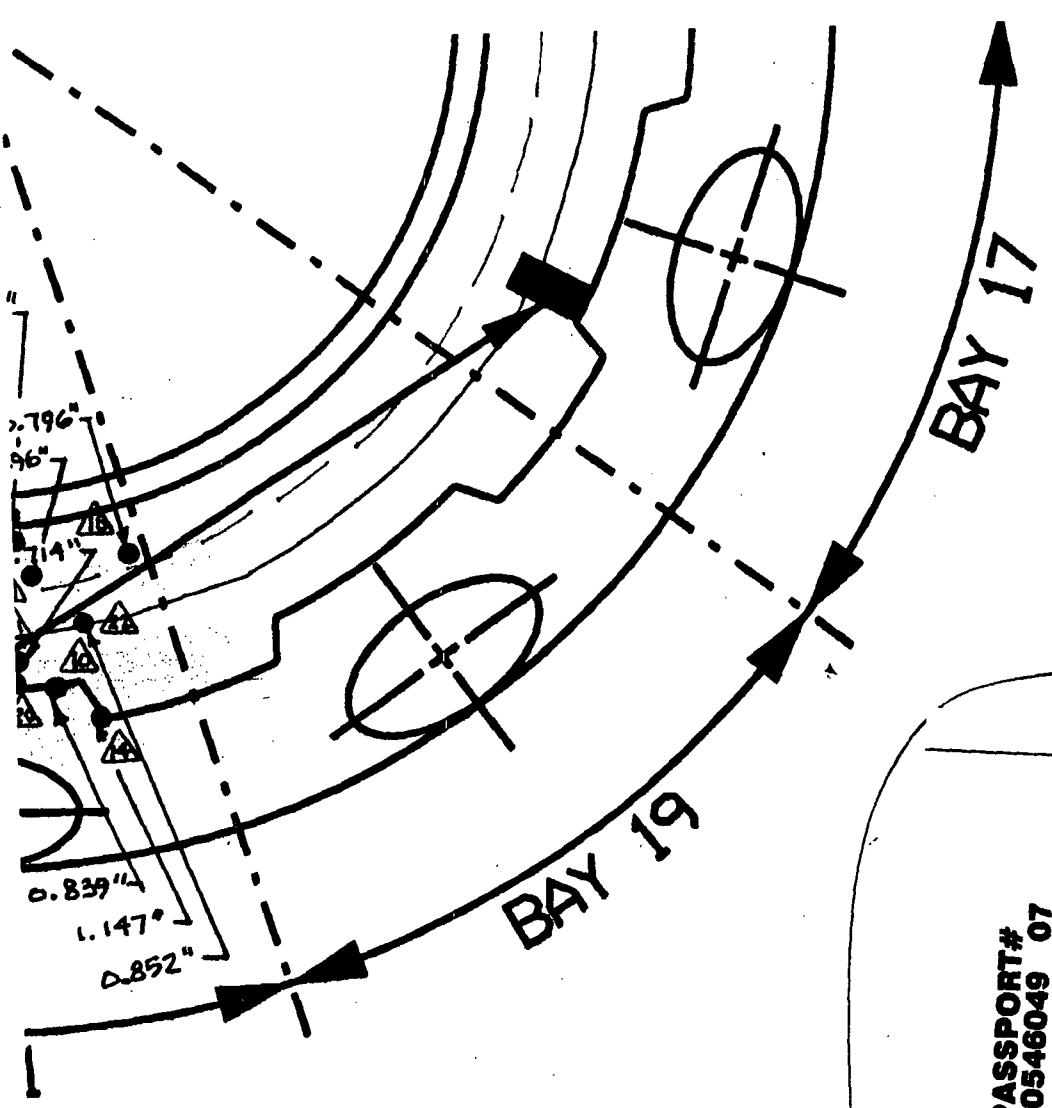
BAY 9

BAY 7

N

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5
PAGE 6 OF 7

Page 6

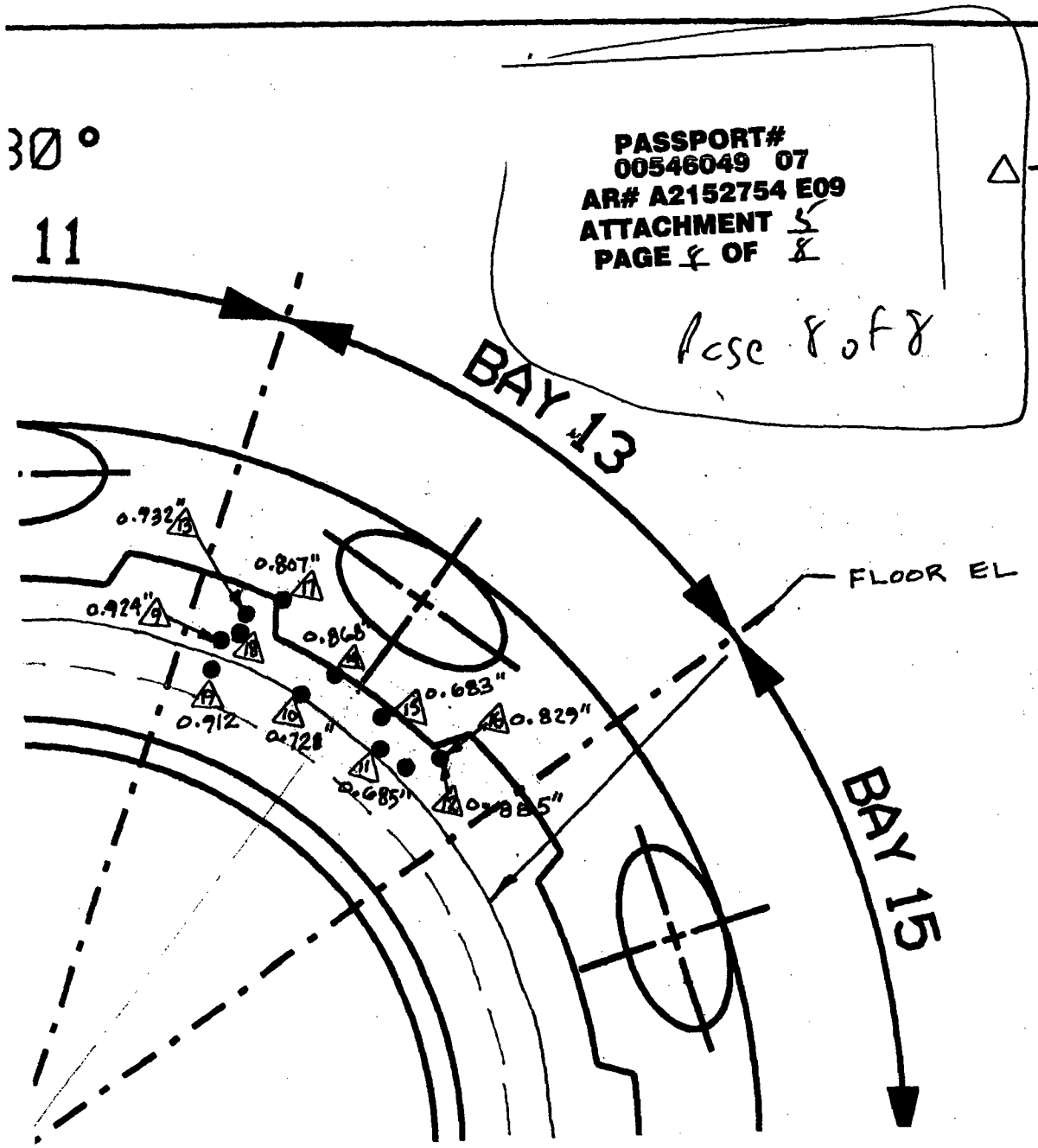


PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 18
PAGE 2 OF

(THIS PAGE 7 of 8

PLAN PART II

NONE)



PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5
PAGE 8 OF 8

Page 8 of 8

△- DATA POINT UT
WITH SHELL THICKNESS
FOR EACH INDIVIDUAL BAY

BAY

PERFO

AREA

BAY

PERFO

AREA

9 - 19

IIA, C

Bay	Point	Vertical	Horizontal	Under Inside Floor	Under Wetted Concrete	1992 value	NDE Data Sheet	2006 Value	Corrosion Rate 1992 to 2006	Corrosion Rate Under floor above Wetted Area	Corrosion Rate in Wetted Area
1	6	D48	R16	Yes	Yes	0.76	1R21LR-022	0.731	2.071		2.071
1	7	D39	R5	Yes	Yes	0.7	1R21LR-022	0.669	2.214		2.214
1	8	D48	R0	Yes	Yes	0.805	1R21LR-022	0.783	1.571		1.571
1	9	D36	L38	Yes		0.805	1R21LR-022	0.754	3.643	3.643	
1	16	D50	R40	Yes	Yes	0.796	1R21LR-022	0.795	0.071		0.071
1	17	D48	R16	Yes	Yes	0.86	1R21LR-022	0.846	1.000		1.000
1	18	D38	L2	Yes		0.917	1R21LR-022	0.899	1.286	1.286	
1	19	D38	L24	Yes		0.89	1R21LR-022	0.865	1.786	1.786	
1	22	D32	R13	Yes		0.852	1R21LR-022	0.854	-0.143		
1	23	D48	R15	Yes	Yes	0.85	1R21LR-022	0.828	1.571		1.571
5	1	D40	R13 *1	Yes	Yes	0.97	1R21LR-019	0.948	1.571		1.571
5	2	D42	R3 *1	Yes	Yes	1.04	1R21LR-019	0.955	6.071		6.071
5	3	D44	R10 *1	Yes	Yes	1.02	1R21LR-019	0.989	2.214		2.214
5	4	D44	R/L7 *1 *2	Yes	Yes	0.97	1R21LR-019	0.948	1.571		1.571
5	5	D46	R/L11 *1 *2	Yes	Yes	0.89	1R21LR-019	0.88	0.714		0.714
5	6	D44	L4	Yes	Yes	1.06	1R21LR-019	0.981	5.643		5.643
13	7	D48	L24	Yes	Yes	0.99	1R21LR-019	0.974	1.143		1.143
5	8	D46	L28	Yes	Yes	1.01	1R21LR-019	1.007	0.214		0.214
9	5	D36	L4	Yes		0.985	92-072-22 Page 1 fo 5	0.964	1.500	1.500	
9	8	D22	L45*	Yes	Yes	0.791	92-072-22 Page 1 fo 8	0.781	0.714		0.714
11	5	D32	L14	Yes		0.831	92-072-10 page 1 of 4	0.823	0.571	0.571	
11	6	D27	L22	Yes		0.8	92-072-10 page 1 of 5	0.756	3.143	3.143	
11	7	D31	R20	Yes		0.831	92-072-10 page 1 of 6	0.817	1.000	1.000	
11	8	D40	R13	Yes	Yes	0.85	92-072-10 page 1 of 7	0.825	1.786		1.786
13	9	D28	R41	Yes		0.924	92-072-24 page 1 of 10	0.915	0.643	0.643	

Bay	Point	Vertical	Horizontal	Under Inside Floor	Under Wetted Concrete	1992 value	NDE Data Sheet	2006 Value	Corrosion Rate 1992 to 2006	Corrosion Rate Under floor above Wetted Area	Corrosion Rate in Wetted Area
13	10	D28	R12	Yes		0.728	92-072-24 page 1 of 11	0.741	-0.929		
13	11	D28	L15	Yes		0.685	92-072-24 page 1 of 12	**0.669**	1.143	1.143	
15	3	D33	R17	Yes		0.932	1R21LR-015	0.935	-0.214		
15	5	D26	L3	Yes		0.85	1R21LR-015	0.855	-0.357		
15	9	D36	L40	Yes		0.722	1R21LR-015	0.749	-1.929		
17	3	D32	R28	Yes		0.898	1R21LR-021	0.894	0.286	0.286	
17	4	D52	R30	Yes	Yes	0.951	1R21LR-021	0.963	-0.857		
17	5	D36	R12	Yes		0.913	1R21LR-021	0.822	6.500	**6.500**	
17	6	D52	L6	Yes	Yes	0.992	1R21LR-021	0.909	5.929		5.929
17	7	D36	L26	Yes		0.97	1R21LR-021	0.97	0.000		
17	8	D52	L40	Yes	Yes	0.99	1R21LR-021	0.96	2.143		2.143
									0.000		
19	2	D52	R66	Yes	Yes	0.924	1R21LR-020	0.921	0.214		0.214
19	3	D33	R49	Yes		0.955	1R21LR-020	0.932	1.643	1.643	
19	4	D32	R11	Yes		0.94	1R21LR-020	Not Located			
19	5	D53	R2	Yes	Yes	0.95	1R21LR-020	0.932	1.286		1.286
19	6	D52	L65	Yes	Yes	0.86	1R21LR-020	Not Located			
19	7	D39	L12	Yes	Yes	0.969	1R21LR-020	0.891	5.571		5.571

Minimum Rate	0.286	0.071
Maximum Rate	**6.500**	6.071
Average Rate	2.280	2.334

Minimum Thickness Recorded in 2006 **0.669**

Assuming a maxiimum corrosion rate of 6.5 MPY and an uncertaintiy of 20 mils the 0.669 location will thin to the following in 2008 **0.636**

Assuming a Aveeage corrosion rate of 2.3 MPY and an uncertaintiy of 20 mils the 0.669 location will thin to the following in 2008 **0.644**

PASSPORT# 07
00546049
AR# A2152754 E09
ATTACHMENT 6 OF
PAGE 2 OF 2
11/3/11

General Electric	**Ultrasonic Thickness Measurement Data Sheet**	Report Number:	1R21LR- 32
Oyster Creek		Date:	10/26/2006
Refueling Outage - 1R21		UT Procedure:	ER-AA-335-004
Page 1 of 2		Specification:	IS-328227-004

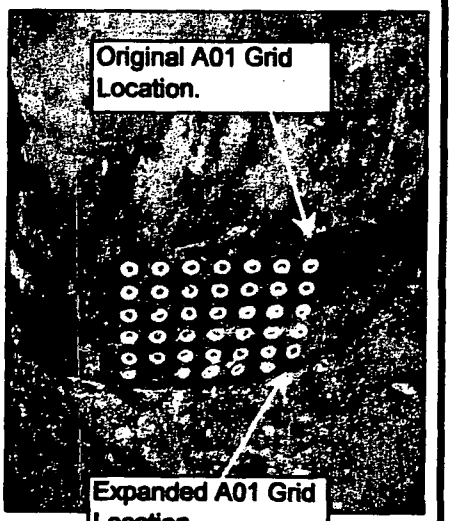
Examiner: Leslie Richter		Level: II	Instrument Type:	Panametrics 37DL Plus	
Examiner: N/A		Level: N/A	Instrument No:	031125409	
Transducer Type: DV 506	Serial #: 072561	Size: 0.438"	Freq: 5 Mhz	Angle: 0°	
Transducer Cable Type: Panametrics	Length: 5'	Couplant: Soundsafe	Batch No:	19620	
Calibration Block Type: C/S Step Wedge		Block Number: CAL-STEP-136			

SYSTEM CALIBRATION

INSTRUMENT SETTINGS		Initial Cal. Time	Calibration Checks		Final Cal. Time	
Coarse Range:	2.0"	9:20	9:35	9:38	10:00	
Coarse Delay:	N/A	Calibrated Sweep Range = 0.500"		Inches to 1.500"	Inches	
Delay Calib:	N/A	Thermometer: 246647		Comp. Temp: 68°	Block Temp: 65°	
Range Calib:	N/A	W/O Number: ~~C2013479~~	C2013727-02			
Instrument Freq.	N/A	Total Crew Dose 45 mr	mmc 10-26-06 Drywell Containment Vessel Thickness Examination. Internal UT Inspections.			
Gain:	55 db					
Damping:	N/A					
Reject:	N/A					
Filter:	N/A					

Trench 1 Bay 5 Extended Grid Data

The UT transducer was positioned in the same orientation at each grid point.



Area extended deeper into Trench

Location ID		Trench 1		Bay	5	Elev.	10' 3"	
6	1.182	1.145	1.088	1.085	1.088	1.083	1.060	6
5	1.142	1.106	1.070	1.105	1.094	1.077	1.084	5
4	1.147	1.070	1.083	1.085	1.125	1.087	1.059	4
3	1.161	1.133	1.131	1.127	1.094	1.060	1.052	3
2	1.165	1.152	1.148	1.138	1.130	1.113	1.096	2
1	1.151	1.142	1.142	1.125	1.144	1.138	1.148	1
	G	F	E	D	C	B	A	

Tscr.	AVG.
0.660	1.113
Min Reading	**Max. Reading**
1.052	1.182

COMMENTS:

The removal of concrete from trench exposed six more inches of liner. The template was placed below previous grid location with the centerline of the top row 1" +/- 1/16" from previous grid bottom row. The holes were painted on the liner using the 8"x 8" template, readings were then taken with template removed.

An area approximately 14"x 6" of extended trench area was scanned 100% with the minimum reading of 1.047" and a maximum reading of 1.150" recorded.

The 100% scan Inspection was performed using a D799 (Serial # 104141) transducer and the grid points inspection was preformed using a DV 506 transducer.

A "V" was stamped above grid point 6D.

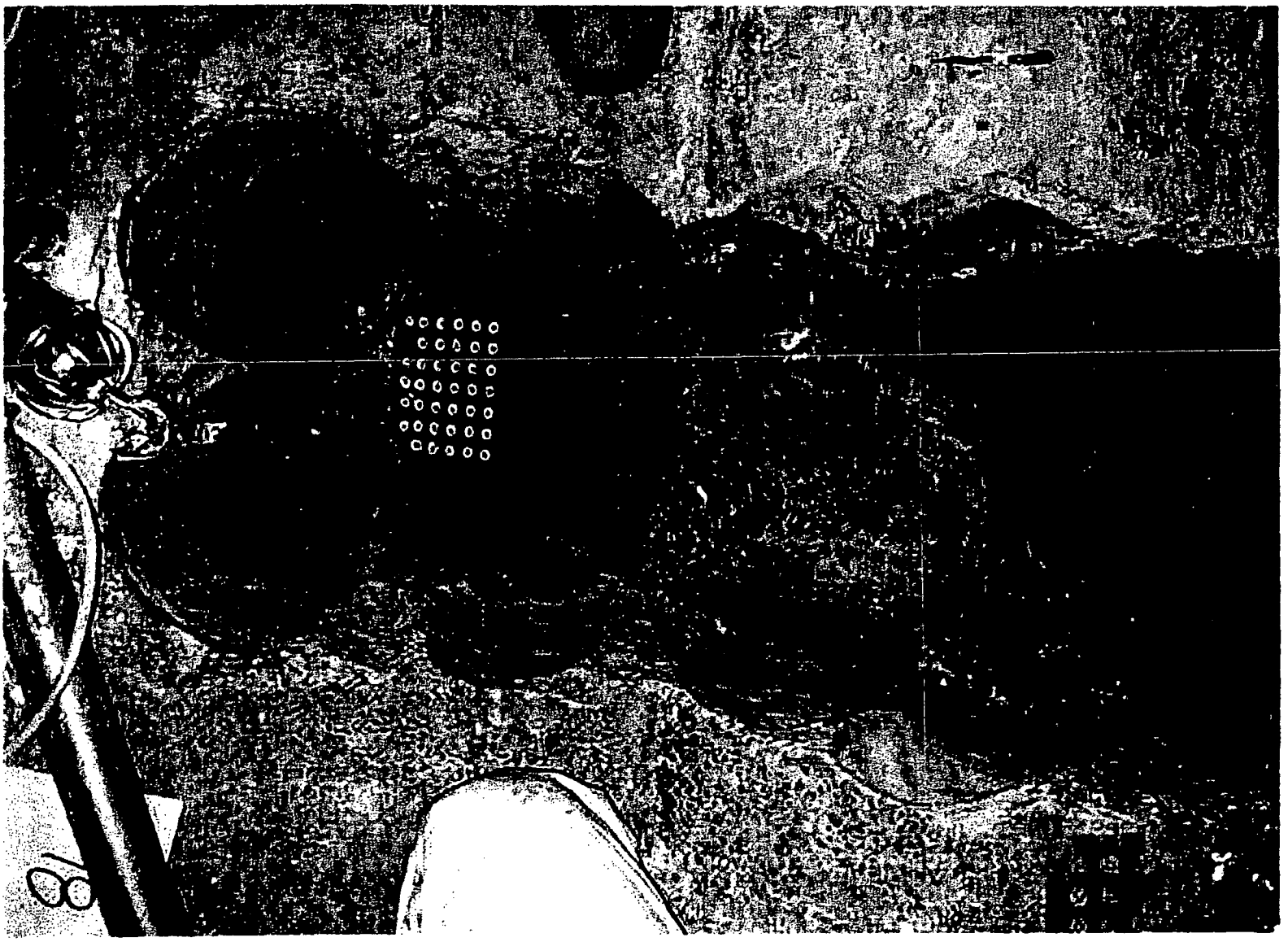
Reviewed by: Lee Stone

PASSPORT# 00546049 07
AR# A2152754 E09
ATTACHMENT 2

6/06

IR2ILR-032 A3 2 of 2

mmc c III 10-26-06



BAY 5 TRENCH 1

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 8
PAGE 1 OF 3

Memorandum

Exelon Nuclear

Asset Management # AM-2006-011
Revision 2

Date: October 31, 2006

To: Howie Ray
Peter Tamburro

cc: Roman Gesior
Richard Hall

From: Steve Leshnoff

Subject: Final Report of the Third Party Independent Review of Oyster Creek Drywell Containment Corrosion Evaluation in Bay 5 and Bay 17 Trenches

The purpose of this memo is to document the independent third party review (ITPR) of the Oyster Creek (OC) Drywell Containment Corrosion Evaluation in Bay 5 and Bay 17 Trenches and to provide you with the results related to that review. The review was performed in accordance with Training & Reference Material (T&RM) HU-AA-1212, Revision 1, Technical Task Risk/Rigor Assessment, Pre-job Brief, Independent Third Party Review, and Post-Job Brief.

Purpose of the Review

Ultrasonic Testing (UT) measurements of the drywell thickness at and below the interior floor at the elevation of the sand bed were obtained during OC 1R21 Refueling Outage. The intent was to complete the assessment of the potential for on-going corrosion both above and below the drywell floor. The purpose of this review is to establish that the appropriate statistical methods were used to evaluate the data and that the correct conclusions were drawn from the statistical evaluation of the data.

Scope of Review

I performed a detailed review of the statistical methods that were used in the evaluation of the UT measurements. The evaluation included the following steps, each of which was reviewed:

- Establish that the UT data from a measurement template was normally distributed using the kurtosis tests
- Derive the standard deviation and standard error for each of the data distributions
- Derivation of the 95% confidence intervals for the data.

- Determination of the lower range of the calculated mean thickness for which there is 95% confidence.
- Calculation of the apparent corrosion rate on an average basis in the trench in Bay 5 and on a point-for-point basis in the trench in Bay 17 below the water level

Limitations

There were no limitations to this review.

Conclusions

All of the statistical tests and steps were appropriate and necessary and were applied correctly. The apparent corrosion rate is minimal. ~~Revision~~ Revision D to Technical Evaluation A2152754 E09 impacts only the ~~narrative~~ narrative description of the UT data collection activities and includes ~~added~~ added detailed discussion in the conclusion without ~~modification~~modification.

Comments

Refer to Attachment A for technical comments and resolution to those comments. The comments did not warrant an Issues Report.

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 1
PAGE 2 OF 2

ATTACHMENT A

AM-2006-011
Revision 1

REFERENCE DOCUMENT NO. /REV: OC Drywell Containment Corrosion Evaluation in Bay 5 and Bay 17 Trenches			
COMMENTS		RESOLUTION	ACCEPTANCE OF RESOLUTION
1	Please define the quantitative acceptance criteria for determining that the data distribution is normally distributed using the kurtosis test (<1.0).	I've defined acceptance criteria a for normal distribution as a Kurtosis value less than +/-1 or a normal distribution plot which approaches a straight line. I've revised attachment 2 pages 16 and 17 and attachment 3 pages 15 and 16 accordingly.	Resolution Accepted
2	Please include in the discussion of the results that the apparent corrosion rate is computed at a 95% confidence interval.	I've revised the summary pages for the trench data comparison, to state that the calculated 1986 and 2006 average thickness values have a 95% confidence.	Resolution Accepted
3			
4			
5			
6			
7			
8			
9			
10			
END			
S. Leshnoff SUBMITTED BY	10/27/06 DATE	Peter Tamburro RESOLVED BY	10/27/06 DATE

MPR
ASSOCIATES INC.
ENGINEERS

Privileged and Confidential

November 3, 2006

PASSPORT#
00546049 07
AR# A2152754 E09
ATTACHMENT 5
PAGE 1 OF 2

Mr. F. Howie Ray
Manager, Mech/Struct Design
Oyster Creek Generating Station
AmerGen Energy Company, LLC
U.S. Route #9
Forked River, NJ 08731-0388

Subject: Third Party Independent Review of Oyster Creek Drywell Water Evaluation

Dear Mr. Ray:

MPR has completed a HU-AA-1212 Independent Third Party Review of the Oyster Creek drywell evaluation concerning standing water found in drywell shell inspection trenches in the 10' 3" concrete floor in the drywell. This review included the following documents:

- Technical Evaluation A/R A2152754 E06, with attachments
- Technical Evaluation A/R A2152754 E09, with attachments
- ECR 06-00879

Based on this review, we generated two comments, one concerning reported local wall thinning in Bay 17 possibly exceeding limiting dimensions for being considered local, and one concerning the relatively low pH value (and possible corrosivity) of trench/drywell gap water during outages when the migration of CRD water through the concrete pad to the inspection trenches and drywell wall occurs. These were transmitted to you via email on November 2. Both comments have been resolved as follows:

- Local wall thinning in Bay 17: Technical Evaluation A/R A2152754 E09 has been revised to include another local thinning acceptance criterion documented in Oyster Creek calculation C-1302-187-5320-024. The UT measurements of concern meet this acceptance criterion and this issue is considered resolved.
- Characterization of the water in the drywell: Section 2.8 of Technical Evaluation A/R A2152754 E06 has been revised to clarify the following points:
  - Any subsequent water (such as reactor coolant) entering the concrete floor-to-drywell gap will increase in pH due to its migration through and contact with the concrete. This will reduce its corrosivity compared to neutral pH water.

- The corrosion of drywell steel surfaces in contact with gap water is expected to occur only during outages when oxygen is present. Corrosion during operation is expected to be almost nil since the drywell operates inerted and no oxygen is present to drive the corrosion reaction. During outages, shell corrosion losses in the gap are expected to be small since the exposure time is very limited and the water pH is expected to be relatively high.
- The expected low corrosion losses in the concrete-to-drywell gap area have been confirmed by examination of steel surfaces in the trenches which has revealed only superficial corrosion of the drywell shell.

With the resolution of these concerns, we consider that the Technical Evaluations and attachments successfully address:

- The structural integrity of the concrete and drywell shell,
- The adequacy of repairs, and the effect of the repairs on the assumptions or inputs used for safety and other analyses, and
- The impacts of past water migration and current repairs on design and the licensing bases.

We also reviewed the technical bases for the Technical Evaluation and conclude that all inputs are accurate or conservative, assumptions are conservative, chemical analysis results are used appropriately, and corrosion evaluations are correct and results used accurately.

Please let me know if you have any questions about this letter.

Sincerely,

J. E. Nestell, PhD